

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

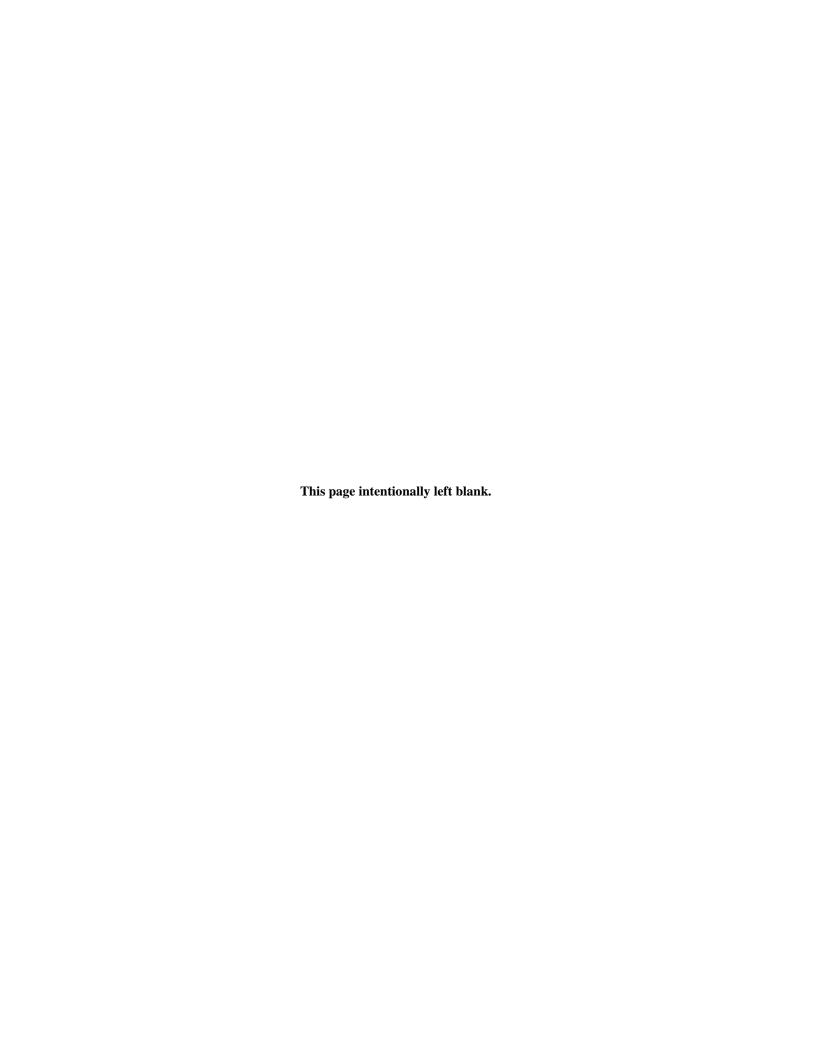
PART IV VERTICAL ENGINES (Excluding VO and IVO-360)

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.

SSP-1776-5 April 13, 2020*

^{* -} Indicates cut-off date for data retrieved prior to publication.



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. (1st 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 (2nd 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 (3rd 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 (4th and 5th 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 (6th and 7th columns)

Like the dimensions shown in the 4th and 5th 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.

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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.

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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
В	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		IO-390-C, -D
	(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,
S4	O-360-A With Gov. at Front		-J, -N, -R (Large Mains – Angle Valve)
	(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	T4	TIO-540-C, -E, -G, -H
	(IO, LIO-360-C1E6 & IO-360-A1D6)	AF	IO-720

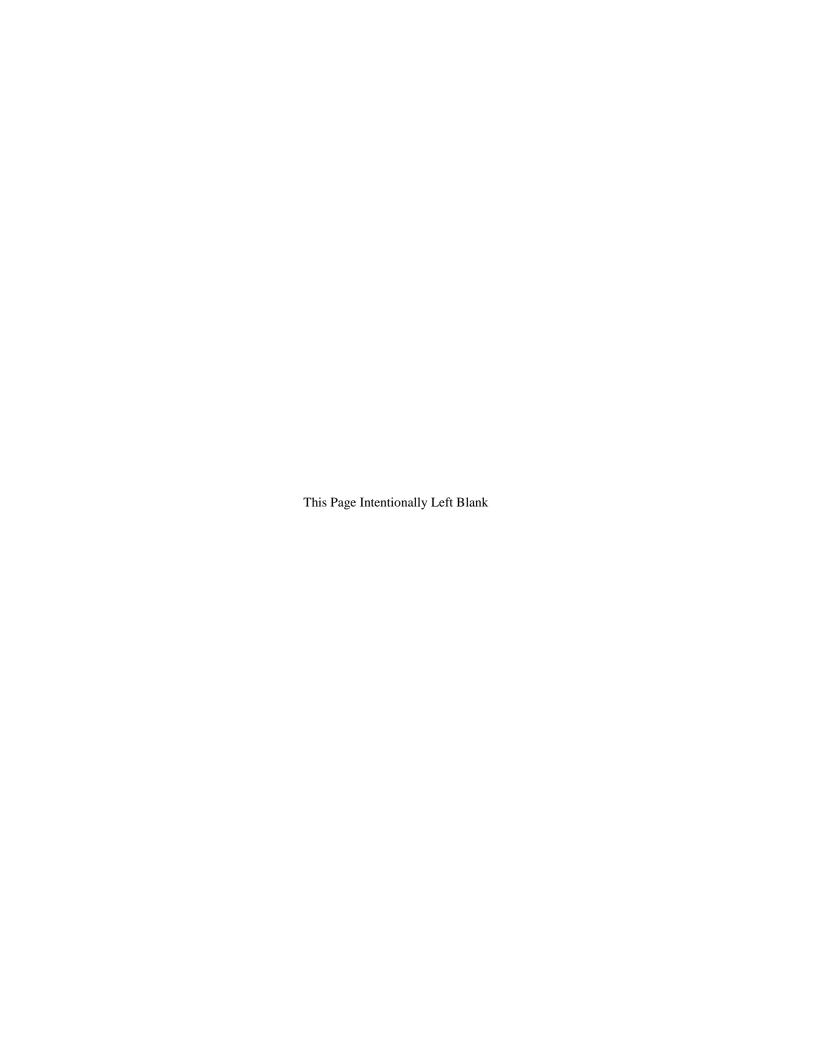
NOTE: In "Chart" column, a number appearing after a letter indicates an exception to the basic model. For example, A1 (O-235-F. –G, -J, -K, -L, -M, -N –P) is an exception to the basic model A (O-235-C, -E, -H)

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

SECTION I SECTION II SECTION IV SECTION V	500 SERIES 600 SERIES 700 SERIES 800 SERIES 900 SERIES	CRANKCASE, CRANKSHAFT & CAMSHAFT CYLINDERS GEAR TRAIN BACKLASH (GEAR TRAIN) TORQUE AND SPRINGS
(A)		ther shrink fits controlled by machining, fits that may readily be where wear does not normally occur. In each case, the fit must be held tolerance.
(B)	Side clearance or	piston rings must be measured with face of ring flush with piston.
(D)	The dimensions s the piston pin.	shown are measured at the bottom of the piston skirt at right angles to
(E)	Permissible wear on the diameter.	of the crankshaft (rod and main bearing journals) to be minus 0.0015
(L)	Loose fit; wherei	n a definite clearance is mentioned between the mating surfaces.
(T)	Tight fit; shrink o	or interference fit.
(WD)	Wide Deck Cran	kcase.

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TECHNICAL PUBLICATION REVISION

REVISION							
REVISION NO. PUBLICATION PUBLICATION NO. PUBLICATION SSP-1776-5-PT1 Service Table of Limits SSP-1776 October 28,							
SSP-1776-5-PT1	Service Table of Limits	SSP-1776	October 28, 2013				
PREVIOUS	REVISIONS	CURRENT REVISION*					
SSP-1776-5-PT1 Service Table of Limits PREVIOUS REVISIONS March 2014 1-1 July 2014 1-10 February 2016 Title Page, 1-1, 1-2, 1-3, 1-8, 1-9, 1-10, 1-11, 1-12 • Added S11 designation to Chart for IO-, AEIO-390-A engine models • Revised tappet information for Reference number 511 and 512 • Updated piston and cylinder barrel information for:		CURRENT Apri Title Page, 1-1, 1-7, 1-8, Added Serial Number ide S10 - HIO-360-A Added new engine model reference number S11 Added new Chart reference engines without S/N suffi Deleted HIO-360-E from Added new Chart reference Added new Chart reference Added new Chart reference Added new reference num in Sections I, II, and V Revised burnishing instru bushing in reference num Revised the Mfr. Min. &	REVISION* 1 2020 1-9, 1-10, 1-11, 1-34, 1-36 ntification for Chart number listing for IO-390-D to Chart ce number S13 for HIO-360-A x A Chart reference S9 ce number S14 for HIO-360-Enbers S13 and S14 as applicab ctions for connecting rod ber 600 Max. Clearance for Piston Rir ded Cylinders (Choke Barrels) in reference number 607				
Title Page, 1-1, 1-10, 1-11, 1-34 Added HIO-360-F1AD, H Added S12 designation for applicable Revised Ref. number 512 Body) for clarity Revised Piston Application numbers Added NOTE to refer to the Instruction No. SI-1037 for number applicability Deleted obsolete part numbers in Piston Deleted NOTES that refer Application Table Updated Lycoming P/N are band couplings for Ref. no. Added Ref. number 933 to	or engines il 2018 1-3, 1-7, 1-8, 1-9, 4, 1-35, 1-36, 1-37 IO-390-A, and TEO-540 to Chart or HIO-360-F1AD to tables where (Tappet Plunger Assembly and on Table to list only piston part one latest revision of Service or engine model and piston part bers and Notes associated with on Application Table ence S.I. 1243 in Piston ond Vendor P/N for one of the V-	revised item.					

Deleted obsolete part numbers for Ref. numbers 950 and 951



PART I – DIRECT DRIVE ENGINES

			Dime	nsions	Clearances	
			Mfr.		Mfr.	
			Min. &	Service	Min. &	Service
Ref.	Chart	Nomenclature	Max.	Max.	Max.	Max.
500	A	All Main Bearings and Crankshaft	1120020	1120120	.0025L	1,10110
300		This island Boarings and Crankshare			.0055L	.0060L
	B-D-G-J-S-T-Y-BD-BE-AF	Main Bearings and Crankshaft			100002	
		(Thin Wall Bearing09 Wall			.0015L	
		Approx.)			.0045L	.0060L
	B-G-J-S-T-Y-AF	Main Bearings and Crankshaft				
		(Thick Wall Bearing16 Wall			.0011L	
		Approx.)			.0041L	.0050L
	A	Diameter of Main Bearing Journal	2.3735			
		on Crankshaft	2.375	(E)		
	B-D-G-J-S-T-Y-BD-BE	Diameter of Main Bearing Journal				
		on Crankshaft	2.3745			
		(2-3/8 in. Main)	2.376	(E)		
	S1-S11-S12-T1-T3-AF	Diameter of Main Bearing Journal				
		on Crankshaft	<u>2.6245</u>			
		(2-5/8 in. Main)	2.626	(E)		
	S8-S10-S13	Diameter of Front Main Bearing				
		Journal on Crankshaft	<u>2.3750</u>			
		(2-3/8 in. Main)	2.3760	(E)		
	S1-S11-S12-T1-T3-AF	Diameter of Front Main Bearing				
		Journal on Crankshaft	<u>2.6245</u>			
		(2-5/8 in. Main)	2.6255	(E)		
500	A-B-B1-D-G*-BD-BE	Crankcase Bearing Bore Diameter				
		(All) (Thin Wall Bearing) (2-3/8	<u>2.566</u>	2.5685		
	Citati V. C. T. V.	in. Main)	2.567			
	G**-J-S-T-Y	Crankcase Bearing Bore Diameter	2 50 57	2 5000		
		(All Except Front) (Thick Wall	<u>2.6865</u>	2.6890		
	T1 T2 AE	Bearing) (2-3/8 in. Main)	2.6875			
	T1-T3-AF	Crankcase Bearing Bore Diameter	2 016	2 0105		
		(Front Only) (Thin Wall Bearing) (2-5/8 in. Main)	2.816 2.817	2.8185		
	T1-T3-AF	Crankcase Bearing Bore Diameter	2.01/			
	11-13-71	(All Except Front) (Thick Wall	2.9365	2.9390		
		Bearing) (2-5/8 in. Main)	$\frac{2.9305}{2.9375}$	2.7370		
	S1-S12-T-AF	Crankcase Bearing Bore Diameter	2.7313			
	01 012 1 AI	(All) (Thin Wall Bearing) (2-5/8	2.816	2.8185		
		in. Main)	2.817	2.0103		
	G**-J-S-T-Y	Crankcase Bearing Bore Diameter				
		(Front Only) (Thin Wall Bearing)	2.566	2.505		
	*O-320-A, -E Narrow Deck,	(2-3/8 in. Main)	$\frac{2.565}{2.567}$	2.5685		
	**O-320-A, -E Wide Deck	,,				
501	ALL	Connecting Rod Bearing and			.0008L	
		Crankshaft			.0038L	.0050L
	A-B-D-G-J-S-T-Y-BD	Diameter of Connecting Rod	2.1235			
		Journal on Crankshaft (2-1/8 in.)	2.125	(E)		
	S-T-AF	Diameter of Connecting Rod	2.2485			
		Journal on Crankshaft (2-1/4 in.)	2.250	(E)		
	A-B-D-G-J-S-T-Y-BD-BE	Connecting Rod Bearing Bore	2 2070			
		Diameter (2-1/8 in.) (Measured At	2.2870 2.2875			
		Axis 30° on Each Side)	2.2813			

PART I – DIRECT DRIVE ENGINES

			Dime	nsions	Clearances	
			Mfr.		Mfr.	
			Min. &	Service	Min. &	Service
Ref.	Chart	Nomenclature	Max.	Max.	Max.	Max.
501	S-T-AF	Connecting Rod Bearing Bore	2.4205			
		Diameter (2-1/4 in.) (Measured At	2.4203 2.4210			
		Axis 30° on Each Side)	2.4210			
502	ALL	Connecting Rod - Side Clearance			<u>.004L</u>	
					.010L	.016L
503	ALL	Connecting Rod - Alignment			.010 in 10	
504	ALL	Connecting Rod – Twist			.012 in 10	Inches
505		Crankshaft Run-Out at Center				
	4 CVII DIDED	Main Bearing				
	4 CYLINDER	Mounted on No. 1 and 4 Journals			002	002
		Max. Run-Out No. 2 Journal Mounted on No. 1 and 4			.002	.002
		Journals Max. Run-Out No. 3				
		Journal			.005	.0075
		Mounted on No. 2 and 4 Journals			.003	.0073
		Max. Run-Out No. 3 Journal				
		Max. Run Out 110. 3 Journal			.003	.0045
	6 CYLINDER	Mounted on No. 2 and 5 Journals			.005	.0013
		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			0.02	000
		M . 1 N O 14Y			.002	.002
		Mounted on No. 2 and 4 Journals				
		Max. Run-out No. 3 Journal			.003	.0045
		Mounted on No. 3 and 5			.003	.0043
		Journals Max. Run-Out No. 4				
		Journal Journal			.003	.0045
		Mounted on No. 4 and 6 Journals			.003	.0015
		Max. Run-Out No. 5 Journal				
					.003	.0045
		Mounted on No. 2 and 6 Journals				
		Max. Run-Out No. 3, 4 and 5			.005	.0075
		Journals				
506	ALL	Crankshaft and Crankcase Front			.009L	
		End Clearance			.016L	.026L
507	ALL	Clearance – Front Face of				
		Crankshaft Oil Slinger to Front				
		Face of Recess in Crankcase			<u>.002</u>	
		(Crankshaft Against Thrust Face)			.007L	(A)

