



# SERVICE TABLE OF LIMITS AND TORQUE VALUE RECOMMENDATIONS

## NOTICE

The basic Table of Limits, SSP-1776 has been completely revised and reissued herewith as SSP-1776-5. It is made up of the following four parts, each part contains five sections.

|          |                                                 |
|----------|-------------------------------------------------|
| PART I   | DIRECT DRIVE ENGINES (Including VO and IVO-360) |
| PART II  | INTEGRAL ACCESSORY DRIVE ENGINES                |
| PART III | GEARED ENGINES                                  |
| PART IV  | VERTICAL ENGINES (Excluding VO and IVO-360)     |

|             |            |                                  |
|-------------|------------|----------------------------------|
| SECTION I   | 500 SERIES | CRANKCASE, CRANKSHAFT & CAMSHAFT |
| SECTION II  | 600 SERIES | CYLINDERS                        |
| SECTION III | 700 SERIES | GEAR TRAIN                       |
| SECTION IV  | 800 SERIES | BACKLASH (GEAR TRAIN)            |
| SECTION V   | 900 SERIES | TORQUE AND SPRINGS               |

This publication supersedes and replaces the previous publication SSP-1776-4. To make sure that SSP-1776-5 will receive the attention of maintenance personnel, a complete set of pages for the book is sent to all registered owners of Overhaul Manuals. These recipients should remove all previous Table of Limits material from the Overhaul Manual and discard.

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## INTRODUCTION

### SERVICE TABLE OF LIMITS

This Table of Limits is provided to serve as a guide to all service and maintenance personnel engaged in the repair and overhaul of Lycoming Aircraft Engines. Much of the material herein contained is subject to revision; therefore, if any doubt exists regarding a specific limit or the incorporation of limits shown, an inquiry should be addressed to the Lycoming factory for clarification.

#### **DEFINITIONS**

|                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ref. (1 <sup>st</sup> column)                            | The numbers in the first column headed "Ref." are shown as a reference number to locate the area described in the "Nomenclature" column. This number will be found in a diagram at the end of each section indicating a typical section where the limit is applicable.                                                                                                                                                                                                                              |
| Chart (2 <sup>nd</sup> column)                           | The letter in this column is used as a symbol to designate engine models to which the specific limits are applicable. A list of the letter and the engines to which it refers is shown on the following page.                                                                                                                                                                                                                                                                                       |
| Nomenclature (3 <sup>rd</sup> column)                    | This is a brief description of the parts or fits specified in the adjacent columns and indicated in the diagram at end of each section.                                                                                                                                                                                                                                                                                                                                                             |
| Dimensions (4 <sup>th</sup> and 5 <sup>th</sup> columns) | The dimensions shown in column 4 are the minimum and maximum dimensions for the part as manufactured. The dimensions shown in column 5 indicate the limit that must not be exceeded. Unless it can be restored to serviceable size, any part that exceeds this dimension must not be rebuilt into an engine.                                                                                                                                                                                        |
| Clearance (6 <sup>th</sup> and 7 <sup>th</sup> columns)  | Like the dimensions shown in the 4 <sup>th</sup> and 5 <sup>th</sup> columns, the clearance represents the fit between the two mating surfaces as controlled during manufacture and as a limit for permissible wear. Clearances may sometimes be found to disagree with limits for mating parts; for example, maximum diameter of cylinder minus minimum diameter of piston exceeds limit for piston and barrel clearance. In such instances, the specified maximum clearance must not be exceeded. |

In some instances, where a parts revision has caused a dimensional or tolerance change, the superseded dimensional data has been deleted from the list; provided compliance with the change is mandatory.

This manual contains torque values specifications for various type of hardware used on Lycoming Engines.

The importance of correct torque application cannot be overemphasized. Under-torque can cause premature wear of nuts and bolts, as well as the parts they secure. Over-torque can cause wear or premature failure of a bolt or nut from overstress on threaded areas

#### **REQUIRED PRACTICES**

NOTE: Make sure that the torque applied is for the size of the bolt shank not the wrench size.

NOTE: Do not exceed the maximum torque plus the friction drag. If the hole and nut castellation do not align, change washer or nut and try again. Exceeding the maximum recommended torque is not recommended.

- Calibrate the torque wrench at least once a year, or immediately after it has been abused or dropped, to ensure continued accuracy.
- Be sure the bolt and nut threads are clean and dry, unless otherwise specified by the manufacturer.
- Apply a smooth even pull when applying torque pressure. If chattering or a jerking motion occurs during the final torque, back off the nut and retorque.
- When installing a castle nut, start alignment with the cotter pin hole at the minimum recommended torque plus friction drag torque.

If special adapters are used which will change the effective length of the torque wrench, the final torque indication or wrench setting must be adjusted accordingly. Identify the correct torque wrench indication or setting with the adapter installed. Refer to AC 43.13-1B for details.

## Drag Torque

VARIABLE AFFECTING TORQUE. Several variables must be taken into consideration when determining the amount of torque to apply to a given fastener. Standard torque charts are developed for dry, un-plated conditions. Surface variables to be taken into account for each specific application include thread roughness, lubrication, hardening, scale, paint, and plating.

Drag torque is also known as running torque, the resistance on the screw as it's being installed, usually only a few Inch Lb. Drag torque is the natural friction between a fastener and its nut, nut plate, etc.

NOTE: When specific torque values are included in a technical manual for a specific item, those values shall be used. This means that friction drag torque was already included for known conditions.

- Run the nut down to near contact with the washer or bearing surface and check the friction drag torque required to turn the nut.
- Add the friction drag torque to the desired torque. This is referred to as “final torque,” which should register on the indicator or setting for a snap-over type torque wrench.
- Final torque = friction drag torque + desired torque.

Letters of the alphabet and numbers are used as symbols throughout the Table of Limits to represent specific interpretations and to designate engine models. Letters in parenthesis refer to dimensional characteristics; letters without parentheses indicate engine models. They are listed below with the separate definitions.

|      |                                                                                                                                                                                                          |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (A)  | These fits are either shrink fits controlled by machining, fits that may readily be adjusted, or fits where wear does not normally occur. In each case, the fit must be held to manufacturing tolerance. |
| (B)  | Side clearance of wedge type rings must be measured with face of ring flush with piston.                                                                                                                 |
| (D)  | These dimensions shown are measured at the bottom of the piston skirt at right angles to the piston pin.                                                                                                 |
| (E)  | Permissible wear on crankshaft (rod and main bearing journals) to be minus .0015 on diameter.                                                                                                            |
| (L)  | Loose fit; wherein a definite clearance is mentioned between the mating surfaces.                                                                                                                        |
| (T)  | Tight fit; shrink or interference fit.                                                                                                                                                                   |
| (WD) | Wide Deck Crankcase.                                                                                                                                                                                     |

The illustrations shown are typical of the referenced limit or fit described in the Table and in no instance are these illustrations intended to represent a specific part or engine model unless specified. Also, the terms used to designate cylinder, piston and ring materials such as “nitride, chrome, half-wedge” are more fully explained in the latest revision of Service Instruction No. 1037.

# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

| CHART | MODELS                                                                   | CHART | MODELS                                                                        |
|-------|--------------------------------------------------------------------------|-------|-------------------------------------------------------------------------------|
| A     | O-235-C, -E, -H                                                          | S7    | HIO-360-D                                                                     |
| A1    | O-235-F, -G, -J, -K, -L, -M, -N, -P                                      | S8    | HIO-360-B                                                                     |
| B     | O-290                                                                    | S9    | HIO-360-C                                                                     |
| B1    | O-290-D2                                                                 | S10   | HIO-360-A (S/N with suffix A)                                                 |
| BD    | O-320-H (76 Series)                                                      | S11   | HIO-390-A                                                                     |
| G     | O, IO, LIO, AEIO-320                                                     |       | IO-, AEIO-390-A                                                               |
| G1    | O, IO-320 With Gov. at Front<br>(O-320-E1F, -E1J, -D1F & IO-320-D1B)     | S12   | HIO-360-F1AD                                                                  |
| G2    | AIO-320                                                                  | S13   | HIO-360-A (S/N without suffix A)                                              |
| J     | O-340                                                                    | S14   | HIO-360-E                                                                     |
| BE    | O, LO-360-E (76 Series)                                                  | D     | O-435-A                                                                       |
| Y     | VO, IVO-360                                                              | T     | O, IO, LIO, AEIO, TIO, LTO-540                                                |
| S     | O, IO, LIO, HIO, LHIO, TO, TIO, AEIO-360                                 | T1    | O-540-G, -H & IO-540-N, -R                                                    |
| S1    | TO-360                                                                   | T2    | (Large Mains – Parallel Valve)                                                |
| S2    | AIO-360                                                                  |       | IO-540-A, -B, -E, -G, -P (Angle Valve)                                        |
| S3    | TIO-360                                                                  | T3    | IO-540-K, -M, -S; TIO, LTIO-540-A, -F, -J, -N, -R (Large Mains – Angle Valve) |
| S4    | O-360-A With Gov. at Front<br>(O-360-A1H, -A1LD)                         |       | IO, AEIO-580-B1A                                                              |
| S5    | IO, LIO-360-A, -C (Angle Valve)                                          |       | TEO-540                                                                       |
| S6    | IO, LIO-360-A, -C With Gov. at Front<br>(IO, LIO-360-C1E6 & IO-360-A1D6) | T4    | TIO-540-C, -E, -G, -H                                                         |
|       |                                                                          | AF    | IO-720                                                                        |

NOTE: In “Chart” column, a number appearing after a letter indicates an exception to the basic model.

For example, A1 (O-235-F, -G, -J, -K, -L, -M, -N -P) is an exception to the basic model A (O-235-C, -E, -H)

When referencing any section in this Table of Limits for a dimension or clearance, if there is no specific A1 row for a particular reference number, the A limits also apply to the A1 engine models.

|             |            |                                  |
|-------------|------------|----------------------------------|
| SECTION I   | 500 SERIES | CRANKCASE, CRANKSHAFT & CAMSHAFT |
| SECTION II  | 600 SERIES | CYLINDERS                        |
| SECTION III | 700 SERIES | GEAR TRAIN                       |
| SECTION IV  | 800 SERIES | BACKLASH (GEAR TRAIN)            |
| SECTION V   | 900 SERIES | TORQUE AND SPRINGS               |

|      |                                                                                                                                                                                                          |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (A)  | These fits are either shrink fits controlled by machining, fits that may readily be adjusted, or fits where wear does not normally occur. In each case, the fit must be held to manufacturing tolerance. |
| (B)  | Side clearance on piston rings must be measured with face of ring flush with piston.                                                                                                                     |
| (D)  | The dimensions shown are measured at the bottom of the piston skirt at right angles to the piston pin.                                                                                                   |
| (E)  | Permissible wear of the crankshaft (rod and main bearing journals) to be minus 0.0015 on the diameter.                                                                                                   |
| (L)  | Loose fit; wherein a definite clearance is mentioned between the mating surfaces.                                                                                                                        |
| (T)  | Tight fit; shrink or interference fit.                                                                                                                                                                   |
| (WD) | Wide Deck Crankcase.                                                                                                                                                                                     |

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## TECHNICAL PUBLICATION REVISION

| REVISION NO.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | PUBLICATION             | PUBLICATION NO.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | PUBLICATION DATE |
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| SSP-1776-5-PT1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Service Table of Limits | SSP-1776                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | October 28, 2013 |
| PREVIOUS REVISIONS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                         | CURRENT REVISION*                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                  |
| <p style="text-align: center;"><b>March 2014</b><br/>1-1</p> <p style="text-align: center;"><b>July 2014</b><br/>1-10</p> <p style="text-align: center;"><b>February 2016</b><br/>Title Page, 1-1, 1-2, 1-3, 1-8, 1-9, 1-10, 1-11, 1-12</p> <ul style="list-style-type: none"> <li>Added S11 designation to Chart for IO-, AEIO-390-A engine models</li> <li>Revised tappet information for Reference number 511 and 512</li> <li>Updated piston and cylinder barrel information for: <ul style="list-style-type: none"> <li>IO, AEIO-390-A</li> <li>TIO-540-C, -E, -G, -H; IO</li> <li>AEIO-580-B1A</li> </ul> </li> </ul> <p style="text-align: center;"><b>September 2016</b><br/>Title Page, 1-8, 1-30</p> <ul style="list-style-type: none"> <li>Added engine model IO-390-C to Chart</li> <li>Added engine model IO-390-C to Piston Application Table</li> <li>Added S11 designation to Reference #823, backlash clearance for front governor engines</li> </ul> <p style="text-align: center;"><b>April 2018</b><br/>Title Page, 1-1, 1-3, 1-7, 1-8, 1-9, 1-10, 1-11, 1-34, 1-35, 1-36, 1-37</p> <ul style="list-style-type: none"> <li>Added HIO-360-F1AD, HIO-390-A, and TEO-540 to Chart</li> <li>Added S12 designation for HIO-360-F1AD to tables where applicable</li> <li>Revised Ref. number 512 (Tappet Plunger Assembly and Body) for clarity</li> <li>Revised Piston Application Table to list only piston part numbers</li> <li>Added NOTE to refer to the latest revision of Service Instruction No. SI-1037 for engine model and piston part number applicability</li> <li>Deleted obsolete part numbers and Notes associated with those part numbers in Piston Application Table</li> <li>Deleted NOTES that reference S.I. 1243 in Piston Application Table</li> <li>Updated Lycoming P/N and Vendor P/N for one of the V-band couplings for Ref. number 921.</li> <li>Added Ref. number 933 to Section V table and figure for torque value for brass union nut on stainless steel injector fuel line (Both Ends)</li> <li>Deleted obsolete part numbers for Ref. numbers 950 and 951</li> </ul> |                         | <p style="text-align: center;"><b>April 2020</b><br/>Title Page, 1-1, 1-7, 1-8, 1-9, 1-10, 1-11, 1-34, 1-36</p> <ul style="list-style-type: none"> <li>Added Serial Number identification for Chart number S10 - HIO-360-A</li> <li>Added new engine model listing for IO-390-D to Chart reference number S11</li> <li>Added new Chart reference number S13 for HIO-360-A engines without S/N suffix A</li> <li>Deleted HIO-360-E from Chart reference S9</li> <li>Added new Chart reference number S14 for HIO-360-E</li> <li>Added new reference numbers S13 and S14 as applicable in Sections I, II, and V</li> <li>Revised burnishing instructions for connecting rod bushing in reference number 600</li> <li>Revised the Mfr. Min. &amp; Max. Clearance for Piston Ring Gap (Compression) Nitrided Cylinders (Choke Barrels) and Piston Ring Gap (Oil) in reference number 607</li> </ul> <p>* Revisions are indicated with a vertical bar to the left of the revised item.</p> |                  |

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# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

### SECTION I – CRANKCASE, CRANKSHAFT, CAMSHAFT

| Ref. | Chart                                                               | Nomenclature                                                                                   | Dimensions              |                 | Clearances              |                 |
|------|---------------------------------------------------------------------|------------------------------------------------------------------------------------------------|-------------------------|-----------------|-------------------------|-----------------|
|      |                                                                     |                                                                                                | Mfr.<br>Min. &<br>Max.  | Service<br>Max. | Mfr.<br>Min. &<br>Max.  | Service<br>Max. |
| 500  | A                                                                   | All Main Bearings and Crankshaft                                                               |                         |                 | <u>.0025L</u><br>.0055L | .0060L          |
|      | B-D-G-J-S-T-Y-BD-BE-AF                                              | Main Bearings and Crankshaft<br>(Thin Wall Bearing - .09 Wall<br>Approx.)                      |                         |                 | <u>.0015L</u><br>.0045L | .0060L          |
|      | B-G-J-S-T-Y-AF                                                      | Main Bearings and Crankshaft<br>(Thick Wall Bearing - .16 Wall<br>Approx.)                     |                         |                 | <u>.0011L</u><br>.0041L | .0050L          |
|      | A                                                                   | Diameter of Main Bearing Journal<br>on Crankshaft                                              | <u>2.3735</u><br>2.375  | (E)             |                         |                 |
|      | B-D-G-J-S-T-Y-BD-BE                                                 | Diameter of Main Bearing Journal<br>on Crankshaft<br>(2-3/8 in. Main)                          | <u>2.3745</u><br>2.376  | (E)             |                         |                 |
|      | S1-S11-S12-T1-T3-AF                                                 | Diameter of Main Bearing Journal<br>on Crankshaft<br>(2-5/8 in. Main)                          | <u>2.6245</u><br>2.626  | (E)             |                         |                 |
|      | S8-S10-S13                                                          | Diameter of Front Main Bearing<br>Journal on Crankshaft<br>(2-3/8 in. Main)                    | <u>2.3750</u><br>2.3760 | (E)             |                         |                 |
|      | S1-S11-S12-T1-T3-AF                                                 | Diameter of Front Main Bearing<br>Journal on Crankshaft<br>(2-5/8 in. Main)                    | <u>2.6245</u><br>2.6255 | (E)             |                         |                 |
| 500  | A-B-B1-D-G*-BD-BE                                                   | Crankcase Bearing Bore Diameter<br>(All) (Thin Wall Bearing) (2-3/8<br>in. Main)               | <u>2.566</u><br>2.567   | 2.5685          |                         |                 |
|      | G**-J-S-T-Y                                                         | Crankcase Bearing Bore Diameter<br>(All Except Front) (Thick Wall<br>Bearing) (2-3/8 in. Main) | <u>2.6865</u><br>2.6875 | 2.6890          |                         |                 |
|      | T1-T3-AF                                                            | Crankcase Bearing Bore Diameter<br>(Front Only) (Thin Wall Bearing)<br>(2-5/8 in. Main)        | <u>2.816</u><br>2.817   | 2.8185          |                         |                 |
|      | T1-T3-AF                                                            | Crankcase Bearing Bore Diameter<br>(All Except Front) (Thick Wall<br>Bearing) (2-5/8 in. Main) | <u>2.9365</u><br>2.9375 | 2.9390          |                         |                 |
|      | S1-S12-T-AF                                                         | Crankcase Bearing Bore Diameter<br>(All) (Thin Wall Bearing) (2-5/8<br>in. Main)               | <u>2.816</u><br>2.817   | 2.8185          |                         |                 |
|      | G**-J-S-T-Y<br>*O-320-A, -E Narrow Deck,<br>**O-320-A, -E Wide Deck | Crankcase Bearing Bore Diameter<br>(Front Only) (Thin Wall Bearing)<br>(2-3/8 in. Main)        | <u>2.566</u><br>2.567   | 2.5685          |                         |                 |
| 501  | ALL                                                                 | Connecting Rod Bearing and<br>Crankshaft                                                       |                         |                 | <u>.0008L</u><br>.0038L | .0050L          |
|      | A-B-D-G-J-S-T-Y-BD                                                  | Diameter of Connecting Rod<br>Journal on Crankshaft (2-1/8 in.)                                | <u>2.1235</u><br>2.125  | (E)             |                         |                 |
|      | S-T-AF                                                              | Diameter of Connecting Rod<br>Journal on Crankshaft (2-1/4 in.)                                | <u>2.2485</u><br>2.250  | (E)             |                         |                 |
|      | A-B-D-G-J-S-T-Y-BD-BE                                               | Connecting Rod Bearing Bore<br>Diameter (2-1/8 in.) (Measured At<br>Axis 30° on Each Side)     | <u>2.2870</u><br>2.2875 |                 |                         |                 |

# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

### SECTION I – CRANKCASE, CRANKSHAFT, CAMSHAFT

| Ref. | Chart      | Nomenclature                                                                                                           | Dimensions              |                 | Clearances             |                 |
|------|------------|------------------------------------------------------------------------------------------------------------------------|-------------------------|-----------------|------------------------|-----------------|
|      |            |                                                                                                                        | Mfr.<br>Min. &<br>Max.  | Service<br>Max. | Mfr.<br>Min. &<br>Max. | Service<br>Max. |
| 501  | S-T-AF     | Connecting Rod Bearing Bore Diameter (2-1/4 in.) (Measured At Axis 30° on Each Side)                                   | <u>2.4205</u><br>2.4210 |                 |                        |                 |
| 502  | ALL        | Connecting Rod - Side Clearance                                                                                        |                         |                 | <u>.004L</u><br>.010L  | .016L           |
| 503  | ALL        | Connecting Rod - Alignment                                                                                             |                         |                 | .010 in 10 Inches      |                 |
| 504  | ALL        | Connecting Rod – Twist                                                                                                 |                         |                 | .012 in 10 Inches      |                 |
| 505  |            | Crankshaft Run-Out at Center Main Bearing                                                                              |                         |                 |                        |                 |
|      | 4 CYLINDER | Mounted on No. 1 and 4 Journals Max. Run-Out No. 2 Journal                                                             |                         |                 | .002                   | .002            |
|      |            | Mounted on No. 1 and 4 Journals Max. Run-Out No. 3 Journal                                                             |                         |                 | .005                   | .0075           |
|      |            | Mounted on No. 2 and 4 Journals Max. Run-Out No. 3 Journal                                                             |                         |                 | .003                   | .0045           |
|      | 6 CYLINDER | Mounted on No. 2 and 5 Journals Max. Run-Out No. 1 Journal                                                             |                         |                 | .002                   | .002            |
|      |            | Mounted on No. 2 and 5 Journals Max. Run-Out No. 3 Journal                                                             |                         |                 | .005                   | .0075           |
|      |            | Mounted on No. 2 and 4 Journals Max. Run-Out No. 3 Journal                                                             |                         |                 | .003                   | .0045           |
|      |            | Mounted on No. 3 and 5 Journals Max. Run-Out No. 4 Journal                                                             |                         |                 | .003                   | .0045           |
|      | 8 CYLINDER | Mounted on No. 2 and 6 Journals Max. Run-Out No. 1 Journal                                                             |                         |                 | .002                   | .002            |
|      |            | Mounted on No. 2 and 4 Journals Max. Run-out No. 3 Journal                                                             |                         |                 | .003                   | .0045           |
|      |            | Mounted on No. 3 and 5 Journals Max. Run-Out No. 4 Journal                                                             |                         |                 | .003                   | .0045           |
|      |            | Mounted on No. 4 and 6 Journals Max. Run-Out No. 5 Journal                                                             |                         |                 | .003                   | .0045           |
|      |            | Mounted on No. 2 and 6 Journals Max. Run-Out No. 3, 4 and 5 Journals                                                   |                         |                 | .005                   | .0075           |
| 506  | ALL        | Crankshaft and Crankcase Front End Clearance                                                                           |                         |                 | <u>.009L</u><br>.016L  | .026L           |
| 507  | ALL        | Clearance – Front Face of Crankshaft Oil Slinger to Front Face of Recess in Crankcase (Crankshaft Against Thrust Face) |                         |                 | <u>.002</u><br>.007L   | (A)             |

# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

### SECTION I – CRANKCASE, CRANKSHAFT, CAMSHAFT

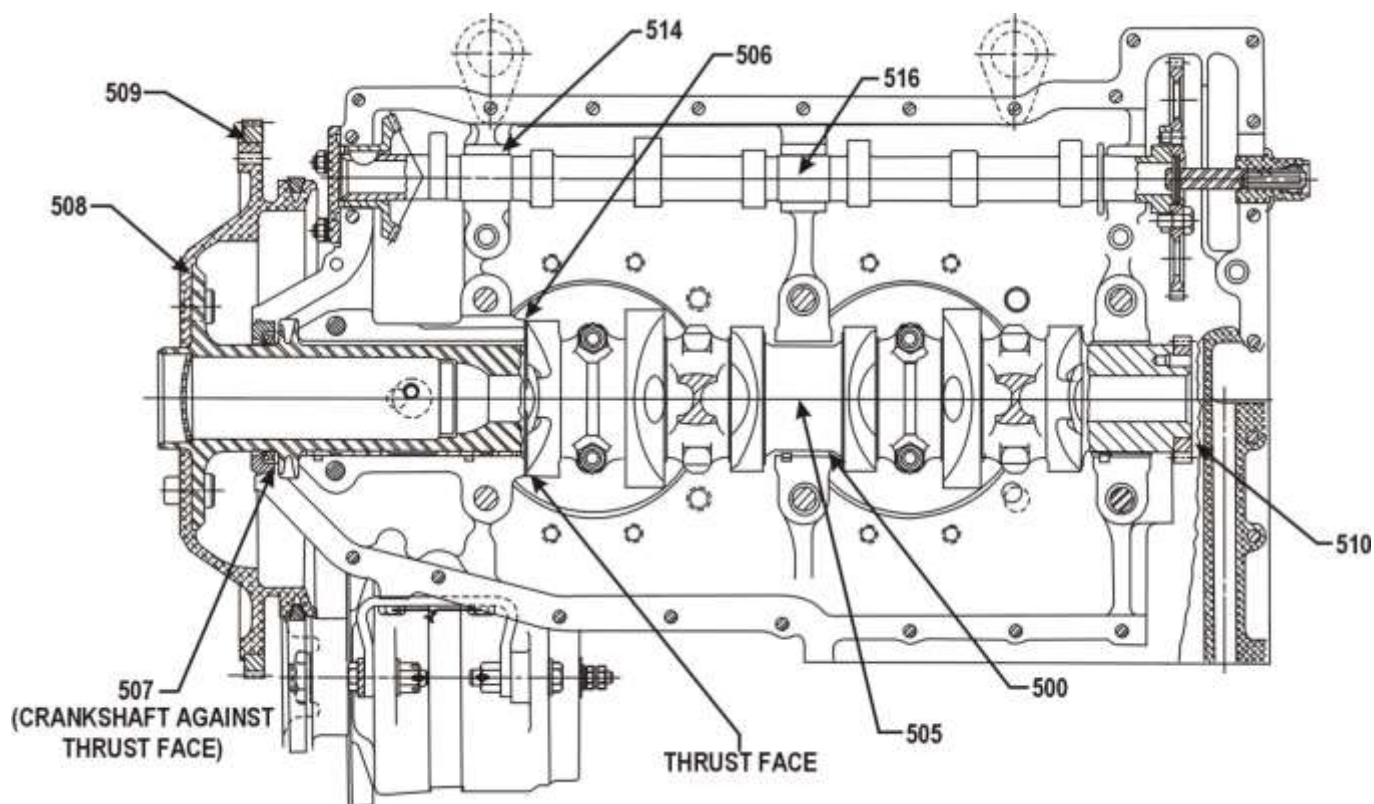
| Ref. | Chart                                  | Nomenclature                                                   | Dimensions             |                 | Clearances             |                 |
|------|----------------------------------------|----------------------------------------------------------------|------------------------|-----------------|------------------------|-----------------|
|      |                                        |                                                                | Mfr.<br>Min. &<br>Max. | Service<br>Max. | Mfr.<br>Min. &<br>Max. | Service<br>Max. |
| 508  | ALL                                    | Crankshaft – Prop. Flange Run-Out                              |                        |                 | .002                   | .005            |
| 509  | ALL                                    | Starter Ring Gear and Support                                  |                        |                 | .014T<br>.022T         | (A)             |
| 510  | A-B-D-G-J-S-T-Y-AF-BD-BE               | Crankshaft Timing Gear and Crankshaft                          |                        |                 | .0005T<br>.0010L       | (A)             |
| 511  | A-B-D-G-J-S-T-Y-AF                     | Tappet Body and Crankcase                                      |                        |                 | .0010L<br>.0033L       | .004L           |
|      | BD-BE                                  | Tappet Body and Crankcase                                      |                        |                 | .0010L<br>.0030L       | .004L           |
|      | A-B<br>(Solid Tappets)                 | O.D. of Tappet                                                 | .6232<br>.6240         | .6229           |                        |                 |
|      | B1-D-G-J-S-T-Y-AF<br>(Flat Tappets)    | O.D. of Tappet                                                 | .7169<br>.7177         | .7166           |                        |                 |
|      | B1-D-G-J-S-T-Y-AF<br>(Roller Tappets)  | O.D. of Tappet                                                 | .8420<br>.8428         | .8417           |                        |                 |
|      | BD-BE                                  | O.D. of Tappet                                                 | .8740<br>.8745         | .8737           |                        |                 |
|      | A-B<br>(Solid Tappets)                 | I.D. Tappet Bore in Crankcase                                  | .6250<br>.6263         | .6266           |                        |                 |
|      | B1-D-G-J-S-T-Y<br>(Flat Tappets)       | I.D. Tappet Bore in Crankcase                                  | .7187<br>.7200         | .7203           |                        |                 |
|      | B1-D-G-J-S-T-Y-AF<br>(Roller Tappets)  | I.D. Tappet Bore in Crankcase                                  | .8437<br>.8445         | .8448           |                        |                 |
|      | BD-BE                                  | I.D. Tappet Bore in Crankcase<br>(Small Bore Tappet)           | .8755<br>.8773         | .8776           |                        |                 |
|      | BD-BE                                  | I.D. Tappet Bore in Crankcase<br>(Large Bore Tappet)           | .9545<br>.9555         |                 |                        |                 |
| 512  | All Models Using Roller Tappets        | Tappet Plunger Assembly and Body – (Roller Tappets)            |                        |                 | .0010L<br>.0047L       | .0067L          |
|      | All Models Using Straight Body Tappets | Tappet Plunger Assembly and Body – (Straight Body Tappets)     |                        |                 | .0010L<br>.0047L       | .0067L          |
|      | All Models Using Hyperbolic Tappets    | Tappet Plunger Assembly and Body – (Hyperbolic Tappets)        |                        |                 | .0010L<br>.0067L       | .0087L          |
| 513  | ALL                                    | Tappet Socket and Body<br>(Hyperbolic Flat and Roller Tappets) |                        |                 | .002L<br>.007L         | .009L           |
| 514  | ALL                                    | Camshaft and Crankcase                                         |                        |                 | .002L<br>.004L         | .006L           |
| 515  | ALL                                    | Camshaft – End Clearance                                       |                        |                 | .002L<br>.009L         | .015L           |
| 516  | ALL                                    | Camshaft Run-Out at Center Bearing Journal                     |                        |                 | .000<br>.001           | .006            |
| 517  | All Models Using Counterweights        | Counterweight Bushing and Crankshaft                           |                        |                 | .0013T<br>.0026T       | (A)             |
| 518  | All Models Using Counterweights        | Counterweight Roller – End Clearance                           |                        |                 | .007L<br>.025L         | .038L           |
| 519  | All Models Using Counterweights        | Counterweight and Crankshaft – Side Clearance*                 |                        |                 | .003L<br>.013L         | .017L           |
|      | *Measure below roller next to flat.    |                                                                |                        |                 |                        |                 |

# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

### SECTION I – CRANKCASE, CRANKSHAFT, CAMSHAFT

| Ref. | Chart                           | Nomenclature                                                                       | Dimensions       |              | Clearances       |              |
|------|---------------------------------|------------------------------------------------------------------------------------|------------------|--------------|------------------|--------------|
|      |                                 |                                                                                    | Mfr. Min. & Max. | Service Max. | Mfr. Min. & Max. | Service Max. |
| 520  | All Models Using Counterweights | Counterweight Bore and Washer O.D.                                                 |                  |              | .0002L<br>.0030L | (A)          |
| 521  | All Models Using Counterweights | I.D. of Counterweight Bushing                                                      | .7485<br>.7505   | .7512        |                  |              |
| 522  | All (AS APPLICABLE)             | O.D. of Counterweight Roller (See latest revision of Service Instruction No. 1012) |                  |              |                  |              |
| 523  | D                               | Thrust Bearing and Propeller Shaft                                                 |                  |              | .0000<br>.0012L  | .002L        |
| 524  | D                               | Thrust Bearing and Thrust Bearing Cap Clamp Fit (Shim to this Fit)                 |                  |              | .003T<br>.005T   | (A)          |
| 525  | D                               | Thrust Bearing Tilt                                                                |                  | .027 Tilt    |                  |              |
| 526  | D                               | Crankshaft Run-Out – Rear Cone Location                                            |                  |              |                  | .003         |
| 527  | D                               | Crankshaft Run-Out – Front Cone Location                                           |                  |              |                  | .007         |
| 528  | D                               | Thrust Bearing and Thrust Bearing Cage                                             |                  |              | .0016L<br>.0034L | .0045L       |

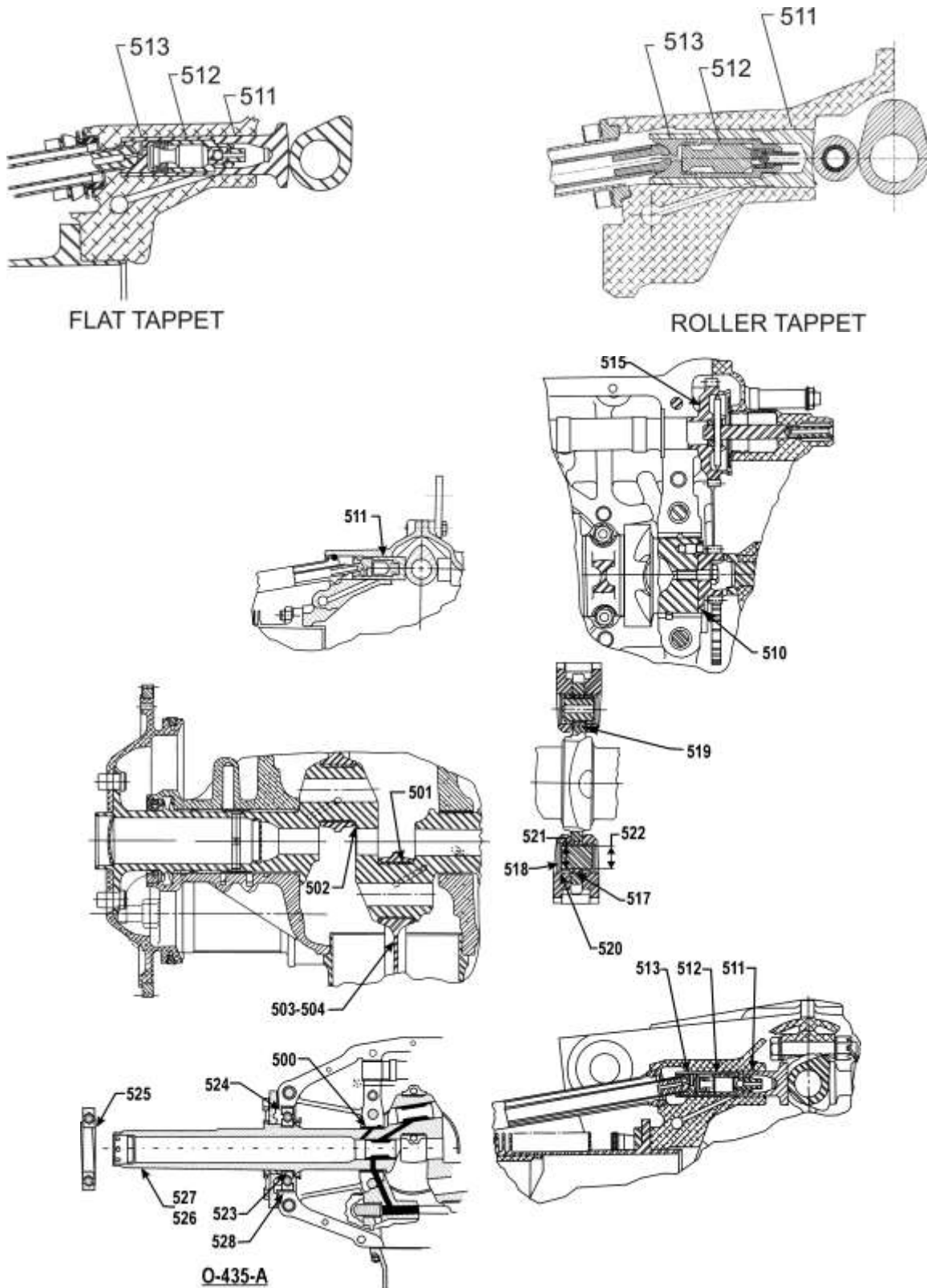


Longitudinal Section Thru Engines

# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

### SECTION I – CRANKCASE, CRANKSHAFT, CAMSHAFT



Crankcase, Crankshaft, Camshaft and Related Parts

# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

### SECTION II – CYLINDERS

| Ref.                                                    | Chart                    | Nomenclature                                                                             | Dimensions                                                                                               |              | Clearances              |              |
|---------------------------------------------------------|--------------------------|------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|--------------|-------------------------|--------------|
|                                                         |                          |                                                                                          | Mfr. Min. & Max.                                                                                         | Service Max. | Mfr. Min. & Max.        | Service Max. |
| 600                                                     | ALL                      | Connecting Rod and Connecting Rod Bushing                                                | Bushings P/N LW-13923 to be burnished in place<br>Bushings P/N 01K28983 is <b>not</b> burnished in place |              |                         |              |
|                                                         | ALL                      | Finished I.D. of Connecting Rod Bushing                                                  | <u>1.1254</u><br>1.1262                                                                                  |              |                         |              |
| 601                                                     | A-B-D-G-J-BD             | Length Between Connecting Rod Bearing Centers                                            | <u>6.4985</u><br>6.5015                                                                                  |              |                         |              |
|                                                         | S-T-Y-AF-BE              | Length Between Connecting Rod Bearing Centers                                            | <u>6.7485</u><br>6.7515                                                                                  |              |                         |              |
| 602                                                     | ALL                      | Connecting Rod Bushing and Piston Pin                                                    |                                                                                                          |              | <u>.0008L</u><br>.0021L | .0025L       |
| 603                                                     | ALL                      | Piston Pin and Piston                                                                    |                                                                                                          |              | <u>.0003L</u><br>.0014L | .0018L       |
|                                                         | ALL                      | Diameter of Piston Pin Hole in Piston                                                    | <u>1.1249</u><br>1.1254                                                                                  |              |                         |              |
|                                                         | ALL                      | Diameter of Piston Pin                                                                   | <u>1.1241</u><br>1.1246                                                                                  |              |                         |              |
| 604                                                     | A-G-J-S-T-AF-BD-BE       | Piston and Piston Pin Plug                                                               |                                                                                                          |              | <u>.0002L</u><br>.0010L | .002L        |
|                                                         | A-G-J-S-T-AF-BD-BE       | *Diameter of Piston Pin Plug                                                             | <u>1.1242</u><br>1.1247                                                                                  |              |                         |              |
| 605                                                     | B-D-G-J-S-T-Y-AF         | Piston Pin and Piston Pin Plug (Optional)                                                |                                                                                                          |              | <u>.0005L</u><br>.0025L | .005L        |
|                                                         | G-J-S-T-Y-AF             | *Diameter of Piston Pin Plug                                                             | <u>.5655</u><br>.5665                                                                                    |              |                         |              |
|                                                         | B-D                      | Diameter of Piston Pin Plug (Thin Wall Pin)                                              | <u>.8405</u><br>.8415                                                                                    |              |                         |              |
| *See latest edition of Service Instruction No. SI-1267. |                          |                                                                                          |                                                                                                          |              |                         |              |
| 606                                                     | A-B                      | Piston Ring and Piston – Side Clearance (Top Ring Comp.) (Plain) Full Wedge              |                                                                                                          |              | <u>.000</u><br>.004L    | .006L (B)    |
|                                                         | B-D                      | Piston Ring and Piston – Side Clearance (Top Ring Comp.) (Chrome) Full Wedge             |                                                                                                          |              | <u>.0025L</u><br>.0065L | .008L (B)    |
|                                                         | G-J-S-T-Y-AF-BD-BE       | Piston Ring and Piston – Side Clearance (Top Ring Comp.) Half Wedge                      |                                                                                                          |              | <u>.0025L</u><br>.0055L | .008L (B)    |
| 606                                                     | B                        | Piston Ring and Piston – Side Clearance (2 <sup>nd</sup> Ring Comp.) (Chrome) Full Wedge |                                                                                                          |              | <u>.0025L</u><br>.0065L | .008L (B)    |
|                                                         | A-B-D-G-J-S-T-Y-AF-BD-BE | Piston Ring and Piston – Side Clearance (2 <sup>nd</sup> Ring Comp.) Full or Half Wedge  |                                                                                                          |              | <u>.000</u><br>.004L    | .006L (B)    |
|                                                         | J                        | Piston Ring and Piston – Side Clearance (3 <sup>rd</sup> Ring Comp.) Half Wedge          |                                                                                                          |              | <u>.000</u><br>.004L    | .006L (B)    |
| 606                                                     | ALL                      | Piston Ring and Piston – Side Clearance (Oil Regulating)                                 |                                                                                                          |              | <u>.002L</u><br>.004L   | .006L (B)    |
|                                                         | A                        | Piston Ring and Piston – Side Clearance (Bottom)                                         |                                                                                                          |              | <u>.003L</u><br>.0055L  | .007L(B)     |

# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

### SECTION II – CYLINDERS

| Ref.                                                                                                                                                                                                      | Chart | Nomenclature                                                                      | Dimensions       |              | Clearances          |              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------|------------------|--------------|---------------------|--------------|
|                                                                                                                                                                                                           |       |                                                                                   | Mfr. Min. & Max. | Service Max. | Mfr. Min. & Max.    | Service Max. |
| 607                                                                                                                                                                                                       | ALL   | Piston Ring Gap (Compression)<br>Plain and Chrome Cylinders<br>(Straight Barrels) |                  |              | <u>.020</u><br>.030 | .047         |
|                                                                                                                                                                                                           | ALL   | Piston Ring Gap (Compression)<br>Nitrided Cylinders (Choke<br>Barrels)            |                  |              | <u>.045</u><br>.065 | .067         |
|                                                                                                                                                                                                           | ALL   | Piston Ring Gap (Oil)                                                             |                  |              | <u>.015</u><br>.040 | .047         |
|                                                                                                                                                                                                           | A-T2  | Piston Ring Gap (Oil Scraper)<br>(All Barrels)                                    |                  |              | <u>.015</u><br>.030 | .047         |
| For Choke Barrels – Ring gap is measured within 4 inches from bottom. Ring gap at top of travel must not be less than .0075.<br>For All Other Barrels – Ring gap is measured at top limit of ring travel. |       |                                                                                   |                  |              |                     |              |

|                          | Piston Specifications                                                                                                                                                                                                                                                                                                               |                  |        |                                     |                                       |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|--------|-------------------------------------|---------------------------------------|
|                          | Piston Number                                                                                                                                                                                                                                                                                                                       | Min. Piston Dia. |        | Cylinder Barrel<br>Maximum Diameter | Max. Clearance<br>Piston Skirt & Cyl. |
|                          |                                                                                                                                                                                                                                                                                                                                     | Top              | Bottom |                                     |                                       |
| 608<br>608<br>609<br>610 | 14B23917                                                                                                                                                                                                                                                                                                                            | 4.3470           | 4.3555 | 4.3795                              | .021L                                 |
|                          | 14B23918*                                                                                                                                                                                                                                                                                                                           | 4.3290           | 4.3605 | 4.3805                              | .018L                                 |
|                          | 14B23919                                                                                                                                                                                                                                                                                                                            | 4.3470           | 4.3555 | 4.3795                              | .021L                                 |
|                          | 14C28324                                                                                                                                                                                                                                                                                                                            | 4.8395           | 4.8590 | 4.8805                              | .018L                                 |
|                          | 14D21953-S                                                                                                                                                                                                                                                                                                                          | 5.0790           | 5.1090 | 5.1305                              | .018L                                 |
|                          | 14D23907                                                                                                                                                                                                                                                                                                                            | 5.0790           | 5.1090 | 5.1305                              | .018L                                 |
|                          | 14D23908*                                                                                                                                                                                                                                                                                                                           | 5.0790           | 5.1090 | 5.1305                              | .018                                  |
|                          | 14D23909*                                                                                                                                                                                                                                                                                                                           | 5.0790           | 5.1090 | 5.1305                              | .018                                  |
|                          | 14D23910*                                                                                                                                                                                                                                                                                                                           | 5.0790           | 5.1090 | 5.1305                              | .018                                  |
|                          | 14D23912*                                                                                                                                                                                                                                                                                                                           | 5.0790           | 5.1090 | 5.1305                              | .018                                  |
|                          | 14D23913                                                                                                                                                                                                                                                                                                                            | 5.0790           | 5.1090 | 5.1305                              | .018L                                 |
|                          | 14D23914*                                                                                                                                                                                                                                                                                                                           | 5.0790           | 5.1090 | 5.1305                              | .018L                                 |
|                          | 14D23915                                                                                                                                                                                                                                                                                                                            | 5.0790           | 5.1090 | 5.1305                              | .018L                                 |
|                          | 14D23916                                                                                                                                                                                                                                                                                                                            | 5.0790           | 5.1090 | 5.1305                              | .018L                                 |
|                          | 14D28056                                                                                                                                                                                                                                                                                                                            | 5.0790           | 5.1090 | 5.1305                              | .018L                                 |
|                          | 14E23911*                                                                                                                                                                                                                                                                                                                           | 5.2720           | 5.3020 | 5.3235                              | .018L                                 |
|                          | 70396†                                                                                                                                                                                                                                                                                                                              | 4.8290           | 4.8620 | 4.8805                              | .018L                                 |
|                          | 75984-S                                                                                                                                                                                                                                                                                                                             | 4.8395           | 4.8590 | 4.8805                              | .018L                                 |
|                          | LW-10208-S                                                                                                                                                                                                                                                                                                                          | 5.0790           | 5.1090 | 5.1305                              | .018L                                 |
|                          | NOTES:                                                                                                                                                                                                                                                                                                                              |                  |        |                                     |                                       |
|                          | Refer to the latest revision of Service Instruction No. SI-1037 for a listing of engine models and piston part numbers applicable for each engine model.                                                                                                                                                                            |                  |        |                                     |                                       |
|                          | To find the average diameter of cylinder in an area 4" above bottom of barrel: First, measure diameter at right angles from plane in which valves are located. Second, measure diameter through the plane in which valves are located. Add both diameters; this sum, divided by 2, represents the average diameter of the cylinder. |                  |        |                                     |                                       |
|                          | * - High Compression.                                                                                                                                                                                                                                                                                                               |                  |        |                                     |                                       |
|                          | † - Piston no longer available from Lycoming Engines.                                                                                                                                                                                                                                                                               |                  |        |                                     |                                       |
|                          | Maximum taper and out-of-round for cylinder in service is .0045 inch.                                                                                                                                                                                                                                                               |                  |        |                                     |                                       |
|                          | To find the average out-of-round, measure diameter of cylinder in an area 4" above bottom of barrel: First, measure diameter at right angles from plane in which valves are located. Second, measure diameter through the plane in which valves are located. Difference between diameters must not exceed .0045 inch.               |                  |        |                                     |                                       |

# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

### SECTION II – CYLINDERS

| Ref. | Chart                                             | Nomenclature                            | Dimensions              |                 | Clearances              |                 |
|------|---------------------------------------------------|-----------------------------------------|-------------------------|-----------------|-------------------------|-----------------|
|      |                                                   |                                         | Mfr.<br>Min. &<br>Max.  | Service<br>Max. | Mfr.<br>Min. &<br>Max.  | Service<br>Max. |
| 611  | A                                                 | Exhaust Valve Seat and Cylinder Head    |                         |                 | <u>.0065T</u><br>.010T  | (A)             |
|      | B-D-G-J-S-T-Y-BD-BE                               | Exhaust Valve Seat and Cylinder Head    |                         |                 | <u>.0045T</u><br>.008T  | (A)             |
|      | S1-S2-S3-S5-S6-S7-S9-S10-S11-S12-S13-S14-T2-T3-AF | Exhaust Valve Seat and Cylinder Head    |                         |                 | <u>.0075T</u><br>.011T  | (A)             |
|      | A                                                 | O.D. Exhaust Seat                       | <u>2.0025</u><br>2.004  |                 |                         |                 |
|      | B-D-G-J-S-T-Y-BD-BE                               | O.D. Exhaust Seat                       | <u>1.7395</u><br>1.741  |                 |                         |                 |
|      | S1-S2-S3-S5-S6-S7-S9-S10-S11-S12-S13-S14-T2-T3-AF | O.D. Exhaust Seat                       | <u>1.9355</u><br>1.937  |                 |                         |                 |
|      | A                                                 | I.D. Exhaust Seat Hole in Cylinder Head | <u>1.994</u><br>1.996   |                 |                         |                 |
|      | B-D-G-J-S-T-Y-BD-BE                               | I.D. Exhaust Seat Hole in Cylinder Head | <u>1.733</u><br>1.735   |                 |                         |                 |
| 611  | S1-S2-S3-S5-S6-S7-S9-S10-S11-S12-S13-S14-T2-T3-AF | Exhaust Seat Hole in Cylinder Head      | <u>1.926</u><br>1.928   |                 |                         |                 |
| 612  | A                                                 | Intake Valve Seat and Cylinder Head     |                         |                 | <u>.0070T</u><br>.0105T | (A)             |
|      | B-D-G-J-S-T-Y-AF-BD-BE                            | Intake Valve Seat and Cylinder Head     |                         |                 | <u>.0066T</u><br>.010T  | (A)             |
|      | A                                                 | O.D. Intake Seat                        | <u>2.0965</u><br>2.0975 |                 |                         |                 |
|      | A1-B-D                                            | O.D. Intake Seat                        | <u>1.9265</u><br>1.928  |                 |                         |                 |
|      | B1-C-J-S-T-Y-BD-BE                                | O.D. Intake Seat                        | <u>2.0815</u><br>2.083  |                 |                         |                 |
|      | S1-S2-S3-S5-S6-S7-S9-S10-S11-S12-S13-S14-T2-T3-AF | O.D. Intake Seat                        | <u>2.2885</u><br>2.290  |                 |                         |                 |
|      | A                                                 | I.D. Intake Seat Hole in Cylinder Head  | <u>2.087</u><br>2.089   |                 |                         |                 |
|      | A1-B-D                                            | I.D. Intake Seat Hole in Cylinder Head  | <u>1.918</u><br>1.920   |                 |                         |                 |
|      | B1-G-J-S-T-Y-BD-BE                                | I.D. Intake Seat Hole in Cylinder Head  | <u>2.073</u><br>2.076   |                 |                         |                 |
|      | S1-S2-S3-S5-S6-S7-S9-S10-S11-S12-S13-S14-T2-T3-AF | I.D. Intake Seat Hole in Cylinder Head  | <u>2.280</u><br>2.282   |                 |                         |                 |
| 613  | ALL                                               | Exhaust Valve Guide in Cylinder Head    |                         |                 | <u>.001T</u><br>.0025T  | (A)             |
| 613  | A-B-D-J                                           | O.D. Exhaust Valve Guide                | <u>.5933</u><br>.5938   |                 |                         |                 |
|      | Y                                                 | O.D. Exhaust Valve Guide                | <u>.6267</u><br>.6272   |                 |                         |                 |
|      | G-J-S-T-AF-BD-BE                                  | O.D. Exhaust Valve Guide                | <u>.6633</u><br>.6638   |                 |                         |                 |
|      | S1                                                | O.D. Exhaust Valve Guide                | <u>.6953</u><br>.6958   |                 |                         |                 |



# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

### SECTION II – CYLINDERS

| Ref. | Chart                                             | Nomenclature                                                        | Dimensions                                                                                 |                 | Clearances             |                 |
|------|---------------------------------------------------|---------------------------------------------------------------------|--------------------------------------------------------------------------------------------|-----------------|------------------------|-----------------|
|      |                                                   |                                                                     | Mfr.<br>Min. &<br>Max.                                                                     | Service<br>Max. | Mfr.<br>Min. &<br>Max. | Service<br>Max. |
| 613  | A-B-D-G-J                                         | I.D. Exhaust Valve Guide Hole in Cylinder Head                      | .5913<br>.5923                                                                             |                 |                        |                 |
|      | Y                                                 | I.D. Exhaust Valve Guide Hole in Cylinder Head                      | .6247<br>.6257                                                                             |                 |                        |                 |
|      | G-J-S-T-AF-BD                                     | I.D. Exhaust Valve Guide Hole in Cylinder Head                      | .6613<br>.6623                                                                             |                 |                        |                 |
|      | S1                                                | I.D. Exhaust Valve Guide Hole in Cylinder Head                      | .6933<br>.6943                                                                             |                 |                        |                 |
| 614  | ALL                                               | Intake Valve Guide and Cylinder Head                                |                                                                                            |                 | .0010T<br>.0025T       |                 |
|      | ALL                                               | O.D. Intake Valve Guide                                             | .5933<br>.5938                                                                             |                 |                        |                 |
|      | ALL                                               | I.D. Intake Valve Guide Hole in Cylinder Head                       | .5913<br>.5923                                                                             |                 |                        |                 |
| 615  | A-B-D                                             | Exhaust Valve Stem and Valve Guide                                  |                                                                                            |                 | .0020L<br>.0038L       | (A)             |
|      | A1-G-J-S-T-BD-BE                                  | Exhaust Valve Stem and Valve Guide (Parallel Valve Heads)           |                                                                                            |                 | .0040L<br>.0060L       | (A)             |
|      | Y                                                 | Exhaust Valve Stem and Valve Guide                                  |                                                                                            |                 | .0035L<br>.0053L       | (A)             |
|      | S1-S2-S3-S5-S6-S11-S12-T2-T3-AF                   | Exhaust Valve Stem and Valve Guide (Angle Valve Heads)              |                                                                                            |                 | .0037L<br>.0050L       | (A)             |
|      | S7-S9-S10-S13-S14                                 | Exhaust Valve Stem and Valve Guide (Angle Valve Heads - Helicopter) |                                                                                            |                 | .0035L<br>.0055L       | (A)             |
|      | A-B-D                                             | O.D. Exhaust Valve Stem                                             | .4012<br>.4020                                                                             |                 |                        |                 |
|      | A1                                                | O.D. Exhaust Valve Stem                                             | .4320<br>.4333                                                                             |                 |                        |                 |
|      | G-J-Y                                             | O.D. Exhaust Valve Stem                                             | .4332<br>.4340                                                                             |                 |                        |                 |
|      | G-J-S-T-BD-BE                                     | O.D. Exhaust Valve Stem (Parallel Valve Heads)                      | .4932<br>.4945                                                                             | .4915           |                        |                 |
|      | S1-S2-S3-S5-S6-S7-S9-S10-S11-S12-S13-S14-T2-T3-AF | O.D. Exhaust Valve Stem (Angle Valve Heads)                         | .4955<br>.4965                                                                             | .4937           |                        |                 |
|      |                                                   |                                                                     | Service allowable limits of .4937 or .4915 is applicable only to inconel or nimonic valves |                 |                        |                 |
|      | A-B-D                                             | Finished I.D. Exhaust Valve Guide                                   | .4040<br>.4050                                                                             |                 |                        |                 |
|      | A1-G-J                                            | Finished I.D. Exhaust Valve Guide                                   | .4370<br>.4380                                                                             |                 |                        |                 |
|      | Y                                                 | Finished I.D. Exhaust Valve Guide                                   | .4375<br>.4385                                                                             |                 |                        |                 |

# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

### SECTION II – CYLINDERS

| Ref. | Chart                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Nomenclature                                                                          | Dimensions             |                 | Clearances              |                 |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|------------------------|-----------------|-------------------------|-----------------|
|      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                       | Mfr.<br>Min. &<br>Max. | Service<br>Max. | Mfr.<br>Min. &<br>Max.  | Service<br>Max. |
| 615  | G-J-S-T-BD-BE                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Finished I.D. Exhaust Valve Guide (Parallel Valve Heads)                              | <u>.4985</u><br>.4995  |                 |                         |                 |
|      | S1-S2-S3-S5-S6-S11-S12-S13-S14-T2-T3-AF                                                                                                                                                                                                                                                                                                                                                                                                                                     | Finished I.D. Exhaust Valve Guide (Angle Valve Heads)                                 | <u>.4995</u><br>.5005  |                 |                         |                 |
|      | S7-S9-S10                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Finished I.D. Exhaust Valve Guide (Angle Valve Heads – Helicopter)                    | <u>.5000</u><br>.5010  |                 |                         |                 |
|      | ½ inch diameter exhaust valves may have exhaust valve guides that are .003 in. over the maximum inside diameter limit, anytime up to 300 hours of service. After 300 hours of service, inside diameter of exhaust valve guide may increase .001 in. during each 100 hours of operation up to the recommended overhaul time for the engine, or not to exceed .015 inch over the basic I.D. See latest edition of Service Instruction No. 1009 for recommended overhaul time. |                                                                                       |                        |                 |                         |                 |
| 616  | ALL                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Intake Valve Stem and Valve Guide                                                     |                        |                 | <u>.0010L</u><br>.0028L | .006L           |
|      | ALL                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | O.D. Intake Valve Stem                                                                | <u>.4022</u><br>.4030  | .4010           |                         |                 |
| 616  | ALL                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Finished I.D. Intake Valve Guide                                                      | <u>.4040</u><br>.4050  |                 |                         |                 |
| 617  | ALL                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Intake and Exhaust Valve and Valve Cap Clearance (Rotator Type Small Dia. Head)       |                        |                 | <u>.000</u><br>.004L    | .006L           |
| 618  | A-B                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Solid Tappet Clearance (After Engine in Run)                                          |                        |                 | <u>.006</u><br>.012     |                 |
|      | A                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Dry Tappet Clearance (Steel Push Rods)                                                |                        |                 | <u>.002</u><br>.008     |                 |
|      | D-G-J-S-T-Y-AF-BD-BE                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Dry Tappet Clearance                                                                  |                        |                 | <u>.028</u><br>.080     |                 |
| 619  | A                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Valve Rocker Shaft and Cylinder Head (No Bushing)                                     |                        |                 | <u>.0001L</u><br>.0013L | .0025L          |
| 619  | B-D-J-S-T-Y                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Valve Rocker Shaft and Valve Rocker Bushing (Parallel Valve Heads)                    |                        |                 | <u>.0001L</u><br>.0013L | .0025L          |
|      | S1-S2-S3-S5-S6-S7-S9-S10-S11-S12-S13-S14-T2-T3-AF                                                                                                                                                                                                                                                                                                                                                                                                                           | Valve Rocker Shaft and Valve Rocker Bushing (Angle Valve Heads)                       |                        |                 | <u>.0001L</u><br>.0013L | .0025L          |
| 619  | A                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Finished I.D. of Valve Rocker Shaft Bores in Cylinder Head (No Bushings)              | <u>.6246</u><br>.6261  | .6270           |                         |                 |
| 619  | B-D-G-J-S-T-Y                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Finished I.D. of Valve Rocker Shaft (Bushing) in Cylinder Head (Parallel Valve Heads) | <u>.6246</u><br>.6261  | .6270           |                         |                 |
|      | S1-S2-S3-S5-S6-S7-S9-S10-S11-S12-S13-S14-T2-T3-AF                                                                                                                                                                                                                                                                                                                                                                                                                           | Finished I.D. of Valve Rocker Shaft (Bushing) in Cylinder Head (Angle Valve Heads)    | <u>.6246</u><br>.6261  | .6270           |                         |                 |
| 620  | ALL                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Valve Rocker Shaft and Valve Rocker Bushing                                           |                        |                 | <u>.0007L</u><br>.0017L | .004L           |
|      | ALL                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Finished I.D. of Rocker Arm Bushing                                                   | <u>.6252</u><br>.6263  | .6270           |                         |                 |
|      | ALL                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | O.D. of Valve Rocker Shaft                                                            | <u>.6241</u><br>.6245  | .6231           |                         |                 |

# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

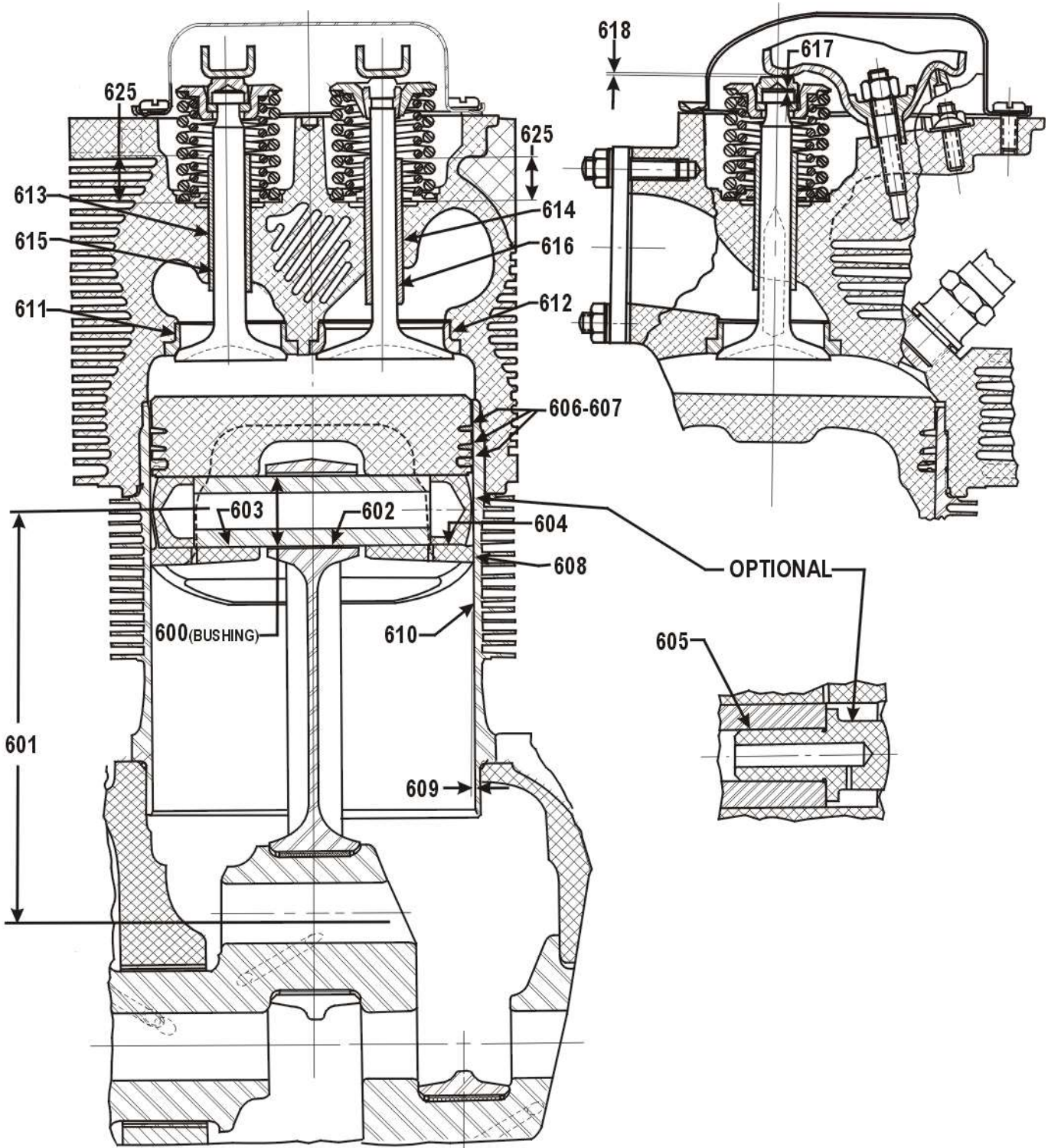
### SECTION II – CYLINDERS

| Ref. | Chart                                             | Nomenclature                                                                                                                                                       | Dimensions                         |                 | Clearances              |                 |
|------|---------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|-----------------|-------------------------|-----------------|
|      |                                                   |                                                                                                                                                                    | Mfr.<br>Min. &<br>Max.             | Service<br>Max. | Mfr.<br>Min. &<br>Max.  | Service<br>Max. |
| 621  | ALL                                               | Valve Rocker Bushing and Valve Rocker                                                                                                                              | Bushing Must Be Burnished In Place |                 |                         |                 |
| 622  | ALL                                               | Valve Rocker Shaft Bushing and Cylinder Head                                                                                                                       |                                    |                 | <u>.0022T</u><br>.0038T | (A)             |
|      | ALL                                               | Valve Rocker Shaft Bushing Hole in Cylinder Head                                                                                                                   | <u>.7380</u><br>.7388              |                 |                         |                 |
| 623  | A-B-D-G-J-S-T-Y                                   | Valve Rocker and Cylinder Head - Side Clearance (Parallel Valve Heads)                                                                                             |                                    |                 | <u>.005L</u><br>.013L   | .016L           |
|      | S1-S2-S3-S5-S6-S7-S9-S10-S11-S12-S13-S14-T2-T3-AF | Valve Rocker and Cylinder Head – Side Clearance (Angle Valve Heads)                                                                                                |                                    |                 | <u>.002L</u><br>.020L   | .024L           |
| 624  | A-B-J                                             | Push Rod and Ball End                                                                                                                                              |                                    |                 | <u>.0005T</u><br>.0025T | (A)             |
| 625  | A                                                 | Intake and Exhaust Valve Guide Height                                                                                                                              | <u>.705</u><br>.725                |                 |                         |                 |
|      | ALL                                               | Intake Valve Guide Height (Parallel Valve Heads)                                                                                                                   | <u>.705</u><br>.725                |                 |                         |                 |
|      | ALL EXCEPT O-235                                  | Exhaust Valve Guide height (Parallel Valve Heads)                                                                                                                  | <u>.765</u><br>.785                |                 |                         |                 |
|      | ALL                                               | Intake and Exhaust Valve Guide height (Angle Valve Heads)                                                                                                          | <u>.914</u><br>.954                |                 |                         |                 |
|      |                                                   | <div>                     MEASURE VALVE GUIDE HEIGHT FROM THE VALVE SPRING SEAT COUNTERBORE IN THE CYLINDER HEAD TO THE TOP OF VALVE GUIDE.                 </div> |                                    |                 |                         |                 |

# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

### SECTION II – CYLINDERS

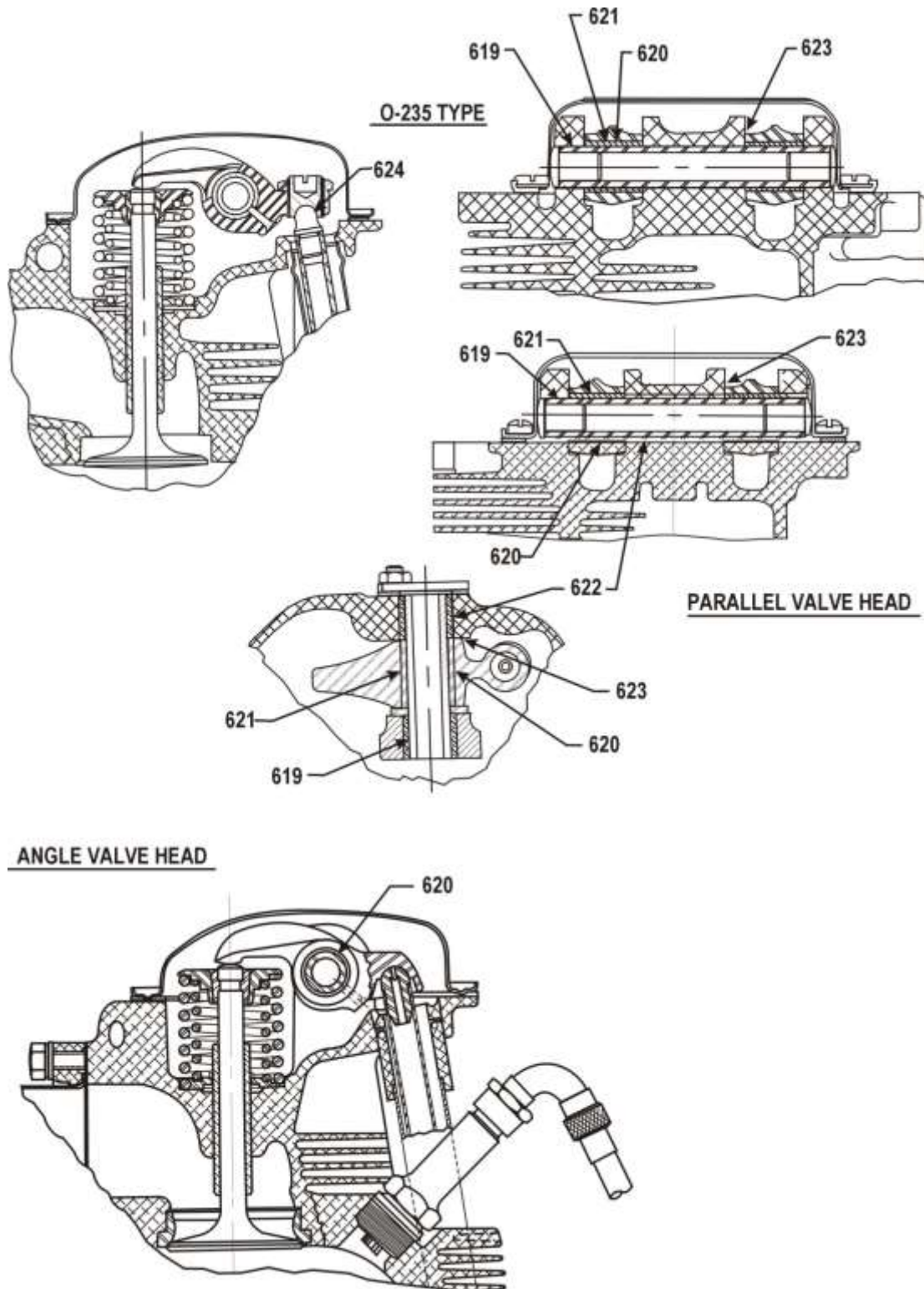


Cylinder, Piston and Valve Components

# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

### SECTION II – CYLINDERS



Cylinder, Piston and Valve Components

# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

### SECTION III – GEAR TRAIN

| Ref.     | Chart                 | Nomenclature                                             | Dimensions             |                 | Clearances             |                 |
|----------|-----------------------|----------------------------------------------------------|------------------------|-----------------|------------------------|-----------------|
|          |                       |                                                          | Mfr.<br>Min. &<br>Max. | Service<br>Max. | Mfr.<br>Min. &<br>Max. | Service<br>Max. |
| OIL PUMP |                       |                                                          |                        |                 |                        |                 |
| 700      | ALL                   | Oil Pump Drive Shaft and Oil Pump Body or Cover          |                        |                 | .0010L<br>.0025L       | .004L           |
| 701      | A-B-D-G-J-S-T-AF      | Oil Pump Drive Shaft and Accessory Housing               |                        |                 | .0015L<br>.0030L       | .006L           |
|          | Y                     | Oil Pump Drive Shaft and Accessory Case                  |                        |                 | .0015L<br>.0030L       | .006L           |
|          | BD-BE                 | Oil Pump Drive Shaft and Crankcase                       |                        |                 | .0010L<br>.0025L       | .004L           |
| 702      | S-T-AF (DUAL MAGNETO) | Oil Pump Drive Shaft – End Clearance                     |                        |                 | .015L<br>.050L         | .065L           |
|          | BD-BE                 | Oil Pump Drive Shaft – End Clearance                     |                        |                 | .017L<br>.037L         | .047L           |
| 703      | A-B-D-G-J-S-T-Y-AF    | Oil Pump Impellers – Diameter Clearance                  |                        |                 | .002L<br>.006L         | .008L           |
|          | BD-BE                 | Oil Pump Impellers – Diameter Clearance                  |                        |                 | .0035L<br>.0075L       | .009L           |
| 704      | ALL (EXCEPT BD-BE)    | Oil Pump Impellers – Side Clearance                      |                        |                 | .002L<br>.0045L        | .005L           |
|          | BD-BE                 | Oil Pump Impellers – Side Clearance                      |                        |                 | .003L<br>.005L         | .006L           |
|          | AS APPLICABLE         | Width of Oil Pump Impellers                              | .622<br>.624           | .621            |                        |                 |
|          | AS APPLICABLE         | Width of Oil Pump Impellers                              | .747<br>.749           | .746            |                        |                 |
|          | AS APPLICABLE         | Width of Oil Pump Impellers                              | .995<br>.997           | .994            |                        |                 |
|          | BD-BE                 | Width of Oil Pump Impellers                              | .622<br>.623           | .620            |                        |                 |
| 705      | S-T-AF (DUAL MAGNETO) | Oil Pump Impeller and Idler Shaft                        |                        |                 | .0010L<br>.0025L       | .004L           |
|          | A-B-D-G-J-S-T-Y-AF    | Oil Pump Impeller and Idler Shaft (Alum. and Sinterbond) |                        |                 | .001T<br>.003T         | (A)             |
|          | BD-BE                 | Oil Pump Impeller and Idler Shaft                        |                        |                 | .002T<br>.004T         | (A)             |
| 706      | A-B-D-G-J-S-T-Y-AF    | Oil Pump Idler Shaft and Oil Pump Body                   |                        |                 | .0005L<br>.0020L       | .003L           |
|          | BD-BE                 | Oil Pump Idler Shaft and Oil Pump Body                   |                        |                 | .0010L<br>.0025L       | .003L           |
|          | S-T-AF (DUAL MAGNETO) | Oil Pump Idler Shaft and Oil Pump Body                   |                        |                 | .0000<br>.0015T        | (A)             |
| 707      | A-B-D-G-J-S-T-Y-AF    | Oil Pump Idler Shaft and Accessory Housing               |                        |                 | .0010L<br>.0025L       | .0035L          |
|          | BD-BE                 | Oil Pump Idler Shaft and Crankcase                       |                        |                 | .0010L<br>.0025L       | .0035L          |
| 708      | G2-S2                 | Scavenge Pump Drive Shaft and Adapter                    |                        |                 | .0010L<br>.0025L       | .004L           |
| 709      | G2-S2                 | Scavenge Pump – End Clearance                            |                        |                 | .000<br>.045L          | .060L           |

# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

### SECTION III – GEAR TRAIN

| Ref. | Chart | Nomenclature | Dimensions             |                 | Clearances             |                 |
|------|-------|--------------|------------------------|-----------------|------------------------|-----------------|
|      |       |              | Mfr.<br>Min. &<br>Max. | Service<br>Max. | Mfr.<br>Min. &<br>Max. | Service<br>Max. |

#### SCAVENGE PUMP

|     |                     |                                              |                       |       |                         |        |
|-----|---------------------|----------------------------------------------|-----------------------|-------|-------------------------|--------|
| 710 | G2-S2               | Scavenge Pump Impellers – Diameter Clearance |                       |       | <u>.007L</u><br>.011L   | .014L  |
| 711 | G2-S2               | Scavenge Pump Impellers – Side Clearance     |                       |       | <u>.003L</u><br>.005L   | .006L  |
|     | G2-S2               | Width of Impellers                           | <u>1.496</u><br>1.498 | 1.495 |                         |        |
| 712 | G2-S2               | Scavenge Pump Impellers and Idler Shaft      |                       |       | <u>.0010L</u><br>.0025L | .004L  |
| 713 | G2-S2               | Scavenge Pump Body and Idler Shaft           |                       |       | <u>.0000</u><br>.0015T  | (A)    |
| 714 | S-T4-AF (WIDE DECK) | Turbocharger Scavenge Pump Drive and Adapter |                       |       | <u>.0010L</u><br>.0025L | .004L  |
| 715 | S-T4-AF (WIDE DECK) | Turbocharger Scavenge Pump Shaft and Adapter |                       |       | <u>.0010L</u><br>.0020L | .0035L |
| 716 | S-T4-AF (WIDE DECK) | Gerotor Pump – Rotor – Side Clearance        |                       |       | <u>.0015L</u><br>.003L  | .004L  |
| 717 | S-T4-AF (WIDE DECK) | Gerotor Pump Housing and Adapter             |                       |       | <u>.0005L</u><br>.0020L | (A)    |
| 718 | S-T4-AF (WIDE DECK) | Turbocharger Scavenge Pump – End Clearance   |                       |       | <u>.0055L</u><br>.0365L | .0415L |
|     | T4 (DUAL MAGNETO)   | Turbocharger Scavenge Pump – End Clearance   |                       |       | <u>.0105L</u><br>.0395L | .0445L |

#### FUEL PUMP

|     |                          |                                                              |  |  |                         |        |
|-----|--------------------------|--------------------------------------------------------------|--|--|-------------------------|--------|
| 719 | A-B-D-G-J-S-T            | AC Fuel Pump Plunger and Accessory Housing                   |  |  | <u>.0015L</u><br>.003L  | .005L  |
| 720 | J-S-T-AF                 | Crankshaft Idler Gear and Crankshaft Idler Gear Shaft        |  |  | <u>.001L</u><br>.003L   | .005L  |
| 721 | S-T-AF<br>(DUAL MAGNETO) | Crankshaft Idler Gear Shaft and Accessory Housing            |  |  | <u>.0020L</u><br>.0035L | .0065L |
|     | S-T-AF<br>(DUAL MAGNETO) | Crankshaft Idler Gear Shaft and Crankcase                    |  |  | <u>.0020L</u><br>.0035L | .0065L |
| 722 | S-T-AF                   | AN Fuel Pump Idler Gear and Shaft                            |  |  | <u>.001L</u><br>.003L   | .005L  |
| 723 | S-T-AF<br>(DUAL MAGNETO) | AN Fuel Pump Idler Shaft and Accessory Housing and Crankcase |  |  | <u>.0020L</u><br>.0035L | .0065L |
|     | S-T-AF<br>(DUAL MAGNETO) | AN Fuel Pump Idler Shaft and Crankcase                       |  |  | <u>.0020L</u><br>.0035L | .0065L |
| 724 | A-B                      | Crankshaft Idler Gear – End Clearance                        |  |  | <u>.003L</u><br>.043L   | .058L  |
|     | G-J-S-Y                  | Crankshaft Idler Gear – End Clearance                        |  |  | <u>.005L</u><br>.040L   | .055L  |
|     | T-AF                     | Crankshaft Idler Gear – End Clearance                        |  |  | <u>.007L</u><br>.037L   | .052L  |
|     | S (DUAL MAGNETO)         | Crankshaft Idler Gear – End Clearance                        |  |  | <u>.020L</u><br>.030L   | .040L  |
|     | T-AF (DUAL MAGNETO)      | Crankshaft Idler Gear – End Clearance                        |  |  | <u>.015L</u><br>.038L   | .046L  |

# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

### SECTION III – GEAR TRAIN

| Ref. | Chart | Nomenclature | Dimensions             |                 | Clearances             |                 |
|------|-------|--------------|------------------------|-----------------|------------------------|-----------------|
|      |       |              | Mfr.<br>Min. &<br>Max. | Service<br>Max. | Mfr.<br>Min. &<br>Max. | Service<br>Max. |

#### FUEL PUMP (CONT.)

|     |                          |                                               |  |  |                         |       |
|-----|--------------------------|-----------------------------------------------|--|--|-------------------------|-------|
| 725 | S                        | AN Fuel Pump Idler Gear – End Clearance       |  |  | <u>.010L</u><br>.045L   | .055L |
|     | T-AF                     | AN Fuel Pump Idler Gear – End Clearance       |  |  | <u>.002L</u><br>.018L   | .024L |
|     | S-T-AF<br>(DUAL MAGNETO) | AN Fuel Pump Idler Gear – End Clearance       |  |  | <u>.015L</u><br>.038L   | .045L |
| 726 | S-T-Y-AF                 | AN Fuel Pump Drive Shaft Gear and Adapter     |  |  | <u>.0010L</u><br>.0025L | .004L |
| 727 | S                        | AN Fuel Pump Drive Shaft Gear – End Clearance |  |  | <u>.035L</u><br>.069L   | .079L |
|     | T-AF                     | AN Fuel Pump Drive Shaft Gear – End Clearance |  |  | <u>.044L</u><br>.081L   | .091L |
|     | T-AF<br>(DUAL MAGNETO)   | AN Fuel Pump Drive Shaft Gear – End Clearance |  |  | <u>.035L</u><br>.073L   | .083L |
|     | Y                        | AN Fuel Pump Drive Shaft Gear – End Clearance |  |  | <u>.000L</u><br>.067L   | .075L |

#### GOVERNOR & HYDRAULIC PUMP

|     |                                    |                                                            |  |  |                         |       |
|-----|------------------------------------|------------------------------------------------------------|--|--|-------------------------|-------|
| 728 | T-AF<br>(NARROW DECK)              | Front Governor Drive Idler Shaft (Both Ends) and Crankcase |  |  | <u>.0010L</u><br>.0025L | .004L |
| 729 | G1-G2-S2-S4-S6-T-AF<br>(WIDE DECK) | Front Governor Idler Gear and Shaft                        |  |  | <u>.0010L</u><br>.0025L | .004L |
| 730 | BD-BE                              | Front Governor Drive Gear and Crankcase                    |  |  | <u>.0010L</u><br>.0025L | .004L |
|     | BD-BE                              | Front Governor Drive Gear and Camshaft                     |  |  | <u>.0005L</u><br>.0025L | .004L |
| 731 | G1-G2-S-T-AF                       | Front Governor Gear and Crankcase                          |  |  | <u>.0010L</u><br>.0025L | .004L |
|     | BD                                 | Front Governor Gear and Crankcase                          |  |  | <u>.0010L</u><br>.0030L | .004L |
| 732 | G1-G2-S-T-AF                       | Front Governor Gear – End Clearance                        |  |  | <u>.008L</u><br>.016L   | .021L |
|     | BD-BE                              | Front Governor Gear – End Clearance                        |  |  | <u>.0045L</u><br>.0165L | .021L |
| 733 | G-J-S                              | Rear Governor Gear and Adapter                             |  |  | <u>.0010L</u><br>.0025L | .005L |
|     | G-S<br>(DUAL MAGNETO)              | Rear Governor Gear and Accessory Housing                   |  |  | <u>.0010L</u><br>.0025L | .005L |
| 734 | G-J-S                              | Rear Governor Gear – End Clearance                         |  |  | <u>.002L</u><br>.024L   | .034L |
|     | G-S<br>(DUAL MAGNETO)              | Rear Governor Gear – End Clearance                         |  |  | <u>.002L</u><br>.037L   | .044L |
| 735 | T-AF                               | Hydraulic Pump Gear and Adapter                            |  |  | <u>.0010L</u><br>.0025L | .004L |
|     | T-AF (DUAL MAGNETO)                | Hydraulic Pump Gear and Accessory Housing                  |  |  | <u>.0010L</u><br>.0025L | .004L |
| 736 | T-AF                               | Hydraulic Pump Gear – End Clearance                        |  |  | <u>.010L</u><br>.066L   | .076L |
|     | T-AF (DUAL MAGNETO)                | Hydraulic Pump Gear – End Clearance                        |  |  | <u>.007L</u><br>.032L   | .039L |



# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

### SECTION III – GEAR TRAIN

| Ref. | Chart | Nomenclature | Dimensions             |                 | Clearances             |                 |
|------|-------|--------------|------------------------|-----------------|------------------------|-----------------|
|      |       |              | Mfr.<br>Min. &<br>Max. | Service<br>Max. | Mfr.<br>Min. &<br>Max. | Service<br>Max. |

#### VACUUM & TACHOMETER

|     |                          |                                                         |  |  |                         |        |
|-----|--------------------------|---------------------------------------------------------|--|--|-------------------------|--------|
| 737 | A-B-G-J-S-T-Y-AF         | Vacuum Pump Gear and Adapter                            |  |  | <u>.0010L</u><br>.0030L | .0045L |
| 737 | S-T-AF<br>(DUAL MAGNETO) | Vacuum Pump Gear and<br>Accessory Housing               |  |  | <u>.0010L</u><br>.0025L | .004L  |
| 737 | D                        | Vacuum Pump Gear and<br>Accessory Housing               |  |  | <u>.0010L</u><br>.0025L | .006L  |
| 738 | A-B-G-J-S-T-AF           | Vacuum Pump Gear – End<br>Clearance                     |  |  | <u>.010L</u><br>.057L   | .075L  |
|     | D                        | Vacuum Pump Gear – End<br>Clearance                     |  |  | <u>.003L</u><br>.020L   | .030L  |
|     | Y                        | Vacuum Pump Gear – End<br>Clearance                     |  |  | <u>.000</u><br>.067L    | .075L  |
|     | S<br>(DUAL MAGNETO)      | Vacuum Pump Gear – End<br>Clearance                     |  |  | <u>.012L</u><br>.044L   | .055L  |
|     | T-AF<br>(DUAL MAGNETO)   | Vacuum Pump Gear – End<br>Clearance                     |  |  | <u>.017L</u><br>.039L   | .050L  |
| 739 | A-B-Y                    | Tachometer Drive Shaft and<br>Adapter                   |  |  | <u>.0015L</u><br>.0035L | .006L  |
|     | BD-BE                    | Tachometer Drive Shaft and<br>Adapter                   |  |  | <u>.0010L</u><br>.0050L | .0065L |
| 739 | D-G-J-S-T-AF             | Tachometer Drive Shaft and<br>Accessory Housing         |  |  | <u>.0015L</u><br>.0035L | .006L  |
| 740 | G-J-S<br>(DUAL DRIVE)    | Vacuum Pump Gear and Adapter                            |  |  | <u>.0010L</u><br>.0025L | .004L  |
| 741 | G-J-S<br>(DUAL DRIVE)    | Vacuum Pump Gear – End<br>Clearance                     |  |  | <u>.000</u><br>.017L    | .027L  |
| 742 | G-J-S<br>(DUAL DRIVE)    | Idler Gear and Shaft                                    |  |  | <u>.0010L</u><br>.0030L | .005L  |
| 743 | G-J-S<br>(DUAL DRIVE)    | Idler Gear – End Clearance                              |  |  | <u>.021L</u><br>.041L   | .060L  |
| 744 | G-J-S<br>(DUAL DRIVE)    | Propeller Governor Gear and<br>Adapter                  |  |  | <u>.0013L</u><br>.0028L | .005L  |
|     | G-J-S<br>(DUAL DRIVE)    | Hydraulic Pump Gear and Adapter                         |  |  | <u>.0013L</u><br>.0028L | .005L  |
| 745 | G-J-S<br>(DUAL DRIVE)    | Propeller Governor or Hydraulic<br>Pump – End Clearance |  |  | <u>.000</u><br>.054L    | .074L  |

#### MAGNETO, GENERATOR, STARTER

|     |    |                                      |  |  |                         |        |
|-----|----|--------------------------------------|--|--|-------------------------|--------|
| 746 | T  | Magneto Bearing and Gear             |  |  | <u>.0005T</u><br>.0001L | .0005L |
| 746 | D  | Magneto Bearing and Gear             |  |  | <u>.0008T</u><br>.0001L | .0005L |
| 747 | T  | Magneto Bearing and Crankcase        |  |  | <u>.0002T</u><br>.0007L | (A)    |
| 747 | D  | Magneto Drive Bearing and<br>Adapter |  |  | <u>.0006T</u><br>.0008T | (A)    |
| 748 | S7 | Magneto Bearing and Gear             |  |  | <u>.0001T</u><br>.0010T | (A)    |

# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

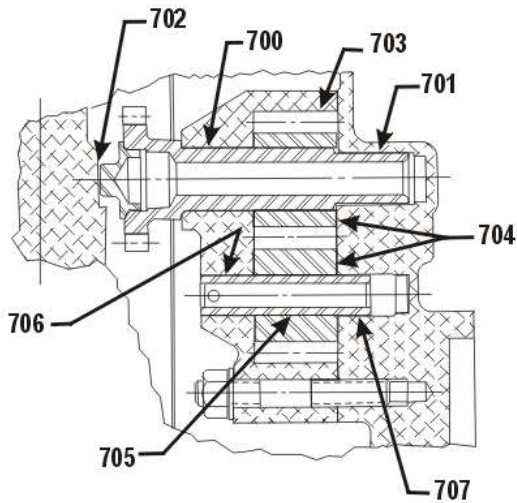
### SECTION III – GEAR TRAIN –

| Ref.                                | Chart                    | Nomenclature                                                 | Dimensions             |                 | Clearances              |                 |
|-------------------------------------|--------------------------|--------------------------------------------------------------|------------------------|-----------------|-------------------------|-----------------|
|                                     |                          |                                                              | Mfr.<br>Min. &<br>Max. | Service<br>Max. | Mfr.<br>Min. &<br>Max.  | Service<br>Max. |
| MAGNETO, GENERATOR, STARTER (CONT.) |                          |                                                              |                        |                 |                         |                 |
| 749                                 | S7                       | Magneto Bearing and Adapter                                  |                        |                 | <u>.000</u><br>.0012L   | .0015L          |
| 750                                 | S-T-AF<br>(DUAL MAGNETO) | Magneto Drive Gear and Crankcase                             |                        |                 | <u>.0010L</u><br>.0025L | .003L           |
| 751                                 | S-T-AF<br>(DUAL MAGNETO) | Magneto Drive Gear – End Clearance                           |                        |                 | <u>.005L</u><br>.073L   | .083L           |
| 752                                 | AF                       | Magneto Drive Gear and Shaft                                 |                        |                 | <u>.001L</u><br>.003L   | .005L           |
| 753                                 | BD-BE                    | Magneto Drive Gear and Crankcase Bushing                     |                        |                 | <u>.001L</u><br>.003L   | .005L           |
| 754                                 | Y                        | Magneto Shaft Gear and Magneto Case                          |                        |                 | <u>.001L</u><br>.003L   | .005L           |
| 755                                 | Y                        | Magneto Shaft Gear and Support Assembly                      |                        |                 | <u>.001L</u><br>.003L   | .005L           |
| 756                                 | Y                        | Magneto Shaft Gear and Accessory Drive Shaft Gear – End Play |                        |                 | <u>.0075L</u><br>.0125L | .015L           |
| 757                                 | Y                        | Accessory Drive Shaft Gear and Support Assembly              |                        |                 | <u>.001L</u><br>.003L   | .005L           |
| 758                                 | S                        | Magneto Gear and Bushing (S4LN-21 and S4LN-1227)             |                        |                 | <u>.0005L</u><br>.0020L | .0035L          |
|                                     | T                        | Magneto Gear and Bushing (S6LN-21 & S6LN-1227)               |                        |                 | <u>.0015L</u><br>.0035L | .0055L          |
|                                     | T-AF<br>(DUAL MAGNETO)   | Magneto Gear and Bushing                                     |                        |                 | <u>.0015L</u><br>.0035L | .0055L          |
| 7095                                | BD-BE                    | Bushing – Magneto Drive and Crankcase                        |                        |                 | <u>.0025T</u><br>.0045T | (A)             |
| 759                                 | D                        | Generator Gear Bushing and Generator Gear                    |                        |                 | <u>.0020T</u><br>.0035T | (A)             |
| 760                                 | D                        | Generator Gear Bushing and Generator Drive Coupling Adapter  |                        |                 | <u>.001L</u><br>.0028L  | .005L           |
| 761                                 | D                        | Bendix Drive Gear Bushing and Crankcase                      |                        |                 | <u>.0005T</u><br>.0025T | (A)             |
| 762                                 | D                        | Bendix Drive Gear and Bendix Drive Gear Bushing              |                        |                 | <u>.0010L</u><br>.0025L | .005L           |
| 763                                 | D                        | Bendix Drive Shaft and Bendix Drive Housing                  |                        |                 | <u>.003L</u><br>.005L   | .010L           |
| 764                                 | D                        | Bendix Drive Shaft – End Clearance                           |                        |                 | <u>.000</u><br>.0059L   | .080L           |

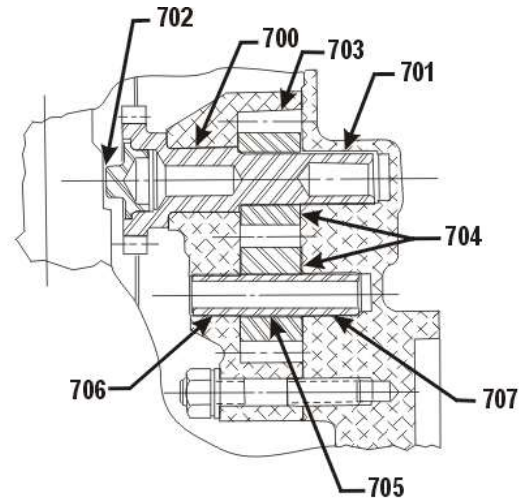
# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

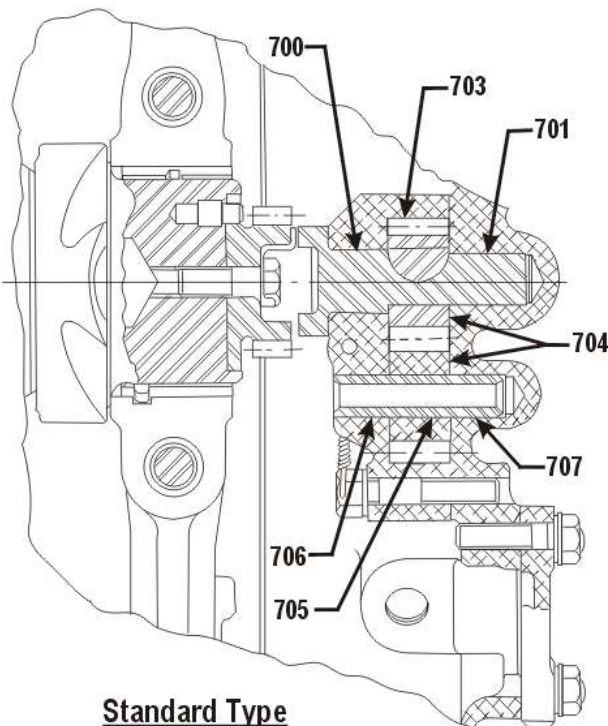
### SECTION III – GEAR TRAIN



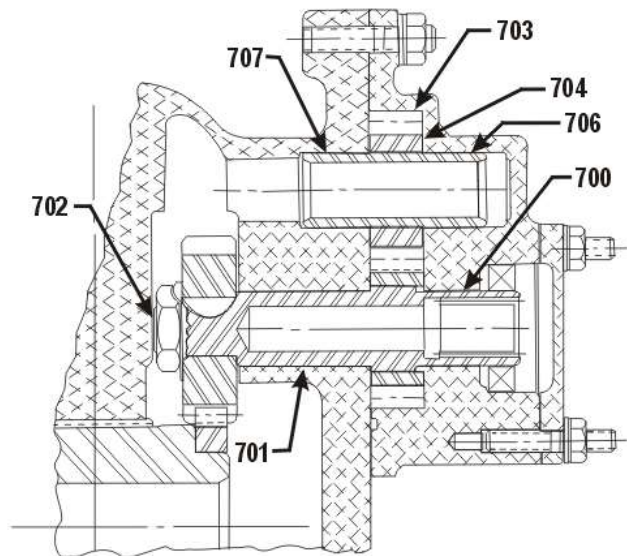
6 CYL-DUAL MAG



4 CYL-DUAL MAG



Standard Type



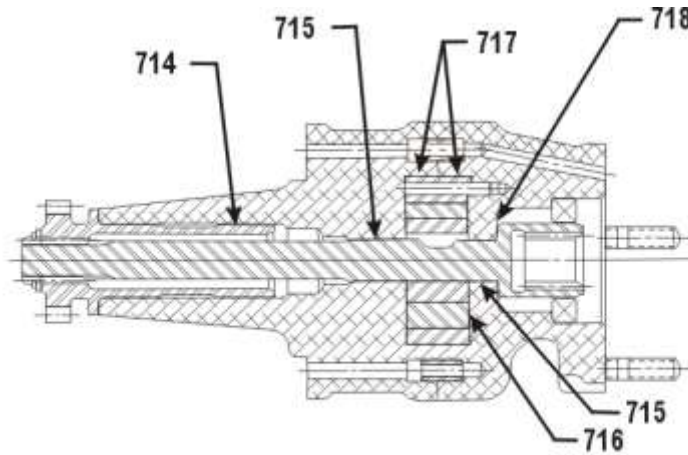
O-320-H,O,LO-360-E

Oil Pumps

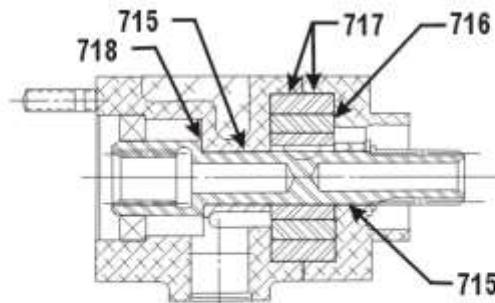
# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

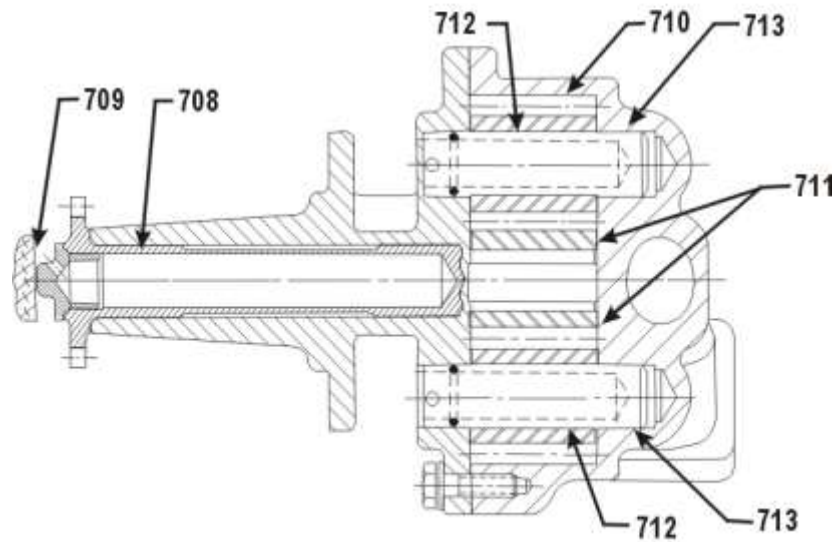
### SECTION III – GEAR TRAIN



**TURBO SCAVENGE PUMP & HYD PUMP (TIO-540-C)**  
**TURBO SCAVENGE PUMP & GOV. (TIO-360)**



**DUAL MAG TURBO SCAVENGE PUMP & HYD. PUMP**



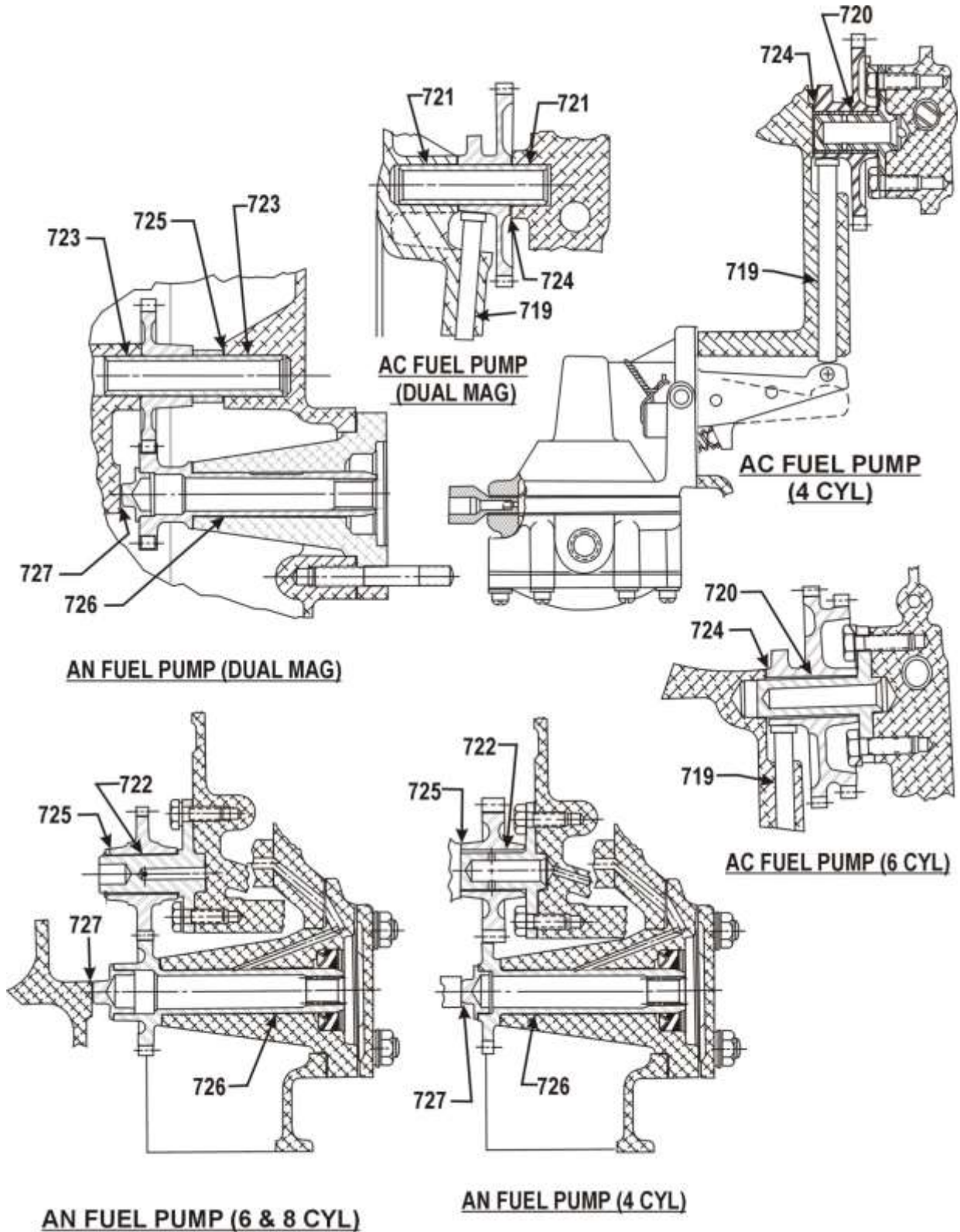
**SCAVENGE PUMP AIO 320 & AIO-360**

Scavenge Pumps

# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

### SECTION III – GEAR TRAIN



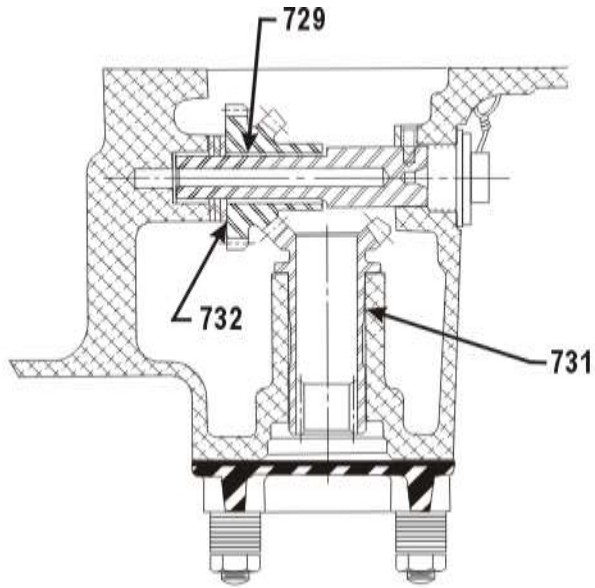
Fuel Pumps



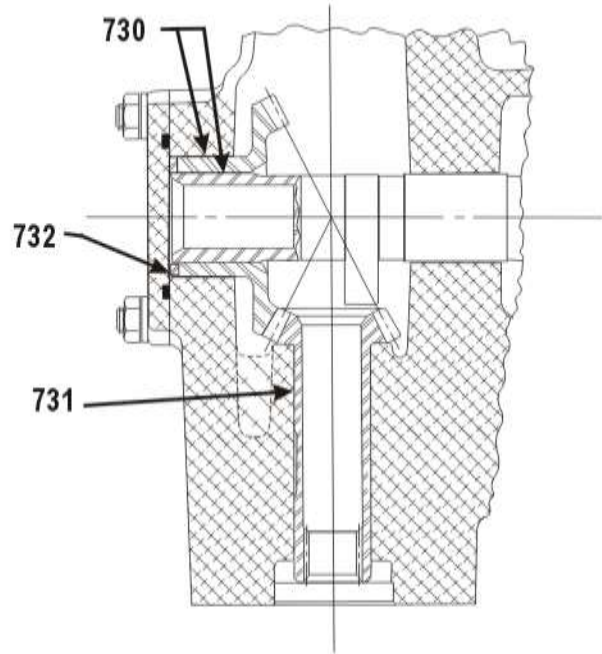
# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

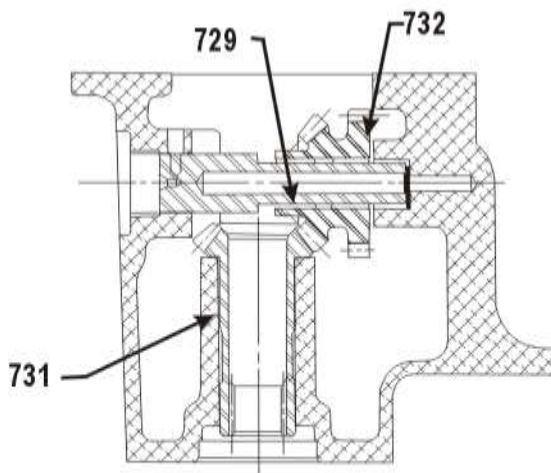
### SECTION III – GEAR TRAIN



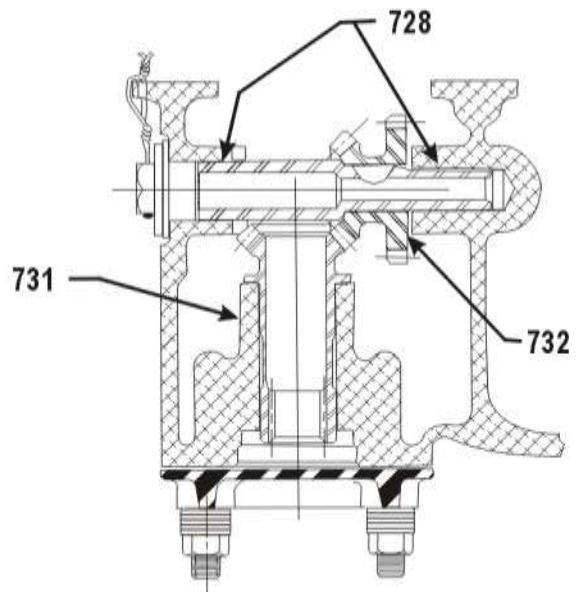
**4 & 8 (WIDE DECK)**



**O-320-H O, LO-360-E**



**6 CYL. (WIDE DECK) (2200 LB)**



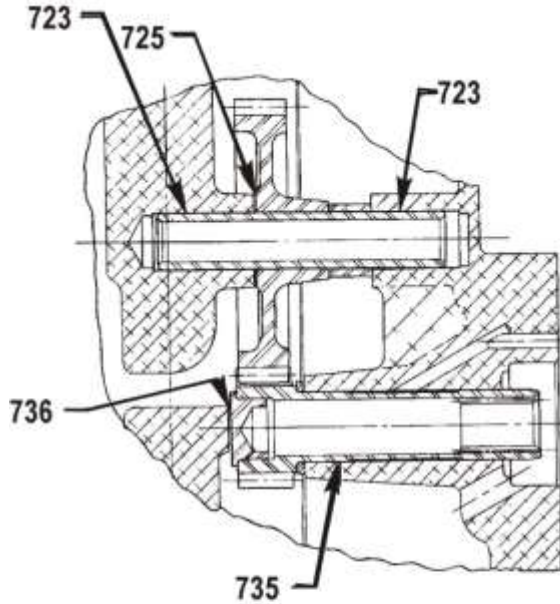
**NARROW DECK (6 & 8 CYL.)**

Front Governor

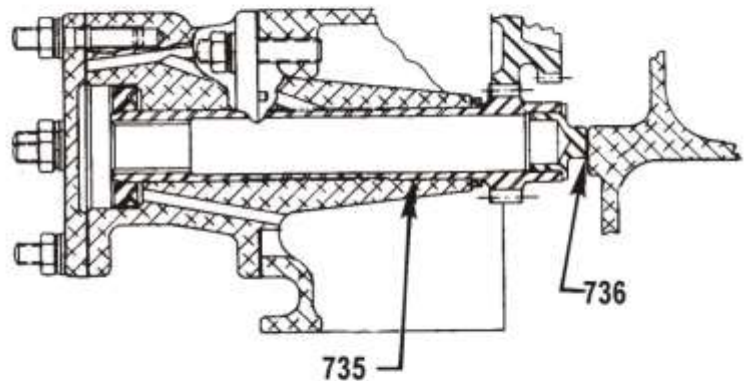
# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

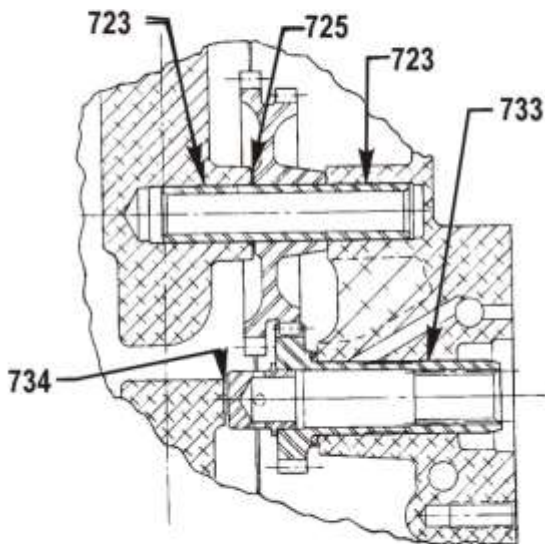
### SECTION III – GEAR TRAIN



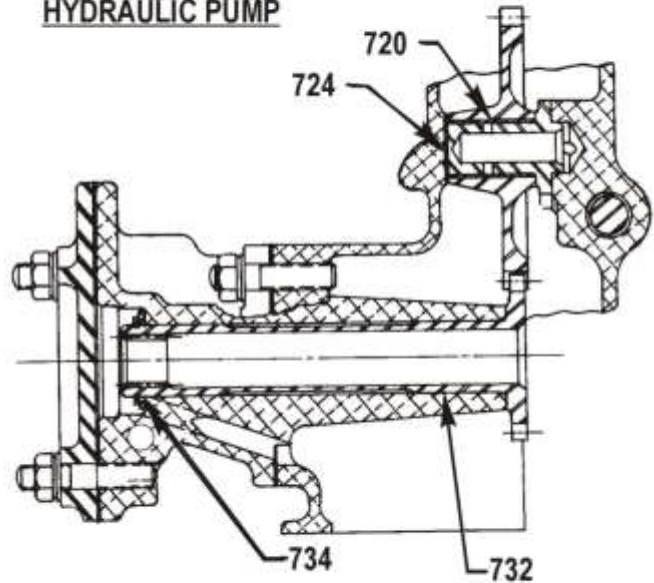
HYDRAULIC PUMP- DUAL MAG



HYDRAULIC PUMP



REAR PROP. GOV (4 CYL)  
(DUAL MAG)



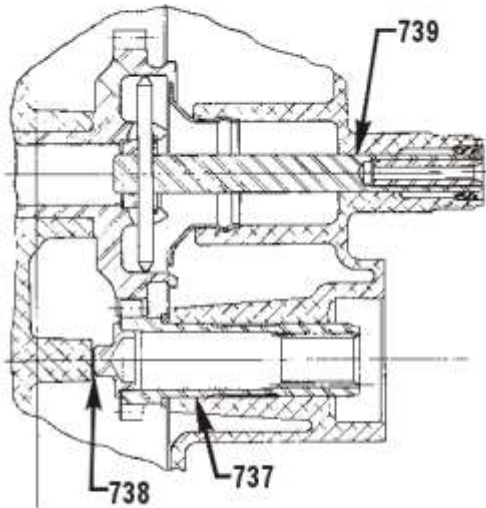
REAR PROP. GOV (4 CYL)  
(STANDARD)

Rear Governor and Hydraulic Pumps

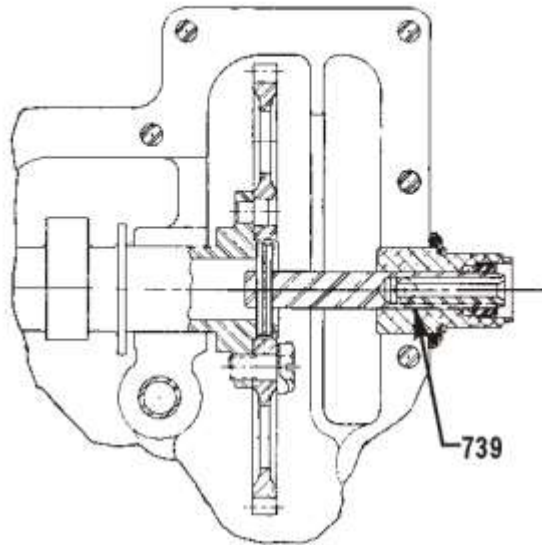
# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

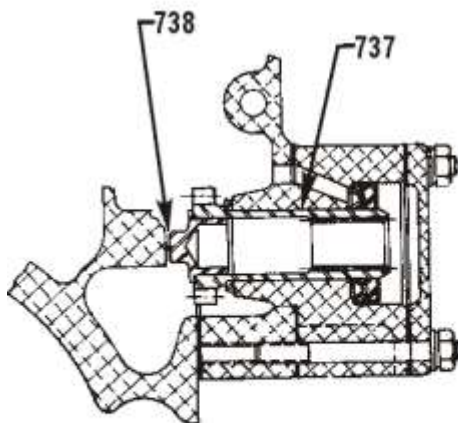
### SECTION III – GEAR TRAIN



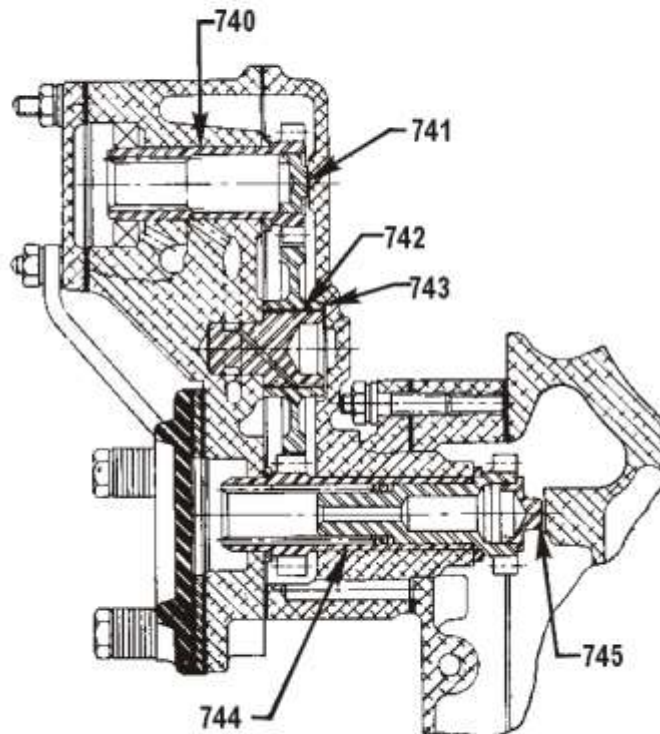
VACUUM PUMP & TACHOMETER



TACHOMETER DRIVE



VACUUM PUMP



DUAL DRIVE (VACUUM PUMP & PROP GOV.)  
OR (VACUUM PUMP & HYD. PUMP)

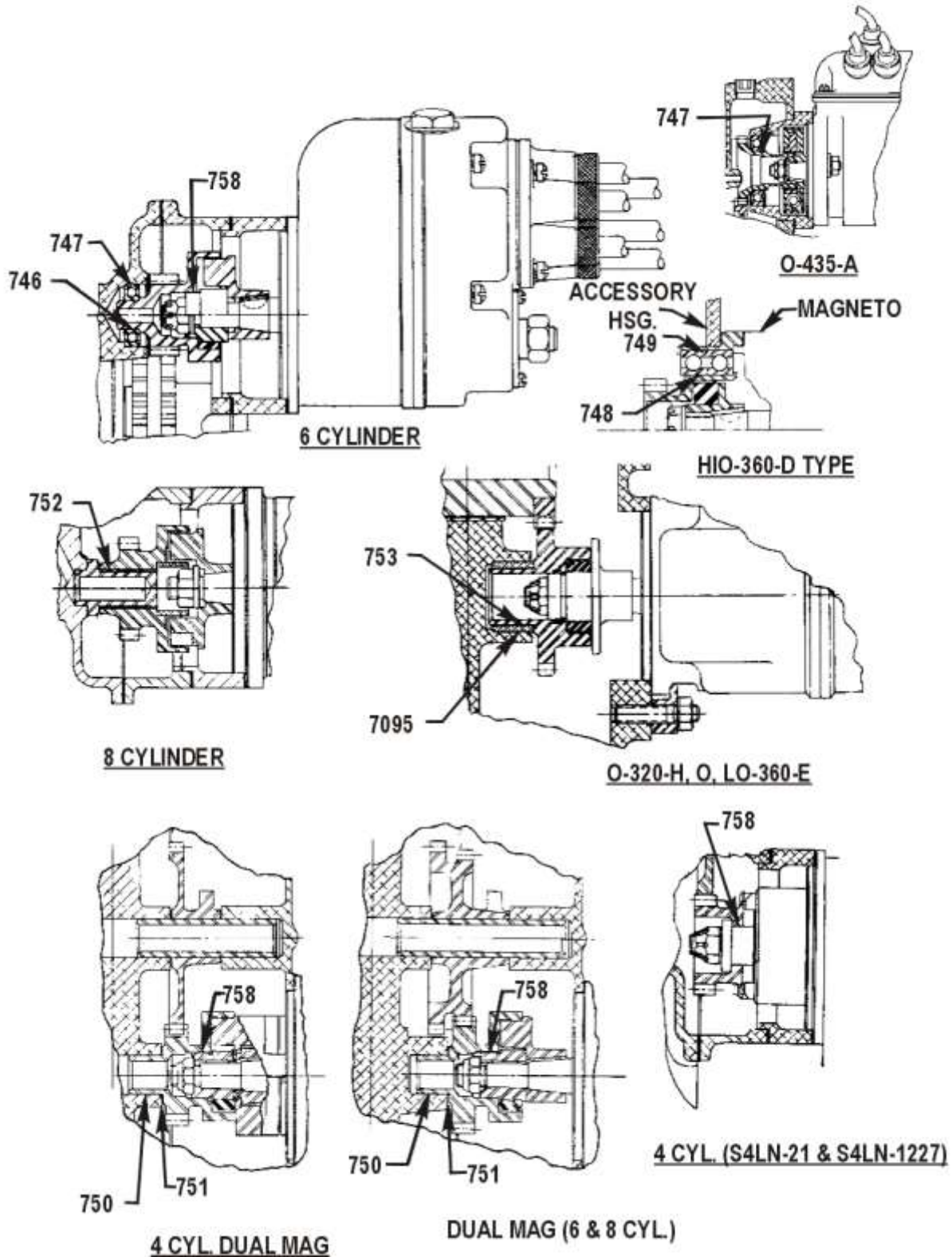
Tachometer Drives, Vacuum and Hydraulic Pump Drives



# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

### SECTION III – GEAR TRAIN

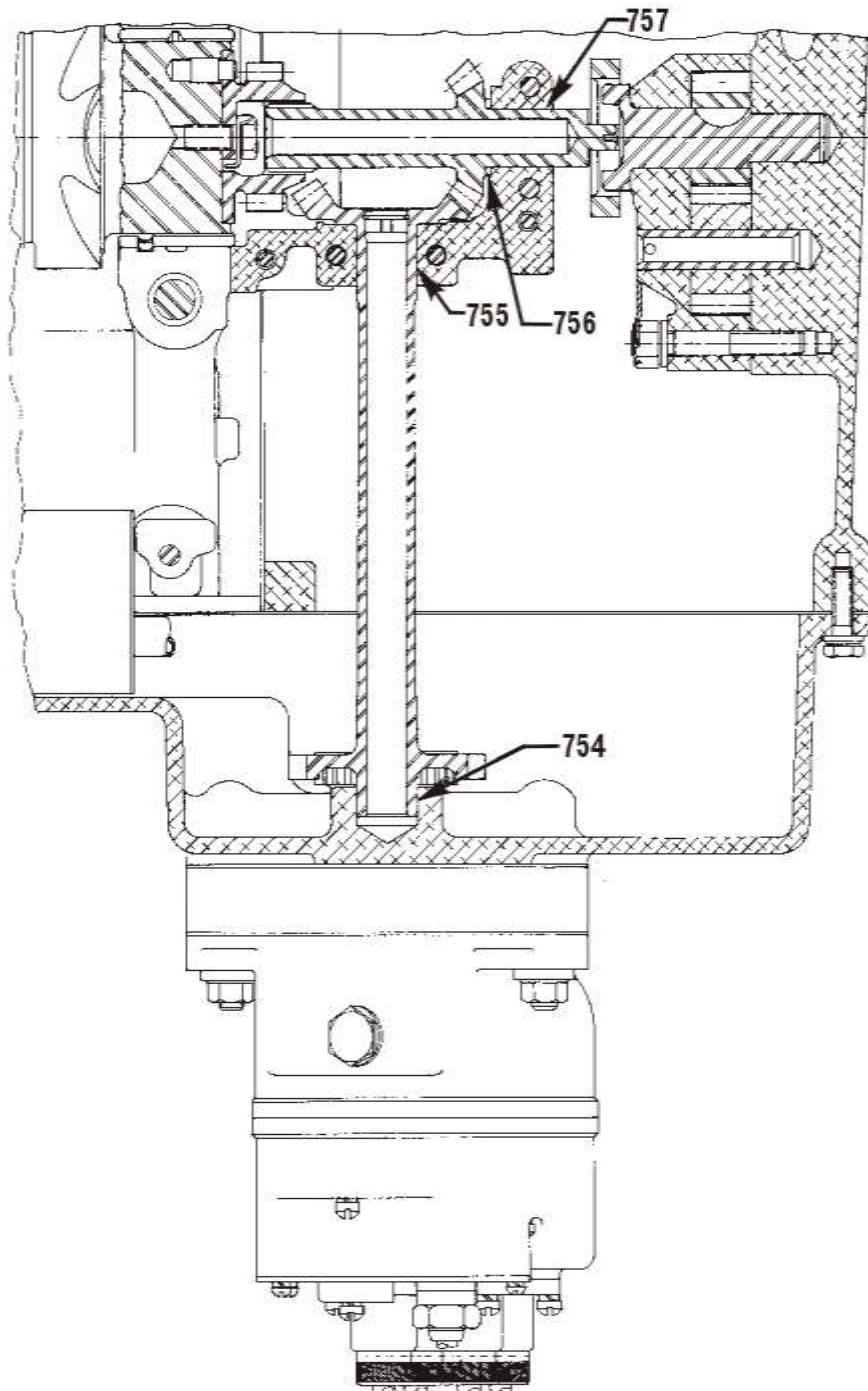


Accessory Drives: Magnetos Generator and Starters

# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

### SECTION III – GEAR TRAIN



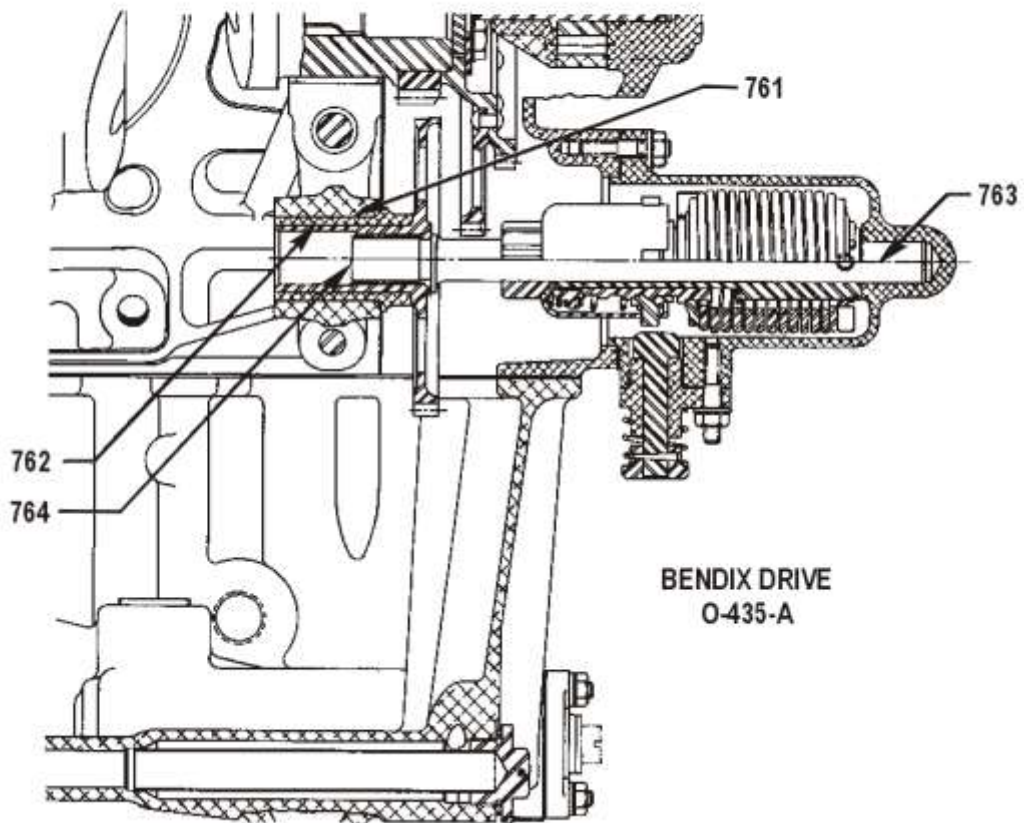
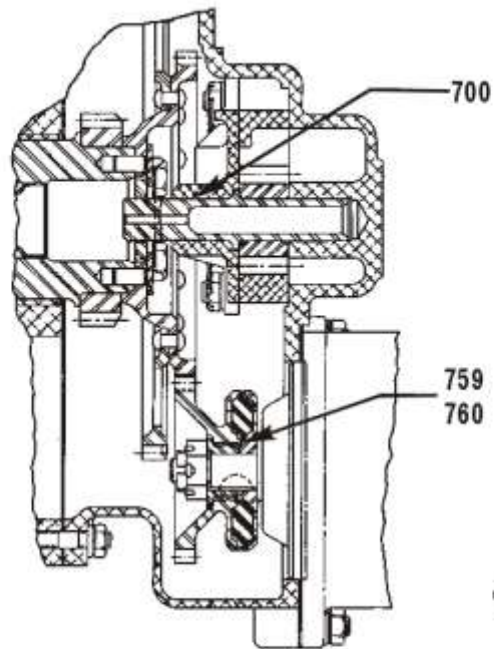
VO, IVO-360

Accessory Drives: Magnetos

# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

### SECTION III – GEAR TRAIN



Generator and Bendix Drive

# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

### SECTION IV – BACKLASH

| Ref. | Chart                    | Nomenclature                                                        | Dimensions             |                 | Clearances             |                 |
|------|--------------------------|---------------------------------------------------------------------|------------------------|-----------------|------------------------|-----------------|
|      |                          |                                                                     | Mfr.<br>Min. &<br>Max. | Service<br>Max. | Mfr.<br>Min. &<br>Max. | Service<br>Max. |
| 800  | A-B-G-J-S-T-Y-AF         | Camshaft and Vacuum Pump – Backlash                                 |                        |                 | <u>.004</u><br>.015    | .020            |
| 801  | BD-BE                    | Camshaft and Vacuum and Oil Pump Drive – Backlash                   |                        |                 | <u>.006</u><br>.014    | .020            |
| 802  | Y                        | Camshaft and Fuel Pump – Backlash                                   |                        |                 | <u>.004</u><br>.015    | .020            |
| 803  | A-B-G-J-S-T-Y-AF         | Camshaft and Crankshaft Idler – Backlash                            |                        |                 | <u>.004</u><br>.015    | .020            |
| 804  | A-B-G-J-S-T-Y-AF         | Crankshaft and Crankshaft Idler – Backlash                          |                        |                 | <u>.004</u><br>.015    | .020            |
| 805  | A-B-G-J-S-T-AF           | Magneto Drive and Crankshaft Idler – Backlash                       |                        |                 | <u>.004</u><br>.015    | .020            |
| 806  | BD-BE                    | Magneto Drive and Crankshaft Gear – Backlash                        |                        |                 | <u>.006</u><br>.014    | .020            |
| 807  | BD-BE                    | Crankshaft Gear and Vacuum and Oil Pump Drive – Backlash            |                        |                 | <u>.006</u><br>.014    | .020            |
| 808  | A-B-D-G-J-S-T-Y-AF       | Oil Pump Impellers – Backlash                                       |                        |                 | <u>.008</u><br>.015    | .020            |
|      | BD-BE                    | Oil Pump Impellers – Backlash                                       |                        |                 | <u>.008</u><br>.012    | .020            |
| 809  | S-T-AF<br>(DUAL MAGNETO) | Oil Pump Drive and Crankshaft Idler – Backlash                      |                        |                 | <u>.004</u><br>.015    | .020            |
| 810  | Y                        | Magneto and Magneto Shaft Gear – Backlash                           |                        |                 | <u>.004</u><br>.015    | .020            |
| 811  | Y                        | Accessory Drive Shaft Gear and Magneto Driven Shaft Gear – Backlash |                        |                 | <u>.003</u><br>.005    | .012            |
| 812  | Y                        | Crankshaft Gear and Accessory Drive Shaft Gear – Spline Backlash    |                        |                 | <u>.002</u><br>.005    | .015            |
| 813  | G-J-S<br>(DUAL DRIVE)    | Camshaft and Propeller Governor or Hydraulic Pump – Backlash        |                        |                 | <u>.004</u><br>.015    | .020            |
| 814  | G-J-S<br>(DUAL DRIVE)    | Governor or Hydraulic Pump Drive and Drive Gear – Spline Backlash   |                        |                 | <u>.0013</u><br>.0073  | .010            |
| 815  | G-J-S<br>(DUAL DRIVE)    | Governor or Hydraulic Pump and Idler – Backlash                     |                        |                 | <u>.004</u><br>.015    | .020            |
| 816  | G-J-S<br>(DUAL DRIVE)    | Vacuum Pump and Idler – Backlash                                    |                        |                 | <u>.004</u><br>.015    | .020            |
| 817  | S-T-AF                   | AN Fuel Pump Idler and Crankshaft Idler – Backlash                  |                        |                 | <u>.004</u><br>.015    | .020            |
| 818  | S-T-AF                   | AN Fuel Pump Idler and Fuel Pump Drive – Backlash                   |                        |                 | <u>.004</u><br>.015    | .020            |
| 819  | S-T-AF<br>(DUAL MAGNETO) | Crankshaft Gear and AN Fuel Pump Idler – Backlash                   |                        |                 | <u>.004</u><br>.015    | .020            |
| 820  | T-AF                     | Hydraulic Pump and Crankshaft Idler – Backlash                      |                        |                 | <u>.004</u><br>.015    | .020            |

# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

### SECTION IV – BACKLASH

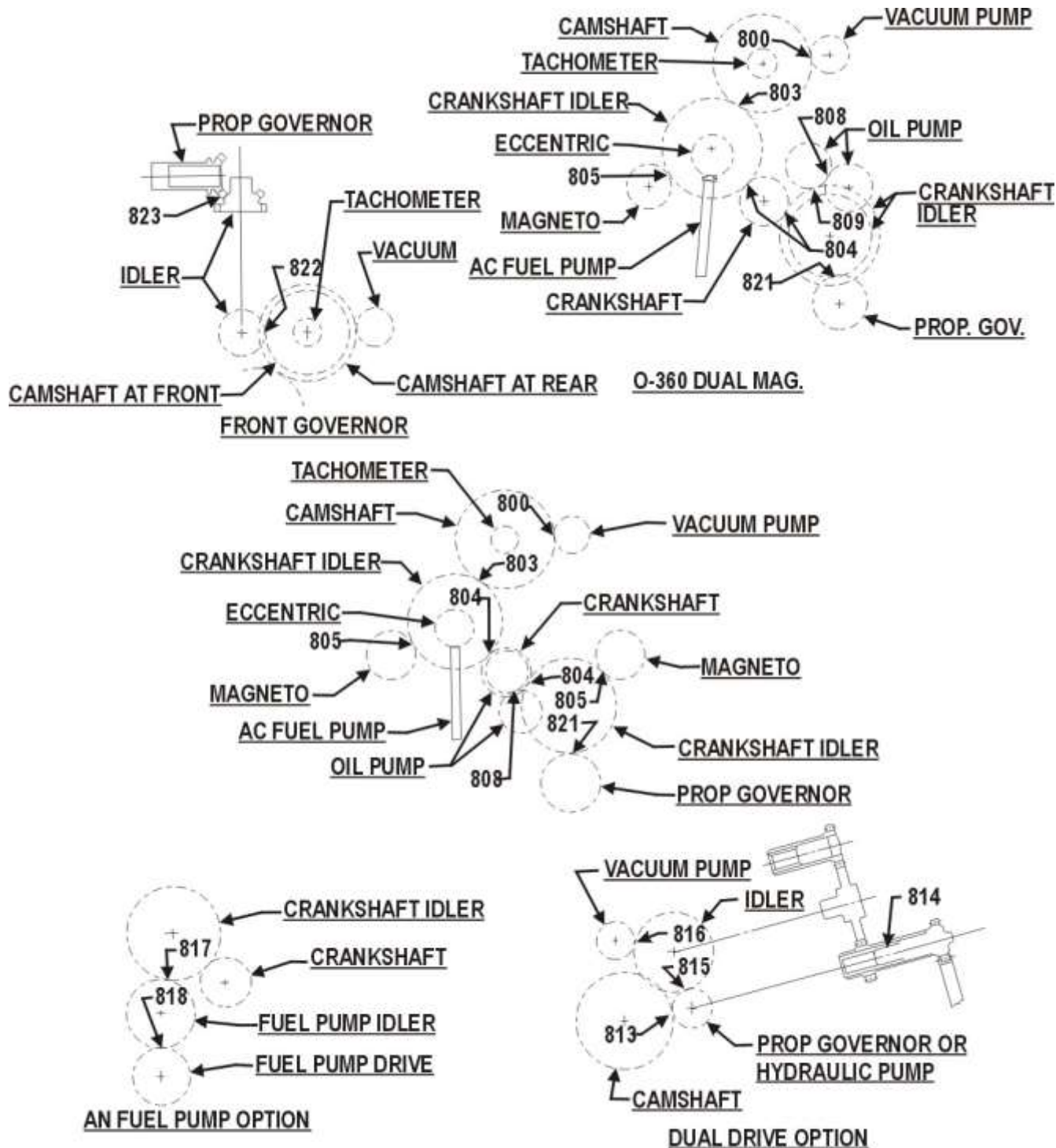
| Ref. | Chart                   | Nomenclature                                                                    | Dimensions             |                 | Clearances             |                 |
|------|-------------------------|---------------------------------------------------------------------------------|------------------------|-----------------|------------------------|-----------------|
|      |                         |                                                                                 | Mfr.<br>Min. &<br>Max. | Service<br>Max. | Mfr.<br>Min. &<br>Max. | Service<br>Max. |
| 821  | G-J-S                   | Propeller Governor Drive and Crankshaft Idler – Backlash (Rear Governor)        |                        |                 | <u>.004</u><br>.015    | .020            |
| 822  | G1-G2-S2-S4-S6-T-AF     | Propeller Governor Idler and Camshaft – Backlash (Front Governor)               |                        |                 | <u>.004</u><br>.015    | .020            |
| 823  | G1-G2-S2-S4-S6-S11-T-AF | Propeller Governor Drive and Idler – Backlash (Bevel Gears) (Front Governor)    |                        |                 | <u>.004</u><br>.008    | .015            |
| 824  | BD-BE                   | Propeller Governor Drive and Camshaft – Backlash (Bevel Gears) (Front Governor) |                        |                 | <u>.003</u><br>.011    | .015            |
| 825  | D                       | Crankshaft Timing Gear and Camshaft Gear – Backlash                             |                        |                 | <u>.004</u><br>.015    | .020            |
| 826  | D                       | Camshaft Gear and Generator Gear – Backlash                                     |                        |                 | <u>.004</u><br>.015    | .020            |
| 827  | D                       | Crankshaft Gear and Generator Gear – Backlash                                   |                        |                 | <u>.004</u><br>.015    | .020            |
| 828  | D                       | Magneto Coupling Spline – Backlash                                              |                        |                 | <u>.001</u><br>.005    | .0075           |
| 829  | D                       | Vacuum Pump Gear and Vacuum Pump Drive Gear – Backlash                          |                        |                 | <u>.004</u><br>.015    | .020            |
| 830  | D                       | Starter Drive and Bendix Drive Gear – Backlash                                  |                        |                 | <u>.004</u><br>.015    | .020            |
| 831  | D                       | Bendix Drive Shaft Spline and Bendix Drive Gear Spline – Backlash               |                        |                 | <u>.001</u><br>.006    | .015            |
| 832  | S                       | Injector Pump Idler Gear and Injector Pump Drive Shaft Gear – Backlash          |                        |                 | <u>.004</u><br>.015    | .020            |



# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

### SECTION IV – BACKLASH



O-235, 0320, O-340 & O-360

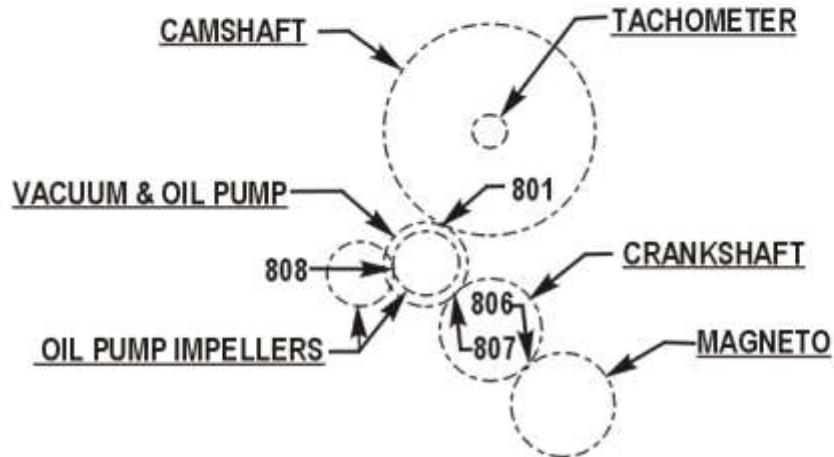
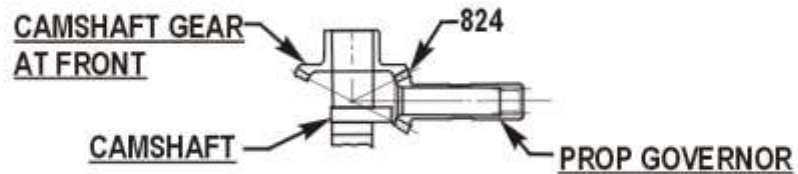
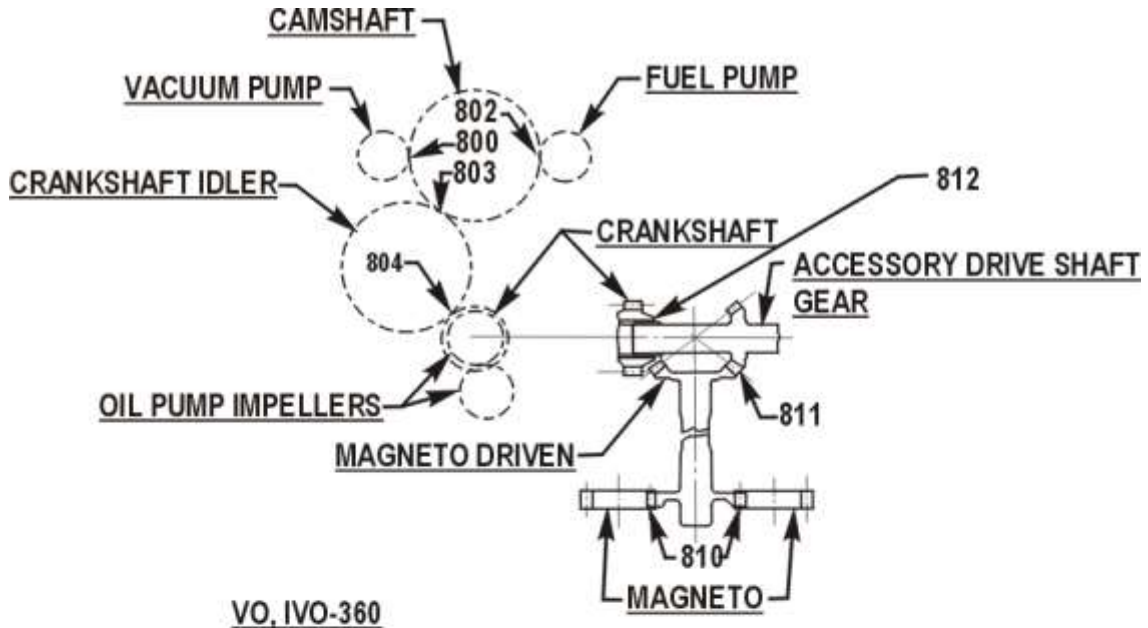
ALL VIEWS SHOWN FROM REAR OF ENGINE

Backlash (Accessory Drives)

# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

### SECTION IV – BACKLASH



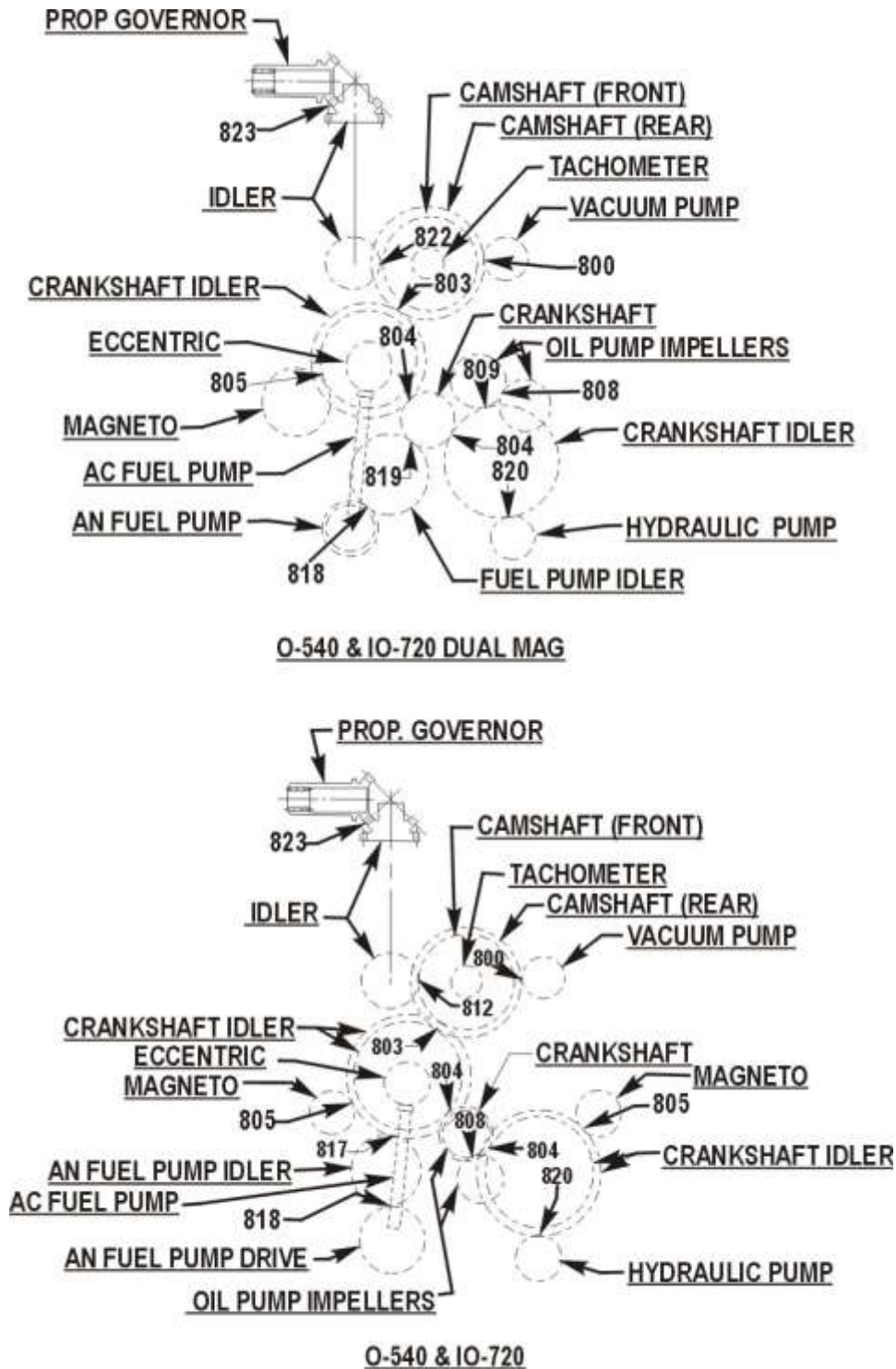
O-320-H, O, LO-360-E  
ALL VIEWS SHOWN FROM REAR OF ENGINE

Backlash (Accessory Drives)

# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

### SECTION IV – BACKLASH



ALL VIEWS SHOWN FROM REAR OF ENGINE

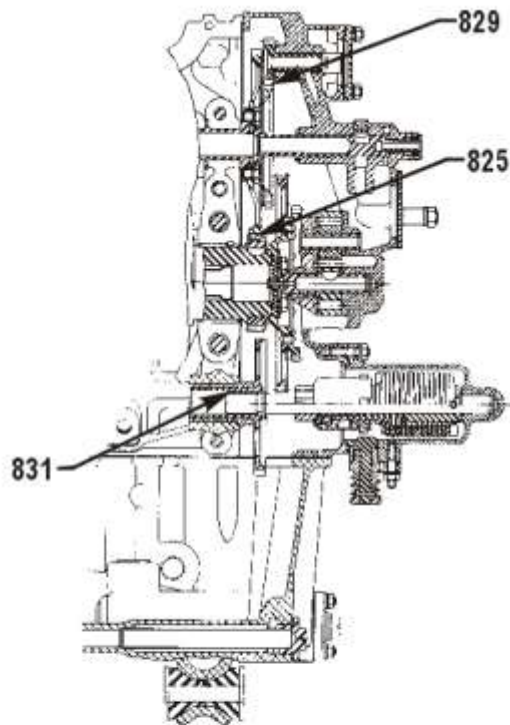
Backlash (Accessory Drives)



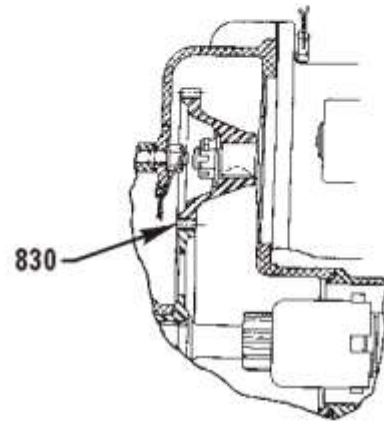
# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

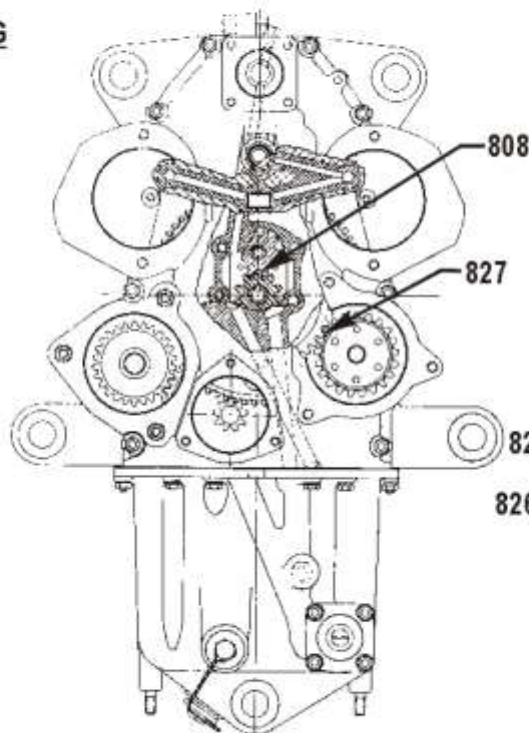
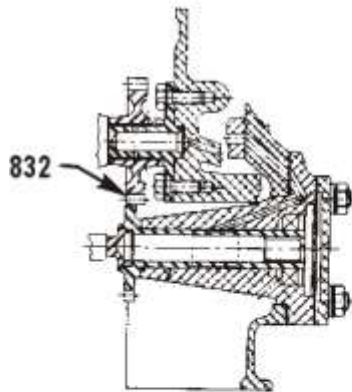
### SECTION IV – BACKLASH



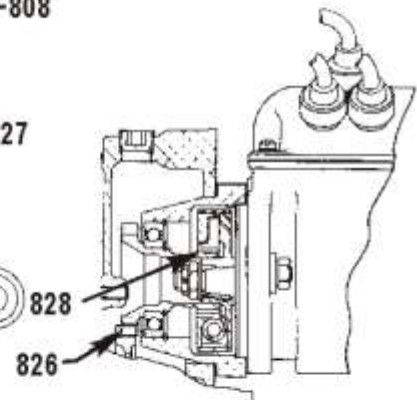
**ACCESSORY HOUSING**  
**O-435-A**



**STARTER DRIVE**  
**O-435-A**



**SECTION THRU REAR**  
**OF ENGINE**



**MAGNETO DRIVE**  
**O-435-A**

Backlash (Accessory Drives)

# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

### SECTION V – SPECIAL TORQUE REQUIREMENTS

| Ref. | Chart                               | Thread Size | Nomenclature                                                                       | Torque Limits    |
|------|-------------------------------------|-------------|------------------------------------------------------------------------------------|------------------|
| 900  | A-B-D-G-S-T-Y-BD-BE                 | 3/8-24      | Connecting Rod Nuts                                                                | 480 in.-lbs      |
|      | J                                   | 3/8-24      | Connecting Rod Nuts                                                                | 360 in.-lbs      |
|      | S1-S3-S5-S6-S7-S9-S11-S12-S14-T3-AF | 3/8-24      | Connecting Rod Bolts – Tighten to this Length                                      | 2-255 – 2.256    |
| 901  | BD-BE                               | 9/16-18     | Oil Pump Shaft Nut                                                                 | 660 in.-lbs      |
| 902  | BD-BE                               | 5/16-24     | Rocker Stud Nut                                                                    | 150 in.-lbs.     |
| 903  | ALL (AS APPLICABLE)<br>(EXCEPT S7)  | 3/8-24      | Magneto Nut (To attach drive member to magneto) – Bendix – Sintered Bushing – Gray | 120-150 in.-lbs. |
|      | ALL (AS APPLICABLE)                 | 3/8-24      | Magneto Nut (To attach drive member to magneto) – Bendix – Steel Bushing           | 170-300 in.-lbs. |
|      | A-G-S                               | 3/8-24      | Magneto Nut (To attach drive member to magneto) – Slick                            | 120-300 in.-lbs. |
|      | S7                                  | 1/2-20      | Magneto Nut (To attach drive member to magneto)                                    | 170-300 in.-lbs. |
| 904  | ALL                                 | 10-32       | Magneto Plate Screws (To attach ignition cable outlet plate to magneto)            | 15 in.-lbs.      |
| 905  | ALL (using a silicone gasket)       | 1/4-20      | Rocker Box Screws                                                                  | 35 in.-lbs.      |
|      | ALL (using a cork gasket)           | 1/4-20      | Rocker Box Screws                                                                  | 50 in.-lbs.      |
| 906  | ALL                                 | 5/16-18     | Exhaust Port Studs                                                                 | 40 in.-lbs. min. |
| 907  | ALL                                 | 18MM        | Spark Plugs                                                                        | 420 in.-lbs.     |
| 908  | ALL                                 | 1/8-27 NPT  | Fuel Pump Vent Fitting<br>(Approximately two turns beyond finger tight)            | 96 in.-lbs.      |
| 909  | ALL                                 | 5/8-32      | Alternator Pulley Nut                                                              | 450 in.-lbs.     |
| 910  | ALL                                 | 1/4-28      | Alternator Output Terminal Nut                                                     | 85 in.-lbs.      |
| 911  | ALL                                 | 10-32       | Alternator Auxiliary Terminal Nut                                                  | 30 in.-lbs.      |
| 912  | ALL                                 | 5/16-24     | Starter Terminal Nut                                                               | 24 in.-lbs.      |
| 913  | ALL (AS APPLICABLE)                 | 1/16-27 NPT | Piston Cooling Nozzle in Crankcase                                                 | 100 in.-lbs.     |
| 914  | Y-S-T-AF                            | 1/8-27 NPT  | Injector Nozzle in Cylinder Head                                                   | 60 in.-lbs.      |
| 915  | ALL (AS APPLICABLE)                 | 3/4-16      | Oil Filter Bolt (AC Can and Element Type)                                          | 300 in.-lbs      |
|      | ALL (AS APPLICABLE)                 | 13/16-16    | Oil Filter (Throw-Away Type)                                                       | 240 in.-lbs.     |
|      | ALL (AS APPLICABLE)                 | 3/4-16      | Converter Stud                                                                     | 720 in.-lbs..)   |
| 916  | ALL (AS APPLICABLE)                 | 3/4-18 NPT  | Carburetor Drain Plug                                                              | 144 in.-lbs.     |
| 917  | ALL (AS APPLICABLE)                 | 1.00-14     | Oil Cooler Bypass Valve                                                            | 300 in.-lbs.     |

# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

### SECTION V – SPECIAL TORQUE REQUIREMENTS (CONT.)

| New Ref.                                                                                                                                | Chart                                                                                                                             | Thread Size                         | Nomenclature                                                                   |                                                 | Torque Limits                                               |
|-----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|--------------------------------------------------------------------------------|-------------------------------------------------|-------------------------------------------------------------|
| 918                                                                                                                                     | ALL (AS APPLICABLE)                                                                                                               | 1-1/4-12                            | Oil Pressure Relief Valve                                                      |                                                 | 300 in.-lbs.                                                |
| 919                                                                                                                                     | ALL                                                                                                                               | 1/4 Hex Head and Below              | Hose Clamps (Worm Type)                                                        |                                                 | 20 in.-lbs.                                                 |
|                                                                                                                                         |                                                                                                                                   | 5/16 Hex. Head and Above            | Hose Clamps (Worm Type) (Metal to metal: example: heat shield to exhaust pipe) |                                                 | 45 in.-lbs.                                                 |
|                                                                                                                                         |                                                                                                                                   | 5/16 Hex. Head and Above            | Hose Clamps (Worm Type)                                                        |                                                 | 30 – 35 in.-lbs.                                            |
| 920                                                                                                                                     | ALL                                                                                                                               |                                     | Cylinder Head Drain Back Hose Clamps                                           |                                                 | 10 in.-lbs.                                                 |
| 921                                                                                                                                     | S-T                                                                                                                               | Exhaust V-Band Coupling Torque Data |                                                                                |                                                 |                                                             |
|                                                                                                                                         | Coupling Size<br>Tube OD                                                                                                          | Lycoming Part<br>Number             | Vendor Part<br>Number                                                          | T-Bolt Split<br>Type Locknut<br>Torque In.-Lbs. | 1/4 In. Drilled Hex Nut With<br>Safety Wire Torque In.-Lbs. |
|                                                                                                                                         | 1.75 in.                                                                                                                          | LW-12093-4                          | MVT69183-175                                                                   | 65                                              | 75                                                          |
|                                                                                                                                         | 2.00 in.                                                                                                                          | LW-12093-5                          | MVT69183-200                                                                   | 85                                              | 75                                                          |
|                                                                                                                                         | 2.25 in.                                                                                                                          | LW-12093-6                          | MVT69183-225                                                                   | 85                                              | 75                                                          |
|                                                                                                                                         | 2.25 in.                                                                                                                          | LW-12125-3                          | MVT69197-225                                                                   | 85                                              |                                                             |
|                                                                                                                                         | 3.69 in.                                                                                                                          | LW-13464                            | U4204-55-369M                                                                  | 70                                              |                                                             |
|                                                                                                                                         | 3.69 in.                                                                                                                          | LW-15768                            | NH1004420-10                                                                   | 70                                              |                                                             |
|                                                                                                                                         | 922                                                                                                                               | ALL                                 | Turbocharger V-Band Torque Data                                                |                                                 |                                                             |
| Turbocharger Model No.                                                                                                                  |                                                                                                                                   | V-Clamp Part No.                    | V-Clamp Diameter                                                               | Torque In.-Lbs.                                 |                                                             |
| TO-473*                                                                                                                                 |                                                                                                                                   | 400500-600                          | 6.00 in.                                                                       | 40 – 80                                         |                                                             |
| TEO659*                                                                                                                                 |                                                                                                                                   | 400500-685                          | 6.85 in.                                                                       | 40 – 50                                         |                                                             |
| THO8A60*                                                                                                                                |                                                                                                                                   | 400500-775                          | 7.75 in.                                                                       | 40 – 60                                         |                                                             |
| THO8A69*                                                                                                                                |                                                                                                                                   | 400500-775                          | 7.75 in.                                                                       | 40 – 60                                         |                                                             |
| 301E10-2**                                                                                                                              |                                                                                                                                   | TC-6-15                             | 6.50 in.                                                                       | 15 – 20                                         |                                                             |
| * - AiResearch turbocharger.<br>** - Rajay turbocharger.<br>See latest revision of Service Instruction No. 1238 for assembly procedure. |                                                                                                                                   |                                     |                                                                                |                                                 |                                                             |
| 927                                                                                                                                     |                                                                                                                                   | Chart                               | Thread Size                                                                    | Nomenclature                                    |                                                             |
|                                                                                                                                         | ALL DUAL<br>MAG. MODELS                                                                                                           | 1/2-20                              | Crankshaft Gear Bolt                                                           |                                                 | 660 in.-lbs.                                                |
|                                                                                                                                         | BD                                                                                                                                | 1/4                                 | Crankshaft Gear Bolts                                                          |                                                 | 96 – 120 in.-lbs.                                           |
| 928                                                                                                                                     | ALL                                                                                                                               | 3/8-16                              | Cylinder Hold Down Studs<br>(Crankcase Driving Torque)                         |                                                 | 100 in.-lbs.                                                |
|                                                                                                                                         |                                                                                                                                   | 7/16-14                             | Cylinder Hold Down Studs<br>(Crankcase Driving Torque)                         |                                                 | 200 in.-lbs.                                                |
|                                                                                                                                         |                                                                                                                                   | 1/2-13                              | Cylinder Hold Down Studs<br>(Crankcase Driving Torque)                         |                                                 | 250 in.-lbs.                                                |
| 929                                                                                                                                     | A-B-D-BD-BE-J-G-Y-S-T-AF                                                                                                          | 3/8                                 | Cylinder Hold Down Nuts                                                        |                                                 | 300 in.-lbs.                                                |
|                                                                                                                                         | A1                                                                                                                                | 7/16                                | Cylinder Hold Down Nuts                                                        |                                                 | 420 in.-lbs.                                                |
|                                                                                                                                         | B-D-BD-BE-J-G-Y-S-T-AF                                                                                                            | 1/2                                 | Cylinder Hold Down Nuts                                                        |                                                 | 600 in.-lbs.                                                |
|                                                                                                                                         | Cylinder Hold Down and Crankcase Parting Flange Nuts’ Tightening Procedures – See latest revision of Service Instruction No. 1029 |                                     |                                                                                |                                                 |                                                             |

# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

### SECTION V – SPECIAL TORQUE REQUIREMENTS (CONT.)

| Ref. | Chart | Thread Size | Nomenclature                                                      | Torque Limits    |
|------|-------|-------------|-------------------------------------------------------------------|------------------|
| 930  | ALL   | 3/8         | Allen Head Screw (Diaphragm Fuel Pump)                            | 225-250 in.-lbs. |
| 931  | A     | 9/16        | Locking Nut (Valve Adjusting Screw)                               | 450 in.-lbs.     |
| 932  | ALL   | 5/16-18     | Exhaust Transitions – Studs (Driving Torque)                      | 100 in.-lbs.     |
|      | ALL   | 3/8-16      | Exhaust Transitions – Studs (Driving Torque)                      | 200 in.-lbs.     |
| 933  | ALL   | 5/16-32     | Brass union nut on stainless steel injector fuel line (Both Ends) | 25-50 in.-lbs.*  |

\* It is also permissible to tighten the fuel line union nut finger tight, then continue tightening the nut with a wrench an additional 30 to 60 degrees (1/2 to 1 flat of the nut.) Torque in excess of 50 in.-lbs. can result in damage to the parts.

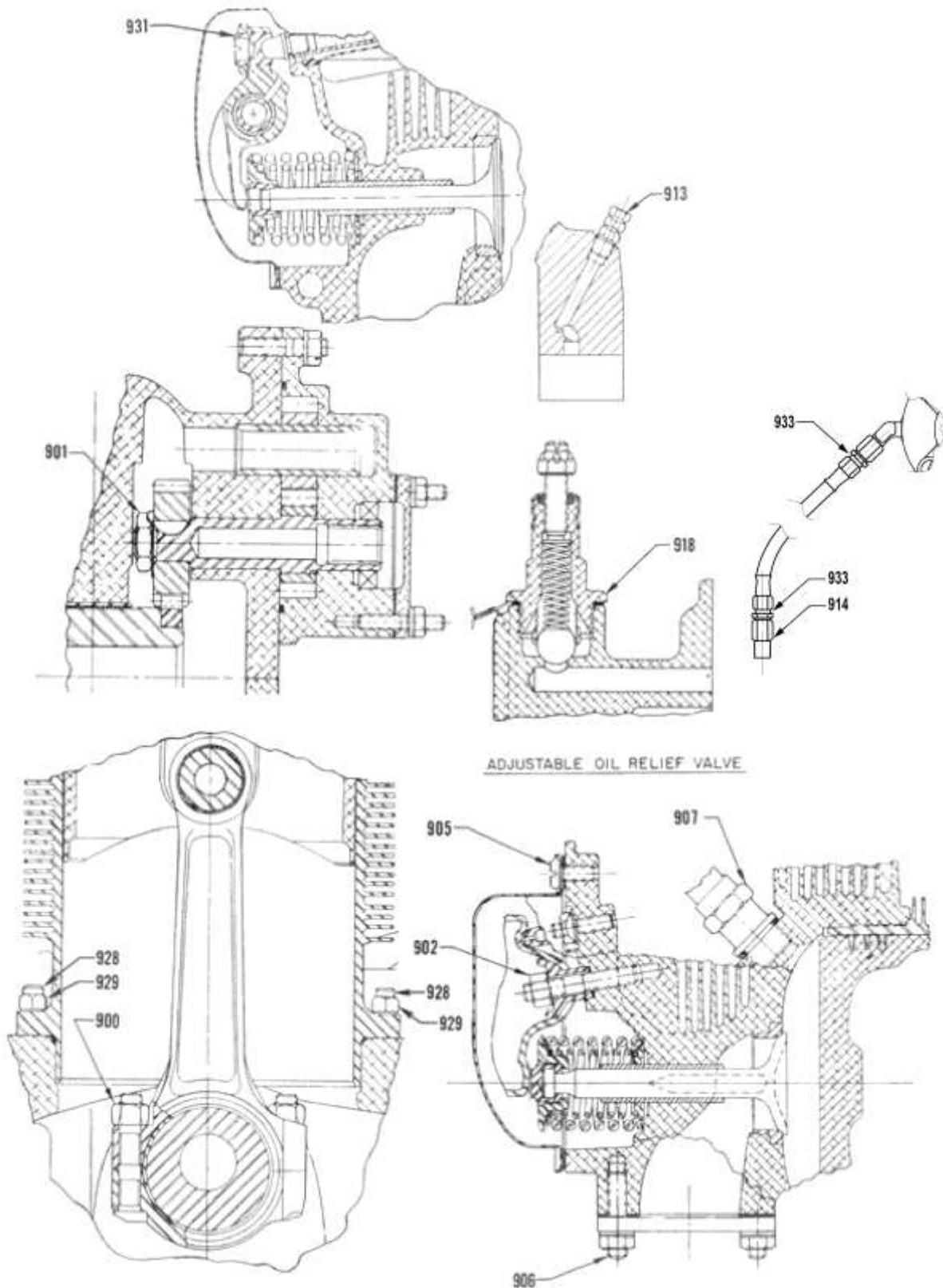
### SECTION V – SPRINGS

| Ref. | Chart                                             | Nomenclature                      | Lycoming Part No. | Wire Dia. | Length at Comp. Length | COMP. LOAD |           |               |
|------|---------------------------------------------------|-----------------------------------|-------------------|-----------|------------------------|------------|-----------|---------------|
|      |                                                   |                                   |                   |           |                        | Mfr. Min.  | Mfr. Min. | Service Max.  |
| 950  | A-B-D-G-J-S-T-Y-BD-BE                             | Outer Valve Springs (Parallel)    | LW-11800          | .177      | 1.30 in.               | 112 lb.    | 122 lb.   | 109 lb. min.  |
|      | S1-S2-S3-S5-S6-S7-S9-S10-S11-S12-S13-S14-T2-T3    | Outer Valve Springs (Angle)       | LW-11796          | .182      | 1.43 in.               | 116 lb.    | 124 lb.   | 113 lb. min.  |
| 951  | A-B-D-G-J-S-T-Y-BD-BE                             | Auxiliary Valve Spring (Parallel) | LW-11795          | .135      | 1.17 in.               | 61 lb.     | 67 lb.    | 58 lb. min.   |
|      | S1-S2-S3-S5-S6-S7-S9-S10-S11-S12-S13-S14-T2-T3-AF | Auxiliary Valve Spring (Angle)    | LW-11797          | .142      | 1.33 in.               | 75 lb.     | 83 lb.    | 72 lb. min.   |
| 952  | ALL (AS APPLICABLE)                               | Oil Pressure Relief Valve Spring  |                   |           |                        |            |           |               |
|      | Lycoming Part Numbers                             | Identification                    |                   |           |                        |            |           |               |
|      |                                                   | Dye                               | Free Length       |           |                        |            |           |               |
|      | 61084                                             | None                              | 2.18              | .054      | 1.30 in.               | 8.5 lb.    | 9.5 lb.   | 8.3 lb. min.  |
|      | LW-18085                                          | Purple/White                      | 1.93              | .067      | 1.44 in.               | 14.50 lb.  | 15.23 lb. | 13.8 lb. min. |
|      | 68668                                             | Purple                            | 2.04              | .054      | 1.30 in.               | 7.1 lb.    | 7.8 lb.   | 6.9 lb. min.  |
|      | 77467                                             | Yellow                            | 1.90              | .054      | 1.30 in.               | 6.4 lb.    | 7.1 lb.   | 6.2 lb. min.  |
|      | LW-11713                                          | White                             | 2.12              | .059      | 1.44 in.               | 10.79 lb.  | 11.92 lb. | 10.5 lb. min. |
| 953  | A-B-G-J-S-T-Y-AF                                  | Oil Cooler Bypass Spring          |                   | .0465     | 1.94 in.               | 6.50 lb.   | 7.25 lb.  | 6.41 lb. min. |
| 954  | BD-BE                                             | Oil Filter Bypass Spring          |                   | .047      | 1.00 in.               | 3.05 lb.   | 3.55 lb.  | 3.0 lb. min.  |
| 955  | D                                                 | Magneto Coupling Spring           |                   | .091      | .603 in.               | 20 lb.     | 22 lb.    | 19 lb. min.   |

# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

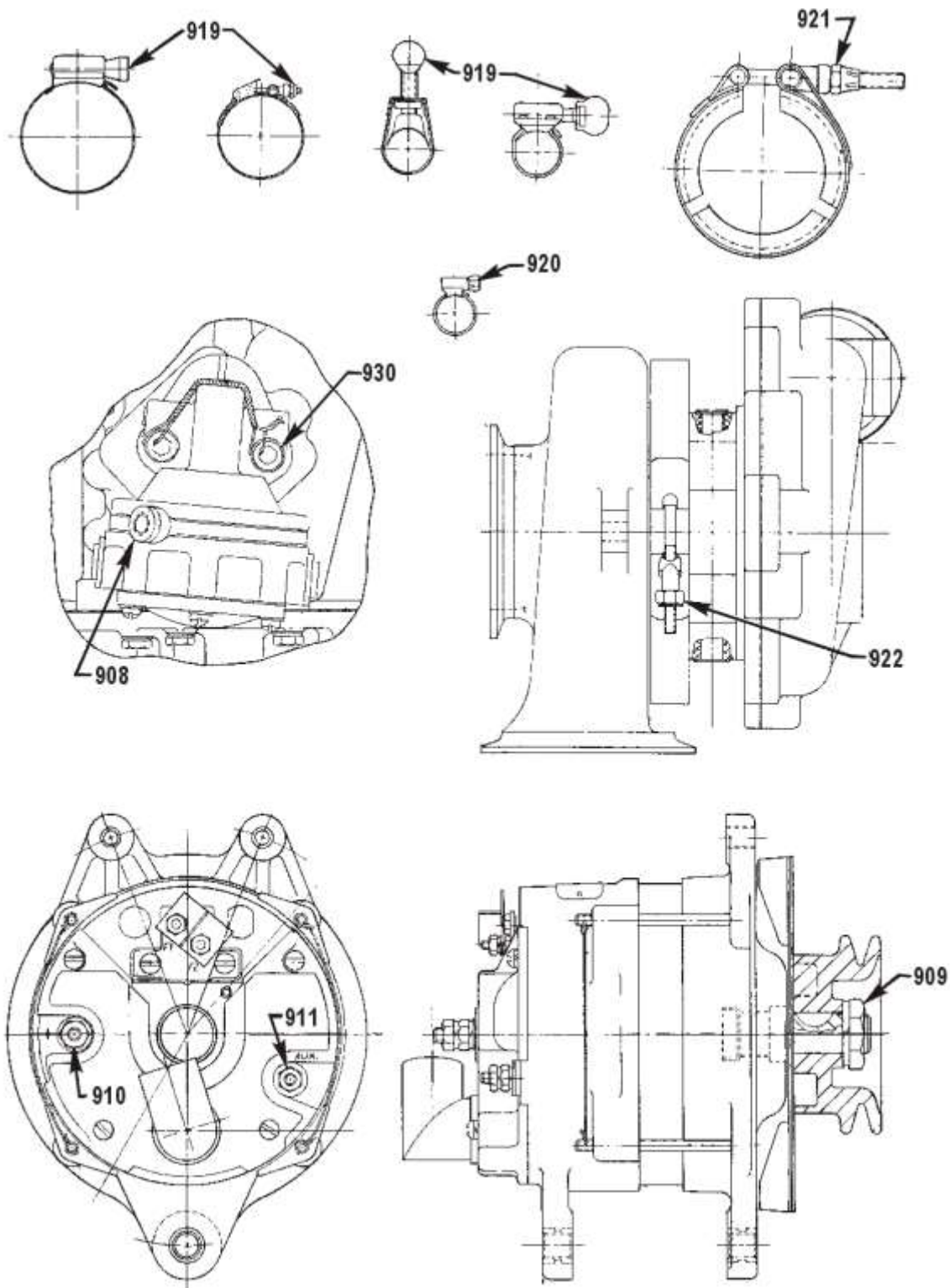
### SECTION V SPECIAL TORQUE REQUIREMENTS



# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

### SECTION V – SPECIAL TORQUE REQUIREMENTS

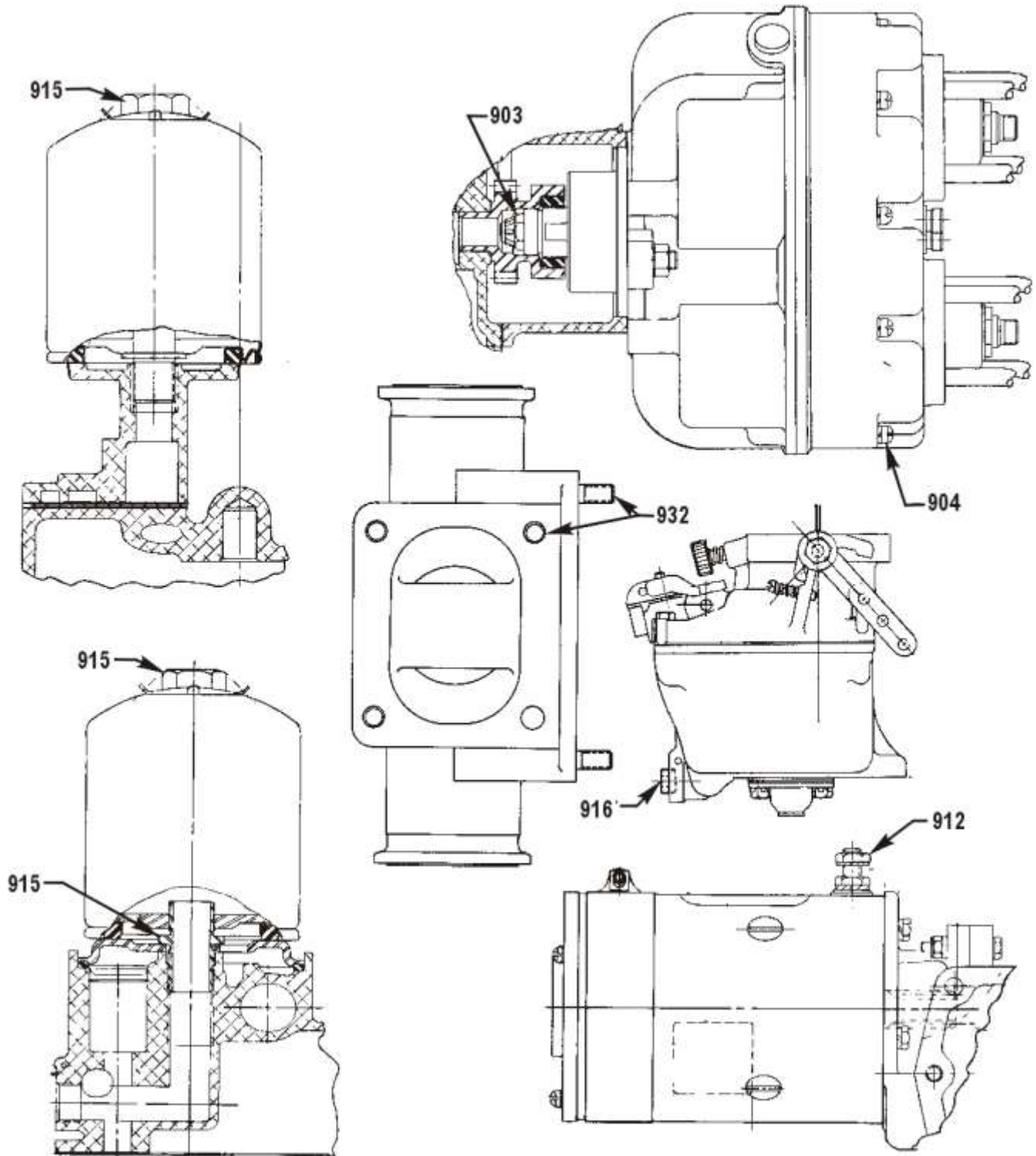


Engine Accessories and Hardware

# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

### SECTION V – SPECIAL TORQUE REQUIREMENTS



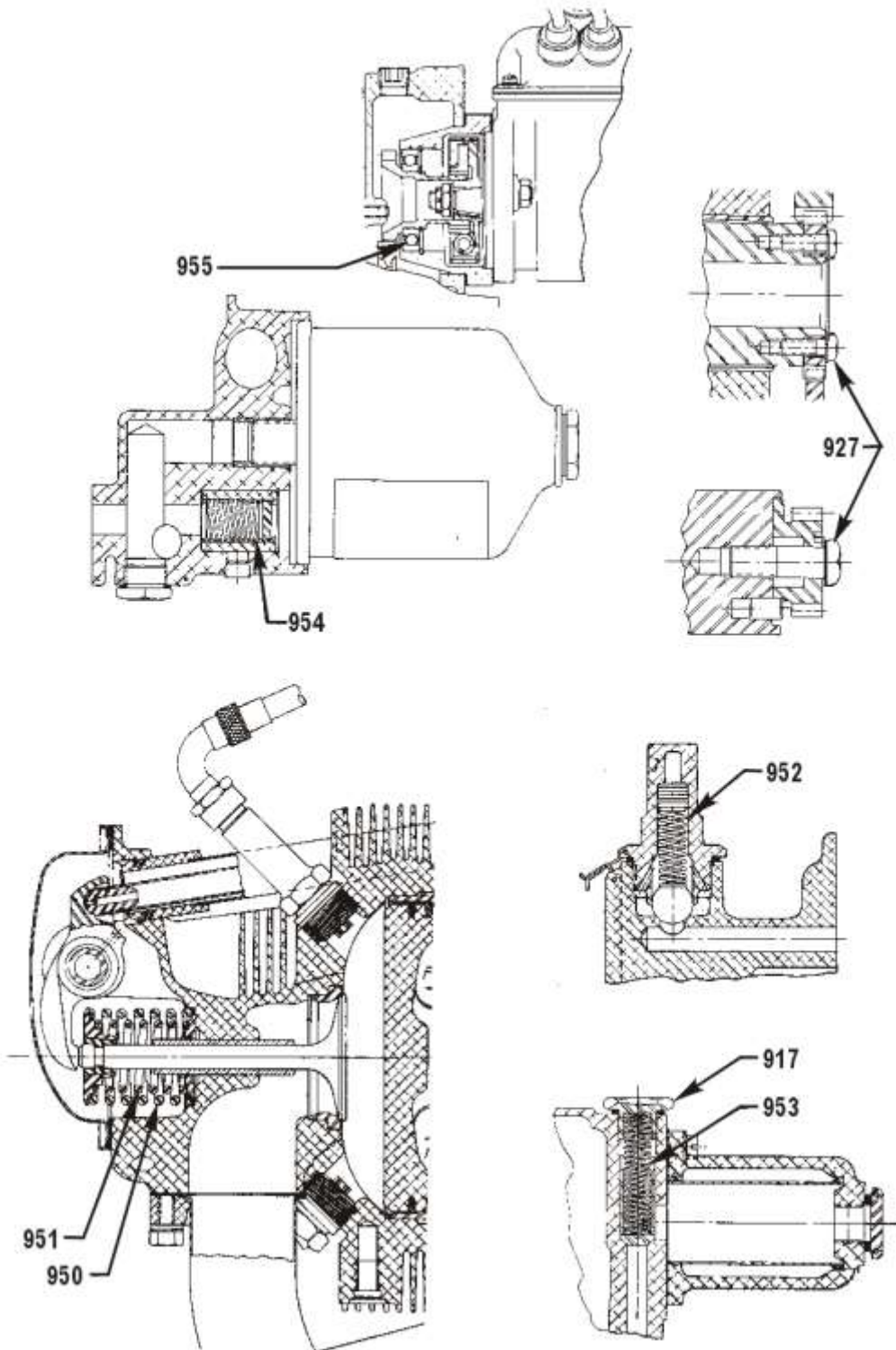
Engine Accessories and Hardware



# SERVICE TABLE OF LIMITS

## PART I – DIRECT DRIVE ENGINES

### SECTION V – SPECIAL TORQUE REQUIREMENTS



Engine Springs and Hardware



# SERVICE TABLE OF LIMITS

## STANDARD TORQUE UNLESS OTHERWISE LISTED

Torque limits for propeller attaching bolts to be supplied by propeller aircraft manufacturer.