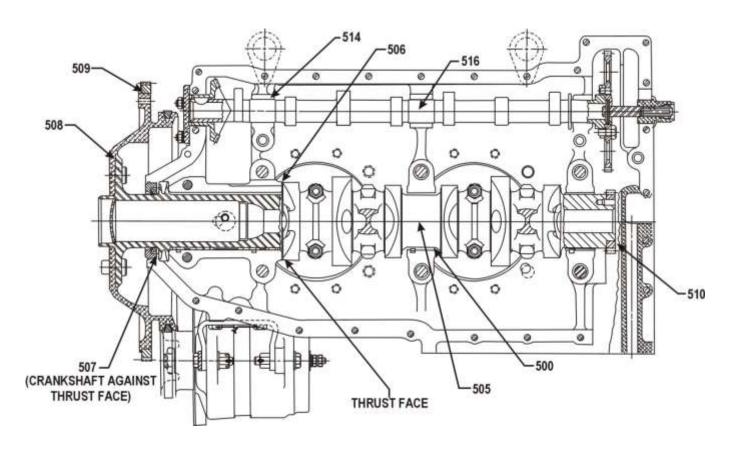
PART I – DIRECT DRIVE ENGINES

			Dime	nsions	Clear	ances
			Mfr.		Mfr.	
			Min. &	Service	Min. &	Service
Ref.	Chart	Nomenclature	Max.	Max.	Max.	Max.
508	ALL	Crankshaft – Prop. Flange				
		Run-Out			.002	.005
509	ALL	Starter Ring Gear and Support			.014T	
					.022T	(A)
510	A-B-D-G-J-S-T-Y-AF-BD-BE	Crankshaft Timing Gear and			.0005T	
		Crankshaft			.0010L	(A)
	A-B-D-G-J-S-T-Y-AF	Tappet Body and Crankcase			.0010L	00.47
511	BD-BE	Transact Data and Constant			.0033L	.004L
311	BD-BE	Tappet Body and Crankcase			.0010L .0030L	.004L
	A-B	O.D. of Tappet	.6232		.0030L	.004L
	(Solid Tappets)	O.D. of Tuppet	.6240	.6229		
	B1-D-G-J-S-T-Y-AF	O.D. of Tappet	.7169	.022)		
	(Flat Tappets)	S.D. of Tupper	.7177	.7166		
	B1-D-G-J-S-T-Y-AF	O.D. of Tappet	.8420			
	(Roller Tappets)		.8428	.8417		
	BD-BE	O.D. of Tappet	.8740			
			.8745	.8737		
	A-B	I.D. Tappet Bore in Crankcase	.6250			
	(Solid Tappets)		.6263	.6266		
	B1-D-G-J-S-T-Y	I.D. Tappet Bore in Crankcase	.7187			
	(Flat Tappets)		.7200	.7203		
	B1-D-G-J-S-T-Y-AF	I.D. Tappet Bore in Crankcase	.8437			
	(Roller Tappets)	ID To the control of	.8445	.8448		
	BD-BE	I.D. Tappet Bore in Crankcase	.8755	9777		
	BD-BE	(Small Bore Tappet)	.8773 .9545	.8776		
	DD-DE	I.D. Tappet Bore in Crankcase (Large Bore Tappet)	.9555			
512	All Models Using Roller	Tappet Plunger Assembly and	.9333		.0010L	
312	Tappets	Body – (Roller Tappets)			.0010L	.0067L
	All Models Using Straight Body	Tappet Plunger Assembly and			.0010L	
	Tappets	Body – (Straight Body Tappets)			.0047L	.0067L
	All Models Using Hyperbolic	Tappet Plunger Assembly and			.0010L	00057
	Tappets	Body – (Hyperbolic Tappets)			.0067L	.0087L
513	ALL	Tappet Socket and Body			.002L	
		(Hyperbolic Flat and Roller			.007L	.009L
		Tappets)				
514	ALL	Camshaft and Crankcase			.002L	
					.004L	.006L
515	ALL	Camshaft – End Clearance			.002L	0.4 ==
F 4 5					.009L	.015L
516	ALL	Camshaft Run-Out at Center			.000	006
517	All Models Union	Bearing Journal			.001	.006
517	All Models Using	Counterweight Bushing and Crankshaft			.0013T	(4)
518	Counterweights All Models Using	Counterweight Roller – End			.0026T .007L	(A)
318	Counterweights	Clearance			.007L .025L	.038L
519	All Models Using	Counterweight and Crankshaft –			.023L	.UJGL
	Counterweights	Side Clearance*			.003L	.017L
	*Measure below roller next to flat				.5151	.51,12

PART I – DIRECT DRIVE ENGINES

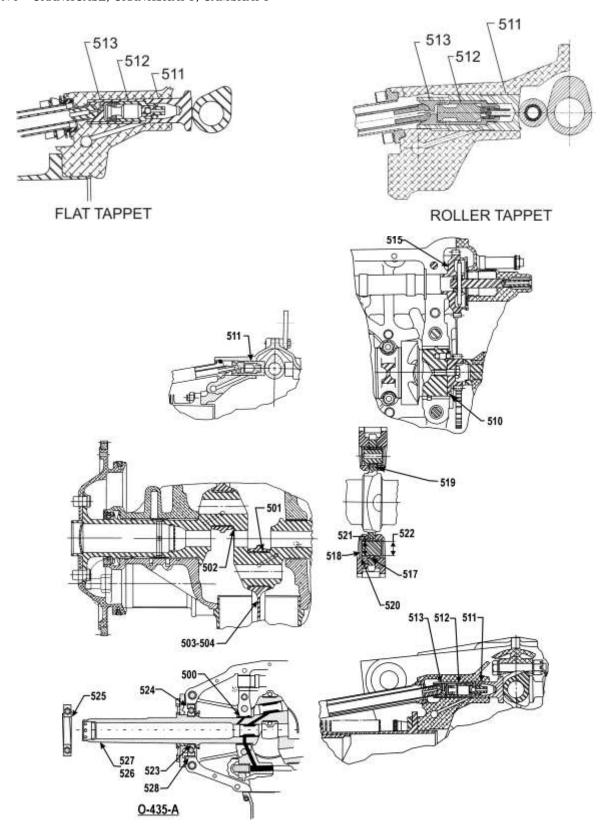
SECTION I – CRANKCASE, CRANKSHAFT, CAMSHAFT

			Dime	nsions	Clear	rances
Ref.	Chart	Nomenclature	Mfr. Min. & Max.	Service Max.	Mfr. Min. & Max.	Service Max.
520	All Models Using Counterweights	Counterweight Bore and Washer O.D.	172421	172422	.0002L .0030L	(A)
521	All Models Using Counterweights	I.D. of Counterweight Bushing	<u>.7485</u> .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			<u>.0000</u> .0012L	.002L
524	D	Thrust Bearing and Thrust Bearing Cap Clamp Fit (Shim to this Fit)			<u>.003T</u> .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			<u>.0016L</u> .0034L	.0045L



Longitudinal Section Thru Engines

PART I – DIRECT DRIVE ENGINES



Crankcase, Crankshaft, Camshaft and Related Parts

PART I – DIRECT DRIVE ENGINES

		r. Min.			
		II. IVIIII.		Mfr. Min.	
		Max.	Service	& Max.	Service
Ref. Chart Nomenclatu	ure		Max.		Max.
600 ALL Connecting Rod and	Connecting Bus	shing P/N	LW-13923	to be burnish	ed in place
Rod Bushing		shing P/N	01K28983	is <u>not</u> burnish	ed in place
ALL Finished I.D. of Conr		.1254			
Bushing		.1262			
601 A-B-D-G-J-BD Length Between Con		5.4985			
Rod Bearing Centers		5.5015			
S-T-Y-AF-BE Length Between Con		5.7485			
Rod Bearing Centers		5.7515			
602 ALL Connecting Rod Bush	hing and			<u>.0008L</u>	
Piston Pin				.0021L	.0025L
603 ALL Piston Pin and Piston	1			<u>.0003L</u>	
				.0014L	.0018L
ALL Diameter of Piston Pi		.1249			
Piston		.1254			
ALL Diameter of Piston Pi		.1241			
		.1246			
604 A-G-J-S-T-AF-BD-BE Piston and Piston Pin	Plug			.0002L	
				.0010L	.002L
A-G-J-S-T-AF-BD-BE *Diameter of Piston I		.1242			
		.1247		00057	
605 B-D-G-J-S-T-Y-AF Piston Pin and Piston	Pin Plug			.0005L	00.77
(Optional)	D: DI			.0025L	.005L
G-J-S-T-Y-AF *Diameter of Piston I		. <u>5655</u>			
D. D. CDI . D		.5665			
B-D Diameter of Piston Pi		8405			
(Thin Wall Pin)		.8415			
*See latest edition of Service Instruction No. SI-1267.	G' 1.				
606 A-B Piston Ring and Pisto				000	
Clearance (Top Ring (Plain) Full Wedge	Comp.)			.000 .004L	.006L (B)
B-D Piston Ring and Pisto	n Sida			.004L	.000L (B)
Clearance (Top Ring				.0025L	
(Chrome) Full Wedge				.0025L	.008L (B)
G-J-S-T-Y-AF-BD-BE Piston Ring and Piston				.0003L	.000L (D)
Clearance (Top Ring				.0025L	
Half Wedge	Comp.)			.0023L	.008L (B)
606 B Piston Ring and Pisto	on – Side			.003312	.0002 (1)
Clearance (2 nd Ring C				.0025L	
(Chrome) Full Wedge				.0065L	.008L (B)
A-B-D-G-J-S-T-Y-AF-BD-BE Piston Ring and Piston					
Clearance (2 nd Ring C				.000	
or Half Wedge	- ·			.004L	.006L (B)
J Piston Ring and Piston	on – Side				(-)
Clearance (3 rd Ring C				.000	
Wedge	1 //			.004L	.006L (B)
606 ALL Piston Ring and Piston	on – Side			.002L	` /
Clearance (Oil Regul				.004L	.006L (B)
A Piston Ring and Pisto				.003L	` ′
Clearance (Bottom)				.0055L	.007L(B)

PART I – DIRECT DRIVE ENGINES

SECTION II - CYLINDERS

		Dimensions		Clear	ances	
Ref.	Chart	Nomenclature	Mfr. Min. & Max.	Service Max.	Mfr. Min. & Max.	Service Max.
607	ALL	Piston Ring Gap (Compression) Plain and Chrome Cylinders (Straight Barrels)			<u>.020</u> .030	.047
	ALL	Piston Ring Gap (Compression) Nitrided Cylinders (Choke Barrels)			.045 .065	.067
	ALL	Piston Ring Gap (Oil)			.015 .040	.047
	A-T2	Piston Ring Gap (Oil Scraper) (All Barrels)			.015 .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.

		Piston Specification	s		
	Min. Pi	ston Dia.	Cylinder Barrel	Max. Clearance	
Piston Number	Top Bottom		Maximum Diameter	Piston Skirt & Cyl	
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	5.0790 5.10	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.

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.

^{* -} High Compression.

^{† -} Piston no longer available from Lycoming Engines.

PART I – DIRECT DRIVE ENGINES

			Dime	nsions	Clear	ances
			Mfr.		Mfr.	
			Min. &	Service	Min. &	Service
Ref.	Chart	Nomenclature	Max.	Max.	Max.	Max.
611	A	Exhaust Valve Seat and Cylinder			.0065T	
		Head			.010T	(A)
	B-D-G-J-S-T-Y-BD-BE	Exhaust Valve Seat and Cylinder			<u>.0045T</u>	
		Head			.008T	(A)
	S1-S2-S3-S5-S6-S7-S9-S10-	Exhaust Valve Seat and Cylinder			<u>.0075T</u>	
	S11-S12-S13-S14-T2-T3-AF	Head			.011T	(A)
	A	O.D. Exhaust Seat	<u>2.0025</u>			
			2.004			
	B-D-G-J-S-T-Y-BD-BE	O.D. Exhaust Seat	1.7395			
			1.741			
	S1-S2-S3-S5-S6-S7-S9-S10-	O.D. Exhaust Seat	<u>1.9355</u>			
	S11-S12-S13-S14-T2-T3-AF		1.937			
	A	I.D. Exhaust Seat Hole in Cylinder	1.994			
		Head	1.996			
	B-D-G-J-S-T-Y-BD-BE	I.D. Exhaust Seat Hole in Cylinder	1.733			
61.1	G1 G2 G2 G5 G5 G7 G0 G10	Head	1.735			
611	\$1-\$2-\$3-\$5-\$6-\$7-\$9-\$10-	Exhaust Seat Hole in Cylinder	1.926			
610	\$11-\$12-\$13-\$14-T2-T3-AF	Head	1.928		00705	
612	A	Intake Valve Seat and Cylinder			.0070T	(4)
	B-D-G-J-S-T-Y-AF-BD-BE	Head			.0105T	(A)
	B-D-G-J-S-1-1-AF-BD-BE	Intake Valve Seat and Cylinder Head			.0066T .010T	(A)
	A	O.D. Intake Seat	2.0965		.0101	(A)
	A	O.D. Illiake Seat	2.0905			
	A1-B-D	O.D. Intake Seat	1.9265			
	AI-B-D	G.B. Intake Seat	1.928			
	B1-C-J-S-T-Y-BD-BE	O.D. Intake Seat	2.0815			
		G.B. Intake Seat	2.083			
	S1-S2-S3-S5-S6-S7-S9-S10-	O.D. Intake Seat	2.2885			
	S11-S12-S13-S14-T2-T3-AF	0.2 / 2.3.3.3.3	2.290			
	Α	I.D. Intake Seat Hole in Cylinder	2.087			
		Head	2.089			
	A1-B-D	I.D. Intake Seat Hole in Cylinder	1.918			
		Head	1.920			
	B1-G-J-S-T-Y-BD-BE	I.D. Intake Seat Hole in Cylinder	2.073			
		Head	2.076			
	S1-S2-S3-S5-S6-S7-S9-S10-	I.D. Intake Seat Hole in Cylinder	<u>2.280</u>			
	S11-S12-S13-S14-T2-T3-AF	Head	2.282			
613	ALL	Exhaust Valve Guide in Cylinder			<u>.001T</u>	
		Head			.0025T	(A)
613	A-B-D-J	O.D. Exhaust Valve Guide	<u>.5933</u>			
			.5938			
	Y	O.D. Exhaust Valve Guide	<u>.6267</u>			
	G I G E A E DE SE		.6272			
	G-J-S-T-AF-BD-BE	O.D. Exhaust Valve Guide	<u>.6633</u>			
	C1	O.D. Enhanct Wall of C. 11	.6638			
	S1	O.D. Exhaust Valve Guide	<u>.6953</u>			
			.6958		1	

PART I – DIRECT DRIVE ENGINES

			Dime	nsions	Clearances	
Ref.	Chart	Nomenclature	Mfr. Min. & Max.	Service Max.	Mfr. Min. & Max.	Service Max.
613	A-B-D-G-J	I.D. Exhaust Valve Guide Hole in Cylinder Head	.5913 .5923			
	Y	I.D. Exhaust Valve Guide Hole in Cylinder Head	.6247 .6257			
	G-J-S-T-AF-BD	I.D. Exhaust Valve Guide Hole in Cylinder Head	.6613 .6623			
	S1	I.D. Exhaust Valve Guide Hole in Cylinder Head	.6933 .6943			
614	ALL	Intake Valve Guide and Cylinder Head			.0010T .0025T	
	ALL	O.D. Intake Valve Guide	.5933 .5938			
	ALL	I.D. Intake Valve Guide Hole in Cylinder Head	.5913 .5923			
615	A-B-D	Exhaust Valve Stem and Valve Guide			.0020L .0038L	(A)
	A1-G-J-S-T-BD-BE	Exhaust Valve Stem and Valve Guide (Parallel Valve Heads)			.0040L .0060L	(A)
	Y	Exhaust Valve Stem and Valve Guide			.0035L .0053L	(A)
	S1-S2-S3-S5-S6-S11-S12-T2- T3-AF	Exhaust Valve Stem and Valve Guide (Angle Valve Heads)			.0037L .0050L	(A)
	\$7-\$9-\$10-\$13-\$14	Exhaust Valve Stem and Valve Guide (Angle Valve Heads - Helicopter)			.0035L .0055L	(A)
	A-B-D	O.D. Exhaust Valve Stem	.4012 .4020			
	A1	O.D. Exhaust Valve Stem	.4320 .4333			
	G-J-Y	O.D. Exhaust Valve Stem	.4332 .4340			
	G-J-S-T-BD-BE	O.D. Exhaust Valve Stem (Parallel Valve Heads)	.4932 .4945	.4915		
	\$1-\$2-\$3-\$5-\$6-\$7-\$9-\$10- \$11-\$12-\$13-\$14-T2-T3-AF	O.D. Exhaust Valve Stem (Angle Valve Heads)	.4955 .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 .4050			
	A1-G-J	Finished I.D. Exhaust Valve Guide	.4370 .4380			
	Y	Finished I.D. Exhaust Valve Guide	.4375 .4385			

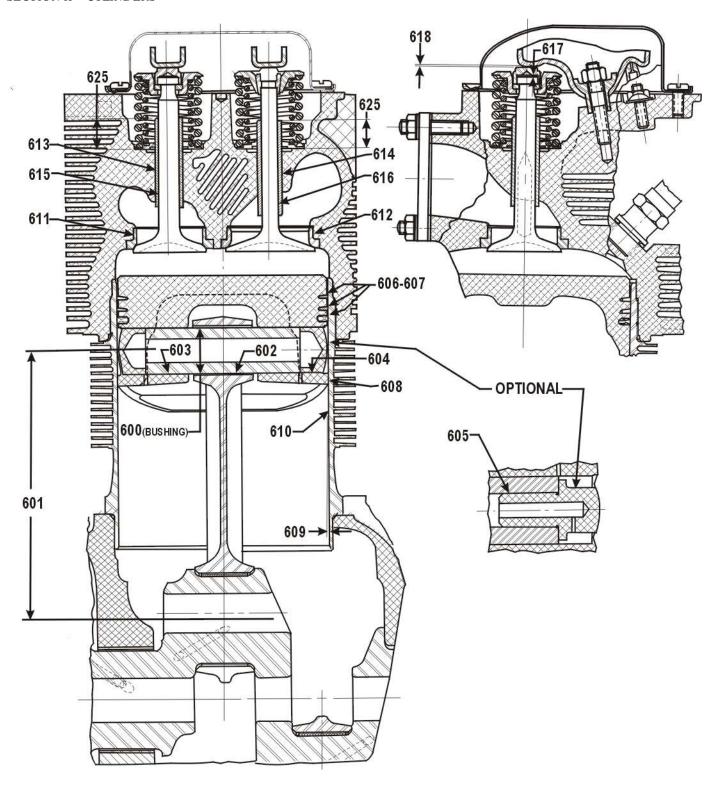
PART I – DIRECT DRIVE ENGINES

			Dime	nsions	Clear	ances
			Mfr.		Mfr.	
			Min. &	Service	Min. &	Service
Ref.	Chart	Nomenclature	Max.	Max.	Max.	Max.
615	G-J-S-T-BD-BE	Finished I.D. Exhaust Valve	.4985			
		Guide (Parallel Valve Heads)	.4995			
	S1-S2-S3-S5-S6-S11-S12-S13-	Finished I.D. Exhaust Valve	.4995			
	S14-T2-T3-AF	Guide (Angle Valve Heads)	.5005			
	S7-S9-S10	Finished I.D. Exhaust Valve	7 000			
		Guide (Angle Valve Heads –	<u>.5000</u>			
		Helicopter)	.5010			
	½ inch diameter exhaust valves m	ay have exhaust valve guides that are	003 in. over	the maximus	n inside diar	neter limit,
		e. After 300 hours of service, inside dis				
		ation up to the recommended overhaul				
		on of Service Instruction No. 1009 for				
616	ALL	Intake Valve Stem and Valve			.0010L	
		Guide			.0028L	.006L
	ALL	O.D. Intake Valve Stem	.4022			
			.4030	.4010		
616	ALL	Finished I.D. Intake Valve Guide	.4040			
			.4050			
617	ALL	Intake and Exhaust Valve and				
		Valve Cap Clearance (Rotator			.000	
		Type Small Dia. Head)			.004L	006L
618	A-B	Solid Tappet Clearance			<u>.006</u>	
		(After Engine in Run)			.012	
	A	Dry Tappet Clearance (Steel Push			.002	
		Rods)			.008	
	D-G-J-S-T-Y-AF-BD-BE	Dry Tappet Clearance			.028	
					.080	
619	A	Valve Rocker Shaft and Cylinder			<u>.0001L</u>	
		Head (No Bushing)			.0013L	.0025L
619	B-D-J-S-T-Y	Valve Rocker Shaft and Valve			.0001L	
		Rocker Bushing (Parallel Valve			.0013L	.0025L
		Heads)			.00102	.00202
	S1-S2-S3-S5-S6-S7-S9-S10-	Valve Rocker Shaft and Valve			.0001L	
	S11-S12-S13-S14-T2-T3-AF	Rocker Bushing (Angle Valve			.0013L	.0025L
ļ		Heads)				
619	A	Finished I.D. of Valve Rocker				
		Shaft Bores in Cylinder Head	<u>.6246</u>			
		(No Bushings)	.6261	.6270		
619	B-D-G-J-S-T-Y	Finished I.D. of Valve Rocker				
		Shaft (Bushing) in Cylinder Head	<u>.6246</u>			
		(Parallel Valve Heads)	.6261	.6270		
	\$1-\$2-\$3-\$5-\$6-\$7-\$9-\$10-	Finished I.D. of Valve Rocker				
	S11-S12-S13-S14-T2-T3-AF	Shaft (Bushing) in Cylinder Head	<u>.6246</u>	6050		
		(Angle Valve Heads)	.6261	.6270	000==	
620	ALL	Valve Rocker Shaft and Valve			.0007L	66.4-
		Rocker Bushing			.0017L	.004L
	ALL	Finished I.D. of Rocker Arm	<u>.6252</u>	6050		
	ATT	Bushing	.6263	.6270		
	ALL	O.D. of Valve Rocker Shaft	<u>.6241</u>	6001		
			.6245	.6231		

PART I – DIRECT DRIVE ENGINES

			Dime	nsions	Clear	ances
Ref.	Chart	Nomenclature	Mfr. Min. & Max.	Service Max.	Mfr. Min. & Max.	Service Max.
621	ALL	Valve Rocker Bushing and	Bushing M			
-522		Valve Rocker	Burnished	In Place	00000	I
622	ALL	Valve Rocker Shaft Bushing			.0022T .0038T	(A)
	ALL	and Cylinder Head Valve Rocker Shaft Bushing	.7380		.00381	(A)
	ALL	Hole in Cylinder Head	.7388			
623	A-B-D-G-J-S-T-Y	Valve Rocker and Cylinder	1,000			
		Head - Side Clearance			<u>.005L</u>	
		(Parallel Valve Heads)			.013L	.016L
	\$1-\$2-\$3-\$5-\$6-\$7-\$9-\$10-	Valve Rocker and Cylinder			<u>.002L</u>	
	S11-S12-S13-S14-T2-T3-AF	Head – Side Clearance			.020L	0241
624	A-B-J	(Angle Valve Heads) Push Rod and Ball End			.0005T	.024L
024	17 D-9	I don Not and Dan End			.0025T	(A)
625	A	Intake and Exhaust Valve	<u>.705</u>		.00201	(12)
		Guide Height	.725			
	ALL	Intake Valve Guide Height	<u>.705</u>			
		(Parallel Valve Heads)	.725			
	ALL EXCEPT O-235	Exhaust Valve Guide height	<u>.765</u>			
	ALL	(Parallel Valve Heads) Intake and Exhaust Valve Guide	.785 .914			
	ALL	height (Angle Valve Heads)	.954			
		norgae (ringre varve riedas)				
		MEASURE VALVE GUIDE HE FROM THE VALVE SPRING S COUNTERBORE IN THE CYI HEAD TO THE TOP OF VALV GUIDE.	SEAT LINDER			

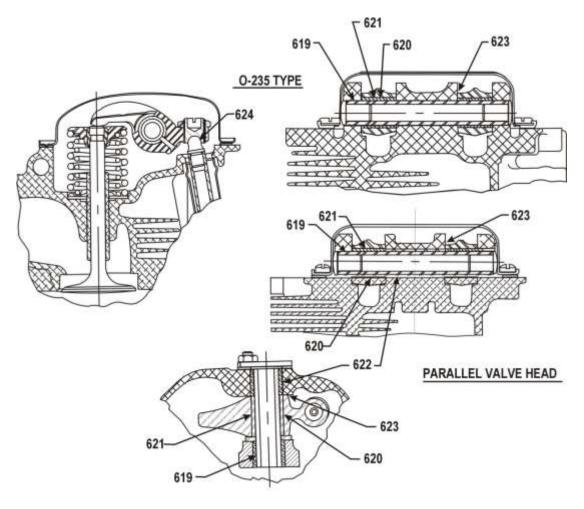
PART I – DIRECT DRIVE ENGINES

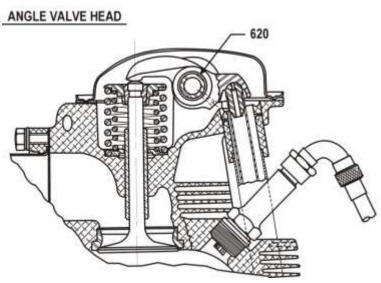


Cylinder, Piston and Valve Components

PART I – DIRECT DRIVE ENGINES

SECTION II – CYLINDERS





Cylinder, Piston and Valve Components

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PART I – DIRECT DRIVE ENGINES

SECTION III – GEAR TRAIN

			Dime	nsions	Clear	ances
			Mfr.		Mfr.	
			Min. &	Service	Min. &	Service
Ref.	Chart	Nomenclature	Max.	Max.	Max.	Max.
OIL PU	<i>JMP</i>					
700	ALL	Oil Pump Drive Shaft and Oil			<u>.0010L</u>	
		Pump Body or Cover			.0025L	.004L
701	A-B-D-G-J-S-T-AF	Oil Pump Drive Shaft and			<u>.0015L</u>	
		Accessory Housing			.0030L	.006L
	Y	Oil Pump Drive Shaft and			<u>.0015L</u>	00.47
	77.77	Accessory Case			.0030L	.006L
	BD-BE	Oil Pump Drive Shaft and			.0010L	0041
702	S T AE (DUAL MACNETO)	Crankcase Oil Pump Drive Shaft – End			.0025L	.004L
702	S-T-AF (DUAL MAGNETO)	Clearance			<u>.015L</u> .050L	.065L
	BD-BE	Oil Pump Drive Shaft – End			.017L	.003L
		Clearance			.037L	.047L
703	A-B-D-G-J-S-T-Y-AF	Oil Pump Impellers – Diameter			.002L	
		Clearance			.006L	.008L
	BD-BE	Oil Pump Impellers – Diameter			.0035L	
		Clearance			.0075L	.009L
704	ALL (EXCEPT BD-BE)	Oil Pump Impellers – Side			<u>.002L</u>	
		Clearance			.0045L	.005L
	BD-BE	Oil Pump Impellers – Side			<u>.003L</u>	00.54
	A C A DDI I C A DI E	Clearance	622		.005L	.006L
	AS APPLICABLE	Width of Oil Pump Impellers	<u>.622</u> .624	.621		
	AS APPLICABLE	Width of Oil Pump Impellers	.747	.021		
	TIS THE ELECTION	with or on rump impeners	.749	.746		
	AS APPLICABLE	Width of Oil Pump Impellers	.995			
			.997	.994		
	BD-BE	Width of Oil Pump Impellers	<u>.622</u>			
			.623	.620		
705	S-T-AF	Oil Pump Impeller and Idler Shaft			<u>.0010L</u>	
	(DUAL MAGNETO)				.0025L	.004L
	A-B-D-G-J-S-T-Y-AF	Oil Pump Impeller and Idler Shaft			.001T	(4)
	BD-BE	(Alum. and Sinterbond)			.003T	(A)
	BD-BE	Oil Pump Impeller and Idler Shaft			<u>.002T</u> .004T	(A)
706	A-B-D-G-J-S-T-Y-AF	Oil Pump Idler Shaft and Oil			.0041 .0005L	(A)
, 00		Pump Body			.0020L	.003L
	BD-BE	Oil Pump Idler Shaft and Oil			.0010L	
		Pump Body			.0025L	.003L
	S-T-AF (DUAL MAGNETO)	Oil Pump Idler Shaft and Oil			.0000	
		Pump Body			.0015T	(A)
707	A-B-D-G-J-S-T-Y-AF	Oil Pump Idler Shaft and			<u>.0010L</u>	
		Accessory Housing			.0025L	.0035L
	BD-BE	Oil Pump Idler Shaft and			.0010L	00251
700	G2 52	Crankcase			.0025L	.0035L
708	G2-S2	Scavenge Pump Drive Shaft and Adapter			.0010L .0025L	.004L
709	G2-S2	Scavenge Pump – End Clearance			.0023L .000	.004L
109	02.02	Scavenge I ump – End Cicarance			.045L	.060L
L	1		1	1	.0 10L	.0001

PART I – DIRECT DRIVE ENGINES

SECTION III – GEAR TRAIN

			Dime	nsions	Clear	ances
			Mfr.		Mfr.	
- 0	CO.		Min. &	Service	Min. &	Service
Ref.	Chart	Nomenclature	Max.	Max.	Max.	Max.
SCAVE	ENGE PUMP					
710	G2-S2	Scavenge Pump Impellers –			<u>.007L</u>	
		Diameter Clearance			.011L	.014L
711	G2-S2	Scavenge Pump Impellers – Side Clearance			<u>.003L</u> .005L	.006L
	G2-S2	Width of Impellers	1.496 1.498	1.495		
712	G2-S2	Scavenge Pump Impellers and Idler Shaft			.0010L .0025L	.004L
713	G2-S2	Scavenge Pump Body and Idler Shaft			<u>.0000</u> .0015T	(A)
714	S-T4-AF (WIDE DECK)	Turbocharger Scavenge Pump Drive and Adapter			.0010L .0025L	.004L
715	S-T4-AF (WIDE DECK)	Turbocharger Scavenge Pump Shaft and Adapter			.0010L .0020L	.0035L
716	S-T4-AF (WIDE DECK)	Gerotor Pump – Rotor – Side Clearance			.0020L .0015L .003L	.0033L
717	S-T4-AF (WIDE DECK)	Gerotor Pump Housing and			<u>.0005L</u>	
718	S-T4-AF (WIDE DECK)	Adapter Turbocharger Scavenge Pump –			.0020L .0055L	(A)
	T4 (DUAL MAGNETO)	End Clearance Turbocharger Scavenge Pump –			.0365L .0105L	.0415L
FUEL	DUMP	End Clearance			.0395L	.0445L
FUEL .	1	ACE ID DI I			00151	
719	A-B-D-G-J-S-T	AC Fuel Pump Plunger and Accessory Housing			.0015L .003L	.005L
720	J-S-T-AF	Crankshaft Idler Gear and Crankshaft Idler Gear Shaft			<u>.001L</u> .003L	.005L
721	S-T-AF (DUAL MAGNETO)	Crankshaft Idler Gear Shaft and Accessory Housing			<u>.0020L</u> .0035L	.0065L
	S-T-AF (DUAL MAGNETO)	Crankshaft Idler Gear Shaft and Crankcase			.0020L .0035L	.0065L
722	S-T-AF	AN Fuel Pump Idler Gear and Shaft			.003L .003L	.005L
723	S-T-AF	AN Fuel Pump Idler Shaft and			<u>.0020L</u>	
	(DUAL MAGNETO) S-T-AF	Accessory Housing and Crankcase AN Fuel Pump Idler Shaft and			.0035L .0020L	.0065L
	(DUAL MAGNETO)	Crankcase			.0020L .0035L	.0065L
724	A-B	Crankshaft Idler Gear – End Clearance			.003L .043L	.058L
	G-J-S-Y	Crankshaft Idler Gear – End Clearance			.043L .005L .040L	
	T-AF	Crankshaft Idler Gear – End			<u>.007L</u>	.055L
	S (DUAL MAGNETO)	Clearance Crankshaft Idler Gear – End			.037L .020L	.052L
	T-AF (DUAL MAGNETO)	Clearance Crankshaft Idler Gear – End			.030L .015L	.040L
		Clearance			.038L	.046L

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PART I – DIRECT DRIVE ENGINES