NOTE: Refer to Table VIII for torque value conversions (In. Lb. or Ft. Lb. to Nm).

| TABLE I                                          |            |          |        |              |            | TABLE II     |                    |
|--------------------------------------------------|------------|----------|--------|--------------|------------|--------------|--------------------|
| BOLTS, SCREW AND NUTS                            |            |          |        |              |            | PIPE PLUGS   |                    |
| Thread                                           | Torque     |          | Thread | Torque       |            | Thread       | Torque<br>In.-Lbs. |
|                                                  | In. Lb.    | Ft. Lb.  |        | In. Lb.      | Ft. Lb.    |              |                    |
| 8                                                | 20 to 22   | -----    | 7/16   | 600 to 660   | 50 to 55   | 1/16-27 NPT  | 40 to 44           |
| 10                                               | 49 to 54   | -----    | 1/2    | 900 to 984   | 75 to 82   | 1/8-27 NPT   | 40 to 44           |
| 1/4                                              | 96 to 106  | -----    | 9/16   | 1320 to 1452 | 110 to 121 | 1/4-18 NPT   | 85 to 94           |
| 5/16                                             | 204 to 228 | 17 to 19 | 5/8    | 1800 to 1980 | 150 to 165 | 3/8-18 NPT   | 110 to 121         |
| 3/8                                              | 360 to 396 | 30 to 33 | 3/4    | 3240 to 3564 | 270 to 297 | 1/2-14 NPT   | 160 to 176         |
| THIN NUTS (1/2 DIA. OF BOLT) – 1/2 LISTED TORQUE |            |          |        |              |            | 3/4-14 NPT   | 230 to 252         |
|                                                  |            |          |        |              |            | 1-11-1/2 NPT | 315 to 347         |

| TABLE III                                                                                                                                                                                                                                                                                                                                                            |               |        | TABLE IV                                                        |           |                 |            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------|-----------------------------------------------------------------|-----------|-----------------|------------|
| CRUSH TYPE GASKETS                                                                                                                                                                                                                                                                                                                                                   |               |        | FLEXIBLE TUBE CONNECTIONS<br>(SEALASTIC OR EQUIVALENT FITTINGS) |           |                 |            |
| Thread Pitch on Part to be Tightened                                                                                                                                                                                                                                                                                                                                 | ANGLE OF TURN |        | Tube Size                                                       | Thread    | Torque In.-Lbs. |            |
| Threads Per Inch                                                                                                                                                                                                                                                                                                                                                     | Aluminum      | Copper |                                                                 |           | Aluminum Alloy  | Steel      |
| 8                                                                                                                                                                                                                                                                                                                                                                    | 135°          | 67°    | (-3) 3/16                                                       | 3/8 - 24  | 30 to 50        | 70 to 80   |
| 10                                                                                                                                                                                                                                                                                                                                                                   | 135°          | 67°    | (-4) 1/4                                                        | 7/16 - 20 | 40 to 65        | 90 to 100  |
| 12                                                                                                                                                                                                                                                                                                                                                                   | 180°          | 90°    | (-5) 5/16                                                       | 1/2 - 20  | 60 to 80        | 135 to 150 |
| 14                                                                                                                                                                                                                                                                                                                                                                   | 180°          | 90°    | (-6) 3/8                                                        | 9/16-18   | 75 to 125       | 270 to 300 |
| 16                                                                                                                                                                                                                                                                                                                                                                   | 270°          | 135°   | (-8) 1/2                                                        | 3/4-16    | 150 to 250      | 450 to 500 |
| 18                                                                                                                                                                                                                                                                                                                                                                   | 270°          | 135°   | (-10) 5/8                                                       | 7/8 - 14  | 200 to 350      | 650 to 700 |
| 20                                                                                                                                                                                                                                                                                                                                                                   | 270°          | 135°   |                                                                 |           |                 |            |
| 24                                                                                                                                                                                                                                                                                                                                                                   | 360°          | 180°   | TABLE V                                                         |           |                 |            |
| 28                                                                                                                                                                                                                                                                                                                                                                   | 360°          | 180°   | STUDS MIN. DRIVING TORQUE                                       |           |                 |            |
| NOTE: Install all crush type gaskets except the self centering type, with the unbroken surface against the flange of the plug or part being tightened against the seal. Turn the part until the sealing surfaces are in contact and then tighten to the angle of turn listed for the appropriate thread size.<br>NOTE: Lubricate Threads Unless Otherwise Specified. |               |        | Threads                                                         |           | Torque In.-Lbs. |            |
|                                                                                                                                                                                                                                                                                                                                                                      |               |        | 1/4-20                                                          |           | 15              |            |
|                                                                                                                                                                                                                                                                                                                                                                      |               |        | 5/16-18                                                         |           | 25              |            |
|                                                                                                                                                                                                                                                                                                                                                                      |               |        | 3/8-16                                                          |           | 50              |            |
|                                                                                                                                                                                                                                                                                                                                                                      |               |        |                                                                 |           |                 |            |

| TABLE VI                               |             |                 |
|----------------------------------------|-------------|-----------------|
| JAM NUT OR STRAIGHT THREAD O-RING BOSS |             |                 |
| Tube Size                              | Thread      | Torque Ft. Lbs. |
| -03                                    | 3/8 – 24    | 8 – 9           |
| -04                                    | 7/16 – 20   | 13 – 15         |
| -05                                    | 1/2 – 20    | 14 – 15         |
| -06                                    | 9/16 – 18   | 23 – 24         |
| -08                                    | 3/4 – 16    | 40 – 43         |
| -10                                    | 7/8 – 14    | 43 – 48         |
| -12                                    | 1-1/16 – 12 | 68 – 75         |
| -14                                    | 1-3/16 – 12 | 83 – 90         |
| -16                                    | 1-5/16 – 12 | 112 – 123       |
| -20                                    | 1-5/8 – 12  | 146 – 161       |
| -24                                    | 1-7/8 – 12  | 154 – 170       |
| -32                                    | 2-1/2 – 12  | 218 – 240       |

# SERVICE TABLE OF LIMITS

## STANDARD TORQUE (CONT.) UNLESS OTHERWISE LISTED

| TABLE VII           |                     |                                                        |         |              |         |                                                                          |         |                                                                                |        |
|---------------------|---------------------|--------------------------------------------------------|---------|--------------|---------|--------------------------------------------------------------------------|---------|--------------------------------------------------------------------------------|--------|
| METAL TUBE FITTINGS |                     |                                                        |         |              |         |                                                                          |         |                                                                                |        |
| Dash Nos.<br>Ref.   | Tubing<br>OD inches | Wrench torque for tightening AN-818 Nut (pound inches) |         |              |         |                                                                          |         | Minimum bend radii<br>measured to tubing<br>centerline. Dimension in<br>inches |        |
|                     |                     | Aluminum-alloy tubing                                  |         | Steel tubing |         | Aluminum-alloy tubing<br>(Flare MS33583) for use<br>on oxygen lines only |         |                                                                                |        |
|                     |                     | Minimum                                                | Maximum | Minimum      | Maximum |                                                                          |         |                                                                                |        |
|                     |                     |                                                        |         |              |         | Minimum                                                                  | Maximum | Alum.<br>Alloy                                                                 | Steel  |
| -2                  | 1/8                 | 20                                                     | 30      | 75           | 85      | --                                                                       | --      | 3/8                                                                            | --     |
| -3                  | 3/16                | 25                                                     | 35      | 95           | 105     | --                                                                       | --      | 7/16                                                                           | 21/32  |
| -4                  | 1/4                 | 50                                                     | 65      | 135          | 150     | --                                                                       | --      | 9/16                                                                           | 7/8    |
| -5                  | 5/16                | 70                                                     | 90      | 170          | 200     | 100                                                                      | 125     | 3/4                                                                            | 1-1/8  |
| -6                  | 3/8                 | 110                                                    | 130     | 270          | 300     | 200                                                                      | 250     | 15/16                                                                          | 1-5/16 |
| -8                  | 1/2                 | 230                                                    | 260     | 450          | 500     | 300                                                                      | 400     | 1-1/4                                                                          | 1-3/4  |
| -10                 | 5/8                 | 330                                                    | 360     | 650          | 700     | --                                                                       | --      | 1-1/2                                                                          | 2-3/16 |
| -12                 | 3/4                 | 460                                                    | 500     | 900          | 1000    | --                                                                       | --      | 1-3/4                                                                          | 2-5/8  |
| -16                 | 1                   | 500                                                    | 700     | 1200         | 1400    | --                                                                       | --      | 3                                                                              | 3-1/2  |
| -20                 | 1-1/4               | 800                                                    | 900     | 1520         | 1680    | --                                                                       | --      | 3-3/4                                                                          | 4-3/8  |
| -24                 | 1-1/2               | 800                                                    | 900     | 1900         | 2100    | --                                                                       | --      | 5                                                                              | 5-1/4  |
| -28                 | 1-3/4               | --                                                     | --      | --           | --      | --                                                                       | --      | --                                                                             | --     |
| -32                 | 2                   | 1800                                                   | 2000    | 2660         | 2940    | --                                                                       | --      | 8                                                                              | 7      |

| TABLE VIII         |         |      |         |         |       |         |         |        |
|--------------------|---------|------|---------|---------|-------|---------|---------|--------|
| TORQUE CONVERSIONS |         |      |         |         |       |         |         |        |
| In. Lb.            | Ft. Lb. | Nm   | In. Lb. | Ft. Lb. | Nm    | In. Lb. | Ft. Lb. | Nm     |
| 5                  | 0.42    | 0.56 | 100     | 8.33    | 11.30 | 1000    | 83.33   | 113.00 |
| 10                 | 0.83    | 1.13 | 200     | 16.67   | 22.60 | 2000    | 166.70  | 226.00 |
| 20                 | 1.67    | 2.26 | 300     | 25.00   | 53.90 | 3000    | 250.00  | 339.00 |
| 30                 | 2.50    | 3.39 | 400     | 33.33   | 45.19 | 4000    | 333.30  | 451.90 |
| 40                 | 3.33    | 4.52 | 500     | 41.67   | 56.49 | 5000    | 416.70  | 564.90 |
| 50                 | 4.17    | 5.65 | 600     | 50.00   | 67.79 | 6000    | 500.00  | 677.90 |

# SERVICE TABLE OF LIMITS

## PART II – INTEGRAL ACCESSORY DRIVE ENGINES

| CHART | MODELS   |
|-------|----------|
| AQ    | TIO-541  |
| AZ    | TIGO-541 |

|             |            |                                  |
|-------------|------------|----------------------------------|
| SECTION I   | 500 SERIES | CRANKCASE, CRANKSHAFT & CAMSHAFT |
| SECTION II  | 600 SERIES | CYLINDERS                        |
| SECTION III | 700 SERIES | GEAR TRAIN                       |
| SECTION IV  | 800 SERIES | BACKLASH (GEAR TRAIN)            |
| SECTION V   | 900 SERIES | TORQUE AND SPRINGS               |

- (A) These fits are either shrink fits controlled by machining, fits that may readily be adjusted, or fits where wear does not normally occur. In each case, the fit must be held to manufacturing tolerance.
- (B) Side clearance on piston rings must be measured with face of ring flush with piston.
- (D) The dimensions shown are measured at the bottom of the piston skirt at right angles to the piston pin.
- (E) Permissible wear of the crankshaft (rod and main bearing journals) to be minus 0.0015 on the diameter.
- (L) Loose fit; wherein a definite clearance is mentioned between the mating surfaces.
- (T) Tight fit; shrink or interference fit.
- (WD) Wide Deck Crankcase.

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## TECHNICAL PUBLICATION REVISION

| REVISION NO.                                                                                                                                                                                                                                                                                                                               | PUBLICATION             | PUBLICATION NO.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | PUBLICATION DATE |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| SSP-1776-5-PT2                                                                                                                                                                                                                                                                                                                             | Service Table of Limits | SSP-1776                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | October 28, 2013 |
| PREVIOUS REVISIONS                                                                                                                                                                                                                                                                                                                         |                         | CURRENT REVISION*                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                  |
| <p style="text-align: center;"><b>April 2018</b></p> <p style="text-align: center;">2-8, 2-23, 2-24, 2-25, 2-26, 2-27, 2-28, 2-29</p> <ul style="list-style-type: none"><li>Deleted NOTES that reference S.I. 1243 in Piston Application Table</li><li>Added pages and figures for all 900 Series reference numbers in Section V</li></ul> |                         | <p style="text-align: center;"><b>April 2020</b></p> <p style="text-align: center;">2-7</p> <ul style="list-style-type: none"><li>Revised burnishing instructions for connecting rod bushing in reference number 600</li><li>Revised the Mfr. Min. &amp; Max. Clearance for Piston Ring Gap (Compression) Nitrided Cylinders (Choke Barrels) and Piston Ring Gap (Oil) in reference number 607</li></ul> <p>* Revisions are indicated with a vertical bar to the left of the revised item.</p> |                  |

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# SERVICE TABLE OF LIMITS

## PART II – INTEGRAL ACCESSORY DRIVE ENGINES

### SECTION I – CRANKCASE, CRANKSHAFT, CAMSHAFT

| Ref. | Chart | Nomenclature                                                                    | Dimensions              |                 | Clearances              |                 |
|------|-------|---------------------------------------------------------------------------------|-------------------------|-----------------|-------------------------|-----------------|
|      |       |                                                                                 | Mfr.<br>Min. &<br>Max.  | Service<br>Max. | Mfr.<br>Min. &<br>Max.  | Service<br>Max. |
| 500  | AQ    | Main Bearings and Crankshaft (Except Front)                                     |                         |                 | <u>.0011L</u><br>.0041L | .0050L          |
|      | AZ    | Main Bearings and Crankshaft                                                    |                         |                 | <u>.0011L</u><br>.0041L | .0050L          |
|      | AQ    | Front Main Bearings and Crankshaft                                              |                         |                 | <u>.0021L</u><br>.0046L | .0050L          |
|      | AQ-AZ | Diameter of Main Bearing Journal on Crankshaft (2-5/8 Main)                     | <u>2.6245</u><br>2.626  | (E)             |                         |                 |
|      | AQ    | Diameter of Front Main Bearing Journal on Crankshaft (2-5/8 Main)               | <u>2.6240</u><br>2.6250 | (E)             |                         |                 |
|      | AQ-AZ | Crankcase Bearing Bore Diameter                                                 | <u>2.9365</u><br>2.9375 | 2.9390          |                         |                 |
| 501  | AQ-AZ | Connecting Rod Bearing and Crankshaft                                           |                         |                 | <u>.0008L</u><br>.0038L | .0050L          |
|      | AZ    | Diameter of Connecting Rod Journal on Crankshaft (2-1/8)                        | <u>2.1235</u><br>2.125  | (E)             |                         |                 |
|      | AQ    | Diameter of Connecting Rod Journal on Crankshaft (2-1/4)                        | <u>2.2485</u><br>2.250  | (E)             |                         |                 |
|      | AZ    | Connecting Rod Bearing Bore Diameter (2-1/8) (Measure at Axis 30° on each side) | <u>2.2870</u><br>2.2875 |                 |                         |                 |
|      | AQ    | Connecting Rod Bearing Bore Diameter (2-1/4) (Measure at Axis 30° on each side) | <u>2.4205</u><br>2.4210 |                 |                         |                 |
| 502  | AQ-AZ | Connecting Rod – Side Clearance                                                 |                         |                 | <u>.004L</u><br>.010L   | .016L           |
| 503  | AQ-AZ | Connecting Rod – Alignment                                                      |                         |                 | .010 in 10 Inches       |                 |
| 504  | AQ-AZ | Connecting Rod – Twist                                                          |                         |                 | .012 in 10 Inches       |                 |
| 505  |       | Crankshaft Run-Out at Center Main Bearings                                      |                         |                 |                         |                 |
|      | AZ    | Mounted on No. 1 and 4 Journals Max. Run-Out No. 2 and 3 Journals               |                         |                 | .005                    | .0075           |
|      |       | Mounted on No. 1 and 3 Journals Max. Run-Out No. 2 Journal                      |                         |                 | .003                    | .0045           |
|      |       | Mounted on No. 2 and 4 Journals Max. Run-Out No. 3 Journal                      |                         |                 | .003                    | .0045           |
|      | AQ    | Mounted on No. 2 and 5 Journals Max. Run-Out No. 1 Journal                      |                         |                 | .002                    | .002            |
|      |       | Mounted on No. 2 and 5 Journals Max. Run-Out No. 3 Journal                      |                         |                 | .005                    | .0075           |
|      |       | Mounted on No. 2 and 4 Journals Max. Run-Out No. 3 Journal                      |                         |                 | .003                    | .0045           |



# SERVICE TABLE OF LIMITS

## PART II – INTEGRAL ACCESSORY DRIVE ENGINES

### SECTION I – CRANKCASE, CRANKSHAFT, CAMSHAFT

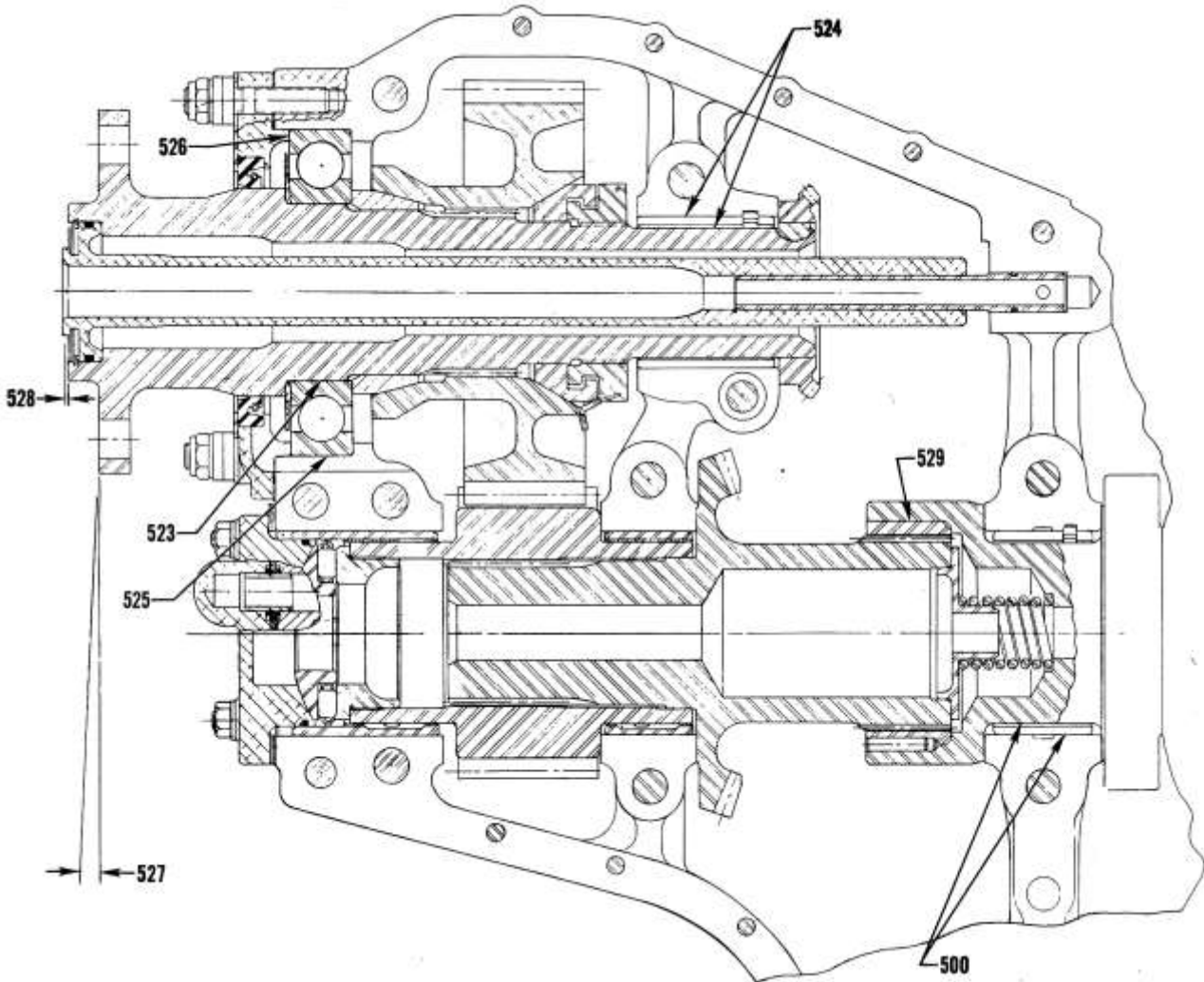
| Ref. | Chart      | Nomenclature                                                                                                           | Dimensions              |                 | Clearances              |                 |
|------|------------|------------------------------------------------------------------------------------------------------------------------|-------------------------|-----------------|-------------------------|-----------------|
|      |            |                                                                                                                        | Mfr.<br>Min. &<br>Max.  | Service<br>Max. | Mfr.<br>Min. &<br>Max.  | Service<br>Max. |
| 506  | AQ (CONT.) | Mounted on No. 3 and 5 Journals Max. Run-Out No. 4 Journal                                                             |                         |                 | .003                    | .0045           |
|      | AQ-AZ      | Crankshaft and Crankcase – Front End Clearance                                                                         |                         |                 | <u>.005L</u><br>.016L   | .026L           |
| 507  | AQ         | Clearance – Front Face of Crankshaft Oil Slinger to Front Face of Recess in Crankcase (Crankshaft Against Thrust Face) |                         |                 | <u>.002</u><br>.007     | (A)             |
| 508  | AQ-AZ      | Crankshaft Propeller Flange Run-Out                                                                                    |                         |                 |                         | .005            |
| 509  | AQ         | Starter Ring Gear and Support                                                                                          |                         |                 | <u>.014T</u><br>.022T   | (A)             |
| 510  | AQ-AZ      | Crankshaft Timing Gear and Crankshaft                                                                                  |                         |                 | <u>.002L</u><br>.0005L  | (A)             |
| 511  | AQ-AZ      | Tappet Body and Crankcase                                                                                              |                         |                 | <u>.0010L</u><br>.0030L | .004L           |
|      | AQ-AZ      | O.D. of Tappet                                                                                                         | <u>.9990</u><br>.9995   | .9987           |                         |                 |
|      | AQ-AZ      | I.D. Tappet Bore in Crankcase                                                                                          | <u>1.0005</u><br>1.0018 | 1.0021          |                         |                 |
| 514  | AQ-AZ      | Camshaft and Crankcase                                                                                                 |                         |                 | <u>.002L</u><br>.004L   | .006L           |
| 515  | AQ-AZ      | Camshaft – End Clearance                                                                                               |                         |                 | <u>.002L</u><br>.004L   | .015L           |
| 516  | AQ-AZ      | Camshaft Run-Out at Center Bearing Journal                                                                             |                         |                 | <u>.000</u><br>.001     | .006            |
| 517  | AQ-AZ      | Counterweight Bushing and Crankshaft                                                                                   |                         |                 | <u>.0013T</u><br>.0026T | (A)             |
| 518  | AQ-AZ      | Counterweight Roller – End Clearance                                                                                   |                         |                 | <u>.003L</u><br>.025L   | .038L           |
| 519  | AQ-AZ      | Counterweight and Crankshaft – Side Clearance (Measure Below Roller Next to Flat)                                      |                         |                 | <u>.003L</u><br>.013L   | .017L           |
| 520  | AQ-AZ      | Counterweight Bore and Washer O.D.                                                                                     |                         |                 | <u>.0002L</u><br>.0030L | (A)             |
| 521  | AQ-AZ      | I.D. Counterweight Bushing                                                                                             | <u>.7485</u><br>.7505   | .7512           |                         |                 |
|      | AZ         | I.D. Counterweight Bushing (2 <sup>nd</sup> order)                                                                     | <u>1.030</u><br>1.032   | 1.0327          |                         |                 |
| 522  | AQ-AZ      | O.D. of Counterweight Roller (See latest revision of Service Instruction No. 1012)                                     |                         |                 |                         |                 |
| 523  | AZ         | Thrust Bearing and Propeller Shaft                                                                                     |                         |                 | <u>.0001L</u><br>.0012L | .002L           |
| 524  | AZ         | Propeller Shaft and Rear Bearing                                                                                       |                         |                 | <u>.0015L</u><br>.0030L | .0040L          |

# SERVICE TABLE OF LIMITS

## PART II – INTEGRAL ACCESSORY DRIVE ENGINES

### SECTION I – CRANKCASE, CRANKSHAFT, CAMSHAFT

| Ref. | Chart | Nomenclature                                                       | Dimensions              |                 | Clearances              |                 |
|------|-------|--------------------------------------------------------------------|-------------------------|-----------------|-------------------------|-----------------|
|      |       |                                                                    | Mfr.<br>Min. &<br>Max.  | Service<br>Max. | Mfr.<br>Min. &<br>Max.  | Service<br>Max. |
| 524  | AZ    | Propeller Shaft Bearing Bore Diameter                              | <u>2.1865</u><br>2.1875 | 2.1885          |                         |                 |
| 525  | AZ    | Thrust Bearing and Crankcase                                       |                         |                 | <u>.0006L</u><br>.0010T | (A)             |
| 526  | AZ    | Thrust Bearing and Thrust Bearing Cap Clamp Fit (Shim to this Fit) |                         |                 | <u>.003T</u><br>.005T   | (A)             |
| 527  | AZ    | Thrust Bearing Tilt at 4 Foot                                      | .027 Tilt               |                 |                         |                 |
| 528  | AZ    | Thrust Bearing End Play                                            |                         |                 | <u>.006</u><br>.008     | .010            |
| 529  | AZ    | Crankshaft and Crankshaft Front Bearing                            |                         |                 | <u>.0002T</u><br>.0015T | (A)             |

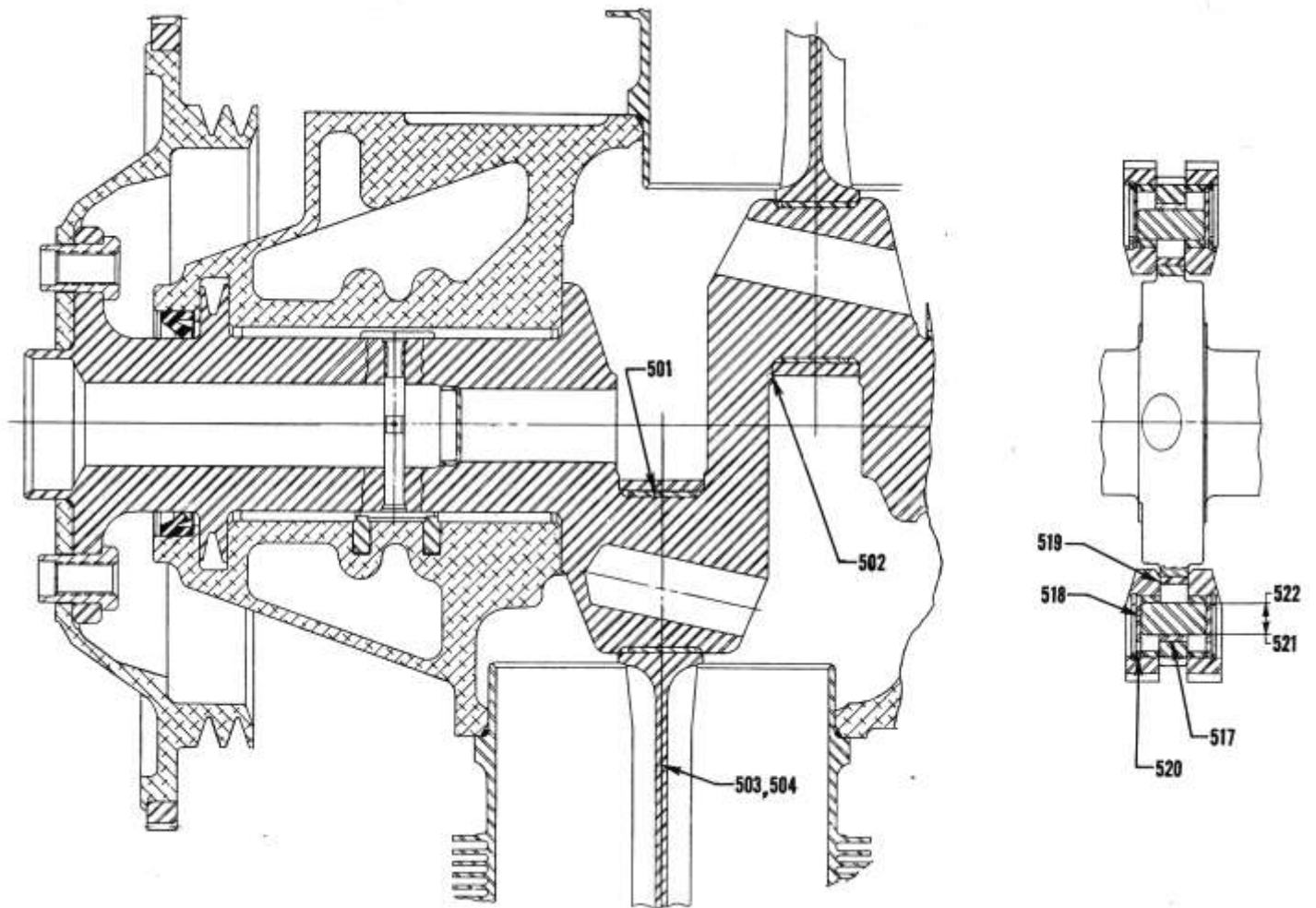


Section Thru Prop. Shaft, Crankshaft and Front Bearings

# SERVICE TABLE OF LIMITS

## PART II – INTEGRAL ACCESSORY DRIVE ENGINES

### SECTION I – CRANKCASE, CRANKSHAFT, CAMSHAFT

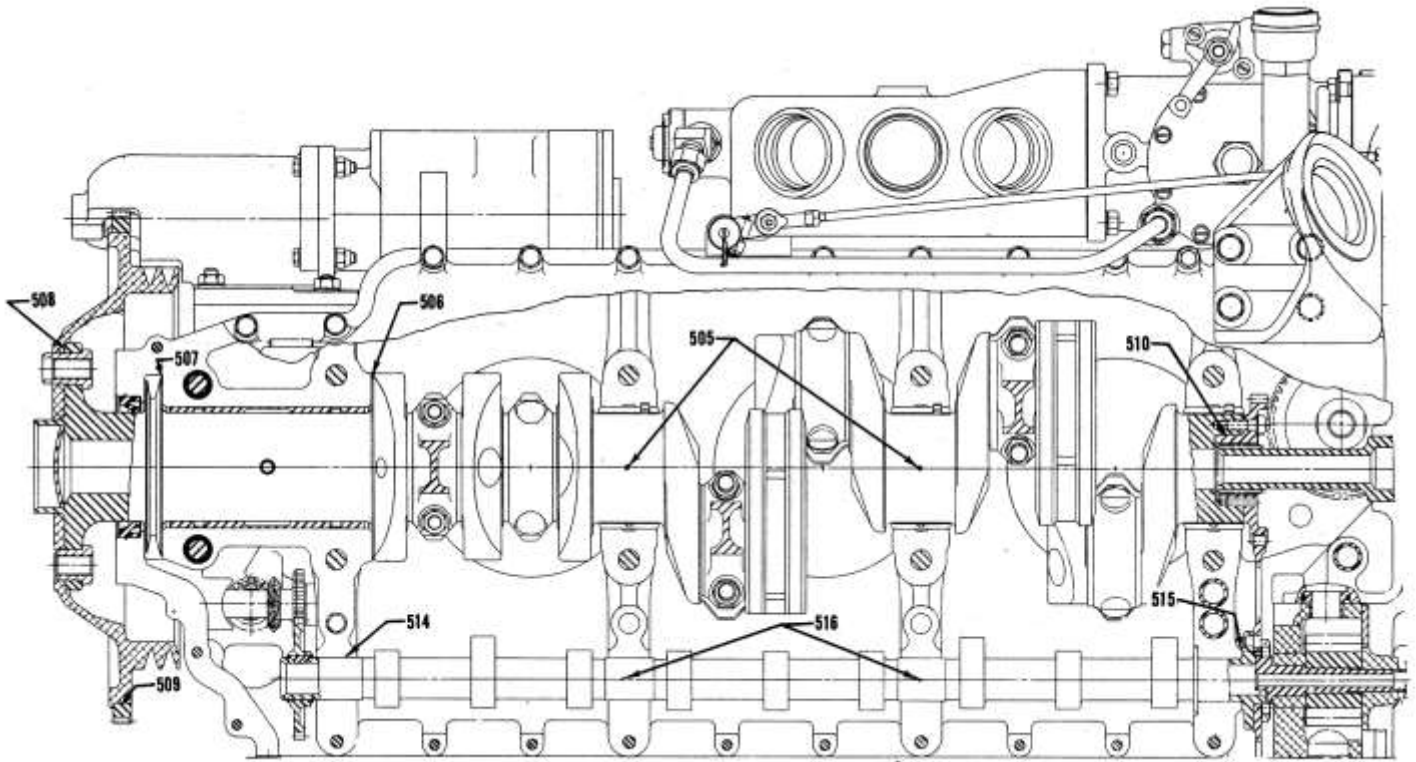


### Connecting Rod, Counterweights and Related Parts

# SERVICE TABLE OF LIMITS

## PART II – INTEGRAL ACCESSORY DRIVE ENGINES

### SECTION I – CRANKCASE, CRANKSHAFT, CAMSHAFT

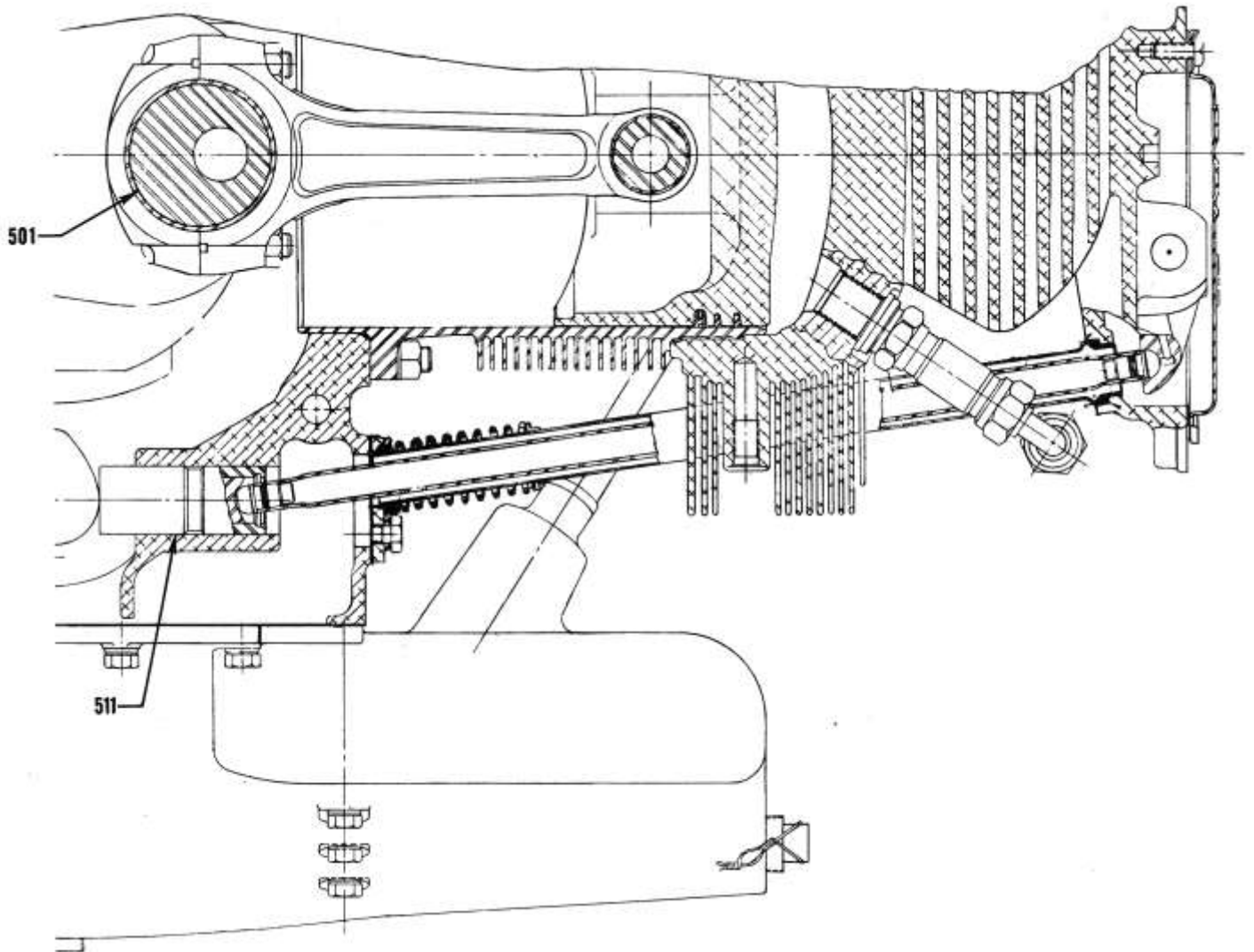


**Longitudinal Section Thru Engine**

# SERVICE TABLE OF LIMITS

## PART II – INTEGRAL ACCESSORY DRIVE ENGINES

### SECTION I – CRANKCASE, CRANKSHAFT, CAMSHAFT



**Connecting Rod Bearing, Tappet Body and Crankcase**

# SERVICE TABLE OF LIMITS

## PART II – INTEGRAL ACCESSORY DRIVE ENGINES

### SECTION II – CYLINDERS

| Ref. | Chart                                                                                                                                                                                                         | Nomenclature                                                                | Dimensions                                                                                               |              | Clearances              |              |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|--------------|-------------------------|--------------|
|      |                                                                                                                                                                                                               |                                                                             | Mfr. Min. & Max.                                                                                         | Service Max. | Mfr. Min. & Max.        | Service Max. |
| 600  | AQ-AZ                                                                                                                                                                                                         | Connecting Rod and Connecting Rod Bushing                                   | Bushings P/N LW-13923 to be burnished in place<br>Bushings P/N 01K28983 is <b>not</b> burnished in place |              |                         |              |
|      | AQ-AZ                                                                                                                                                                                                         | Finished I.D. of Connecting Rod Bushing                                     | <u>1.1254</u><br>1.1262                                                                                  |              |                         |              |
| 601  | AQ-AZ                                                                                                                                                                                                         | Length Between Connecting Rod Bearing Centers                               | <u>6.7485</u><br>6.7515                                                                                  |              |                         |              |
| 602  | AQ-AZ                                                                                                                                                                                                         | Connecting Rod Bushing and Piston Pin                                       |                                                                                                          |              | <u>.0008L</u><br>.0021L | .0025L       |
| 603  | AQ-AZ                                                                                                                                                                                                         | Piston Pin and Piston                                                       |                                                                                                          |              | <u>.0003L</u><br>.0014L | .0018L       |
|      | AQ-AZ                                                                                                                                                                                                         | Diameter of Piston Pin Hole in Piston                                       | <u>1.1249</u><br>1.1254                                                                                  |              |                         |              |
|      | AQ-AZ                                                                                                                                                                                                         | Diameter of Piston Pin                                                      | <u>1.1241</u><br>1.1246                                                                                  |              |                         |              |
| 604  | AQ-AZ                                                                                                                                                                                                         | Piston and Piston Pin Plug                                                  |                                                                                                          |              | <u>.0002L</u><br>.0010L | .002L        |
|      | AQ-AZ                                                                                                                                                                                                         | *Diameter of Piston Pin Plug                                                | <u>1.1242</u><br>1.1247                                                                                  |              |                         |              |
| 605  | AQ-AZ                                                                                                                                                                                                         | Piston Pin and Piston Pin Plug – Nitrided and Chrome Cylinders              |                                                                                                          |              | <u>.0005L</u><br>.0025L | .005L        |
|      | AQ-AZ                                                                                                                                                                                                         | *Diameter of Piston Pin Plug                                                | <u>.5655</u><br>.5665                                                                                    |              |                         |              |
|      | * See latest revision of Service Instruction No. 1267.                                                                                                                                                        |                                                                             |                                                                                                          |              |                         |              |
| 606  | AQ-AZ                                                                                                                                                                                                         | Piston Ring and Piston – Side Clearance (Top Ring Comp.)                    |                                                                                                          |              | <u>.0025L</u><br>.0055L | .008L (B)    |
|      | AQ-AZ                                                                                                                                                                                                         | Piston Ring and Piston – Side Clearance (2 <sup>nd</sup> Ring Comp.)        |                                                                                                          |              | <u>.000L</u><br>.004L   | .006L (B)    |
|      | AQ-AZ                                                                                                                                                                                                         | Piston Ring and Piston - Side Clearance (Oil Regulating)                    |                                                                                                          |              | <u>.002L</u><br>.004L   | .006L (B)    |
| 607  | AQ-AZ                                                                                                                                                                                                         | Piston Ring Gap (Compression) Chrome Cylinders (Straight Barrels)           |                                                                                                          |              | <u>.020</u><br>.030     | .047         |
|      | AQ-AZ                                                                                                                                                                                                         | Piston Ring Gap (Compression) Nitrided and Chrome Cylinders (Choke Barrels) |                                                                                                          |              | <u>.045</u><br>.065     | .067         |
|      | AQ-AZ                                                                                                                                                                                                         | Piston Ring Gap (Oil Regulating) (All Barrels)                              |                                                                                                          |              | <u>.015</u><br>.040     | .047         |
|      | For Choke Barrels – Ring gap is measured within 4 inches from bottom. Ring gap at top of travel must not be less than .0075.<br><br>For All Other Barrels – Ring gap is measured at top limit of ring travel. |                                                                             |                                                                                                          |              |                         |              |

# SERVICE TABLE OF LIMITS

## PART II – INTEGRAL ACCESSORY DRIVE ENGINES

### SECTION II – CYLINDERS

| Ref.                     | Chart<br><br>Nomenclature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                |                        |                 | Dimensions              |                    | Clearances             |                                             |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|------------------------|-----------------|-------------------------|--------------------|------------------------|---------------------------------------------|
|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                |                        |                 | Mfr.<br>Min. &<br>Max.  | Service<br>Max.    | Mfr.<br>Min. &<br>Max. | Service<br>Max.                             |
|                          | Engine and Piston Application                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                | Min. Piston Diameter   |                 | Type of Piston          | Cylinder Barrel    |                        | Max.<br>Clearance<br>Piston Skirt<br>& Cyl. |
|                          | Engine Chart<br>Code Letter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Piston Number                                  | Top                    | Bottom          |                         | Type of<br>Surface | Maximum<br>Diameter    |                                             |
| 608<br>608<br>609<br>610 | AQ-AZ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 76966, LW-10545                                | 5.0790                 | 5.1090          | Forged-Cam              | N-C                | 5.1305                 | .018L                                       |
|                          | <p>NOTES:</p> <p>To find the average diameter of cylinder in an area 4” above bottom of barrel: First, measure diameter at right angles from plane in which valves are located. Second, measure diameter through the plane in which valves are located. Add both diameters; this sum, divided by 2, represents the average diameter of the cylinder.</p> <p>*=High Compression.</p> <p>Cylinder Barrel: N=nitride hardened, C=chrome plated.</p> <p>Maximum taper and out-of-round permitted for cylinder in service is .0045 inch.</p> <p>To find the average out-of-round, measure diameter of cylinder in an area 4” above bottom of barrel: First, measure diameter at right angles from plane in which valves are located. Second, measure diameter through the plane in which valves are located. Difference between diameters must not exceed .0045 inch.</p> <p>Piston diameter at top is measured at top ring land (between top and second compression ring grooves) at right angle to piston pin hole; diameter at bottom of piston is measured at the bottom of the piston skirt at right angles to the piston pin.</p> |                                                |                        |                 |                         |                    |                        |                                             |
| Ref.                     | Chart                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Nomenclature                                   | Dimensions             |                 | Clearances              |                    |                        |                                             |
|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                | Mfr.<br>Min. &<br>Max. | Service<br>Max. | Mfr.<br>Min. &<br>Max.  | Service<br>Max.    |                        |                                             |
| 611                      | AQ-AZ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Exhaust Valve Seat and Cylinder Head           |                        |                 | <u>.0075T</u><br>.011T  | (A)                |                        |                                             |
|                          | AQ-AZ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | O.D. Exhaust Seat                              | <u>1.9355</u><br>1.937 |                 |                         |                    |                        |                                             |
|                          | AQ-AZ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | I.D. Exhaust Seat Hole in Cylinder Head        | <u>1.926</u><br>1.928  |                 |                         |                    |                        |                                             |
| 612                      | AQ-AZ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Intake Valve Seat Hole in Cylinder Head        |                        |                 | <u>.0065T</u><br>.010T  | (A)                |                        |                                             |
|                          | AQ-AZ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | O.D. Intake Seat                               | <u>2.2885</u><br>2.290 |                 |                         |                    |                        |                                             |
|                          | AQ-AZ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | I.D. Intake Seat Hole in Cylinder Head         | <u>2.280</u><br>2.282  |                 |                         |                    |                        |                                             |
| 613                      | AQ-AZ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Exhaust Valve Guide and Cylinder Head          |                        |                 | <u>.0011T</u><br>.0030T | (A)                |                        |                                             |
|                          | AQ-AZ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | O.D. Exhaust Valve Guide                       | <u>.6954</u><br>.6963  |                 |                         |                    |                        |                                             |
|                          | AQ-AZ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | I.D. Exhaust Valve Guide Hole in Cylinder Head | <u>.6933</u><br>.6943  |                 |                         |                    |                        |                                             |

# SERVICE TABLE OF LIMITS

## PART II – INTEGRAL ACCESSORY DRIVE ENGINES

### SECTION II – CYLINDERS

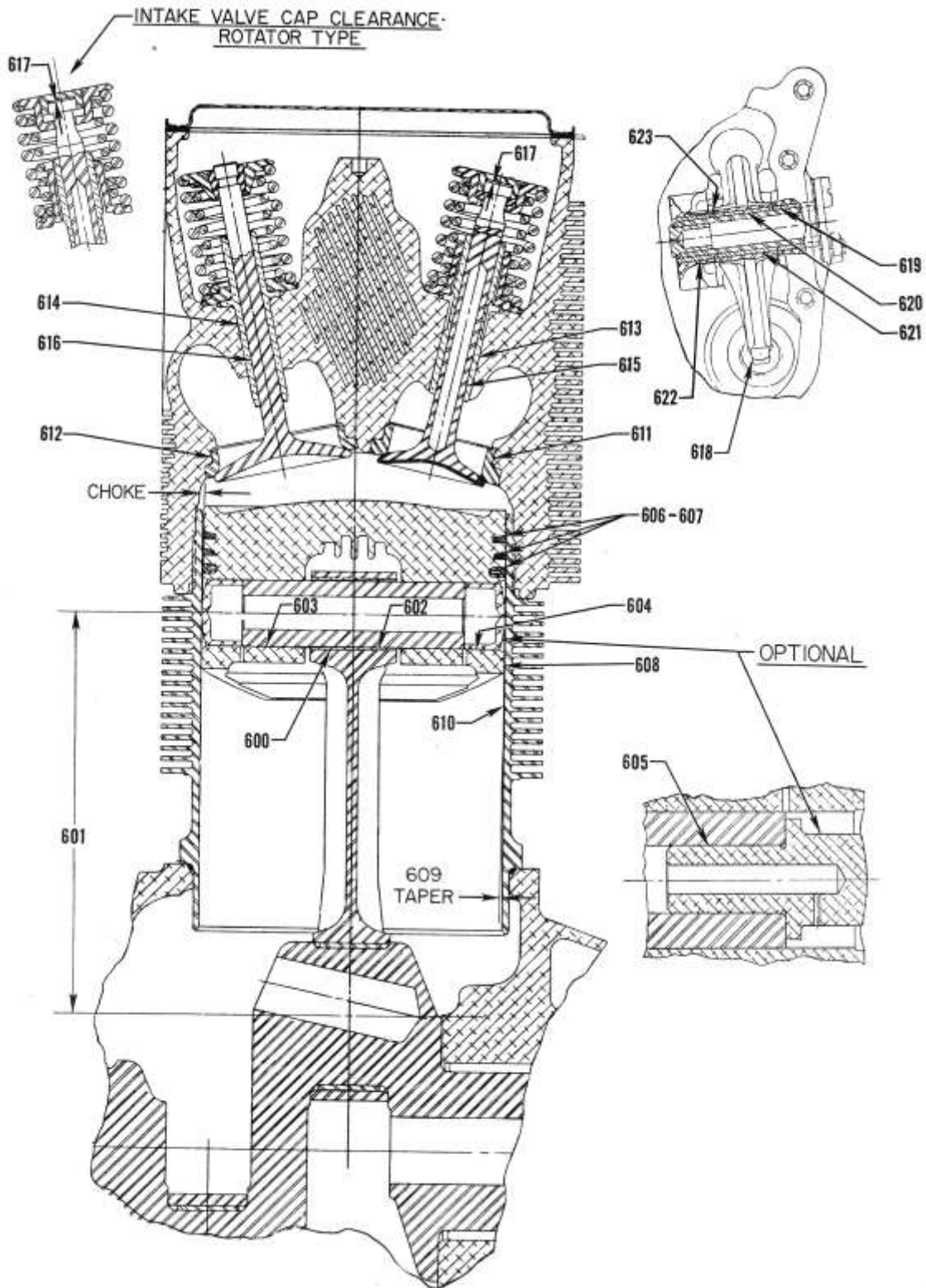
| Ref. | Chart                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Nomenclature                                                                               | Dimensions                         |                 | Clearances              |                 |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|------------------------------------|-----------------|-------------------------|-----------------|
|      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                            | Mfr.<br>Min. &<br>Max.             | Service<br>Max. | Mfr.<br>Min. &<br>Max.  | Service<br>Max. |
| 614  | AQ-AZ                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Intake Valve Guide and Cylinder Head                                                       |                                    |                 | <u>.0010T</u><br>.0025T |                 |
|      | AQ-AZ                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | O.D. Intake Valve Guide                                                                    | <u>.5933</u><br>.5938              |                 |                         |                 |
|      | AQ-AZ                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | I.D. Intake Valve Guide Hole in Cylinder Head                                              | <u>.5913</u><br>.5923              |                 |                         |                 |
| 615  | AQ-AZ                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Exhaust Valve Stem and Valve Guide                                                         |                                    |                 | <u>.0037L</u><br>.0050L | (A)             |
|      | AQ-AZ                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | O.D. Exhaust Valve Stem                                                                    | <u>.4955</u><br>.4965              | .4937           |                         |                 |
|      | AQ-AZ                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Finished I.D. Exhaust Valve Guide                                                          | <u>.4995</u><br>.5005              |                 |                         |                 |
|      | 1/2 inch diameter exhaust valves may have exhaust valve guides that are .003 in. over the maximum inside diameter limit, anytime up to 300 hours of service. After 300 hours of service, inside diameter of exhaust valve guide may increase .001 in. during each 100 hours of operation up to the recommended overhaul time for the engine, or not to exceed .015 inch over the basic I.D. See latest revision of Service Instruction No. 1009 for recommended overhaul time. |                                                                                            |                                    |                 |                         |                 |
| 616  | AQ-AZ                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Intake Valve Stem and Valve Guide                                                          |                                    |                 | <u>.0010L</u><br>.0028L | .006L           |
|      | AQ-AZ                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | O.D. Intake Valve Stem                                                                     | <u>.4022</u><br>.4030              | .4010           |                         |                 |
|      | AQ-AZ                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Finished I.D. Intake Valve Guide                                                           | <u>.4040</u><br>.4050              |                 |                         |                 |
| 617  | AQ-AZ                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Intake and Exhaust Valve and Valve Cap – Clearance (Rotator Type with Small Diameter Head) |                                    |                 | <u>.000</u><br>.004L    | .005L           |
| 618  | AQ-AZ                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Dry Tappet Clearance                                                                       |                                    |                 | <u>.040</u><br>.105     |                 |
| 619  | AQ-AZ                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Valve Rocker Shaft and Valve Rocker Bushing                                                |                                    |                 | <u>.0001L</u><br>.0013L | .0025L          |
|      | AQ-AZ                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Finished I.D. of Valve Rocker Shaft (Bushing) in Cylinder Head                             | <u>.6246</u><br>.6261              | .6270           |                         |                 |
| 620  | AQ-AZ                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Valve Rocker Shaft and Valve Rocker Bushing                                                |                                    |                 | <u>.0007L</u><br>.0017L | .004L           |
|      | AQ-AZ                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Finished I.D. of Rocker Arm Bushing                                                        | <u>.6252</u><br>.6263              | .6270           |                         |                 |
|      | AQ-AZ                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | O.D. Valve Rocker Shaft                                                                    | <u>.6241</u><br>.6245              | .6231           |                         |                 |
| 621  | AQ-AZ                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Valve Rocker Bushing and Valve Rocker                                                      | Bushing Must Be Burnished in Place |                 |                         |                 |
| 622  | AQ-AZ                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Valve Rocker Shaft Bushing and Cylinder Head                                               |                                    |                 | <u>.0022T</u><br>.0038T | (A)             |
|      | AQ-AZ                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Valve Rocker Shaft Bushing Hole in Cylinder Head                                           | <u>.7380</u><br>.7388              |                 |                         |                 |
| 623  | AQ-AZ                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Valve Rocker and Cylinder Head – Side Clearance                                            |                                    |                 | <u>.002L</u><br>.020L   | .024L           |



# SERVICE TABLE OF LIMITS

## PART II – INTEGRAL ACCESSORY DRIVE ENGINES

### SECTION II – CYLINDERS



Cylinder, Piston and Valve Components

# SERVICE TABLE OF LIMITS

## PART II – INTEGRAL ACCESSORY DRIVE ENGINES

### SECTION III – GEAR TRAIN

| Ref. | Chart | Nomenclature | Dimensions             |                 | Clearances             |                 |
|------|-------|--------------|------------------------|-----------------|------------------------|-----------------|
|      |       |              | Mfr.<br>Min. &<br>Max. | Service<br>Max. | Mfr.<br>Min. &<br>Max. | Service<br>Max. |

#### OIL PUMP

|     |       |                                           |                       |       |                         |        |
|-----|-------|-------------------------------------------|-----------------------|-------|-------------------------|--------|
| 700 | AQ-AZ | Oil Pump Drive Shaft and Oil Pump Body    |                       |       | <u>.0010L</u><br>.0030L | .004L  |
| 701 | AQ-AZ | Oil Pump Drive Shaft and Oil Pump Cover   |                       |       | <u>.0035L</u><br>.0050L | .0065L |
| 703 | AQ-AZ | Oil Pump Impellers – Diameter Clearance   |                       |       | <u>.002L</u><br>.005L   | .008L  |
| 704 | AQ-AZ | Oil Pump Impellers – Side Clearance       |                       |       | <u>.002L</u><br>.0045L  | .005L  |
|     |       | Width of Oil Pump Impellers               | <u>1.372</u><br>1.374 | 1.371 |                         |        |
| 705 | AQ-AZ | Oil Pump Driven Impellers and Idler Shaft |                       |       | <u>.0005L</u><br>.002L  | .004L  |

#### FUEL PUMP

|     |       |                                            |  |  |                         |        |
|-----|-------|--------------------------------------------|--|--|-------------------------|--------|
| 722 | AQ-AZ | Fuel Pump Idler Gear and Shaft             |  |  | <u>.001L</u><br>.003L   | .005L  |
| 725 | AQ-AZ | Fuel Pump Idler Gear – End Clearance       |  |  | <u>.002L</u><br>.028L   | .038L  |
| 726 | AQ-AZ | Fuel Pump Drive Shaft Gear and Crankcase   |  |  | <u>.0010L</u><br>.0025L | .004L  |
| 727 | AQ-AZ | Fuel Pump Drive Shaft Gear – End Clearance |  |  | <u>.0015L</u><br>.0385L | .0485L |

#### GOVERNOR & TACHOMETER

|     |       |                                                            |  |  |                         |       |
|-----|-------|------------------------------------------------------------|--|--|-------------------------|-------|
| 728 | AQ    | Front Governor Drive Idler Shaft (Both Ends) and Crankcase |  |  | <u>.0010L</u><br>.0025L | .004L |
| 731 | AQ-AZ | Governor Driven Gear and Crankcase                         |  |  | <u>.0010L</u><br>.0025L | .004L |
| 732 | AQ-AZ | Propeller Governor Drive Gear – End Clearance              |  |  | <u>.008L</u><br>.016L   | .021L |
| 739 | AZ    | Tachometer Drive Shaft and Adapter                         |  |  | <u>.0015L</u><br>.0035L | .006L |

#### VACUUM PUMP & HYDRAULIC PUMP

|     |       |                                                            |  |  |                         |       |
|-----|-------|------------------------------------------------------------|--|--|-------------------------|-------|
| 759 | AQ-AZ | Vacuum and Hydraulic Pump Drive Shaft Gear and Crankcase   |  |  | <u>.0010L</u><br>.0025L | .006L |
| 760 | AQ-AZ | Vacuum and Hydraulic Pump Drive Shaft Gear – End Clearance |  |  | <u>.018L</u><br>.028L   | .035L |

#### MAGNETO

|     |       |                                        |  |  |                         |       |
|-----|-------|----------------------------------------|--|--|-------------------------|-------|
| 761 | AQ-AZ | Magneto Coupling and Crankcase         |  |  | <u>.0010L</u><br>.0030L | .004L |
| 762 | AQ-AZ | Magneto Drive Shaft Gear and Crankcase |  |  | <u>.0010L</u><br>.0030L | .004L |

# SERVICE TABLE OF LIMITS

## PART II – INTEGRAL ACCESSORY DRIVE ENGINES

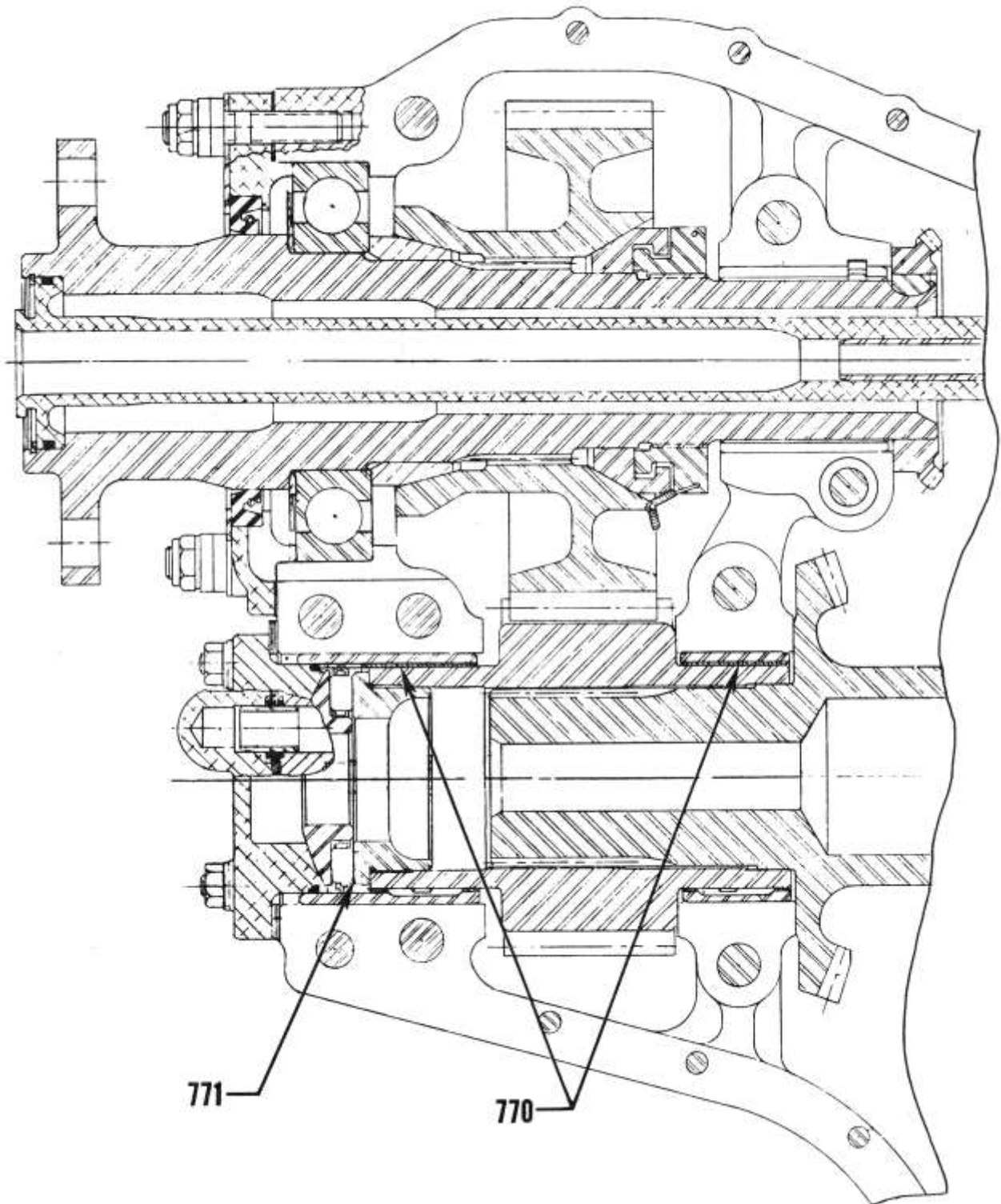
### SECTION III – GEAR TRAIN

| Ref.                                                                          | Chart | Nomenclature                                               | Dimensions             |                 | Clearances              |                 |
|-------------------------------------------------------------------------------|-------|------------------------------------------------------------|------------------------|-----------------|-------------------------|-----------------|
|                                                                               |       |                                                            | Mfr.<br>Min. &<br>Max. | Service<br>Max. | Mfr.<br>Min. &<br>Max.  | Service<br>Max. |
| ACCESSORY DRIVE, COMPRESSOR, BREATHER, PROPELLER SHAFT, ALTERNATOR, & STARTER |       |                                                            |                        |                 |                         |                 |
| 763                                                                           | AQ-AZ | Accessory Drive Gear Intermediate and Crankcase (2 Places) |                        |                 | <u>.0010L</u><br>.0030L | .005L           |
| 764                                                                           | AQ-AZ | Accessory Drive Gear – End Clearance                       |                        |                 | <u>.016L</u><br>.018L   | .020L           |
| 765                                                                           | AQ-AZ | Accessory Drive Gear and Crankcase                         |                        |                 | <u>.0010L</u><br>.0030L | .005L           |
| 766                                                                           | AQ-AZ | Compressor Drive Shaft and Compressor Drive Adapter        |                        |                 | <u>.0010L</u><br>.0030L | .005L           |
| 767                                                                           | AQ-AZ | Compressor Drive Shaft – End Clearance                     |                        |                 | <u>.0005</u><br>.0295   | .040            |
| 768                                                                           | AQ-AZ | Breather Slinger Gear and Shaft                            |                        |                 | <u>.0021L</u><br>.0035L | .005L           |
| 769                                                                           | AQ-AZ | Breather Slinger Gear – End Clearance                      |                        |                 | <u>.008</u><br>.017     | .025            |
| 770                                                                           | AZ    | Propeller Shaft Drive Gear and Bearings                    |                        |                 | <u>.0025L</u><br>.0050L | .0060L          |
| 771                                                                           | AZ    | Propeller Shaft Drive Gear – End Play                      |                        |                 | <u>.005</u><br>.015     | .022            |
| 772                                                                           | AZ    | Propeller Shaft and Rear Bearing                           |                        |                 | <u>.0015L</u><br>.0030L | .0040L          |
| 773                                                                           | AZ    | Alternator Driven Gear and Adapter Bushing                 |                        |                 | <u>.0025L</u><br>.0045L | .0065L          |
| 774                                                                           | AZ    | Starter Drive and Alternator Drive Gear – End Play         |                        |                 | <u>.004</u><br>.008     | .011            |
| 775                                                                           | AZ    | Starter Driven Gear and Adapter Bushing                    |                        |                 | <u>.0015L</u><br>.0030L | .005L           |
| 776                                                                           | AZ    | Starter Drive Shaft (Slip Coupling) and Crankcase          |                        |                 | <u>.0015L</u><br>.0040L | .007L           |
| 777                                                                           | AZ    | Starter Idler Gear and Idler Gear Bearing                  |                        |                 | <u>.0005L</u><br>.0020L | .005L           |

# SERVICE TABLE OF LIMITS

## PART II – INTEGRAL ACCESSORY DRIVE ENGINES

### SECTION III – GEAR TRAIN

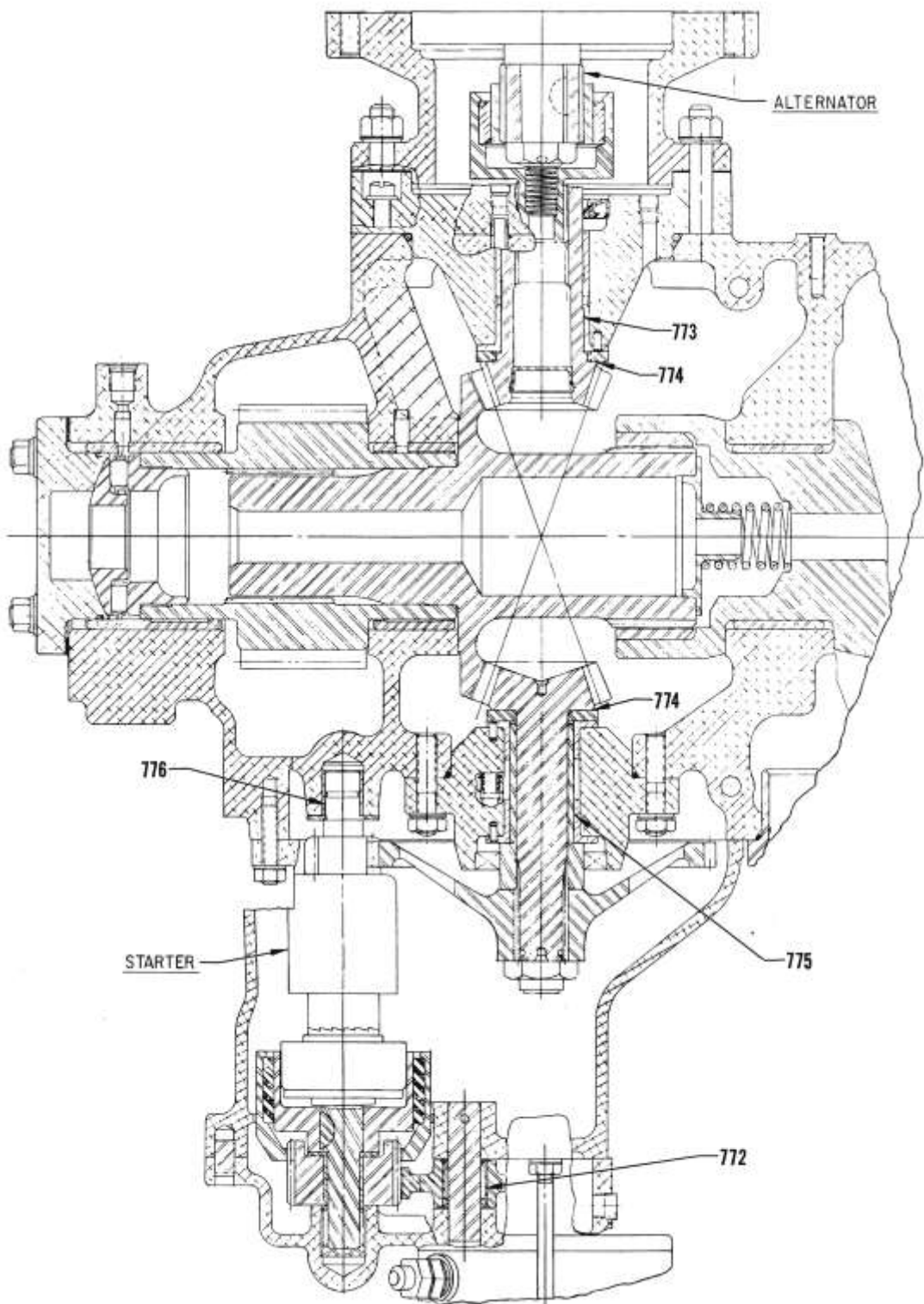


**Propeller Shaft Drive Gear**

# SERVICE TABLE OF LIMITS

## PART II – INTEGRAL ACCESSORY DRIVE ENGINES

### SECTION III – GEAR TRAIN

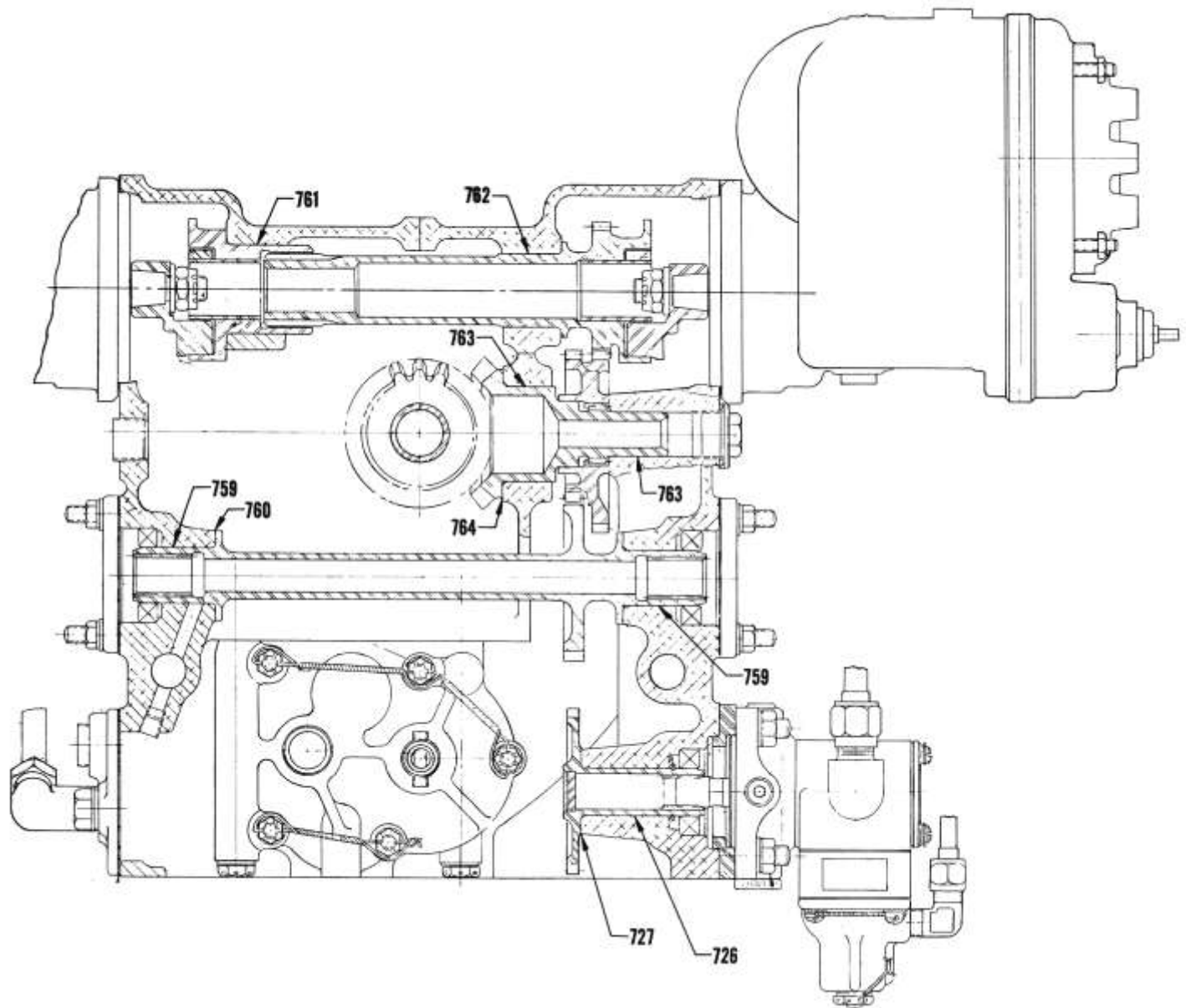


**Alternator, Starter and Propeller Shaft**

# SERVICE TABLE OF LIMITS

## PART II – INTEGRAL ACCESSORY DRIVE ENGINES

### SECTION III – GEAR TRAIN

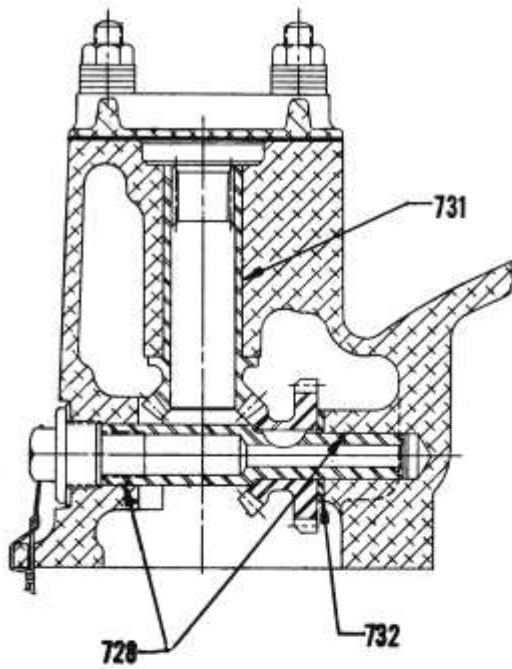


**Fuel Pump, Magneto, Vacuum and Hydraulic Pump**

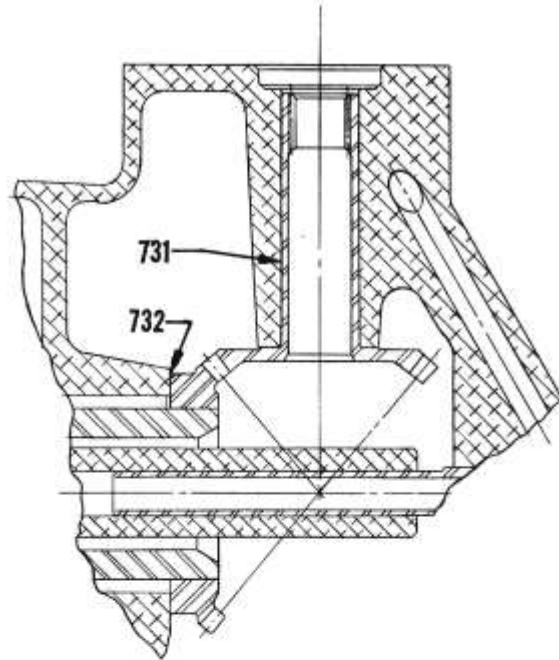
# SERVICE TABLE OF LIMITS

## PART II – INTEGRAL ACCESSORY DRIVE ENGINES

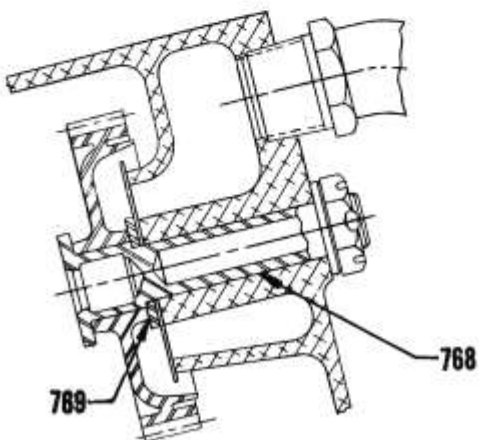
### SECTION III – GEAR TRAIN



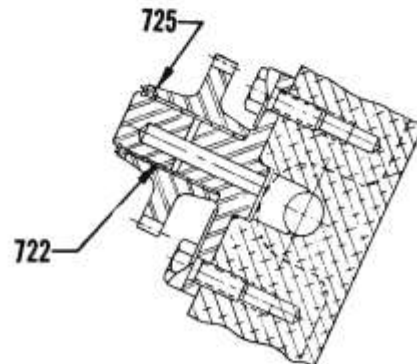
TIGO-54I  
PROP. GOVERNOR



TIGO-54I  
PROP. GOVERNOR



BREATHER GEAR  
TIO-54I ONLY



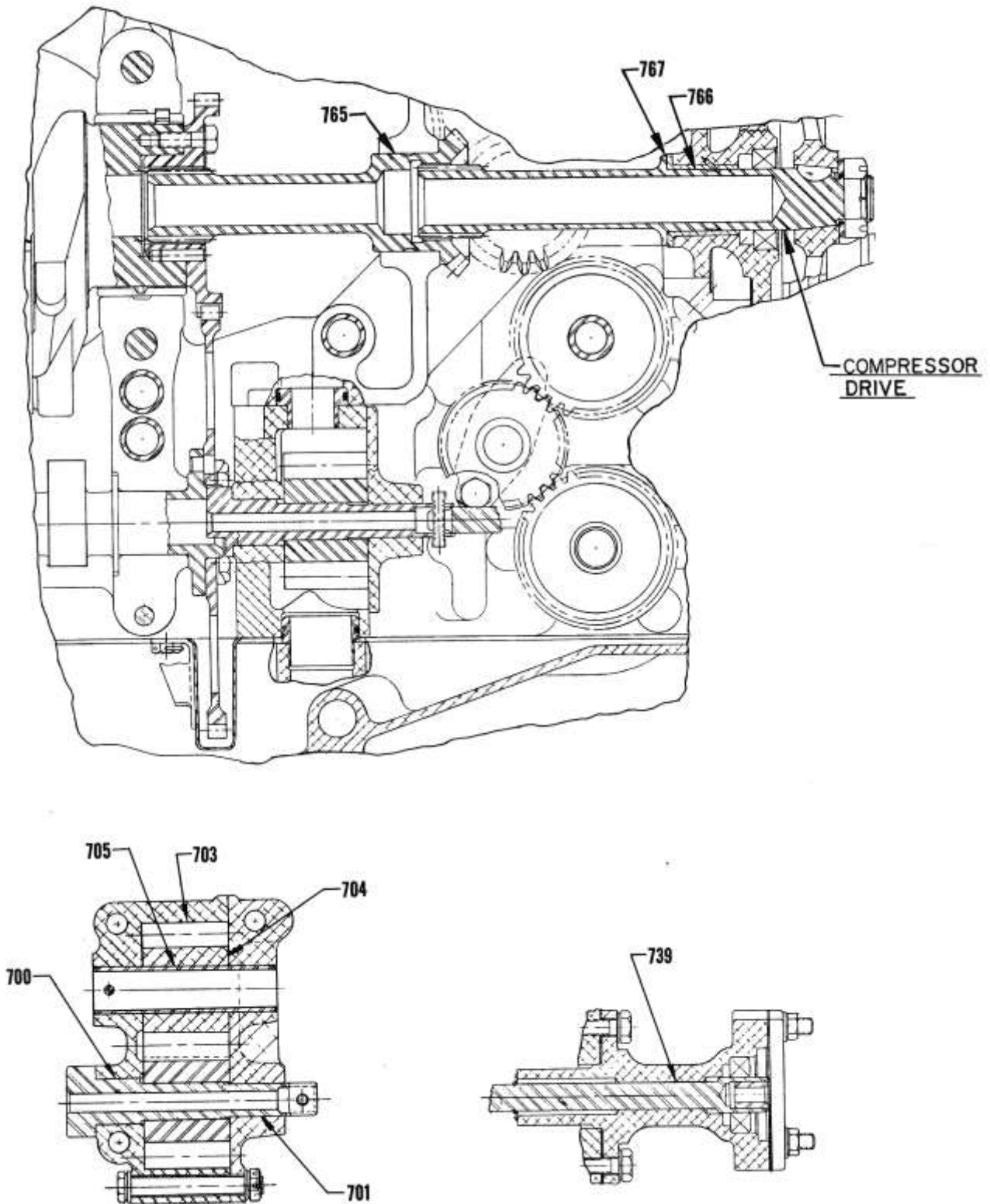
FUEL PUMP IDLER GEAR

### Governor, Fuel Pump and Breather Gear

# SERVICE TABLE OF LIMITS

## PART II – INTEGRAL ACCESSORY DRIVE ENGINES

### SECTION III – GEAR TRAIN



Oil Pump, Tachometer and Compressor



# SERVICE TABLE OF LIMITS

## PART II – INTEGRAL ACCESSORY DRIVE ENGINES

### SECTION IV – BACKLASH

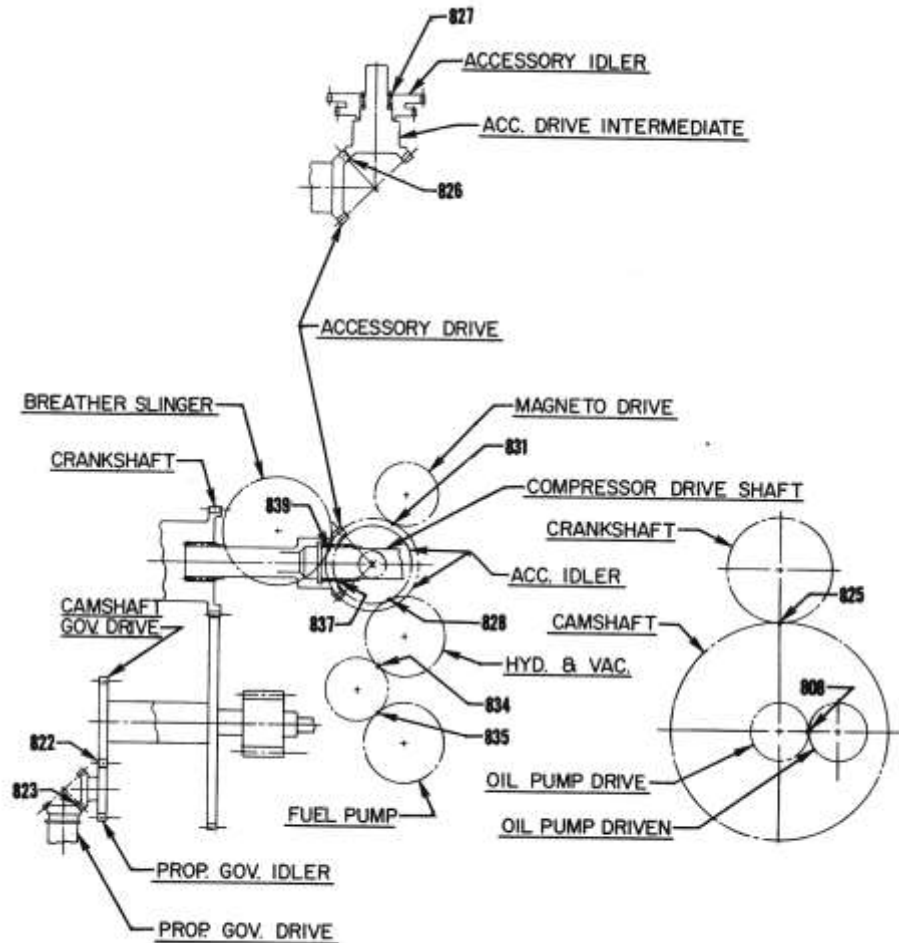
| Ref. | Chart | Nomenclature                                                                                  | Dimensions             |                 | Clearances             |                 |
|------|-------|-----------------------------------------------------------------------------------------------|------------------------|-----------------|------------------------|-----------------|
|      |       |                                                                                               | Mfr.<br>Min. &<br>Max. | Service<br>Max. | Mfr.<br>Min. &<br>Max. | Service<br>Max. |
| 808  | AQ-AZ | Oil Pump Impellers – Backlash                                                                 |                        |                 | <u>.008</u><br>.013    | .020            |
| 822  | AQ    | Propeller Governor Idler and<br>Camshaft – Backlash                                           |                        |                 | <u>.005</u><br>.015    | .020            |
| 823  | AQ-AZ | Propeller Governor Drive and<br>Idler – Backlash                                              |                        |                 | <u>.004</u><br>.008    | .015            |
| 825  | AQ-AZ | Crankshaft Timing Gear and<br>Camshaft – Backlash                                             |                        |                 | <u>.005</u><br>.015    | .020            |
| 826  | AQ-AZ | Accessory Drive and Accessory<br>Drive Intermediate                                           |                        |                 | <u>.004L</u><br>.006L  | .010L           |
| 827  | AQ-AZ | Accessory Drive Gear<br>Intermediate and Idler – Spline<br>Backlash                           |                        |                 | <u>.002</u><br>.005    | .007            |
| 828  | AQ-AZ | Accessory Idler and Vacuum<br>and Hydraulic Pump Gear –<br>Backlash                           |                        |                 | <u>.004</u><br>.011    | .016            |
| 829  | AZ    | Propeller Shaft – Reduction<br>Gear Total Backlash at 4 Foot<br>Radius                        |                        |                 | <u>.38</u><br>.75      | .90             |
| 830  | AZ    | Starter (Bendix – Slip Coupling)<br>and Starter Drive Gear –<br>Backlash                      |                        |                 | <u>.016</u><br>.031    | .045            |
| 831  | AQ-AZ | Accessory Idler and Magneto<br>Drive Shaftgear – Backlash                                     |                        |                 | <u>.005</u><br>.015    | .020            |
| 832  | AZ    | Starter Drive Gear and Starter<br>and Alternator Drive Shaft Gear<br>– Backlash               |                        |                 | <u>.004</u><br>.008    | .015            |
| 833  | AZ    | Alternator Drive Gear and<br>Starter and Alternator Drive<br>Shaftgear – Backlash             |                        |                 | <u>.003</u><br>.008    | .012            |
| 834  | AQ-AZ | Fuel Pump Idler Gear and<br>Vacuum and Hydraulic Pump<br>Drive Gear – Backlash                |                        |                 | <u>.002</u><br>.015    | .020            |
| 835  | AQ-AZ | Fuel Pump Idler Gear and Fuel<br>Pump Drive – Backlash                                        |                        |                 | <u>.0006</u><br>.0160  | .021            |
| 836  | AQ-AZ | Magneto Drive Shaft Gear and<br>Magneto Coupling – Spline<br>Backlash                         |                        |                 | <u>.0010</u><br>.0045  | .0075           |
| 837  | AQ-AZ | Accessory Drive Gear and<br>Compressor Drive Shaft – Spline<br>Backlash                       |                        |                 | <u>.0040</u><br>.0076  | .014            |
| 838  | AQ-AZ | Crankshaft Gear and Accessory<br>Drive Shaftgear – Spline<br>Backlash                         |                        |                 | <u>.0040</u><br>.0076  | .014            |
| 839  | AQ    | Breather Slinger Gear and<br>Accessory Idler – Backlash                                       |                        |                 | <u>.005</u><br>.015    | .020            |
| 840  | AZ    | Front Crankshaft Spline Bushing<br>and Alternator and Starter Shaft<br>Gear – Spline Backlash |                        |                 | <u>.001</u><br>.005    | .006            |