SECTION III – GEAR TRAIN

			Dimensions		Clear	rances
Ref.	Chart	Nomenclature	Mfr. Min. & Max.	Service Max.	Mfr. Min. & Max.	Service Max.
	PUMP (CONT.)	Nomenciature	Max.	Max.	wax.	Max.
725	S	AN Fuel Pump Idler Gear – End			.010L	
123	3	Clearance			.045L	.055L
	T-AF	AN Fuel Pump Idler Gear – End			.002L	.033E
		Clearance			.018L	.024L
	S-T-AF	AN Fuel Pump Idler Gear – End			<u>.015L</u>	
	(DUAL MAGNETO)	Clearance			.038L	.045L
726	S-T-Y-AF	AN Fuel Pump Drive Shaft Gear			<u>.0010L</u>	
		and Adapter			.0025L	.004L
727	S	AN Fuel Pump Drive Shaft Gear –			<u>.035L</u>	0501
	T AE	End Clearance			.069L	.079L
	T-AF	AN Fuel Pump Drive Shaft Gear – End Clearance			<u>.044L</u> .081L	0011
	T-AF	AN Fuel Pump Drive Shaft Gear –			.035L	.091L
	(DUAL MAGNETO)	End Clearance			.033L .073L	.083L
	Y	AN Fuel Pump Drive Shaft Gear –			.000L	.063L
		End Clearance			.067L	.075L
COVE	RNOR & HYDRAULIC PUMP	End Cicurance			.007E	.073E
	1	Front Governor Drive Idler Shaft			00101	1
728	T-AF (NARROW DECK)	(Both Ends) and Crankcase			.0010L .0025L	.004L
729	G1-G2-S2-S4-S6-T-AF	Front Governor Idler Gear and			.0023L .0010L	.004L
129	(WIDE DECK)	Shaft			.0025L	.004L
730	BD-BE	Front Governor Drive Gear and			.0010L	.001E
750		Crankcase			.0025L	.004L
	BD-BE	Front Governor Drive Gear and			.0005L	
		Camshaft			.0025L	.004L
731	G1-G2-S-T-AF	Front Governor Gear and			<u>.0010L</u>	
		Crankcase			.0025L	.004L
	BD	Front Governor Gear and			<u>.0010L</u>	
		Crankcase			.0030L	.004L
732	G1-G2-S-T-AF	Front Governor Gear – End			.008L	0211
	BD-BE	Clearance			.016L	.021L
	BD-BE	Front Governor Gear – End Clearance			.0045L .0165L	.021L
733	G-J-S	Rear Governor Gear and Adapter			.0010JL	.021L
133	G-3-5	Real Governor Gear and Adapter			.0025L	.005L
	G-S	Rear Governor Gear and			.0010L	.0022
	(DUAL MAGNETO)	Accessory Housing			.0025L	.005L
734	G-J-S	Rear Governor Gear – End			.002L	
		Clearance			.024L	.034L
	G-S	Rear Governor Gear – End			<u>.002L</u>	
	(DUAL MAGNETO)	Clearance			.037L	.044L
735	T-AF	Hydraulic Pump Gear and Adapter			<u>.0010L</u>	
					.0025L	.004L
1	T-AF (DUAL MAGNETO)	Hydraulic Pump Gear and			.0010L	00.41
726	TAE	Accessory Housing			.0025L	.004L
736	T-AF	Hydraulic Pump Gear – End Clearance			.010L .066L	.076L
1	T-AF (DUAL MAGNETO)	Hydraulic Pump Gear – End			.007L	.U/UL
1	1 M (DUAL MAGNETO)	Clearance			.032L	.039L
L	1	Sieurunee	İ	l .	.002	.0071

PART I – DIRECT DRIVE ENGINES

SECTION III – GEAR TRAIN

Ref. Chart Nomenclature	Mfr.		N/C.	
	3.71		Mfr.	
	Min. &	Service	Min. &	Service
THE CHILL A THE CHILD CETTED	Max.	Max.	Max.	Max.
VACUUM & TACHOMETER				
737 A-B-G-J-S-T-Y-AF Vacuum Pump Gear and	Adapter		<u>.0010L</u>	
			.0030L	.0045L
737 S-T-AF Vacuum Pump Gear and			.0010L	00.41
(DUAL MAGNETO) Accessory Housing 737 D Vacuum Pump Gear and			.0025L .0010L	.004L
Accessory Housing			.0010L .0025L	.006L
738 A-B-G-J-S-T-AF Vacuum Pump Gear – E	nd		.010L	.000L
Clearance	iid		.057L	.075L
D Vacuum Pump Gear – E	nd		.003L	
Clearance			.020L	.030L
Y Vacuum Pump Gear – E	nd		.000	
Clearance			.067L	.075L
S Vacuum Pump Gear – E	nd		<u>.012L</u>	
(DUAL MAGNETO) Clearance			.044L	.055L
T-AF Vacuum Pump Gear – E	nd		<u>.017L</u>	0.501
(DUAL MAGNETO) Clearance	1		.039L	.050L
739 A-B-Y Tachometer Drive Shaft Adapter	and		<u>.0015L</u> .0035L	.006L
BD-BE Tachometer Drive Shaft	and		.0033L .0010L	.000L
Adapter	and		.0050L	.0065L
739 D-G-J-S-T-AF Tachometer Drive Shaft	and		.0015L	.00022
Accessory Housing			.0035L	.006L
740 G-J-S Vacuum Pump Gear and	Adapter		.0010L	
(DUAL DRIVE)			.0025L	.004L
741 G-J-S Vacuum Pump Gear – E	nd		.000	
(DUAL DRIVE) Clearance			.017L	.027L
742 G-J-S Idler Gear and Shaft			.0010L	0051
(DUAL DRIVE) 743 G-J-S Idler Gear – End Cleara			.0030L	.005L
(DUAL DRIVE)	ice		<u>.021L</u> .041L	.060L
744 G-J-S Propeller Governor Gear	r and		.0013L	.000L
(DUAL DRIVE) Adapter	unu		.0028L	.005L
G-J-S Hydraulic Pump Gear ar	nd Adapter		.0013L	
(DUAL DRIVE)	1		.0028L	.005L
745 G-J-S Propeller Governor or H	ydraulic		.000	
(DUAL DRIVE) Pump – End Clearance			.054L	.074L
MAGNETO, GENERATOR, STARTER				
746 T Magneto Bearing and G	ear		<u>.0005T</u>	
			.0001L	.0005L
746 D Magneto Bearing and G	ear		.0008T	000 ==
747 T	1		.0001L	.0005L
747 T Magneto Bearing and Co	rankcase		.0002T	(4)
747 D Magneto Drive Bearing	and		.0007L .0006T	(A)
Adapter	and		.00001 T8000.	(A)
748 S7 Magneto Bearing and G	ear		.0001T	(11)
inaghete Bearing and G			.0010T	(A)

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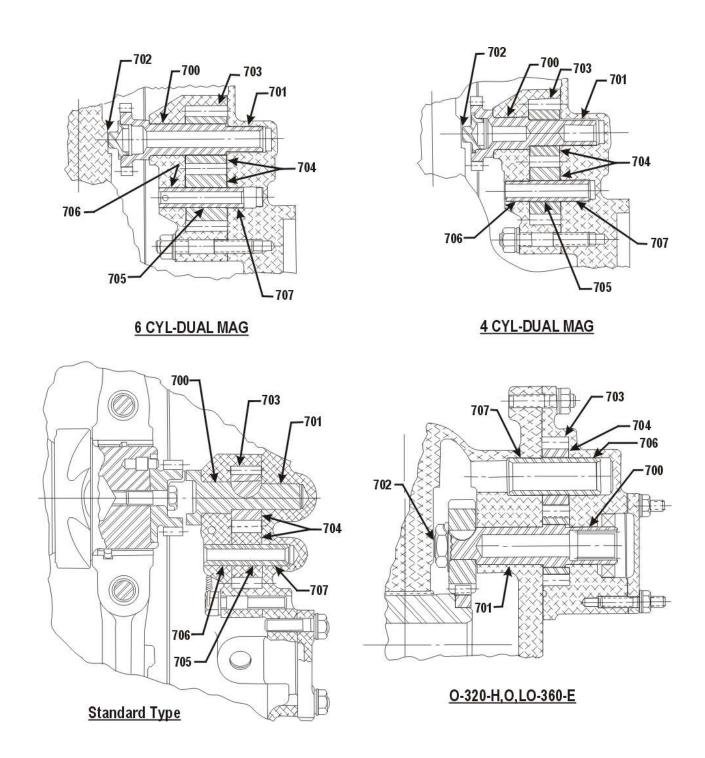
PART I – DIRECT DRIVE ENGINES

SECTION III – GEAR TRAIN –

				nsions	Clearances	
			Mfr.		Mfr.	
D.C	CI 4	NT 1.4	Min. &	Service	Min. &	Service
Ref.	Chart	Nomenclature	Max.	Max.	Max.	Max.
	ETO, GENERATOR, STARTER	<u> </u>				
749	S7	Magneto Bearing and Adapter			<u>.000</u> .0012L	.0015L
750	S-T-AF (DUAL MAGNETO)	Magneto Drive Gear and Crankcase			<u>.0010L</u> .0025L	.003L
751	S-T-AF (DUAL MAGNETO)	Magneto Drive Gear – End Clearance			.005L .073L	.083L
752	AF	Magneto Drive Gear and Shaft			<u>.001L</u>	
753	BD-BE	Magneto Drive Gear and			.003L .001L	.005L
754	Y	Crankcase Bushing Magneto Shaft Gear and Magneto			.003L .001L	.005L
755	Y	Case Magneto Shaft Gear and Support			.003L .001L	.005L
756	Y	Assembly Magneto Shaft Gear and			.003L	.005L
,,,,	-	Accessory Drive Shaft Gear – End Play			<u>.0075L</u> .0125L	.015L
757	Y	Accessory Drive Shaft Gear and Support Assembly			<u>.001L</u> .003L	.005L
758	S	Magneto Gear and Bushing (S4LN-21 and S4LN-1227)			<u>.0005L</u> .0020L	.0035L
	T	Magneto Gear and Bushing (S6LN-21 & S6LN-1227)			<u>.0015L</u> .0035L	.0055L
	T-AF (DUAL MAGNETO)	Magneto Gear and Bushing			.0015L .0035L	.0055L
7095	BD-BE	Bushing – Magneto Drive and Crankcase			<u>.0025T</u> .0045T	(A)
759	D	Generator Gear Bushing and Generator Gear			.0020T .0035T	(A)
760	D	Generator Gear Bushing and Generator Drive Coupling Adapter			.001L .0028L	.005L
761	D	Bendix Drive Gear Bushing and Crankcase			.0025T .0025T	(A)
762	D	Bendix Drive Gear and Bendix Drive Gear Bushing			.0010L .0025L	.005L
763	D	Bendix Drive Shaft and Bendix			.0025L .003L .005L	
764	D	Drive Housing Bendix Drive Shaft – End			.000	.010L
		Clearance			.0059L	.080L

PART I – DIRECT DRIVE ENGINES

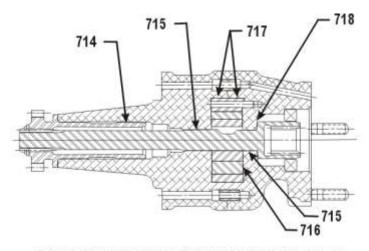
SECTION III – GEAR TRAIN



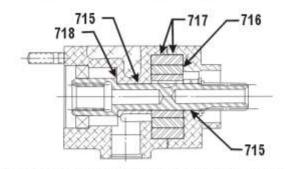
Oil Pumps

PART I – DIRECT DRIVE ENGINES

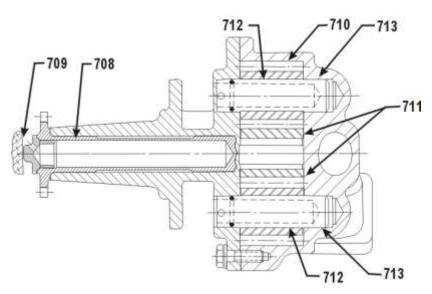
SECTION III – GEAR TRAIN



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



DUAL MAG TURBO SCAVENGE PUMP & HYD. PUMP

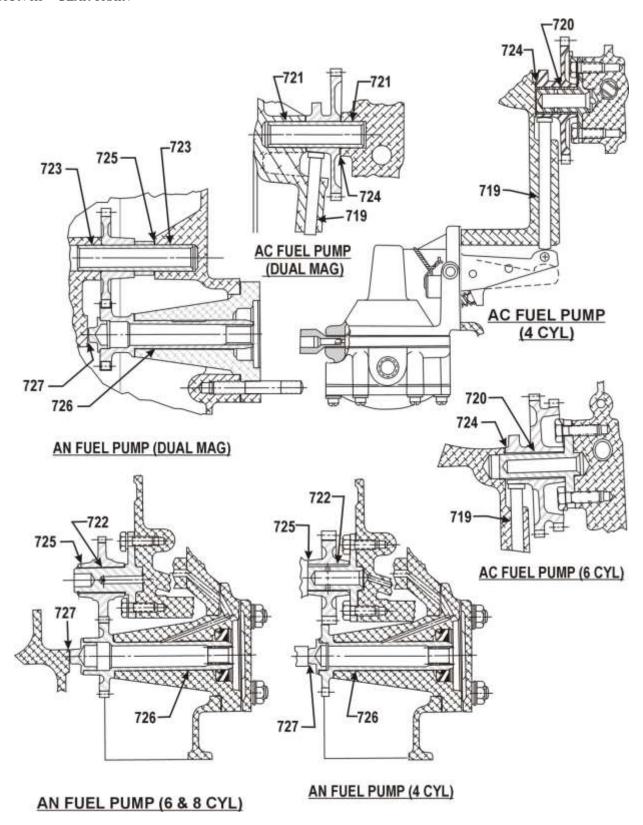


SCAVENGE PUMP AIO 320 & AIO-360

Scavenge Pumps

PART I – DIRECT DRIVE ENGINES

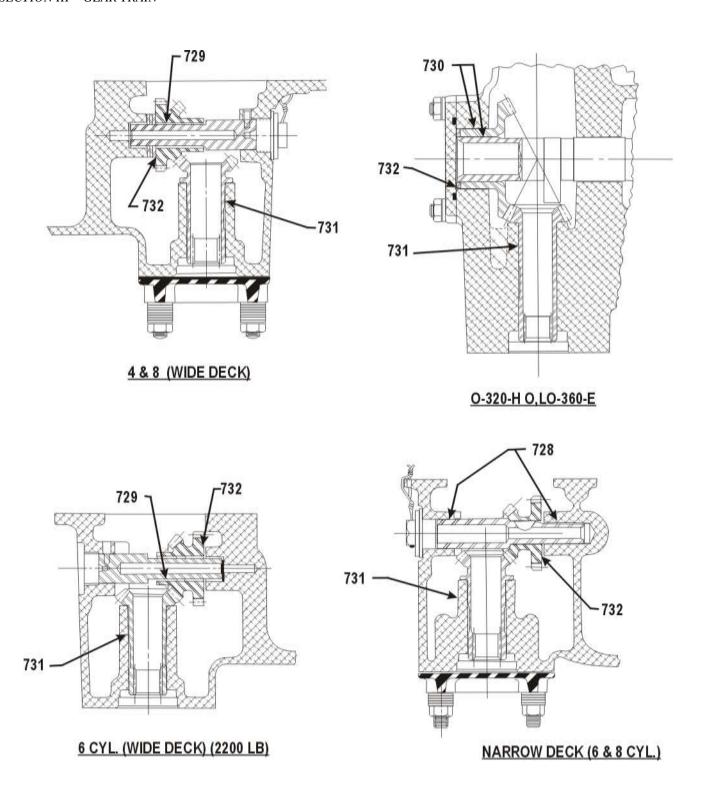
SECTION III – GEAR TRAIN



Fuel Pumps

PART I – DIRECT DRIVE ENGINES

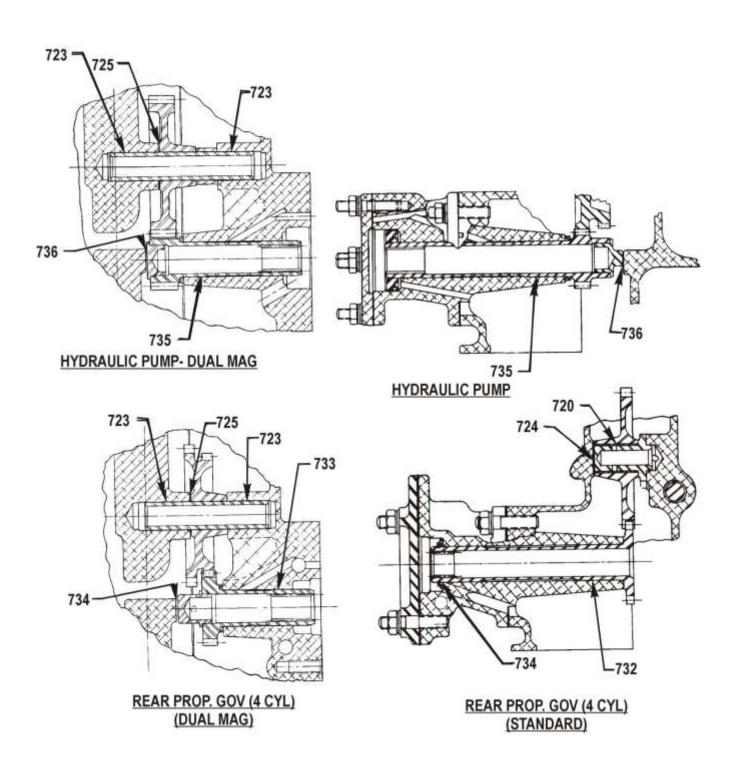
SECTION III – GEAR TRAIN



Front Governor

PART I – DIRECT DRIVE ENGINES

SECTION III – GEAR TRAIN

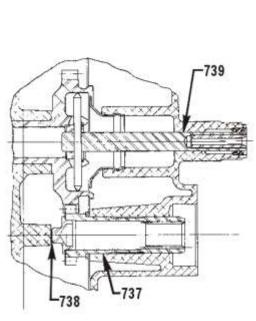


Rear Governor and Hydraulic Pumps

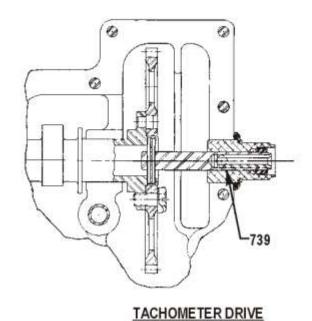
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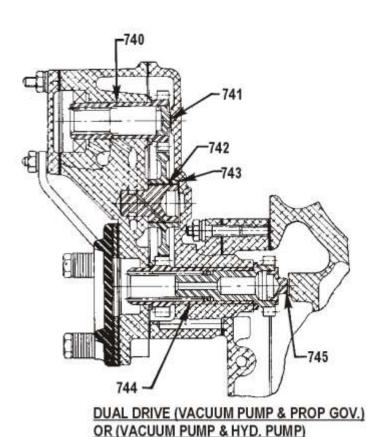
PART I – DIRECT DRIVE ENGINES