# SERVICE TABLE OF LIMITS

## PART II – INTEGRAL ACCESSORY DRIVE ENGINES

### SECTION IV – BACKLASH

| Ref. | Chart | Nomenclature                                                                       | Dimensions             |                 | Clearances             |                 |
|------|-------|------------------------------------------------------------------------------------|------------------------|-----------------|------------------------|-----------------|
|      |       |                                                                                    | Mfr.<br>Min. &<br>Max. | Service<br>Max. | Mfr.<br>Min. &<br>Max. | Service<br>Max. |
| 841  | AZ    | Propeller Shaft Drive Gear and Alternator and Starter Shaft Gear – Spline Backlash |                        |                 | <u>.001</u><br>.004    | .006            |
| 842  | AZ    | Propeller Shaft Drive Gear and Driven Gear – Backlash                              |                        |                 | <u>.008</u><br>.014    | .016            |
| 843  | AZ    | Starter Slip Coupling Gear and Starter Idler – Backlash                            |                        |                 | <u>.0002</u><br>.0045  | .0075           |
| 844  | AZ    | Bendix Starter Motor Shaft Gear and Idler – Backlash                               |                        |                 | <u>.0002</u><br>.0045  | .0075           |
| 845  | AZ    | Propeller Shaft Spline and Propeller Shaft Driven Gear – Spline Backlash           |                        |                 | <u>.008</u><br>.011    | .015            |
|      |       | (When Measured at O.D. of Propeller Gear)                                          |                        |                 | <u>.020</u><br>.028    | .036            |



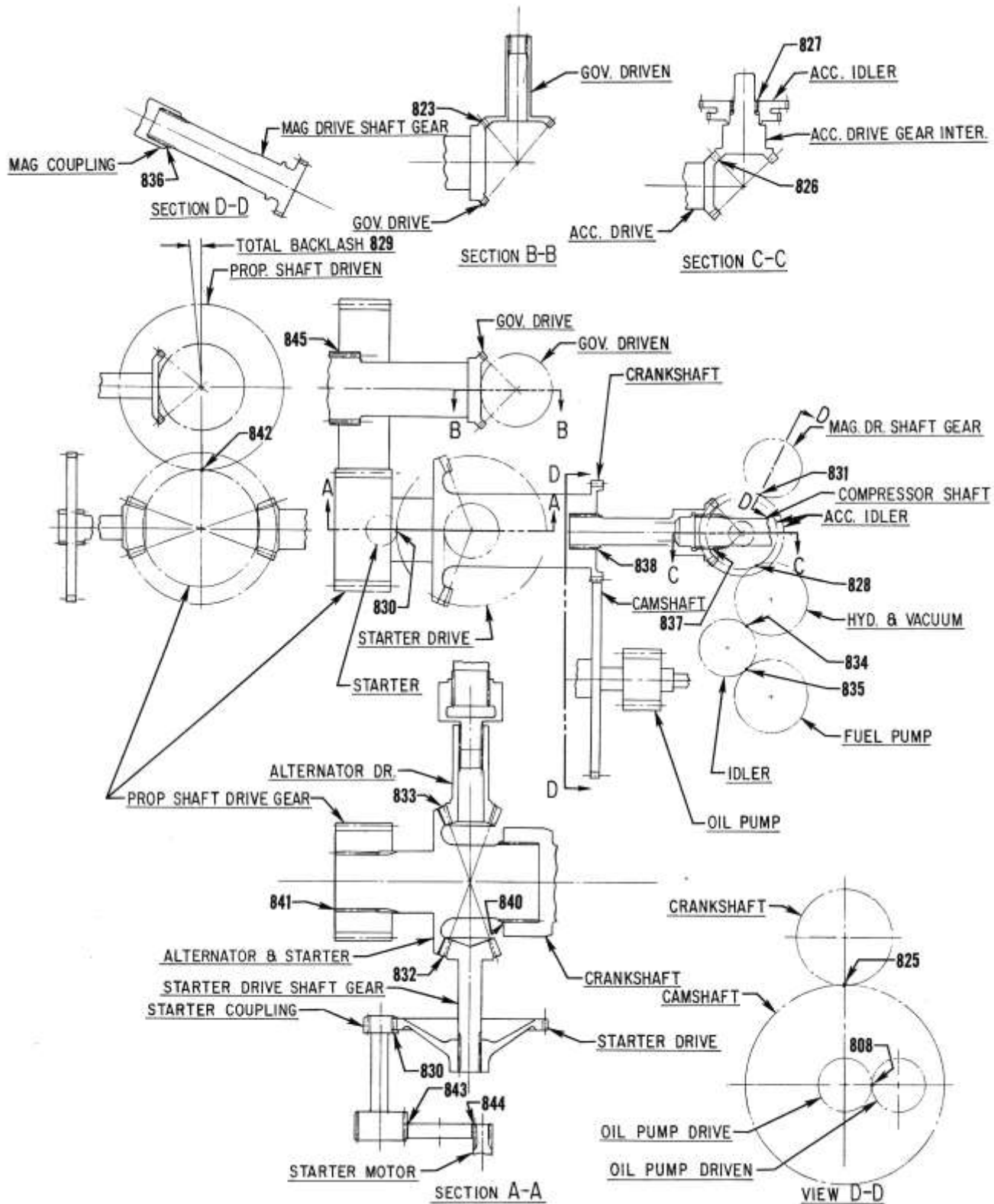
TIO-541

### Accessory Drives

# SERVICE TABLE OF LIMITS

## PART II – INTEGRAL ACCESSORY DRIVE ENGINES

### SECTION IV – BACKLASH



Accessory Drives

# SERVICE TABLE OF LIMITS

## PART II – INTEGRAL ACCESSORY DRIVE ENGINES

### SECTION V – SPECIAL TORQUE REQUIREMENTS

| Ref. | Chart                                                                                                       | Thread Size                     | Nomenclature                                        | Torque Limits                                   |
|------|-------------------------------------------------------------------------------------------------------------|---------------------------------|-----------------------------------------------------|-------------------------------------------------|
| 900  | AQ-AZ                                                                                                       | 3/8-24                          | Connecting Rod Nuts – Tighten to Length             | 2.255-2.256                                     |
| 903  | AQ-AZ                                                                                                       | 3/8-24                          | Magneto – Nut (To attach drive member to magneto)   | 300 in. lbs.                                    |
| 904  | AQ-AZ                                                                                                       | 10-32                           | Magneto – Plate Screws                              | 15 in. lbs.                                     |
| 905  | AQ-AZ (using a silicone gasket)                                                                             | 1/4-20                          | Rocker Box Screws                                   | 35 in.-lbs.                                     |
|      | AQ-AZ (using a cork gasket)                                                                                 | 1/4-20                          | Rocker Box Screws                                   | 50 in. lbs.                                     |
| 907  | AQ-AZ                                                                                                       | 18MM                            | Spark Plugs                                         | 420 in. lbs.                                    |
| 909  | AQ                                                                                                          |                                 | Alternator Pulley Nut                               | 450 in. lbs.                                    |
|      | AZ                                                                                                          |                                 | Alternator Quill Shaft Nut                          | 474 in. lbs.                                    |
| 910  | AQ-AZ                                                                                                       | 1/4-28                          | Alternator Output Terminal Nut                      | 85 in. lbs.                                     |
| 911  | AQ-AZ                                                                                                       | 10-32                           | Alternator Auxiliary Nut                            | 30 in. lbs.                                     |
| 912  | AQ-AZ                                                                                                       | 5/16-24                         | Starter Terminal Nut                                | 2 in. lbs.                                      |
| 913  | AQ-AZ                                                                                                       | 1/16-27 NPT                     | Piston Cooling Nozzle in Crankcase                  | 100 in. lbs.                                    |
| 915  | AQ-AZ                                                                                                       | 3/4-16                          | Oil Filter Bolt (AC Can and Element Type)           | 300 in. lbs.                                    |
|      | AQ-AZ                                                                                                       | 13/16-16                        | Oil Filter (Throw away type)                        | 240 in. lbs.                                    |
|      | AQ-AZ                                                                                                       | 3/4-16                          | Converter Stud                                      | 720 in. lbs.                                    |
| 917  | AQ-AZ                                                                                                       | 1.00-14                         | Oil Cooler Bypass Valve                             | 300 in. lbs.                                    |
| 918  | AQ-AZ                                                                                                       | 1-1/4-12                        | Oil Pressure Relief Valve                           | 300 in. lbs.                                    |
| 919  | AQ-AZ                                                                                                       |                                 | Hose Clamps                                         | 45 in. lbs.                                     |
| 921  | Exhaust V-Band Coupling Torque Data                                                                         |                                 |                                                     |                                                 |
|      | Coupling Size<br>Tube OD                                                                                    | Lycoming Part<br>No.            | Vendor Part No.                                     | T-Bolt Split Type<br>Locknut Torque In.<br>Lbs. |
|      | 2.00 in.                                                                                                    | LW-12093-5                      | MVT69183-200                                        | 85                                              |
|      | 2.25 in.                                                                                                    | LW-12093-6                      | MVT-69183-225                                       | 85                                              |
|      | 2.25 in.                                                                                                    | LW-12125-3                      | MVT-69197-225                                       | 85                                              |
| 922  | AZ                                                                                                          | Turbocharger V-Band Torque Data |                                                     |                                                 |
|      | Turbocharger Model No.                                                                                      |                                 | V-Clamp Part No.                                    | V-Clamp Diameter                                |
|      | T18A21*                                                                                                     |                                 | 400500-925                                          | 9.25 in.                                        |
|      | * - AiResearch turbocharger.<br>See latest revision of Service Instruction No. 1238 for assembly procedure. |                                 |                                                     |                                                 |
| 923  | AZ                                                                                                          | 2-1/16-12                       | Propeller Shaft Lock Nut                            | 1000 ft. lbs.                                   |
| 924  | AQ-AZ                                                                                                       | 7/16-20                         | Fuel Injector Nozzles (In Induction Housing)        | 210 in. lbs.                                    |
| 925  | AQ-AZ                                                                                                       | 3/4-16                          | Compressor Drive Pulley Nut                         | 240 in. lbs.                                    |
| 926  | AZ                                                                                                          | 5/8-18                          | Starter Drive Shaft Gear Nut                        | 900 in. lbs.                                    |
| 927  | AQ-AZ                                                                                                       | 1/4                             | Bolts – Crankshaft Gear                             | 96-120 in. lbs.                                 |
| 928  | AQ-AZ                                                                                                       | 3/8-16                          | Cylinder Hold Down Studs (Crankcase Driving Torque) | 100 in. lbs.                                    |
|      |                                                                                                             | 1/2-13                          | Cylinder Hold Down Studs (Crankcase Driving Torque) | 250 in. lbs.                                    |
| 929  | AQ-AZ                                                                                                       | 3/8                             | Cylinder Hold Down Nuts                             | 300 in. lbs.                                    |
|      |                                                                                                             | 1/2                             | Cylinder Hold Down Nuts                             | 600 in. lbs.                                    |
|      | Cylinder Hold Down Nut Tightening Procedure – See latest revision of Service Instruction No. 1029.          |                                 |                                                     |                                                 |
| 932  | AQ-AZ                                                                                                       | 5/16-18                         | Exhaust Transitions – Studs (Driving Torque)        | 100 in. lbs.                                    |
|      |                                                                                                             | 3/8-16                          | Exhaust Transitions – Studs (Driving Torque)        | 200 in. lbs.                                    |

# SERVICE TABLE OF LIMITS

## PART II – INTEGRAL ACCESSORY DRIVE ENGINES

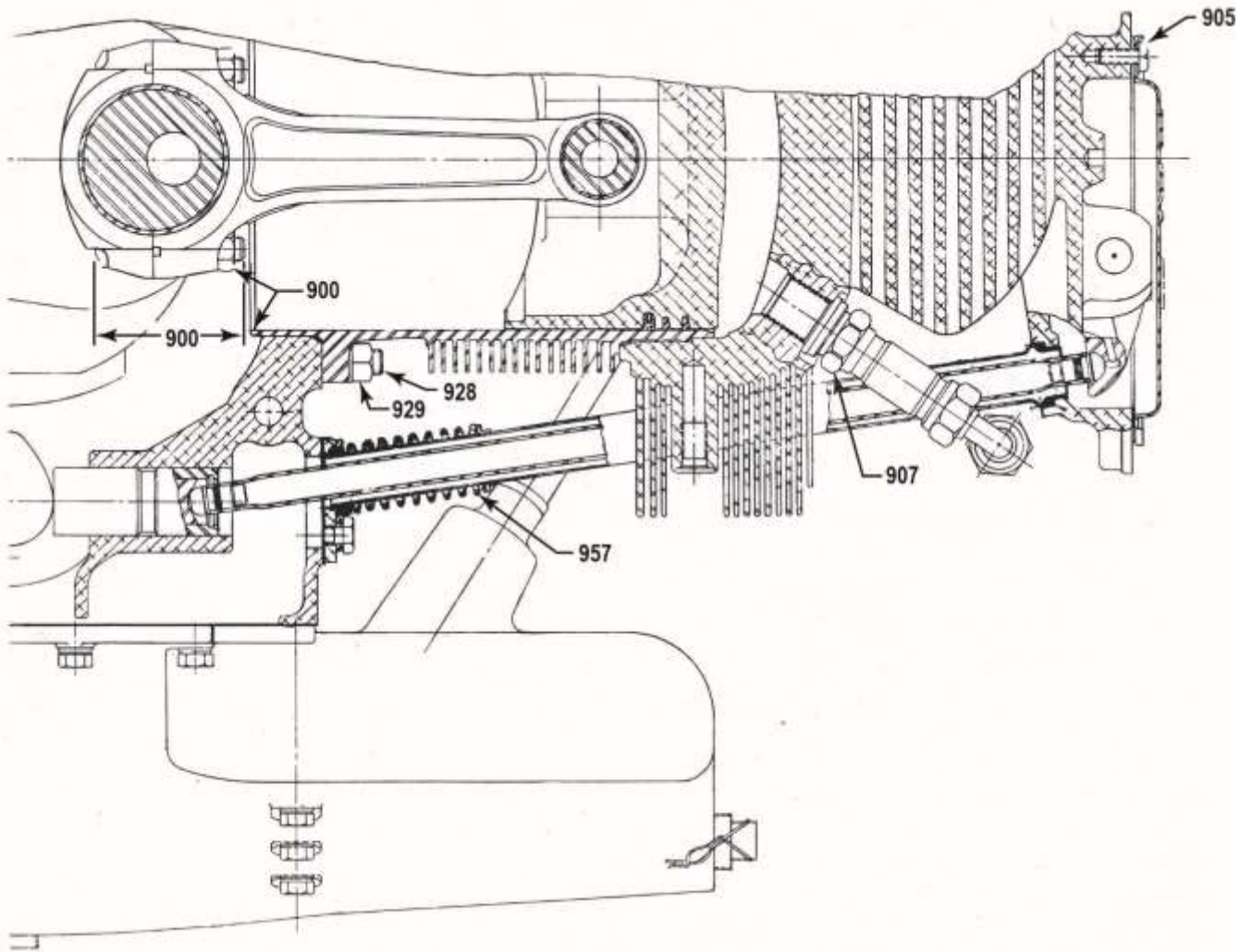
### SECTION V – SPRINGS

| Ref. | Chart | Nomenclature                                                       | Lyc.<br>Part No.  | Wire<br>Dia.   | Length<br>at Comp.<br>Length | COMP. LOAD         |                    |                  |
|------|-------|--------------------------------------------------------------------|-------------------|----------------|------------------------------|--------------------|--------------------|------------------|
|      |       |                                                                    |                   |                |                              | Mfr.<br>Min.       | Mfr.<br>Max.       | Service<br>Max.  |
| 950  | AQ-AZ | Outer Valve Spring                                                 | LW-11798<br>76351 | .192<br>.177   | 1.610 in.<br>1.610 in.       | 136 lb.<br>136 lb. | 144 lb.<br>144 lb. | 133 lb.<br>min.  |
| 951  | AQ-AZ | Auxiliary Valve Spring                                             | LW-11799<br>76352 | .148<br>.142   | 1.48 in.<br>1.48 in.         | 86 lb.<br>86 lb.   | 94 lb.<br>94 lb.   | 83 lb.<br>min.   |
| 952  | AQ-AZ | Oil Pressure Relief<br>Valve Spring                                |                   |                |                              |                    |                    |                  |
|      |       | Lycoming<br>Part<br>Numbers                                        | Identification    |                |                              |                    |                    |                  |
|      |       |                                                                    | Dye               | Free<br>Length |                              |                    |                    |                  |
|      |       | 68668                                                              | Purple            | 2.04           | .054                         | 1.30 in.           | 7.1 lb.            | 7.8 lb.          |
|      |       | LW-11713                                                           | White             | 2.12           | .059                         | 1.44 in.           | 10.79 lb.          | 11.92 lb.        |
|      |       | LW-11138                                                           | None              | 2.64           | .051                         | 1.44 in.           | 8.55 lb.           | 9.45 lb.         |
| 955  | AQ-AZ | Fuel Drain Check Valve Spring                                      |                   | .047           | .75 in.                      | 5.50 lb.           | 6.50 lb.           | 5.35 lb.<br>min. |
| 956  | AQ-AZ | Oil Filter Relief Valve Spring                                     |                   | .054           | 1.93 in.                     | 3.05 lb.           | 3.55 lb.           | 3.00 lb.<br>min. |
| 957  | AZ    | Shroud Tube Spring                                                 |                   | .105           | 2.09 in.                     | 14 lb.             | 16 lb.             | 13 lb.<br>min.   |
| 958  | AQ-AZ | Pressurizing Valve Spring                                          |                   | .032           | .455-.485                    | .65 lb.            | .75 lb.            | .63 lb.<br>min.  |
| 959  | AZ    | Spring Between Crankshaft and<br>Starter and Alternator Drive Gear |                   | .13            | 1.40 in.                     | 48 lb.             | 52 lb.             | 46 lb.<br>min.   |
| 960  | AZ    | Alternator Drive Coupling Spring                                   |                   | .047           | .83 in.                      | 10 lb.             | 11 lb.             | 9 lb.<br>min.    |

# SERVICE TABLE OF LIMITS

## PART II – INTEGRAL ACCESSORY DRIVE ENGINES

### SECTION V – SPECIAL TORQUE REQUIREMENTS

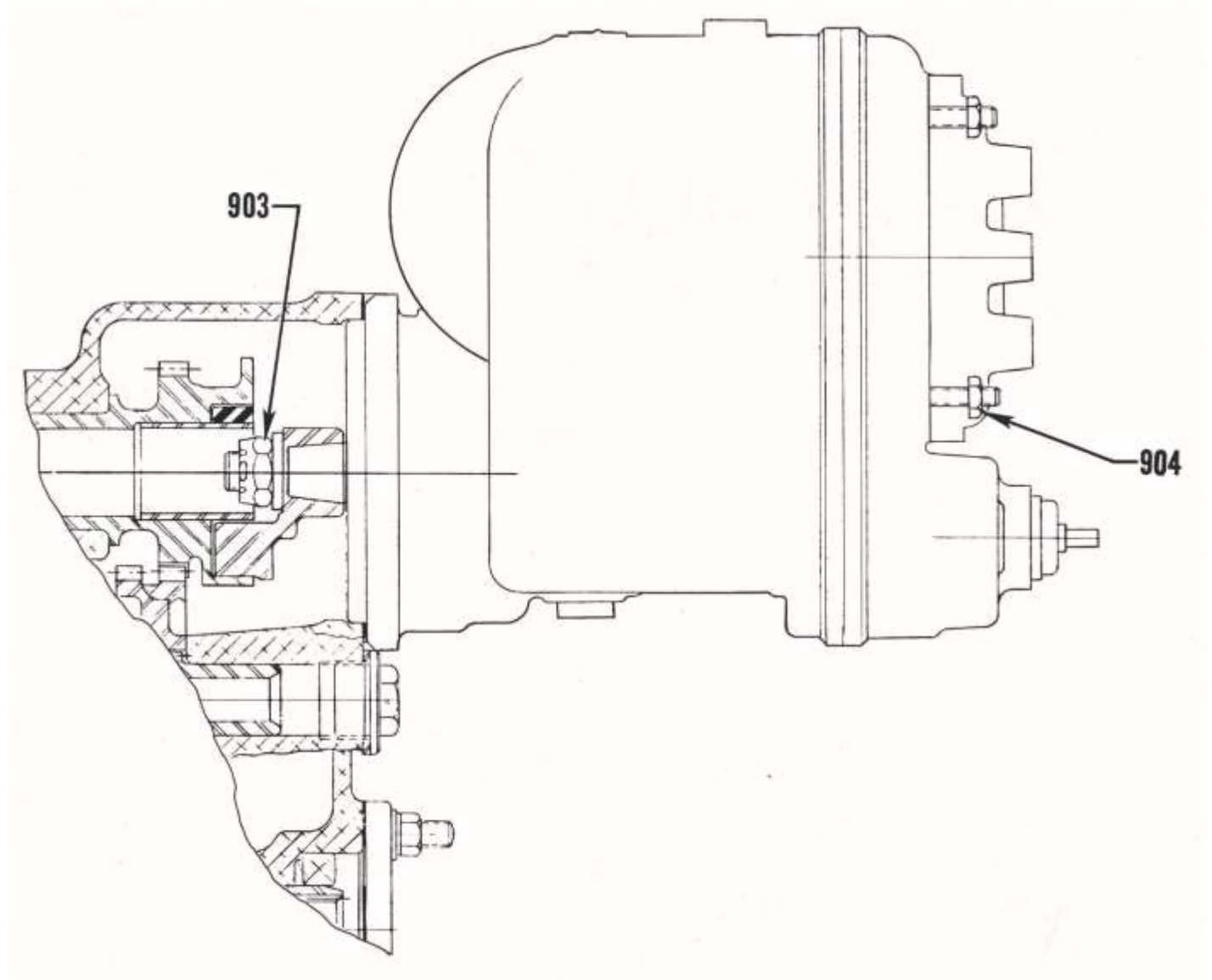


### Engine Accessories and Hardware

# SERVICE TABLE OF LIMITS

## PART II – INTEGRAL ACCESSORY DRIVE ENGINES

### SECTION V – SPECIAL TORQUE REQUIREMENTS

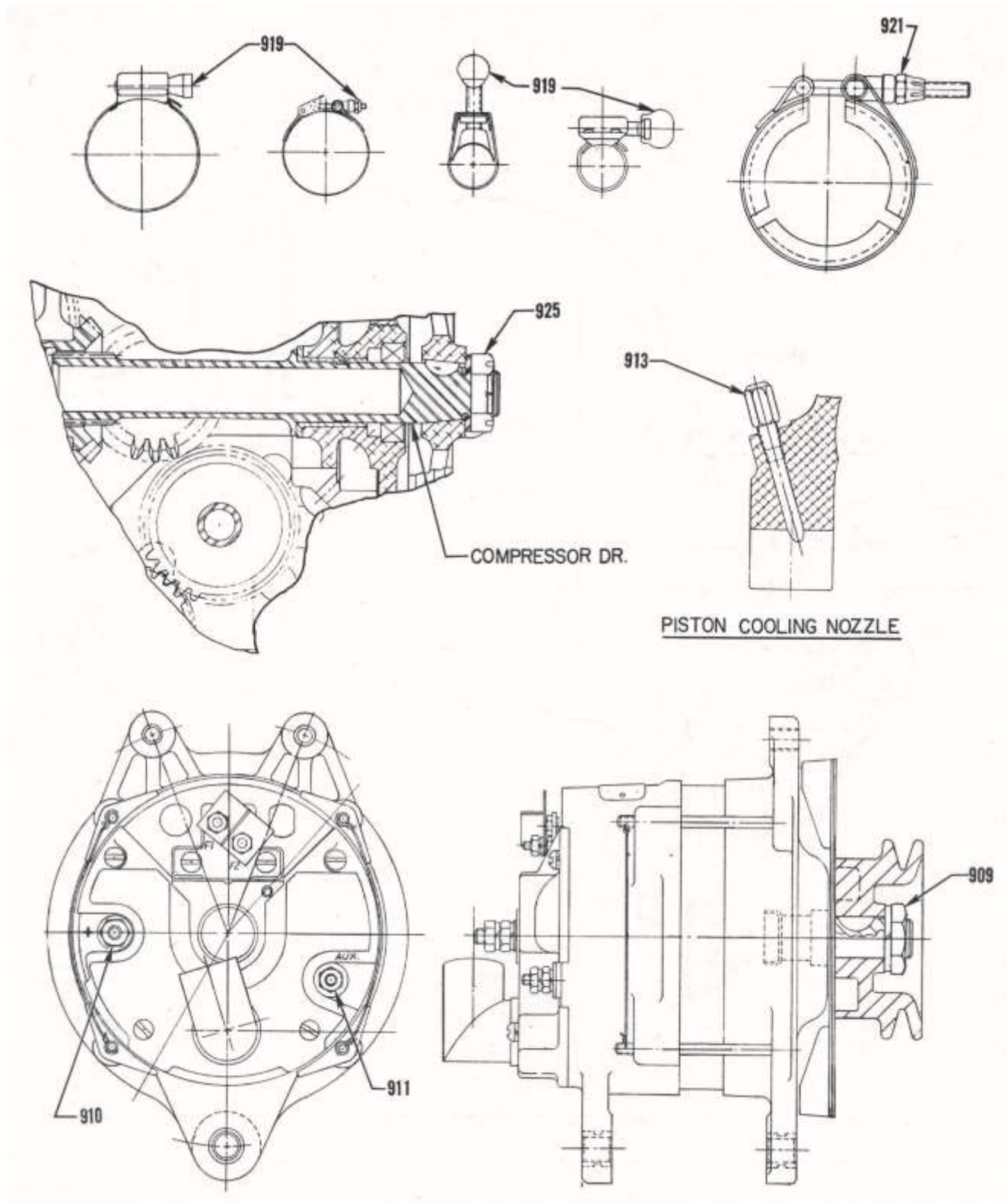


### Engine Accessories and Hardware

# SERVICE TABLE OF LIMITS

## PART II – INTEGRAL ACCESSORY DRIVE ENGINES

### SECTION V – SPECIAL TORQUE REQUIREMENTS



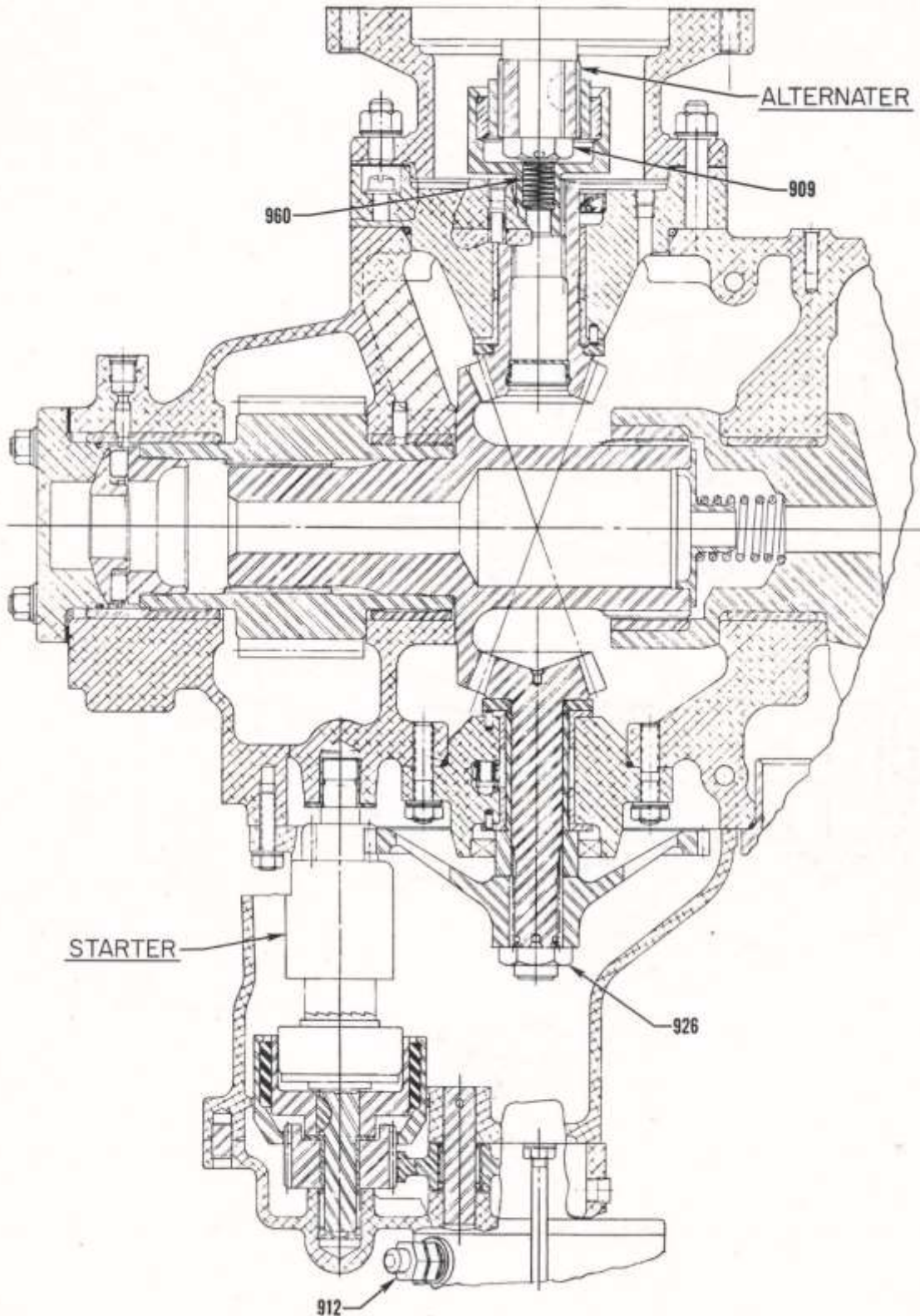
### Engine Accessories and Hardware



# SERVICE TABLE OF LIMITS

## PART II – INTEGRAL ACCESSORY DRIVE ENGINES

### SECTION V – SPECIAL TORQUE REQUIREMENTS

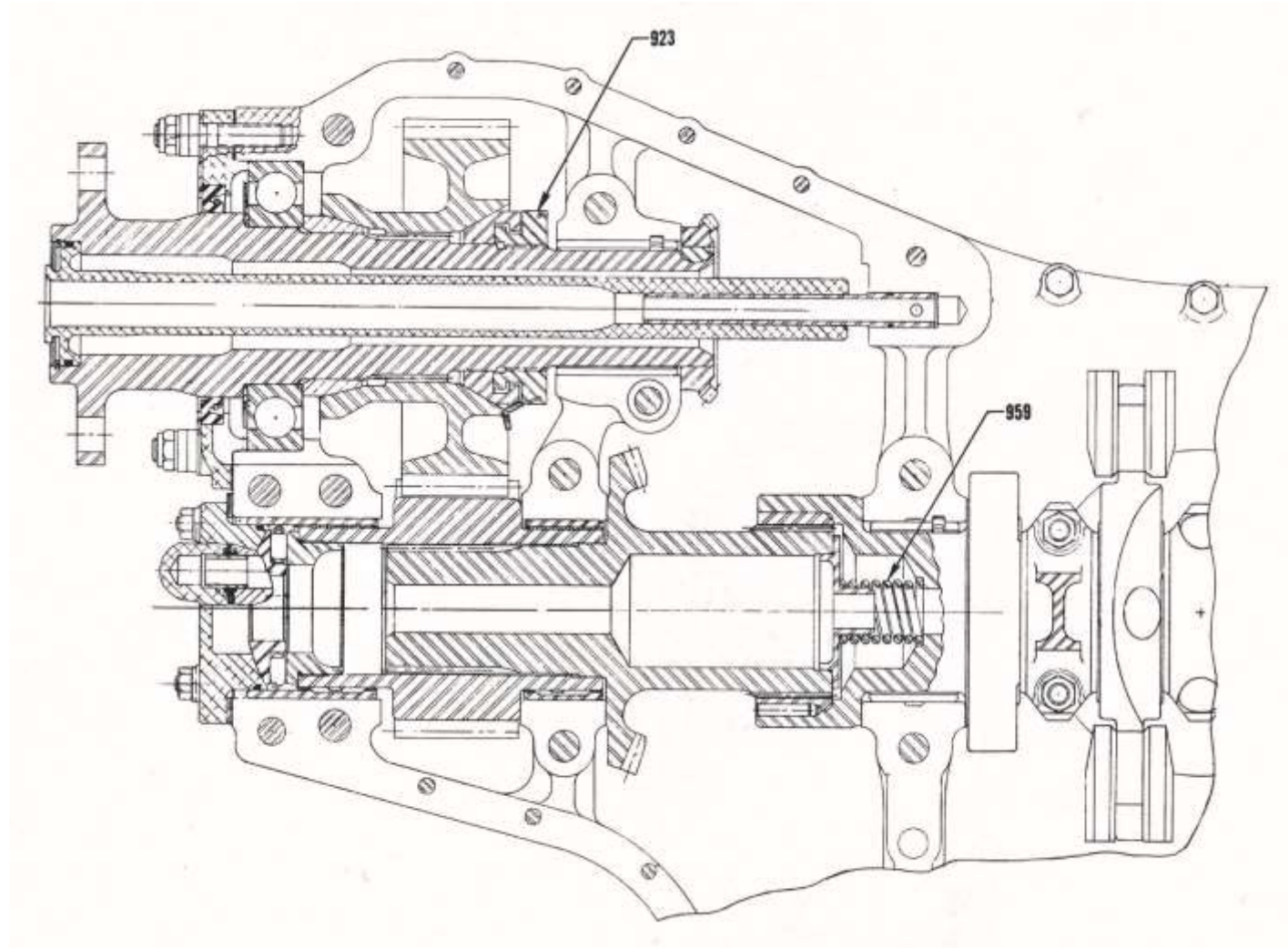


**Engine Accessories and Hardware**

# SERVICE TABLE OF LIMITS

## PART II – INTEGRAL ACCESSORY DRIVE ENGINES

### SECTION V – SPECIAL TORQUE REQUIREMENTS

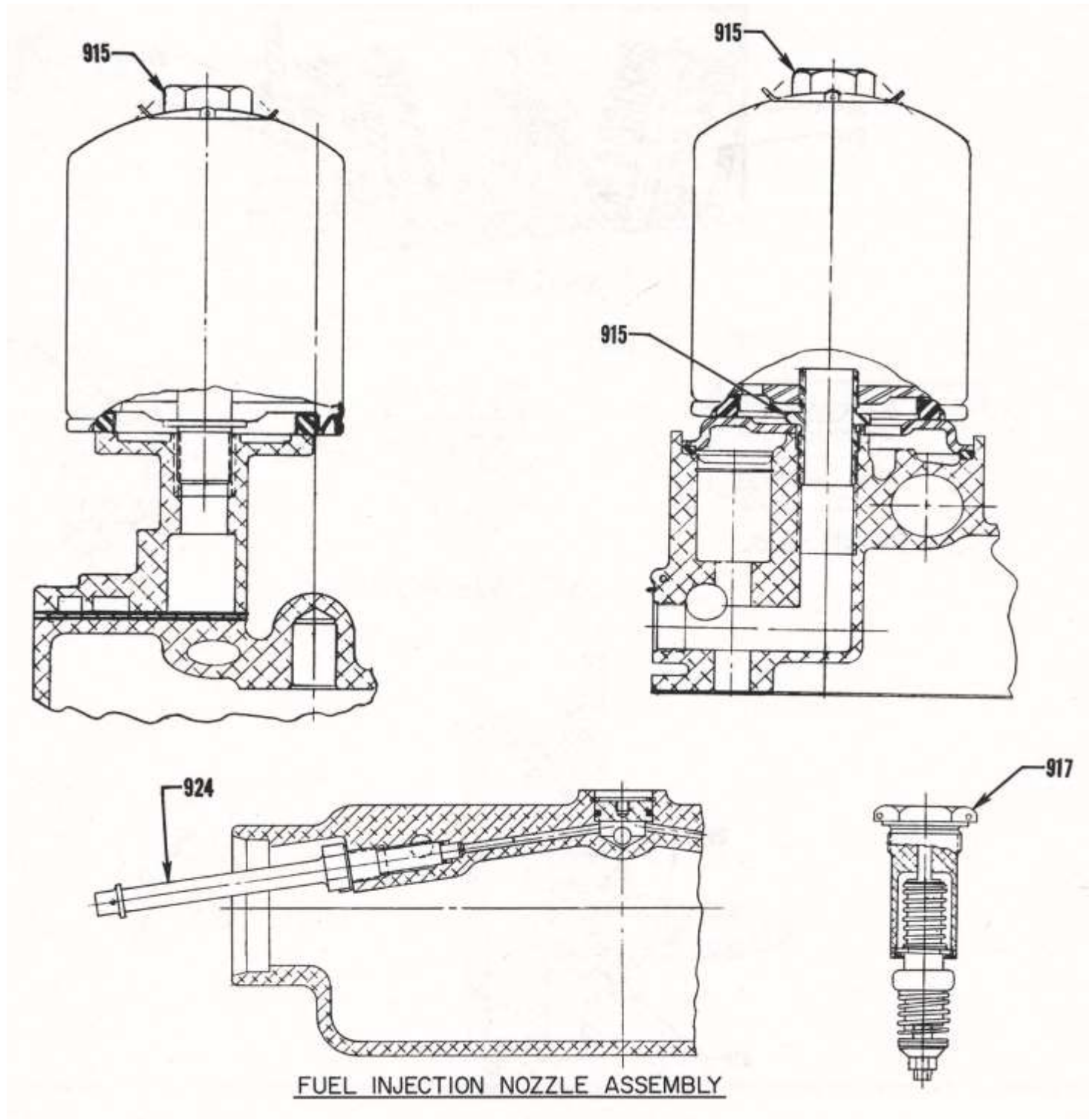


### Engine Accessories and Hardware

# SERVICE TABLE OF LIMITS

## PART II – INTEGRAL ACCESSORY DRIVE ENGINES

### SECTION V – SPECIAL TORQUE REQUIREMENTS



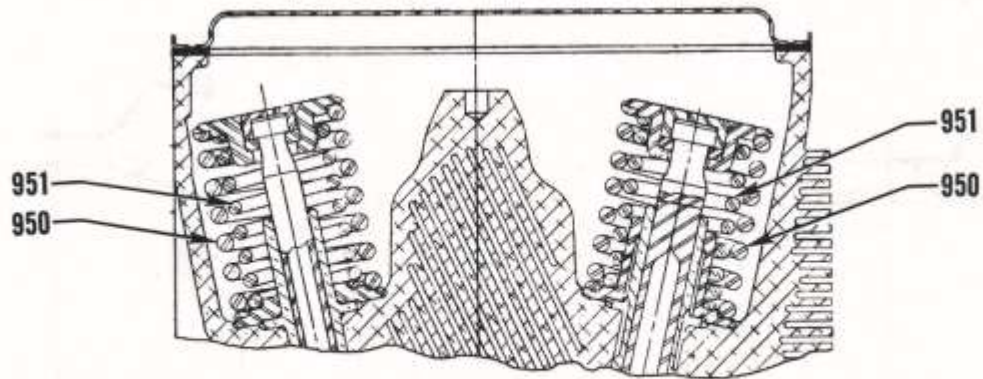
### Engine Accessories and Hardware



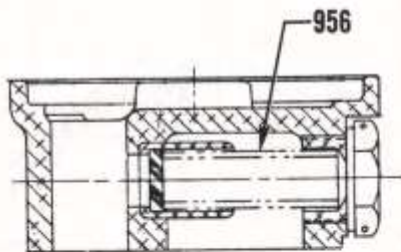
# SERVICE TABLE OF LIMITS

## PART II – INTEGRAL ACCESSORY DRIVE ENGINES

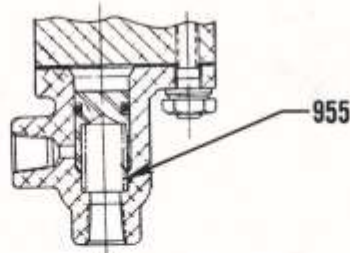
### SECTION V – SPECIAL TORQUE REQUIREMENTS



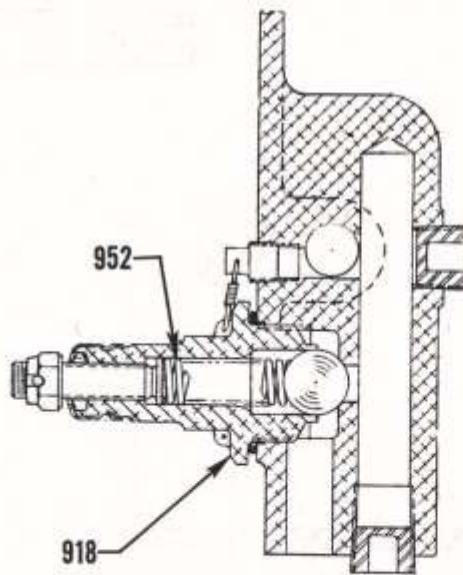
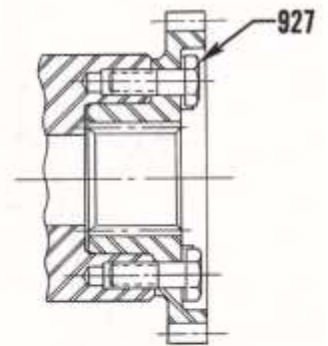
VALVE SPRINGS



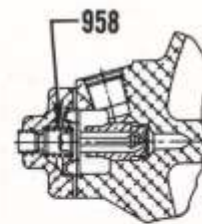
OIL RELIEF VALVE



FUEL DRAIN CHECK VALVE



OIL PRESSURE RELIEF VALVE



### Engine Accessories and Hardware

# SERVICE TABLE OF LIMITS

## PART II – INTEGRAL ACCESSORY DRIVE ENGINES

### STANDARD TORQUE UNLESS OTHERWISE LISTED

Torque limits for propeller attaching bolts to be supplied by propeller aircraft manufacturer.

NOTE: Refer to Table VIII for torque value conversions (In. Lb. or Ft. Lb. to Nm).

| TABLE I<br>BOLTS, SCREW AND NUTS                 |            |          |        |              |            | TABLE II<br>PIPE PLUGS |            |
|--------------------------------------------------|------------|----------|--------|--------------|------------|------------------------|------------|
| Thread                                           | Torque     |          | Thread | Torque       |            | Thread                 | Torque     |
|                                                  | In. Lb.    | Ft. Lb.  |        | In. Lb.      | Ft. Lb.    |                        | In. Lbs.   |
| 8                                                | 20 to 22   | -----    | 7/16   | 600 to 660   | 50 to 55   | 1/16-27 NPT            | 40 to 44   |
| 10                                               | 49 to 54   | -----    | 1/2    | 900 to 984   | 75 to 82   | 1/8-27 NPT             | 40 to 44   |
| 1/4                                              | 96 to 106  | -----    | 9/16   | 1320 to 1452 | 110 to 121 | 1/4-18 NPT             | 85 to 94   |
| 5/16                                             | 204 to 228 | 17 to 19 | 5/8    | 1800 to 1980 | 150 to 165 | 3/8-18 NPT             | 110 to 121 |
| 3/8                                              | 360 to 396 | 30 to 33 | 3/4    | 3240 to 3564 | 270 to 297 | 1/2-14 NPT             | 160 to 176 |
| THIN NUTS (1/2 DIA. OF BOLT) – 1/2 LISTED TORQUE |            |          |        |              |            | 3/4-14 NPT             | 230 to 252 |
|                                                  |            |          |        |              |            | 1-11-1/2 NPT           | 315 to 347 |

| TABLE III                                                                                                                                                                                                                                                                                                                                                            |               |        | TABLE IV                                                        |           |                 |            |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------|-----------------------------------------------------------------|-----------|-----------------|------------|--|
| CRUSH TYPE GASKETS                                                                                                                                                                                                                                                                                                                                                   |               |        | FLEXIBLE TUBE CONNECTIONS<br>(SEALASTIC OR EQUIVALENT FITTINGS) |           |                 |            |  |
| Thread Pitch on Part to be Tightened                                                                                                                                                                                                                                                                                                                                 | ANGLE OF TURN |        | Tube Size                                                       | Thread    | Torque In. Lbs. |            |  |
| Threads Per Inch                                                                                                                                                                                                                                                                                                                                                     | Aluminum      | Copper |                                                                 |           | Aluminum Alloy  | Steel      |  |
| 8                                                                                                                                                                                                                                                                                                                                                                    | 135°          | 67°    | (-3) 3/16                                                       | 3/8 - 24  | 30 to 50        | 70 to 80   |  |
| 10                                                                                                                                                                                                                                                                                                                                                                   | 135°          | 67°    | (-4) 1/4                                                        | 7/16 - 20 | 40 to 65        | 90 to 100  |  |
| 12                                                                                                                                                                                                                                                                                                                                                                   | 180°          | 90°    | (-5) 5/16                                                       | 1/2 - 20  | 60 to 80        | 135 to 150 |  |
| 14                                                                                                                                                                                                                                                                                                                                                                   | 180°          | 90°    | (-6) 3/8                                                        | 9/16-18   | 75 to 125       | 270 to 300 |  |
| 16                                                                                                                                                                                                                                                                                                                                                                   | 270°          | 135°   | (-8) 1/2                                                        | 3/4-16    | 150 to 250      | 450 to 500 |  |
| 18                                                                                                                                                                                                                                                                                                                                                                   | 270°          | 135°   | (-10) 5/8                                                       | 7/8 - 14  | 200 to 350      | 650 to 700 |  |
| 20                                                                                                                                                                                                                                                                                                                                                                   | 270°          | 135°   |                                                                 |           |                 |            |  |
| 24                                                                                                                                                                                                                                                                                                                                                                   | 360°          | 180°   |                                                                 |           |                 |            |  |
| 28                                                                                                                                                                                                                                                                                                                                                                   | 360°          | 180°   |                                                                 |           |                 |            |  |
| NOTE: Install all crush type gaskets except the self centering type, with the unbroken surface against the flange of the plug or part being tightened against the seal. Turn the part until the sealing surfaces are in contact and then tighten to the angle of turn listed for the appropriate thread size.<br>NOTE: Lubricate Threads Unless Otherwise Specified. |               |        | TABLE V                                                         |           |                 |            |  |
|                                                                                                                                                                                                                                                                                                                                                                      |               |        | STUDS MIN. DRIVING TORQUE                                       |           |                 |            |  |
|                                                                                                                                                                                                                                                                                                                                                                      |               |        | Threads                                                         |           | Torque In. Lbs. |            |  |
|                                                                                                                                                                                                                                                                                                                                                                      |               |        | 1/4-20                                                          |           | 15              |            |  |
|                                                                                                                                                                                                                                                                                                                                                                      |               |        | 5/16-18                                                         |           | 25              |            |  |
| 3/8-16                                                                                                                                                                                                                                                                                                                                                               |               | 50     |                                                                 |           |                 |            |  |

| TABLE VI<br>JAM NUT OR STRAIGHT THREAD O-RING BOSS |             |                 |
|----------------------------------------------------|-------------|-----------------|
| Tube Size                                          | Thread      | Torque Ft. Lbs. |
| -03                                                | 3/8 – 24    | 8 – 9           |
| -04                                                | 7/16 – 20   | 13 – 15         |
| -05                                                | 1/2 – 20    | 14 – 15         |
| -06                                                | 9/16 – 18   | 23 – 24         |
| -08                                                | 3/4 – 16    | 40 – 43         |
| -10                                                | 7/8 – 14    | 43 – 48         |
| -12                                                | 1-1/16 – 12 | 68 – 75         |
| -14                                                | 1-3/16 – 12 | 83 – 90         |
| -16                                                | 1-5/16 – 12 | 112 – 123       |
| -20                                                | 1-5/8 – 12  | 146 – 161       |
| -24                                                | 1-7/8 – 12  | 154 – 170       |
| -32                                                | 2-1/2 – 12  | 218 – 240       |

# SERVICE TABLE OF LIMITS

## STANDARD TORQUE (CONT.) UNLESS OTHERWISE LISTED

| TABLE VII           |                     |                                                        |         |              |         |                                                                          |     |                                                                                |         |
|---------------------|---------------------|--------------------------------------------------------|---------|--------------|---------|--------------------------------------------------------------------------|-----|--------------------------------------------------------------------------------|---------|
| METAL TUBE FITTINGS |                     |                                                        |         |              |         |                                                                          |     |                                                                                |         |
| Dash Nos.<br>Ref.   | Tubing<br>OD inches | Wrench torque for tightening AN-818 Nut (pound inches) |         |              |         |                                                                          |     | Minimum bend radii<br>measured to tubing<br>centerline. Dimension in<br>inches |         |
|                     |                     | Aluminum-alloy tubing                                  |         | Steel tubing |         | Aluminum-alloy tubing<br>(Flare MS33583) for use<br>on oxygen lines only |     |                                                                                |         |
|                     |                     | Minimum                                                | Maximum | Minimum      | Maximum |                                                                          |     | Minimum                                                                        | Maximum |
|                     |                     | -2                                                     | 1/8     | 20           | 30      | 75                                                                       | 85  | --                                                                             | --      |
| -3                  | 3/16                | 25                                                     | 35      | 95           | 105     | --                                                                       | --  | 7/16                                                                           | 21/32   |
| -4                  | 1/4                 | 50                                                     | 65      | 135          | 150     | --                                                                       | --  | 9/16                                                                           | 7/8     |
| -5                  | 5/16                | 70                                                     | 90      | 170          | 200     | 100                                                                      | 125 | 3/4                                                                            | 1-1/8   |
| -6                  | 3/8                 | 110                                                    | 130     | 270          | 300     | 200                                                                      | 250 | 15/16                                                                          | 1-5/16  |
| -8                  | 1/2                 | 230                                                    | 260     | 450          | 500     | 300                                                                      | 400 | 1-1/4                                                                          | 1-3/4   |
| -10                 | 5/8                 | 330                                                    | 360     | 650          | 700     | --                                                                       | --  | 1-1/2                                                                          | 2-3/16  |
| -12                 | 3/4                 | 460                                                    | 500     | 900          | 1000    | --                                                                       | --  | 1-3/4                                                                          | 2-5/8   |
| -16                 | 1                   | 500                                                    | 700     | 1200         | 1400    | --                                                                       | --  | 3                                                                              | 3-1/2   |
| -20                 | 1-1/4               | 800                                                    | 900     | 1520         | 1680    | --                                                                       | --  | 3-3/4                                                                          | 4-3/8   |
| -24                 | 1-1/2               | 800                                                    | 900     | 1900         | 2100    | --                                                                       | --  | 5                                                                              | 5-1/4   |
| -28                 | 1-3/4               | --                                                     | --      | --           | --      | --                                                                       | --  | --                                                                             | --      |
| -32                 | 2                   | 1800                                                   | 2000    | 2660         | 2940    | --                                                                       | --  | 8                                                                              | 7       |

| TABLE VIII         |         |      |         |         |       |         |         |        |
|--------------------|---------|------|---------|---------|-------|---------|---------|--------|
| TORQUE CONVERSIONS |         |      |         |         |       |         |         |        |
| In. Lb.            | Ft. Lb. | Nm   | In. Lb. | Ft. Lb. | Nm    | In. Lb. | Ft. Lb. | Nm     |
| 5                  | 0.42    | 0.56 | 100     | 8.33    | 11.30 | 1000    | 83.33   | 113.00 |
| 10                 | 0.83    | 1.13 | 200     | 16.67   | 22.60 | 2000    | 166.70  | 226.00 |
| 20                 | 1.67    | 2.26 | 300     | 25.00   | 53.90 | 3000    | 250.00  | 339.00 |
| 30                 | 2.50    | 3.39 | 400     | 33.33   | 45.19 | 4000    | 333.30  | 451.90 |
| 40                 | 3.33    | 4.52 | 500     | 41.67   | 56.49 | 5000    | 416.70  | 564.90 |
| 50                 | 4.17    | 5.65 | 600     | 50.00   | 67.79 | 6000    | 500.00  | 677.90 |

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

| CHART | MODELS                                    |
|-------|-------------------------------------------|
| E     | GO-435 ALL                                |
| E1    | GO-435-C2B2, -C2B2-6                      |
| H     | GO-480, IGO-480 ALL                       |
| H1    | GO-480-B                                  |
| H2    | GO-480-F1A6, -F2A6, -F4A6, -G2D6, -G2F6   |
| H3    | GO-480-G1H6, -G1D6                        |
| H4    | GO-480-D1A (Crosswise Accessory Housing)  |
| H5    | GO-480-G1B6 (Crosswise Accessory Housing) |
| P     | GSO-480, IGSO-480                         |
| P1    | IGSO-480                                  |
| AB    | IGSO-540                                  |
| AC    | IGO-540                                   |

### NOTE

In “Chart” column, a number appearing after a letter shows exception to basic model.

|             |                   |                                  |
|-------------|-------------------|----------------------------------|
| SECTION I   | 500 SERIES        | CRANKCASE, CRANKSHAFT & CAMSHAFT |
| SECTION II  | 600 SERIES        | CYLINDERS                        |
| SECTION III | 700 & 7000 SERIES | GEAR TRAIN                       |
| SECTION IV  | 800 SEREIS        | BACKLASH (GEAR TRAIN)            |
| SECTION V   | 900 SERIES        | TORQUE & SPRINGS                 |

- (A) These fits are either shrunk fits controlled by machining, fits that may readily be adjusted, or fits where wear does not normally occur. In each case, the fit must be held to manufacturing tolerance.
- (B) Side clearance on piston rings must be measured with face of ring flush with piston.
- (C) Replacements to correct these items must be made to give uniform backlash within 0.001 between the stationary gear and pinions, and within 0.001 between the pinions and the ring gear.
- (D) These dimensions shown are measured at bottom of piston skirt at right angles to piston pin.
- (E) Permissible wear of the crankshaft (rod and main bearing journals) to be minus 0.0015 on the diameter.
- (L) Loose fit; wherein a definite clearance is mentioned between the mating surfaces.
- (T) Tight fit; shrink or interference fit.

SSP-1776-5-PT3

April 13, 2020\*

\* - Indicates cut-off date for data retrieved prior to publication.

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## TECHNICAL PUBLICATION REVISION

| REVISION NO.                                                                                                                                                                                                                                                                                                                            | PUBLICATION             | PUBLICATION NO.                                                                                                                                                                                                                                                                                                                                                                                                                        | PUBLICATION DATE |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| SSP-1776-5-PT3                                                                                                                                                                                                                                                                                                                          | Service Table of Limits | SSP-1776                                                                                                                                                                                                                                                                                                                                                                                                                               | October 28, 2013 |
| PREVIOUS REVISIONS                                                                                                                                                                                                                                                                                                                      |                         | CURRENT REVISION*                                                                                                                                                                                                                                                                                                                                                                                                                      |                  |
| <p><b>April 2018</b></p> <p>3-9, 3-47, 3-53</p> <ul style="list-style-type: none"><li>Deleted NOTES that reference S.I. 1243 in Piston Application Table</li><li>Added Ref. number 930 to Section V table and figure for torque value for brass union nut on stainless steel injector fuel lines and primer lines (Both Ends)</li></ul> |                         | <p><b>April 2020</b></p> <p>3-8</p> <ul style="list-style-type: none"><li>Revised burnishing instructions for connecting rod bushing in reference number 600</li><li>Revised the Mfr. Min. &amp; Max. Clearance for Piston Ring Gap (Compression) Nitrided Cylinders (Choke Barrels) and Piston Ring Gap (Oil) in reference number 607</li></ul> <p>* Revisions are indicated with a vertical bar to the left of the revised item.</p> |                  |

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# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION I – CRANKCASE, CRANKSHAFT AND CAMSHAFT

| Ref. | Chart         | Nomenclature                                                             | Dimensions              |              | Clearances              |              |
|------|---------------|--------------------------------------------------------------------------|-------------------------|--------------|-------------------------|--------------|
|      |               |                                                                          | Mfr. Min. & Max.        | Service Max. | Mfr. Min. & Max.        | Service Max. |
| 500  | E-H1-H2-H4    | All Main Bearings and Crankshaft                                         |                         |              | <u>.0015L</u><br>.0045L | .0060L       |
|      | H3-H5-P-AB-AC | Main Bearings and Crankshaft (Except Front)                              |                         |              | <u>.0011L</u><br>.0041L | .0050L       |
|      | H3-H5-P-AB-AC | Front Main Bearings and Crankshaft                                       |                         |              | <u>.0011L</u><br>.0041L | .0050L       |
|      | E-H-P         | Diameter of Main Bearing Journal on Crankshaft                           | <u>2.3745</u><br>2.376  | (E)          |                         |              |
|      | E-H1-H2-H4    | Crankcase Bearing Bore Diameters (All)                                   | <u>2.566</u><br>2.567   | 2.5685       |                         |              |
|      | H3-H5-P-AB-AC | Crankcase Bearing Bore Diameters (All)                                   | <u>2.6865</u><br>2.6875 | 2.6890       |                         |              |
| 501  | ALL           | Connecting Rod Bearings and Crankshaft                                   |                         |              | <u>.0008L</u><br>.0038L | .0050L       |
|      | ALL           | Diameter of Connecting Rod Journal on Crankshaft (2-1/8 in.)             | <u>2.1235</u><br>2.125  | (E)          |                         |              |
|      | ALL           | Connecting Rod Bearing Bore Diameter (Measured at axis 30° on each side) | <u>2.2870</u><br>2.2875 |              |                         |              |
| 502  | ALL           | Connecting Rod Side Clearance                                            |                         |              | <u>.004L</u><br>.010L   | .016L        |
| 503  | ALL           | Connecting Rod Alignment                                                 |                         |              | .010 in 10 Inches       |              |
| 504  | ALL           | Connecting Rod Twist                                                     |                         |              | .012 in 10 Inches       |              |
| 505  | ALL           | Crankshaft Run-Out at Center Main Bearings                               |                         |              |                         |              |
|      |               | Mounted on No. 1 and 4 Journals Max. Run-Out No. 2 and 3 Journals        |                         |              | .005                    | .0075        |
|      |               | Mounted on No. 1 and 3 Journals Max. Run-Out No. 2 Journal               |                         |              | .003                    | .0045        |
|      |               | Mounted on No. 2 and 4 Journals Max. Run-Out No. 3 Journal               |                         |              | .003                    | .0045        |
| 506  | ALL           | Crankshaft and Crankcase Front End Clearance                             |                         |              | <u>.006L</u><br>.015L   | .025L        |
| 510  | E-H1-H2-H3    | Crankshaft Timing Gear and Crankshaft                                    |                         |              | <u>.0015L</u><br>.0005T | (A)          |
|      | H4-H5-P-AB-AC | Crankshaft Timing Gear and Crankshaft                                    |                         |              | <u>.0000</u><br>.0015T  | (A)          |
| 511  | ALL           | Tappet Body and Crankcase                                                |                         |              | <u>.0010L</u><br>.0033L | .004L        |
|      | ALL           | O.D. of Tappet                                                           | <u>.7169</u><br>.7177   | .7166        |                         |              |
|      | ALL           | I.D. Tappet Bore in Crankcase                                            | <u>.7187</u><br>.7200   | .7203        |                         |              |

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION I – CRANKCASE, CRANKSHAFT, CAMSHAFT

| Ref. | Chart                                  | Nomenclature                                                                                   | Dimensions             |                 | Clearances              |                 |
|------|----------------------------------------|------------------------------------------------------------------------------------------------|------------------------|-----------------|-------------------------|-----------------|
|      |                                        |                                                                                                | Mfr.<br>Min. &<br>Max. | Service<br>Max. | Mfr.<br>Min. &<br>Max.  | Service<br>Max. |
| 512  | ALL                                    | Tappet Plunger Assembly and Body (Hyperbolic)                                                  |                        |                 | <u>.0010L</u><br>.0067L | .0087L          |
| 513  | ALL                                    | Tappet Socket and Body (Hyperbolic)                                                            |                        |                 | <u>.002L</u><br>.007L   | .009L           |
| 514  | ALL                                    | Camshaft and Crankcase                                                                         |                        |                 | <u>.002L</u><br>.004L   | .006L           |
| 515  | ALL                                    | Camshaft – End Clearance                                                                       |                        |                 | <u>.002L</u><br>.009L   | .015L           |
| 516  | ALL                                    | Camshaft Run-Out at Center Bearing Journal                                                     |                        |                 | <u>.000</u><br>.001     | .006            |
| 517  | ALL                                    | Counterweight Bushing and Crankshaft                                                           |                        |                 | <u>.0013T</u><br>.0026T | (A)             |
| 518  | ALL                                    | Counterweight Roller – End Clearance                                                           |                        |                 | <u>.007L</u><br>.025L   | .038L           |
| 519  | ALL                                    | Counterweight and Crankshaft – Side Clearance*                                                 |                        |                 | <u>.003L</u><br>.013L   | .017L           |
|      | * - Measure below roller next to flat. |                                                                                                |                        |                 |                         |                 |
| 520  | ALL                                    | Counterweight Bore and Washer O.D.                                                             |                        |                 | <u>.0002L</u><br>.0030L | (A)             |
| 521  | ALL                                    | I.D. of Counterweight Bushing                                                                  | <u>.7485</u><br>.7505  | .7512           |                         |                 |
| 522  | ALL                                    | O.D. of Counterweight Roller (P/N 69433) (See latest revision of Service Instruction No. 1012) | <u>.5045</u><br>.5050  |                 |                         |                 |
|      | AC                                     | O.D. of Counterweight Roller (P/N 73287) (See latest revision of Service Instruction No. 1012) | <u>.5189</u><br>.5194  |                 |                         |                 |
|      | ALL                                    | O.D. of Counterweight Roller (P/N 70416) (See latest revision of Service Instruction No. 1012) | <u>.6945</u><br>.6950  |                 |                         |                 |
| 523  | ALL                                    | Thrust Bearing and Propeller Shaft                                                             |                        |                 | <u>.0000</u><br>.0012L  | .002L           |
| 526  | ALL                                    | Thrust Bearing and Thrust Bearing Cap Clamp Fit (Shim to this fit)                             |                        |                 | <u>.003T</u><br>.005T   | (A)             |
| 527  | ALL                                    | Thrust Bearing Tilt                                                                            |                        | .027 Tilt       |                         |                 |
| 528  | ALL                                    | Thrust Bearing – End Play                                                                      |                        |                 | <u>.006</u><br>.008     | .010            |
| 530  | ALL                                    | Propeller Shaft Run-Out (Rear Cone Location)                                                   |                        |                 |                         | .003            |
| 531  | ALL                                    | Propeller Shaft Run-Out (Front Cone Location) (Propeller Shaft Installed)                      |                        |                 |                         | .007            |
| 532  | E-H1-H2-H3                             | Starter Jaw and Crankshaft                                                                     |                        |                 | <u>.0005L</u><br>.0040L | (A)             |
| 533  | ALL                                    | Thrust Bearing and Reduction Gear Housing                                                      |                        |                 | <u>.0006L</u><br>.0024L | .0035L          |

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

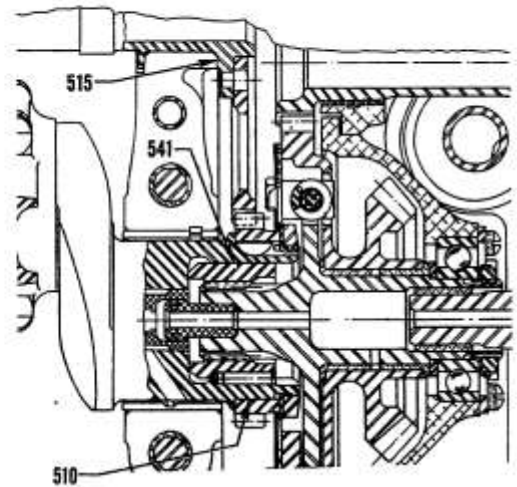
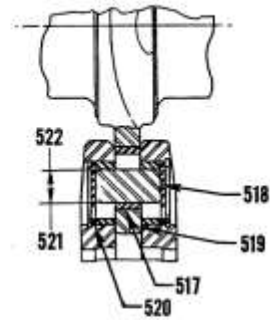
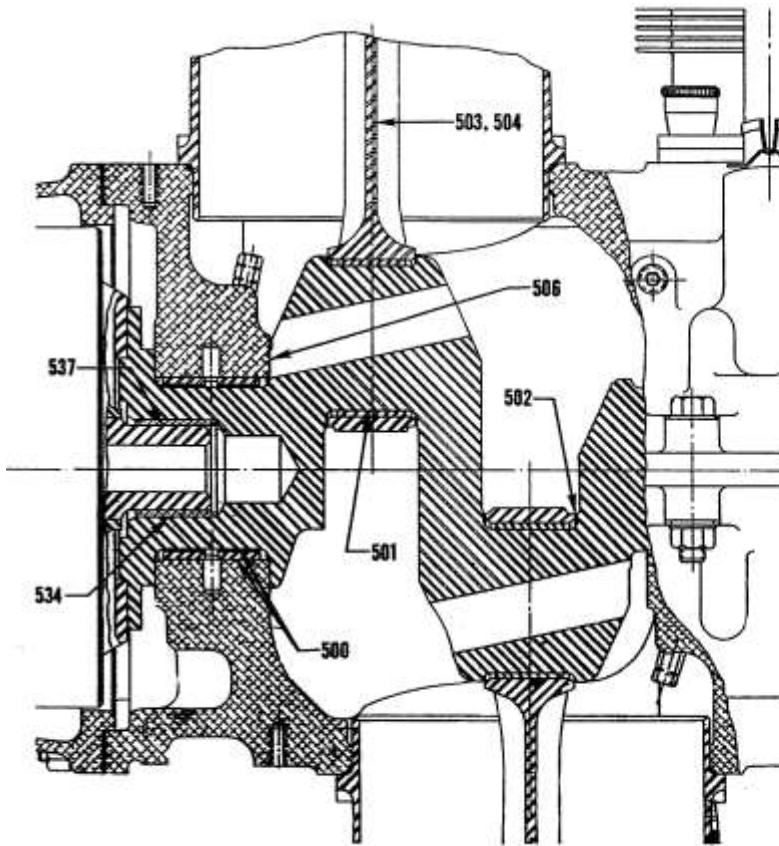
### SECTION I – CRANKCASE, CRANKSHAFT, CAMSHAFT

| Ref. | Chart         | Nomenclature                                                                  | Dimensions                                                                    |                 | Clearances                        |                 |
|------|---------------|-------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-----------------|-----------------------------------|-----------------|
|      |               |                                                                               | Mfr.<br>Min. &<br>Max.                                                        | Service<br>Max. | Mfr.<br>Min. &<br>Max.            | Service<br>Max. |
| 534  | ALL           | Crankshaft and Crankcase Front Bushing                                        |                                                                               |                 | <u>.0010T</u><br>.0025T           | (A)             |
| 535  | ALL           | Pinion – End Clearance                                                        |                                                                               |                 | <u>.011</u><br>.016               | .030            |
| 536  | ALL           | Pinion Shaft and Cage (See latest revision of Service Instruction No. 1236)   |                                                                               |                 | <u>.0001T</u><br>.0005T           |                 |
|      | ALL           | Pinion Shaft and Cage (See latest revision of Service Instruction No. 1114)   |                                                                               |                 | Select for Hand Push Fit (C) .002 |                 |
| 537  | ALL           | Propeller Shaft and Crankshaft Bushing                                        |                                                                               |                 | <u>.0020L</u><br>.0035L           | .005L           |
|      | ALL           | I.D. Propeller Shaft Bushing in Crankshaft                                    | <u>1.251</u><br>1.2525                                                        | 1.253           |                                   |                 |
|      |               |                                                                               | This Diameter must be concentric with Front Main Bearing within .003 in. TIR. |                 |                                   |                 |
| 538  | ALL           | Stationary Gear and Plate – End Clearance                                     |                                                                               |                 | <u>.000</u><br>.004               | .007            |
| 539  | ALL           | Ring Gear and Drive Plate – End Clearance                                     |                                                                               |                 | <u>.000</u><br>.004               | .007            |
| 540  | P-AB-AC       | Reduction Gear Governor and Magneto Housing and Reduction Gear Housing Sleeve |                                                                               |                 | <u>.004T</u><br>.006T             | (A)             |
| 541  | H4-H5-P-AB-AC | Rear Crankshaft Spline Bushing and Crankshaft                                 |                                                                               |                 | <u>.0002T</u><br>.0015T           | (A)             |

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION I – CRANKCASE, CRANKSHAFT AND CAMSHAFT

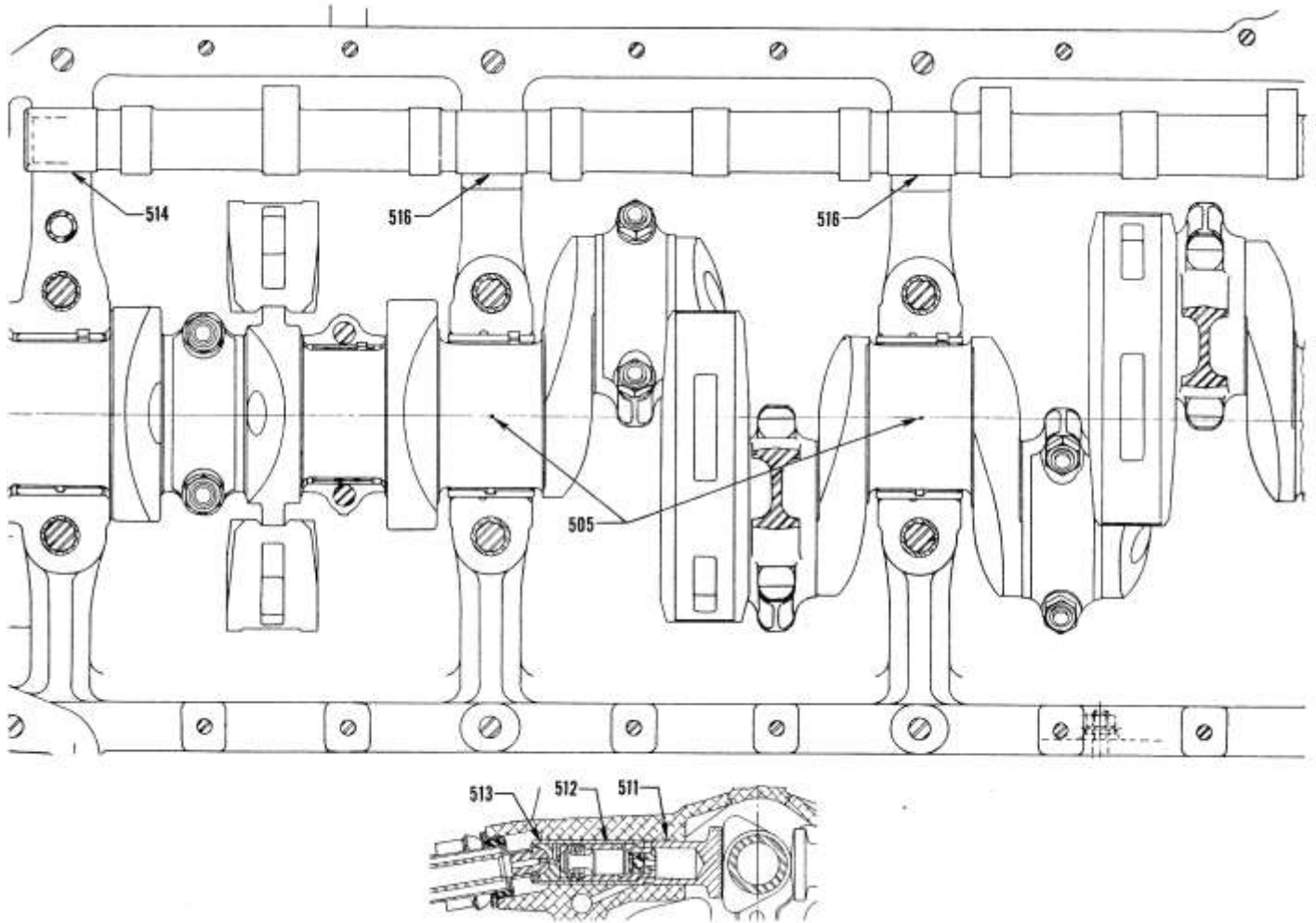


Crankcase, Crankshaft, Bearings, Camshaft, Tappets and Counterweights

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION I – CRANKCASE, CRANKSHAFT, CAMSHAFT

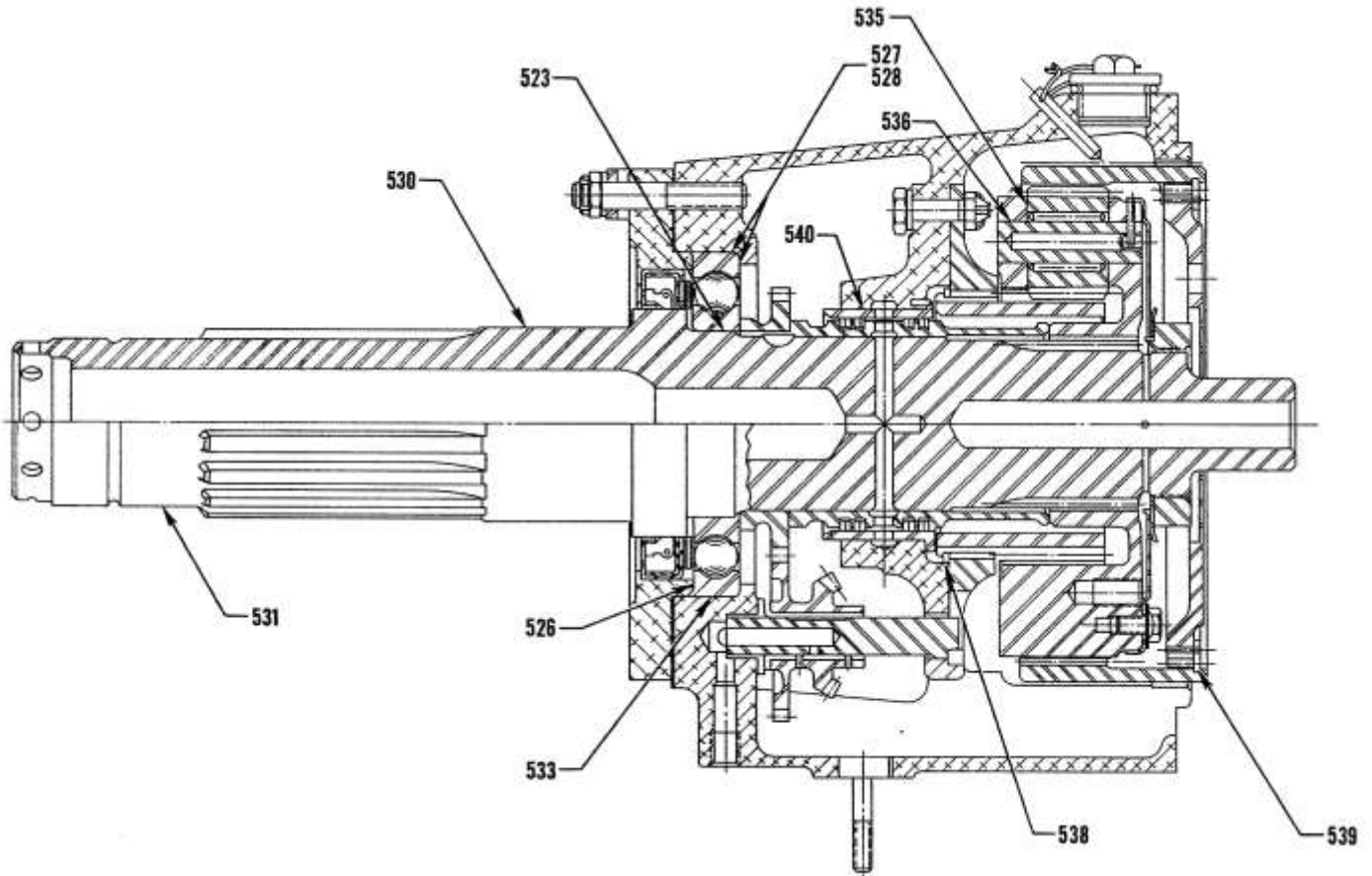


**Longitudinal Section Thru Engine, Camshaft, Tappet Body and Crankshaft**

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION I – CRANKCASE, CRANKSHAFT, CAMSHAFT



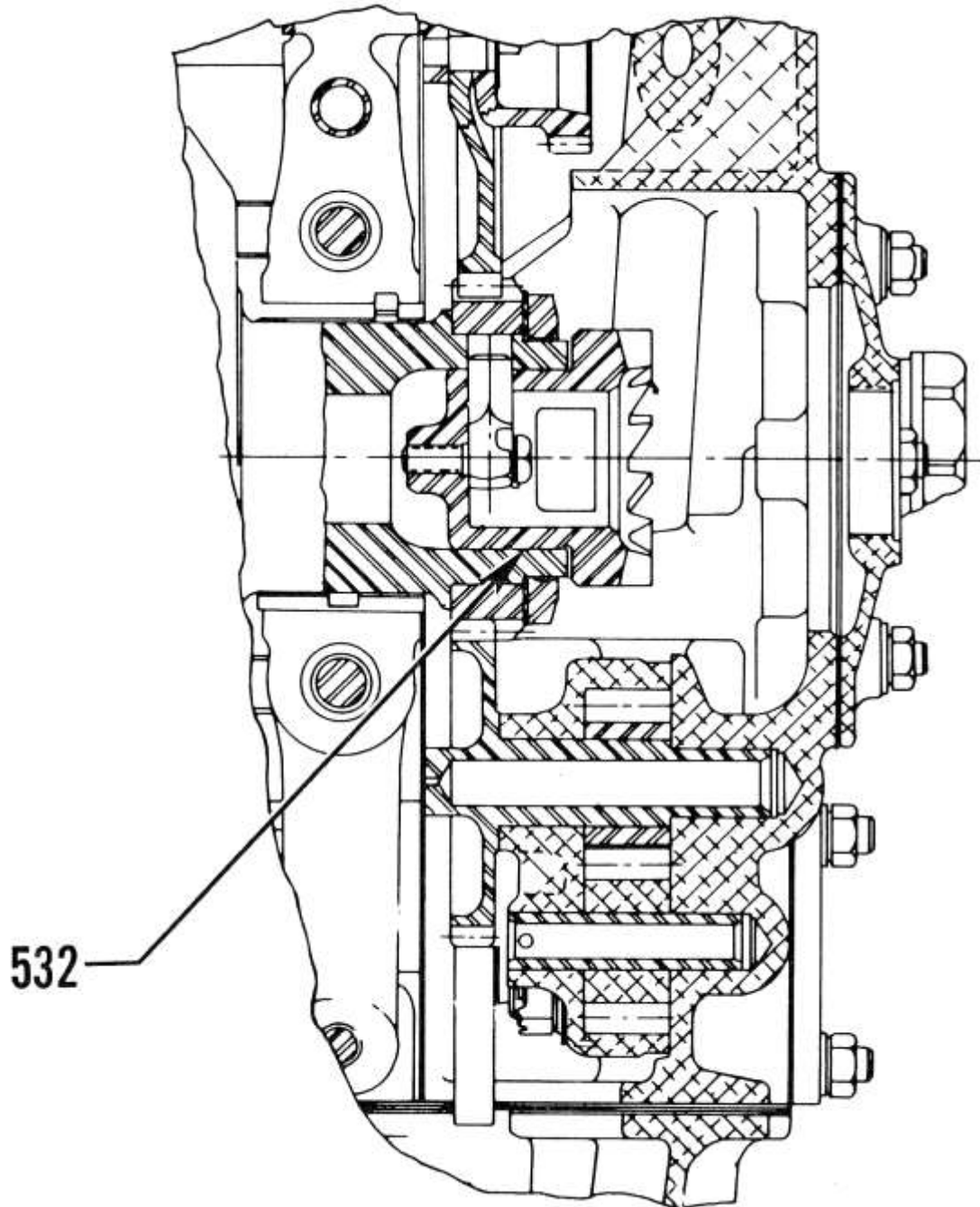
### Reduction Gear and Related Parts



# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION I – CRANKCASE, CRANKSHAFT, CAMSHAFT



**Starter Jaw and Crankshaft**

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION II – CYLINDERS

| Ref.                                                  | Chart               | Nomenclature                                                                            | Dimensions                                                                                               |              | Clearances              |              |
|-------------------------------------------------------|---------------------|-----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|--------------|-------------------------|--------------|
|                                                       |                     |                                                                                         | Mfr. Min. & Max.                                                                                         | Service Max. | Mfr. Min. & Max.        | Service Max. |
| 600                                                   | ALL                 | Connecting Rod and Connecting Rod Bushing                                               | Bushings P/N LW-13923 to be burnished in place<br>Bushings P/N 01K28983 is <b>not</b> burnished in place |              |                         |              |
|                                                       |                     | Finished I.D. of Connecting Rod Bushing                                                 | <u>1.1254</u><br>1.1262                                                                                  |              |                         |              |
| 601                                                   | E-H-P               | Length Between Connecting Rod Bearing Centers                                           | <u>6.4985</u><br>6.5015                                                                                  |              |                         |              |
|                                                       | AB-AC               | Length Between Connecting Rod Bearing Centers                                           | <u>6.4785</u><br>6.7515                                                                                  |              |                         |              |
| 602                                                   | ALL                 | Connecting Rod Bushing and Piston Pin                                                   |                                                                                                          |              | <u>.0008L</u><br>.0021L | .0025L       |
| 603                                                   | ALL                 | Piston Pin and Piston                                                                   |                                                                                                          |              | <u>.0003L</u><br>.0014L | .0018L       |
|                                                       | ALL                 | Diameter of Piston Pin Hole in Piston                                                   | <u>1.1249</u><br>1.1254                                                                                  |              |                         |              |
|                                                       | ALL                 | Diameter of Piston Pin                                                                  | <u>1.1241</u><br>1.1246                                                                                  |              |                         |              |
| 604                                                   | H-P-AB-AC           | Piston and Piston Pin Plug                                                              |                                                                                                          |              | <u>.0002L</u><br>.0010L | .002L        |
|                                                       | H-P-AB-AC           | *Diameter of Piston Pin Plug                                                            | <u>1.1242</u><br>1.1247                                                                                  |              |                         |              |
| 605                                                   | ALL                 | Piston Pin and Piston Pin Plug (Optional)                                               |                                                                                                          |              | <u>.0005L</u><br>.0025L | .005L        |
|                                                       | H-P-AB-AC           | *Diameter of Piston Pin Plug                                                            | <u>.5655</u><br>.5665                                                                                    |              |                         |              |
|                                                       | E                   | Diameter of Piston Pin Plug (Thin Wall Pin)                                             | <u>.8405</u><br>.8415                                                                                    |              |                         |              |
| *See latest revision of Service Instruction No. 1267. |                     |                                                                                         |                                                                                                          |              |                         |              |
| 606                                                   | ALL                 | Piston Ring and Piston – Side Clearance (Top Ring Comp.) Half Wedge                     |                                                                                                          |              | <u>.0025L</u><br>.0055L | .008L (B)    |
|                                                       | ALL                 | Piston Ring and Piston – Side Clearance (2 <sup>nd</sup> Ring Comp.) Full or Half Wedge |                                                                                                          |              | <u>.000</u><br>.004L    | .006L (B)    |
|                                                       | ALL (AS APPLICABLE) | Piston Ring and Piston – Side Clearance (3 <sup>rd</sup> Ring Comp.) Half Wedge         |                                                                                                          |              | <u>.000</u><br>.004L    | .006L (B)    |
|                                                       | ALL                 | Piston Ring and Piston – Side Clearance (Oil Regulating)                                |                                                                                                          |              | <u>.002L</u><br>.004L   | .006L (B)    |
|                                                       | ALL (AS APPLICABLE) | Piston Ring and Piston – Side Clearance (Oil Scraper)                                   |                                                                                                          |              | <u>.003L</u><br>.0055L  | .007L (B)    |
| 607                                                   | ALL                 | Piston Ring Gap (Comp.) Plain and Chrome Cylinders (Straight Barrels)                   |                                                                                                          |              | <u>.020</u><br>.030     | .047         |
|                                                       | ALL                 | Piston Ring Gap (Comp.) Nitrided and Chrome Cylinders (Choke Barrels)                   |                                                                                                          |              | <u>.045</u><br>.065     | .067         |
|                                                       | ALL                 | Piston Ring Gap (Oil Regulating) (All Barrels)                                          |                                                                                                          |              | <u>.015</u><br>.040     | .047         |

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION II – CYLINDERS

| Ref. | Chart                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Nomenclature                                                       | Dimensions           |              | Clearances       |                 |                  |                                       |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|----------------------|--------------|------------------|-----------------|------------------|---------------------------------------|
|      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                    | Mfr. Min. & Max.     | Service Max. | Mfr. Min. & Max. | Service Max.    |                  |                                       |
| 607  | ALL (AS APPLICABLE)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Piston Ring Gap (Oil Scraper)<br>(All Barrels)                     |                      |              | .015<br>.030     | .047            |                  |                                       |
|      | For Choke Barrels – Ring gap is measured within 4 inches from bottom. Ring gap at top of travel must not be less than .0075.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                    |                      |              |                  |                 |                  |                                       |
|      | For All Other Barrels – Ring gap is measured at top limit of ring travel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                    |                      |              |                  |                 |                  |                                       |
|      | Engine and Piston Application                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                    | Min. Piston Diameter |              | Type of Piston   | Cylinder Barrel |                  | Max. Clearance<br>Piston Skirt & Cyl. |
|      | Engine Chart<br>Code Letter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Piston Number                                                      | Top                  | Bottom       |                  | Type of Surface | Maximum Diameter |                                       |
| 608  | E                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 67266, 71553                                                       | 4.8395               | 4.8540       | Forged-Round     | P               | 4.8805           | .018L                                 |
| 608  | E                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 73620, 73628                                                       | 4.8395               | 4.8540       | Forged-Round     | N               | 4.8805           | .018L                                 |
| 609  | E                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 67266, 71553, 73620, 73628, 73932                                  | 4.8395               | 4.8540       | Forged-Round     | C               | 4.8805           | .0225L                                |
| 610  | E                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 75984                                                              | 4.8395               | 4.8590       | Forged-Cam       | C-N             | 4.8805           | .018L                                 |
|      | H-P                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 69236                                                              | 5.0905               | 5.1040       | Forged-Cam       | P-C             | 5.1305           | .0225L                                |
|      | H-P                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 71545, 71608*                                                      | 5.0905               | 5.1025       | Forged-Round     | C               | 5.1305           | .024L                                 |
|      | H-P-AB-AC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 71940, 72249*, 72578, 73947*, 73976                                | 5.0905               | 5.1040       | Forged-Round     | C               | 5.1305           | .0225L                                |
|      | H-AC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 71940, 72249*, 73947*, 73976                                       | 5.0905               | 5.1040       | Forged-Round     | N               | 5.1305           | .023L                                 |
|      | H-P-AB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 74242, 75617*                                                      | 5.0790               | 5.1090       | Forged-Cam       | C               | 5.1305           | .018L                                 |
|      | H-P-AB-AC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 74242, 76258*                                                      | 5.0790               | 5.1090       | Forged-Cam       | N               | 5.1305           | .018L                                 |
|      | AC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 75617*, 76258*                                                     | 5.0790               | 5.1090       | Forged-Cam       | C-N             | 5.1305           | .018L                                 |
|      | H-P-AB-AC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 73264*, 75961, 76966, 78203*, 78762, LW-10207*, LW-10208, LW-10545 | 5.0790               | 5.1090       | Forged-Cam       | C-N             | 5.1305           | .018L                                 |
|      | NOTES:<br><br>To find the average diameter of cylinder in an area 4” above bottom of barrel: First, measure diameter at right angles from plane in which valves are located. Second, measure diameter through the plane in which valves are located. Add both diameters; this sum, divided by 2, represents the average diameter of the cylinder.<br><br>*=High Compression.<br><br>Cylinder Barrel: N=nitride hardened, C=chrome plated.<br><br>Maximum taper and out-of-round permitted for cylinder in service is .0045 inch.<br><br>To find the average out-of-round, measure diameter of cylinder in an area 4” above bottom of barrel: First, measure diameter at right angles from plane in which valves are located. Second, measure diameter through the plane in which valves are located. Difference between diameters must not exceed .0045 inch.<br><br>Piston diameter at top is measured at top ring land (between top and second compression ring grooves) at right angle to piston pin hole; diameter at bottom of piston is measured at the bottom of the piston skirt at right angles to the piston pin. |                                                                    |                      |              |                  |                 |                  |                                       |

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION II – CYLINDERS

| Ref. | Chart                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Nomenclature                                   | Dimensions                                                                         |                 | Clearances              |                 |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|------------------------------------------------------------------------------------|-----------------|-------------------------|-----------------|
|      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                | Mfr.<br>Min. &<br>Max.                                                             | Service<br>Max. | Mfr.<br>Min. &<br>Max.  | Service<br>Max. |
| 611  | ALL                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Exhaust Valve Seat and Cylinder Head           |                                                                                    |                 | <u>.0075T</u><br>.011T  | (A)             |
|      | ALL                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | O.D. Exhaust Seat                              | <u>1.9355</u><br>1.937                                                             |                 |                         |                 |
|      | ALL                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | I.D. Exhaust Seat Hole in Cylinder Head        | <u>1.926</u><br>1.928                                                              |                 |                         |                 |
| 612  | ALL                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Intake Valve Seat and Cylinder Head            |                                                                                    |                 | <u>.0065T</u><br>.010T  | (A)             |
|      | E-H-P                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | O.D. Intake Seat                               | <u>2.1675</u><br>2.169                                                             |                 |                         |                 |
|      | AB-AC                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | O.D. Intake Seat                               | <u>2.2885</u><br>2.290                                                             |                 |                         |                 |
|      | E-H-P                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | I.D. Intake Seat Hole in Cylinder Head         | <u>2.159</u><br>2.161                                                              |                 |                         |                 |
|      | AB-AC                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | I.D. Intake Seat Hole in Cylinder Head         | <u>2.280</u><br>2.282                                                              |                 |                         |                 |
| 613  | ALL                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Exhaust Valve Guide and Cylinder Head          |                                                                                    |                 | <u>.001T</u><br>.0025T  | (A)             |
|      | ALL                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | O.D. Exhaust Valve Guide                       | <u>.6633</u><br>.6638                                                              |                 |                         |                 |
|      | ALL                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | I.D. Exhaust Valve Guide Hole in Cylinder Head | <u>.6613</u><br>.6623                                                              |                 |                         |                 |
| 614  | ALL                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Intake Valve Guide and Cylinder Head           |                                                                                    |                 | <u>.001T</u><br>.0025T  | (A)             |
|      | ALL                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | O.D. Intake Valve Guide                        | <u>.5933</u><br>.5938                                                              |                 |                         |                 |
|      | ALL                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | I.D. Intake Valve Guide Hole in Cylinder Head  | <u>.5913</u><br>.5923                                                              |                 |                         |                 |
| 615  | ALL                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Exhaust Valve Stem and Valve Guide             |                                                                                    |                 | <u>.0037L</u><br>.0050L |                 |
|      | ALL                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | O.D. Exhaust Valve Stem                        | <u>.4957</u><br>.4965                                                              | .4937           |                         |                 |
|      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                | Service allowable limits of .4937 is applicable only to inconel or nimonic valves. |                 |                         |                 |
|      | ALL                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Finished I.D. Exhaust Valve Guide              | <u>.4995</u><br>.5005                                                              |                 |                         |                 |
|      | ½ inch diameter exhaust valves may have exhaust valve guides that are .003 inch over the maximum inside diameter limit, anytime up to 300 hours of service. After 300 hours of service, inside diameter of exhaust valve guide may increase .001 inch during each 100 hours of operation up to the recommended overhaul time for the engine, or not to exceed .015 inch over the basic I.D. See latest revision of Service Instruction No. 1009 for recommended overhaul time. |                                                |                                                                                    |                 |                         |                 |
| 616  | ALL                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Intake Valve Stem and Valve Guide              |                                                                                    |                 | <u>.0010L</u><br>.0028L | .006L           |
|      | ALL                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | O.D. Intake Valve Stem                         | <u>.4022</u><br>.4030                                                              | .4010           |                         |                 |
|      | ALL                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Finished I.D. Intake Valve Guide               | <u>.4040</u><br>.4050                                                              |                 |                         |                 |

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

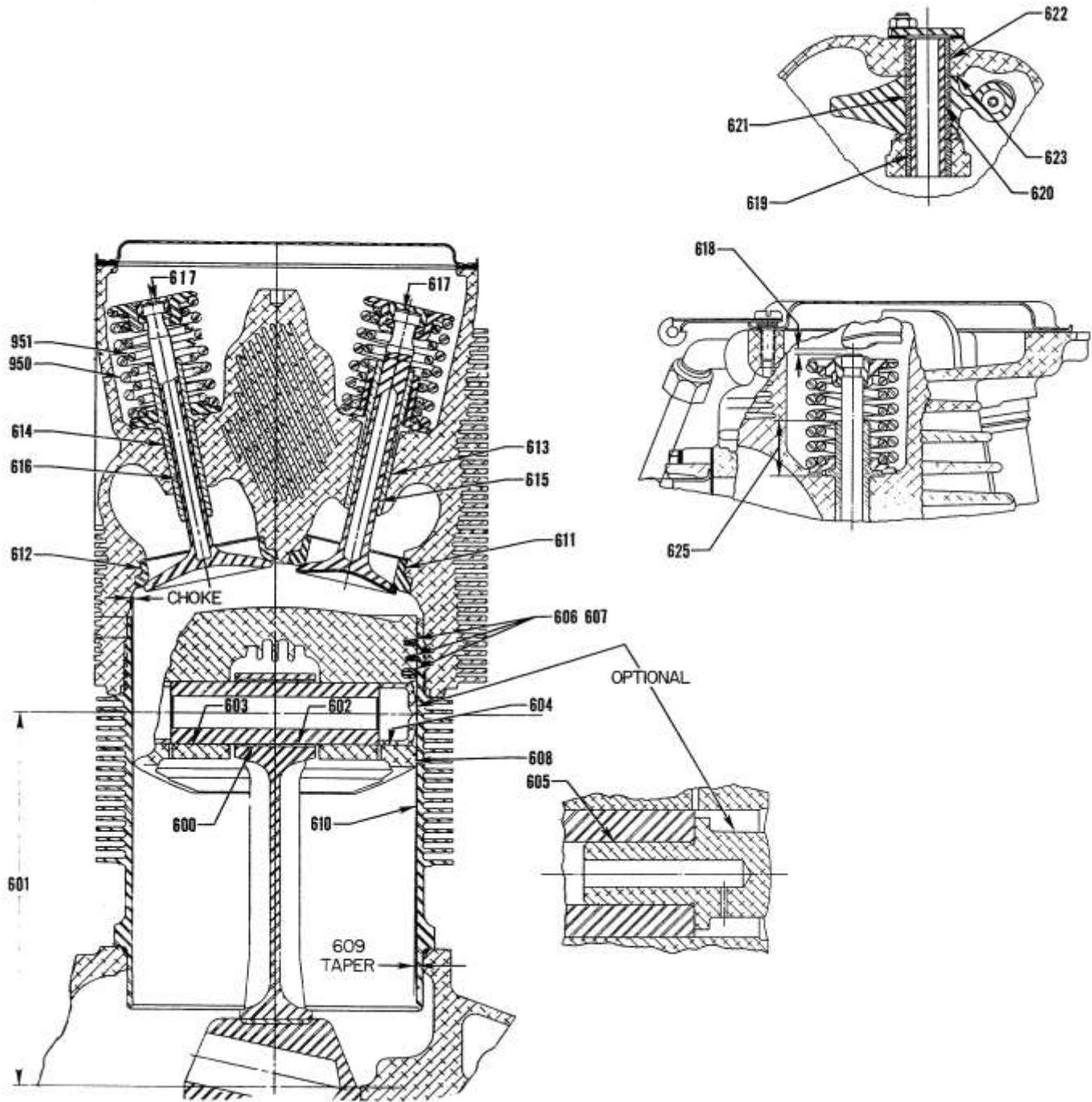
### SECTION II – CYLINDERS

| Ref. | Chart | Nomenclature                                                                                                      | Dimensions                         |                 | Clearances              |                 |
|------|-------|-------------------------------------------------------------------------------------------------------------------|------------------------------------|-----------------|-------------------------|-----------------|
|      |       |                                                                                                                   | Mfr.<br>Min. &<br>Max.             | Service<br>Max. | Mfr.<br>Min. &<br>Max.  | Service<br>Max. |
| 617  | ALL   | Valve and Valve Cap Clearance                                                                                     |                                    |                 | <u>.000</u><br>.004L    | .005L           |
| 618  | ALL   | Dry Tappet Clearance                                                                                              |                                    |                 | <u>.028</u><br>.080     |                 |
| 619  | ALL   | Valve Rocker Shaft and Valve Rocker Bushing                                                                       |                                    |                 | <u>.0001L</u><br>.0013L | .0025L          |
|      | ALL   | Finished I.D. of Valve Rocker Shaft (Bushing) in Cylinder Head                                                    | <u>.6246</u><br>.6261              | .6270           |                         |                 |
| 620  | ALL   | Valve Rocker Shaft and Valve Rocker Bushing                                                                       |                                    |                 | <u>.0007L</u><br>.0017L | .004L           |
|      | ALL   | O.D. Valve Rocker Shaft                                                                                           | <u>.6241</u><br>.6245              | .6231           |                         |                 |
|      | ALL   | Finished I.D. of Rocker Arm Bushing                                                                               | <u>.6252</u><br>.6263              | .6270           |                         |                 |
| 621  | ALL   | Valve Rocker Bushing and Valve Rocker                                                                             | Bushing Must Be Burnished In Place |                 |                         |                 |
| 622  | ALL   | Valve Rocker Shaft Bushing and Cylinder Head                                                                      |                                    |                 | <u>.0022T</u><br>.0038T | (A)             |
|      | ALL   | Valve Rocker Shaft Bushing and Hole in Cylinder Head                                                              | <u>.7380</u><br>.7388              |                 |                         |                 |
| 623  | ALL   | Valve Rocker and Cylinder Head – Side Clearance                                                                   |                                    |                 | <u>.002L</u><br>.020L   | .024L           |
| 625  | ALL   | Intake and Exhaust Valve Guide Height                                                                             | <u>.914</u><br>.954                |                 |                         |                 |
|      |       | MEASURE VALVE GUIDE HEIGHT FROM THE VALVE SPRING SEAT COUNTERBORE IN THE CYLINDER HEAD TO THE TOP OF VALVE GUIDE. |                                    |                 |                         |                 |

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION II – CYLINDERS



Cylinder, Piston, Connecting Rod and Valve Components

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION III – GEAR TRAIN

| Ref.                     | Chart         | Nomenclature                                                         | Dimensions             |                 | Clearances              |                 |
|--------------------------|---------------|----------------------------------------------------------------------|------------------------|-----------------|-------------------------|-----------------|
|                          |               |                                                                      | Mfr.<br>Min. &<br>Max. | Service<br>Max. | Mfr.<br>Min. &<br>Max.  | Service<br>Max. |
| OIL PUMP & SCAVENGE PUMP |               |                                                                      |                        |                 |                         |                 |
| 700                      | E-H1-H2-H3    | Oil Pump Drive Gear and Oil Pump Body                                |                        |                 | <u>.0010L</u><br>.0025L | .004L           |
| 701                      | E-H1-H2-H3    | Oil Pump Drive Gear and Accessory Housing                            |                        |                 | <u>.0015L</u><br>.0030L | .006L           |
| 702                      | E-H1-H2-H3    | Oil Pump Drive Gear – End Clearance                                  |                        |                 | <u>.008L</u><br>.042L   | .060L           |
|                          | H4-H5-P-AB-AC | Oil Pump and Scavenge Pump Gear – End Clearance                      |                        |                 | <u>.007L</u><br>.030L   | .045L           |
| 703                      | E-H1-H2-H3    | Oil Pump Impeller – Diameter Clearance                               |                        |                 | <u>.002L</u><br>.005L   | .008L           |
|                          | H4-H5-P-AB-AC | Oil Pump and Scavenge Pump Impellers – Diameter Clearance            |                        |                 | <u>.007L</u><br>.011L   | .014L           |
| 704                      | E-H1-H2-H3    | Oil Pump Impeller – Side Clearance                                   |                        |                 | <u>.002L</u><br>.0045L  | .005L           |
|                          | H4-H5-P-AB-AC | Oil Pump and Scavenge Pump Impellers – Side Clearance                |                        |                 | <u>.003L</u><br>.0055L  | .006L           |
|                          | E-H1-H2-H3    | Width of Oil Pump Impellers                                          | <u>.747</u><br>.749    | .746            |                         |                 |
|                          | H4-H5-P-AB-AC | Width of Oil Pump Impellers                                          | <u>.995</u><br>.997    | .994            |                         |                 |
|                          | H4-H5-P-AB-AC | Width of Oil Scavenge Pump Impellers                                 | <u>1.496</u><br>1.498  | 1.495           |                         |                 |
| 705                      | E-H1-H2-H3    | Oil Pump Driven Impellers and Idler Shaft                            |                        |                 | <u>.0010L</u><br>.0025L | .004L           |
|                          | H4-H5-P-AB-AC | Oil Pump and Oil Scavenge Pump Driven Impellers and Idler Shaft      |                        |                 | <u>.0010L</u><br>.0025L | .004L           |
| 706                      | E-H1-H2-H3    | Oil Pump Idler Shaft and Oil Pump Body                               |                        |                 | <u>.0000</u><br>.0025T  | (A)             |
|                          | H4-H5-P-AB-AC | Oil Pump Idler Shaft and Oil Pump Body                               |                        |                 | <u>.0000</u><br>.0015T  | (A)             |
| 707                      | E-H1-H2-H3    | Oil Pump Idler Shaft and Accessory Housing                           |                        |                 | <u>.0005L</u><br>.0025L | .0035L          |
| 713                      | H4-H5-P-AB-AC | Oil Pump Idler Shaft and Scavenge Pump Body                          |                        |                 | <u>.0000</u><br>.0015T  | (A)             |
| 777                      | H4-H5-P-AB-AC | Oil Pump Drive Shaft Bushing and Scavenge Pump Body                  |                        |                 | <u>.001T</u><br>.003T   | (A)             |
| 778                      | H4-H5-P-AB-AC | Oil Pump Drive Shaft Bushing and Oil Pump Body                       |                        |                 | <u>.001T</u><br>.003T   | (A)             |
| 779                      | H4-H5-P-AB-AC | Oil Pump Drive Shaft Bushing and Oil Pressure and Scavenge Pump Gear |                        |                 | <u>.0015L</u><br>.0035L | .005L           |
| 780                      | H4-H5-P-AB-AC | Oil Pump Drive Shaft Bushing and Oil Pump Shaft                      |                        |                 | <u>.0015L</u><br>.0035L | .005L           |

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION III – GEAR TRAIN

| Ref. | Chart | Nomenclature | Dimensions             |                 | Clearances             |                 |
|------|-------|--------------|------------------------|-----------------|------------------------|-----------------|
|      |       |              | Mfr.<br>Min. &<br>Max. | Service<br>Max. | Mfr.<br>Min. &<br>Max. | Service<br>Max. |

#### FUEL PUMP

|     |               |                                                         |  |  |                         |       |
|-----|---------------|---------------------------------------------------------|--|--|-------------------------|-------|
| 727 | E-H1-H2-H3    | Fuel Pump Drive Gear – End Clearance                    |  |  | <u>.016L</u><br>.045L   | .065L |
| 781 | E-H1-H2-H3    | Fuel Pump Drive Gear and Accessory Housing              |  |  | <u>.0010L</u><br>.0030L | .005L |
| 782 | H4-H5-P-AB-AC | Fuel Pump Drive Gear Bushing and Accessory Housing      |  |  | <u>.001T</u><br>.004T   | (A)   |
| 783 | H4-H5-P       | Fuel Pump Drive Shaft Gear – End Clearance              |  |  | <u>.006L</u><br>.064L   | .074L |
| 784 | H4-H5-P       | Fuel Pump Drive Shaft Gear and Bushing                  |  |  | <u>.001L</u><br>.004L   | .006L |
| 785 | P1            | Injector Drive Gear and Accessory Housing Cover Bushing |  |  | <u>.0036L</u><br>.0048L | .006L |
| 786 | P1            | Injector Drive Gear – End Clearance                     |  |  | <u>.002L</u><br>.020L   | .030L |
| 787 | P1            | Injector Idler Gear and Magneto Idler Ball Bearing      |  |  | <u>.0005T</u><br>.0004L | (A)   |
| 788 | P1            | Injector Idler Shaft and Magneto Idler Ball Bearing     |  |  | <u>.0001T</u><br>.0005L | (A)   |
| 789 | AB            | Injector Drive Shaftgear and Accessory Housing Bushing  |  |  | <u>.001L</u><br>.003L   | .005L |
| 790 | AC            | Fuel Pump Drive Shaftgear and Accessory Housing Bushing |  |  | <u>.001L</u><br>.003L   | .005L |
| 791 | AB            | Injector Drive Shaftgear – End Clearance                |  |  | <u>.006</u><br>.036     | .048  |
| 792 | AC            | Fuel Pump Drive Shaftgear – End Clearance               |  |  | <u>.006</u><br>.036     | .048  |

#### VACUUM PUMP & TACHOMETER

|     |                                                 |                                                                                |  |  |                         |       |
|-----|-------------------------------------------------|--------------------------------------------------------------------------------|--|--|-------------------------|-------|
| 737 | E-H1-H2-H3                                      | Vacuum Pump Gear and Accessory Housing                                         |  |  | <u>.0010L</u><br>.0025L | .006L |
| 738 | E-H1-H2-H3                                      | Vacuum Pump Gear – End Clearance                                               |  |  | <u>.016L</u><br>.045L   | .065L |
|     | Reference No. 739 to follow Reference No. 7000. |                                                                                |  |  |                         |       |
| 793 | H4-H5-P                                         | Vacuum Pump Shaftgear Bushing and Accessory Housing Cover                      |  |  | <u>.0015T</u><br>.0035T | (A)   |
| 794 | H4-H5-P                                         | Vacuum Pump Shaftgear Bushing (At Cover) and Vacuum Pump Shaftgear             |  |  | <u>.002L</u><br>.004L   | .006L |
| 795 | H4-H5-P                                         | Vacuum Pump Shaftgear Bushing and Accessory Housing                            |  |  | <u>.0015T</u><br>.0035T | (A)   |
| 796 | H4-H5-P                                         | Vacuum Pump Shaftgear Bushing (At Accessory Housing) and Vacuum Pump Shaftgear |  |  | <u>.0020L</u><br>.0045L | .006L |
| 797 | H4-H5-P                                         | Vacuum Pump Shaftgear – End Clearance                                          |  |  | <u>.008</u><br>.030     | .050  |
| 798 | AB-AC                                           | Vacuum Pump Drive Gear and Vacuum Pump Spline Coupling – End Clearance         |  |  | <u>.008</u><br>.045     | .065  |



# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### PART III – GEAR TRAIN

| Ref. | Chart | Nomenclature | Dimensions             |                 | Clearances             |                 |
|------|-------|--------------|------------------------|-----------------|------------------------|-----------------|
|      |       |              | Mfr.<br>Min. &<br>Max. | Service<br>Max. | Mfr.<br>Min. &<br>Max. | Service<br>Max. |

#### VACUUM PUMP & TACHOMETER (CONT.)

|      |               |                                                                      |                                  |  |                         |       |
|------|---------------|----------------------------------------------------------------------|----------------------------------|--|-------------------------|-------|
| 799  | AB-AC         | Vacuum Pump Drive Gear Bushing and Accessory Housing                 |                                  |  | <u>.001T</u><br>.003T   | (A)   |
| 7000 | AB-AC         | Vacuum Pump Drive Gear Bushing and Vacuum Pump Drive Gear            |                                  |  | <u>.002L</u><br>.004L   | .006L |
| 739  | E-H1-H2-H3    | Tachometer Drive Gear and Accessory Housing                          |                                  |  | <u>.0010L</u><br>.0025L | .006L |
| 7001 | E-H1-H2-H3    | Tachometer Drive Gear – End Clearance                                |                                  |  | <u>.000</u><br>.030L    | .040L |
| 7002 | E-H1          | Tachometer Driven Gear and Adapter                                   |                                  |  | <u>.0015L</u><br>.0035L | .005L |
| 7003 | E-H1          | Tachometer Cover and Adapter                                         |                                  |  | <u>.001T</u><br>.003T   | (A)   |
| 7004 | E-H1          | Tachometer Gear – End Clearance                                      |                                  |  | <u>.001L</u><br>.040L   | .060L |
| 7005 | H1-H2-H3      | Electric Tachometer Idler Gear – End Clearance                       |                                  |  | <u>.005L</u><br>.052L   | .065L |
| 7006 | H1-H2-H3      | Electric Tachometer Driven Gear – End Clearance                      |                                  |  | <u>.005L</u><br>.027L   | .047L |
| 7006 | H4-H5-P-AB-AC | Electric Tachometer Driven Gear – End Clearance                      |                                  |  | <u>.007L</u><br>.025L   | .047L |
| 7007 | H1-H2-H3      | Electric Tachometer Idler Gear Shaft and Idler Gear Bushing          |                                  |  | <u>.001L</u><br>.0025L  | .004L |
| 7008 | H1-H2-H3      | Electric Tachometer Driven Gear and Adapter                          |                                  |  | <u>.0015L</u><br>.0035L | .006L |
| 7009 | AB-AC         | Tachometer Drive Idler Gear Bushing and Tachometer Drive Idler Gear  | Bushing To Be Burnished In Place |  |                         |       |
| 7010 | AB-AC         | Tachometer Drive Idler Gear Bushing and Tachometer Drive Idler Shaft |                                  |  | <u>.001L</u><br>.003L   | .004L |
| 7011 | AB-AC         | Tachometer Drive Idler Gear – End Clearance                          |                                  |  | <u>.005L</u><br>.014L   | .024L |
| 7012 | H1-H5-P-AB-AC | Electric Tachometer Driven Gear and Accessory Housing Cover          |                                  |  | <u>.001L</u><br>.003L   | .004L |

#### GOVERNOR

|      |     |                                                                                    |  |  |                       |       |
|------|-----|------------------------------------------------------------------------------------|--|--|-----------------------|-------|
| 7013 | ALL | Governor Drive Idler Gear Bushing and Governor Drive Idler Shaft                   |  |  | <u>.000L</u><br>.002L | .004L |
| 7014 | ALL | Governor Driven Gear and Governor Drive Adapter Bushing                            |  |  | <u>.001L</u><br>.003L | .004L |
| 7015 | ALL | Reduction Gear Governor and Magneto Housing and Magneto and Governor Drive Bushing |  |  | <u>.002T</u><br>.004T | (A)   |
| 7016 | ALL | Governor Drive Idler Gear and Governor Drive Idler Gear Bushing                    |  |  | <u>.001T</u><br>.003T | (A)   |
| 7017 | ALL | Governor Adapter and Governor Drive Adapter Bushing                                |  |  | <u>.001T</u><br>.003T | (A)   |

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION III – GEAR TRAIN

| Ref.                          | Chart      | Nomenclature                                                                      | Dimensions                         |                 | Clearances              |                 |
|-------------------------------|------------|-----------------------------------------------------------------------------------|------------------------------------|-----------------|-------------------------|-----------------|
|                               |            |                                                                                   | Mfr.<br>Min. &<br>Max.             | Service<br>Max. | Mfr.<br>Min. &<br>Max.  | Service<br>Max. |
| MAGNETO, GENERATOR, & STARTER |            |                                                                                   |                                    |                 |                         |                 |
| 7018                          | AB-AC      | Magneto Drive Idler Gear and<br>Magneto Drive Idler Bushing                       |                                    |                 | <u>.001T</u><br>.003T   | (A)             |
| 7019                          | AB-AC      | Magneto Drive Idler Shaft and<br>Magneto Drive Idler Bushings                     |                                    |                 | <u>.001L</u><br>.003L   | .005L           |
| 7020                          | AB-AC      | Reduction Gear Housing<br>Magneto Drive Bushings and<br>Magneto Drive Idler Shaft |                                    |                 | <u>.000</u><br>.002L    | .004L           |
| 7021                          | AB-AC      | Magneto Drive Adapter and<br>Magneto Adapter Bushings                             |                                    |                 | <u>.001T</u><br>.003T   | (A)             |
| 7022                          | AB-AC      | Magneto Drive Gear and<br>Magneto Adapter Bushings                                |                                    |                 | <u>.001L</u><br>.003L   | .005L           |
| 7023                          | E-H1-H2-H3 | Magneto Drive Bushing and<br>Magneto Gear                                         |                                    |                 | <u>.001T</u><br>.0005L  | .001L           |
| 7024                          | E-H1-H2-H3 | Magneto Drive Bearing and<br>Support                                              |                                    |                 | <u>.0001T</u><br>.0007L | (A)             |
| 7025                          | H4-H5-P    | Magneto Drive Idler Gear Hub<br>Bushing and Magneto Drive<br>Idler Gear Hub       | Bushing Must Be Burnished In Place |                 |                         |                 |
| 7026                          | H4-H5-P    | Magneto Drive Idler Gear Hub<br>Bushing and Magneto Drive<br>Idler Shaft          |                                    |                 | <u>.001L</u><br>.003L   | .004L           |
| 7027                          | H4-H5-P    | Magneto Drive Idler Gear Hub –<br>End Clearance                                   |                                    |                 | <u>.005L</u><br>.014L   | .024L           |
| 7028                          | H4-H5-P    | Magneto Drive Shaft and<br>Accessory Housing Cover<br>Bushing                     |                                    |                 | <u>.0020L</u><br>.0045L | .006L           |
| 7029                          | H4-H5-P    | Magneto Drive Shaft and<br>Accessory Housing Bushing                              |                                    |                 | <u>.0025L</u><br>.0045L | .006L           |
| 7030                          | H4-H5-P    | Magneto Drive Shaft Sleeve and<br>Magneto Drive Shaft                             |                                    |                 | <u>.001T</u><br>.004T   | (A)             |
| 7031                          | H4-H5-P    | Magneto Drive Shaft Sleeve and<br>Magneto Drive Coupling                          |                                    |                 | <u>.001T</u><br>.004T   | (A)             |
| 7032                          | H4-H5-P    | Magneto Drive Shaft Gear – End<br>Clearance                                       |                                    |                 | <u>.002L</u><br>.020L   | .030L           |
| 7033                          | E-H1-H2-H3 | Generator Driven Gear Bushing<br>and Accessory Housing                            |                                    |                 | <u>.001T</u><br>.003T   | (A)             |
| 7034                          | E-H1-H2-H3 | Generator Driven Gear and<br>Bushing                                              |                                    |                 | <u>.002L</u><br>.004L   | .006L           |
| 7035                          | E-H1-H2-H3 | Generator Driven Gear – End<br>Clearance                                          |                                    |                 | <u>.005L</u><br>.049L   | .060L           |
| 7036                          | H1         | Generator Drive Idler Gear and<br>Bushing (Hi-Speed)                              | Bushing Must Be Burnished In Place |                 |                         |                 |
| 7037                          | H1         | Finished I.D. of Idler Gear<br>Bushing                                            | <u>1.000</u><br>1.001              | 1.002           |                         |                 |
| 7038                          | H1         | Generator Drive Countershaft<br>and Bushing                                       |                                    |                 | <u>.0015L</u><br>.0035L | .005L           |
| 7039                          | H1         | Generator Drive Idler Gear –<br>End Clearance                                     |                                    |                 | <u>.004L</u><br>.010L   | .020L           |

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION III – GEAR TRAIN

| Ref. | Chart | Nomenclature | Dimensions             |                 | Clearances             |                 |
|------|-------|--------------|------------------------|-----------------|------------------------|-----------------|
|      |       |              | Mfr.<br>Min. &<br>Max. | Service<br>Max. | Mfr.<br>Min. &<br>Max. | Service<br>Max. |

#### MAGNETO, GENERATOR, STARTER (CONT.)

|      |               |                                                                              |  |  |                         |       |
|------|---------------|------------------------------------------------------------------------------|--|--|-------------------------|-------|
| 7040 | E1-H1-H3      | Angle Generator Drive – Generator Driven Gear Bushing and Generator Housing  |  |  | <u>.001T</u><br>.003T   | (A)   |
| 7041 | E1-H1-H3      | Angle Generator Drive – Generator Driven Gear and Bushing                    |  |  | <u>.002L</u><br>.004L   | .006L |
| 7042 | E1-H1-H3      | Angle Generator Drive – Generator Housing and Generator Drive Gear           |  |  | <u>.001L</u><br>.003L   | .004L |
| 7043 | H4-H5-P-AB-AC | Generator Drive Gear Bushing and Accessory Housing Cover                     |  |  | <u>.0015T</u><br>.0035T | (A)   |
| 7044 | H4-H5-P-AB-AC | Generator Drive Gear Bushing (At Cover) and Generator Drive Gear             |  |  | <u>.002L</u><br>.004L   | .006L |
| 7045 | H4-H5-P-AB-AC | Generator Drive Gear Bushing and Accessory Housing                           |  |  | <u>.002T</u><br>.004T   | (A)   |
| 7046 | H4-H5-P-AB-AC | Generator Drive Gear Bushing (At Accessory Housing) and Generator Drive Gear |  |  | <u>.0025L</u><br>.0045L | .006L |
| 7047 | H4-H5-P-AB-AC | Generator Drive Gear – End Clearance                                         |  |  | <u>.010</u><br>.038     | .050  |
| 7048 | H4-H5-P-AB-AC | Starter Drive Gear Bushings and Adapter                                      |  |  | <u>.002T</u><br>.004T   | (A)   |
| 7049 | H4-H5-P-AB-AC | Starter Drive Gear Bushings and Starter Drive Gear                           |  |  | <u>.002L</u><br>.004L   | .006L |
| 7050 | H4-H5-P-AB-AC | Starter Drive Adapter and Accessory Housing Cover                            |  |  | <u>.0005L</u><br>.0025L | (A)   |
| 7051 | E1-H1-H2-H3   | Oil Relief Plunger and Oil Relief Valve Plug                                 |  |  | <u>.0015L</u><br>.0035L | .005L |
|      | H4-H5-P-AB-AC | Oil Relief Valve Plunger and Sleeve                                          |  |  | <u>.001L</u><br>.003L   | .005L |

#### ACCESSORY DRIVE

|      |               |                                                                         |  |  |                         |       |
|------|---------------|-------------------------------------------------------------------------|--|--|-------------------------|-------|
| 7053 | H4-H5-AC      | Accessory Idler Gear Bearing and Accessory Drive Gear                   |  |  | <u>.0001L</u><br>.0007T | (A)   |
|      | P             | Accessory Drive Gear Bearing and Accessory Drive Shaft                  |  |  | <u>.0001L</u><br>.0007T | (A)   |
|      | AB            | Accessory Idler Gear Bearing and Supercharger and Accessory Drive Gear  |  |  | <u>.0001L</u><br>.0007T | (A)   |
| 7054 | P-AB          | Supercharger and Accessory Drive Gear and Bushing                       |  |  | <u>.001T</u><br>.003T   | (A)   |
| 7055 | H1-H5-P-AB-AC | Accessory Idler Gear Bearing and Accessory Drive Shaft Adapter          |  |  | <u>.0005T</u><br>.0005L | (A)   |
| 7056 | P-AB          | Supercharger and Accessory Drive Gear Bushing and Accessory Drive Shaft |  |  | <u>.0005L</u><br>.0017L | .004L |

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION III – GEAR TRAIN

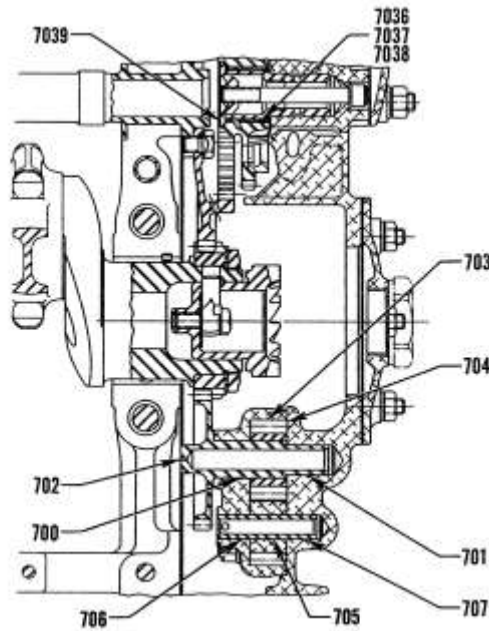
| Ref.                    | Chart | Nomenclature                                                                                                     | Dimensions              |                 | Clearances              |                 |
|-------------------------|-------|------------------------------------------------------------------------------------------------------------------|-------------------------|-----------------|-------------------------|-----------------|
|                         |       |                                                                                                                  | Mfr.<br>Min. &<br>Max.  | Service<br>Max. | Mfr.<br>Min. &<br>Max.  | Service<br>Max. |
| ACCESSORY DRIVE (CONT.) |       |                                                                                                                  |                         |                 |                         |                 |
| 7056                    | P-AB  | Finished I.D. of Supercharger and Accessory Drive Gear Bushing                                                   | <u>1.3295</u><br>1.3305 | 1.3312          |                         |                 |
| 7057                    | P-AB  | Supercharger and Accessory Drive Gear – End Clearance                                                            |                         |                 | <u>.004L</u><br>.012L   | .017L           |
| 7058                    | P     | Accessory Drive Shaft and Bushing                                                                                |                         |                 | <u>.001T</u><br>.003T   | (A)             |
|                         | P     | Finished I.D. of Accessory Drive Shaft Bushing                                                                   | <u>.750</u><br>.7515    | .752            |                         |                 |
| 7059                    | P-AB  | Supercharger Drive Shaftgear and Accessory Drive Shaft Bushing                                                   |                         |                 | <u>.002L</u><br>.004L   | .006L           |
| 7060                    | P-AB  | Supercharger Drive Shaftgear and Supercharger Shaft Bearing                                                      |                         |                 | <u>.0038L</u><br>.0050L | .008L           |
| 7061                    | P-AB  | Supercharger Drive Shaftgear – End Clearance (Use 1 Spacer if Necessary to Maintain Fit)                         |                         |                 | <u>.011L</u><br>.020L   | .020L           |
| 7062                    | P-AB  | Impeller and Supercharger Air Inlet Adapter – Clearance                                                          |                         |                 | <u>.040L</u><br>.070L   |                 |
| 7063                    | P     | Intermediate Supercharger Drive Shaftgear and Bushing                                                            |                         |                 | <u>.0040L</u><br>.0055L | .0075L          |
| 7064                    | P-AB  | Accessory Housing and Intermediate Supercharger Drive Shaftgear Bushing                                          |                         |                 | <u>.001T</u><br>.003T   | (A)             |
| 7065                    | P-AB  | Intermediate Supercharger Drive Gear and Bushing                                                                 |                         |                 | <u>.002L</u><br>.004L   | .006L           |
| 7066                    | P     | Intermediate Supercharger Drive Gear – End Clearance                                                             |                         |                 | <u>.011L</u><br>.026L   | .030L           |
|                         | AB    | Intermediate Supercharger Drive Gear – End Clearance                                                             |                         |                 | <u>.009L</u><br>.020L   | .024L           |
| 7067                    | AB    | Accessory Housing Adapter and Bearing                                                                            |                         |                 | <u>.0006L</u><br>.0006T | .0016L          |
| 7068                    | AB    | Supercharger and Accessory Drive Gear Support and Bearing                                                        |                         |                 | <u>.0002T</u><br>.0013T | (A)             |
| 7069                    | AB    | Supercharger and Accessory Drive Gear Support and Bushing                                                        |                         |                 | <u>.001T</u><br>.003T   | (A)             |
| 7070                    | P-AB  | Supercharger Shaft Bearing and Supercharger Housing                                                              |                         |                 | <u>.0005L</u><br>.002L  | (A)             |
| 7071                    | AB    | Supercharger and Accessory Drive Gear and Accessory Drive Shaft – End Clearance                                  |                         |                 | <u>.001L</u><br>.015L   | .020L           |
| 7072                    | AB-AC | Oil Pressure and Scavenge Pump Idler Gear Bushing and Fuel Injector or Fuel Pump Drive Shaftgear (As Applicable) |                         |                 | <u>.001L</u><br>.003L   | .005L           |
| 7073                    | AB-AC | Oil Pressure and Scavenge Pump Idler Gear and Bushing                                                            |                         |                 | <u>.001T</u><br>.003T   | (A)             |

# SERVICE TABLE OF LIMITS

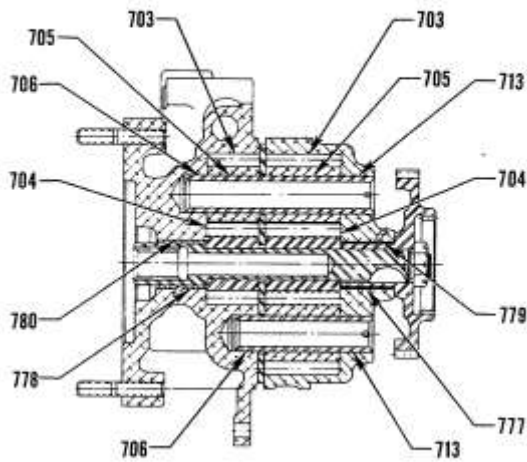
## PART III – GEARED ENGINES

### SECTION III – GEAR TRAIN

| Ref.                    | Chart | Nomenclature                                                 | Dimensions             |                 | Clearances              |                 |
|-------------------------|-------|--------------------------------------------------------------|------------------------|-----------------|-------------------------|-----------------|
|                         |       |                                                              | Mfr.<br>Min. &<br>Max. | Service<br>Max. | Mfr.<br>Min. &<br>Max.  | Service<br>Max. |
| ACCESSORY DRIVE (CONT.) |       |                                                              |                        |                 |                         |                 |
| 7074                    | P1    | Throttle Shaft and Supercharger<br>Air Inlet Housing Bushing |                        |                 | <u>.001L</u><br>.003L   | .005L           |
| 7074                    | AB    | Throttle Shaft and Supercharger<br>Air Inlet Housing Bushing |                        |                 | <u>.0005L</u><br>.0025L | .005L           |
| 7075                    | H2-H3 | Propeller Flange Two Locator<br>Holes                        | <u>.5000</u><br>.5005  | .5008           |                         |                 |



REAR MOUNTED ACCESSORY HSG.



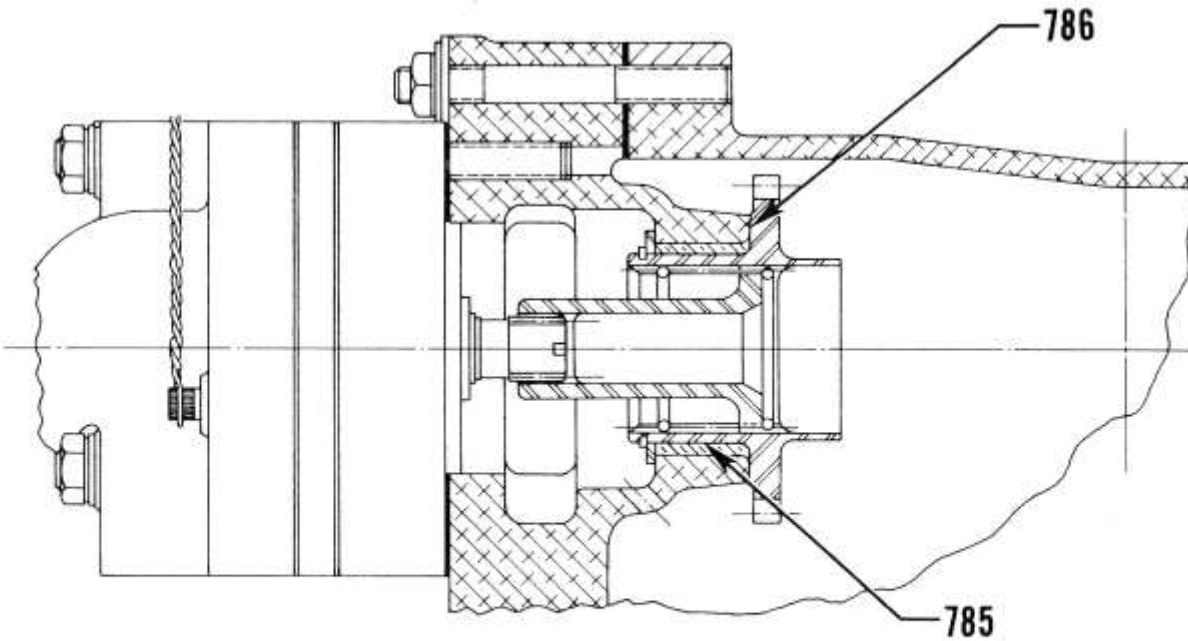
CROSSWISE ACCESSORY HSG.

### Oil Pumps

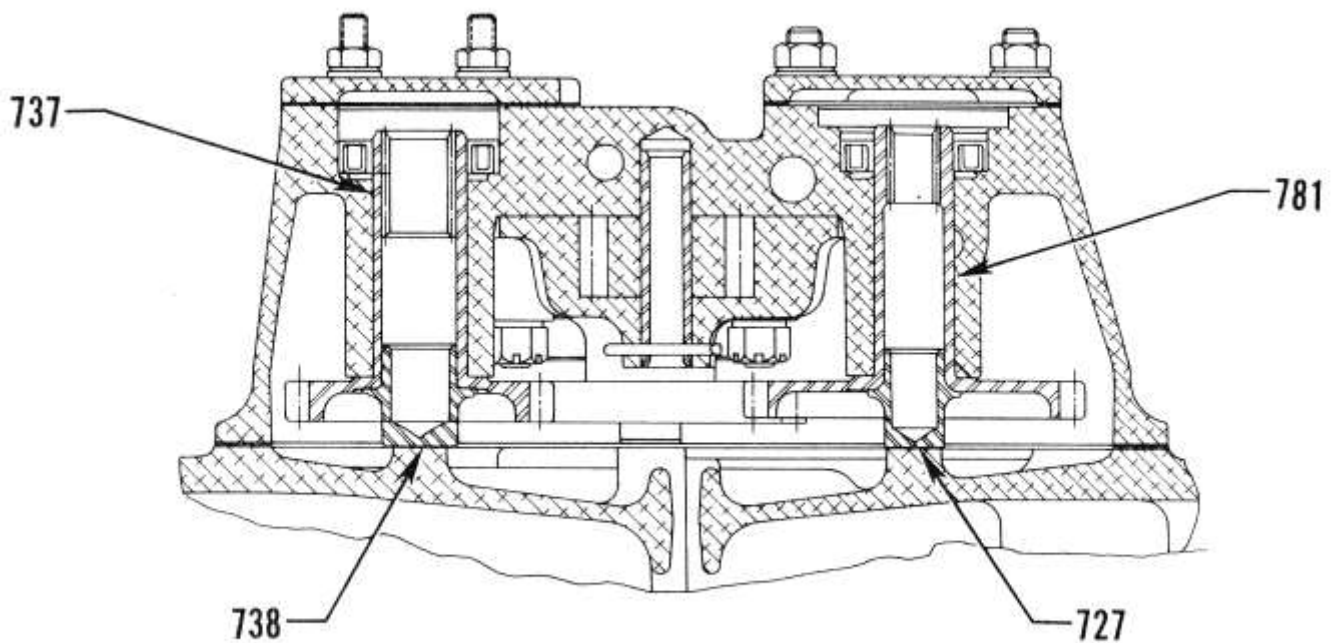
# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION III – GEAR TRAIN



Simmonds Injector

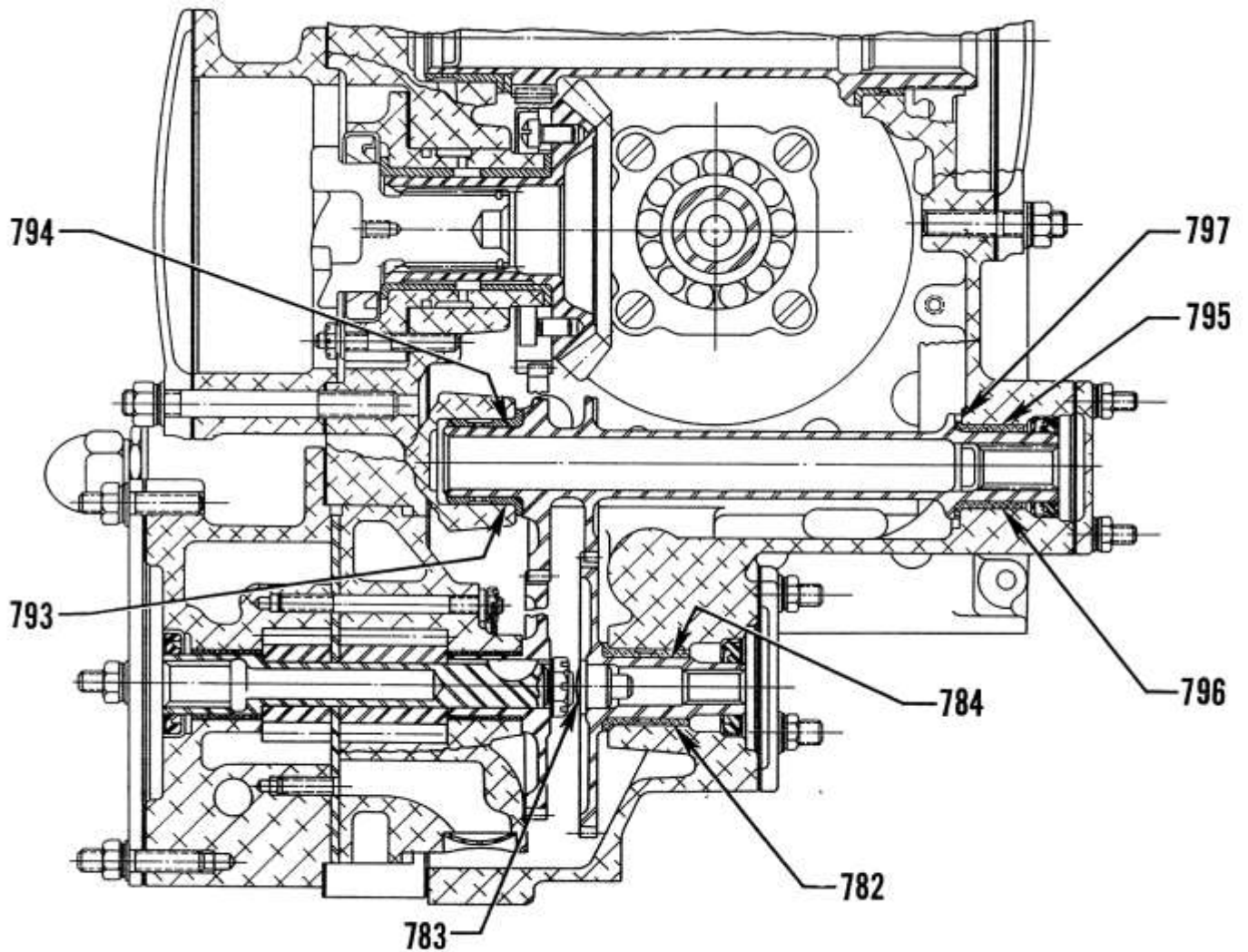


Vacuum and Fuel Pump Drives

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION III – GEAR TRAIN



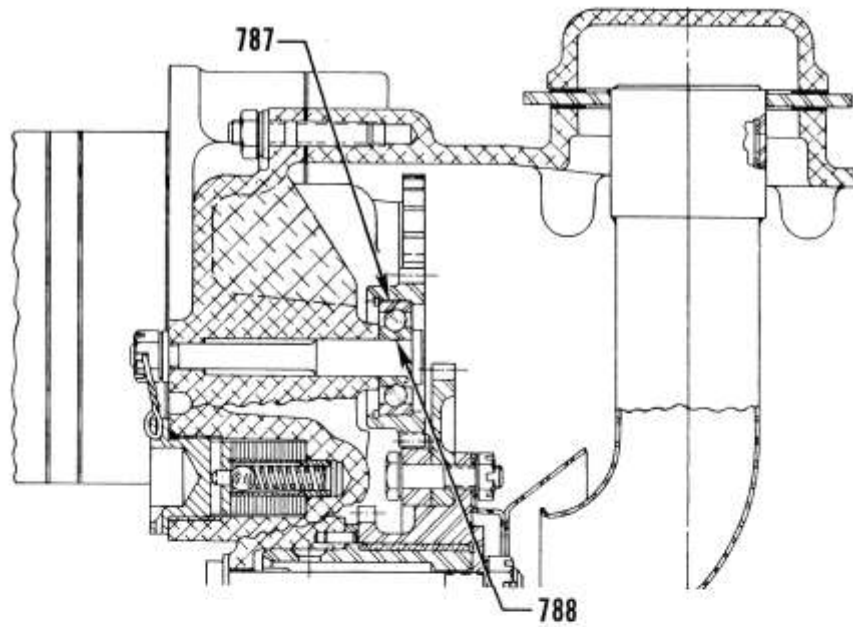
CROSSWISE ACCESSORY HSG.

### Vacuum and Fuel Pump Drives

# SERVICE TABLE OF LIMITS

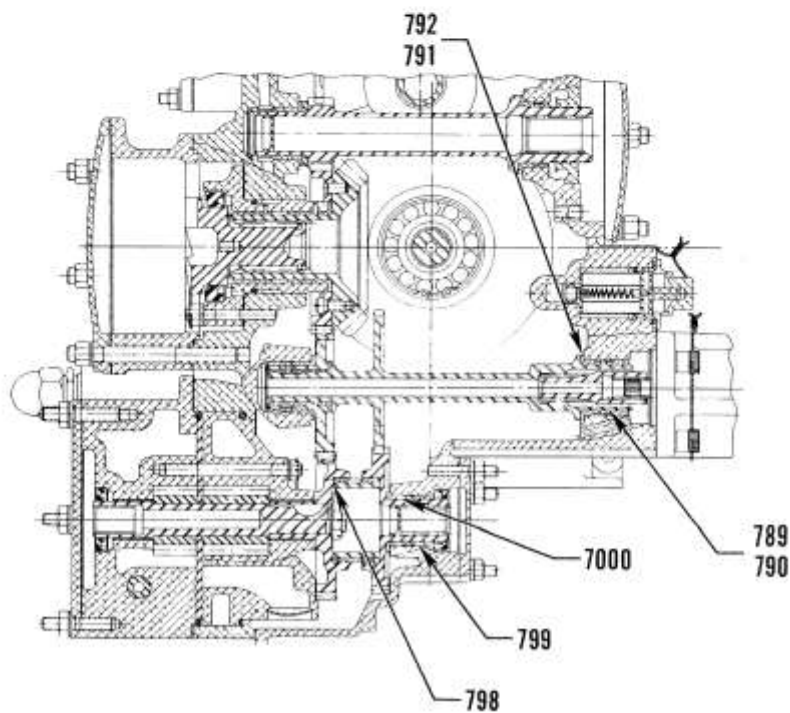
## PART III – GEARED ENGINES

### SECTION III – GEAR TRAIN



IGSO-480

Fuel Injector and Magneto Idler Bearing



IGO, IGSO-540

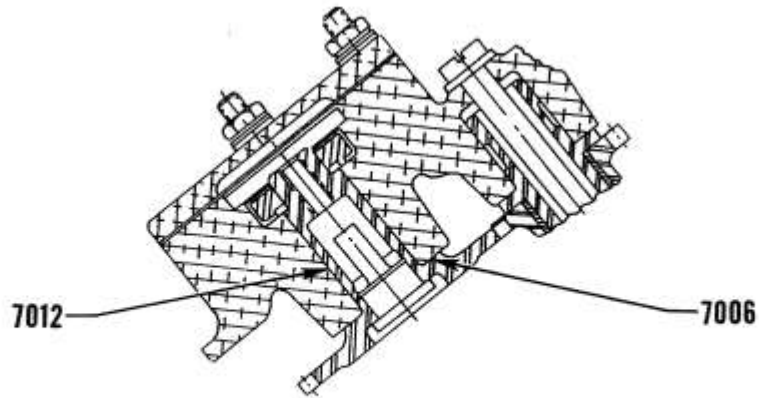
Fuel Injector and/or Fuel Pump, Vacuum Pump Drives



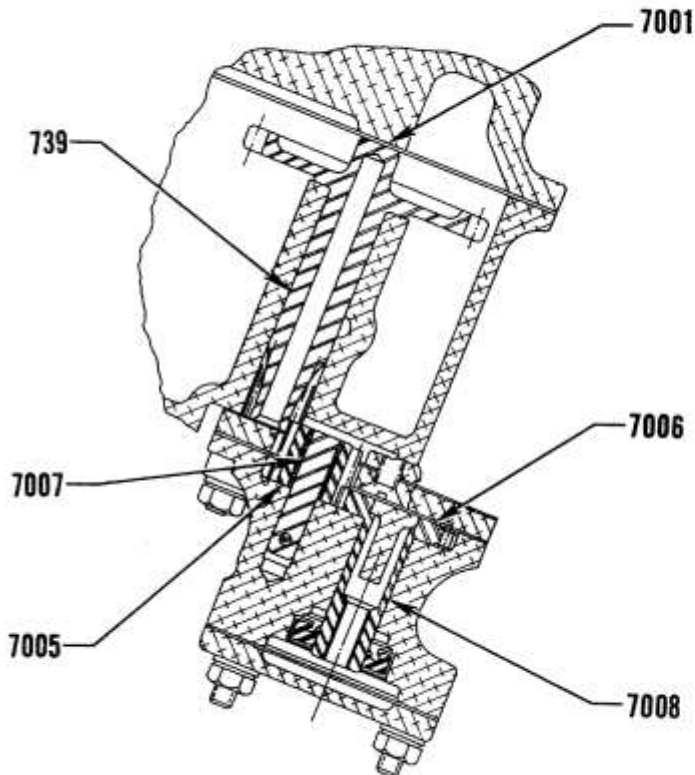
# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

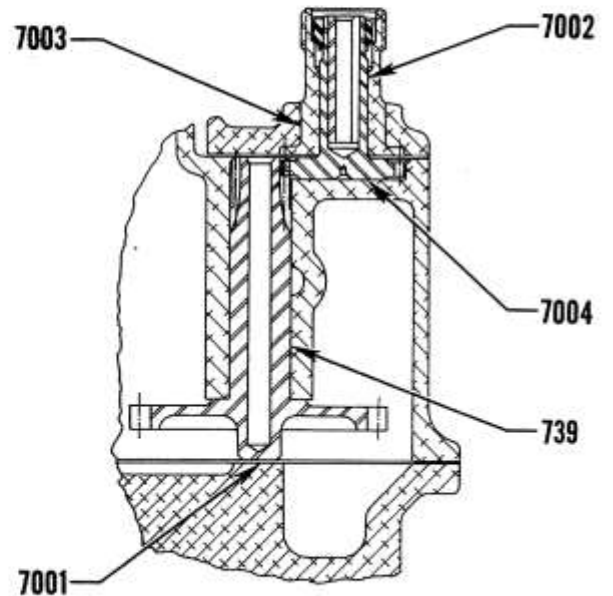
### SECTION III – GEAR TRAIN



GO-480-D, GSO, IGSO-480 & IGO, IGSO-540



GO-480-B,F & GID6



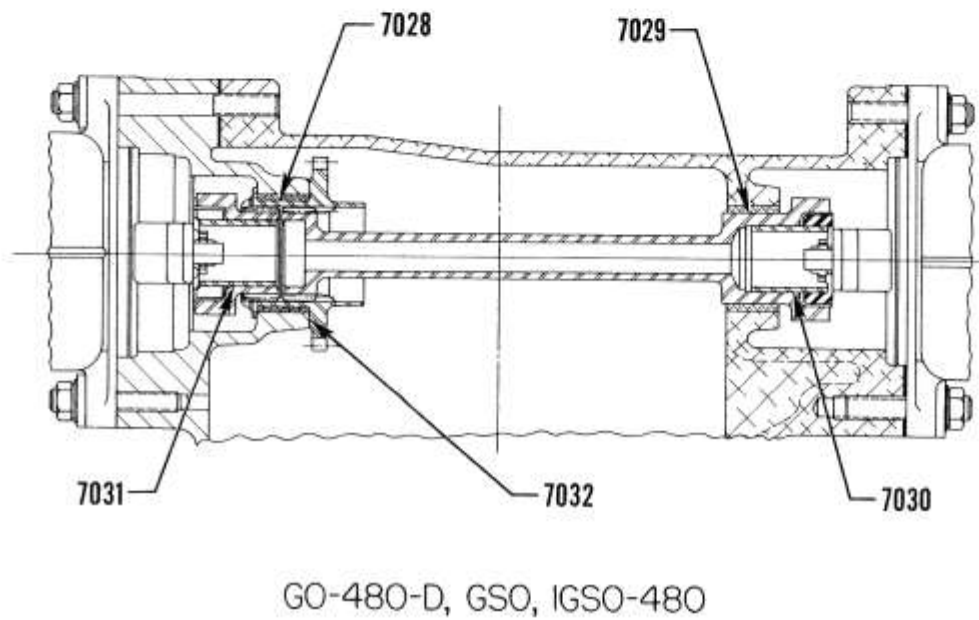
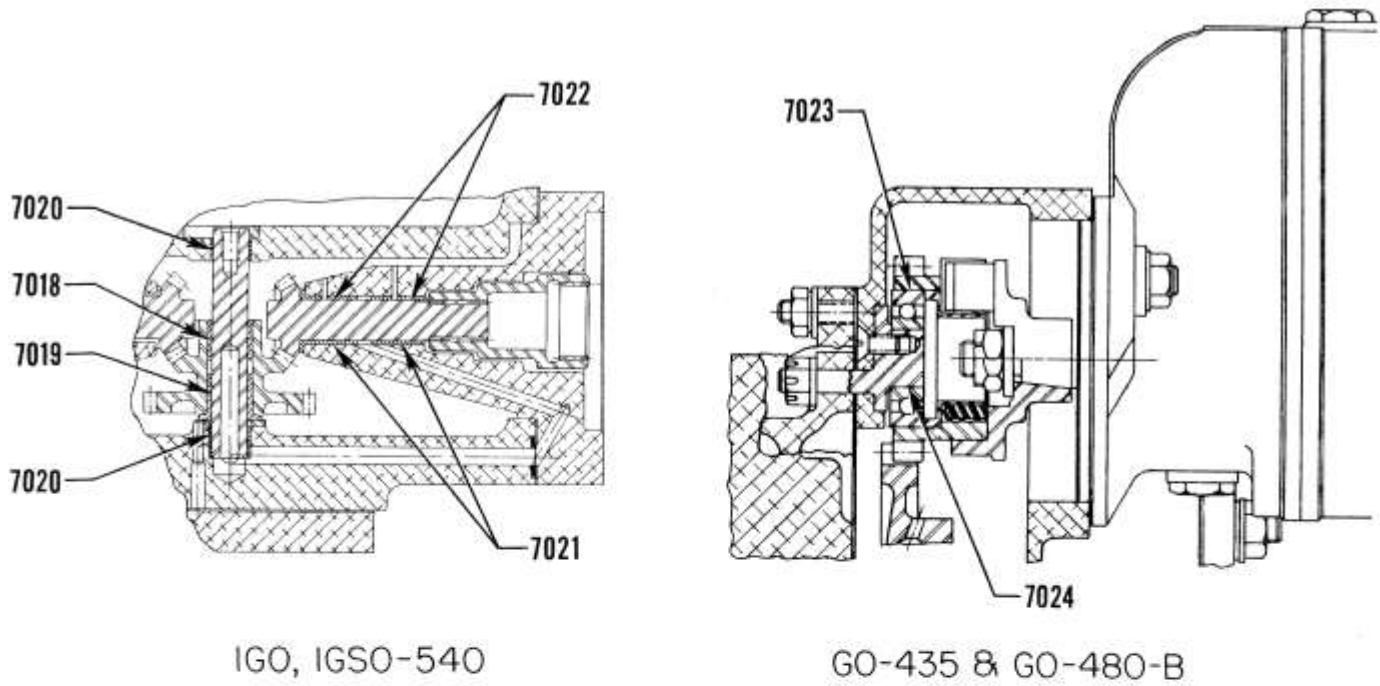
GO-435-C & GO-480-B

### Tachometer Drives

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION III – GEAR TRAIN

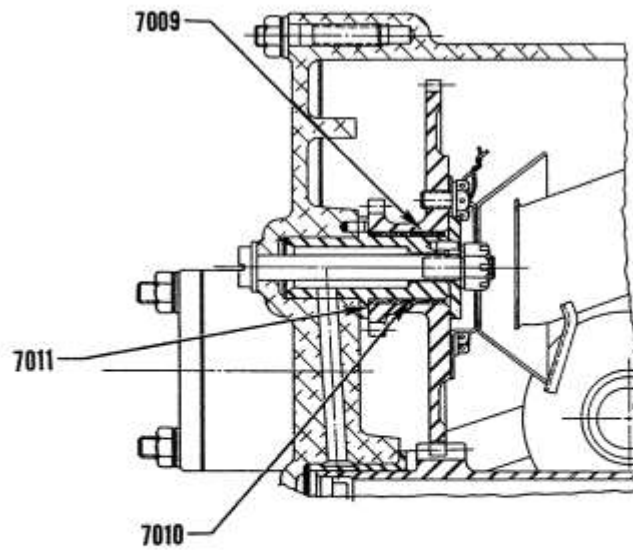


### Magneto Drives

# SERVICE TABLE OF LIMITS

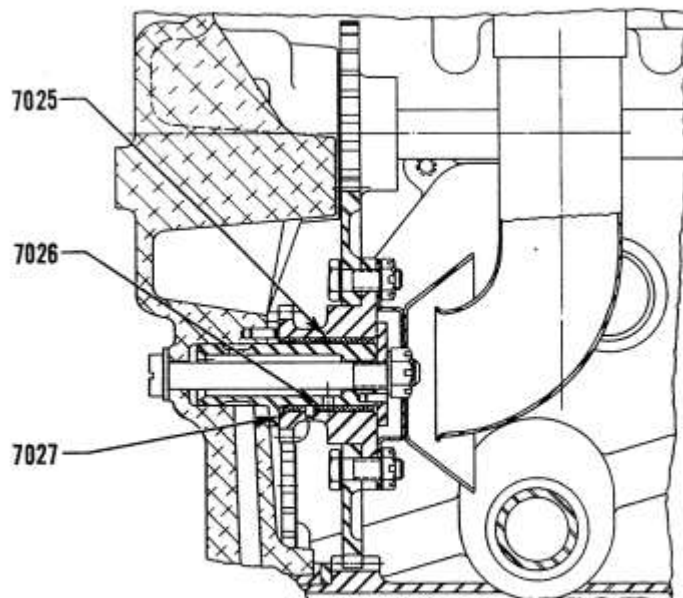
## PART III – GEARED ENGINES

### SECTION III – GEAR TRAIN



IGO, IGSO-540-A & B

### Tachometer Drives



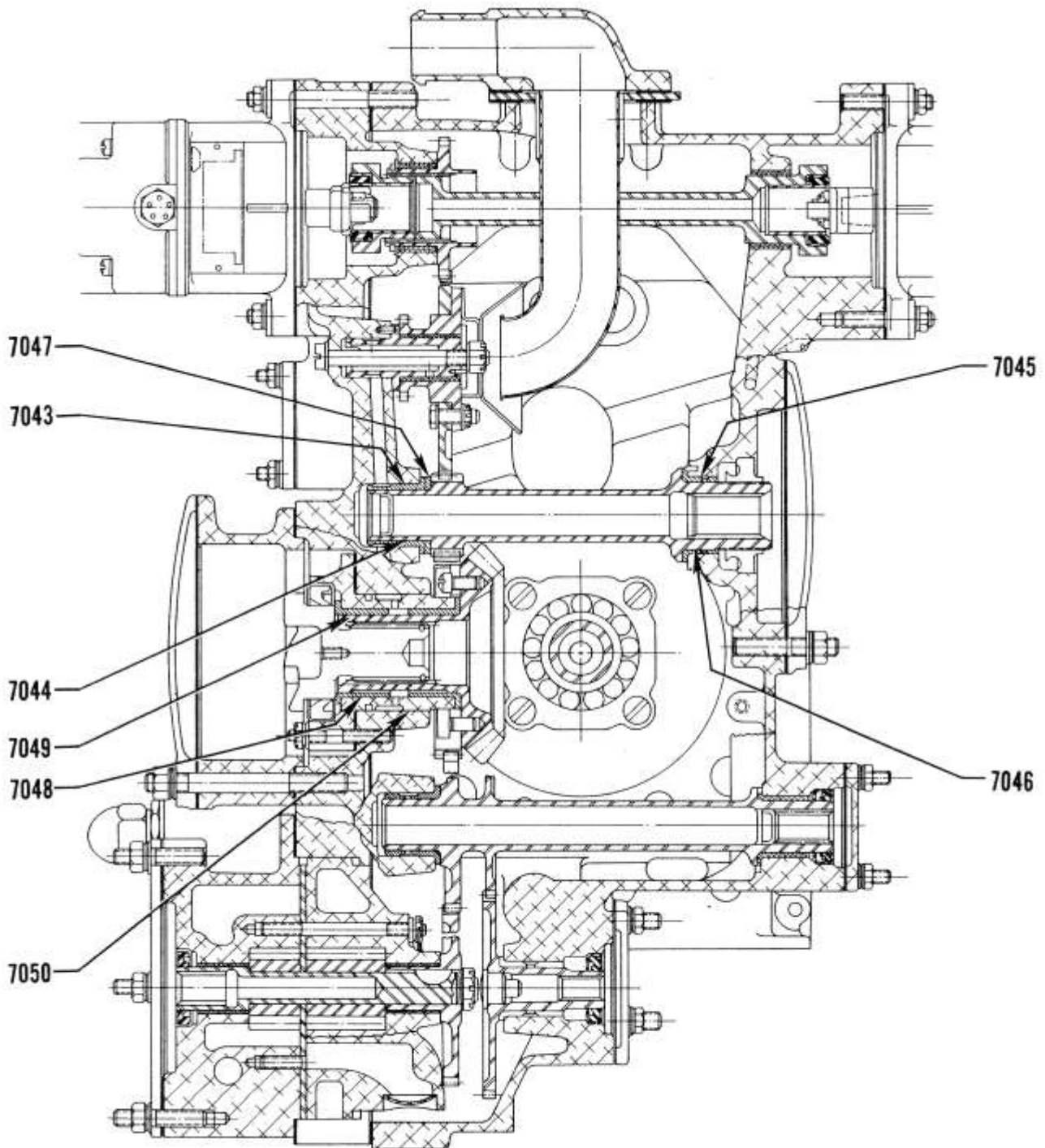
GO-480-B, GIB6, GSO, IGSO-480

### Magneto and Tachometer Idler Gear

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION III – GEAR TRAIN



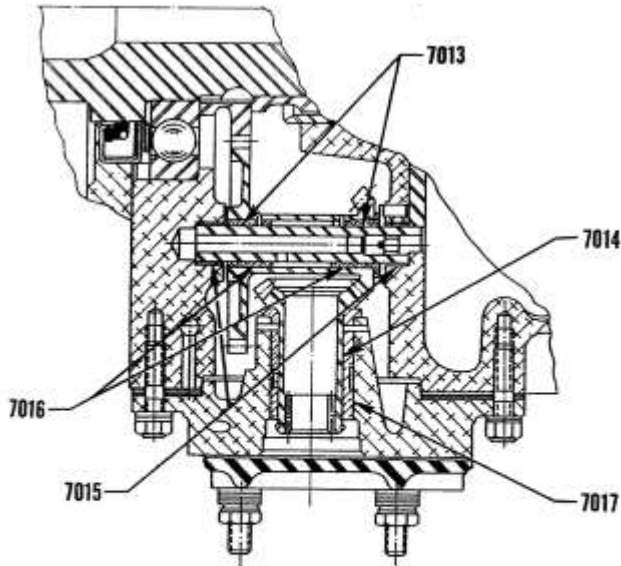
GO-480-B, GSO, IGSO-480 & IGO, IGSO-540

**Generator and Starter Drives**

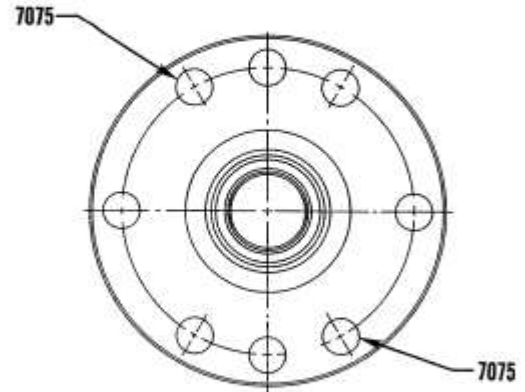
# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

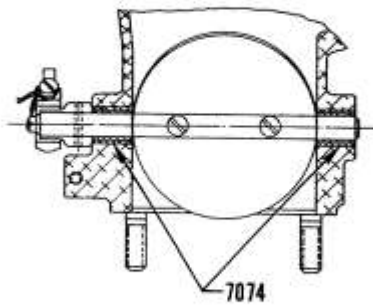
### SECTION III – GEAR TRAIN



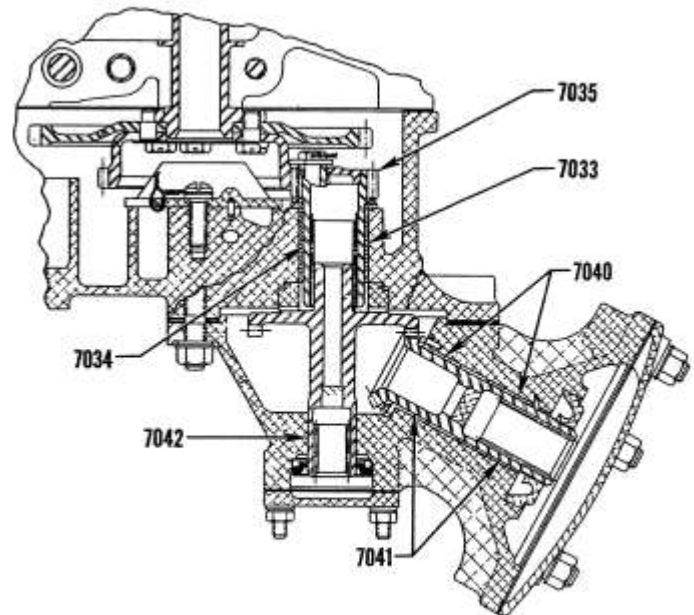
GOVERNOR DRIVE



GO-480-F, GID6  
PROP FLANGE



IGSO-480, 540  
THROTTLE LEVER



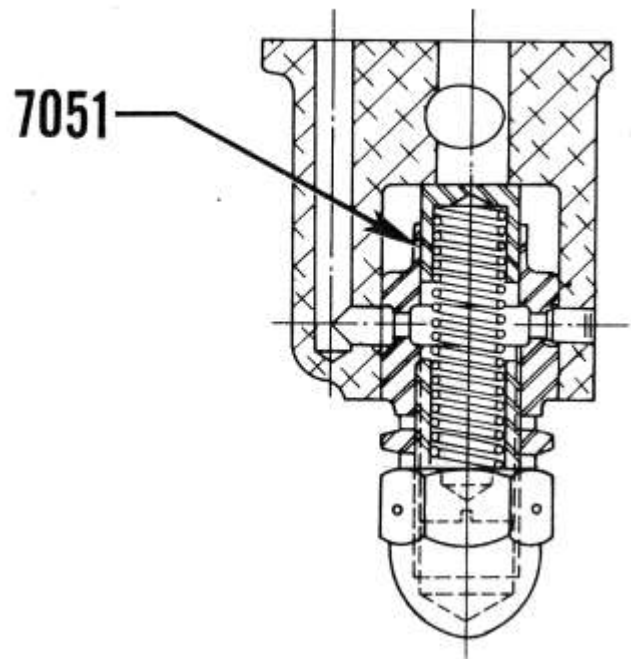
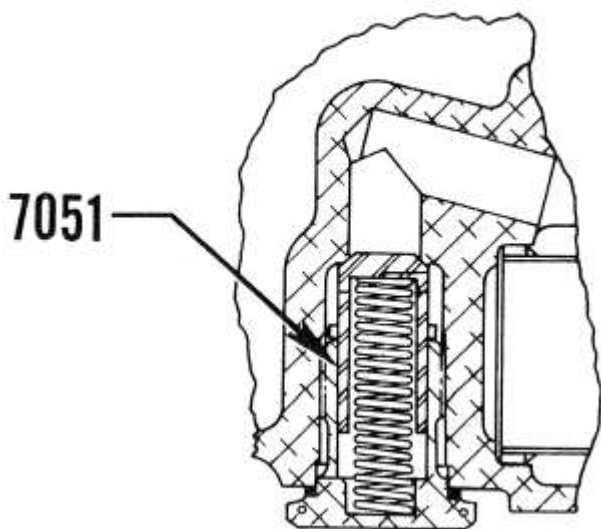
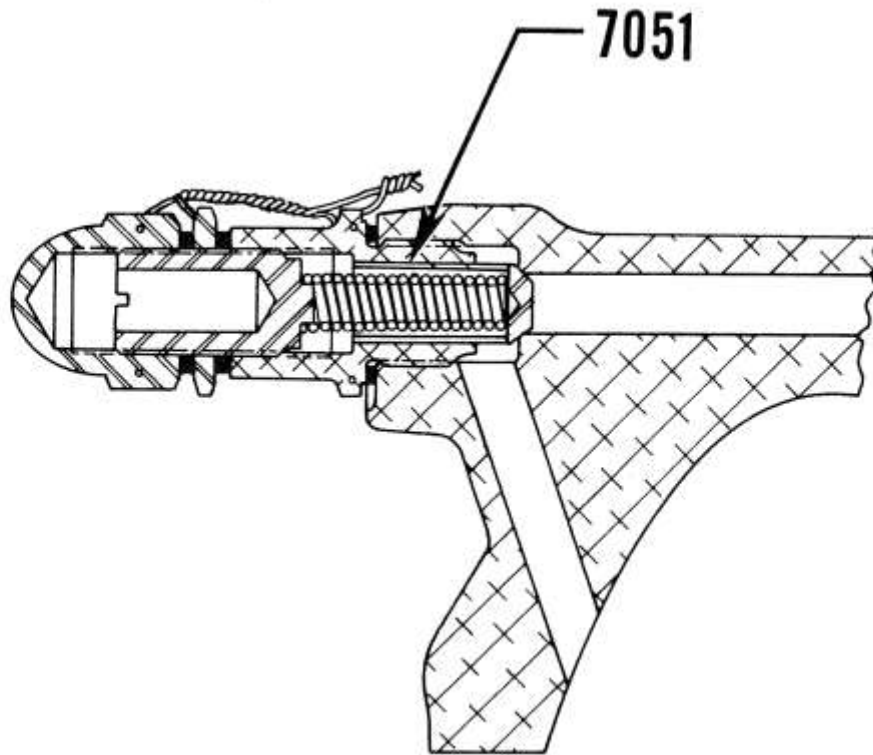
GO-435, GO-480-B, GID6  
DUAL GENERATOR & VACUUM PUMP DRIVE

Governor Drive, Prop. Flange, Throttle Lever,  
Dual Generator and Vacuum Pump Drive

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION III – GEAR TRAIN

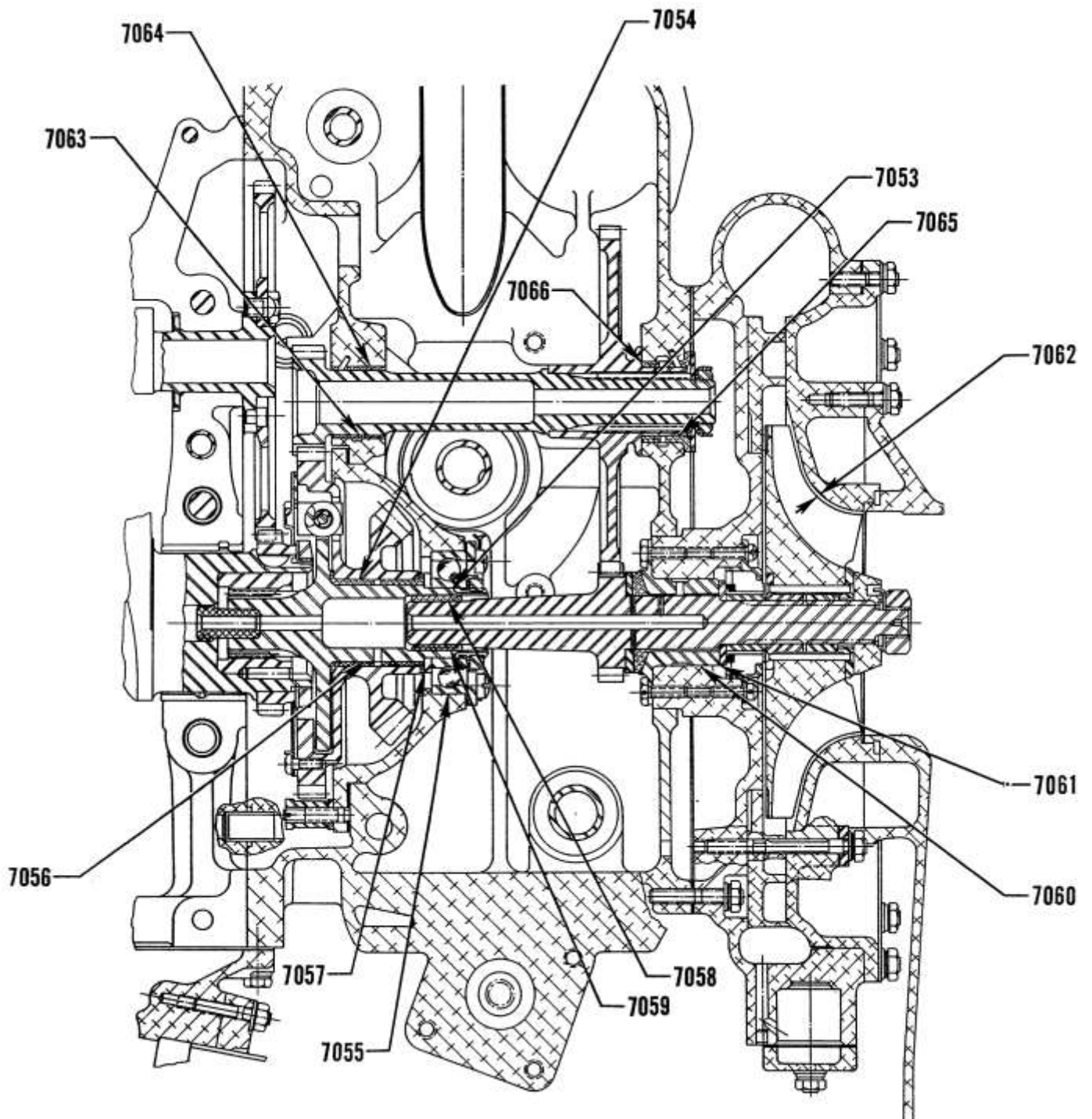


**Oil Relief Valves**

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION III – GEAR TRAIN

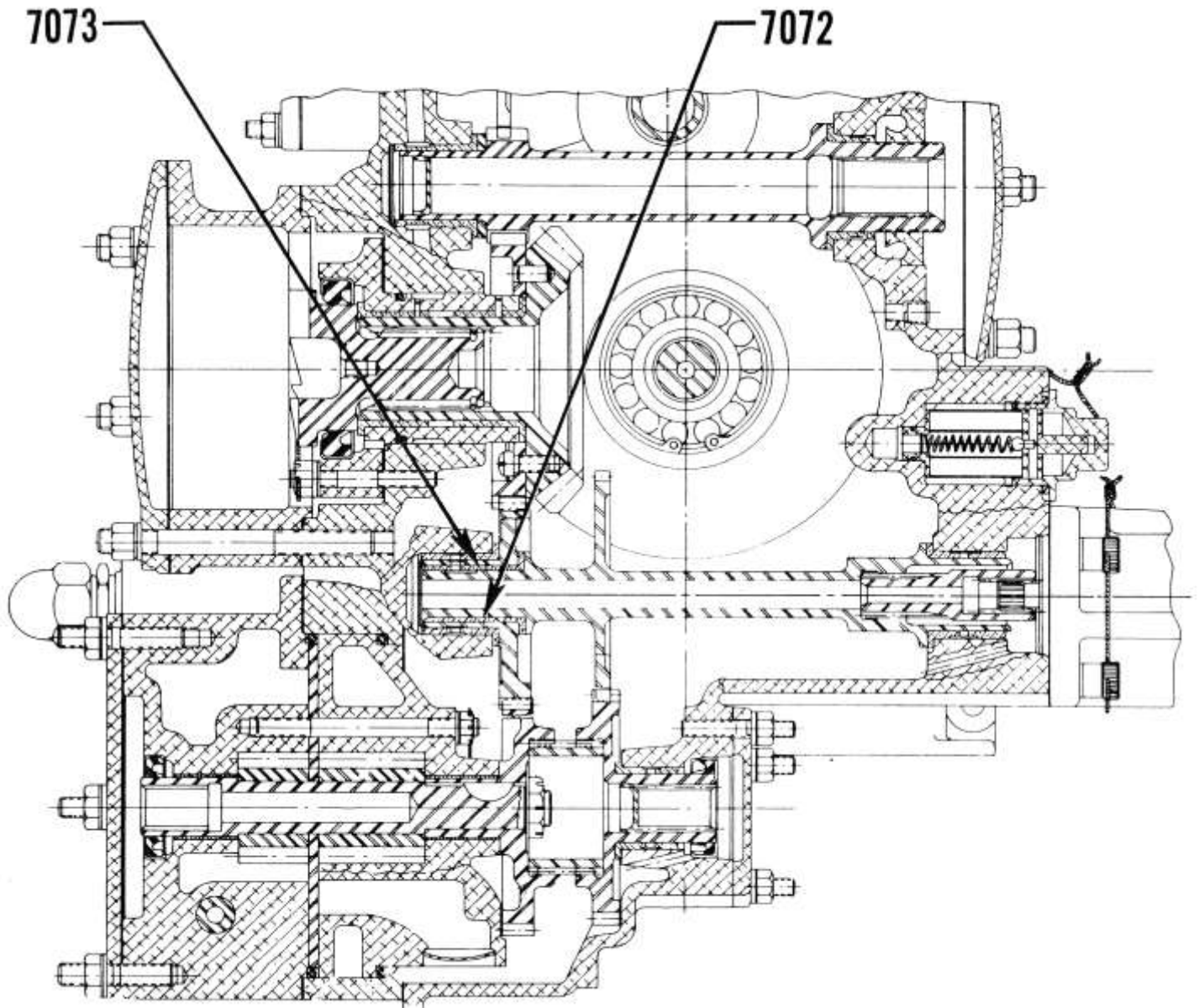


### Supercharger and Components

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION III – GEAR TRAIN



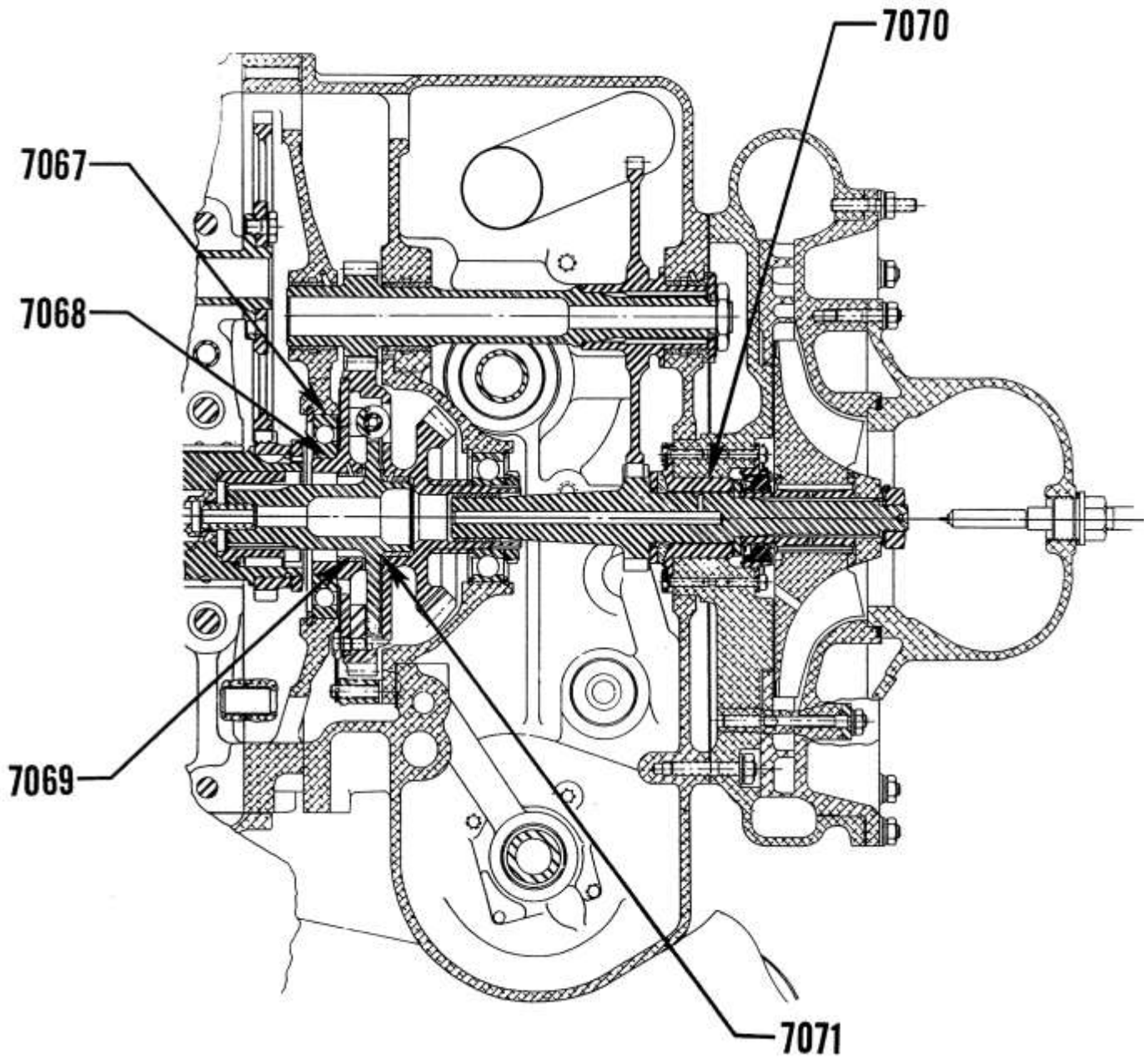
**Oil Scavenge Pump and Drives**



# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION III – GEAR TRAIN



**Supercharger Housing**

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION IV – BACKLASH

| Ref. | Chart       | Nomenclature                                                        | Dimensions             |                 | Clearances             |                 |
|------|-------------|---------------------------------------------------------------------|------------------------|-----------------|------------------------|-----------------|
|      |             |                                                                     | Mfr.<br>Min. &<br>Max. | Service<br>Max. | Mfr.<br>Min. &<br>Max. | Service<br>Max. |
| 807  | E-H1-H2-H3  | Oil Pump Drive Gear and Crankshaft Timing Gear                      |                        |                 | <u>.004</u><br>.015    | .020            |
| 808  | E-H1-H2-H3  | Oil Pump Impellers                                                  |                        |                 | <u>.008</u><br>.015    | .020            |
|      | E-H1-H2-H3  | Oil Pump and Scavenge Pump Impellers                                |                        |                 | <u>.008</u><br>.015    | .020            |
| 825  | ALL         | Crankshaft Timing Gear and Camshaft Gear                            |                        |                 | <u>.004</u><br>.015    | .020            |
| 829  | ALL         | Propeller Shaft – Reduction Gear – Total Backlash (At 4 ft. Radius) |                        |                 |                        | .50             |
| 846  | E-H1-H2-H3  | Camshaft Gear and Magneto Gear                                      |                        |                 | <u>.004</u><br>.015    | .020            |
| 847  | E-H1-H2-H3  | Tachometer Drive Gear and Crankshaft Timing Gear                    |                        |                 | <u>.004</u><br>.015    | .020            |
| 848  | E-H1        | Tachometer Driven Gear and Tachometer Drive Gear                    |                        |                 | <u>.004</u><br>.015    | .020            |
| 849  | ALL         | Stationary Gear and Stationary Gear Drive Plate                     |                        |                 | <u>.002</u><br>.005    | .010            |
| 850  | ALL         | Ring Gear and Ring Gear Drive Plate                                 |                        |                 | <u>.001</u><br>.004    | .010            |
| 851  | E-H2-H3     | Generator Drive Gear and Generator Driven Gear                      |                        |                 | <u>.004</u><br>.015    | .020            |
| 852  | E-H1-H2-H3  | Oil Pump Drive Gear and Accessory (Fuel Pump) Drive Gear            |                        |                 | <u>.004</u><br>.015    | .020            |
| 853  | E-H1-H2-H3  | Oil Pump Drive Gear and Vacuum Pump Drive Gear                      |                        |                 | <u>.004</u><br>.015    | .020            |
| 854  | ALL         | Pinion Gear and Stationary Gear                                     |                        |                 | <u>.004</u><br>.0077   | .012 (C)        |
| 855  | ALL         | Pinion Gear and Ring Gear                                           |                        |                 | <u>.003</u><br>.0065   | .012 (C)        |
| 856  | ALL         | Governor and Magneto Drive Gear and Governor Drive Idler Gear       |                        |                 | <u>.004</u><br>.015    | .020            |
| 857  | AB-AC       | Governor and Magneto Drive Gear and Magneto Drive Idler Gear        |                        |                 | <u>.004</u><br>.015    | .020            |
| 858  | ALL         | Governor Drive Idler Gear (Bevel Gear End) and Governor Driven Gear |                        |                 | <u>.004</u><br>.008    | .015            |
| 859  | H1          | Camshaft Gear and Generator Drive Idler Gear                        |                        |                 | <u>.004</u><br>.015    | .020            |
| 860  | H1          | Generator Drive Idler Gear and Generator Driven Gear                |                        |                 | <u>.004</u><br>.015    | .020            |
| 861  | E1-H1-H2-H3 | Electric Tachometer Idler Gear and Driven Gear                      |                        |                 | <u>.004</u><br>.015    | .020            |
| 862  | E1-H1-H2-H3 | Electric Tachometer Idler Gear and Tachometer Drive Gear            |                        |                 | <u>.004</u><br>.015    | .020            |