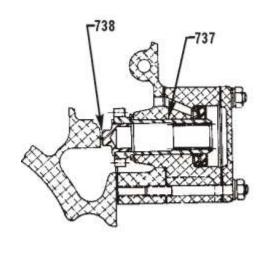
SECTION III – GEAR TRAIN



VACUUM PUMP & TACHOMETER







VACUUM PUMP

PART I – DIRECT DRIVE ENGINES

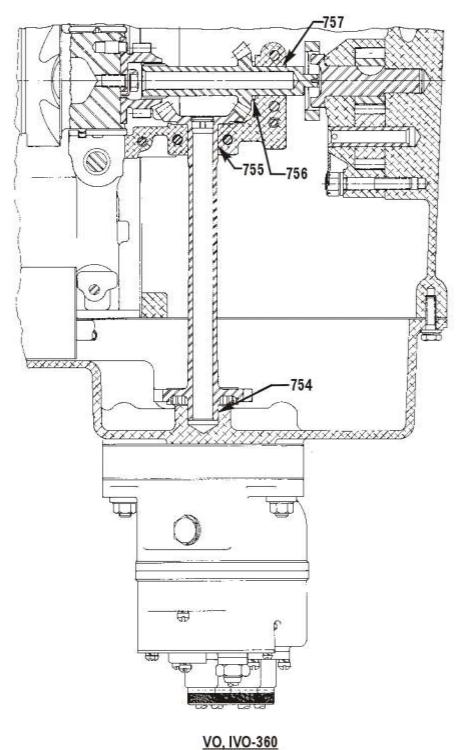
SECTION III – GEAR TRAIN -758 747 O-435-A 746 ACCESSOR MAGNETO HSG 6 CYLINDER HIO-360-D TYPE 752 753 7095 **8 CYLINDER** O-320-H, O, LO-360-E 758 4 CYL. (S4LN-21 & S4LN-1227) 750 DUAL MAG (6 & 8 CYL.) 4 CYL. DUAL MAG

Accessory Drives: Magnetos Generator and Starters

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PART I – DIRECT DRIVE ENGINES

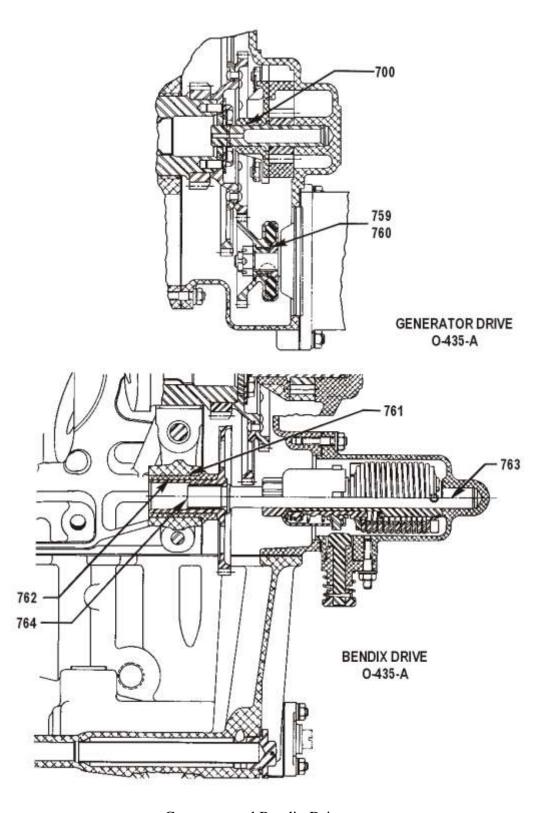
SECTION III – GEAR TRAIN



Accessory Drives: Magnetos

PART I – DIRECT DRIVE ENGINES

SECTION III – GEAR TRAIN



Generator and Bendix Drive

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PART I – DIRECT DRIVE ENGINES

SECTION IV – BACKLASH

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

PART I – DIRECT DRIVE ENGINES

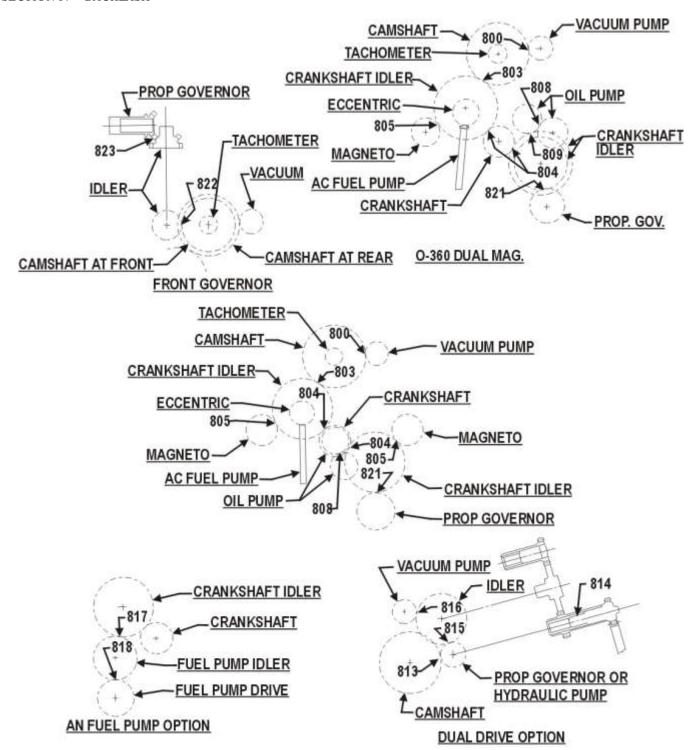
SECTION IV – BACKLASH

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

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PART I – DIRECT DRIVE ENGINES

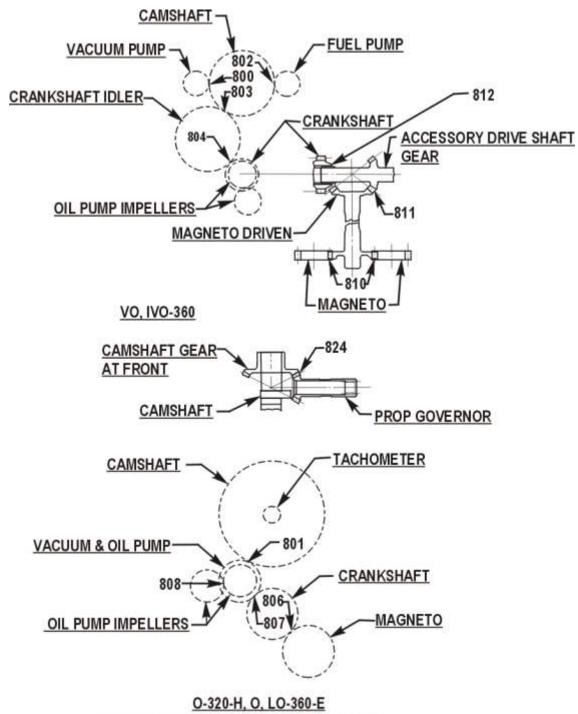
SECTION IV - BACKLASH



O-235, 0320, O-340 &O-360 ALL VIEWS SHOWN FROM REAR OF ENGINE

PART I – DIRECT DRIVE ENGINES

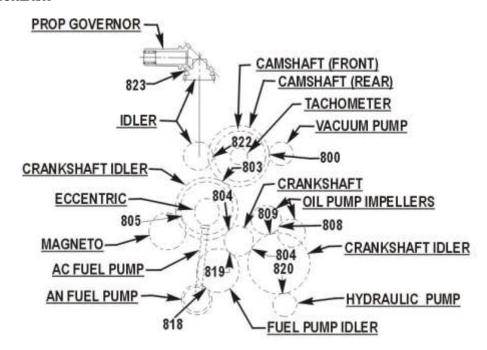
SECTION IV - BACKLASH



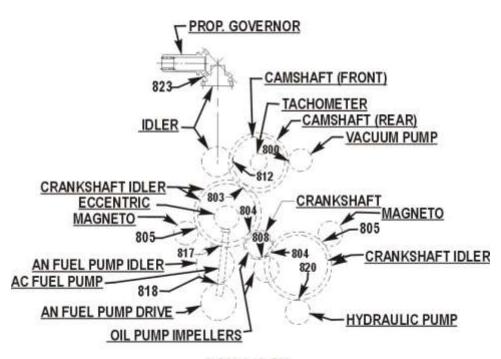
ALL VIEWS SHOWN FROM REAR OF ENGINE

PART I – DIRECT DRIVE ENGINES

SECTION IV - BACKLASH



0-540 & 10-720 DUAL MAG

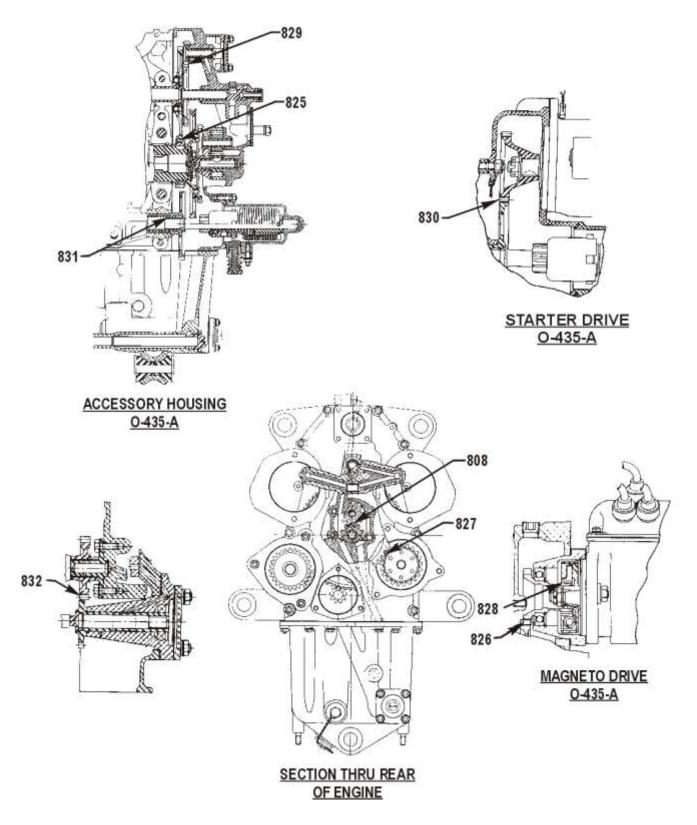


0-540 & 10-720

ALL VIEWS SHOWN FROM REAR OF ENGINE

PART I – DIRECT DRIVE ENGINES

SECTION IV - BACKLASH



PART I – DIRECT DRIVE ENGINES

Ref.	Chart	Thread Size	Nomenclature	Torque Limits
900	A-B-D-G-S-T-Y-BD-BE	3/8-24	Connecting Rod Nuts	480 inlbs
	J	3/8-24	Connecting Rod Nuts	360 inlbs
	\$1-\$3-\$5-\$6-\$7-\$9-\$11-\$12- \$14-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 inlbs
902	BD-BE	5/16-24	Rocker Stud Nut	150 inlbs.
903	ALL (AS APPLICABLE) (EXCEPT S7)	3/8-24	Magneto Nut (To attach drive member to magneto) – Bendix – Sintered Bushing – Gray	120-150 inlbs.
	ALL (AS APPLICABLE)	3/8-24	Magneto Nut (To attach drive member to magneto) – Bendix – Steel Bushing	170-300 inlbs.
	A-G-S	3/8-24	Magneto Nut (To attach drive member to magneto) – Slick	120-300 inlbs.
	S7	1/2-20	Magneto Nut (To attach drive member to magneto)	170-300 inlbs.
904	ALL	10-32	Magneto Plate Screws (To attach ignition cable outlet plate to magneto)	15 inlbs.
905	ALL (using a silicone gasket)	1/4-20	Rocker Box Screws	35 inlbs.
	ALL (using a cork gasket)	1/4-20	Rocker Box Screws	50 inlbs.
906	ALL	5/16-18	Exhaust Port Studs	40 inlbs. min.
907	ALL	18MM	Spark Plugs	420 inlbs.
908	ALL	1/8-27 NPT	Fuel Pump Vent Fitting (Approximately two turns beyond finger tight)	96 inlbs.
909	ALL	5/8-32	Alternator Pulley Nut	450 inlbs.
910	ALL	1/4-28	Alternator Output Terminal Nut	85 inlbs.
911	ALL	10-32	Alternator Auxiliary Terminal Nut	30 inlbs.
912	ALL	5/16-24	Starter Terminal Nut	24 inlbs.
913	ALL (AS APPLICABLE)	1/16-27 NPT	Piston Cooling Nozzle in Crankcase	100 inlbs.
914	Y-S-T-AF	1/8-27 NPT	Injector Nozzle in Cylinder Head	60 inlbs.
915	ALL (AS APPLICABLE)	3/4-16	Oil Filter Bolt (AC Can and Element Type)	300 inlbs
	ALL (AS APPLICABLE)	13/16-16	Oil Filter (Throw-Away Type)	240 inlbs.
	ALL (AS APPLICABLE)	3/4-16	Converter Stud	720 inlbs)
916	ALL (AS APPLICABLE)	3/4-18 NPT	Carburetor Drain Plug	144 inlbs.
917	ALL (AS APPLICABLE)	1.00-14	Oil Cooler Bypass Valve	300 inlbs.