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION IV – BACKLASH

| Ref. | Chart         | Nomenclature                                                                        | Dimensions             |                 | Clearances             |                 |
|------|---------------|-------------------------------------------------------------------------------------|------------------------|-----------------|------------------------|-----------------|
|      |               |                                                                                     | Mfr.<br>Min. &<br>Max. | Service<br>Max. | Mfr.<br>Min. &<br>Max. | Service<br>Max. |
| 863  | E1-H1         | Angle Generator Drive Gear and Generator Driven Gear                                |                        |                 | <u>.002</u><br>.004    | .010            |
| 864  | E1-H1         | Angle Generator Drive Gear and Generator Drive Gear Spline                          |                        |                 | <u>.003</u><br>.007    | .009            |
| 865  | P1            | Generator Drive Gear and Magneto Drive Idler Gear                                   |                        |                 | <u>.004</u><br>.015    | .020            |
|      | H4-H5-P-AB-AC | Generator Drive Gear and Tachometer Drive Idler Gear                                |                        |                 | <u>.004</u><br>.015    | .020            |
| 866  | P1            | Electric Tachometer Drive Gear (Magneto Idler Hub) and Tachometer Driven Gear       |                        |                 | <u>.004</u><br>.015    | .020            |
|      | H4-H5-P-AB-AC | Tachometer Drive Idler Gear and Tachometer Driven Gear                              |                        |                 | <u>.004</u><br>.015    | .020            |
| 867  | H4-H5-P       | Tachometer Drive Idler Gear and Magneto Drive Shaftgear                             |                        |                 | <u>.004</u><br>.015    | .020            |
| 868  | H4-H5-P       | Magneto Drive Shaft (Spline) and Magneto Drive Shaftgear (Spline)                   |                        |                 | <u>.001</u><br>.015    | .008            |
| 869  | H4-H5-P       | Magneto Drive Shaftgear (Spline) and Magneto Drive Coupling (Spline)                |                        |                 | <u>.001</u><br>.005    | .008            |
| 870  | H4-H5-AC      | Rear Crankshaft (Spline Bushing) and Accessory Drive Gear (Spline)                  |                        |                 | <u>.002</u><br>.0073   | .018            |
|      | P-AB          | Rear Crankshaft (Spline Bushing) and Accessory Drive Shaft (Spline)                 |                        |                 | <u>.002</u><br>.0073   | .018            |
| 871  | H4-H5-AC      | Accessory Idler Gear and Starter Drive Gear                                         |                        |                 | <u>.004</u><br>.008    | .015            |
| 871  | P-AB          | Supercharger and Accessory Drive Gear and Starter and Accessory Drive Gear          |                        |                 | <u>.004</u><br>.008    | .015            |
| 872  | H4-H5-P-AB-AC | Accessory Drive Gear and Generator Drive Gear                                       |                        |                 | <u>.004</u><br>.015    | .020            |
| 873  | H4-H5-P       | Accessory Drive Gear and Vacuum Pump Shaftgear                                      |                        |                 | <u>.004</u><br>.015    | .020            |
| 874  | H4-H5-P       | Vacuum Pump Shaftgear and Oil Pressure and Scavenge Pump Gear                       |                        |                 | <u>.004</u><br>.015    | .020            |
| 875  | E             | Scavenge Pump Driven Gear and Accessory Drive Gear                                  |                        |                 | <u>.004</u><br>.015    | .020            |
| 876  | E             | Scavenge Pump Impellers                                                             |                        |                 | <u>.008</u><br>.015    | .020            |
| 877  | P-AB          | Supercharger and Accessory Drive Gear and Intermediate Supercharger Drive Shaftgear |                        |                 | <u>.006</u><br>.015    | .020            |
| 878  | P-AB          | Supercharger Drive Shaftgear and Intermediate Supercharger Drive Gear               |                        |                 | <u>.006</u><br>.015    | .020            |

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

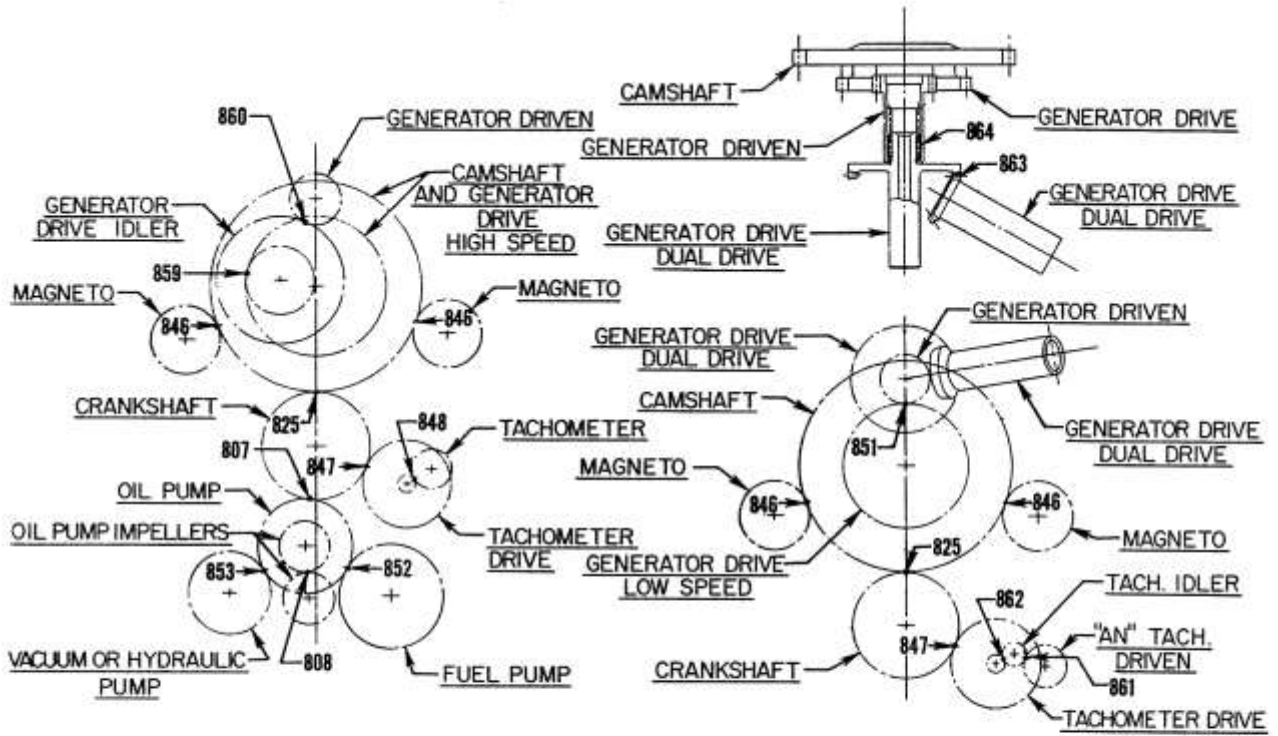
### SECTION IV – BACKLASH

| Ref. | Chart         | Nomenclature                                                                                         | Dimensions             |                 | Clearances             |                 |
|------|---------------|------------------------------------------------------------------------------------------------------|------------------------|-----------------|------------------------|-----------------|
|      |               |                                                                                                      | Mfr.<br>Min. &<br>Max. | Service<br>Max. | Mfr.<br>Min. &<br>Max. | Service<br>Max. |
| 879  | P-AB          | Intermediate Supercharger Drive Shaftgear (Spline) and Intermediate Supercharger Drive Gear (Spline) |                        |                 | <u>.000</u><br>.002    | .005            |
| 880  | P1            | Fuel Injector Idler Gear and Magneto Drive Shaftgear                                                 |                        |                 | <u>.004</u><br>.015    | .020            |
| 881  | P1            | Fuel Injector Drive Idler Gear and Fuel Injector Idler Gear                                          |                        |                 | <u>.004</u><br>.015    | .020            |
| 882  | P1            | Injector Drive Shaft (Spline) and Fuel Injector Pump (Spline)                                        |                        |                 | <u>.0005</u><br>.0056  | .008            |
| 883  | P1            | Magneto Drive Shaftgear (Spline) and Fuel Injector Drive Shaft (Spline)                              |                        |                 | <u>.002</u><br>.006    | .008            |
| 884  | AB-AC         | Magneto Drive Idler Gear (Bevel End) and Magneto Driven Gear                                         |                        |                 | <u>.004</u><br>.008    | .015            |
| 885  | AB-AC         | Magneto Driven Gear (Spline) and Magneto Drive Coupling (Spline)                                     |                        |                 | <u>.001</u><br>.004    | .007            |
| 886  | AB-AC         | Magneto Drive Coupling (Spline) and Magneto Coupling (Spline)                                        |                        |                 | <u>.001</u><br>.004    | .007            |
| 887  | H4-H5-P-AB-AC | Starter Jaw (Spline) and Starter Drive Gear (Spline)                                                 |                        |                 | <u>.002</u><br>.005    | .010            |
| 888  | AB-AC         | Accessory and Starter Drive and Oil Pressure and Scavenge Pump Idler Gear                            |                        |                 | <u>.004</u><br>.015    | .020            |
| 889  | AB-AC         | Oil Pressure and Scavenge Pump Idler and Oil Pressure and Scavenge Pump Gear                         |                        |                 | <u>.004</u><br>.015    | .020            |
| 890  | AB            | Fuel Injector Drive Shaftgear (Spline) and Fuel Injector Drive Coupling (Spline)                     |                        |                 | <u>.003</u><br>.007    | .012            |
| 891  | AB            | Fuel Injector Drive Coupling (Spline) and Fuel Injector Pump (Spline)                                |                        |                 | <u>.002</u><br>.005    | .010            |
| 892  | AB-AC         | Oil Pressure and Scavenge Pump Gear (Spline) and Vacuum Pump Coupling (Spline)                       |                        |                 | <u>.003</u><br>.0065   | .010            |
| 893  | AB-AC         | Vacuum Pump Drive Gear (Spline) and Vacuum Pump Coupling (Spline)                                    |                        |                 | <u>.003</u><br>.0065   | .010            |
| 894  | AB            | Vacuum Pump Drive Gear and Fuel Injector Drive Shaftgear                                             |                        |                 | <u>.004</u><br>.015    | .020            |
| 895  | H4-H5-P-AC    | Vacuum Pump Shaftgear and Fuel Pump Drive Shaftgear                                                  |                        |                 | <u>.004</u><br>.015    | .020            |

# SERVICE TABLE OF LIMITS

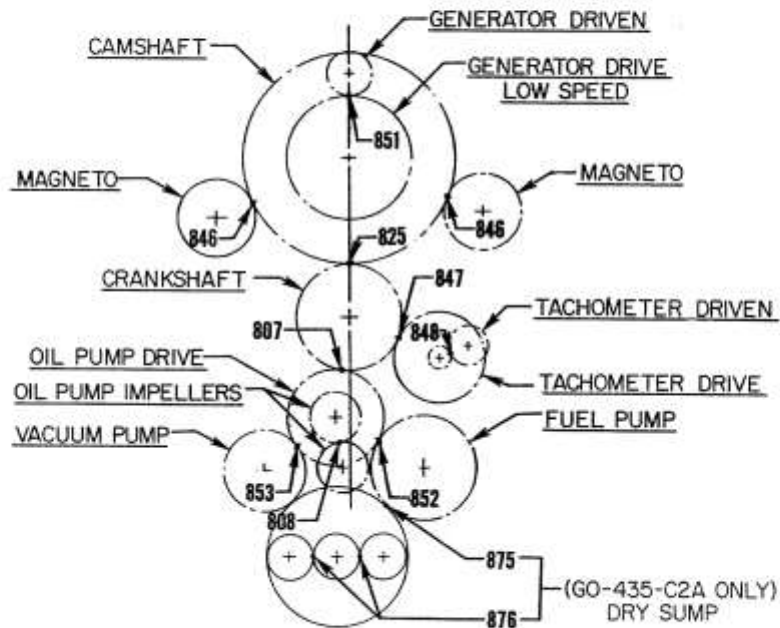
## PART III – GEARED ENGINES

### SECTION IV- BACKLASH



GO-480-B, G & IGO-480-A SERIES

OPTIONAL ACCESSORY DRIVE  
GO-435-C2BI - GO-480-C2E6, GIH6



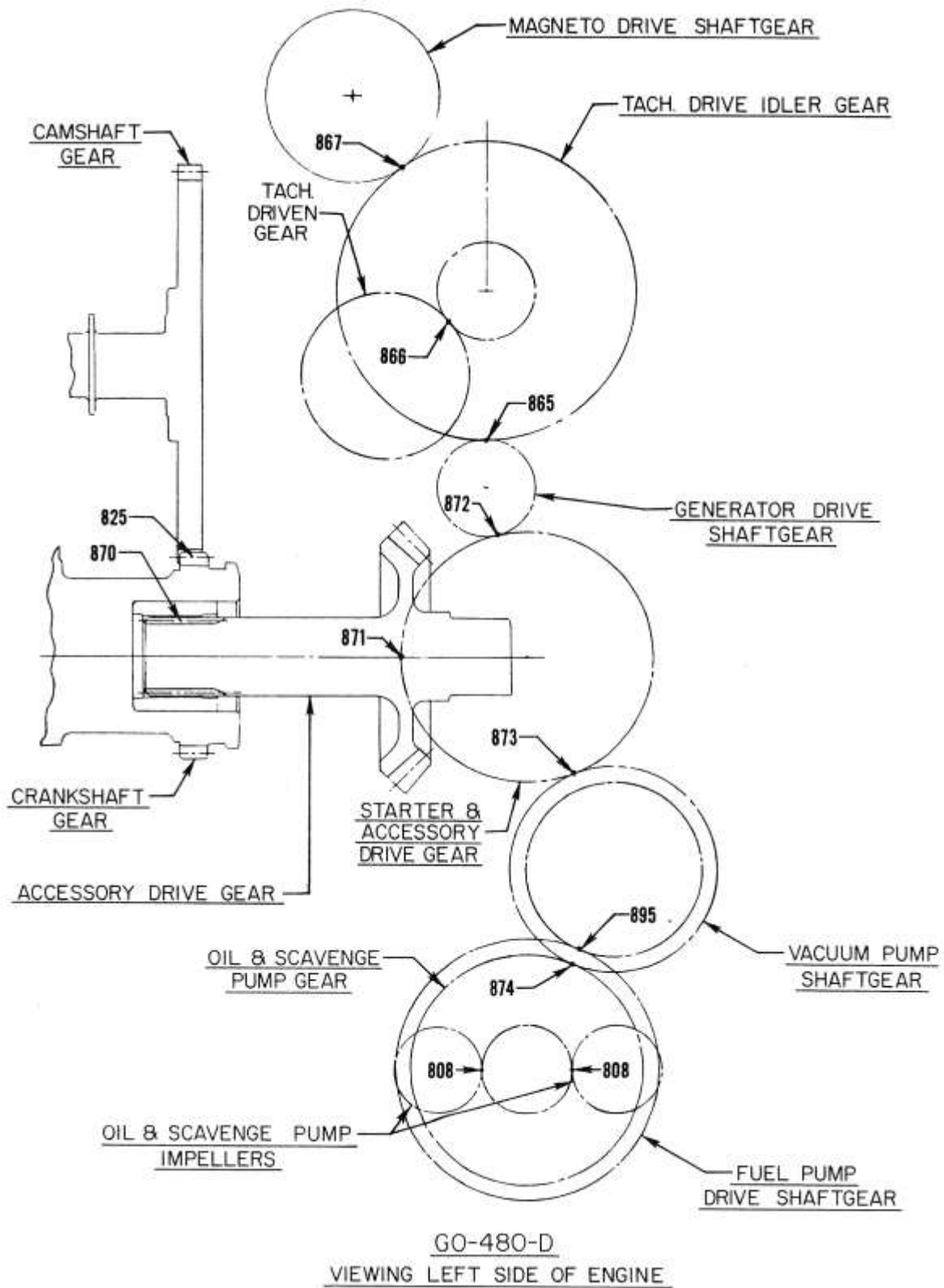
GO-435-C2A, C2B SERIES  
GO-480-F, G SERIES

### Accessory Drives

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION IV – BACKLASH

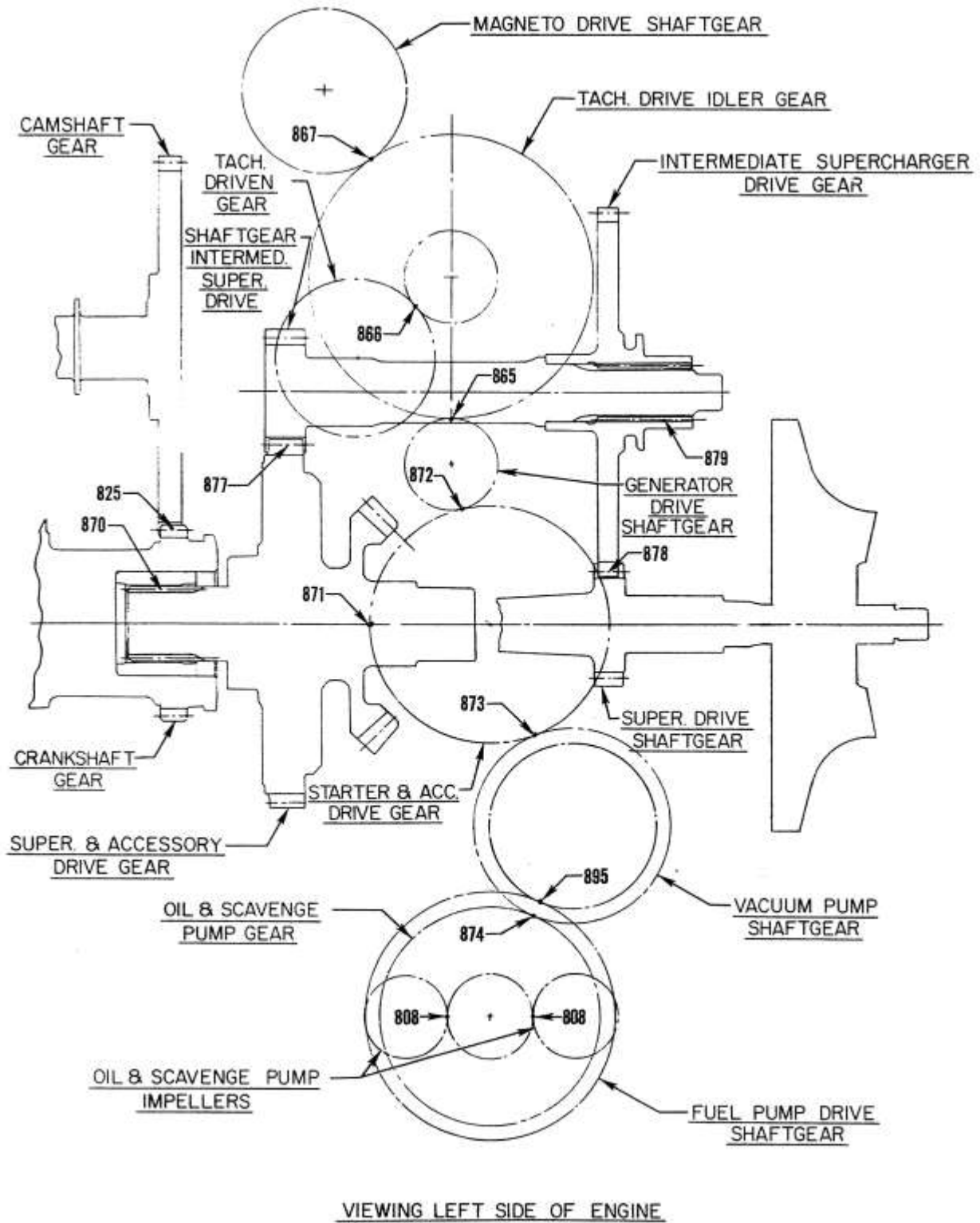


### Accessory Drives

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION IV – BACKLASH

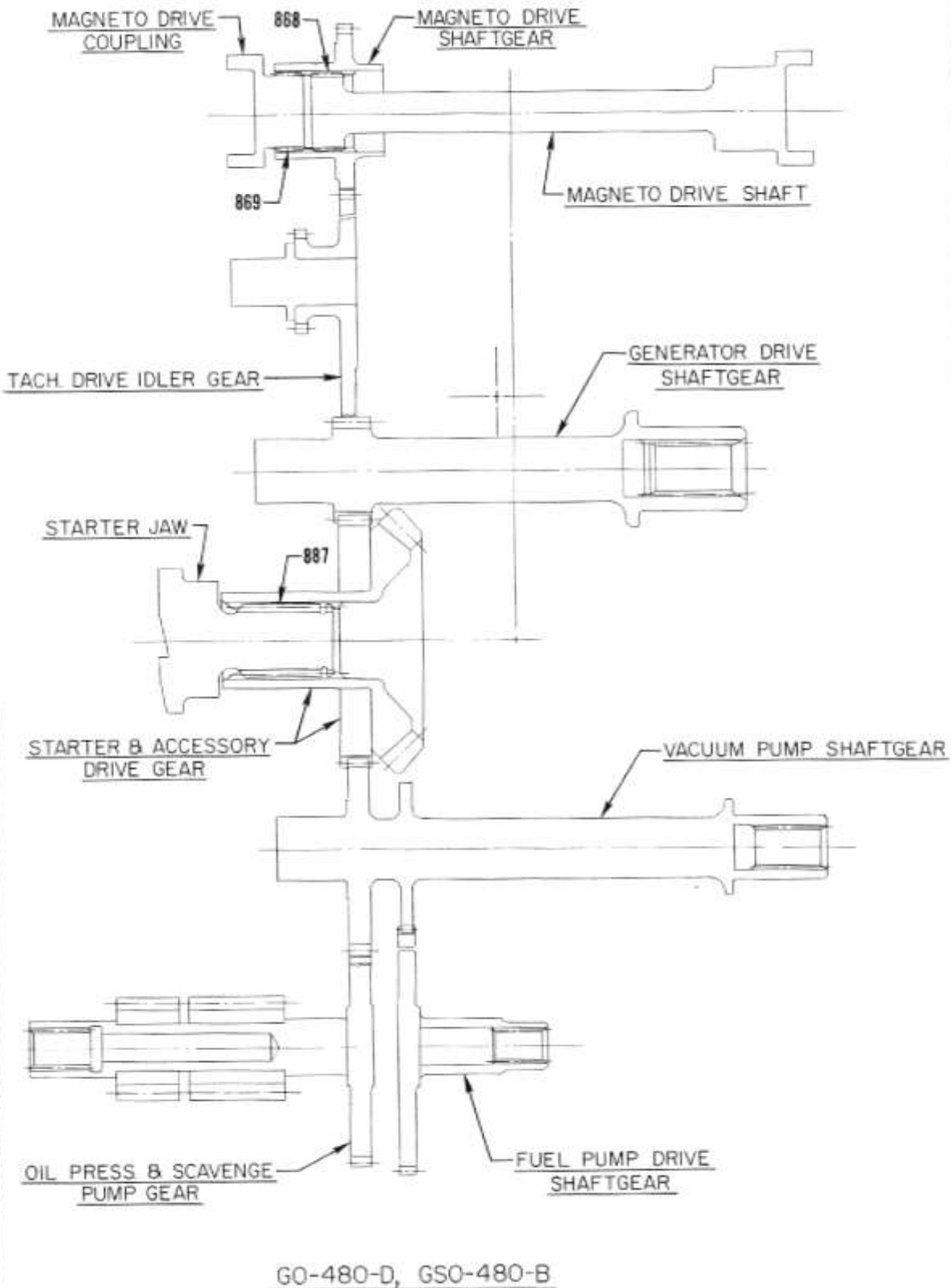


### Accessory Drives

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION IV – BACKLASH



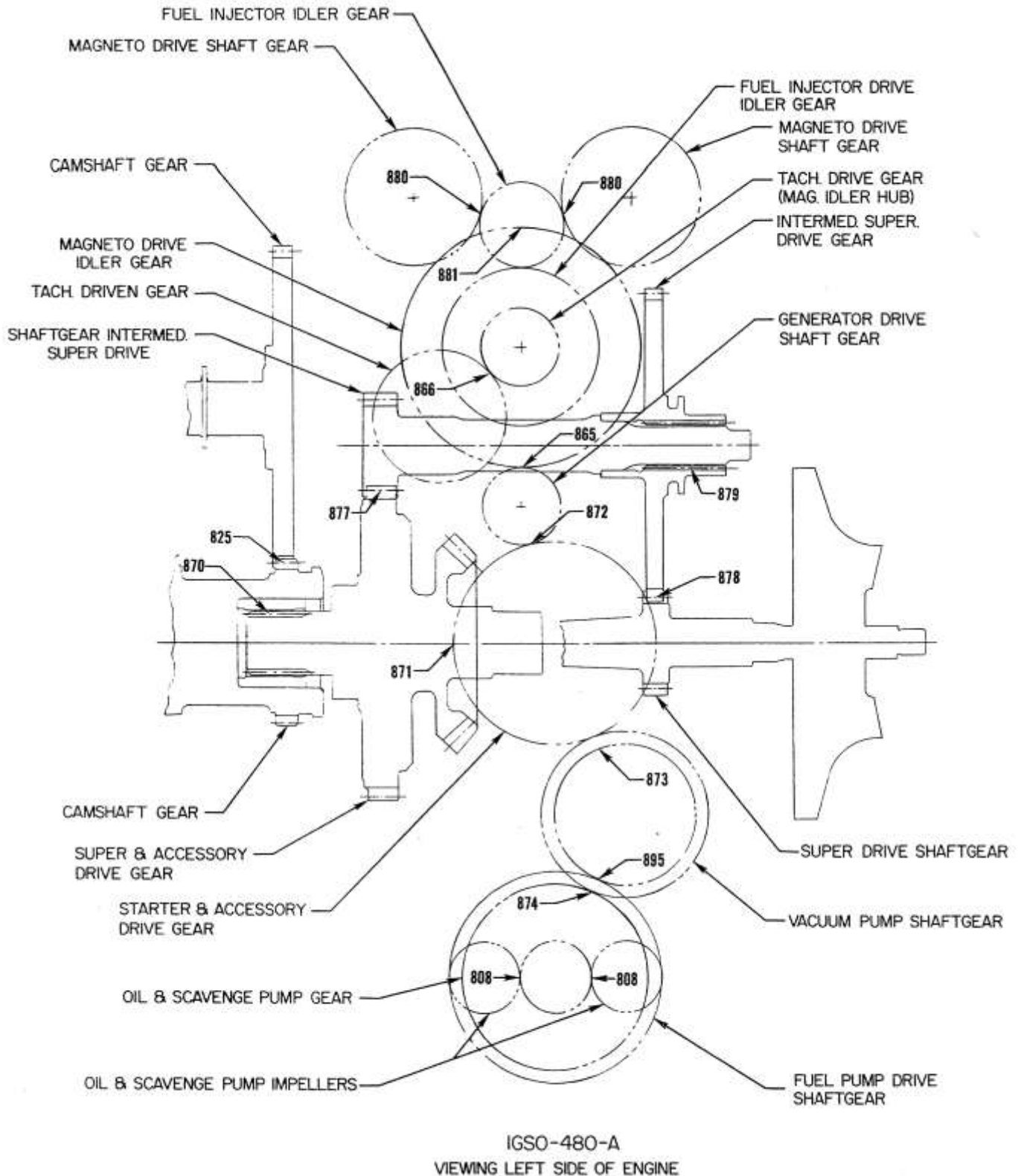
Accessory Drives



# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION IV – BACKLASH

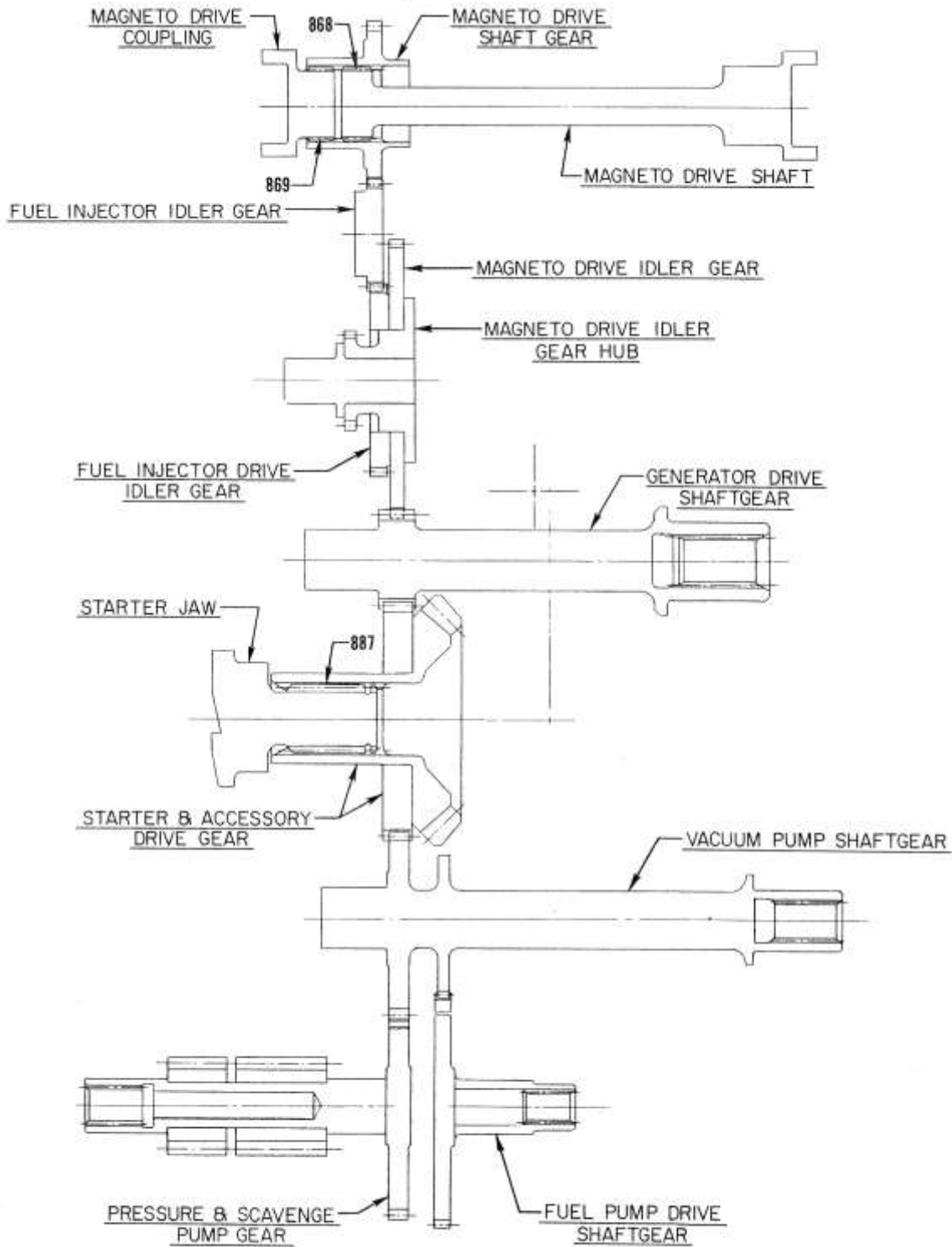


### Accessory Drives

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION IV – BACKLASH



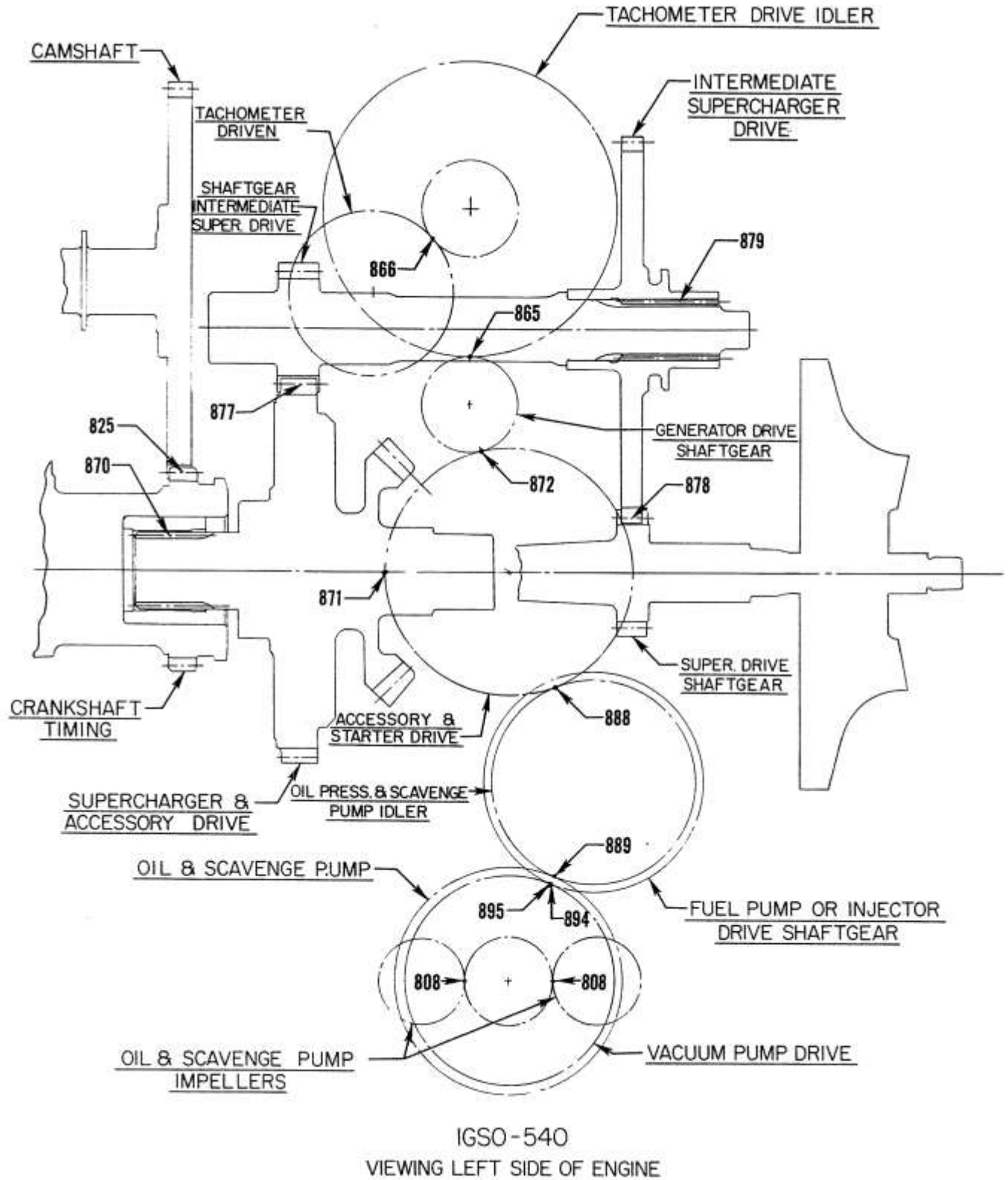
IGSO-480-A SERIES

### Accessory Drives

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION IV – BACKLASH

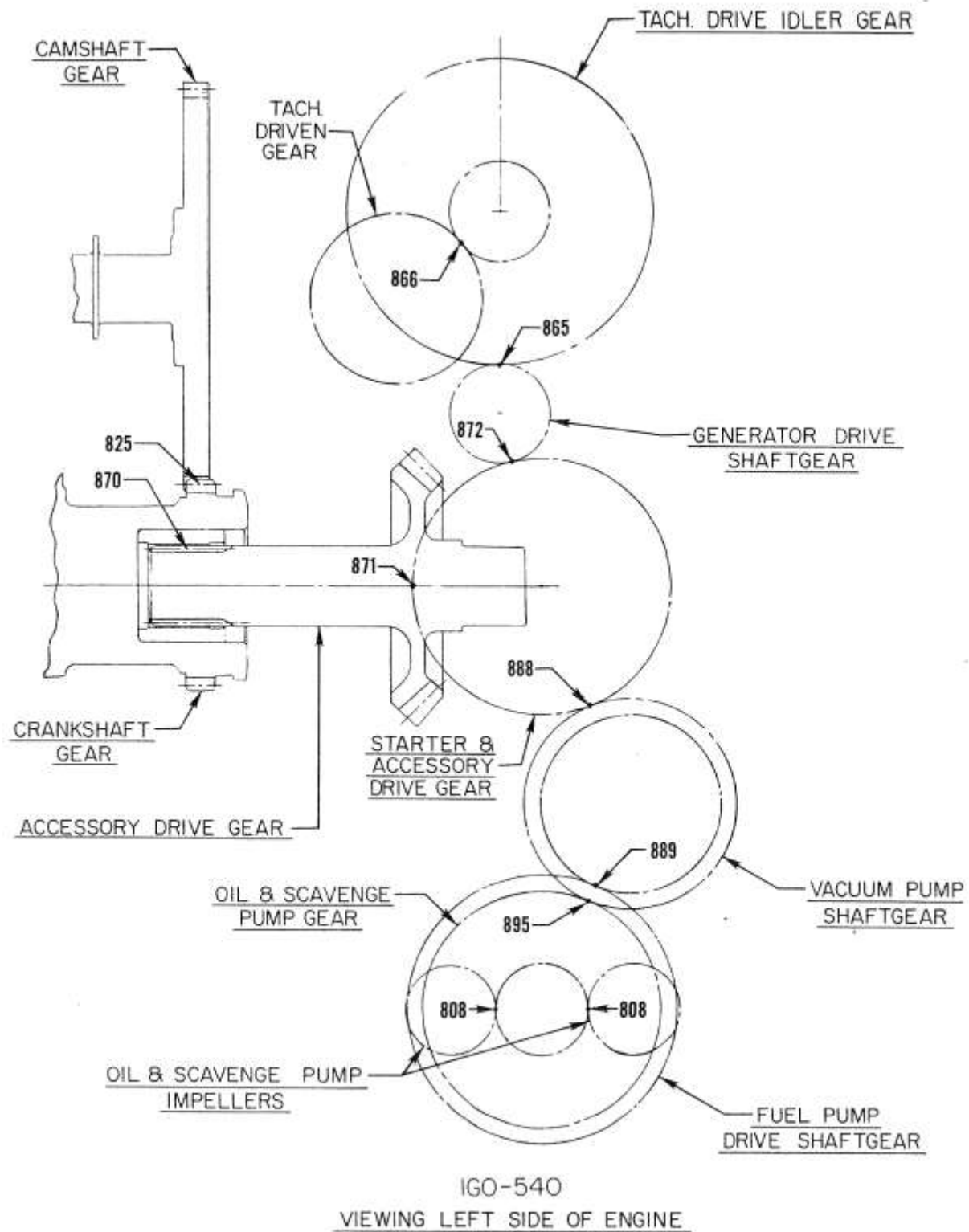


### Accessory Drives

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION IV – BACKLASH

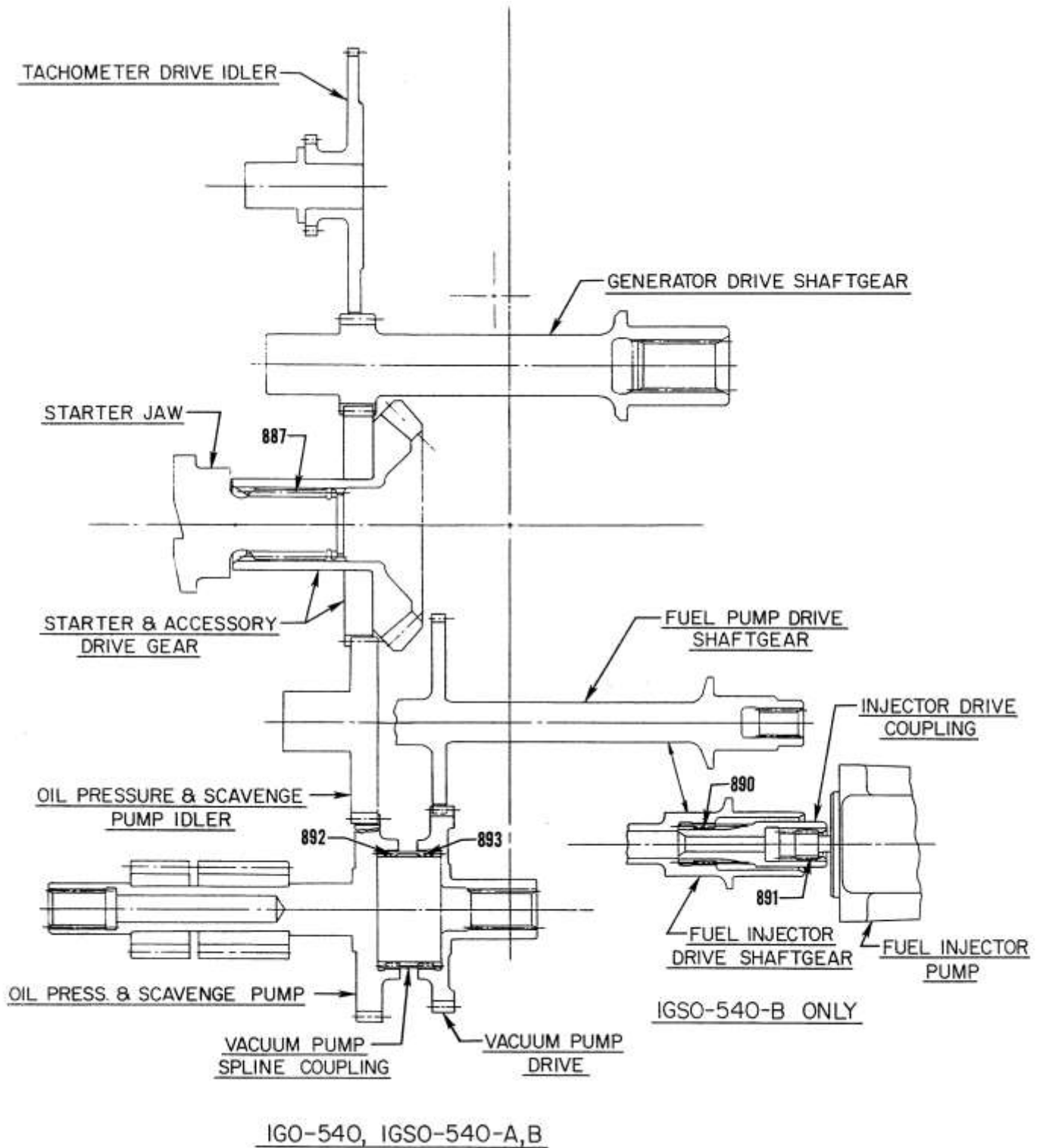


### Accessory Drives

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION IV – BACKLASH

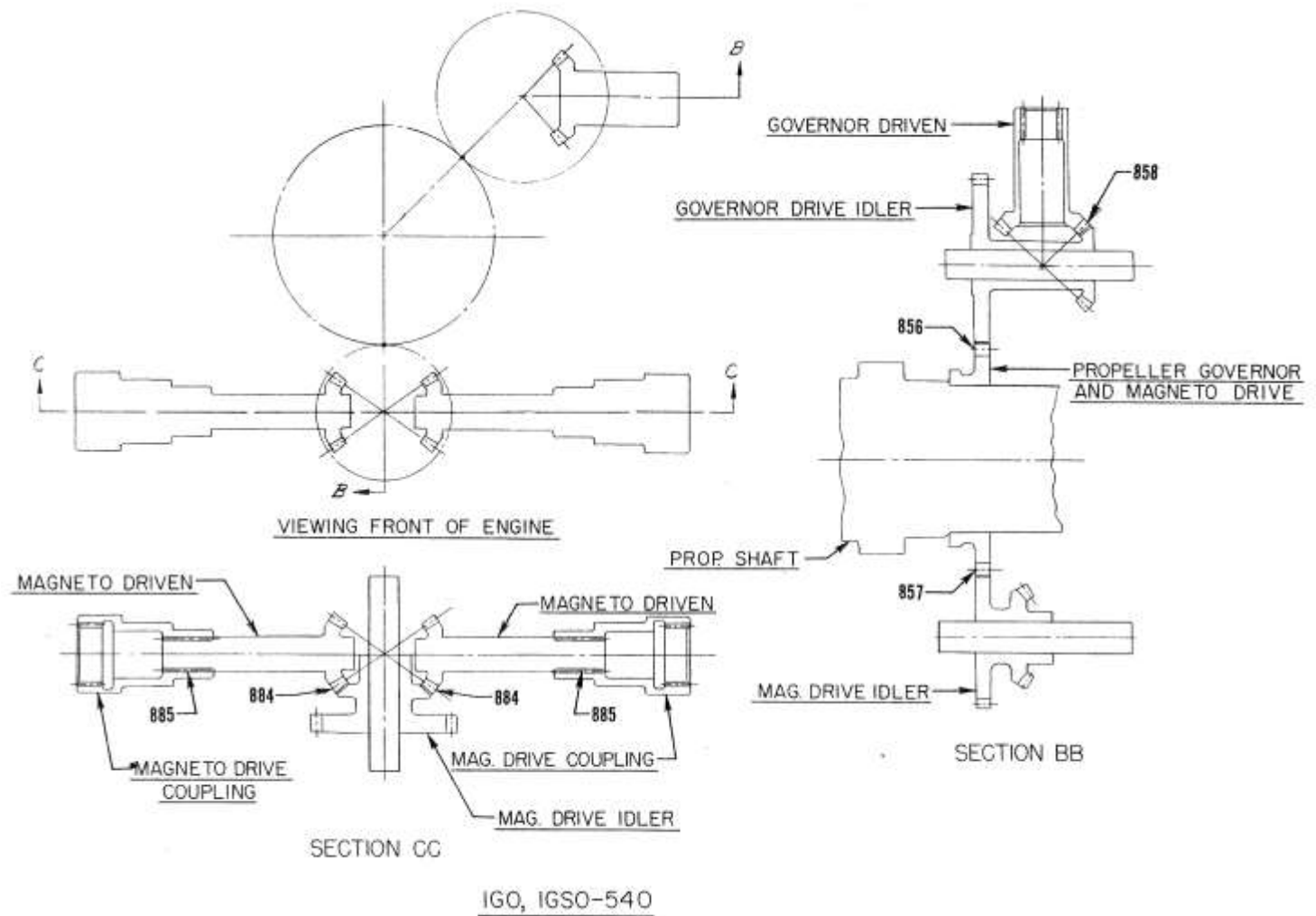


### Accessory Drives

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION IV – BACKLASH

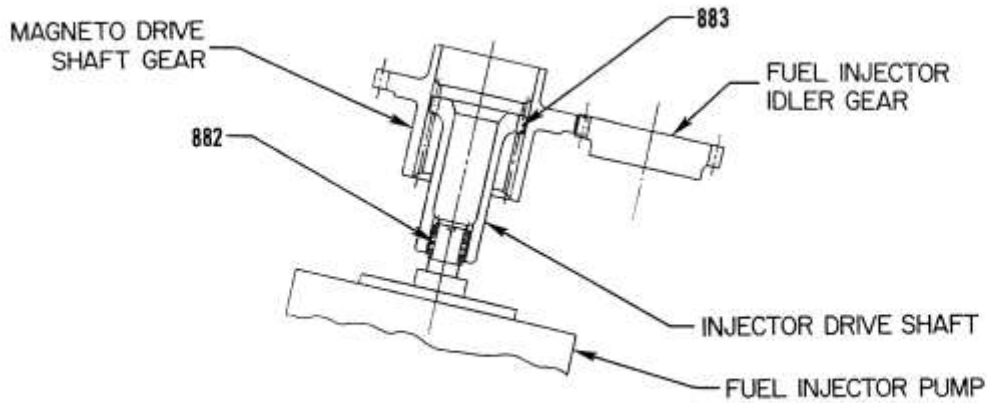


### Accessory Drives

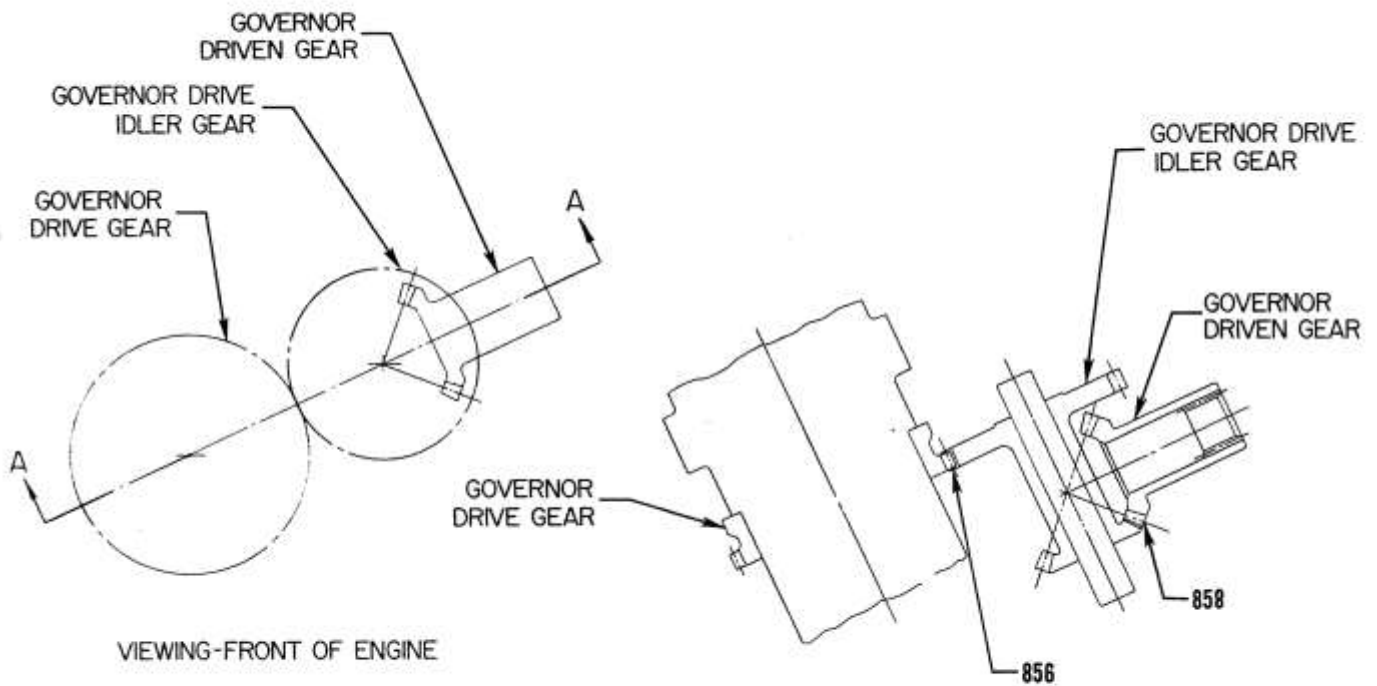
# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION IV – BACKLASH



IGSO-480-B



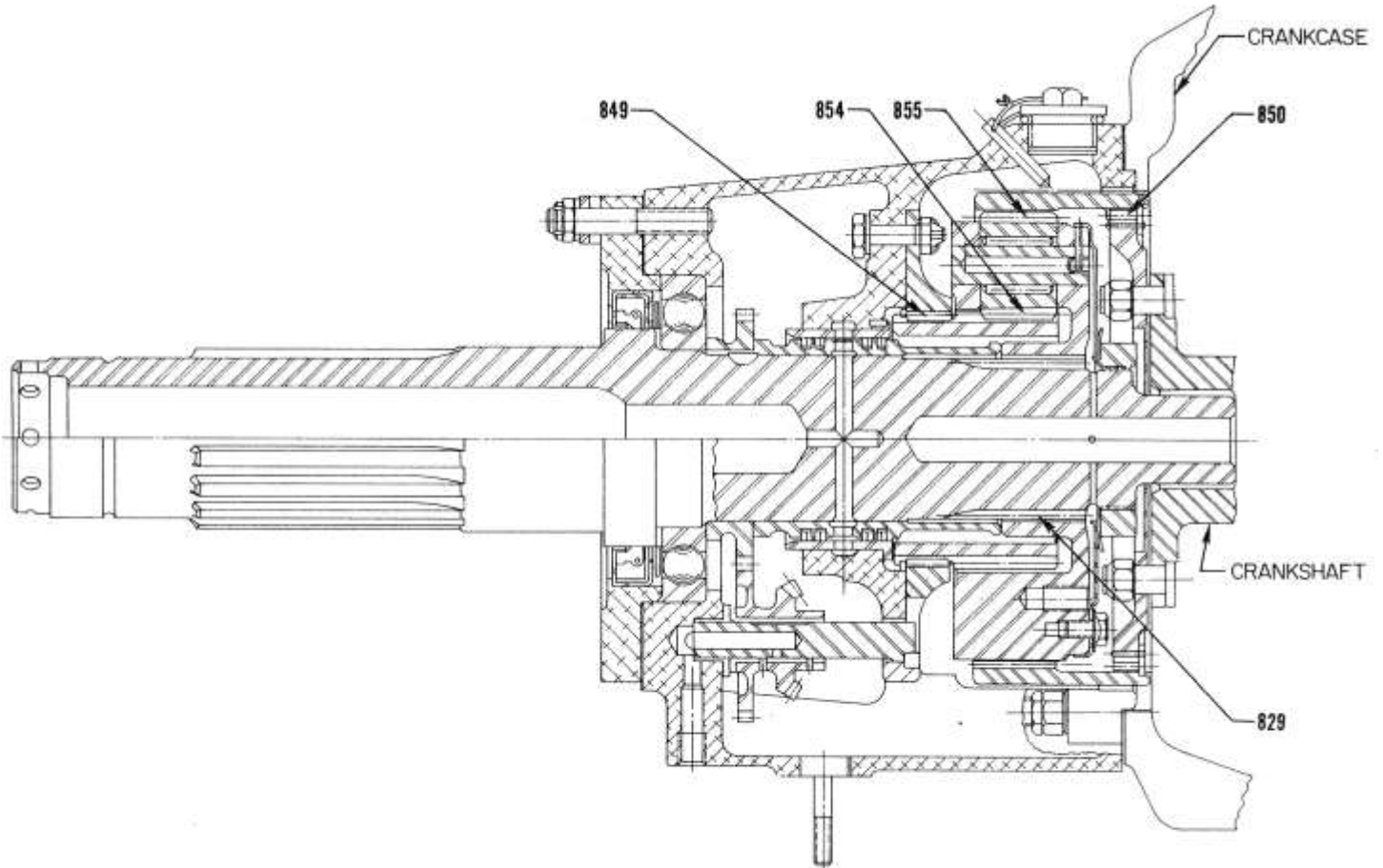
GO-435, GO, GSO & IGSO-480-A

### Accessory Drives

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION IV – BACKLASH



SECTION THRU REDUCTION GEAR

### Accessory Drives



# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION V – SPECIAL TORQUE REQUIREMENTS

| Ref.                                                                                                                                                                                                                                                   | Chart                                                                                                                              | Thread Size             | Nomenclature                                                                          | Torque Limits              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------------------------------------------------------------------------------------|----------------------------|
| 900                                                                                                                                                                                                                                                    | E-H-P                                                                                                                              | 3/8-24                  | Connecting Rod Nuts                                                                   | 480 in. lbs.               |
|                                                                                                                                                                                                                                                        | AB-AC                                                                                                                              | 3/8-24                  | Connecting Rod Bolts – Tighten to Length                                              | 2.255-2.256                |
| 901                                                                                                                                                                                                                                                    | H4-H5-P-AB-AC                                                                                                                      | 1/2-20                  | Oil Pump Shaft Nut                                                                    | 360-480 in. lbs.           |
| 903                                                                                                                                                                                                                                                    | E-H                                                                                                                                | 3/8-24                  | Magneto Nut (To attach drive member to magneto) – Steel Bushing                       | 300 in. lbs.               |
| 904                                                                                                                                                                                                                                                    | H-P1                                                                                                                               | 10-32                   | Screw Plate Nuts (To attach ignition cable outlet plate to magneto)                   | 15 in. lbs.                |
| 905                                                                                                                                                                                                                                                    | ALL (using a silicone gasket)                                                                                                      | 1/4-20                  | Rocker Box Screws                                                                     | 35 in.-lbs.                |
|                                                                                                                                                                                                                                                        | ALL (using a cork gasket)                                                                                                          | 1/4-20                  | Rocker Box Screws                                                                     | 50 in.-lbs.                |
| 906                                                                                                                                                                                                                                                    | ALL                                                                                                                                | 5/16-18                 | Exhaust Port Studs (Driving Torque)                                                   | 40 in. lbs. min.           |
|                                                                                                                                                                                                                                                        | ALL                                                                                                                                | 5/16-18                 | Nut to Attach Exhaust Stacks to Cylinder Head                                         | 160-180 in. lbs.           |
| 907                                                                                                                                                                                                                                                    | ALL                                                                                                                                | 18MM                    | Spark Plugs                                                                           | 420 in. lbs.               |
| 909                                                                                                                                                                                                                                                    | ALL                                                                                                                                | 5/8-32                  | Alternator Pulley Nut                                                                 | 450 in. lbs.               |
|                                                                                                                                                                                                                                                        | ALL                                                                                                                                | 5/8-32                  | Alternator Nut (Quill Shaft)                                                          | 474 in. lbs.               |
| 910                                                                                                                                                                                                                                                    | AC                                                                                                                                 | 1/4-28                  | Alternator Output Terminal Nut                                                        | 85 in. lbs.                |
| 911                                                                                                                                                                                                                                                    | AC                                                                                                                                 | 10-32                   | Alternator Auxiliary Terminal Nut                                                     | 30 in. lbs.                |
| 913                                                                                                                                                                                                                                                    | H3-H5-P-AB-AC                                                                                                                      | 1/16-27 NPT             | Piston Cooling Nozzle in Crankcase                                                    | 100 in. lbs.               |
| 914                                                                                                                                                                                                                                                    | AC                                                                                                                                 | 1/8-27 NPT              | Injector Nozzle in Cylinder Head                                                      | 60 in. lbs.                |
| 919                                                                                                                                                                                                                                                    | ALL                                                                                                                                | 1/4 Hex Head and Below  | Hose Clamps (Worm Type)                                                               | 45 in. lbs.                |
|                                                                                                                                                                                                                                                        | ALL                                                                                                                                | 5/16 Hex Head and Above | Hose Clamps (Worm Type)                                                               | 45 in. lbs.                |
| 919-1                                                                                                                                                                                                                                                  | ALL                                                                                                                                |                         | “T” Bolt Hose Clamps –<br>Initial Torque . . . . .<br>Retorque After Engine Test. . . | 35 in. lbs.<br>25 in. lbs. |
| 920                                                                                                                                                                                                                                                    | ALL                                                                                                                                |                         | Cylinder Head Drain Back Hose Clamp                                                   | 10 in. lbs.                |
| 928                                                                                                                                                                                                                                                    | ALL                                                                                                                                | 3/8-16                  | Cylinder Hold Down Studs (Crankcase Driving Torque)                                   | 100 in. lbs.               |
|                                                                                                                                                                                                                                                        | ALL                                                                                                                                | 1/2-13                  | Cylinder Hold Down Studs (Crankcase Driving Torque)                                   | 250 in. lbs.               |
| 929                                                                                                                                                                                                                                                    | ALL                                                                                                                                | 3/8                     | Cylinder Hold Down Nuts                                                               | 300 in. lbs.               |
|                                                                                                                                                                                                                                                        | ALL                                                                                                                                | 1/2                     | Cylinder Hold Down Nuts                                                               | 600 in. lbs.               |
| 930                                                                                                                                                                                                                                                    | ALL                                                                                                                                | 5/16-32                 | Brass union nut on stainless steel injector/primer fuel line (Both Ends)              | 25-50 in.-lbs.*            |
| * It is also permissible to tighten the fuel line union nut finger tight, then continue tightening the nut with a wrench an additional 30 to 60 degrees (1/2 to 1 flat of the nut.) Torque in excess of 50 in.-lbs. can result in damage to the parts. |                                                                                                                                    |                         |                                                                                       |                            |
|                                                                                                                                                                                                                                                        | Cylinder Hold Down and Crankcase Parting Flange Nuts’ Tightening Procedures – See latest revision of Service Instruction No. 1029. |                         |                                                                                       |                            |
| 931                                                                                                                                                                                                                                                    | ALL                                                                                                                                | 2.000-16                | Pinion Cage Retaining Nut                                                             | 400 ft. lbs.               |
| 932                                                                                                                                                                                                                                                    | E-H1-H4-H5-P-AB-AC                                                                                                                 |                         | Propeller Retaining Nut                                                               | 450-500 ft. lbs.           |
| 933                                                                                                                                                                                                                                                    | H4-H5-P-AB-AC                                                                                                                      |                         | Accessory Drive Shaft Nut                                                             | 75-125 ft. lbs.            |
| 934                                                                                                                                                                                                                                                    | H4-H5-P-AB-AC                                                                                                                      |                         | Crankshaft Gear Retaining Nut                                                         | 150 ft. lbs.               |

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION V – SPECIAL TORQUE REQUIREMENTS

| Ref. | Chart         | Thread Size | Nomenclature                                      | Torque Limits                                                |
|------|---------------|-------------|---------------------------------------------------|--------------------------------------------------------------|
| 936  | P-AB          |             | Supercharger – Intermediate Drive Shaft Nut       | 75 ft. lbs.                                                  |
| 937  | P-AB          |             | Supercharger – Impeller Locknut                   | (600 in. lbs. Plus Torque Req'd. to Reach Next Locking Slot) |
| 938  | H4-H5-P-AB-AC | 1/4-28      | Thin Slotted Nut                                  | (38 in. lbs. Plus Torque Req'd. to Reach Next Locking Slot)  |
| 940  | ALL           |             | Ring Gear Assembly – Attaching Nuts               | 360 in. lbs.                                                 |
| 941  | ALL           |             | Reduction Gear Assembly – Attaching Nuts          | 300 in. lbs.                                                 |
| 942  | E1-H1         | 1/4-18 NPT  | Carburetor Drain Plug                             | 120-144 in. lbs.                                             |
|      | E-H-P         | 1/8-27 NPT  | Carburetor Drain Plug                             | 50-60 in. lbs.                                               |
| 943  | P             | 10-32       | Screws (To Attach Accessory Drive Coupling Plate) | 25-30 in. lbs.                                               |

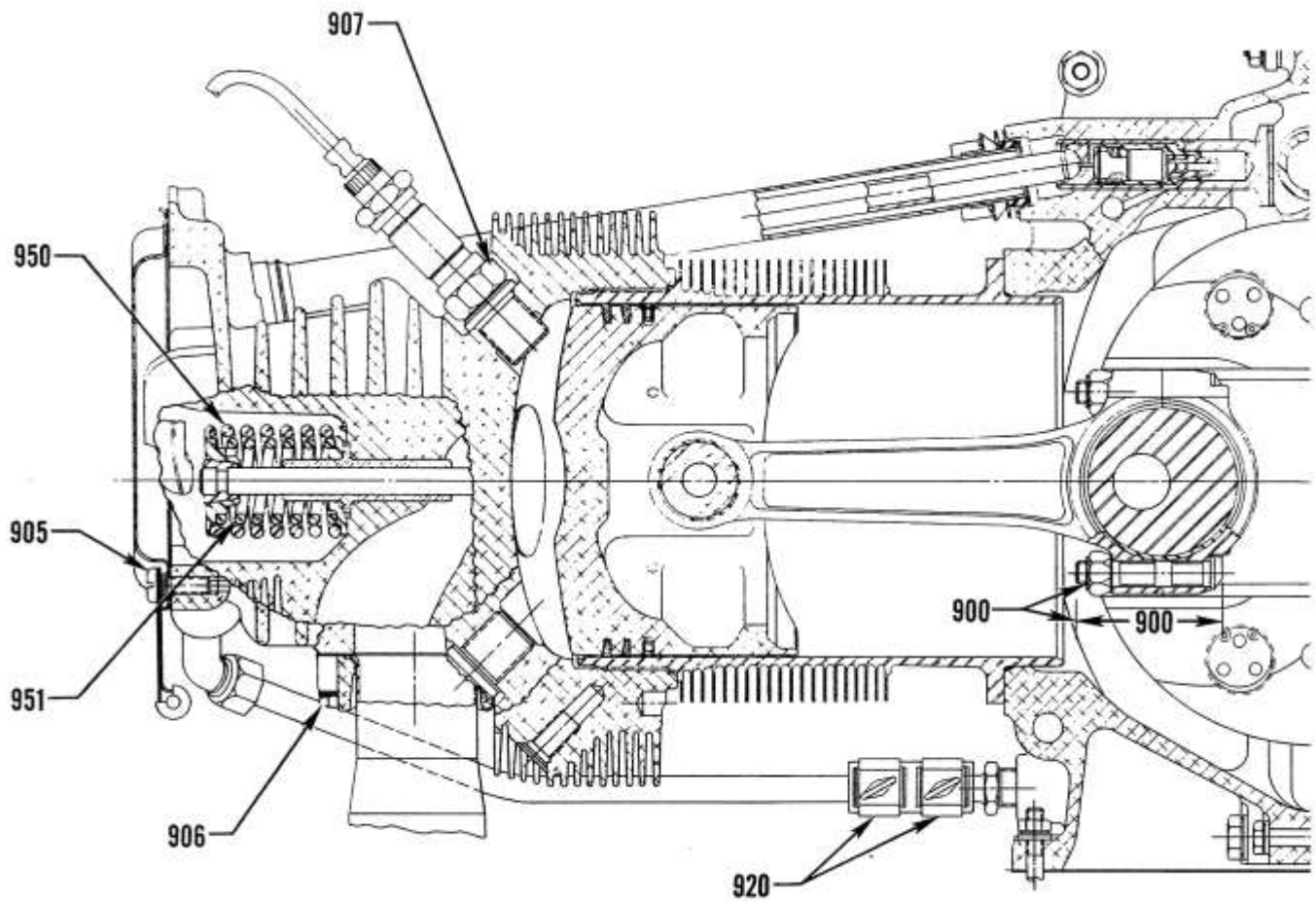
### SECTION V – SPRINGS

| Ref. | Chart         | Nomenclature                          | Lyc.<br>Part No.  | Wire<br>Dia.   | Length<br>at Comp.<br>Length | COMP. LOAD       |              |                  |                |
|------|---------------|---------------------------------------|-------------------|----------------|------------------------------|------------------|--------------|------------------|----------------|
|      |               |                                       |                   |                |                              | Mfr.<br>Min.     | Mfr.<br>Max. | Service<br>Max.  |                |
| 950  | ALL           | Outer Valve Springs<br>(Angle)        | 68326             | .177           | 1.46 in.                     | 103 lb.          | 111 lb.      | 100 lb.<br>min.  |                |
|      | ALL           | Outer Valve Springs<br>(Angle)        | LW-11796          | .182           | 1.43 in.                     | 114 lb.          | 124 lb.      | 111 lb.<br>min.  |                |
| 951  | ALL           | Auxiliary Valve<br>Springs (Angle)    | 68328<br>LW-11797 | .142           | 1.33 in.                     | 75 lb.<br>73 lb. | 83 lb.       | 72 lb.<br>min.   |                |
| 952  | H4-H5-P-AB-AC | Check Valve Springs                   |                   |                |                              |                  |              |                  |                |
|      |               | Lycoming Part<br>Numbers              | Free<br>Length    |                |                              |                  |              |                  |                |
|      |               | 654-B                                 | -----             | .031           | 1.03 in.                     | .74 lb.          | .94 lb.      | .69 lb.<br>min.  |                |
|      |               | 73761                                 | 2.065             | .041           | 1.03 in.                     | 3.15 lb.         | 3.35 lb.     | 3.10 lb.<br>min. |                |
| 953  |               | Oil Pressure Relief<br>Valve Spring   |                   |                |                              |                  |              |                  |                |
|      |               | Lycoming<br>Part<br>Numbers           | Identification    |                |                              |                  |              |                  |                |
|      |               |                                       | Dye               | Free<br>Length |                              |                  |              |                  |                |
|      | H4-H5-P-AB-AC | 68542                                 | None              | 2.38           | .067                         | 1.66 in.         | 15 lb.       | 17 lb.           | 14 lb. min.    |
|      | H4-H5-P-AB-AC | LW-14029                              | White             | 2.28           | .072                         | 1.66 in.         | 20 lb.       | 22 lb.           | 17 lb. min.    |
|      | E1-H1-H2-H3   | 60476                                 | None              | 2.38           | .047                         | 1.44 in.         | 7.15 lb.     | 7.65 lb.         | 7.00 lb. min.  |
|      | E1-H1-H2-H3   | 66920                                 | None              | 2.54           | .047                         | 1.44 in.         | 8.35 lb.     | 8.85 lb.         | 8.20 lb. min.  |
|      | E1-H1-H2-H3   | 74596                                 | None              | 2.96           | .047                         | 1.44 in.         | 11.65 lb.    | 12.15 lb.        | 11.50 lb. min. |
| 954  |               | Supercharger Drive Coupling<br>Spring |                   |                |                              |                  |              |                  |                |
|      |               | Lycoming<br>Part<br>Numbers           |                   |                |                              |                  |              |                  | Free Length    |
|      | P             | 68830                                 | 1.25              | .148           | 1.10 in.                     | 168 lb.          | 184 lb.      | 165 lb. min.     |                |
|      | P             | LW-12303                              | 1.28              | .148           | 1.13 in.                     | 168 lb.          | 184 lb.      | 165 lb. min.     |                |
|      | AB            | 72774                                 | 1.23              | .177           | 1.10 in.                     | 249 lb.          | 275 lb.      | 244 lb. min.     |                |
|      | AB            | LW-12301                              | 1.26              | .177           | 1.13 in.                     | 255 lb.          | 270 lb.      | 250 lb. min.     |                |

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION V – SPECIAL TORQUE REQUIREMENTS

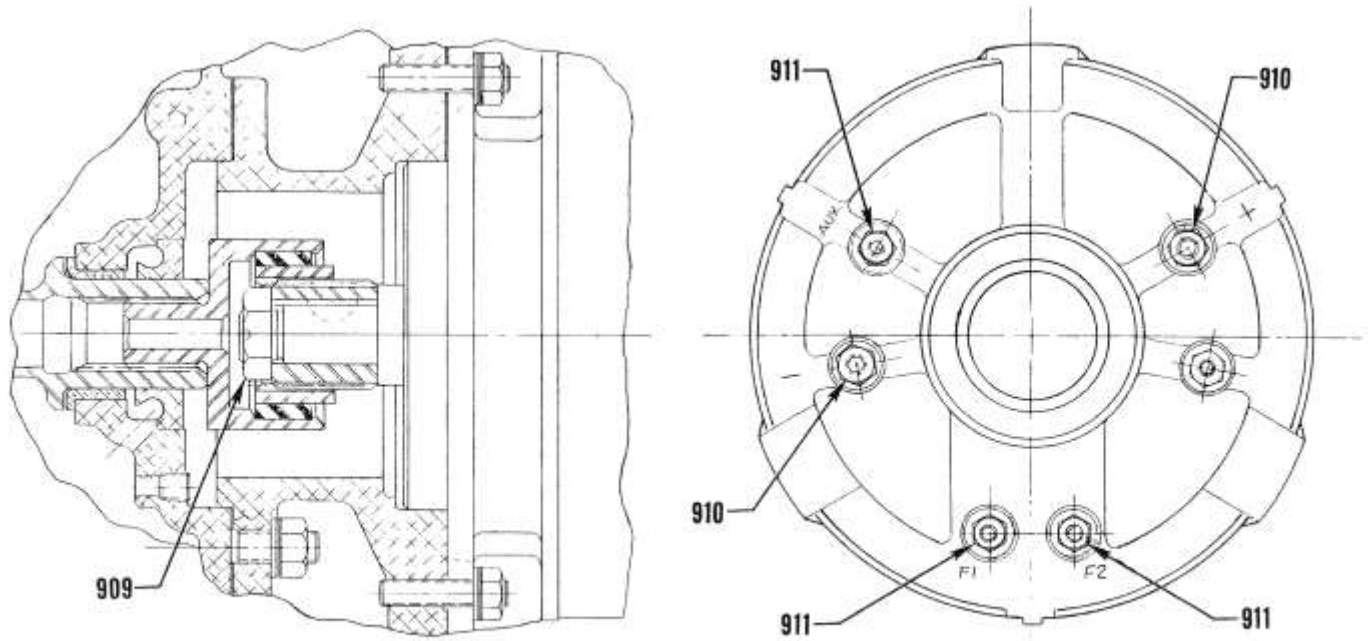


### Engine Accessories and Hardware

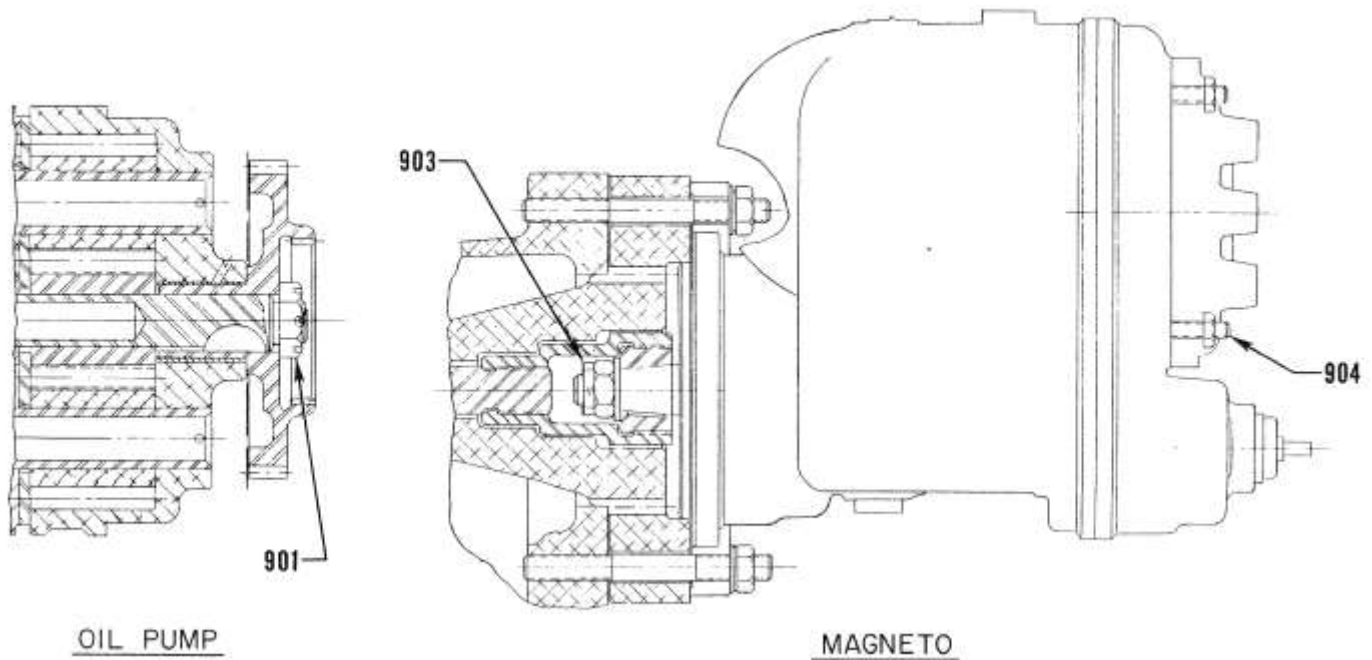
# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION V – SPECIAL TORQUE REQUIREMENTS



ALTERNATOR & ALTERNATOR DRIVE



OIL PUMP

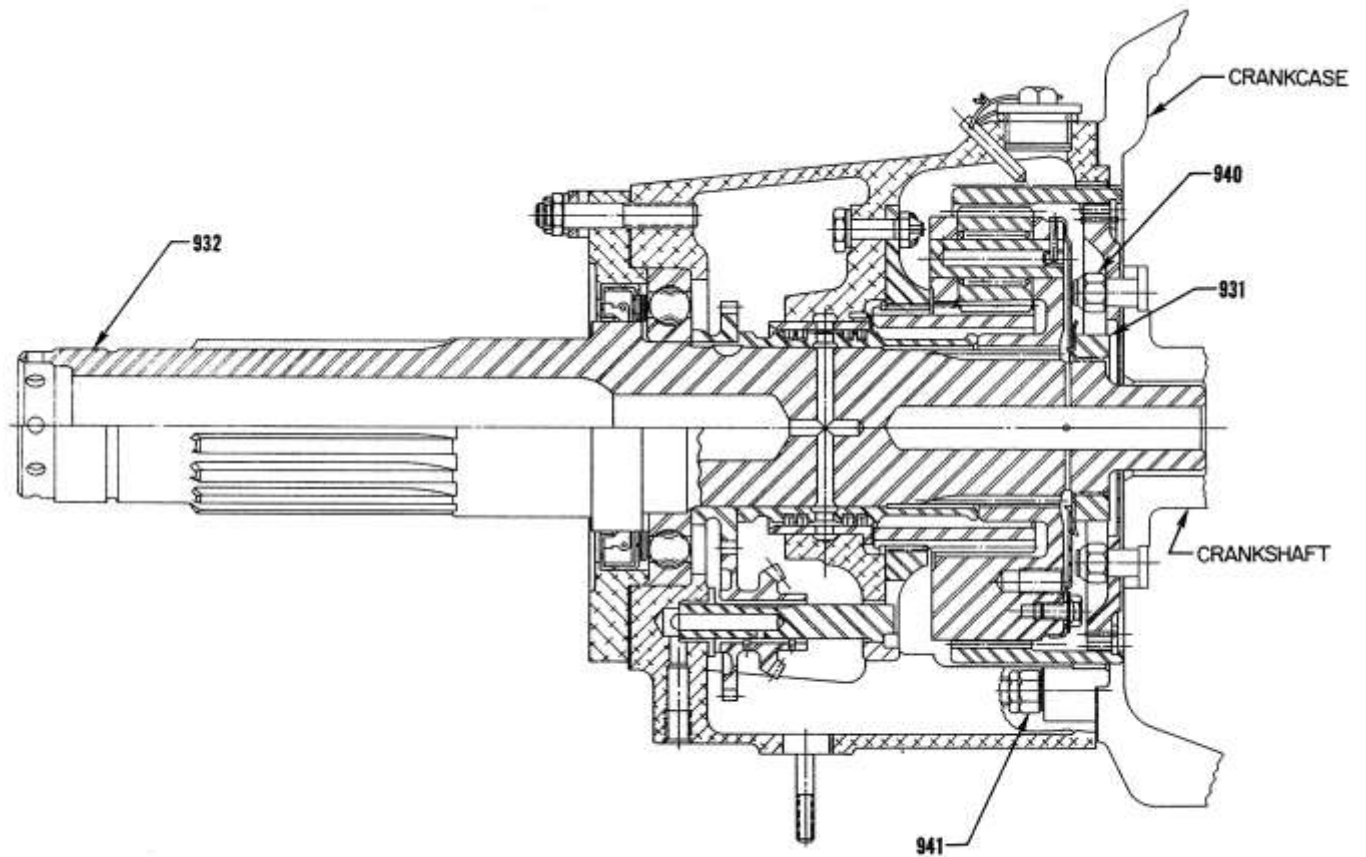
MAGNETO

### Engine Accessories and Hardware

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION V – SPECIAL TORQUE REQUIREMENTS

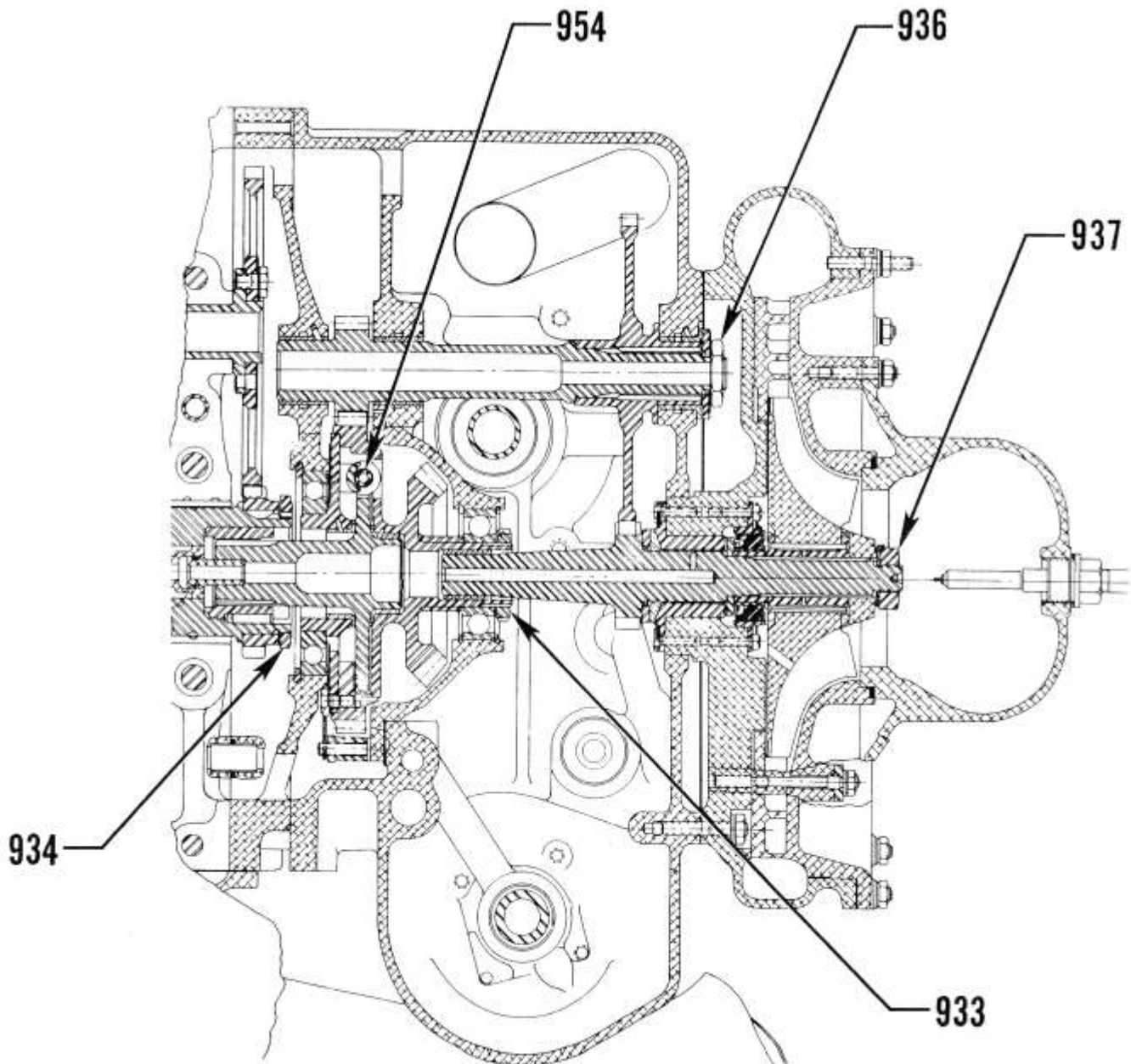


SECTION THRU REDUCTION GEAR

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION V – SPECIAL TORQUE REQUIREMENTS



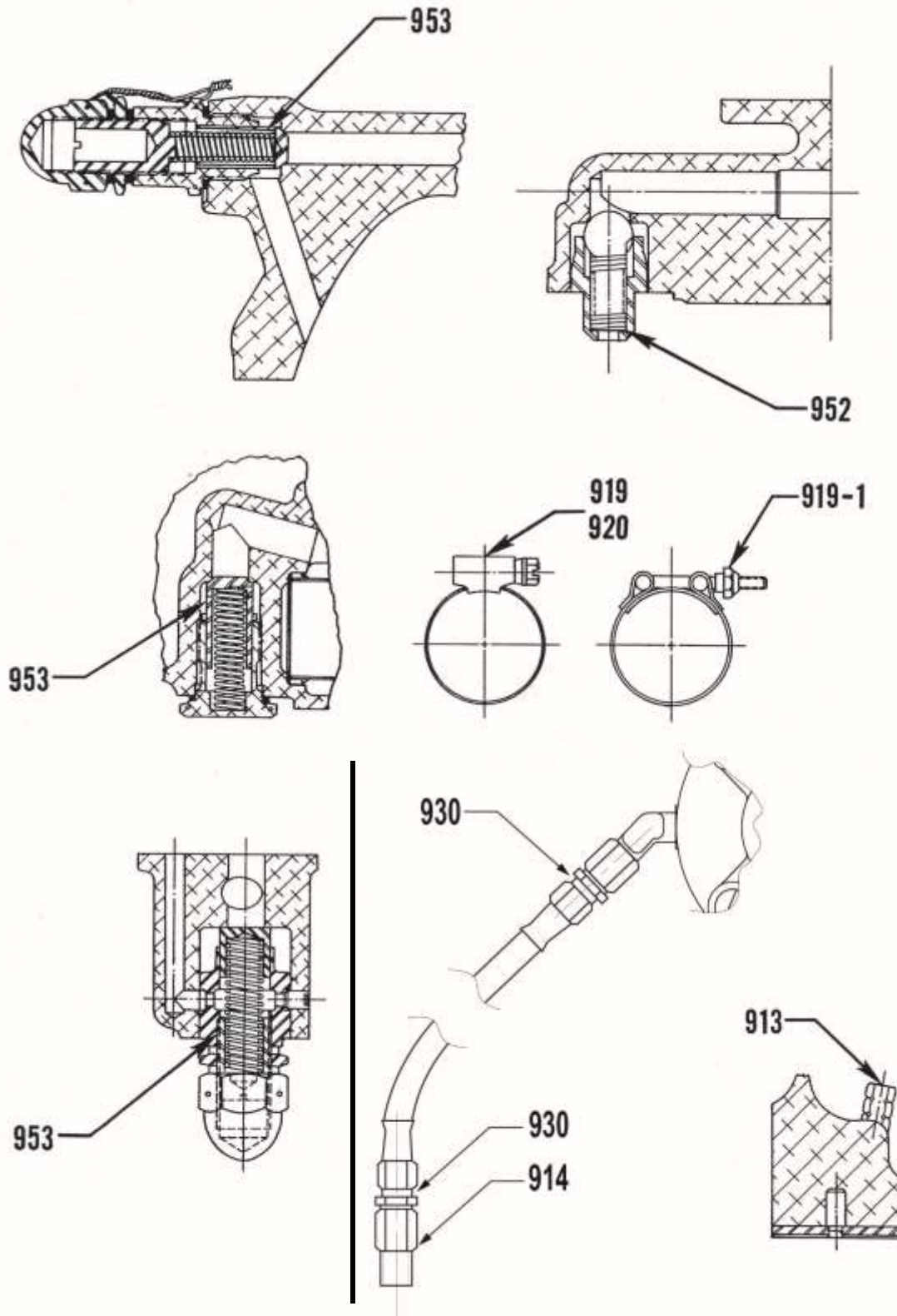
## SECTION THRU ACCESSORY HSG. & SUPERCHARGER

### Engine Accessories and Hardware

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### SECTION V – SPECIAL TORQUE REQUIREMENTS



Engine Springs and Hardware

# SERVICE TABLE OF LIMITS

## PART III – GEARED ENGINES

### STANDARD TORQUE

#### UNLESS OTHERWISE LISTED

Torque limits for propeller attaching bolts to be supplied by propeller aircraft manufacturer.