PART I – DIRECT DRIVE ENGINES

New Ref.	Chart	Thr	ead Size		Nomenclature			Torque Limits	
918	ALL (AS APPLICABLE)	1-1/4-12	2		Oil Pressure F	Relief Valve	300 inlbs.		
919	ALL		1/4 Hex Head and Below		Hose Clamps	(Worm Type)	20 inlbs.		
		5/16 He	5/16 Hex. Head and Above			(Worm Type) (Metalle: heat shield to exh		45 inlbs.	
		5/16 He	x. Head		Hose Clamps	(Worm Type)		30 – 35 inlbs.	
920	ALL				Cylinder Head	d Drain Back Hose C	lamps	10 inlbs.	
	S-T				Exhaust V-l	Band Coupling Torqu	ue Data		
921	Coupling Size Tube OD	Lycoming Numb			Vendor Part Number	T-Bolt Split Type Locknut Torque InLbs.		Drilled Hex Nut With Wire Torque InLbs.	
	1.75 in.	LW-120	93-4	M	VT69183-175	65		75	
	2.00 in.	LW-120	93-5	M	VT69183-200	85		75	
	2.25 in.	LW-120	93-6	M	VT69183-225	85		75	
	2.25 in.	LW-121	25-3	M	VT69197-225	85			
	3.69 in.	LW-13-	464	U۷	1204-55-369M	70			
	3.69 in.	LW-15	768	N	H1004420-10	70			
922	ALL		Turbocharger V-Band Torque Data						
	Turbocharger M	odel No.	V-C	lamp	Part No.	V-Clamp Diamete		Torque InLbs.	
	TO-473*				00-600 6.00 in.			40 – 80	
	TEO659°				00-685 6.85 in.			40 – 50	
	THO8A60				00-775	7.75 in.		40 – 60	
	THO8A69				00-775	7.75 in.		40 - 60	
	301E10-2°			TC-		6.50 in.		15 – 20	
	* - AiResearch to ** - Rajay turboch	ırbocharge narger.			1		l		
	Chart		ead Size		No. 1238 for assembly procedure. Nomenclature			Torque Limits	
927	ALL DUAL MAG. MODELS		/2-20		Crankshaft Ge			660 inlbs.	
	BD		1/4		Crankshaft Ge	ear Bolts		96 – 120 inlbs.	
		3	/8-16		Cylinder Hold (Crankcase D	l Down Studs riving Torque)		100 inlbs.	
928	ALL	7/	7/16-14		Cylinder Hold (Crankcase D	l Down Studs riving Torque)		200 inlbs.	
		1	/2-13		Cylinder Holo (Crankcase D	l Down Studs riving Torque)		250 inlbs.	
	A-B-D-BD-BE-J- G-Y-S-T-AF		3/8		Cylinder Hold			300 inlbs.	
929	A1	_	7/16		Cylinder Hold	l Down Nuts		420 inlbs.	
	B-D-BD-BE-J-G- Y-S-T-AF		1/2		Cylinder Holo			600 inlbs.	
	Cylinder Hold Do Service Instruction			e Par	ting Flange Nu	nts' Tightening Proce	edures -	- See latest revision of	

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 inlbs.
931	A	9/16	Locking Nut (Valve Adjusting Screw)	450 inlbs.
932	ALL	5/16-18	Exhaust Transitions – Studs (Driving Torque)	100 inlbs.
	ALL	3/8-16	Exhaust Transitions – Studs (Driving Torque)	200 inlbs.
933	ALL	5/16-32	Brass union nut on stainless steel injector fuel line (Both Ends)	25-50 inlbs.*

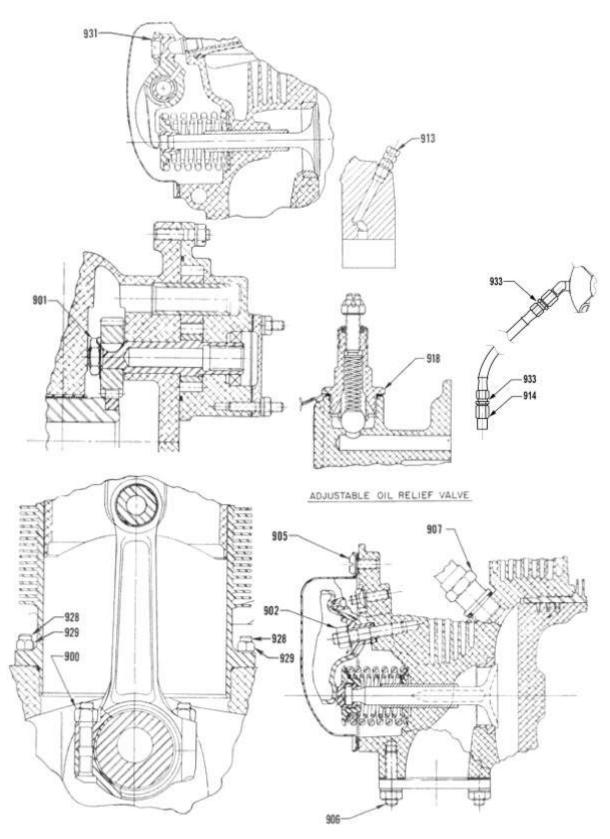
^{*} It is also permissible to tighten the fuel line union nut finger tight, then continue tightening the nut with a wrench an additional 30 to 60 degrees (1/2 to 1 flat of the nut.) Torque in excess of 50 in.-lbs. can result in damage to the parts.

SECTION V – SPRINGS

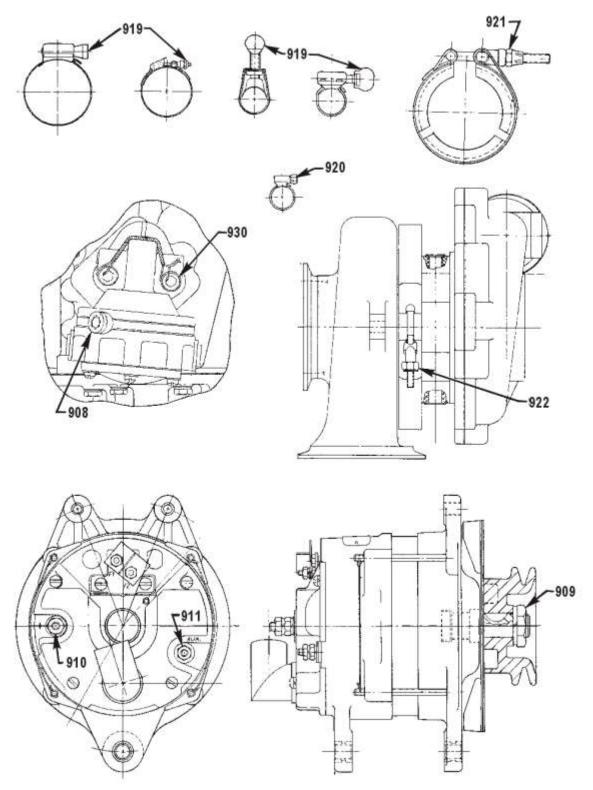
					Length		COMP. LOAD			
Ref.	Chart	Nomenclature	Lycoming Part No.	Wire Dia.	at Comp. Length	Mfr. Min.	Mfr. Min.	Service Max.		
950	A-B-D-G-J-S-T- Y-BD-BE	Outer Valve Springs (Parallel)	LW-11800	.177	1.30 in.	112 lb.	122 lb.	109 lb. min.		
	\$1-\$2-\$3-\$5-\$6-\$7-\$9-\$10-\$11-\$12-\$13-\$14-\$T2-\$T3	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								
		Identifica	tion							
	Lycoming Part Numbers	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.		

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PART I – DIRECT DRIVE ENGINES

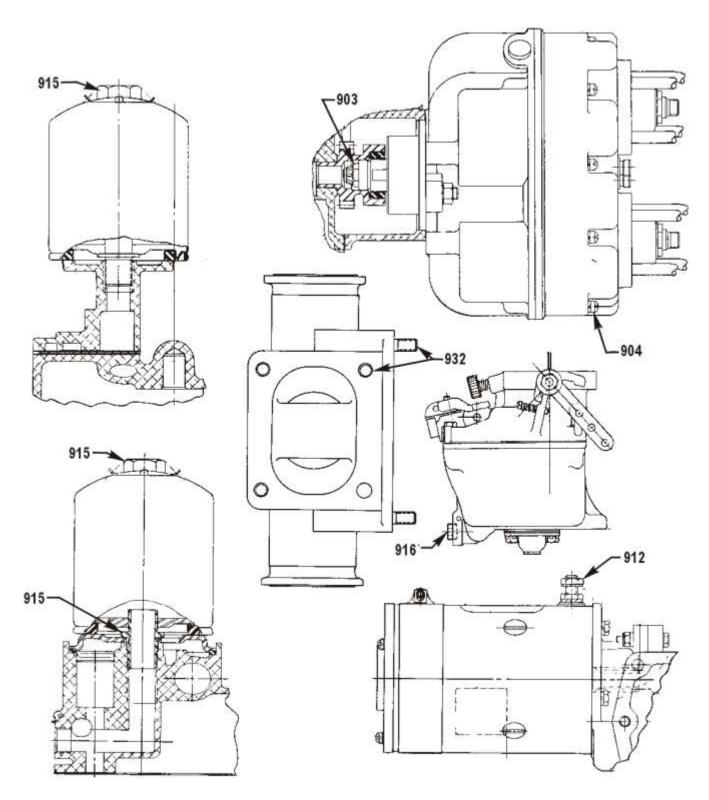


PART I – DIRECT DRIVE ENGINES



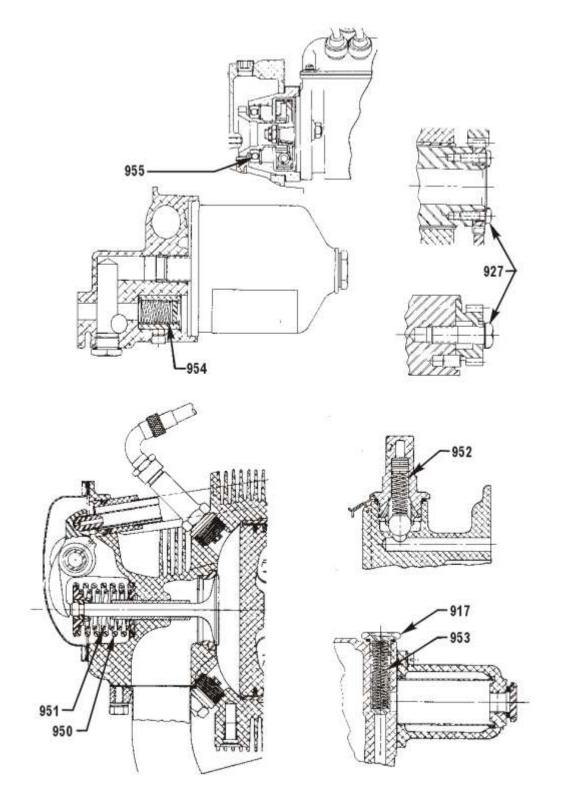
Engine Accessories and Hardware

PART I – DIRECT DRIVE ENGINES



Engine Accessories and Hardware

PART I – DIRECT DRIVE ENGINES



Engine Springs and Hardware

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).

		TAB	TABLE II					
	В	OLTS, SCRE	W AND N	IUTS		PIPE PLUGS		
Thread	Tor	que	Thread	Torq	ue	Thread	Torque	
Tiffead	In. Lb.	Ft. Lb.	Tillead	In. Lb.	Ft. Lb.	Tillead	InLbs.	
8	20 to 22		7/16	7/16 600 to 660 50 to		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	270 to 297	1/2-14 NPT	160 to 176			
ти	IN NUTS (1/2	DIA OF DO	NI TE	3/4-14 NPT	230 to 252			
1.11	IIIN INO 13 (1/2	L DIA. OF BU	UE	1-11-1/2 NPT	315 to 347			

TADLEIII		1	Т	ADI E IV		
TABLE III			TABLE IV FLEXIBLE TUBE CONNECTIONS			
CRUSH TYPE GAS	KETS				EQUIVALENT FIT	
Thread Pitch on Part to be Tightened	ANGLE OI	F TURN	Tube	Thread	Torque InLbs.	
Threads Per Inch	Aluminum	Copper	Size		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°	S	TUDS MIN.	DRIVING TORQU	E
NOTE: Install all crush type ga	skets except	the self	Thr	eads	Torque In	Lbs.
centering type, with the unbroken sur	face against th	he flange	1/4	20	15	
of the plug or part being tightened ag	5/10	6-18	25			
part until the sealing surfaces are in c	3/8	G-16	50			
to the angle of turn listed for the app. NOTE: Lubricate Threads Unless Ot						

	TABLE VI						
JAN	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					

STANDARD TORQUE (CONT.) UNLESS OTHERWISE LISTED

	TABLE VII									
	METAL TUBE FITTINGS									
			Wrench torque	e for tightening	g AN-818 Nut	(pound inches)			Minimum bend radii	
Dash Nos. Ref.	Tubing OD inches	Aluminum-	alloy tubing	Steel tubing		Aluminum-alloy tubing (Flare MS33583) for use on oxygen lines only		measured to tubing centerline. Dimension in inches		
		Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Alum. 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

PART II – INTEGRAL ACCESSORY DRIVE ENGINES

CHART	MODELS
AQ	TIO-541
AZ	TIGO-541

SECTION I SECTION III SECTION IV SECTION V	500 SERIES 600 SERIES 700 SERIES 800 SERIES 900 SERIES	CRANKCASE, CRANKSHAFT & CAMSHAFT CYLINDERS GEAR TRAIN BACKLASH (GEAR TRAIN) TORQUE AND SPRINGS
(A)		ther shrink fits controlled by machining, fits that may readily be where wear does not normally occur. In each case, the fit must be held tolerance.
(B)	Side clearance or	n piston rings must be measured with face of ring flush with piston.
(D)	The dimensions s the piston pin.	shown are measured at the bottom of the piston skirt at right angles to
(E)	Permissible wear on the diameter.	of the crankshaft (rod and main bearing journals) to be minus 0.0015
(L)	Loose fit; wherei	n a definite clearance is mentioned between the mating surfaces.
(T)	Tight fit; shrink o	or interference fit.
(WD)	Wide Deck Cranl	kcase.

SSP-1776-5-PT2 April 13, 2020*

^{* -} Indicates cut-off date for data retrieved prior to publication.





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*
Apr	il 2018	April	2020
2-8, 2-23, 2-24, 2-25	, 2-26, 2-27, 2-28, 2-29	2	-7
 2-8, 2-23, 2-24, 2-25 Deleted NOTES that refer Application Table Added pages and figures f numbers in Section V 	ence S.I. 1243 in Piston	 Revised burnishing instruction bushing in reference numbers Revised the Mfr. Min. & No. 	etions for connecting rod ber 600 Max. Clearance for Piston Ring ed Cylinders (Choke Barrels) in reference number 607



PART II – INTEGRAL ACCESSORY DRIVE ENGINES

SECTION I – CRANKCASE, CRANKSHAFT, CAMSHAFT

			Dime	nsions	Clearances	
			Mfr.		Mfr.	
			Min. &	Service	Min. &	Service
Ref.	Chart	Nomenclature	Max.	Max.	Max.	Max.
500	AQ	Main Bearings and Crankshaft			.0011L	
		(Except Front)			.0041L	.0050L
	AZ	Main Bearings and Crankshaft			.0011L	
		•			.0041L	.0050L
	AQ	Front Main Bearings and			<u>.0021L</u>	
		Crankshaft			.0046L	.0050L
	AQ-AZ	Diameter of Main Bearing				
		Journal on Crankshaft (2-5/8	<u>2.6245</u>			
		Main)	2.626	(E)		
	AQ	Diameter of Front Main Bearing				
		Journal on Crankshaft (2-5/8	<u>2.6240</u>			
		Main)	2.6250	(E)		
	AQ-AZ	Crankcase Bearing Bore	<u>2.9365</u>			
		Diameter	2.9375	2.9390		
501	AQ-AZ	Connecting Rod Bearing and			<u>.0008L</u>	
		Crankshaft			.0038L	.0050L
	AZ	Diameter of Connecting Rod	<u>2.1235</u>	(T)		
		Journal on Crankshaft (2-1/8)	2.125	(E)		
	AQ	Diameter of Connecting Rod	2.2485			
		Journal on Crankshaft (2-1/4)	2.250	(E)		
	AZ	Connecting Rod Bearing Bore	2 2050			
		Diameter (2-1/8) (Measure at	<u>2.2870</u>			
		Axis 30° on each side)	2.2875			
	AQ	Connecting Rod Bearing Bore	2.4205			
		Diameter (2-1/4) (Measure at	<u>2.4205</u>			
502	40.47	Axis 30° on each side)	2.4210		0041	
502	AQ-AZ	Connecting Rod – Side Clearance			<u>.004L</u> .010L	.016L
503	AQ-AZ	Connecting Rod – Alignment				0 Inches
504	AQ-AZ	Connecting Rod – Twist				0 Inches
505	110 112	Crankshaft Run-Out at Center			.012 III	To menes
303		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	<u> </u>		.003	.0045