NOTE: Refer to Table VIII for torque value conversions (In. Lb. or Ft. Lb. to Nm).

| TABLE I                                          |            |          |        |              |            | TABLE II     |            |
|--------------------------------------------------|------------|----------|--------|--------------|------------|--------------|------------|
| BOLTS, SCREW AND NUTS                            |            |          |        |              |            | PIPE PLUGS   |            |
| Thread                                           | Torque     |          | Thread | Torque       |            | Thread       | Torque     |
|                                                  | In. Lb.    | Ft. Lb.  |        | In. Lb.      | Ft. Lb.    |              | In. Lbs.   |
| 8                                                | 20 to 22   | -----    | 7/16   | 600 to 660   | 50 to 55   | 1/16-27 NPT  | 40 to 44   |
| 10                                               | 49 to 54   | -----    | 1/2    | 900 to 984   | 75 to 82   | 1/8-27 NPT   | 40 to 44   |
| 1/4                                              | 96 to 106  | -----    | 9/16   | 1320 to 1452 | 110 to 121 | 1/4-18 NPT   | 85 to 94   |
| 5/16                                             | 204 to 228 | 17 to 19 | 5/8    | 1800 to 1980 | 150 to 165 | 3/8-18 NPT   | 110 to 121 |
| 3/8                                              | 360 to 396 | 30 to 33 | 3/4    | 3240 to 3564 | 270 to 297 | 1/2-14 NPT   | 160 to 176 |
| THIN NUTS (1/2 DIA. OF BOLT) – 1/2 LISTED TORQUE |            |          |        |              |            | 3/4-14 NPT   | 230 to 252 |
|                                                  |            |          |        |              |            | 1-11-1/2 NPT | 315 to 347 |

| TABLE III                                                                                                                                                                                                                                                                                                                                                                |               |        | TABLE IV                                                        |           |                 |            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------|-----------------------------------------------------------------|-----------|-----------------|------------|
| CRUSH TYPE GASKETS                                                                                                                                                                                                                                                                                                                                                       |               |        | FLEXIBLE TUBE CONNECTIONS<br>(SEALASTIC OR EQUIVALENT FITTINGS) |           |                 |            |
| Thread Pitch on Part to be Tightened                                                                                                                                                                                                                                                                                                                                     | ANGLE OF TURN |        | Tube Size                                                       | Thread    | Torque In. Lbs. |            |
| Threads Per Inch                                                                                                                                                                                                                                                                                                                                                         | Aluminum      | Copper |                                                                 |           | Aluminum Alloy  | Steel      |
| 8                                                                                                                                                                                                                                                                                                                                                                        | 135°          | 67°    | (-3) 3/16                                                       | 3/8 - 24  | 30 to 50        | 70 to 80   |
| 10                                                                                                                                                                                                                                                                                                                                                                       | 135°          | 67°    | (-4) 1/4                                                        | 7/16 - 20 | 40 to 65        | 90 to 100  |
| 12                                                                                                                                                                                                                                                                                                                                                                       | 180°          | 90°    | (-5) 5/16                                                       | 1/2 - 20  | 60 to 80        | 135 to 150 |
| 14                                                                                                                                                                                                                                                                                                                                                                       | 180°          | 90°    | (-6) 3/8                                                        | 9/16-18   | 75 to 125       | 270 to 300 |
| 16                                                                                                                                                                                                                                                                                                                                                                       | 270°          | 135°   | (-8) 1/2                                                        | 3/4-16    | 150 to 250      | 450 to 500 |
| 18                                                                                                                                                                                                                                                                                                                                                                       | 270°          | 135°   | (-10) 5/8                                                       | 7/8 - 14  | 200 to 350      | 650 to 700 |
| 20                                                                                                                                                                                                                                                                                                                                                                       | 270°          | 135°   |                                                                 |           |                 |            |
| 24                                                                                                                                                                                                                                                                                                                                                                       | 360°          | 180°   |                                                                 |           |                 |            |
| 28                                                                                                                                                                                                                                                                                                                                                                       | 360°          | 180°   |                                                                 |           |                 |            |
| NOTE: Install all crush type gaskets except the self-centering type, with the unbroken surface against the flange of the plug or part being tightened against the seal. Turn the part until the sealing surfaces are in contact and then tighten to the angle of turn listed for the appropriate thread size.<br><br>NOTE: Lubricate Threads Unless Otherwise Specified. |               |        | TABLE V                                                         |           |                 |            |
|                                                                                                                                                                                                                                                                                                                                                                          |               |        | STUDS MIN. DRIVING TORQUE                                       |           |                 |            |
|                                                                                                                                                                                                                                                                                                                                                                          |               |        | Threads                                                         |           | Torque In. Lbs. |            |
|                                                                                                                                                                                                                                                                                                                                                                          |               |        | 1/4-20                                                          |           | 15              |            |
|                                                                                                                                                                                                                                                                                                                                                                          |               |        | 5/16-18                                                         |           | 25              |            |
|                                                                                                                                                                                                                                                                                                                                                                          |               |        | 3/8-16                                                          |           | 50              |            |

| TABLE VI                               |             |                 |
|----------------------------------------|-------------|-----------------|
| JAM NUT OR STRAIGHT THREAD O-RING BOSS |             |                 |
| Tube Size                              | Thread      | Torque Ft. Lbs. |
| -03                                    | 3/8 – 24    | 8 – 9           |
| -04                                    | 7/16 – 20   | 13 – 15         |
| -05                                    | 1/2 – 20    | 14 – 15         |
| -06                                    | 9/16 – 18   | 23 – 24         |
| -08                                    | 3/4 – 16    | 40 – 43         |
| -10                                    | 7/8 – 14    | 43 – 48         |
| -12                                    | 1-1/16 – 12 | 68 – 75         |
| -14                                    | 1-3/16 – 12 | 83 – 90         |
| -16                                    | 1-5/16 – 12 | 112 – 123       |
| -20                                    | 1-5/8 – 12  | 146 – 161       |
| -24                                    | 1-7/8 – 12  | 154 – 170       |
| -32                                    | 2-1/2 – 12  | 218 – 240       |



# SERVICE TABLE OF LIMITS

## STANDARD TORQUE (CONT.) UNLESS OTHERWISE LISTED

| TABLE VII           |                     |                                                        |         |              |         |                                                                          |     |                                                                                |         |
|---------------------|---------------------|--------------------------------------------------------|---------|--------------|---------|--------------------------------------------------------------------------|-----|--------------------------------------------------------------------------------|---------|
| METAL TUBE FITTINGS |                     |                                                        |         |              |         |                                                                          |     |                                                                                |         |
| Dash Nos.<br>Ref.   | Tubing<br>OD inches | Wrench torque for tightening AN-818 Nut (pound inches) |         |              |         |                                                                          |     | Minimum bend radii<br>measured to tubing<br>centerline. Dimension in<br>inches |         |
|                     |                     | Aluminum-alloy tubing                                  |         | Steel tubing |         | Aluminum-alloy tubing<br>(Flare MS33583) for use<br>on oxygen lines only |     |                                                                                |         |
|                     |                     | Minimum                                                | Maximum | Minimum      | Maximum |                                                                          |     | Minimum                                                                        | Maximum |
|                     |                     | -2                                                     | 1/8     | 20           | 30      | 75                                                                       | 85  | --                                                                             | --      |
| -3                  | 3/16                | 25                                                     | 35      | 95           | 105     | --                                                                       | --  | 7/16                                                                           | 21/32   |
| -4                  | 1/4                 | 50                                                     | 65      | 135          | 150     | --                                                                       | --  | 9/16                                                                           | 7/8     |
| -5                  | 5/16                | 70                                                     | 90      | 170          | 200     | 100                                                                      | 125 | 3/4                                                                            | 1-1/8   |
| -6                  | 3/8                 | 110                                                    | 130     | 270          | 300     | 200                                                                      | 250 | 15/16                                                                          | 1-5/16  |
| -8                  | 1/2                 | 230                                                    | 260     | 450          | 500     | 300                                                                      | 400 | 1-1/4                                                                          | 1-3/4   |
| -10                 | 5/8                 | 330                                                    | 360     | 650          | 700     | --                                                                       | --  | 1-1/2                                                                          | 2-3/16  |
| -12                 | 3/4                 | 460                                                    | 500     | 900          | 1000    | --                                                                       | --  | 1-3/4                                                                          | 2-5/8   |
| -16                 | 1                   | 500                                                    | 700     | 1200         | 1400    | --                                                                       | --  | 3                                                                              | 3-1/2   |
| -20                 | 1-1/4               | 800                                                    | 900     | 1520         | 1680    | --                                                                       | --  | 3-3/4                                                                          | 4-3/8   |
| -24                 | 1-1/2               | 800                                                    | 900     | 1900         | 2100    | --                                                                       | --  | 5                                                                              | 5-1/4   |
| -28                 | 1-3/4               | --                                                     | --      | --           | --      | --                                                                       | --  | --                                                                             | --      |
| -32                 | 2                   | 1800                                                   | 2000    | 2660         | 2940    | --                                                                       | --  | 8                                                                              | 7       |

| TABLE VIII         |         |      |         |         |       |         |         |        |
|--------------------|---------|------|---------|---------|-------|---------|---------|--------|
| TORQUE CONVERSIONS |         |      |         |         |       |         |         |        |
| In. Lb.            | Ft. Lb. | Nm   | In. Lb. | Ft. Lb. | Nm    | In. Lb. | Ft. Lb. | Nm     |
| 5                  | 0.42    | 0.56 | 100     | 8.33    | 11.30 | 1000    | 83.33   | 113.00 |
| 10                 | 0.83    | 1.13 | 200     | 16.67   | 22.60 | 2000    | 166.70  | 226.00 |
| 20                 | 1.67    | 2.26 | 300     | 25.00   | 53.90 | 3000    | 250.00  | 339.00 |
| 30                 | 2.50    | 3.39 | 400     | 33.33   | 45.19 | 4000    | 333.30  | 451.90 |
| 40                 | 3.33    | 4.52 | 500     | 41.67   | 56.49 | 5000    | 416.70  | 564.90 |
| 50                 | 4.17    | 5.65 | 600     | 50.00   | 67.79 | 6000    | 500.00  | 677.90 |

# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL DRIVE ENGINES EXCLUDING VO AND IVO-360

| CHART | MODELS                 |
|-------|------------------------|
| L     | VO, TVO-435 (ALL)      |
| L1    | VO-435-B, TVO-435-F    |
| L2    | TVO-435-A              |
| V     | VO, IVO, TVO, TIVO-540 |
| V1    | TVO, TIVO-540          |

### NOTE

In “Chart” column, a number appearing after a letter shows exceptions to the basic model.

|             |                   |                                  |
|-------------|-------------------|----------------------------------|
| SECTION I   | 500 SERIES        | CRANKCASE, CRANKSHAFT & CAMSHAFT |
| SECTION II  | 600 SERIES        | CYLINDERS                        |
| SECTION III | 700 & 7000 SERIES | GEAR TRAIN                       |
| SECTION IV  | 800 & 8000 SERIES | BACKLASH (GEAR TRAIN)            |
| SECTION V   | 900 SERIES        | TORQUE AND SPRINGS               |

- (A) These fits are either shrink fits controlled by machining, fits that may readily be adjusted, or fits where wear does not normally occur, in each case the fit must be held to the manufacturing tolerance.
- (B) Side clearance on piston rings must be measured with face of ring flush with piston.
- (D) These dimensions shown are measured at bottom of piston skirt at right angles to piston pin.
- (E) Permissible wear of the crankshaft (rod and main bearing journals) to be minus 0.0015 on the diameter.
- (L) Loose fit; wherein a definite clearance is mentioned between the mating surfaces.
- (T) Tight fit; shrink or interference fit.

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## TECHNICAL PUBLICATION REVISION

| REVISION NO.                                                                                                                                                                                                                                                                                                                                                                                    | PUBLICATION             | PUBLICATION NO.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | PUBLICATION DATE |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| SSP-1776-5-PT4                                                                                                                                                                                                                                                                                                                                                                                  | Service Table of Limits | SSP-1776                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | October 28, 2013 |
| PREVIOUS REVISIONS                                                                                                                                                                                                                                                                                                                                                                              |                         | CURRENT REVISION*                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                  |
| <p style="text-align: center;"><b>April 2018</b></p> <p style="text-align: center;">4-6, 4-35, 4-39</p> <ul style="list-style-type: none"><li>Deleted NOTES that reference S.I. 1243 in Piston Application Table</li><li>Added Ref. number 930 to Section V table and figure for torque value for brass union nut on stainless steel injector fuel lines and primer lines (Both Ends)</li></ul> |                         | <p style="text-align: center;"><b>April 2020</b></p> <p style="text-align: center;">4-5, 4-6</p> <ul style="list-style-type: none"><li>Revised burnishing instructions for connecting rod bushing in reference number 600</li><li>Revised the Mfr. Min. &amp; Max. Clearance for Piston Ring Gap (Compression) Nitrided Cylinders (Choke Barrels) and Piston Ring Gap (Oil) in reference number 607</li></ul> <p>* Revisions are indicated with a vertical bar to the left of the revised item.</p> |                  |

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# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL ENGINES

### SECTION I – CRANKCASE, CRANKSHAFT AND CAMSHAFT

| Ref. | Chart | Nomenclature                                                                         | Dimensions              |                 | Clearances              |                 |
|------|-------|--------------------------------------------------------------------------------------|-------------------------|-----------------|-------------------------|-----------------|
|      |       |                                                                                      | Mfr.<br>Min. &<br>Max.  | Service<br>Max. | Mfr.<br>Min. &<br>Max.  | Service<br>Max. |
| 500  | L     | All Main Bearings and Crankshaft                                                     |                         |                 | <u>.0015L</u><br>.0045L | .0060L          |
|      | L1-V  | Main Bearings and Crankshaft (Except Front)                                          |                         |                 | <u>.0011L</u><br>.0041L | .0050L          |
|      | V     | Front Main Bearing and Crankshaft                                                    |                         |                 | <u>.0011L</u><br>.0041L | .0050L          |
|      | L1    | Front Main Bearing and Crankshaft                                                    |                         |                 | <u>.0015L</u><br>.0045L | .0050L          |
|      | ALL   | Diameter of Main Bearing Journal on Crankshaft                                       | <u>2.3745</u><br>2.376  | (E)             |                         |                 |
|      | L     | Crankcase Bearing Bore Diameter (All)                                                | <u>2.566</u><br>2.567   | 2.5685          |                         |                 |
|      | V     | Crankcase Bearing Bore Diameter (All)                                                | <u>2.6865</u><br>2.6875 | 2.6890          |                         |                 |
| 501  | ALL   | Connecting Rod Bearing and Crankshaft                                                |                         |                 | <u>.0008L</u><br>.0038L | .0050L          |
|      | ALL   | Diameter of Connecting Rod Journal on Crankshaft (2-1/8 in.)                         | <u>2.1235</u><br>2.125  | (E)             |                         |                 |
|      | ALL   | Connecting Rod Bearing Bore Diameter (2-1/8 in.) (Measured at Axis 30° on Each Side) | <u>2.2870</u><br>2.2875 |                 |                         |                 |
| 502  | ALL   | Connecting Rod – Side Clearance                                                      |                         |                 | <u>.004L</u><br>.010L   | .016L           |
| 503  | ALL   | Connecting Rod – Alignment                                                           |                         |                 | .010 in 10 Inches       |                 |
| 504  | ALL   | Connecting Rod – Twist                                                               |                         |                 | .012 in 12 Inches       |                 |
| 505  | ALL   | Crankshaft Run-Out at Center Main Bearings                                           |                         |                 |                         |                 |
|      |       | Mounted on No. 1 and 4 Journals Max. Run-Out No. 2 and 3 Journals                    |                         |                 | .005                    | .0075           |
|      |       | Mounted on No. 1 and 3 Journals Max. Run-Out No. 2 Journal                           |                         |                 | .003                    | .0045           |
|      |       | Mounted on No. 2 and 4 Journals Max. Run-Out No. 3 Journal                           |                         |                 | .003                    | .0045           |
| 506  | ALL   | Crankshaft and Crankcase Front End Clearance                                         |                         |                 | <u>.006L</u><br>.015L   | .025L           |
| 508  | ALL   | Crankshaft Propeller Flange Run-Out                                                  |                         |                 | .002                    | .005            |
| 510  | ALL   | Crankshaft Timing Gear and Crankshaft                                                |                         |                 | <u>.0000</u><br>.0015T  | (A)             |
| 511  | ALL   | Tappet Body and Crankcase                                                            |                         |                 | <u>.0010L</u><br>.0033L | .004L           |
|      | ALL   | O.D. of Tappet                                                                       | <u>.7169</u><br>.7177   | .7166           |                         |                 |
|      | ALL   | I.D. Tappet Bore in Crankcase                                                        | <u>.7187</u><br>.7200   | .7203           |                         |                 |

# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL ENGINES

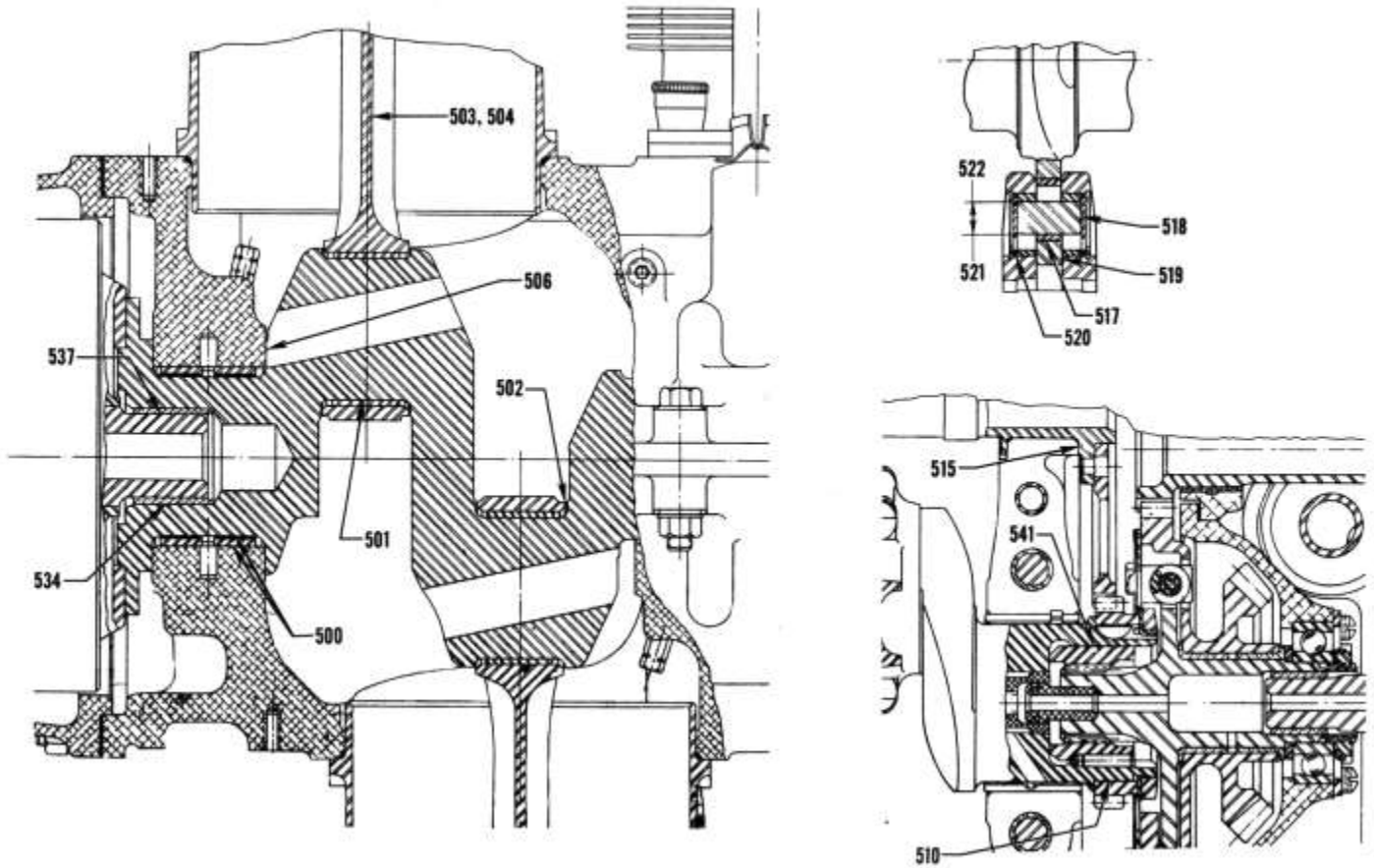
### SECTION I – CRANKCASE, CRANKSHAFT AND CAMSHAFT

| Ref.                                   | Chart | Nomenclature                                                                                   | Dimensions             |                 | Clearances              |                 |
|----------------------------------------|-------|------------------------------------------------------------------------------------------------|------------------------|-----------------|-------------------------|-----------------|
|                                        |       |                                                                                                | Mfr.<br>Min. &<br>Max. | Service<br>Max. | Mfr.<br>Min. &<br>Max.  | Service<br>Max. |
| 512                                    | ALL   | Tappet Plunger Assembly and Body – Hyperbolic                                                  |                        |                 | <u>.0010L</u><br>.0067L | .0087L          |
| 513                                    | ALL   | Tappet Socket and Body (Hyperbolic)                                                            |                        |                 | <u>.002L</u><br>.007L   | .009L           |
| 514                                    | ALL   | Camshaft and Crankcase                                                                         |                        |                 | <u>.002L</u><br>.004L   | .006L           |
| 515                                    | ALL   | Camshaft – End Clearance                                                                       |                        |                 | <u>.002L</u><br>.009L   | .015L           |
| 516                                    | ALL   | Camshaft Run-Out at Center Bearing Journal                                                     |                        |                 | <u>.000</u><br>.001     | .006            |
| 517                                    | V     | Counterweight Bushing and Crankshaft                                                           |                        |                 | <u>.0013T</u><br>.0026T | (A)             |
| 518                                    | V     | Counterweight Roller – End Clearance                                                           |                        |                 | <u>.007L</u><br>.025L   | .038L           |
| 519                                    | V     | Counterweight and Crankshaft Side Clearance*                                                   |                        |                 | <u>.003L</u><br>.013L   | .017L           |
| 520                                    | V     | Counterweight Bore and Washer O.D.                                                             |                        |                 | <u>.0002L</u><br>.0030L | (A)             |
| 521                                    | V     | I.D. of Counterweight Bushing                                                                  | <u>.7485</u><br>.7505  | .7512           |                         |                 |
| 522                                    | V     | O.D. of Counterweight Roller (P/N 73338) (See latest revision of Service Instruction No. 1012) | <u>.5255</u><br>.5260  |                 |                         |                 |
| 541                                    | ALL   | Rear Crankshaft Spline Bushing and Crankshaft                                                  |                        |                 | <u>.0002T</u><br>.0015T | (A)             |
| * - Measure below roller next to flat. |       |                                                                                                |                        |                 |                         |                 |

# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL ENGINES

### SECTION I – CRANKCASE, CRANKSHAFT AND CAMSHAFT



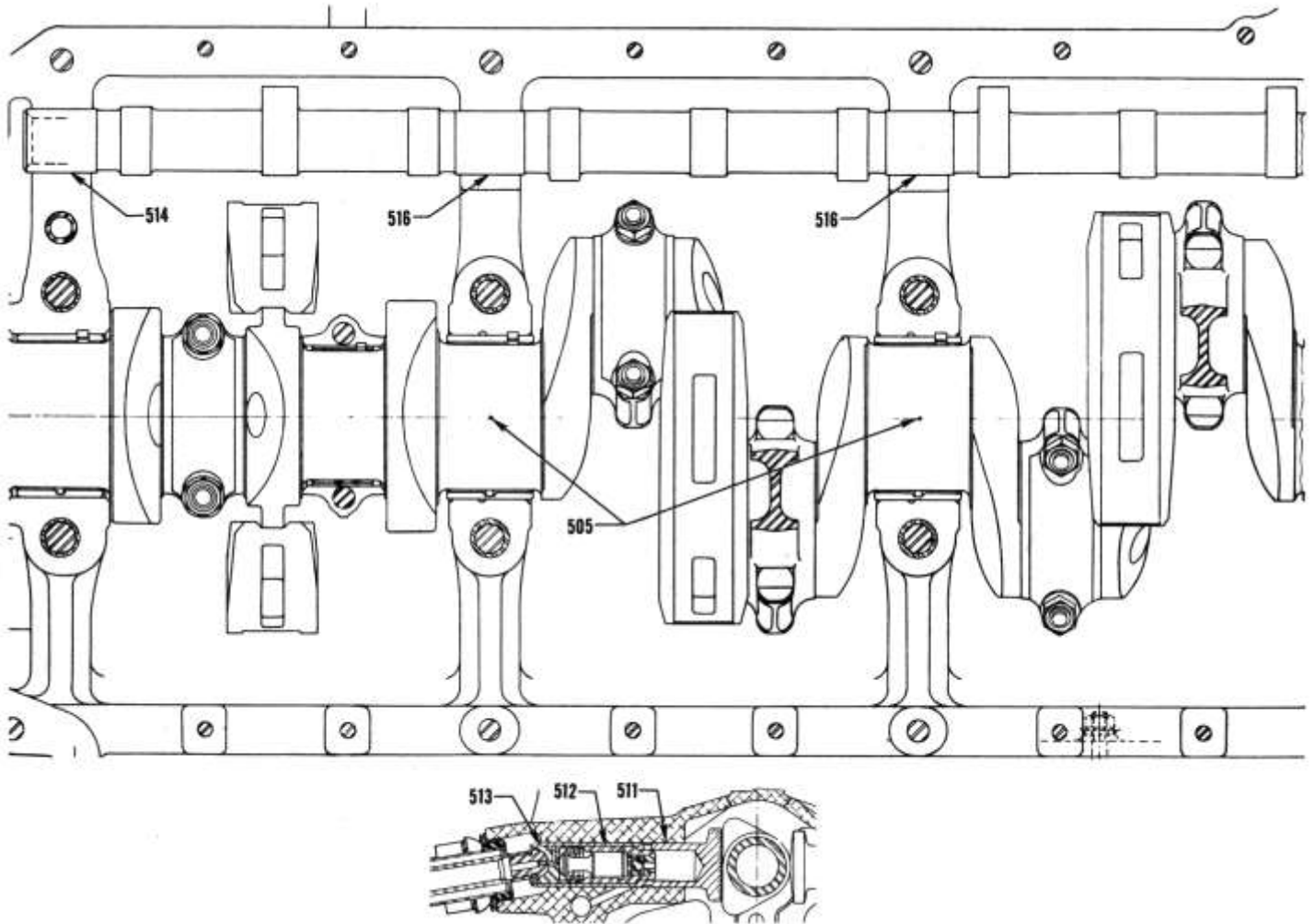
### Crankcase, Crankshaft, Bearings, Camshaft and Counterweights



# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL ENGINES

### SECTION I – CRANKCASE, CRANKSHAFT AND CAMSHAFT



**Longitudinal Section Thru Engine, Camshaft, Tappet Body and Crankshaft**

# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL ENGINES

### SECTION II – CYLINDERS

| Ref. | Chart                                                                                                      | Nomenclature                                                                            | Dimensions                                                                                               |              | Clearances              |              |
|------|------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|--------------|-------------------------|--------------|
|      |                                                                                                            |                                                                                         | Mfr. Min. & Max.                                                                                         | Service Max. | Mfr. Min. & Max.        | Service Max. |
| 600  | ALL                                                                                                        | Connecting Rod and Connecting Rod Bushing                                               | Bushings P/N LW-13923 to be burnished in place<br>Bushings P/N 01K28983 is <b>not</b> burnished in place |              |                         |              |
|      | ALL                                                                                                        | Finished I.D. of Connecting Rod Bushing                                                 | <u>1.1254</u><br>1.1262                                                                                  |              |                         |              |
| 601  | L                                                                                                          | Length Between Connecting Rod Bearing Centers                                           | <u>6.4985</u><br>6.5015                                                                                  |              |                         |              |
|      | V                                                                                                          | Length Between Connecting Rod Bearing Centers                                           | <u>6.7485</u><br>6.7515                                                                                  |              |                         |              |
| 602  | ALL                                                                                                        | Connecting Rod Bushing and Piston Pin                                                   |                                                                                                          |              | <u>.0008L</u><br>.0021L | .0025L       |
| 603  | ALL                                                                                                        | Piston Pin and Piston                                                                   |                                                                                                          |              | <u>.0003L</u><br>.0014L | .0018L       |
|      | ALL                                                                                                        | Diameter of Piston Pin Hole in Piston                                                   | <u>1.1249</u><br>1.1254                                                                                  |              |                         |              |
|      | ALL                                                                                                        | Diameter of Piston Pin                                                                  | <u>1.1241</u><br>1.1246                                                                                  |              |                         |              |
| 604  | V                                                                                                          | Piston and Piston Pin Plug                                                              |                                                                                                          |              | <u>.0002L</u><br>.0010L | .002L        |
|      | V                                                                                                          | Diameter of Piston Pin Plug*                                                            | <u>1.1242</u><br>1.1247                                                                                  |              |                         |              |
| 605  | ALL                                                                                                        | Piston Pin and Piston Pin Plug (Nitrided and Chrome Cylinders)                          |                                                                                                          |              | <u>.0005L</u><br>.0025L | .005L        |
|      | V                                                                                                          | Diameter of Piston Pin Plug*                                                            | <u>.5655</u><br>.5665                                                                                    |              |                         |              |
|      | L                                                                                                          | Diameter of Piston Pin Plug**                                                           | <u>.7605</u><br>.7615                                                                                    |              |                         |              |
|      | L                                                                                                          | Diameter of Piston Pin Plug** (Thin Wall Pin)                                           | <u>.8405</u><br>.8415                                                                                    |              |                         |              |
|      | *See latest revision of Service Instruction No. 1267.<br>**See latest revision of Service Bulletin No. 316 |                                                                                         |                                                                                                          |              |                         |              |
| 606  | ALL                                                                                                        | Piston Ring and Piston – Side Clearance (Top Ring Comp.) Half Wedge                     |                                                                                                          |              | <u>.0025L</u><br>.0055L | .008L (B)    |
|      | ALL (AS APPLICABLE)                                                                                        | Piston Ring and Piston – Side Clearance (2 <sup>nd</sup> Ring Comp.) Full or Half Wedge |                                                                                                          |              | <u>.000</u><br>.004L    | .006L (B)    |
|      | ALL                                                                                                        | Piston Ring and Piston – Side Clearance (Oil Regulating)                                |                                                                                                          |              | <u>.002L</u><br>.004L   | .006L (B)    |
|      | ALL (AS APPLICABLE)                                                                                        | Piston Ring and Piston – Side Clearance (Oil Scraper)                                   |                                                                                                          |              | <u>.003L</u><br>.0055L  | .007L (B)    |
|      | ALL (AS APPLICABLE)                                                                                        | Piston Ring and Piston – Side Clearance (3 <sup>rd</sup> Ring Comp.) Half Wedge         |                                                                                                          |              | <u>.000</u><br>.004L    | .006L (B)    |
| 607  | ALL                                                                                                        | Piston Ring Gap (Compression) Chrome Cylinders (Straight Barrels)                       |                                                                                                          |              | <u>.020</u><br>.030     | .047         |
|      | ALL                                                                                                        | Piston Ring Gap (Compression) Nitrided and Chrome Cylinders (Choke Barrels)             |                                                                                                          |              | <u>.045</u><br>.065     | .067         |

# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL ENGINES

### SECTION II – CYLINDERS

| Ref.                                                                                                                         | Chart                                                                                                                                                                                                                                                                                                                               | Nomenclature                                   | Dimensions           |              | Clearances          |                 |                  |                                    |
|------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|----------------------|--------------|---------------------|-----------------|------------------|------------------------------------|
|                                                                                                                              |                                                                                                                                                                                                                                                                                                                                     |                                                | Mfr. Min. & Max.     | Service Max. | Mfr. Min. & Max.    | Service Max.    |                  |                                    |
| 607                                                                                                                          | ALL                                                                                                                                                                                                                                                                                                                                 | Piston Ring Gap (Oil Regulating) (All Barrels) |                      |              | <u>.015</u><br>.040 | .047            |                  |                                    |
|                                                                                                                              | ALL (AS APPLICABLE)                                                                                                                                                                                                                                                                                                                 | Piston Ring Gap (Oil Scraper) (All Barrels)    |                      |              | <u>.015</u><br>.030 | .047            |                  |                                    |
| For Choke Barrels – Ring gap is measured within 4 inches from bottom. Ring gap at top of travel must not be less than .0075. |                                                                                                                                                                                                                                                                                                                                     |                                                |                      |              |                     |                 |                  |                                    |
| For All Other Barrels – Ring gap is measured at top limit of ring travel.                                                    |                                                                                                                                                                                                                                                                                                                                     |                                                |                      |              |                     |                 |                  |                                    |
|                                                                                                                              | Engine and Piston Application                                                                                                                                                                                                                                                                                                       |                                                | Min. Piston Diameter |              | Cylinder Barrel     |                 |                  |                                    |
|                                                                                                                              | Engine Chart Code Letter                                                                                                                                                                                                                                                                                                            | Piston Number                                  | Top                  | Bottom       | Type of Piston      | Type of Surface | Maximum Diameter | Max. Clearance Piston Skirt & Cyl. |
| 608                                                                                                                          | L                                                                                                                                                                                                                                                                                                                                   | 67266, 71553, 73620                            | 4.8395               | 4.8540       | Forged-Round        | C               | 4.8805           | .0225L                             |
| 608                                                                                                                          |                                                                                                                                                                                                                                                                                                                                     | 73932                                          | 4.8395               | 4.8540       | Forged-Round        | N               | 4.8805           | .0225L                             |
| 609                                                                                                                          |                                                                                                                                                                                                                                                                                                                                     | 75984                                          | 4.8395               | 4.8590       | Forged-Cam          | C               | 4.8805           | .018L                              |
| 610                                                                                                                          |                                                                                                                                                                                                                                                                                                                                     | 75984, 76172*                                  | 4.8395               | 4.8590       | Forged-Cam          | N               | 4.8805           | .018L                              |
|                                                                                                                              | V                                                                                                                                                                                                                                                                                                                                   | 71940, 72249, 72578, 73947*, 73976             | 5.0905               | 5.1040       | Forged-Round        | C               | 5.1305           | .0225L                             |
|                                                                                                                              |                                                                                                                                                                                                                                                                                                                                     | 71940, 72249, 73947, 73976                     | 5.0905               | 5.1040       | Forged-Round        | N               | 5.1305           | .023L                              |
|                                                                                                                              |                                                                                                                                                                                                                                                                                                                                     | 74242, 75617                                   | 5.0790               | 5.1090       | Forged-Cam          | C-N             | 5.1305           | .018L                              |
|                                                                                                                              |                                                                                                                                                                                                                                                                                                                                     | 78203, 78762, LW-10207*, LW-10208              | 5.0790               | 5.1090       | Forged-Cam          | C-N             | 5.1305           | .018L                              |
|                                                                                                                              | NOTES:                                                                                                                                                                                                                                                                                                                              |                                                |                      |              |                     |                 |                  |                                    |
|                                                                                                                              | To find the average diameter of cylinder in an area 4” above bottom of barrel: First, measure diameter at right angles from plane in which valves are located. Second, measure diameter through the plane in which valves are located. Add both diameters; this sum, divided by 2, represents the average diameter of the cylinder. |                                                |                      |              |                     |                 |                  |                                    |
|                                                                                                                              | *=High Compression.                                                                                                                                                                                                                                                                                                                 |                                                |                      |              |                     |                 |                  |                                    |
|                                                                                                                              | Cylinder Barrel: N=nitride hardened, C=chrome plated.                                                                                                                                                                                                                                                                               |                                                |                      |              |                     |                 |                  |                                    |
|                                                                                                                              | Maximum taper and out-of-round permitted for cylinder in service is .0045 inch.                                                                                                                                                                                                                                                     |                                                |                      |              |                     |                 |                  |                                    |
|                                                                                                                              | To find the average out-of-round, measure diameter of cylinder in an area 4” above bottom of barrel: First, measure diameter at right angles from plane in which valves are located. Second, measure diameter through the plane in which valves are located. Difference between diameters must not exceed .0045 inch.               |                                                |                      |              |                     |                 |                  |                                    |
|                                                                                                                              | Piston diameter at top is measured at top ring land (between top and second compression ring grooves) at right angle to piston pin hole; diameter at bottom of piston is measured at the bottom of the piston skirt at right angles to the piston pin.                                                                              |                                                |                      |              |                     |                 |                  |                                    |

# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL ENGINES

### SECTION II – CYLINDERS

| Ref. | Chart | Nomenclature                                                            | Dimensions             |                 | Clearances              |                 |
|------|-------|-------------------------------------------------------------------------|------------------------|-----------------|-------------------------|-----------------|
|      |       |                                                                         | Mfr.<br>Min. &<br>Max. | Service<br>Max. | Mfr.<br>Min. &<br>Max.  | Service<br>Max. |
| 611  | L     | Exhaust Valve Seat and Cylinder Head (Flat Seat)                        |                        |                 | <u>.0065T</u><br>.010T  | (A)             |
|      | ALL   | Exhaust Valve Seat and Cylinder Head (Allison Seat)                     |                        |                 | <u>.0075T</u><br>.011T  | (A)             |
|      | ALL   | O.D. Exhaust Seat (Allison Seat)                                        | <u>1.9355</u><br>1.937 |                 |                         |                 |
|      | L     | O.D. Exhaust Seat (Flat Seat)                                           | <u>2.0965</u><br>2.098 |                 |                         |                 |
|      | ALL   | I.D. Exhaust Seat Hole in Cylinder Head (Allison Seat)                  | <u>1.926</u><br>1.928  |                 |                         |                 |
|      | L     | I.D. Exhaust Seat Hole in Cylinder Head (Flat Seat)                     | <u>2.088</u><br>2.090  |                 |                         |                 |
| 612  | ALL   | Intake Valve Seat and Cylinder Head                                     |                        |                 | <u>.0065T</u><br>.010T  | (A)             |
|      | L     | O.D. Intake Seat (Allison Seat)                                         | <u>2.1675</u><br>2.169 |                 |                         |                 |
|      | L     | O.D. Intake Seat (Flat Seat)                                            | <u>2.3145</u><br>2.316 |                 |                         |                 |
|      | V     | O.D. Intake Seat                                                        | <u>2.2885</u><br>2.290 |                 |                         |                 |
|      | L     | I.D. Intake Seat Hole in Cylinder Head (Allison Seat)                   | <u>2.159</u><br>2.161  |                 |                         |                 |
|      | L     | I.D. Intake Seat Hole in Cylinder Head (Flat Seat)                      | <u>2.306</u><br>2.308  |                 |                         |                 |
|      | V     | I.D. Intake Seat Hole in Cylinder Head                                  | <u>2.280</u><br>2.282  |                 |                         |                 |
| 613  | ALL   | Exhaust Valve Guide and Cylinder Head                                   |                        |                 | <u>.001T</u><br>.0025T  | (A)             |
|      | ALL   | O.D. Exhaust Valve Guide (1/2 in. Exhaust Valve)                        | <u>.6633</u><br>.6638  |                 |                         |                 |
|      | L     | O.D. Exhaust Valve Guide (7/16 in. Exhaust Valve)                       | <u>.5933</u><br>.5938  |                 |                         |                 |
|      | ALL   | I.D. Exhaust Valve Guide Hole in Cylinder Head (1/2 in. Exhaust Valve)  | <u>.6613</u><br>.6623  |                 |                         |                 |
|      | L     | I.D. Exhaust Valve Guide Hole in Cylinder Head (7/16 in. Exhaust Valve) | <u>.5913</u><br>.5923  |                 |                         |                 |
| 614  | ALL   | Intake Valve Guide and Cylinder Head                                    |                        |                 | <u>.001T</u><br>.0025T  | (A)             |
|      | ALL   | O.D. Intake Valve Guide                                                 | <u>.5933</u><br>.5938  |                 |                         |                 |
|      | ALL   | I.D. Intake Valve Guide Hole in Cylinder Head                           | <u>.5913</u><br>.5923  |                 |                         |                 |
| 615  | ALL   | Exhaust Valve Stem and Valve Guide                                      |                        |                 | <u>.0035L</u><br>.0053L | (A)             |

# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL ENGINES

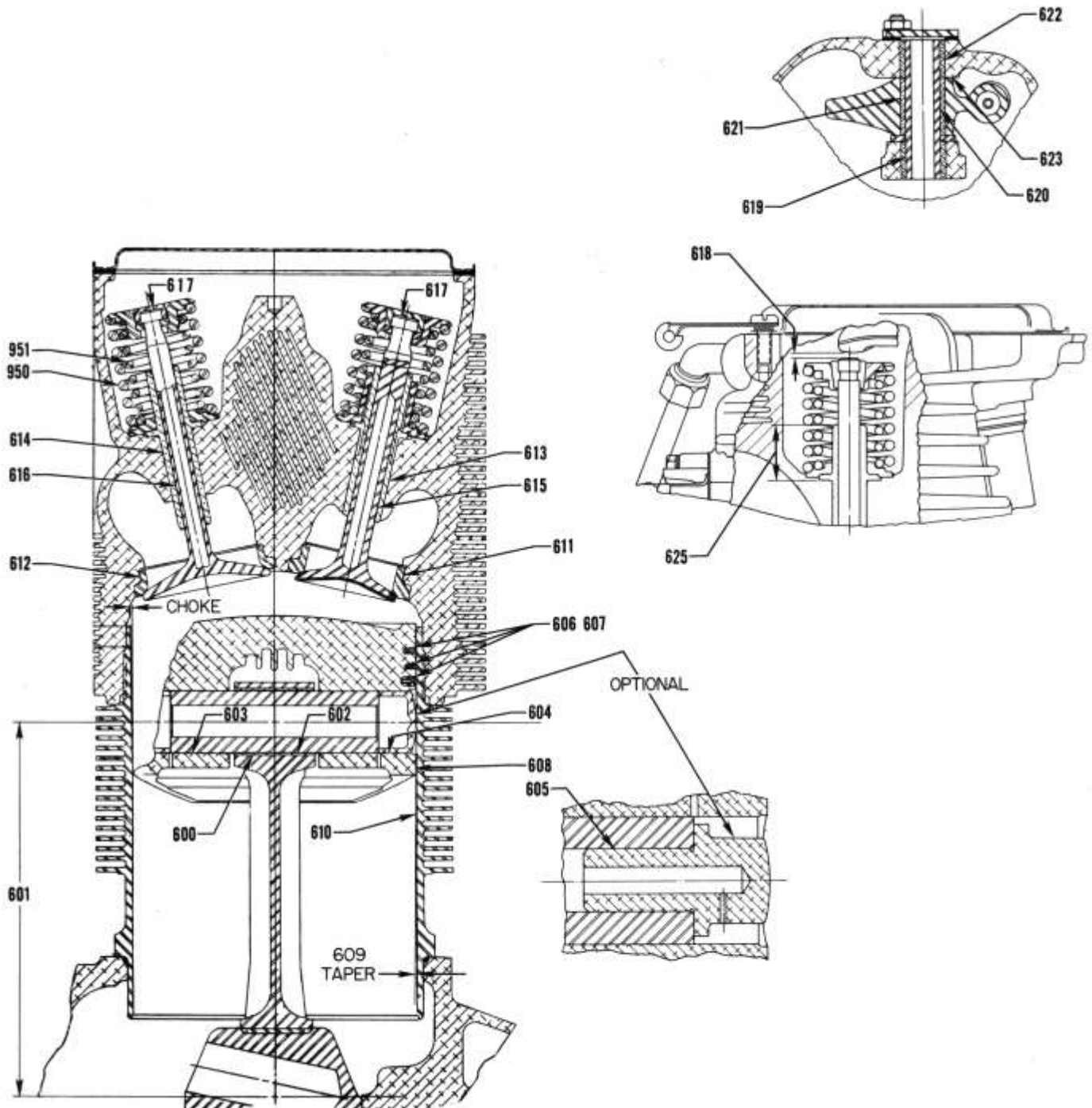
### SECTION II – CYLINDERS

| Ref.                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Chart | Nomenclature                                                                                                          | Dimensions                                                                         |                 | Clearances              |                 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-----------------|-------------------------|-----------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |                                                                                                                       | Mfr.<br>Min. &<br>Max.                                                             | Service<br>Max. | Mfr.<br>Min. &<br>Max.  | Service<br>Max. |
| 615                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ALL   | O.D. Exhaust Valve Stem                                                                                               | <u>.4957</u><br>.4965                                                              | .4937           |                         |                 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |                                                                                                                       | Service allowable limits of .4937 is applicable only to inconel or nimonic valves. |                 |                         |                 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | L     | O.D. Exhaust Valve Stem (7/16 in. Exhaust Valve)                                                                      | <u>.4332</u><br>.4340                                                              |                 |                         |                 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ALL   | Finished I.D. Exhaust Valve Guide (1/2 in. Exhaust Valve)                                                             | <u>.5000</u><br>.5010                                                              |                 |                         |                 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | L     | Finished I.D. Exhaust Valve Guide (7/16 in. Exhaust Valve)                                                            | <u>.4360</u><br>.4370                                                              |                 |                         |                 |
| ½ inch diameter exhaust valves may have exhaust valve guides that are .003 in. over the maximum inside diameter limit, anytime up to 300 hours of service. After 300 hours of service, inside diameter of exhaust valve guide may increase .001 in. during each 100 hours of operation up to the recommended overhaul time for the engine, or not to exceed .015 inch over the basic I.D. See latest revision of Service Instruction No. 1009 for recommended overhaul time. |       |                                                                                                                       |                                                                                    |                 |                         |                 |
| 616                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ALL   | Intake Valve Stem and Valve Guide                                                                                     |                                                                                    |                 | <u>.0010L</u><br>.0028L | .006L           |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ALL   | O.D. Intake Valve Stem                                                                                                | <u>.4022</u><br>.4030                                                              | .4010           |                         |                 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ALL   | Finished I.D. Intake Valve Guide                                                                                      | <u>.4040</u><br>.4050                                                              |                 |                         |                 |
| 617                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ALL   | Valve and Valve Cap Clearance                                                                                         |                                                                                    |                 | <u>.000</u><br>.004L    | .005L           |
| 618                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ALL   | Dry Tappet Clearance                                                                                                  |                                                                                    |                 | <u>.028</u><br>.080     |                 |
| 619                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ALL   | Valve Rocker Shaft and Valve Rocker Bushing                                                                           |                                                                                    |                 | <u>.0001L</u><br>.0013L | .0025L          |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ALL   | Finished I.D. of Valve Rocker Shaft Bushing in Cylinder Head                                                          | <u>.6246</u><br>.6261                                                              | .6270           |                         |                 |
| 620                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ALL   | Valve Rocker Shaft and Valve Rocker Bushings                                                                          |                                                                                    |                 | <u>.0007L</u><br>.0017L | .004L           |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ALL   | O.D. Valve Rocker Shaft                                                                                               | <u>.6241</u><br>.6245                                                              | .6231           |                         |                 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ALL   | Finished I.D. of Rocker Arm Bushing                                                                                   | <u>.6252</u><br>.6263                                                              | .6270           |                         |                 |
| 621                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ALL   | Valve Rocker Bushing and Valve Rocker                                                                                 | Bushing Must Be Burnished In Place                                                 |                 |                         |                 |
| 622                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ALL   | Valve Rocker Shaft Bushing and Cylinder Head                                                                          |                                                                                    |                 | <u>.0022T</u><br>.0038T | (A)             |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ALL   | Valve Rocker Shaft Bushing Hole in Cylinder Head                                                                      | <u>.7380</u><br>.7388                                                              |                 |                         |                 |
| 623                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ALL   | Valve Rocker and Cylinder Head – Side Clearance                                                                       |                                                                                    |                 | <u>.002L</u><br>.020L   | .024L           |
| 625                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ALL   | Intake and Exhaust Valve Guide Height                                                                                 | <u>.914</u><br>.954                                                                |                 |                         |                 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       | MEASURE THE VALVE GUIDE HEIGHT FROM THE VALVE SPRING SEAT COUNTERBORE IN THE CYLINDER HEAD TO THE TOP OF VALVE GUIDE. |                                                                                    |                 |                         |                 |

# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL ENGINES

### SECTION II – CYLINDERS



Cylinder, Piston, Connecting Rod and Valve Components

# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL ENGINES

### SECTION III – GEAR TRAIN

| Ref.     | Chart | Nomenclature                                                   | Dimensions             |                 | Clearances              |                 |
|----------|-------|----------------------------------------------------------------|------------------------|-----------------|-------------------------|-----------------|
|          |       |                                                                | Mfr.<br>Min. &<br>Max. | Service<br>Max. | Mfr.<br>Min. &<br>Max.  | Service<br>Max. |
| OIL PUMP |       |                                                                |                        |                 |                         |                 |
| 702      | L-V   | Oil Pump and Scavenge Pump Gear – End Clearance                |                        |                 | <u>.007L</u><br>.030L   | .045L           |
|          | L1    | Oil Pump Drive Gear – End Clearance                            |                        |                 | <u>.010L</u><br>.035L   | .060L           |
| 703      | L-V   | Oil Pump and Scavenge Pump Impellers – Dia. Clearance          |                        |                 | <u>.007L</u><br>.011L   | .014L           |
|          | L1    | Oil Pump Impellers – Dia. Clearance                            |                        |                 | <u>.007L</u><br>.011L   | .014L           |
| 704      | L-V   | Oil Pump and Scavenge Pump Impellers – Side Clearance          |                        |                 | <u>.003L</u><br>.0055L  | .006L           |
|          | L1    | Oil Pump Impellers – Side Clearance                            |                        |                 | <u>.003L</u><br>.0055L  | .006L           |
|          | ALL   | Width of Oil Pump Impellers                                    | <u>.995</u><br>.997    | .994            |                         |                 |
|          | ALL   | Width of Oil Scavenge Pump Impellers                           | <u>1.496</u><br>1.498  | 1.495           |                         |                 |
| 705      | L-V   | Oil Pump and Oil Scavenge Pump Driven Impeller and Idler Shaft |                        |                 | <u>.001L</u><br>.0025L  | .004L           |
|          | L1    | Oil Pump Driven Impeller and Idler Shaft                       |                        |                 | <u>.0010L</u><br>.0025L | .004L           |
| 706      | ALL   | Oil Pump Idler Shaft and Oil Pump Body                         |                        |                 | <u>.0000</u><br>.0015T  | (A)             |
|          | L1    | Oil Pump Idler Shaft and Oil Pump Cover                        |                        |                 | <u>.0000</u><br>.0015T  | (A)             |
| 713      | L-V   | Oil Pump Idler Shaft and Scavenge Pump Body                    |                        |                 | <u>.0000</u><br>.0015T  | (A)             |
| 777      | L-V   | Oil Pump Drive Shaft Bushing and Scavenge Pump Body            |                        |                 | <u>.001T</u><br>.003T   | (A)             |
|          | L1    | Oil Pump Drive Shaft Bushing and Oil Pump Body                 |                        |                 | <u>.001T</u><br>.003T   | (A)             |
| 778      | ALL   | Oil Pump Drive Shaft Bushing and Oil Pump Body                 |                        |                 | <u>.001T</u><br>.003T   | (A)             |
|          | L1    | Oil Pump Drive Shaft Bushing and Oil Pump Cover                |                        |                 | <u>.001T</u><br>.003T   | (A)             |
| 779      | L-V   | Oil Pump Drive Bushing and Oil Scavenge Pump Gear              |                        |                 | <u>.0015L</u><br>.0035L | .005L           |
|          | L1    | Oil Pump Drive Gear and Oil Pump Cover                         |                        |                 | <u>.0015L</u><br>.0035L | .005L           |
| 780      | ALL   | Oil Pump Drive Shaft Bushing and Oil Pump Shaft                |                        |                 | <u>.0015L</u><br>.0035L | .005L           |
| 7051     | ALL   | Oil Relief Valve Plunger and Sleeve                            |                        |                 | <u>.001L</u><br>.003L   | .005L           |
| 7076     | L1    | Oil Pump Drive Gear Bushing and Accessory Housing              |                        |                 | <u>.002T</u><br>.004T   | (A)             |
| 7077     | L1    | Oil Pump Drive Gear and Accessory Housing Bushing              |                        |                 | <u>.0015L</u><br>.0035L | .005L           |

# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL ENGINES

### SECTION III – GEAR TRAIN

| Ref.        | Chart | Nomenclature                                                                   | Dimensions                         |                 | Clearances              |                 |
|-------------|-------|--------------------------------------------------------------------------------|------------------------------------|-----------------|-------------------------|-----------------|
|             |       |                                                                                | Mfr.<br>Min. &<br>Max.             | Service<br>Max. | Mfr.<br>Min. &<br>Max.  | Service<br>Max. |
| FUEL PUMP   |       |                                                                                |                                    |                 |                         |                 |
| 782         | L-V   | Fuel Pump Drive Shaftgear Bushing and Accessory Housing                        |                                    |                 | <u>.001T</u><br>.004T   | (A)             |
| 783         | L-V   | Fuel Pump Drive Shaftgear – End Clearance                                      |                                    |                 | <u>.006</u><br>.064     | .074            |
| 784         | L-V   | Fuel Pump Drive Shaftgear and Bushing                                          |                                    |                 | <u>.001L</u><br>.004L   | .006L           |
| VACUUM PUMP |       |                                                                                |                                    |                 |                         |                 |
| 793         | L-V   | Vacuum Pump Shaftgear Bushing and Accessory Housing Cover                      |                                    |                 | <u>.0015T</u><br>.0035T | (A)             |
| 794         | L-V   | Vacuum Pump Shaftgear Bushing (At Cover) and Vacuum Pump Shaftgear             |                                    |                 | <u>.002L</u><br>.004L   | .006L           |
| 795         | L-V   | Vacuum Pump Shaftgear Bushing and Accessory Housing                            |                                    |                 | <u>.0015T</u><br>.0035T | (A)             |
|             | L1    | Vacuum Pump Shaftgear Bushing and Accessory Housing                            |                                    |                 | <u>.0025T</u><br>.0045T | (A)             |
| 796         | ALL   | Vacuum Pump Shaftgear Bushing (At Accessory Housing) and Vacuum Pump Shaftgear |                                    |                 | <u>.002L</u><br>.0045L  | .006L           |
| 797         | L-V   | Vacuum Pump Shaftgear – End Clearance                                          |                                    |                 | <u>.008</u><br>.030     | .050            |
| 799         | L1    | Vacuum Pump Drive Gear Bushing and Accessory Housing                           |                                    |                 | <u>.002T</u><br>.004T   | (A)             |
| 7000        | L1    | Vacuum Pump Drive Gear Bushing and Vacuum Pump Drive Gear                      |                                    |                 | <u>.0025L</u><br>.0045L | .006L           |
| 7078        | L1    | Vacuum Pump Drive Gear and Cover                                               |                                    |                 | <u>.0013L</u><br>.0033L | .005L           |
| 7079        | L1    | Vacuum Pump Drive Gear – End Clearance                                         |                                    |                 | <u>.010</u><br>.032     | .037            |
| TACHOMETER  |       |                                                                                |                                    |                 |                         |                 |
| 7002        | L1    | Tachometer Driven Gear and Adapter                                             |                                    |                 | <u>.001L</u><br>.003L   | .0045L          |
| 7006        | L-V   | Electric Tachometer Driven Gear – End Clearance                                |                                    |                 | <u>.007</u><br>.025     | .047            |
| 7012        | L-V   | Electric Tachometer Driven Gear and Accessory Housing Cover                    |                                    |                 | <u>.001L</u><br>.003L   | .004L           |
| 7088        | L1    | Tachometer Adapter and Accessory Housing                                       |                                    |                 | <u>.0005L</u><br>.0025L | .0035L          |
| MAGNETO     |       |                                                                                |                                    |                 |                         |                 |
| 7025        | L-V   | Magneto Drive Idler Gear Hub Bushing and Magneto Drive Idler Gear Hub          | Bushing Must Be Burnished In Place |                 |                         |                 |
| 7026        | L-V   | Magneto Drive Idler Gear Hub Bushing and Magneto Drive Idler Shaft             |                                    |                 | <u>.001L</u><br>.003L   | .004L           |



# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL ENGINES

### SECTION III – GEAR TRAIN

| Ref. | Chart | Nomenclature | Dimensions             |                 | Clearances             |                 |
|------|-------|--------------|------------------------|-----------------|------------------------|-----------------|
|      |       |              | Mfr.<br>Min. &<br>Max. | Service<br>Max. | Mfr.<br>Min. &<br>Max. | Service<br>Max. |

#### MAGNETO (CONT.)

|      |     |                                                                |  |  |                         |       |
|------|-----|----------------------------------------------------------------|--|--|-------------------------|-------|
| 7027 | L-V | Magneto Drive Idler Gear Hub – End Clearance                   |  |  | <u>.005</u><br>.014     | .024  |
| 7028 | L-V | Magneto Drive Shaft and Accessory Housing Cover                |  |  | <u>.002L</u><br>.0045L  | .006L |
| 7029 | L-V | Magneto Drive Shaft and Accessory Housing                      |  |  | <u>.0025L</u><br>.0045L | .006L |
| 7030 | ALL | Magneto Drive Shaft Sleeve and Magneto Drive Shaft             |  |  | <u>.001T</u><br>.004T   | (A)   |
| 7031 | ALL | Magneto Drive Shaft Sleeve and Magneto Drive Coupling          |  |  | <u>.001T</u><br>.004T   | (A)   |
| 7032 | L-V | Magneto Drive Shaftgear – End Clearance                        |  |  | <u>.002</u><br>.020     | .030  |
| 7039 | L1  | Magneto Drive Idler Gear – End Clearance                       |  |  | <u>.002</u><br>.030     | .040  |
| 7080 | L1  | Magneto Drive Idler Gear Bushing and Magneto Drive Idler Shaft |  |  | <u>.001L</u><br>.003L   | .004L |
| 7081 | L1  | Magneto Drive Idler Gear and Magneto Drive Idler Gear Bushing  |  |  | <u>.0005T</u><br>.0025T | (A)   |
| 7082 | L1  | Magneto Drive Gear Bushing and Accessory Housing               |  |  | <u>.002T</u><br>.004T   | (A)   |
| 7083 | L1  | Magneto Drive Coupling and Accessory Housing Bushing           |  |  | <u>.001L</u><br>.003L   | .004L |
| 7084 | L1  | Magneto Drive Gear and Accessory Housing Bushing               |  |  | <u>.001L</u><br>.003L   | .004L |

#### GENERATOR

|      |     |                                                                              |  |  |                         |       |
|------|-----|------------------------------------------------------------------------------|--|--|-------------------------|-------|
| 7043 | L-V | Generator Drive Gear Bushing and Accessory Housing Cover                     |  |  | <u>.0015T</u><br>.0035T | (A)   |
| 7044 | L-V | Generator Drive Gear Bushing (At Cover) and Generator Drive Gear             |  |  | <u>.002L</u><br>.004L   | .006L |
| 7045 | L-V | Generator Drive Gear Bushing and Accessory Housing                           |  |  | <u>.002T</u><br>.004T   | (A)   |
| 7046 | L-V | Generator Drive Gear Bushing (At Accessory Housing) and Generator Drive Gear |  |  | <u>.0025L</u><br>.0045L | .006L |
| 7047 | L-V | Generator Drive Gear – End Clearance                                         |  |  | <u>.010</u><br>.038     | .050  |

#### STARTER

|      |     |                                                        |  |  |                        |       |
|------|-----|--------------------------------------------------------|--|--|------------------------|-------|
| 7048 | L-V | Starter Drive Gear Bushing and Adapter                 |  |  | <u>.002T</u><br>.004T  | (A)   |
|      | L1  | Starter Drive Spacer Bushing and Adapter               |  |  | <u>.002T</u><br>.004T  | (A)   |
| 7049 | L-V | Starter Drive Gear Bushings and Starter Drive Gear     |  |  | <u>.002L</u><br>.004L  | .006L |
|      | L1  | Starter Drive Spacer and Starter Drive Adapter Bushing |  |  | <u>.0015L</u><br>.003L | .004L |

# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL ENGINES

### SECTION III – GEAR TRAIN

| Ref. | Chart | Nomenclature | Dimensions             |                 | Clearances             |                 |
|------|-------|--------------|------------------------|-----------------|------------------------|-----------------|
|      |       |              | Mfr.<br>Min. &<br>Max. | Service<br>Max. | Mfr.<br>Min. &<br>Max. | Service<br>Max. |

#### STARTER (CONT.)

|      |     |                                                                  |  |  |                         |       |
|------|-----|------------------------------------------------------------------|--|--|-------------------------|-------|
| 7050 | L-V | Starter Drive Adapter and Accessory Housing Cover                |  |  | <u>.0005L</u><br>.0025L | (A)   |
| 7089 | L1  | Starter Drive Gear – End Clearance                               |  |  | <u>.007</u><br>.011     | .015  |
| 7090 | L1  | Bendix Drive Shaft (Slip Coupling) and Accessory Housing Bushing |  |  | <u>.0015L</u><br>.0045L | .005L |

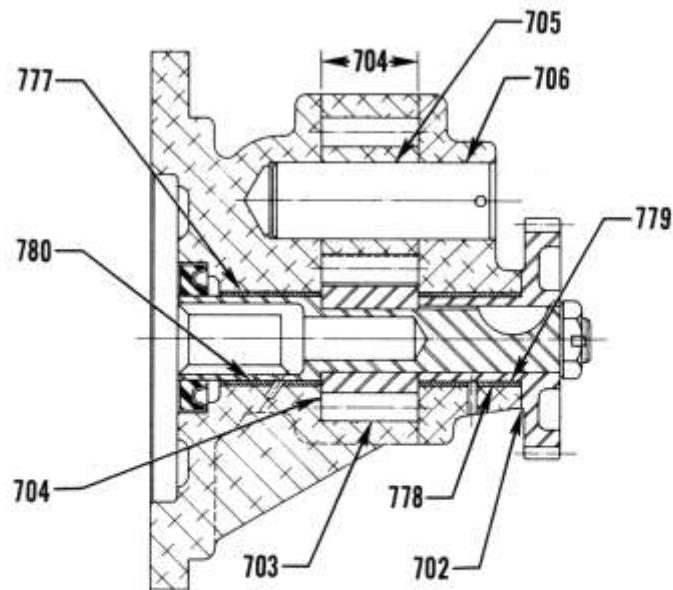
#### ACCESSORY DRIVE

|      |     |                                                                |  |  |                         |        |
|------|-----|----------------------------------------------------------------|--|--|-------------------------|--------|
| 7053 | L-V | Accessory Idler Gear Bearing and Accessory Drive Gear          |  |  | <u>.0001L</u><br>.0007T | (A)    |
| 7054 | V   | Accessory Drive Gear and Bushing                               |  |  | <u>.001T</u><br>.003T   | (A)    |
| 7055 | L-V | Accessory Idler Gear Bearing and Accessory Drive Shaft Adapter |  |  | <u>.0005T</u><br>.0005L | (A)    |
| 7056 | V   | Accessory Drive Gear Bushing and Accessory Drive Shaft         |  |  | <u>.0005L</u><br>.0017L | .004L  |
| 7057 | V   | Accessory Drive Gear – End Clearance                           |  |  | <u>.004</u><br>.012     | .017   |
| 7086 | L1  | Accessory Drive Shaftgear Bushing and Accessory Housing        |  |  | <u>.002T</u><br>.004T   | (A)    |
| 7087 | L1  | Accessory Drive Shaftgear and Accessory Housing Bushing        |  |  | <u>.002L</u><br>.004L   | .006L  |
| 7091 | L1  | Dual Accessory Idler Gear and Idler Shaft                      |  |  | <u>.001L</u><br>.003L   | .0045L |
| 7092 | L1  | Dual Accessory Idler Gear – End Clearance                      |  |  | <u>.009</u><br>.018     | .023L  |
| 7093 | L1  | Dual Accessory Drive Gear – End Clearance                      |  |  | <u>.005</u><br>.062     | .077   |
| 7094 | L1  | Dual Accessory Drive Gear and Adapter                          |  |  | <u>.0013L</u><br>.0028L | .0034L |

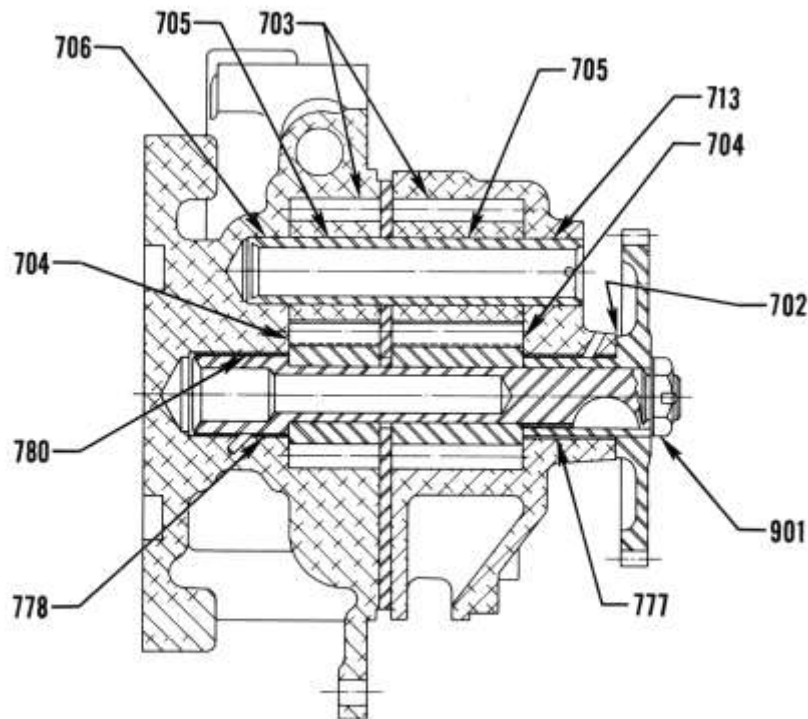
# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL ENGINES

### SECTION III – GEAR TRAIN



VO-435-B & TVO-435-F  
OIL PUMP & HYD. PUMP DR.



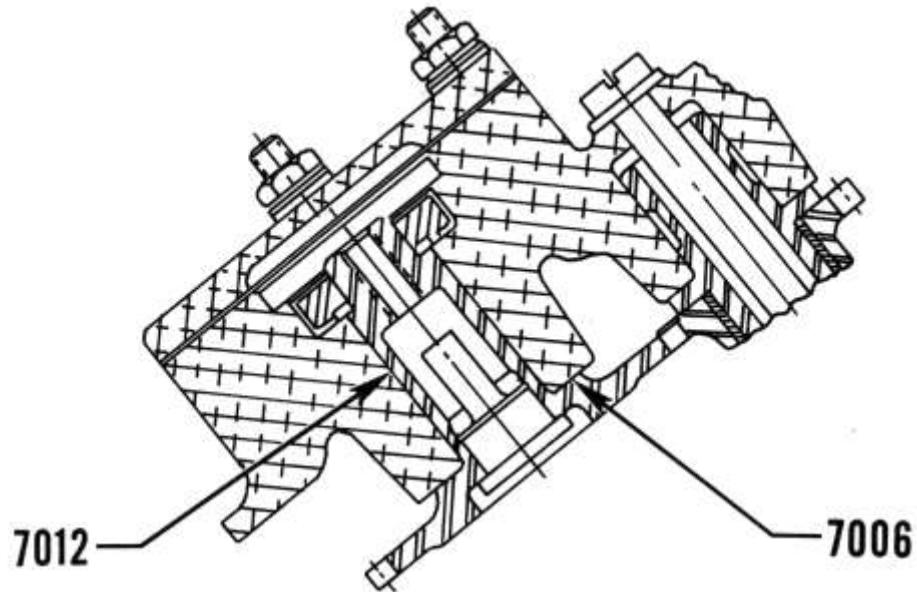
CROSSWISE ACC. HSG.

### Oil Pumps

# SERVICE TABLE OF LIMITS

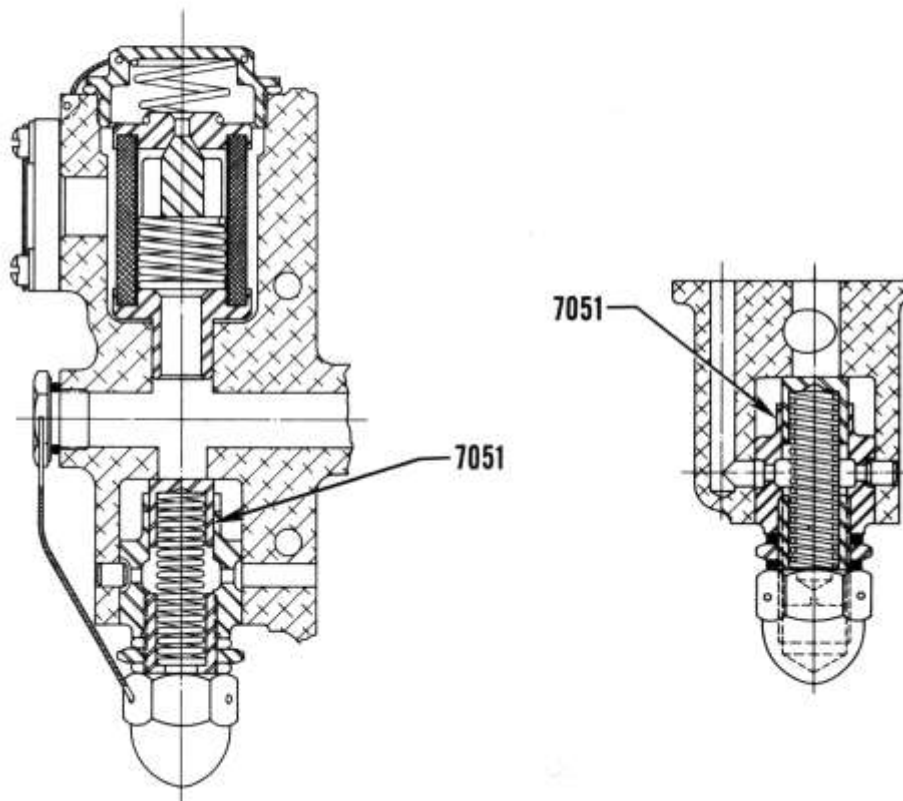
## PART IV – VERTICAL ENGINES

### SECTION III – GEAR TRAIN



VO, TVO-435-A & VO, TVO-540

Tachometer Drive

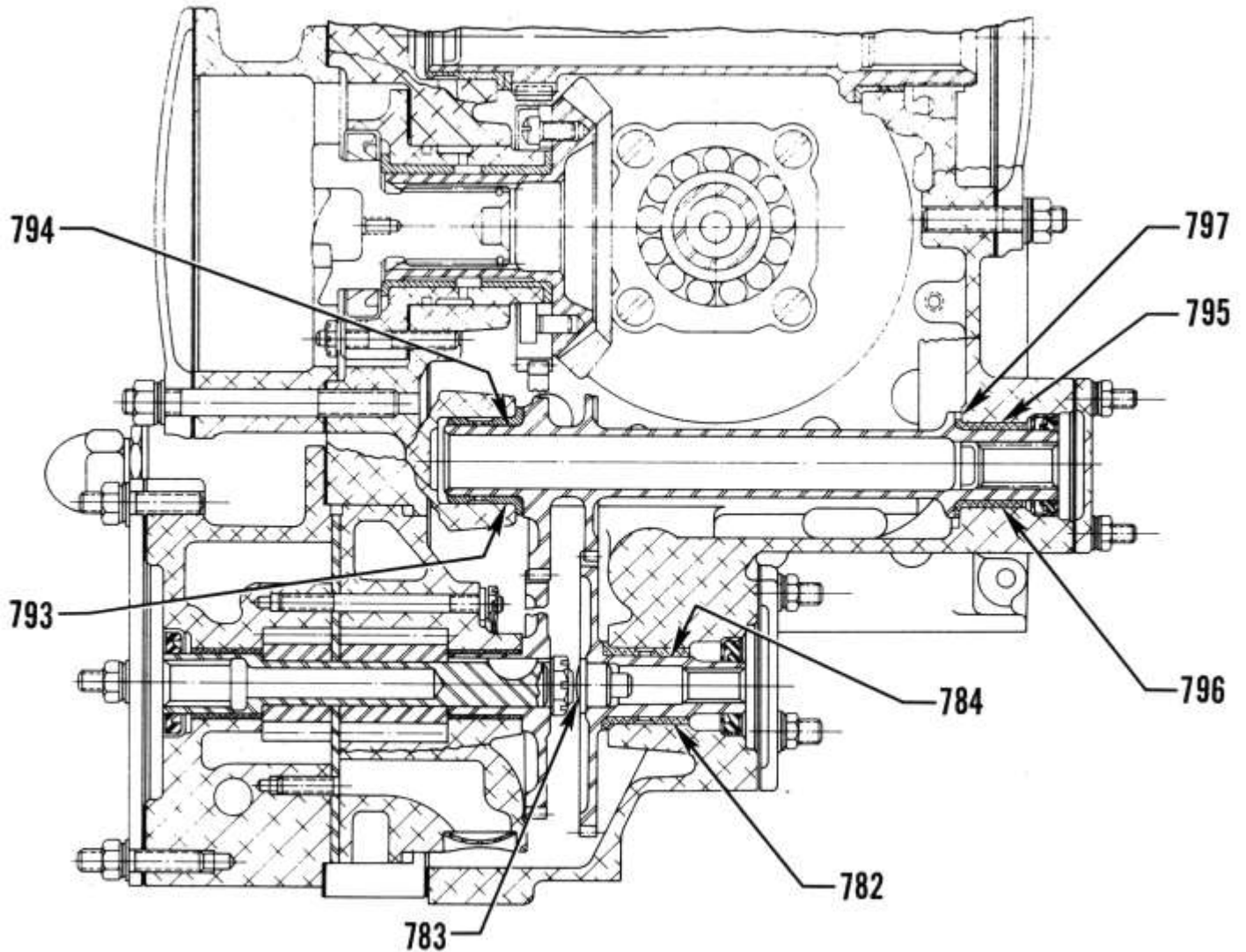


Oil Relief Valves

# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL ENGINES

### SECTION III – GEAR TRAIN



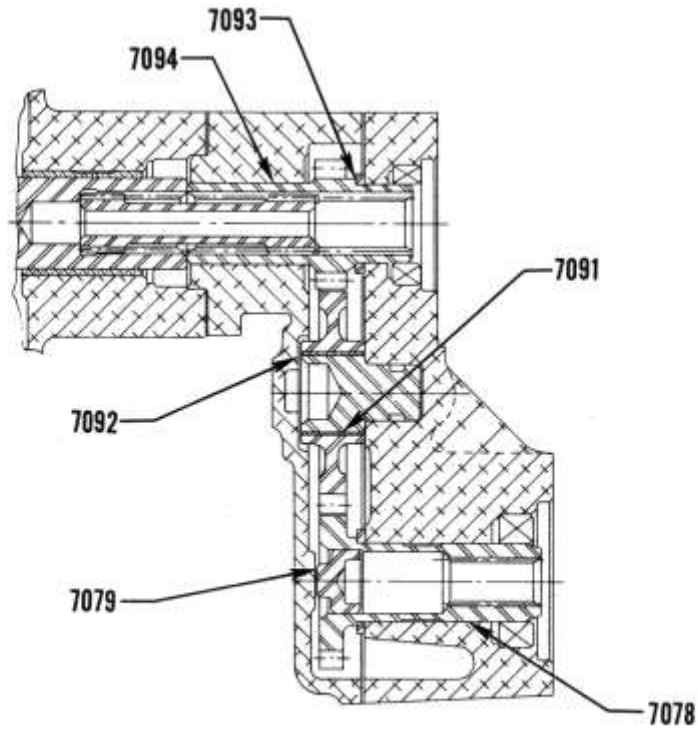
CROSSWISE ACCESSORY HSG.

### Vacuum and Fuel Pump Drives

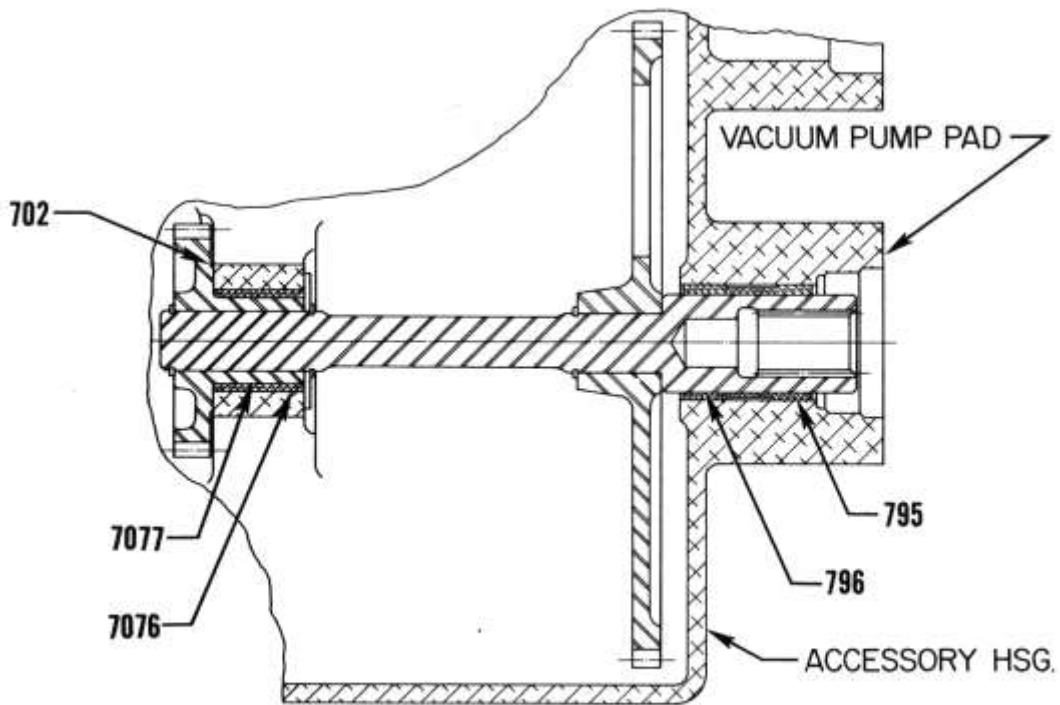
# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL ENGINES

### SECTION III – GEAR TRAIN



TVO-435-F  
Vacuum Pump and Fuel Pump Dual Drive

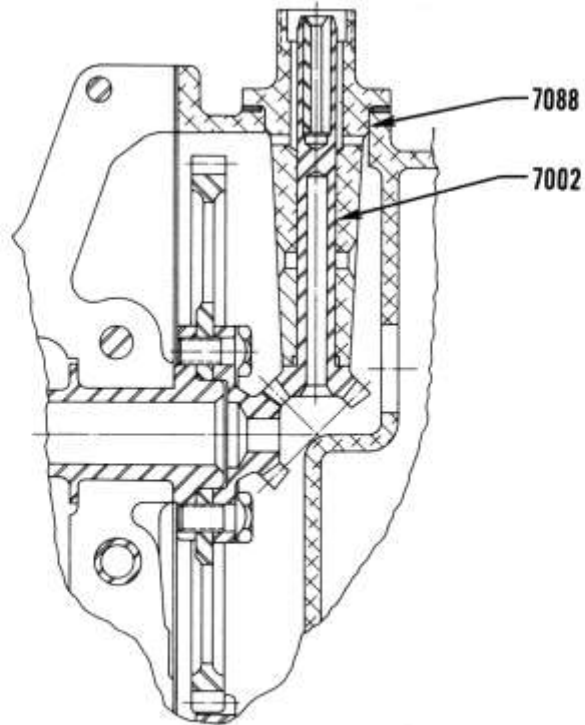


VO-435-BIA & TVO-435-F  
Vacuum Pump Drive

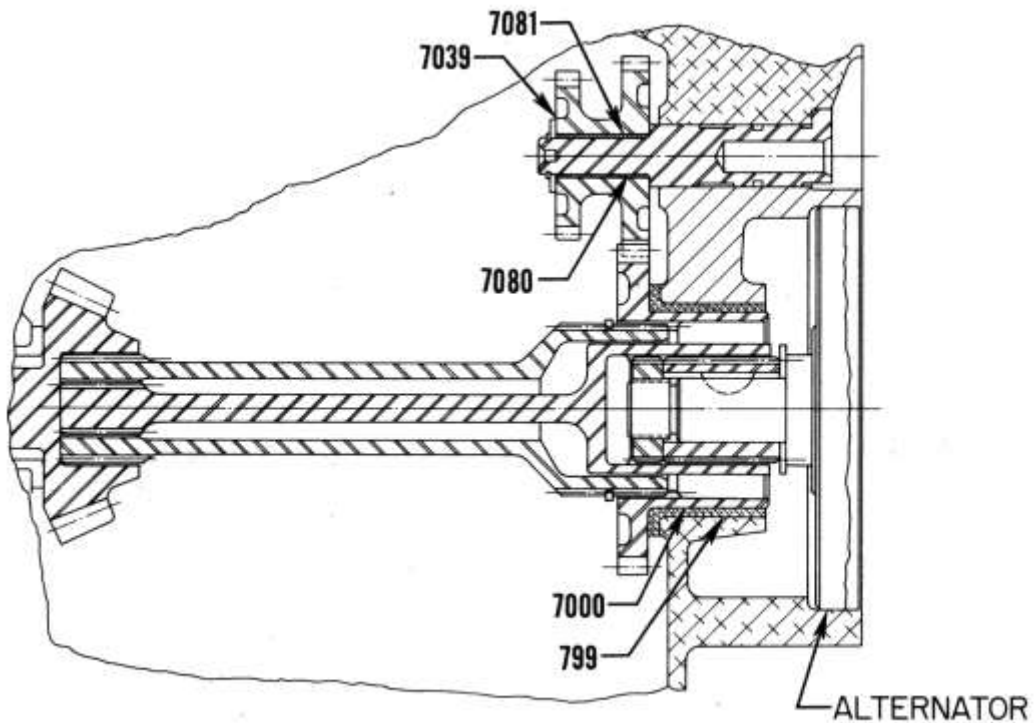
# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL ENGINES

### SECTION III – GEAR TRAIN



VO-435-B & TVO-435-F  
Tachometer Drive

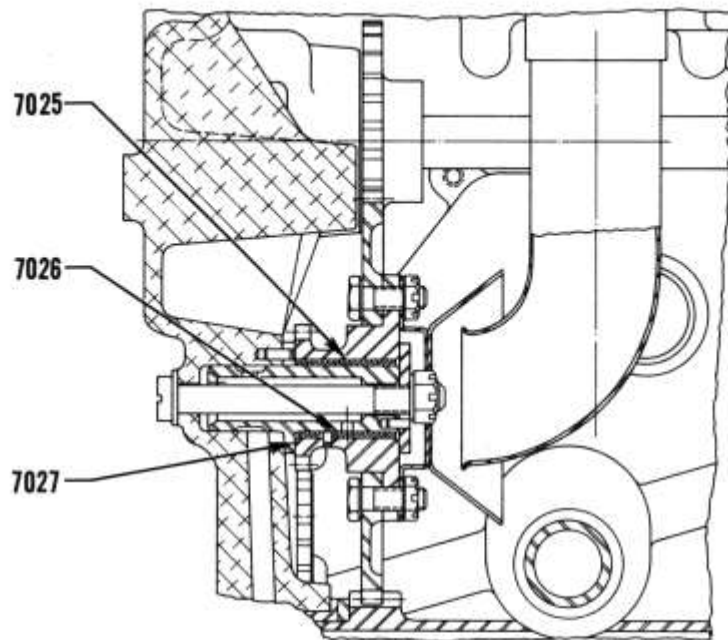


VO-435-B & TVO-435-F  
Vacuum, Magneto and Alternator Drive

# SERVICE TABLE OF LIMITS

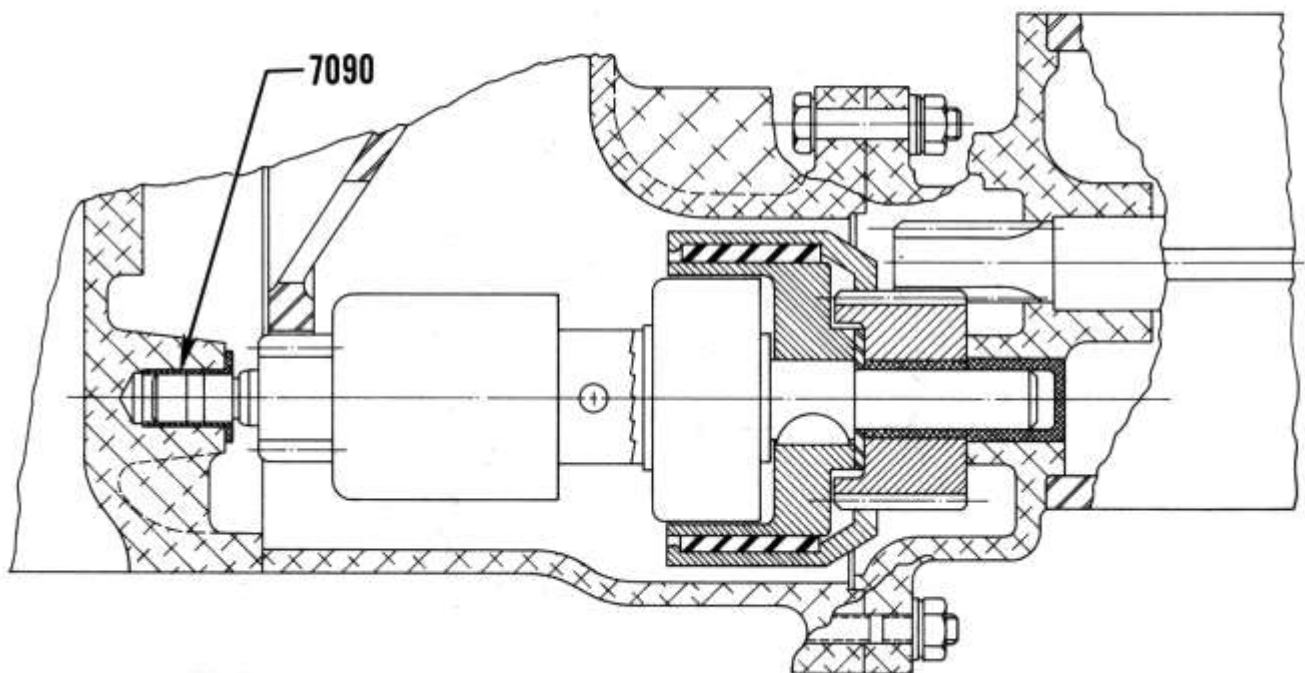
## PART IV – VERTICAL ENGINES

### SECTION III – GEAR TRAIN



VO, TVO-435-A & VO, TVO-540

**Magneto and Tachometer Idler Gear**



VO-435-B & TVO-435-F

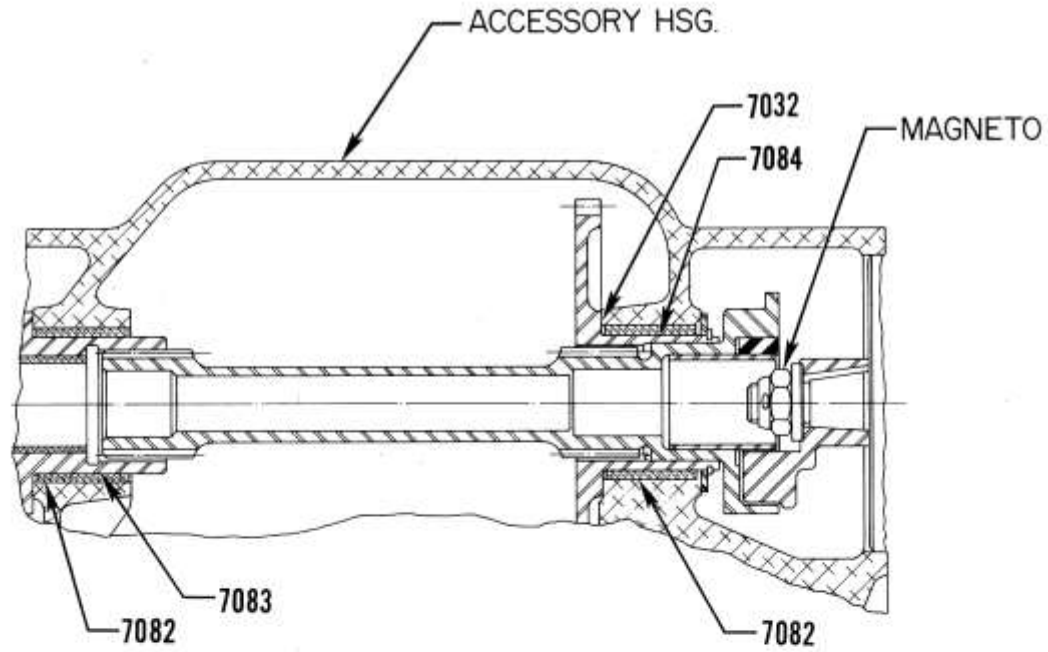
**Bendix Drive**



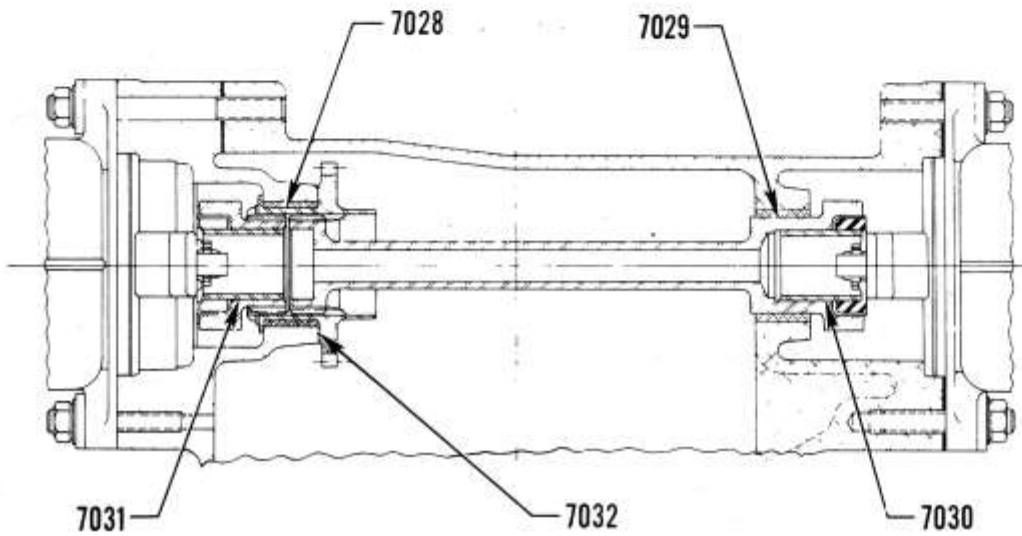
# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL ENGINES

### SECTION III – GEAR TRAIN



VO-435-BIA



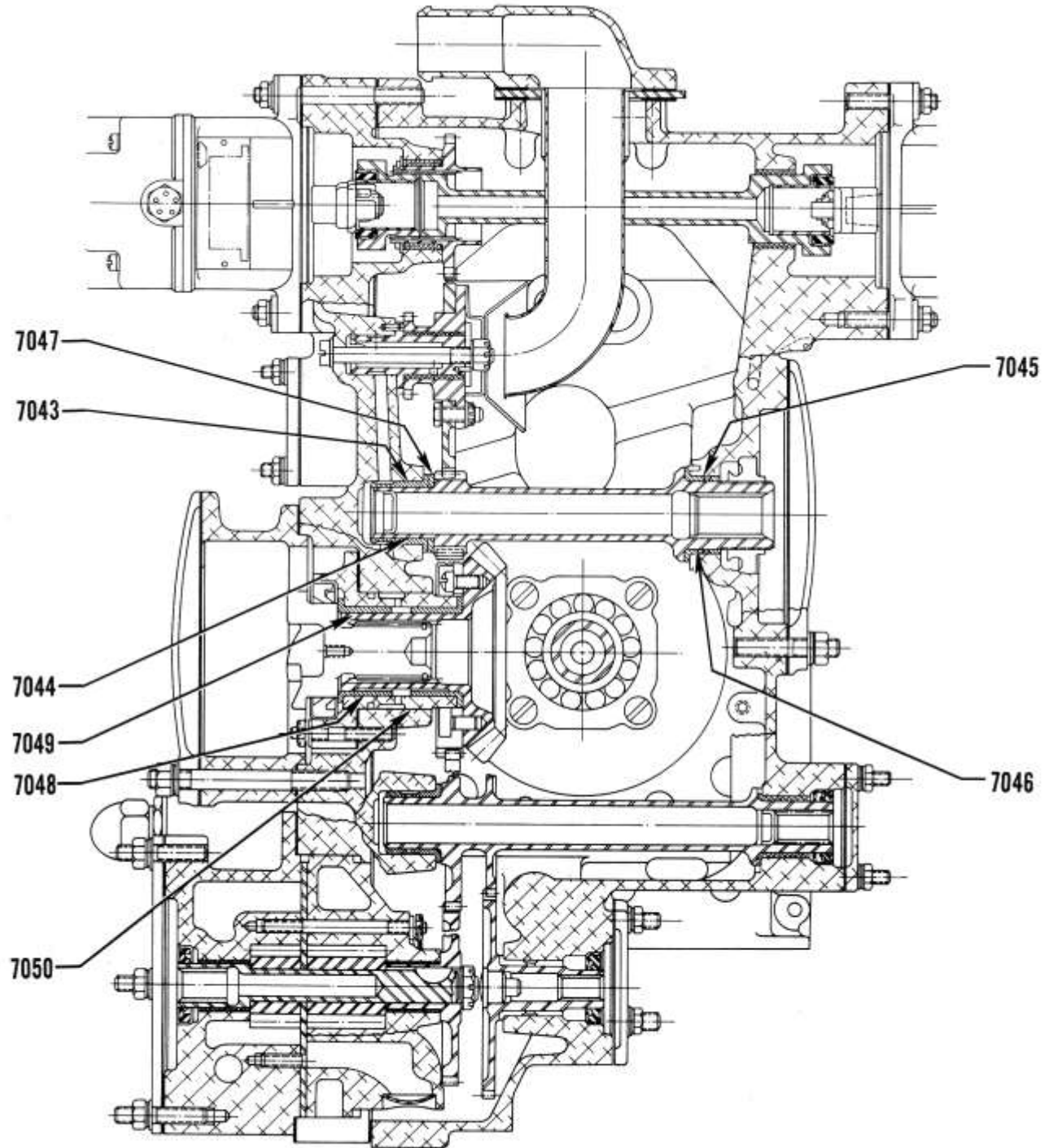
VO, TVO-435-A & VO, TVO-540

### Magneto Drives

# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL ENGINES

### SECTION III – GEAR TRAIN



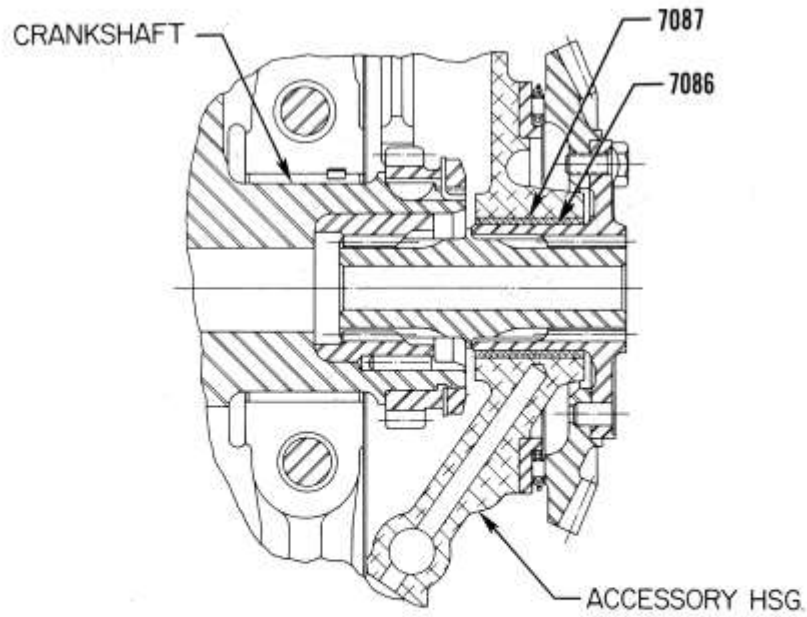
VO, TVO-435-A & VO, TVO-540

Generator and Starter Drives

# SERVICE TABLE OF LIMITS

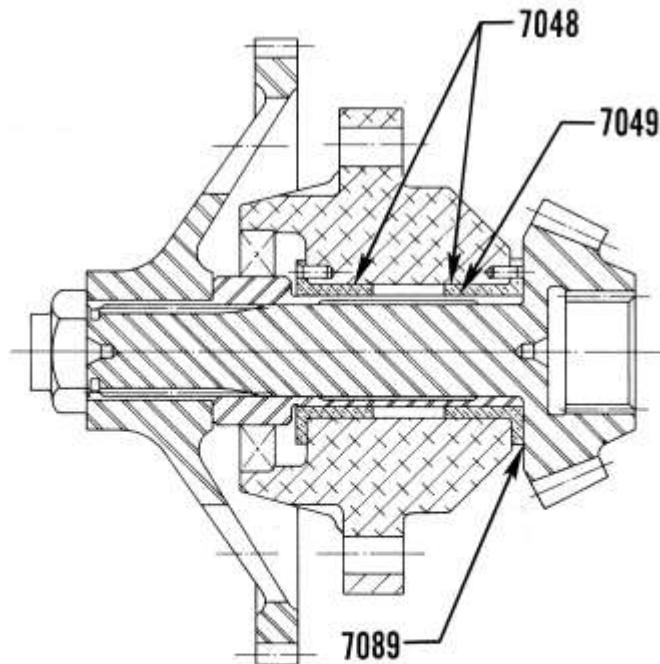
## PART IV – VERTICAL ENGINES

### SECTION III – GEAR TRAIN



VO-435-BIA

Accessory Drive Gear



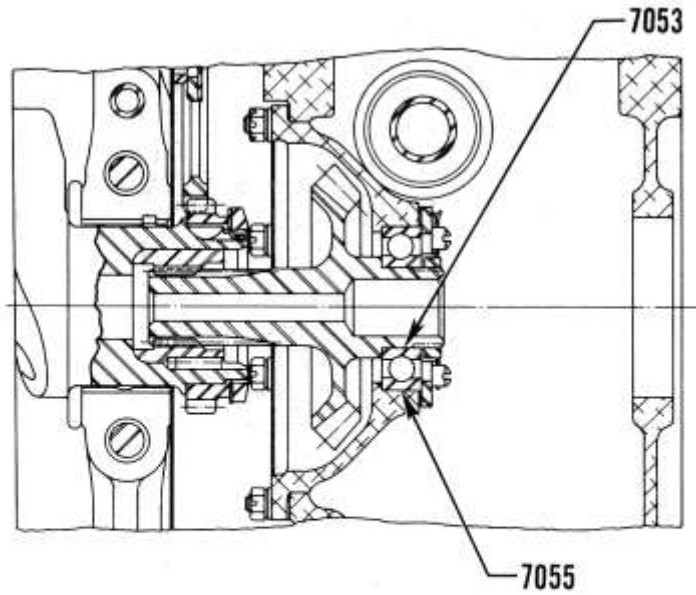
VO-435-BIA

Starter Drive

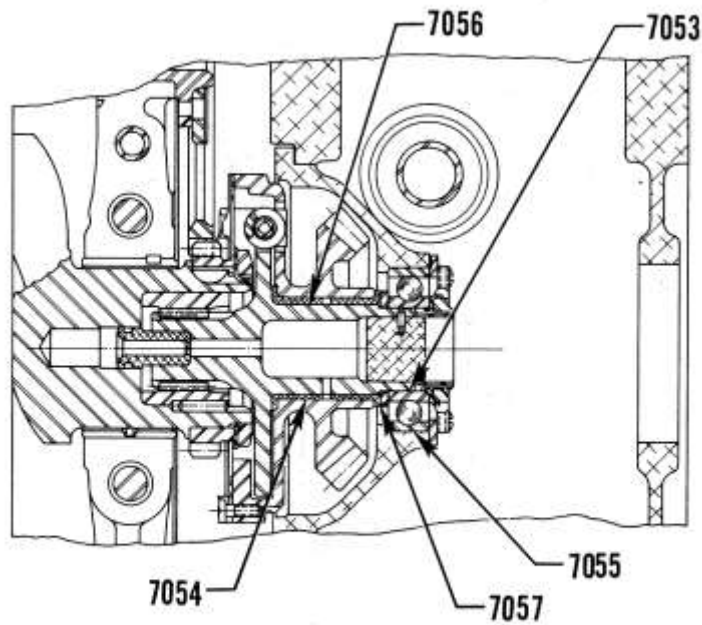
# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL ENGINES

### SECTION III – GEAR TRAIN



VO, TVO-435-A & VO, TVO-540



VO-540

Accessory Drives

# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL ENGINES

### SECTION IV – BACKLASH

| Ref. | Chart | Nomenclature                                                                   | Dimensions             |                 | Clearances             |                 |
|------|-------|--------------------------------------------------------------------------------|------------------------|-----------------|------------------------|-----------------|
|      |       |                                                                                | Mfr.<br>Min. &<br>Max. | Service<br>Max. | Mfr.<br>Min. &<br>Max. | Service<br>Max. |
| 808  | L1    | Oil Pump Impellers                                                             |                        |                 | <u>.005</u><br>.015    | .020            |
|      | L-V   | Oil Pump and Scavenge Pump Impellers                                           |                        |                 | <u>.008</u><br>.015    | .020            |
| 825  | ALL   | Crankshaft Timing Gear and Camshaft Gear                                       |                        |                 | <u>.004</u><br>.015    | .020            |
| 866  | L-V   | Electric Tachometer Drive Gear (Magnetto Idler Hub) and Tachometer Driven Gear |                        |                 | <u>.004</u><br>.015    | .020            |
| 867  | L-V   | Generator Drive Gear and Magnetto Drive Idler Gear                             |                        |                 | <u>.004</u><br>.015    | .020            |
| 868  | L-V   | Magnetto Drive Shaft (Spline) and Magnetto Drive Shaftgear (Spline)            |                        |                 | <u>.001</u><br>.005    | .008            |
| 869  | L-V   | Magnetto Drive Shaftgear (Spline) and Magnetto Drive Coupling (Spline)         |                        |                 | <u>.001</u><br>.005    | .008            |
|      | L1    | Magnetto Drive Shaft (Spline) and Magnetto Drive Coupling (Spline)             |                        |                 | <u>.001</u><br>.0045   | .0075           |
| 870  | L-V1  | Rear Crankshaft Spline Bushing and Accessory Gear (Spline)                     |                        |                 | <u>.002</u><br>.0073   | .018            |
|      | L1    | Rear Crankshaft Spline Bushing and Accessory Drive Quill Shaft (Spline)        |                        |                 | <u>.004</u><br>.0073   | .018            |
|      | V     | Rear Crankshaft Spline Bushing and Accessory Drive Shaft (Spline)              |                        |                 | <u>.002</u><br>.0073   | .018            |
| 871  | L-V   | Accessory Drive Gear and Starter Drive Gear                                    |                        |                 | <u>.004</u><br>.008    | .015            |
|      | L1    | Accessory Drive Gear and Starter Drive Gear                                    |                        |                 | <u>.002</u><br>.016    | .022            |
|      | L1    | Starter Drive Shaftgear and Starter Drive Gear (Spline)                        |                        |                 | <u>.000</u><br>.002    | .004            |
| 872  | L-V   | Accessory Drive Gear and Generator Drive Gear                                  |                        |                 | <u>.004</u><br>.015    | .020            |
|      | L1    | Alternator Drive Shaft (Spline) and Vacuum and Magnetto Drive Shaft (Spline)   |                        |                 | <u>.001</u><br>.004    | .006            |
|      | L1    | Alternator Drive Shaft (Spline) and Alternator (Spline)                        |                        |                 | <u>.001</u><br>.005    | .007            |
| 873  | L-V   | Accessory Drive Gear and Vacuum Pump Shaftgear                                 |                        |                 | <u>.004</u><br>.015    | .020            |
| 874  | L-V   | Vacuum Pump Shaftgear and Oil Pressure Scavenge Pump Gear                      |                        |                 | <u>.004</u><br>.015    | .020            |
| 884  | L1    | Magnetto Drive Idler Gear and Magnetto Driven Gear                             |                        |                 | <u>.006</u><br>.014    | .020            |
|      | L1    | Magnetto Drive Gear and Magnetto Idler Drive Gear                              |                        |                 | <u>.006</u><br>.014    | .020            |

# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL ENGINES

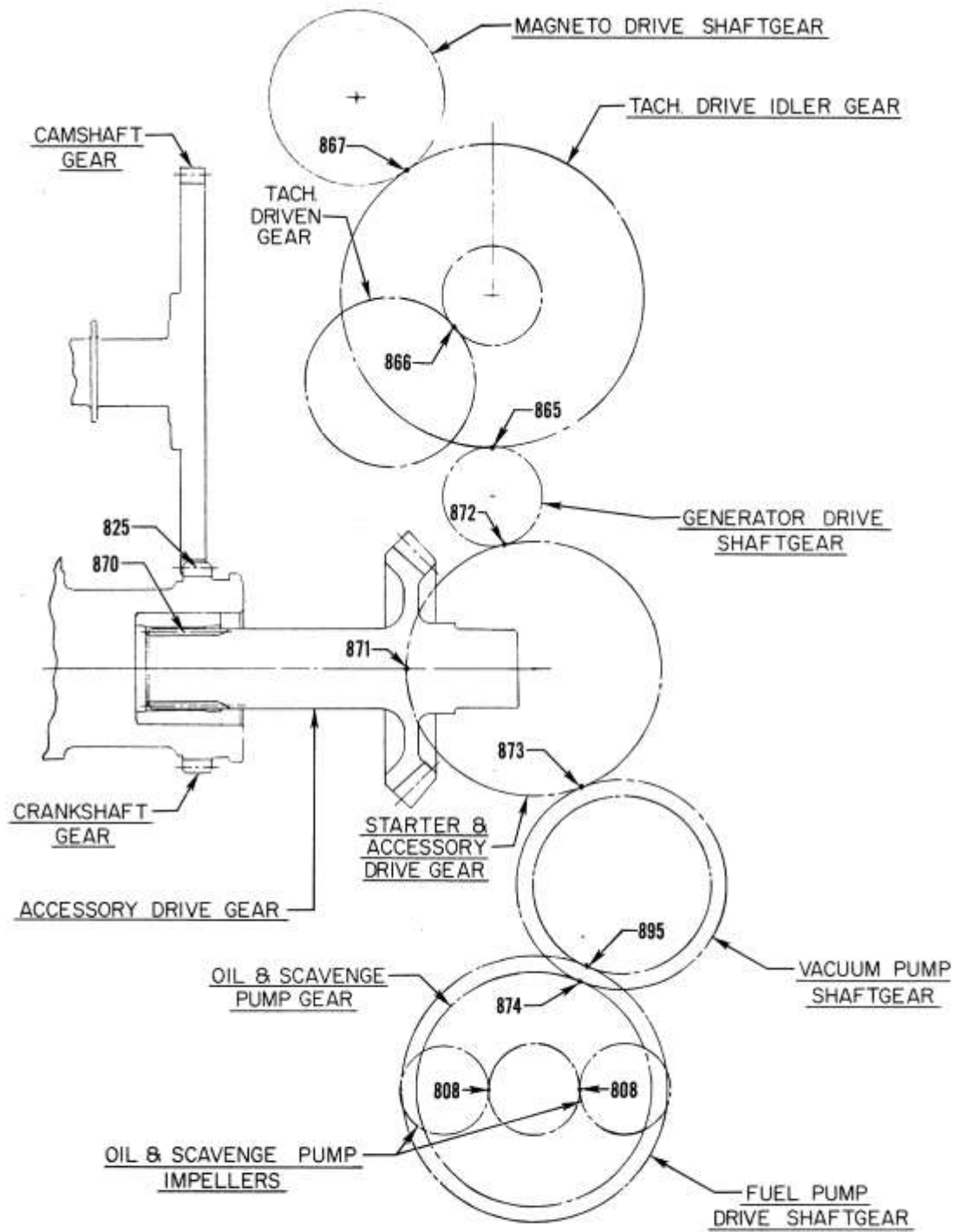
### SECTION IV – BACKLASH

| Ref. | Chart | Nomenclature                                                                 | Dimensions             |                 | Clearances             |                 |
|------|-------|------------------------------------------------------------------------------|------------------------|-----------------|------------------------|-----------------|
|      |       |                                                                              | Mfr.<br>Min. &<br>Max. | Service<br>Max. | Mfr.<br>Min. &<br>Max. | Service<br>Max. |
| 895  | L-V   | Vacuum Pump Shaftgear and Fuel Pump Drive Shaftgear                          |                        |                 | <u>.004</u><br>.010    | .015            |
| 896  | L1    | Oil Pump Drive Gear and Tachometer Drive Shaftgear                           |                        |                 | <u>.006</u><br>.014    | .020            |
| 897  | L1    | Tachometer Drive Gear and Tachometer Drive Shaftgear                         |                        |                 | <u>.002</u><br>.006    | .010            |
| 898  | L1    | Magneto Gear (Spline) and Magneto Drive Shaft (Spline)                       |                        |                 | <u>.001</u><br>.0045   | .0075           |
| 899  | L1    | Starter Drive Shaftgear (Spline) and Vacuum, Magneto Shaft (Spline)          |                        |                 | <u>.001</u><br>.004    | .007            |
| 8001 | L1    | Accessory Drive Quill Shaft (Spline) and Accessory Drive Gear (Spline)       |                        |                 | <u>.004</u><br>.0073   | .011            |
| 8002 | L1    | Vacuum Pump Drive Gear (Spline) and Shaft Vacuum Pump Magneto Drive (Spline) |                        |                 | <u>.001</u><br>.004    | .007            |
| 8003 | L1    | Vacuum, Oil Pump Drive Shaftgear and Vacuum Pump Drive Gear                  |                        |                 | <u>.005</u><br>.015    | .020            |
| 8004 | L1    | Dual Accessory Drive Gear and Idler                                          |                        |                 | <u>.004</u><br>.015    | .020            |
| 8005 | L1    | Starter Drive Gear and Bendix Drive (Slip Coupling) Gear                     |                        |                 | <u>.016</u><br>.026    | .031            |
| 8006 | L1    | Dual Accessory Idler Gear and Vacuum Pump Drive Gear                         |                        |                 | <u>.004</u><br>.015    | .020            |

# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL ENGINES

### SECTION IV – BACKLASH



VO, TVO-435-A & VO, TVO-540

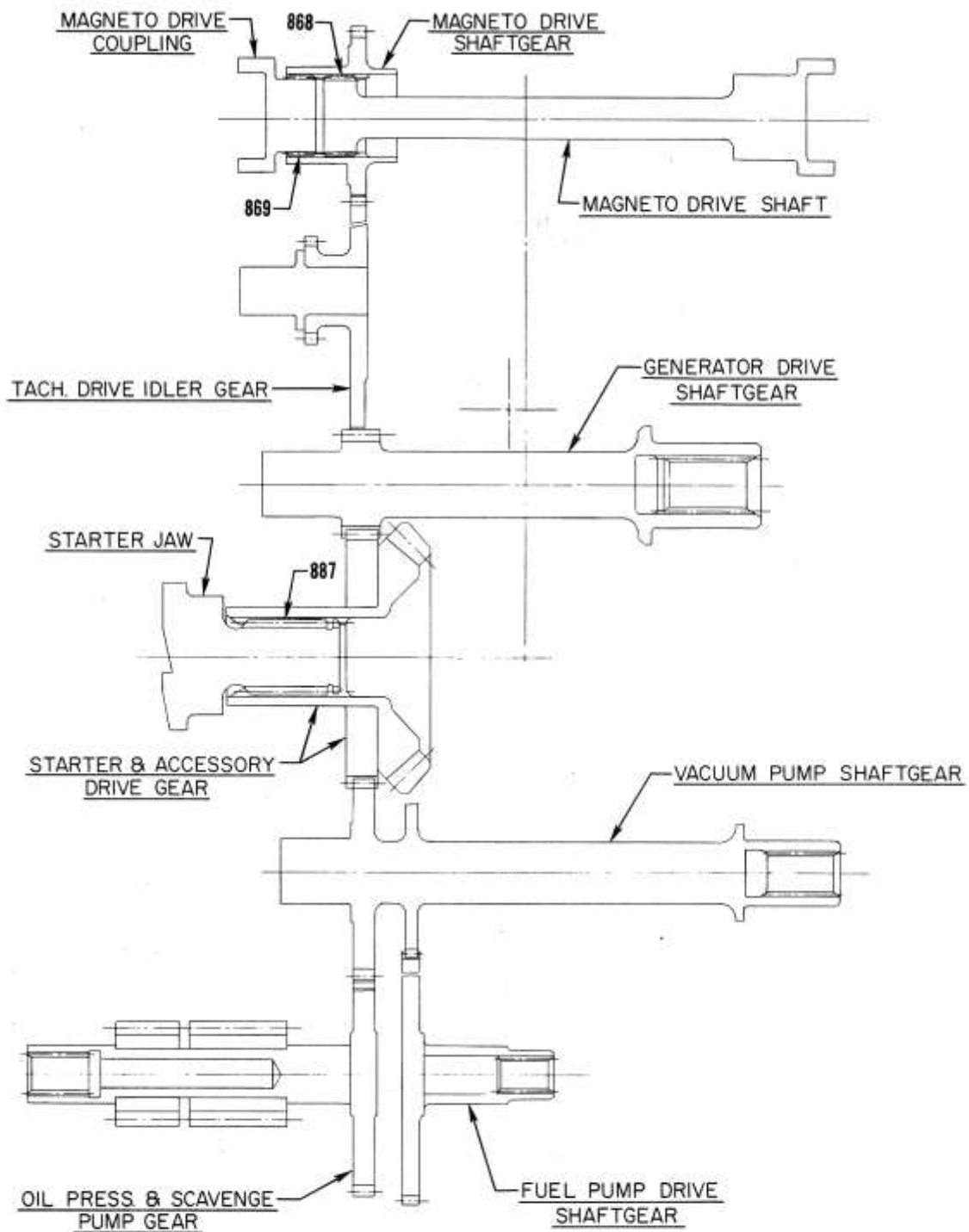
VIEWING LEFT SIDE OF ENGINE

Accessory Drives

# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL ENGINES

### SECTION IV – BACKLASH



VO-TVO-435-A & VO, TVO-540  
REAR OF ENGINE

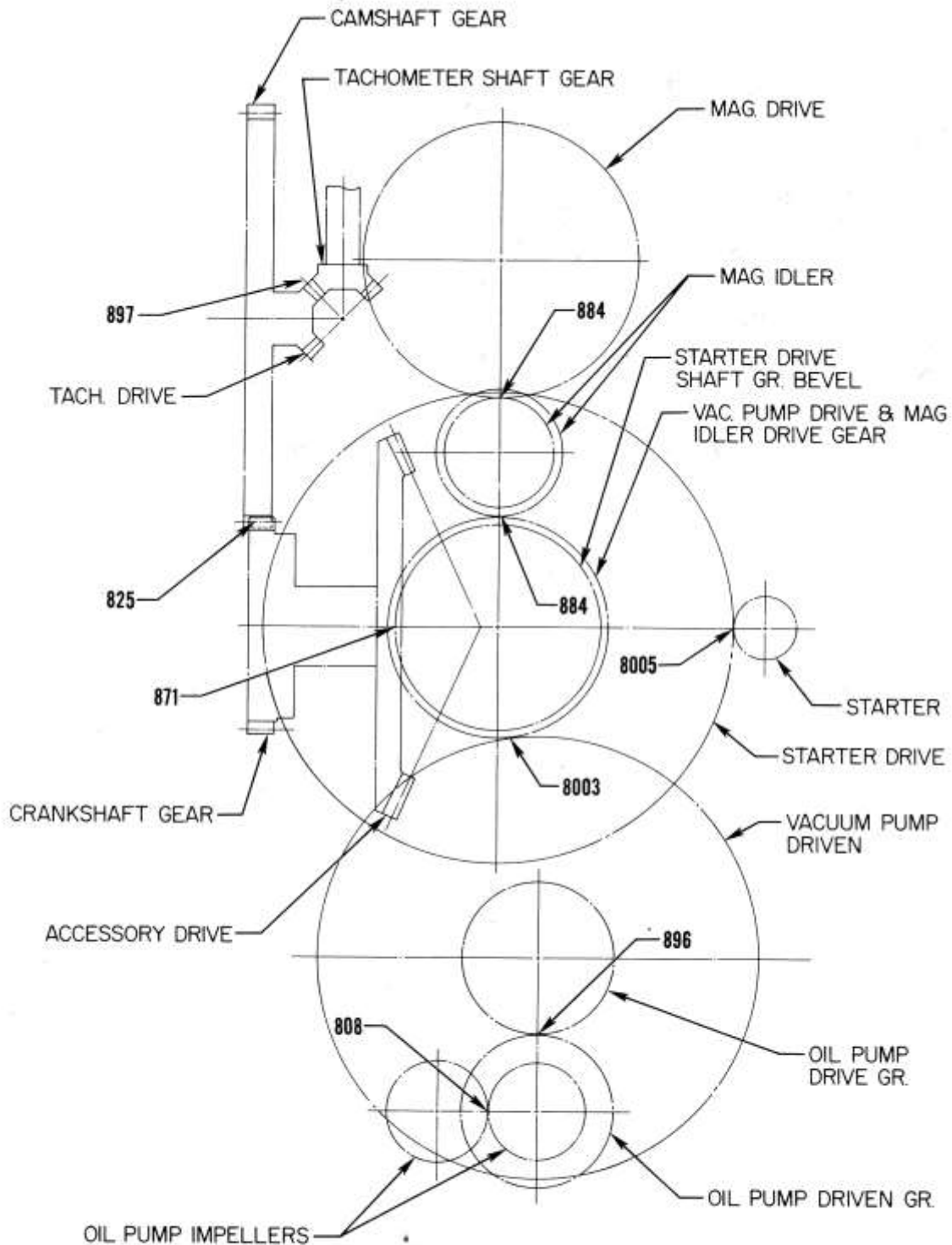
Accessory Drives



# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL ENGINES

### SECTION IV – BACKLASH



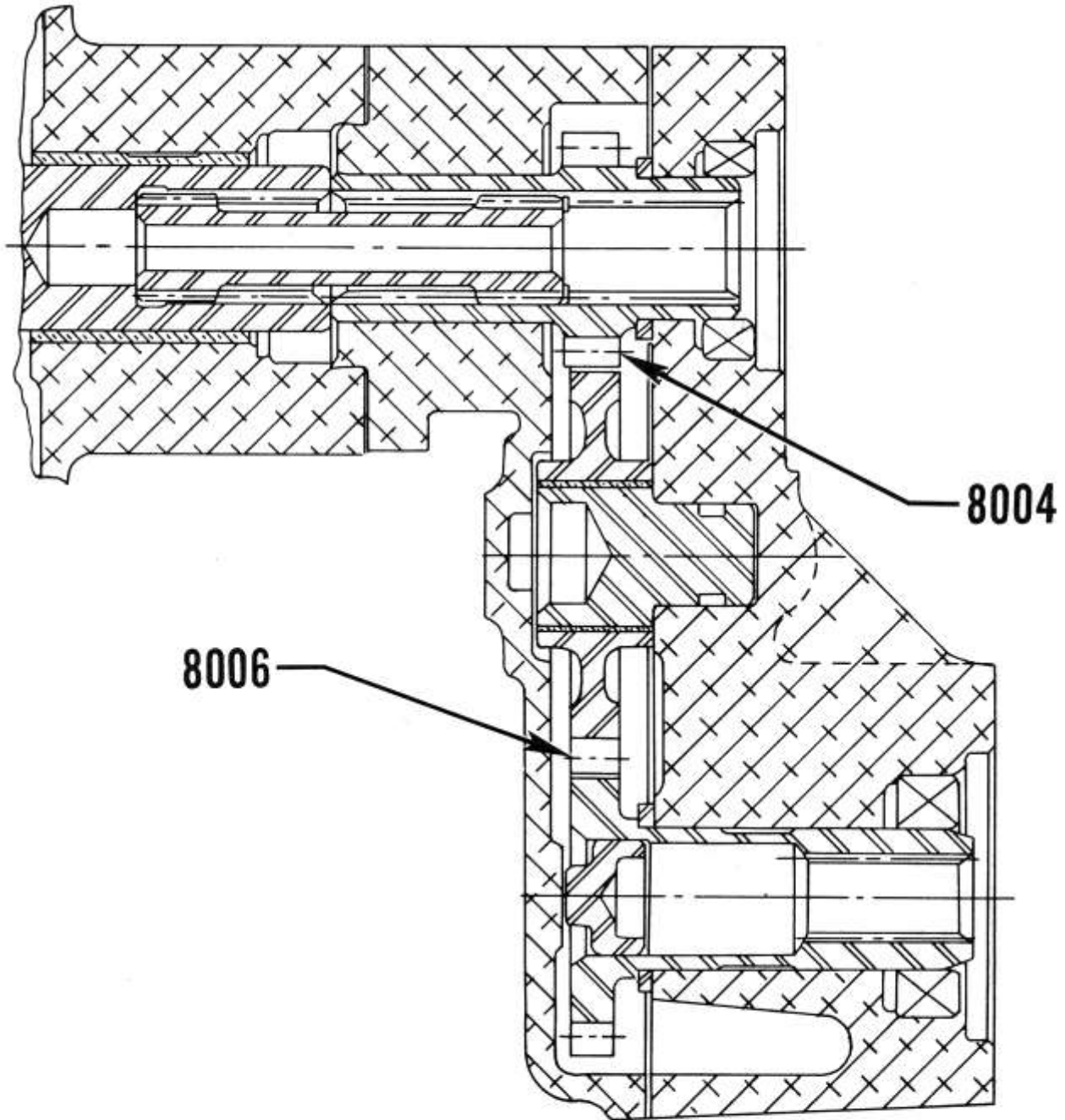
VO-435-B1A  
LEFT SIDE OF ENGINE

### Accessory Drives

# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL ENGINES

### SECTION IV – BACKLASH



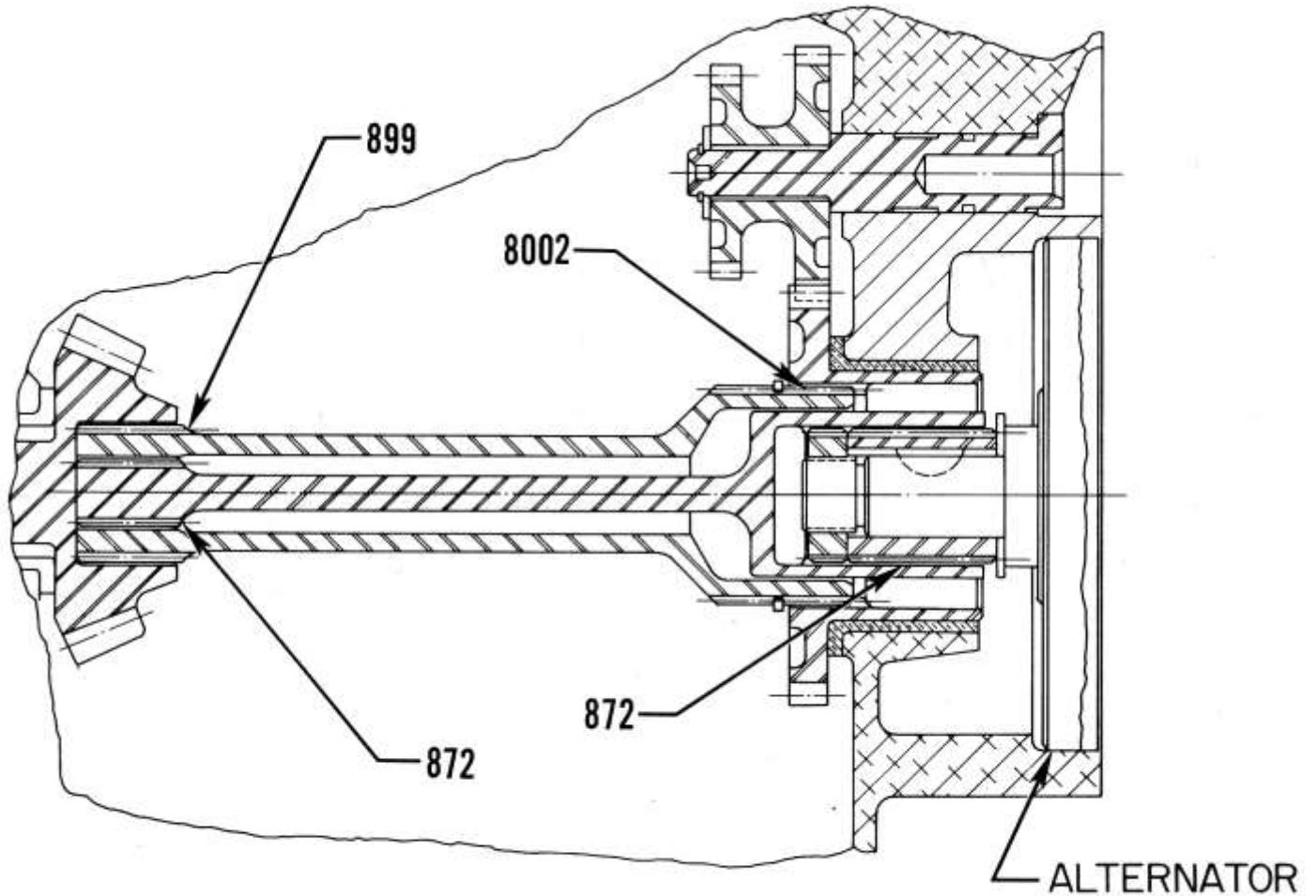
TV0-435-F

Vacuum Pump and Fuel Pump Dual Drives

# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL ENGINES

### SECTION IV – BACKLASH



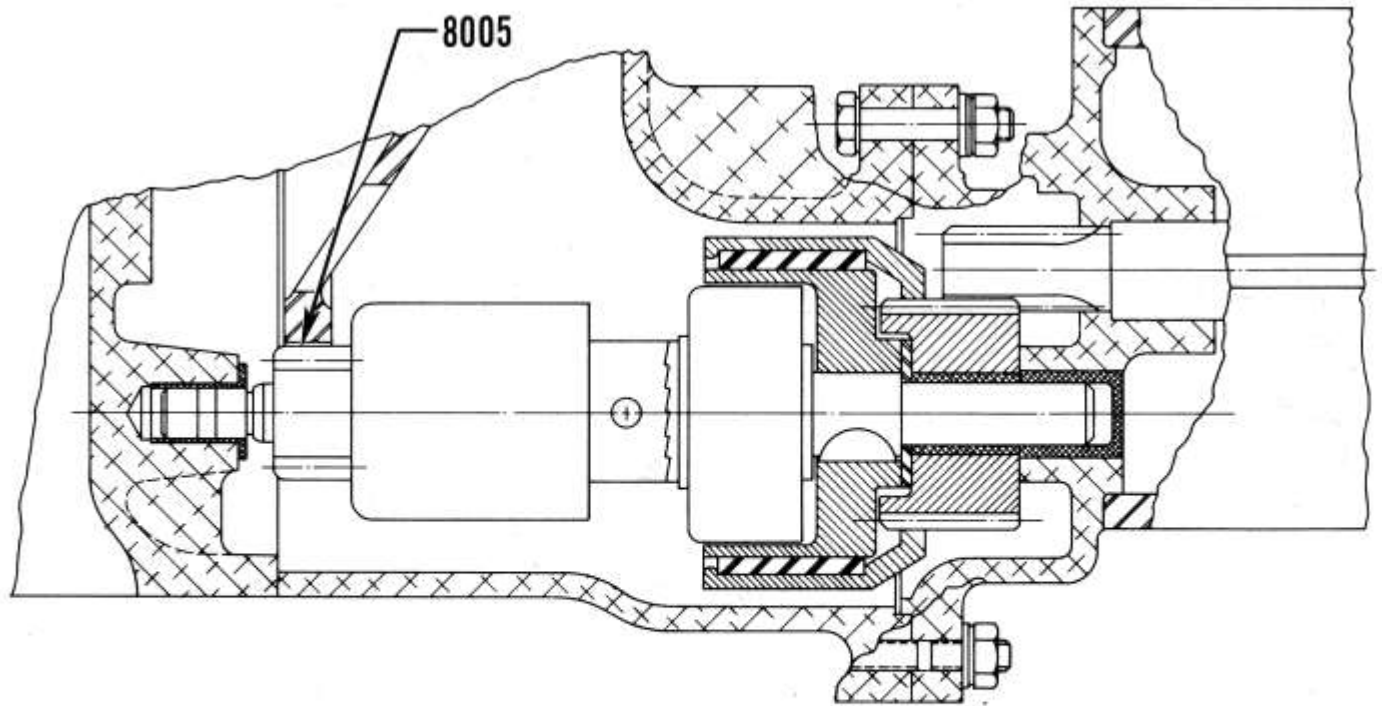
VO-435-B & TVO-435-F

**Vacuum, Magneto and Alternator Drives**

# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL ENGINES

### SECTION IV – BACKLASH



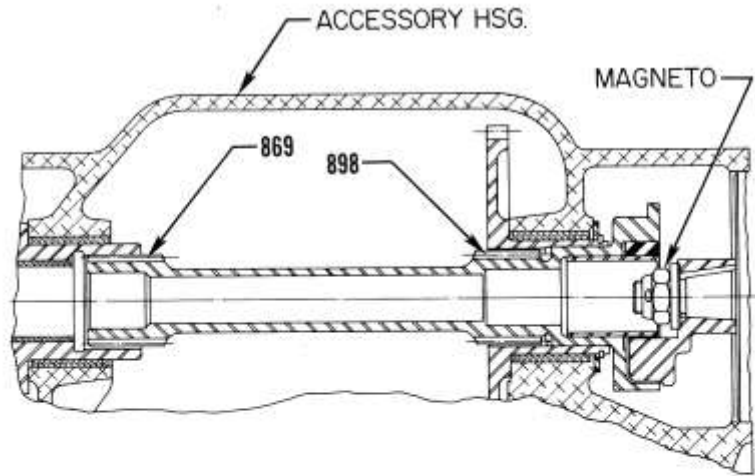
VO-435-B & TVO-435-F

**Bendix Drive**

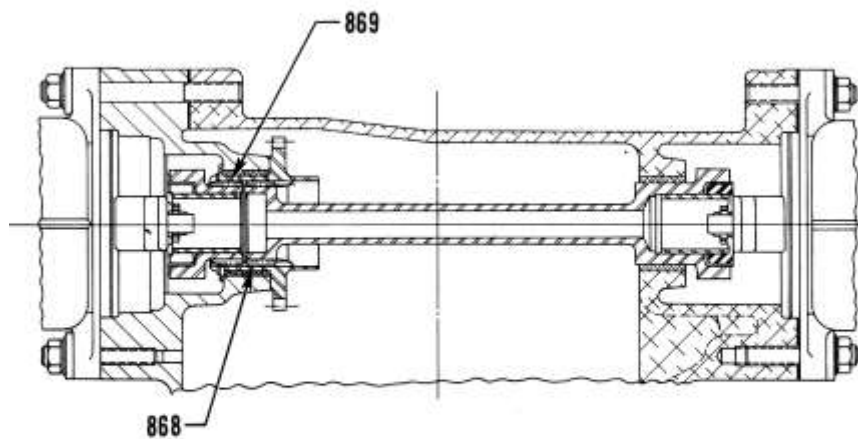
# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL ENGINES

### SECTION IV – BACKLASH



VO-435-BIA



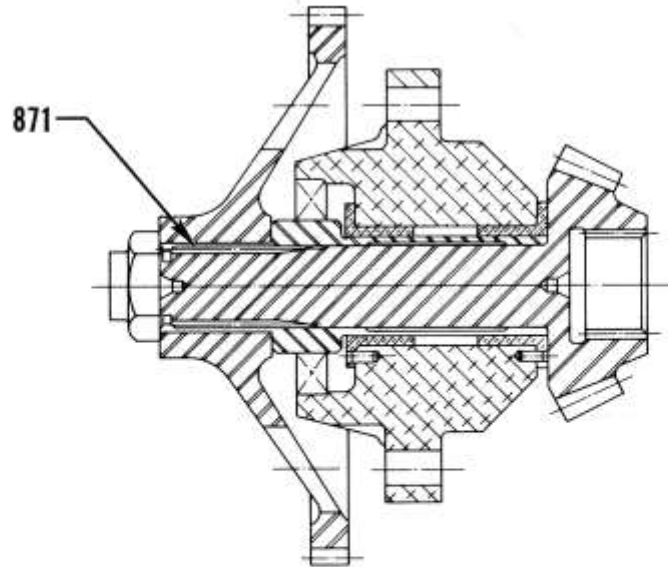
VO, TVO-435-A & VO, TVO-540

### Magneto Drives

# SERVICE TABLE OF LIMITS

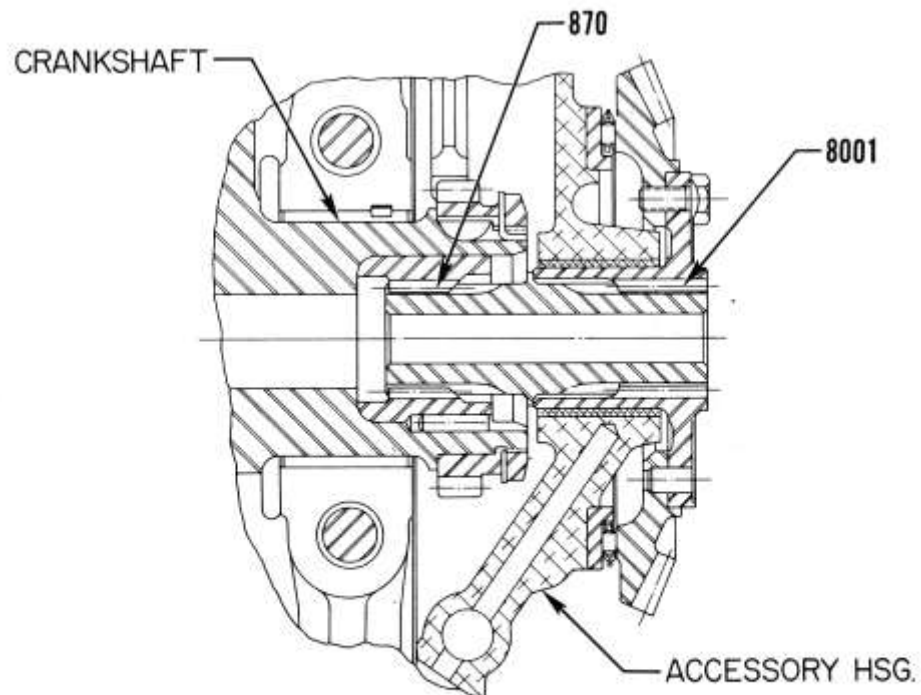
## PART IV – VERTICAL ENGINES

### SECTION IV – BACKLASH



VO-435-BIA

Starter Drives



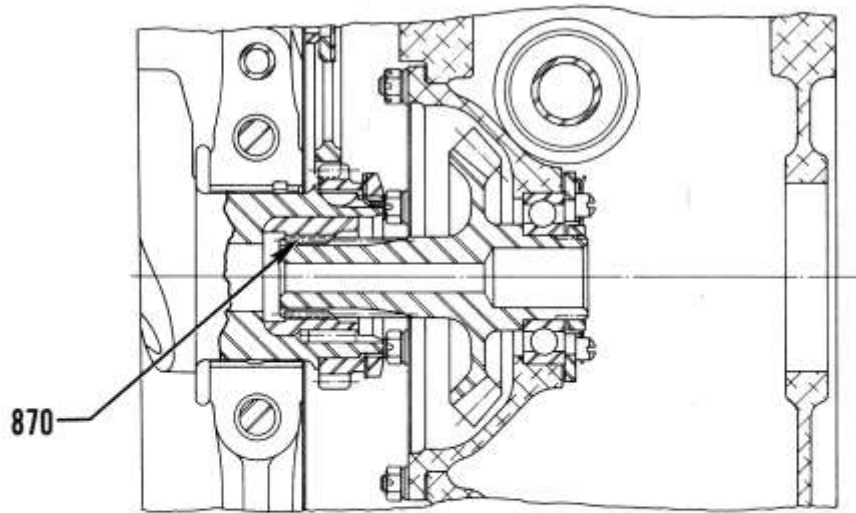
VO-435-BIA

Accessory Drive Gear

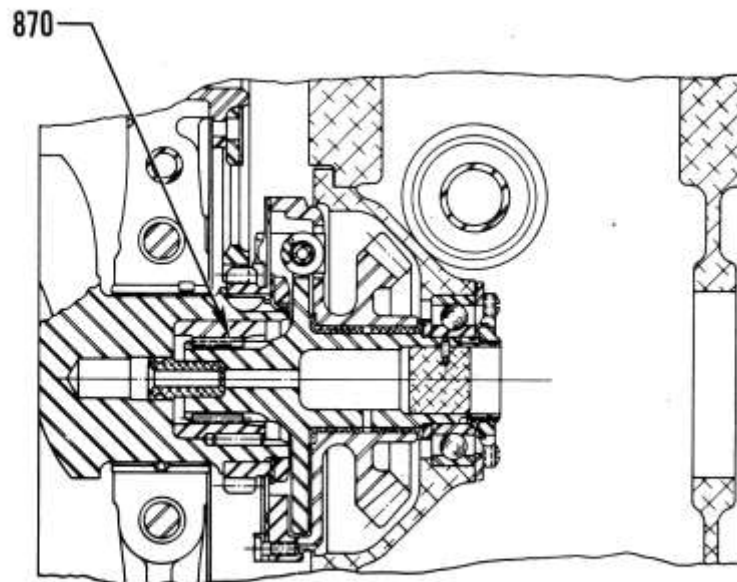
# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL ENGINES

### SECTION IV – BACKLASH



VO, TVO-435-A & TVO-540



VO-540

### Accessory Drives

# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL ENGINES

### SECTION V – SPECIAL TORQUE REQUIREMENTS

| Ref.                                                                                                                                                                                                                                                   | Chart                                                                                                                              | Thread Size             | Nomenclature                                                                            | Torque Limits              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----------------------------------------------------------------------------------------|----------------------------|
| 900                                                                                                                                                                                                                                                    | L                                                                                                                                  | 3/8-24                  | Connecting Rod Nuts                                                                     | 480 in. lbs.               |
|                                                                                                                                                                                                                                                        | V                                                                                                                                  | 3/8-24                  | Connecting Rod Bolt and Nut – Tighten to This Length                                    | 2.255-2.256                |
| 901                                                                                                                                                                                                                                                    | ALL                                                                                                                                | 1/2-20                  | Oil Pump Shaft Nut                                                                      | 360-480 in. lbs.           |
| 903                                                                                                                                                                                                                                                    | ALL                                                                                                                                | 3/8-24                  | Magneto Nut (To attach drive member to magneto) – Steel Bushing                         | 300 in. lbs.               |
| 904                                                                                                                                                                                                                                                    | ALL                                                                                                                                | 10-32                   | Screw Plate Nuts (To attach ignition cable outlet plate to magneto)                     | 15 in. lbs.                |
| 905                                                                                                                                                                                                                                                    | ALL (using a silicone gasket)                                                                                                      | 1/4-20                  | Rocker Box Screws                                                                       | 35 in.-lbs.                |
|                                                                                                                                                                                                                                                        | ALL (using a cork gasket)                                                                                                          | 1/4-20                  | Rocker Box Screws                                                                       | 50 in.-lbs.                |
| 906                                                                                                                                                                                                                                                    | ALL                                                                                                                                | 5/16-18                 | Exhaust Port Studs (Driving Torque)                                                     | 40 in. lbs. min.           |
|                                                                                                                                                                                                                                                        | ALL                                                                                                                                | 5/16-18                 | Nuts to Attach Exhaust Stacks to Cylinder Head                                          | 160-180 in. lbs.           |
| 907                                                                                                                                                                                                                                                    | ALL                                                                                                                                | 18MM                    | Spark Plugs                                                                             | 420 in. lbs.               |
| 909                                                                                                                                                                                                                                                    | L-V                                                                                                                                | 5/8-32                  | Alternator Pulley Nut                                                                   | 450 in. lbs.               |
|                                                                                                                                                                                                                                                        | L1                                                                                                                                 | 5/8-32                  | Alternator Nut (Quill Shaft)                                                            | 474 in. lbs.               |
| 910                                                                                                                                                                                                                                                    | L1                                                                                                                                 | 1/4-28                  | Alternator Output Terminal Nut                                                          | 85 in. lbs.                |
| 911                                                                                                                                                                                                                                                    | L1                                                                                                                                 | 10-32                   | Alternator Auxiliary Terminal Nut                                                       | 30 in. lbs.                |
| 913                                                                                                                                                                                                                                                    | L1-L2-V                                                                                                                            | 1/16-27 NPT             | Piston Cooling Nozzle in Crankcase                                                      | 100 in. lbs.               |
| 914                                                                                                                                                                                                                                                    | V-V1                                                                                                                               | 1/8-27 NPT              | Injector Nozzle in Cylinder Head                                                        | 60 in. lbs.                |
| 919                                                                                                                                                                                                                                                    | ALL                                                                                                                                | 1/4 Hex Head and Below  | Hose Clamps (Worm Type)                                                                 | 20 in. lbs.                |
|                                                                                                                                                                                                                                                        | ALL                                                                                                                                | 5/16 Hex Head and Above | Hose Clamps (Worm Type)                                                                 | 45 in. lbs.                |
| 919-1                                                                                                                                                                                                                                                  | ALL                                                                                                                                |                         | “T” Bolt Hose Clamps<br>Initial Torque . . . . .<br>Retorque After Run-In . . . . .     | 35 in. lbs.<br>25 in. lbs. |
| 920                                                                                                                                                                                                                                                    | ALL                                                                                                                                |                         | Cylinder Head Drain Back Hose Clamp                                                     | 10 in. lbs.                |
| 921                                                                                                                                                                                                                                                    | L2-V1                                                                                                                              |                         | Exhaust Clamp – Coupling – V-Band (See latest revision of Service Instruction No. 1238) |                            |
| 928                                                                                                                                                                                                                                                    | ALL                                                                                                                                | 3/8-16                  | Cylinder Hold Down Studs (Crankcase Driving Torque)                                     | 100 in. lbs.               |
|                                                                                                                                                                                                                                                        | ALL                                                                                                                                | 1/2-13                  | Cylinder Hold Down Studs (Crankcase Driving Torque)                                     | 250 in. lbs.               |
| 929                                                                                                                                                                                                                                                    | ALL                                                                                                                                | 3/8-16                  | Cylinder Hold Down Nuts                                                                 | 300 in. lbs.               |
|                                                                                                                                                                                                                                                        | ALL                                                                                                                                | 1/2-13                  | Cylinder Hold Down Nuts                                                                 | 600 in. lbs.               |
| 930                                                                                                                                                                                                                                                    | ALL                                                                                                                                | 5/16-32                 | Brass union nut on stainless steel injector/primer fuel line (Both Ends)                | 25-50 in.-lbs.*            |
| * It is also permissible to tighten the fuel line union nut finger tight, then continue tightening the nut with a wrench an additional 30 to 60 degrees (1/2 to 1 flat of the nut.) Torque in excess of 50 in.-lbs. can result in damage to the parts. |                                                                                                                                    |                         |                                                                                         |                            |
|                                                                                                                                                                                                                                                        | Cylinder Hold Down and Crankcase Parting Flange Nuts’ Tightening Procedures – See latest revision of Service Instruction No. 1029. |                         |                                                                                         |                            |
| 933                                                                                                                                                                                                                                                    | L-V                                                                                                                                |                         | Accessory Drive Shaft Nut                                                               | 75-125 ft. lbs.            |
| 934                                                                                                                                                                                                                                                    | ALL                                                                                                                                |                         | Crankshaft Gear Retaining Nut                                                           | 150 ft. lbs.               |



# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL ENGINES

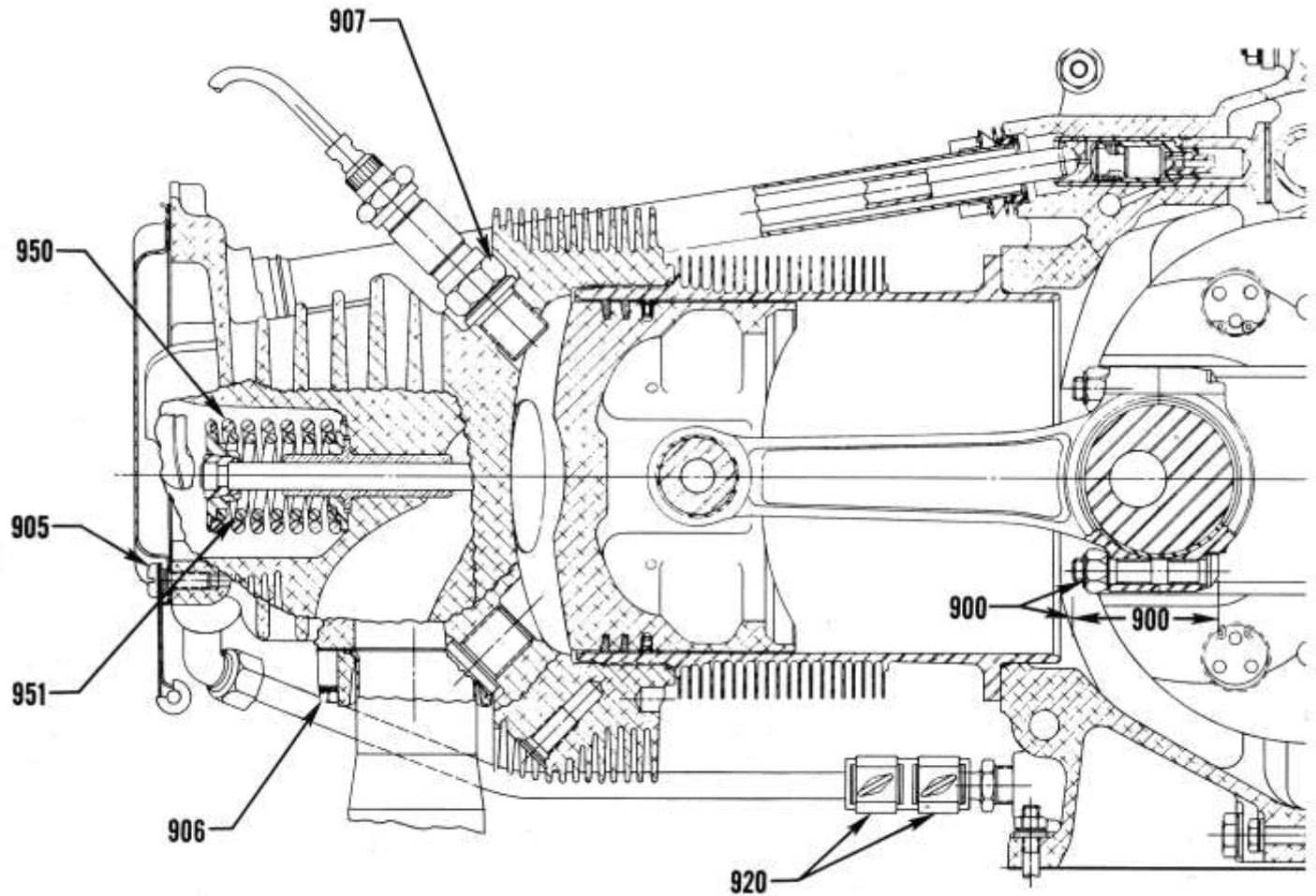
### SECTION V – SPECIAL TORQUE REQUIREMENTS

| Ref. | Chart               | Thread Size                      | Nomenclature                                                                   |             |                        |                  | Torque Limits    |               |             |
|------|---------------------|----------------------------------|--------------------------------------------------------------------------------|-------------|------------------------|------------------|------------------|---------------|-------------|
| 938  | ALL                 | 1/4-28                           | Thin Slotted Nut (38 in. lbs. plus torque required to reach next locking slot) |             |                        |                  | 38 in. lbs.      |               |             |
| 942  | ALL                 | 1/8-27 NPT                       | Carburetor Drain Plug                                                          |             |                        |                  | 50-60 in. lbs.   |               |             |
| 943  | V                   | 10-32                            | Screws (To attach necessary drive coupling plate)                              |             |                        |                  | 25-30 in. lbs.   |               |             |
| 944  | V                   |                                  | Carburetor Throttle Lever Screw                                                |             |                        |                  | 20-28 in. lbs.   |               |             |
| 945  | L1                  |                                  | Accessory Drive Shaft and Accessory Drive Gear Attaching Screw                 |             |                        |                  | 100-120 in. lbs. |               |             |
|      | SECTION V – SPRINGS |                                  |                                                                                |             |                        |                  |                  |               |             |
| Ref. | Chart               | Nomenclature                     | Lyc. Part No.                                                                  | Wire Dia.   | Length at Comp. Length | COMP. LOAD       |                  |               |             |
|      |                     |                                  |                                                                                |             |                        | Mfr. Min.        | Mfr. Max.        | Service Max.  |             |
| 950  | ALL                 | Outer Valve Springs (Angle)      | 68326                                                                          | .177        | 1.46 in.               | 103 lb.          | 111 lb.          | 100 lb. min.  |             |
|      | ALL                 | Outer Valve Springs (Angle)      | LW-11796                                                                       | .182        | 1.43 in.               | 114 lb.          | 124 lb.          | 111 lb. min.  |             |
| 951  | ALL                 | Auxiliary Valve Springs (Angle)  | 68328<br>LW-11797                                                              | .142        | 1.33 in.               | 75 lb.<br>73 lb. | 83 lb.           | 70 lb. min.   |             |
| 952  | L-V                 | Check Valve Springs              |                                                                                |             |                        |                  |                  |               |             |
|      |                     | Lycoming Part Numbers            | Free Length                                                                    |             |                        |                  |                  |               |             |
|      |                     | 654-B                            | -----                                                                          | .031        | 1.03 in.               | .74 lb.          | .94 lb.          | .69 lb. min.  |             |
|      |                     | 73761                            | 2.065                                                                          | .041        | 1.03 in.               | 3.15 lb.         | 3.35 lb.         | 3.10 lb. min. |             |
| 953  |                     | Oil Pressure Relief Valve Spring |                                                                                |             |                        |                  |                  |               |             |
|      |                     | Lycoming Part Numbers            | Identification                                                                 |             |                        |                  |                  |               |             |
|      |                     |                                  | Dye                                                                            | Free Length |                        |                  |                  |               |             |
|      | L-V                 | 68542                            | None                                                                           | 2.38        | .067                   | 1.66 in.         | 15 lb.           | 17 lb.        | 14 lb. min. |
|      | L-V                 | LW-14029                         | White                                                                          | 2.28        | .072                   | 1.66 in.         | 20 lb.           | 22 lb.        | 17 lb. min. |
| 954  |                     | Accessory Drive Coupling Spring  |                                                                                |             |                        |                  |                  |               |             |
|      |                     | Lycoming Part Numbers            | Free Length                                                                    |             |                        |                  |                  |               |             |
|      | V – AS APPLICABLE   | 74616                            | 1.25                                                                           | .092        | 1.10 in.               | 23 lb.           | 26 lb.           | 20 lb.        |             |

# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL ENGINES

### SECTION V – SPECIAL TORQUE AND SPRINGS

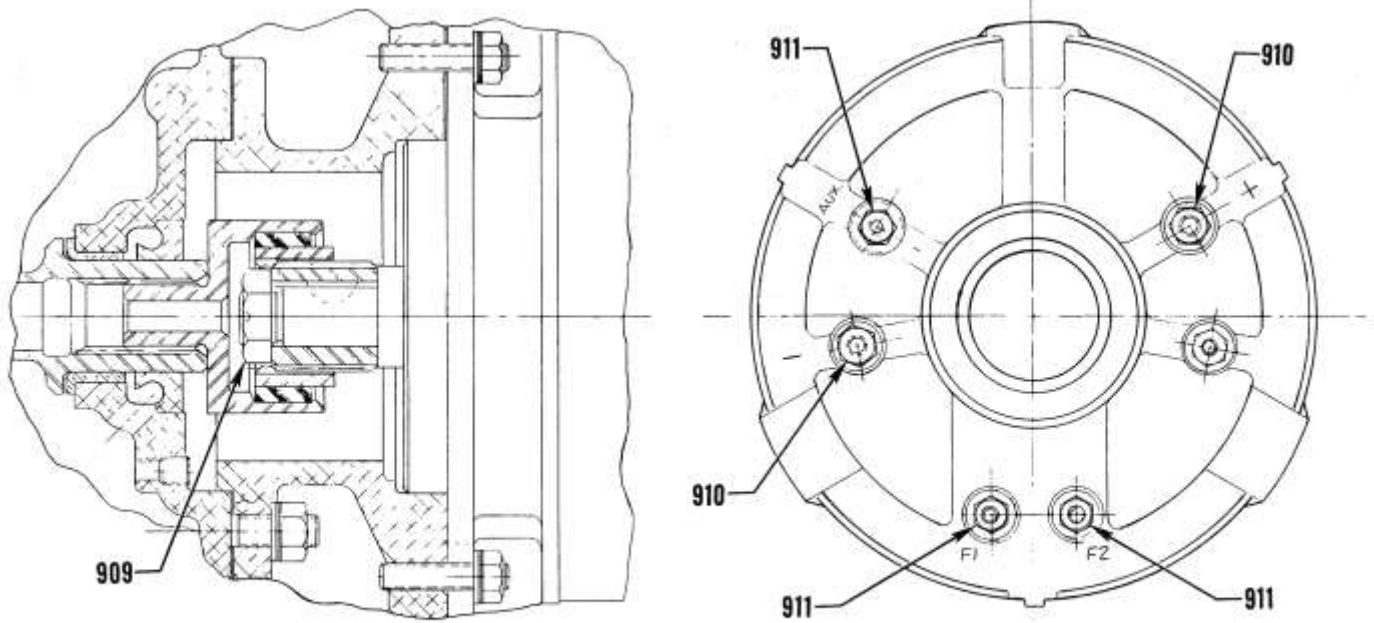


### Engine Accessories and Hardware

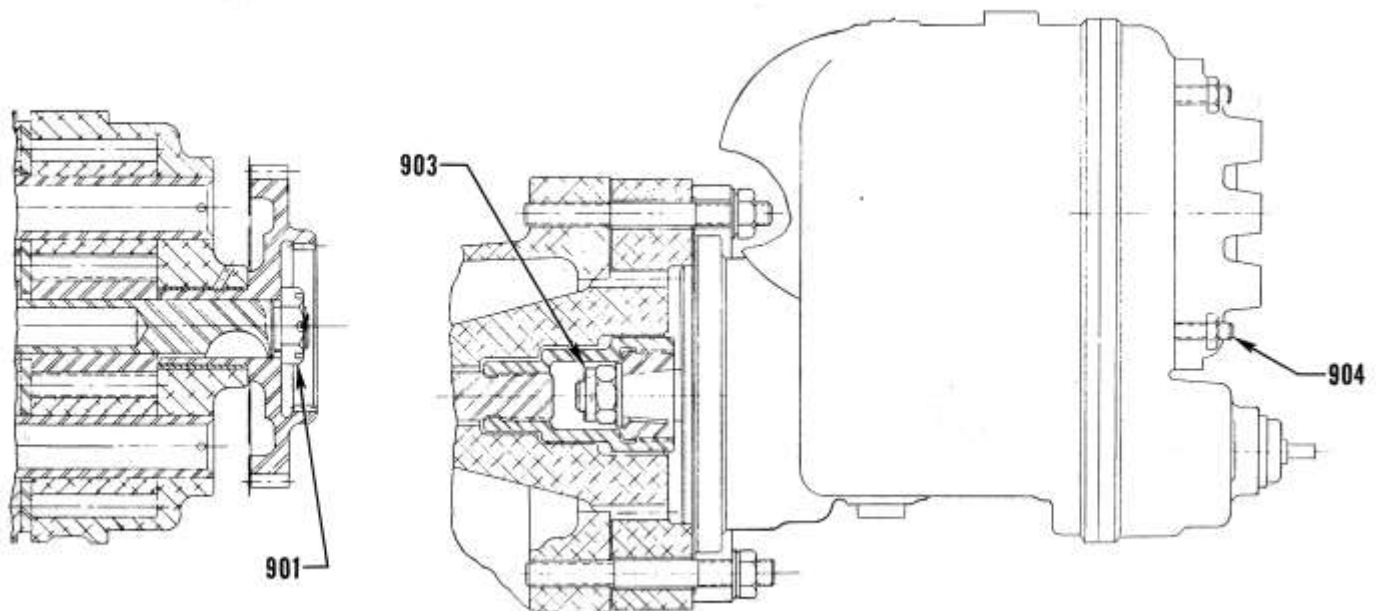
# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL ENGINES

### SECTION V – SPECIAL TORQUE AND SPRINGS



ALTERNATOR & ALTERNATOR DRIVE



OIL PUMP

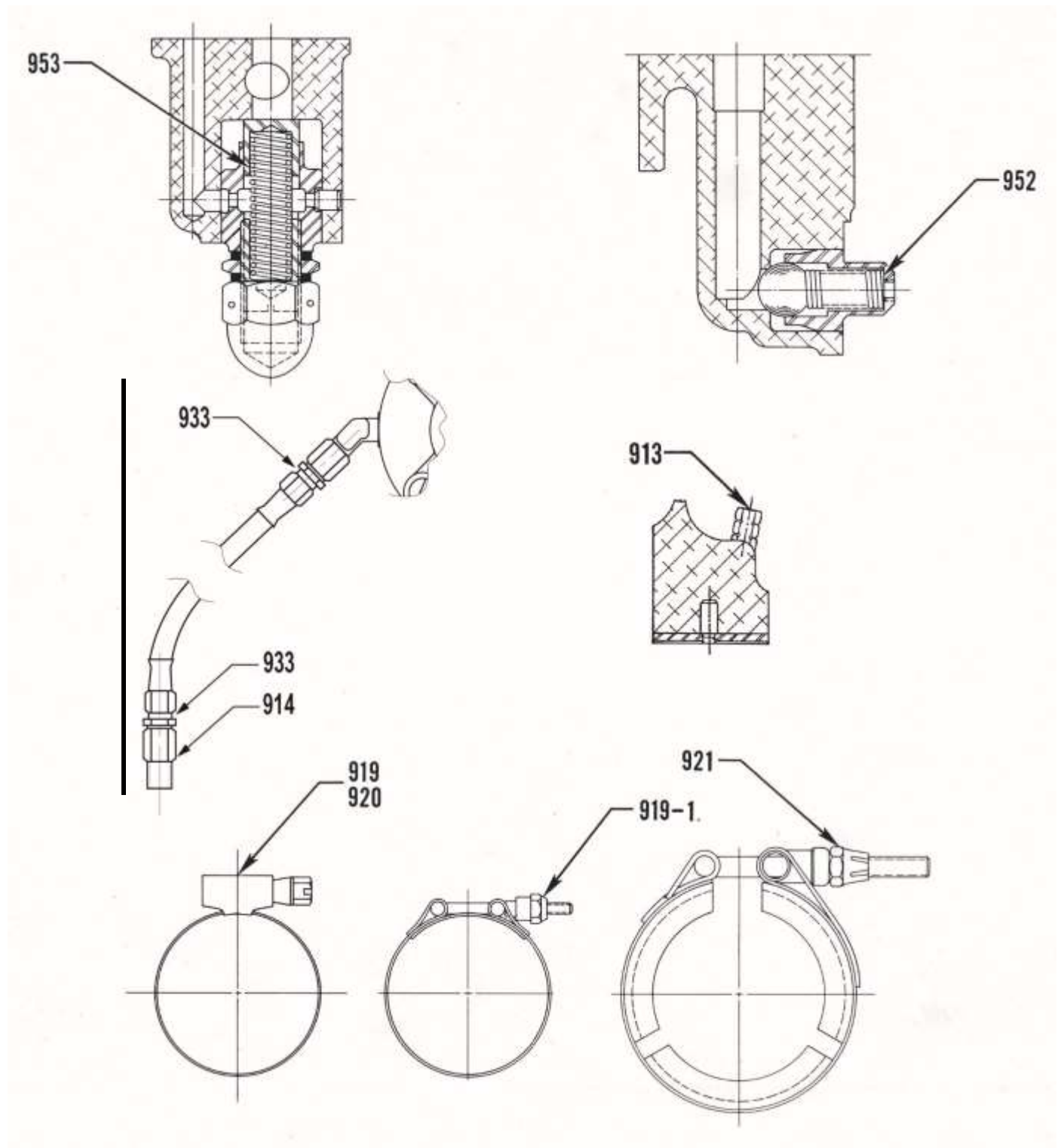
MAGNETO

## Engine Accessories and Hardware

# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL ENGINES

### SECTION V – SPECIAL TORQUE AND SPRINGS



### Engine Accessories and Hardware

# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL ENGINES

### STANDARD TORQUE

#### UNLESS OTHERWISE LISTED

Torque limits for propeller attaching bolts to be supplied by propeller aircraft manufacturer.

NOTE: Refer to Table VIII for torque value conversions (In. Lb. or Ft. Lb. to Nm).

| TABLE I<br>BOLTS, SCREW AND NUTS                 |            |          |        |              |            | TABLE II<br>PIPE PLUGS |            |
|--------------------------------------------------|------------|----------|--------|--------------|------------|------------------------|------------|
| Thread                                           | Torque     |          | Thread | Torque       |            | Thread                 | Torque     |
|                                                  | In. Lb.    | Ft. Lb.  |        | In. Lb.      | Ft. Lb.    |                        | In. Lbs.   |
| 8                                                | 20 to 22   | -----    | 7/16   | 600 to 660   | 50 to 55   | 1/16-27 NPT            | 40 to 44   |
| 10                                               | 49 to 54   | -----    | 1/2    | 900 to 984   | 75 to 82   | 1/8-27 NPT             | 40 to 44   |
| 1/4                                              | 96 to 106  | -----    | 9/16   | 1320 to 1452 | 110 to 121 | 1/4-18 NPT             | 85 to 94   |
| 5/16                                             | 204 to 228 | 17 to 19 | 5/8    | 1800 to 1980 | 150 to 165 | 3/8-18 NPT             | 110 to 121 |
| 3/8                                              | 360 to 396 | 30 to 33 | 3/4    | 3240 to 3564 | 270 to 297 | 1/2-14 NPT             | 160 to 176 |
| THIN NUTS (1/2 DIA. OF BOLT) – 1/2 LISTED TORQUE |            |          |        |              |            | 3/4-14 NPT             | 230 to 252 |
|                                                  |            |          |        |              |            | 1-11-1/2 NPT           | 315 to 347 |

| TABLE III<br>CRUSH TYPE GASKETS                                                                                                                                                                                                                                                                                                                                      |               |        | TABLE IV<br>FLEXIBLE TUBE CONNECTIONS<br>(SEALASTIC OR EQUIVALENT FITTINGS) |           |                 |            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------|-----------------------------------------------------------------------------|-----------|-----------------|------------|
| Thread Pitch on Part to be Tightened                                                                                                                                                                                                                                                                                                                                 | ANGLE OF TURN |        | Tube Size                                                                   | Thread    | Torque In. Lbs. |            |
| Threads Per Inch                                                                                                                                                                                                                                                                                                                                                     | Aluminum      | Copper |                                                                             |           | Aluminum Alloy  | Steel      |
| 8                                                                                                                                                                                                                                                                                                                                                                    | 135°          | 67°    | (-3) 3/16                                                                   | 3/8 - 24  | 30 to 50        | 70 to 80   |
| 10                                                                                                                                                                                                                                                                                                                                                                   | 135°          | 67°    | (-4) 1/4                                                                    | 7/16 - 20 | 40 to 65        | 90 to 100  |
| 12                                                                                                                                                                                                                                                                                                                                                                   | 180°          | 90°    | (-5) 5/16                                                                   | 1/2 - 20  | 60 to 80        | 135 to 150 |
| 14                                                                                                                                                                                                                                                                                                                                                                   | 180°          | 90°    | (-6) 3/8                                                                    | 9/16-18   | 75 to 125       | 270 to 300 |
| 16                                                                                                                                                                                                                                                                                                                                                                   | 270°          | 135°   | (-8) 1/2                                                                    | 3/4-16    | 150 to 250      | 450 to 500 |
| 18                                                                                                                                                                                                                                                                                                                                                                   | 270°          | 135°   | (-10) 5/8                                                                   | 7/8 - 14  | 200 to 350      | 650 to 700 |
| 20                                                                                                                                                                                                                                                                                                                                                                   | 270°          | 135°   |                                                                             |           |                 |            |
| 24                                                                                                                                                                                                                                                                                                                                                                   | 360°          | 180°   |                                                                             |           |                 |            |
| 28                                                                                                                                                                                                                                                                                                                                                                   | 360°          | 180°   |                                                                             |           |                 |            |
| NOTE: Install all crush type gaskets except the self centering type, with the unbroken surface against the flange of the plug or part being tightened against the seal. Turn the part until the sealing surfaces are in contact and then tighten to the angle of turn listed for the appropriate thread size.<br>NOTE: Lubricate Threads Unless Otherwise Specified. |               |        | TABLE V<br>STUDS MIN. DRIVING TORQUE                                        |           |                 |            |
|                                                                                                                                                                                                                                                                                                                                                                      |               |        | Threads                                                                     |           | Torque In. Lbs. |            |
|                                                                                                                                                                                                                                                                                                                                                                      |               |        | 1/4-20                                                                      |           | 15              |            |
|                                                                                                                                                                                                                                                                                                                                                                      |               |        | 5/16-18                                                                     |           | 25              |            |
|                                                                                                                                                                                                                                                                                                                                                                      |               |        | 3/8-16                                                                      |           | 50              |            |

| TABLE VI<br>JAM NUT OR STRAIGHT THREAD O-RING BOSS |             |                 |
|----------------------------------------------------|-------------|-----------------|
| Tube Size                                          | Thread      | Torque Ft. Lbs. |
| -03                                                | 3/8 – 24    | 8 – 9           |
| -04                                                | 7/16 – 20   | 13 – 15         |
| -05                                                | 1/2 – 20    | 14 – 15         |
| -06                                                | 9/16 – 18   | 23 – 24         |
| -08                                                | 3/4 – 16    | 40 – 43         |
| -10                                                | 7/8 – 14    | 43 – 48         |
| -12                                                | 1-1/16 – 12 | 68 – 75         |
| -14                                                | 1-3/16 – 12 | 83 – 90         |
| -16                                                | 1-5/16 – 12 | 112 – 123       |
| -20                                                | 1-5/8 – 12  | 146 – 161       |
| -24                                                | 1-7/8 – 12  | 154 – 170       |
| -32                                                | 2-1/2 – 12  | 218 – 240       |

# SERVICE TABLE OF LIMITS

## PART IV – VERTICAL ENGINES

### STANDARD TORQUE (CONT.) UNLESS OTHERWISE LISTED

| TABLE VII           |                     |                                                        |         |              |         |                                                                          |         |                                                                                |        |
|---------------------|---------------------|--------------------------------------------------------|---------|--------------|---------|--------------------------------------------------------------------------|---------|--------------------------------------------------------------------------------|--------|
| METAL TUBE FITTINGS |                     |                                                        |         |              |         |                                                                          |         |                                                                                |        |
| Dash Nos.<br>Ref.   | Tubing<br>OD inches | Wrench torque for tightening AN-818 Nut (pound inches) |         |              |         |                                                                          |         | Minimum bend radii<br>measured to tubing<br>centerline. Dimension in<br>inches |        |
|                     |                     | Aluminum-alloy tubing                                  |         | Steel tubing |         | Aluminum-alloy tubing<br>(Flare MS33583) for use<br>on oxygen lines only |         |                                                                                |        |
|                     |                     | Minimum                                                | Maximum | Minimum      | Maximum |                                                                          |         |                                                                                |        |
|                     |                     | Minimum                                                | Maximum | Minimum      | Maximum | Minimum                                                                  | Maximum | Alum.<br>Alloy                                                                 | Steel  |
| -2                  | 1/8                 | 20                                                     | 30      | 75           | 85      | --                                                                       | --      | 3/8                                                                            | --     |
| -3                  | 3/16                | 25                                                     | 35      | 95           | 105     | --                                                                       | --      | 7/16                                                                           | 21/32  |
| -4                  | 1/4                 | 50                                                     | 65      | 135          | 150     | --                                                                       | --      | 9/16                                                                           | 7/8    |
| -5                  | 5/16                | 70                                                     | 90      | 170          | 200     | 100                                                                      | 125     | 3/4                                                                            | 1-1/8  |
| -6                  | 3/8                 | 110                                                    | 130     | 270          | 300     | 200                                                                      | 250     | 15/16                                                                          | 1-5/16 |
| -8                  | 1/2                 | 230                                                    | 260     | 450          | 500     | 300                                                                      | 400     | 1-1/4                                                                          | 1-3/4  |
| -10                 | 5/8                 | 330                                                    | 360     | 650          | 700     | --                                                                       | --      | 1-1/2                                                                          | 2-3/16 |
| -12                 | 3/4                 | 460                                                    | 500     | 900          | 1000    | --                                                                       | --      | 1-3/4                                                                          | 2-5/8  |
| -16                 | 1                   | 500                                                    | 700     | 1200         | 1400    | --                                                                       | --      | 3                                                                              | 3-1/2  |
| -20                 | 1-1/4               | 800                                                    | 900     | 1520         | 1680    | --                                                                       | --      | 3-3/4                                                                          | 4-3/8  |
| -24                 | 1-1/2               | 800                                                    | 900     | 1900         | 2100    | --                                                                       | --      | 5                                                                              | 5-1/4  |
| -28                 | 1-3/4               | --                                                     | --      | --           | --      | --                                                                       | --      | --                                                                             | --     |
| -32                 | 2                   | 1800                                                   | 2000    | 2660         | 2940    | --                                                                       | --      | 8                                                                              | 7      |

| TABLE VIII         |         |      |         |         |       |         |         |        |
|--------------------|---------|------|---------|---------|-------|---------|---------|--------|
| TORQUE CONVERSIONS |         |      |         |         |       |         |         |        |
| In. Lb.            | Ft. Lb. | Nm   | In. Lb. | Ft. Lb. | Nm    | In. Lb. | Ft. Lb. | Nm     |
| 5                  | 0.42    | 0.56 | 100     | 8.33    | 11.30 | 1000    | 83.33   | 113.00 |
| 10                 | 0.83    | 1.13 | 200     | 16.67   | 22.60 | 2000    | 166.70  | 226.00 |
| 20                 | 1.67    | 2.26 | 300     | 25.00   | 53.90 | 3000    | 250.00  | 339.00 |
| 30                 | 2.50    | 3.39 | 400     | 33.33   | 45.19 | 4000    | 333.30  | 451.90 |
| 40                 | 3.33    | 4.52 | 500     | 41.67   | 56.49 | 5000    | 416.70  | 564.90 |
| 50                 | 4.17    | 5.65 | 600     | 50.00   | 67.79 | 6000    | 500.00  | 677.90 |