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PART II – INTEGRAL ACCESSORY DRIVE ENGINES

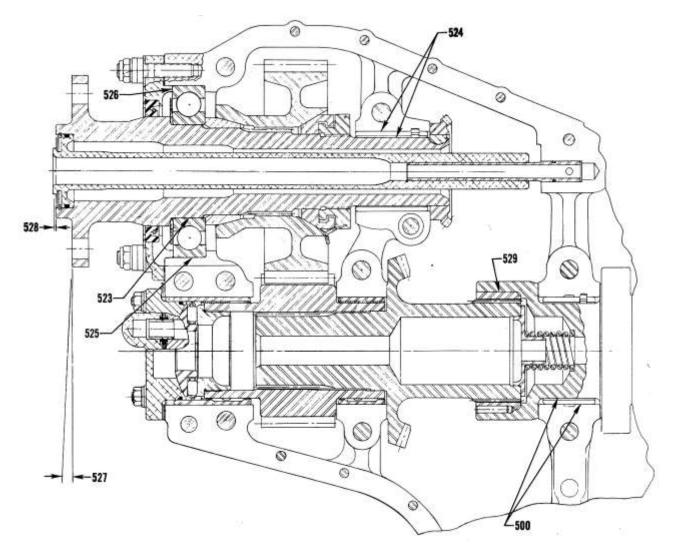
 $SECTION\ I-CRANKCASE,\ CRANKSHAFT,\ CAMSHAFT$

			Dime	nsions	Clearances	
Ref.	Chart	Nomenclature	Mfr. Min. & Max.	Service Max.	Mfr. Min. & Max.	Service Max.
506	AQ (CONT.)	Mounted on No. 3 and 5				
		Journals Max. Run-Out No. 4			002	0045
	AQ-AZ	Journal Crankshaft and Crankcase –			.003 .005L	.0045
	AQ-AL	Front End Clearance			.016L	.026L
507	AQ	Clearance – Front Face of Crankshaft Oil Slinger to Front Face of Recess in Crankcase (Crankshaft Against Thrust Face)			.002 .007	(A)
508	AQ-AZ	Crankshaft Propeller Flange Run-Out			.007	.005
509	AQ	Starter Ring Gear and Support			<u>.014T</u> .022T	(A)
510	AQ-AZ	Crankshaft Timing Gear and Crankshaft			.002L .0005L	(A)
511	AQ-AZ	Tappet Body and Crankcase			.0010L .0030L	.004L
	AQ-AZ	O.D. of Tappet	<u>.9990</u> .9995	.9987		
	AQ-AZ	I.D. Tappet Bore in Crankcase	1.0005 1.0018	1.0021		
514	AQ-AZ	Camshaft and Crankcase			.002L .004L	.006L
515	AQ-AZ	Camshaft – End Clearance			.002L .004L	.015L
516	AQ-AZ	Camshaft Run-Out at Center Bearing Journal			.000 .001	.006
517	AQ-AZ	Counterweight Bushing and Crankshaft			.0013T .0026T	(A)
518	AQ-AZ	Counterweight Roller – End Clearance			.003L .025L	.038L
519	AQ-AZ	Counterweight and Crankshaft – Side Clearance (Measure Below Roller Next to Flat)			.003L .013L	.017L
520	AQ-AZ	Counterweight Bore and Washer O.D.			.0002L .0030L	(A)
521	AQ-AZ	I.D. Counterweight Bushing	<u>.7485</u> .7505	.7512	.003011	(11)
	AZ	I.D. Counterweight Bushing (2 nd order)	1.030 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			.0001L .0012L	.002L
524	AZ	Propeller Shaft and Rear Bearing			.0015L .0030L	.0040L

PART II – INTEGRAL ACCESSORY DRIVE ENGINES

SECTION I – CRANKCASE, CRANKSHAFT, CAMSHAFT

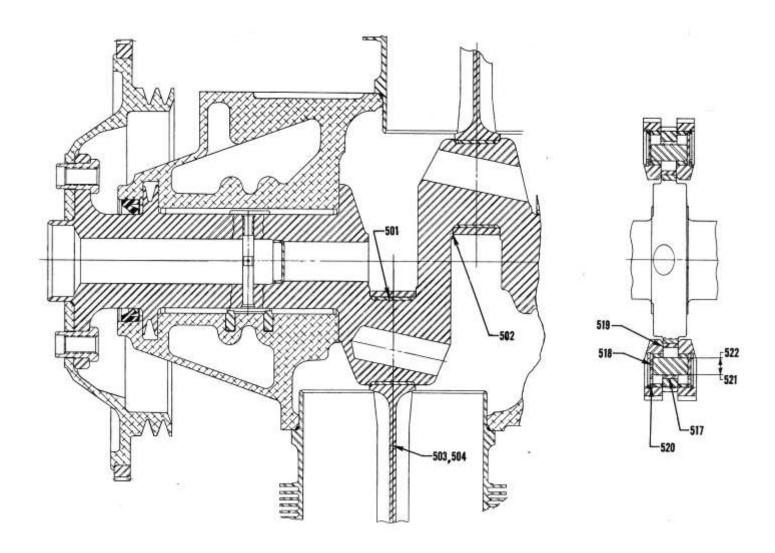
			Dimensions		Clear	ances
Ref.	Chart	Nomenclature	Mfr. Min. & Max.	Service Max.	Mfr. Min. & Max.	Service Max.
524	AZ	Propeller Shaft Bearing Bore	2.1865	171421	1,1421	111421
		Diameter	2.1875	2.1885		
525	AZ	Thrust Bearing and Crankcase			<u>.0006L</u>	
					.0010T	(A)
526	AZ	Thrust Bearing and Thrust				
		Bearing Cap Clamp Fit (Shim to			<u>.003T</u>	
		this Fit)			.005T	(A)
527	AZ	Thrust Bearing Tilt at 4 Foot		.027	Tilt	
528	AZ	Thrust Bearing End Play			<u>.006</u>	
					.008	.010
529	AZ	Crankshaft and Crankshaft Front			<u>.0002T</u>	
		Bearing			.0015T	(A)



Section Thru Prop. Shaft, Crankshaft and Front Bearings

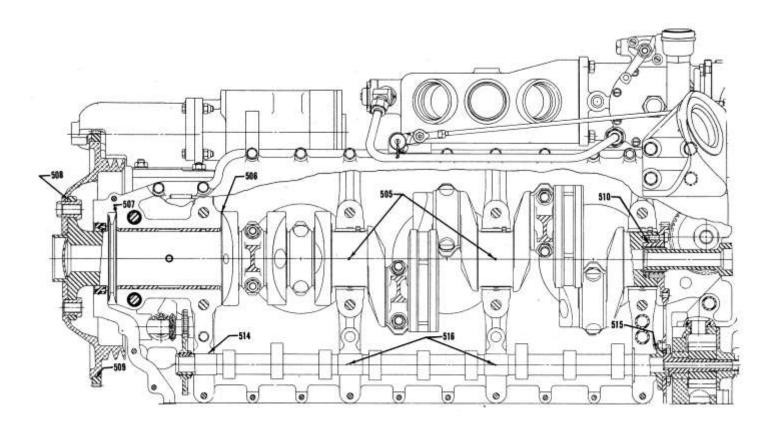
PART II – INTEGRAL ACCESSORY DRIVE ENGINES

 $SECTION\ I-CRANKCASE,\ CRANKSHAFT,\ CAMSHAFT$



PART II – INTEGRAL ACCESSORY DRIVE ENGINES

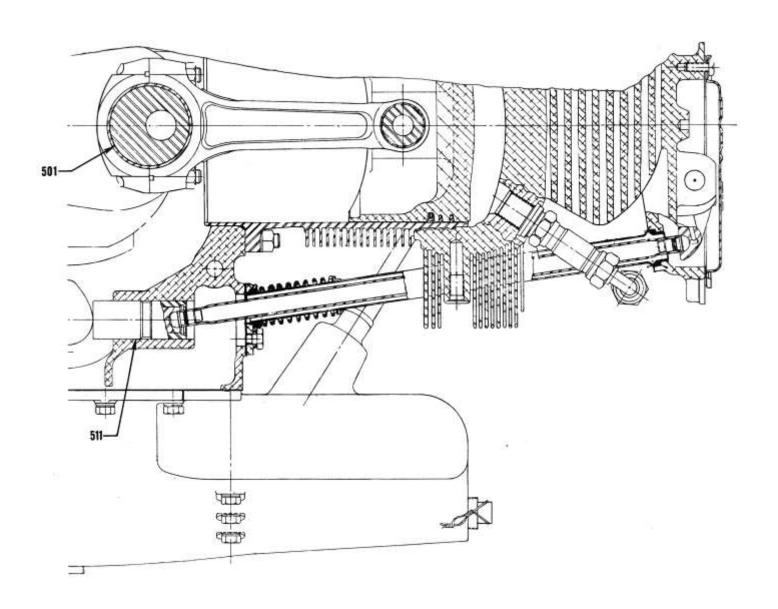
SECTION I – CRANKCASE, CRANKSHAFT, CAMSHAFT



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PART II – INTEGRAL ACCESSORY DRIVE ENGINES

SECTION I – CRANKCASE, CRANKSHAFT, CAMSHAFT



PART II – INTEGRAL ACCESSORY DRIVE ENGINES

SECTION II – CYLINDERS

			Dimen	sions	Clearances	
			Mfr. Min.		Mfr.	
Ref.	Chart	Nomenclature	& Max.	Service Max.	Min. & Max.	Service Max.
600	AQ-AZ	Connecting Rod and Connecting Rod Bushing	Bushing P/N Bushing P/N		to be burnis	
	AQ-AZ	Finished I.D. of Connecting Rod Bushing	1.1254 1.1262			
601	AQ-AZ	Length Between Connecting Rod Bearing Centers	6.7485 6.7515			
602	AQ-AZ	Connecting Rod Bushing and Piston Pin			.0008L .0021L	.0025L
603	AQ-AZ	Piston Pin and Piston			.0003L .0014L	.0018L
	AQ-AZ	Diameter of Piston Pin Hole in Piston	1.1249 1.1254			
	AQ-AZ	Diameter of Piston Pin	1.1241 1.1246			
604	AQ-AZ	Piston and Piston Pin Plug			.0002L .0010L	.002L
	AQ-AZ	*Diameter of Piston Pin Plug	1.1242 1.1247			
605	AQ-AZ	Piston Pin and Piston Pin Plug – Nitrided and Chrome Cylinders			.0005L .0025L	.005L
	AQ-AZ	*Diameter of Piston Pin Plug	. <u>5655</u> .5665			
	* See latest revision of Se	rvice Instruction No. 1267.	1			1
606	AQ-AZ	Piston Ring and Piston – Side Clearance (Top Ring Comp.)			.0025L .0055L	.008L (B)
	AQ-AZ	Piston Ring and Piston – Side Clearance (2 nd Ring Comp.)			.000L .004L	.006L (B)
	AQ-AZ	Piston Ring and Piston - Side Clearance (Oil Regulating)			.002L .004L	.006L (B)
607	AQ-AZ	Piston Ring Gap (Compression) Chrome Cylinders (Straight Barrels)			.020 .030	.047
	AQ-AZ	Piston Ring Gap (Compression) Nitrided and Chrome Cylinders (Choke Barrels)			.045 .065	.067
	AQ-AZ	Piston Ring Gap (Oil Regulating) (All Barrels)			.015 .040	.047
	.0075.	gap is measured within 4 inches from bott		at top of tra	vel must not	be less than
	For All Other Barrels – Ri	ing gap is measured at top limit of ring trav	vel.			

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PART II – INTEGRAL ACCESSORY DRIVE ENGINES

SECTION II - CYLINDERS

						D	imensions		Clea	arances
Ref.		Chart	Noi	nenclature		Mfr Min. Max	& Serv		Mfr. Min. & Max.	Service Max.
	Engine and	d Piston Application	Min. Pisto	on Diameter			Cylinder B		rrel Max.	
	Engine Chart Code Letter	Piston Number	Тор	Bottom	Type of	Piston	Type of Surface		Iaximum Diameter	Clearance Piston Skirt & Cyl.
608 608 609 610	AQ-AZ	76966, LW-10545	5.0790	5.1090	Forged-	-Cam	N-C		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.

			Dimension	S	Clearances	'
Ref.	Chart	Nomenclature	Mfr. Min. & Max.	Service Max.	Mfr. Min. & Max.	Service Max.
			Max.	Max.		wax.
611	AQ-AZ	Exhaust Valve Seat and Cylinder Head			.0075T .011T	(A)
	AQ-AZ	O.D. Exhaust Seat	1.9355 1.937			
	AQ-AZ	I.D. Exhaust Seat Hole in Cylinder Head	1.926 1.928			
612	AQ-AZ	Intake Valve Seat Hole in Cylinder Head			<u>.0065T</u> .010T	(A)
	AQ-AZ	O.D. Intake Seat	2.2885 2.290			
	AQ-AZ	I.D. Intake Seat Hole in Cylinder Head	2.280 2.282			
613	AQ-AZ	Exhaust Valve Guide and Cylinder Head			.0011T .0030T	(A)
	AQ-AZ	O.D. Exhaust Valve Guide	<u>.6954</u> .6963			
	AQ-AZ	I.D. Exhaust Valve Guide Hole in Cylinder Head	<u>.6933</u> .6943			

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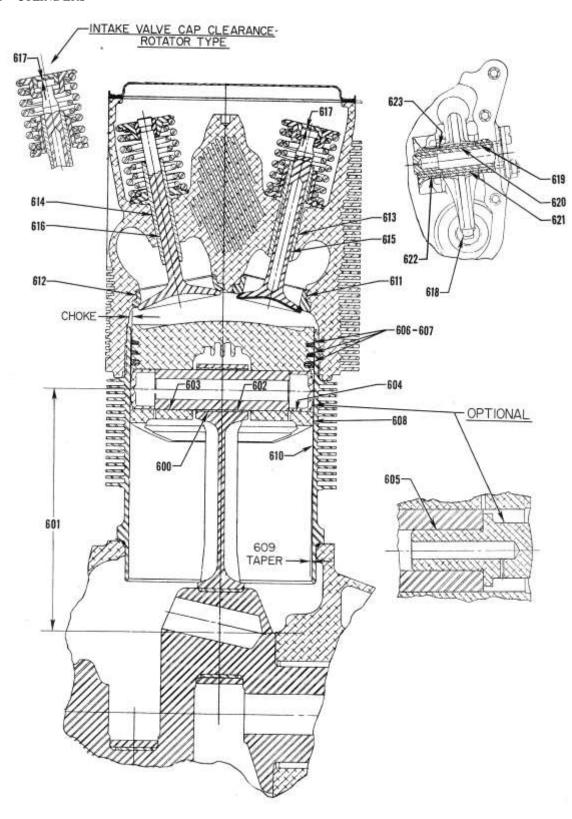
PART II – INTEGRAL ACCESSORY DRIVE ENGINES

SECTION II – CYLINDERS

			Dime	nsions	Clearances	
			Mfr.		Mfr.	
Ref.	Chart	Nomenclature	Min. & Max.	Service Max.	Min. & Max.	Service Max.
614	AQ-AZ	Intake Valve Guide and Cylinder Head			<u>.0010T</u> .0025T	
	AQ-AZ	O.D. Intake Valve Guide	. <u>5933</u> .5938			
	AQ-AZ	I.D. Intake Valve Guide Hole in Cylinder Head	.5913 .5923			
615	AQ-AZ	Exhaust Valve Stem and Valve Guide	10720		.0037L .0050L	(A)
	AQ-AZ	O.D. Exhaust Valve Stem	<u>.4955</u> .4965	.4937	.0030L	(11)
	AQ-AZ	Finished I.D. Exhaust Valve Guide	.4995 .5005	.1937		
	limit, anytime up to 300 hou .001 in. during each 100 ho	valves may have exhaust valve guides that urs of service. After 300 hours of service, insours of operation up to the recommended ovalatest revision of Service Instruction No. 1	side diameter verhaul time	r of exhaust v for the engir	valve guide mand and to the contract of the co	nay increase
616	AQ-AZ	Intake Valve Stem and Valve Guide			<u>.0010L</u> .0028L	.006L
	AQ-AZ	O.D. Intake Valve Stem	<u>.4022</u> .4030	.4010		
	AQ-AZ	Finished I.D. Intake Valve Guide	<u>.4040</u> .4050			
617	AQ-AZ	Intake and Exhaust Valve and Valve Cap – Clearance (Rotator Type with Small Diameter Head)			.000 .004L	.005L
618	AQ-AZ	Dry Tappet Clearance			.040 .105	10002
619	AQ-AZ	Valve Rocker Shaft and Valve Rocker Bushing			.0001L .0013L	.0025L
	AQ-AZ	Finished I.D. of Valve Rocker Shaft (Bushing) in Cylinder Head	<u>.6246</u> .6261	.6270		
620	AQ-AZ	Valve Rocker Shaft and Valve Rocker Bushing			.0007L .0017L	.004L
	AQ-AZ	Finished I.D. of Rocker Arm Bushing	<u>.6252</u> .6263	.6270	100172	10012
	AQ-AZ	O.D. Valve Rocker Shaft	.6241 .6245	.6231		
621	AQ-AZ	Valve Rocker Bushing and Valve Rocker			Burnished in	Place
622	AQ-AZ	Valve Rocker Shaft Bushing and Cylinder Head	Dusti	1.1351.150	.0022T .0038T	(A)
	AQ-AZ	Valve Rocker Shaft Bushing Hole in Cylinder Head	<u>.7380</u> .7388		.00301	(11)
623	AQ-AZ	Valve Rocker and Cylinder Head – Side Clearance			.002L .020L	.024L

PART II – INTEGRAL ACCESSORY DRIVE ENGINES

SECTION II – CYLINDERS



Cylinder, Piston and Valve Components

PART II – INTEGRAL ACCESSORY DRIVE ENGINES

SECTION III – GEAR TRAIN

			Dime	Dimensions		Clearances	
Ref.	Chart	Nomenclature	Mfr. Min. & Max.	Service Max.	Mfr. Min. & Max.	Service Max.	
OIL PU	UMP		•	•			
700	AQ-AZ	Oil Pump Drive Shaft and Oil Pump Body			.0010L .0030L	.004L	
701	AQ-AZ	Oil Pump Drive Shaft and Oil Pump Cover			.0035L .0050L	.0065L	
703	AQ-AZ	Oil Pump Impellers – Diameter Clearance			.002L .005L	.008L	
704	AQ-AZ	Oil Pump Impellers – Side Clearance			<u>.002L</u> .0045L	.005L	
		Width of Oil Pump Impellers	1.372 1.374	1.371			
705	AQ-AZ	Oil Pump Driven Impellers and Idler Shaft			.0005L .002L	.004L	
FUEL	PUMP		ı	ı			
722	AQ-AZ	Fuel Pump Idler Gear and Shaft			<u>.001L</u> .003L	.005L	
725	AQ-AZ	Fuel Pump Idler Gear – End Clearance			<u>.002L</u> .028L	.038L	
726	AQ-AZ	Fuel Pump Drive Shaft Gear and Crankcase			<u>.0010L</u> .0025L	.004L	
727	AQ-AZ	Fuel Pump Drive Shaft Gear – End Clearance			<u>.0015L</u> .0385L	.0485L	
GOVE	RNOR & TACHOMETER						
728	AQ	Front Governor Drive Idler Shaft (Both Ends) and Crankcase			<u>.0010L</u> .0025L	.004L	
731	AQ-AZ	Governor Driven Gear and Crankcase			<u>.0010L</u> .0025L	.004L	
732	AQ-AZ	Propeller Governor Drive Gear – End Clearance			<u>.008L</u> .016L	.021L	
739	AZ	Tachometer Drive Shaft and Adapter			<u>.0015L</u> .0035L	.006L	
VACU	UM PUMP & HYDRAULIC PUMP		•	•	•	·	
759	AQ-AZ	Vacuum and Hydraulic Pump Drive Shaft Gear and Crankcase			<u>.0010L</u> .0025L	.006L	
760	AQ-AZ	Vacuum and Hydraulic Pump Drive Shaft Gear – End Clearance			.018L .028L	.035L	
MAGN	ЕТО						
761	AQ-AZ	Magneto Coupling and Crankcase			.0010L .0030L	.004L	
762	AQ-AZ	Magneto Drive Shaft Gear and Crankcase			.0010L .0030L	.004L	

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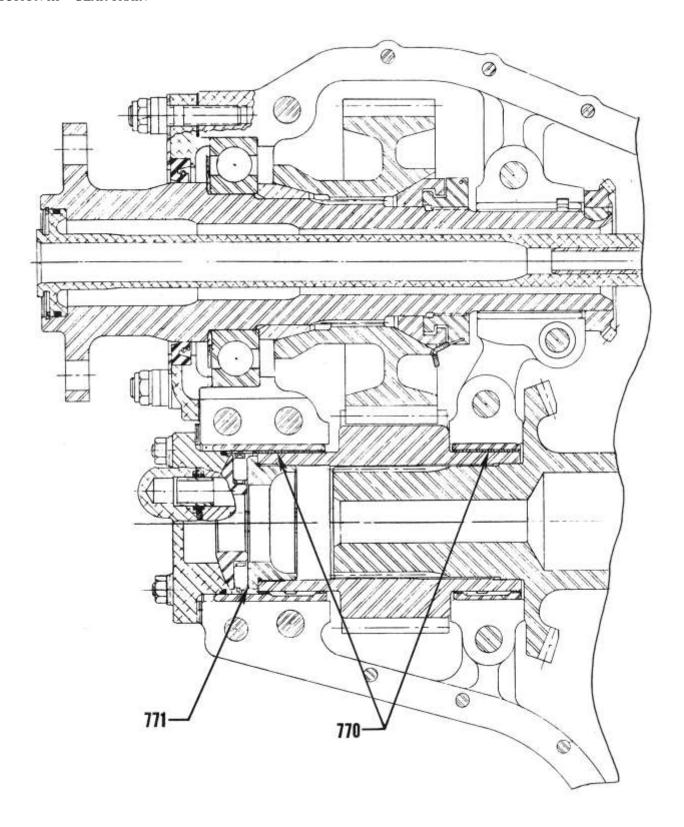
PART II – INTEGRAL ACCESSORY DRIVE ENGINES

SECTION III – GEAR TRAIN

			Dime	nsions	Clear	ances
			Mfr.		Mfr.	
			Min. &	Service	Min. &	Service
Ref.	Chart	Nomenclature	Max.	Max.	Max.	Max.
ACCES	SSORY DRIVE, COMPRESSOR, BR.	EATHER, PROPELLER SHAFT, AL	TERNATOR,	& STARTE	R	
763	AQ-AZ	Accessory Drive Gear				
		Intermediate and Crankcase (2			<u>.0010L</u>	
		Places)			.0030L	.005L
764	AQ-AZ	Accessory Drive Gear – End			<u>.016L</u>	
		Clearance			.018L	.020L
765	AQ-AZ	Accessory Drive Gear and			<u>.0010L</u>	
		Crankcase			.0030L	.005L
766	AQ-AZ	Compressor Drive Shaft and			<u>.0010L</u>	
		Compressor Drive Adapter			.0030L	.005L
767	AQ-AZ	Compressor Drive Shaft – End			<u>.0005</u>	
		Clearance			.0295	.040
768	AQ-AZ	Breather Slinger Gear and Shaft			<u>.0021L</u>	
					.0035L	.005L
769	AQ-AZ	Breather Slinger Gear – End			<u>.008</u>	
		Clearance			.017	.025
770	AZ	Propeller Shaft Drive Gear and			<u>.0025L</u>	
		Bearings			.0050L	.0060L
771	AZ	Propeller Shaft Drive Gear –			<u>.005</u>	
		End Play			.015	.022
772	AZ	Propeller Shaft and Rear Bearing			<u>.0015L</u>	
					.0030L	.0040L
773	AZ	Alternator Driven Gear and			<u>.0025L</u>	
		Adapter Bushing			.0045L	.0065L
774	AZ	Starter Drive and Alternator			<u>.004</u>	011
	1.5	Drive Gear – End Play			.008	.011
775	AZ	Starter Driven Gear and Adapter			<u>.0015L</u>	00.57
	1.5	Bushing			.0030L	.005L
776	AZ	Starter Drive Shaft (Slip			.0015L	0077
	1.5	Coupling) and Crankcase			.0040L	.007L
777	AZ	Starter Idler Gear and Idler Gear			.0005L	0051
		Bearing			.0020L	.005L

PART II – INTEGRAL ACCESSORY DRIVE ENGINES

SECTION III – GEAR TRAIN

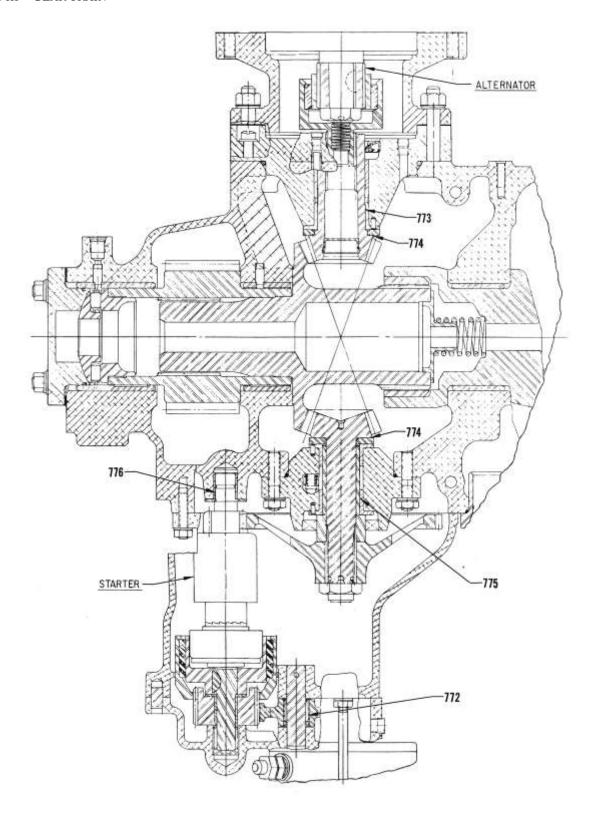


Propeller Shaft Drive Gear

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PART II – INTEGRAL ACCESSORY DRIVE ENGINES

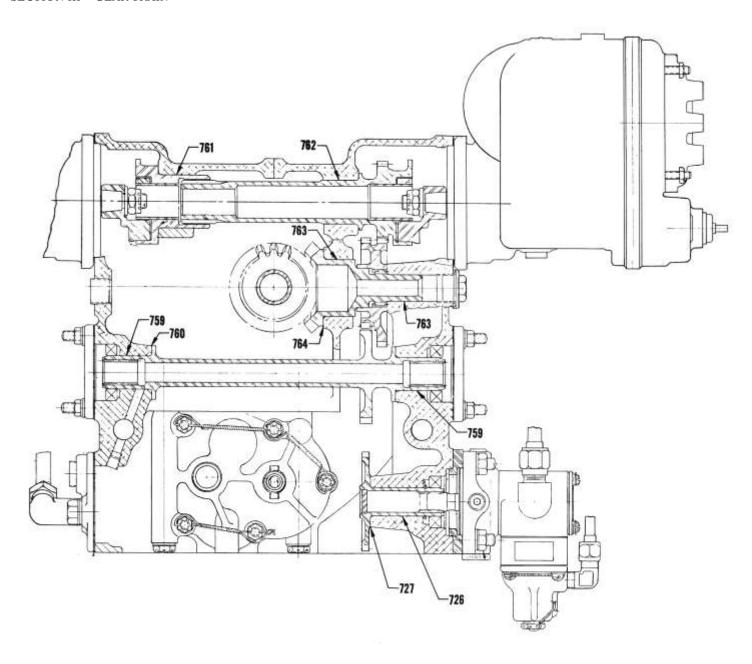
SECTION III – GEAR TRAIN



Alternator, Starter and Propeller Shaft

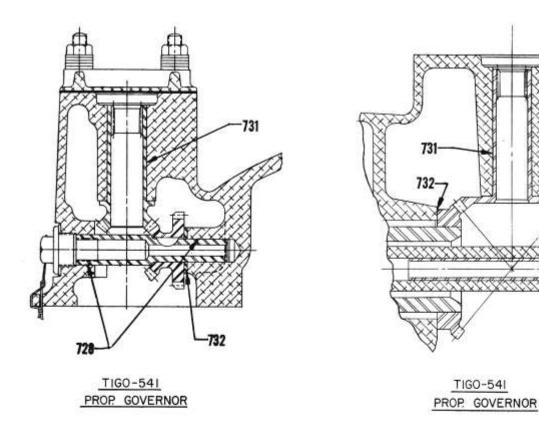
PART II – INTEGRAL ACCESSORY DRIVE ENGINES

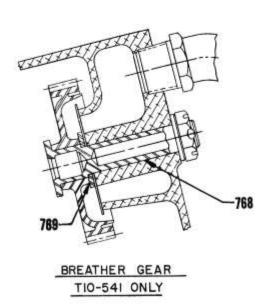
SECTION III – GEAR TRAIN

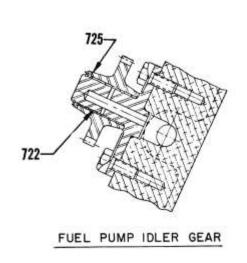


PART II – INTEGRAL ACCESSORY DRIVE ENGINES

SECTION III – GEAR TRAIN



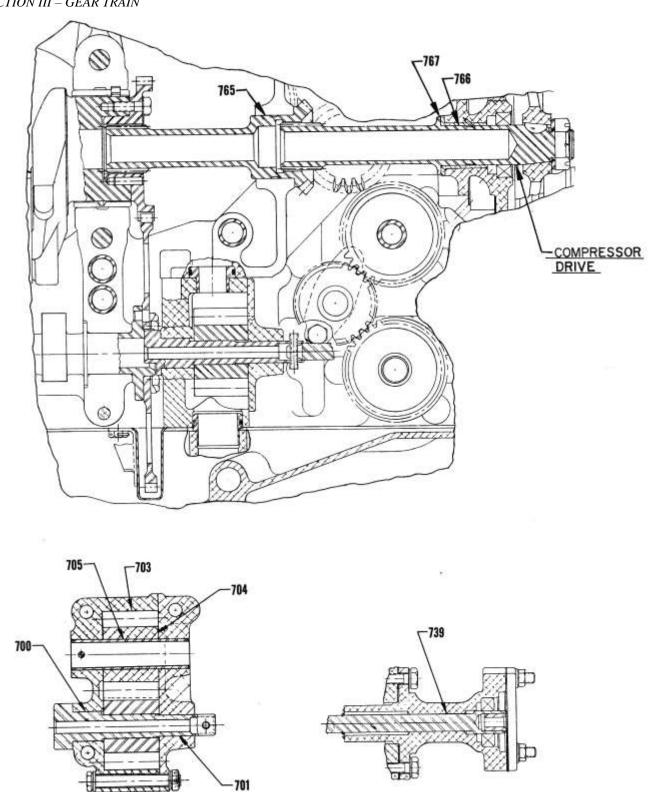




Governor, Fuel Pump and Breather Gear

PART II – INTEGRAL ACCESSORY DRIVE ENGINES

SECTION III – GEAR TRAIN



Oil Pump, Tachometer and Compressor

PART II – INTEGRAL ACCESSORY DRIVE ENGINES

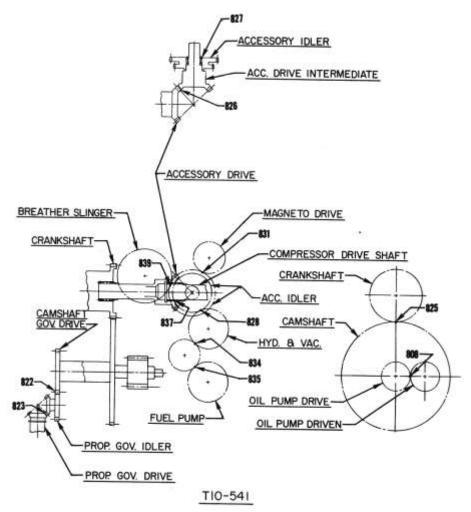
SECTION IV – BACKLASH

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

PART II – INTEGRAL ACCESSORY DRIVE ENGINES

SECTION IV - BACKLASH

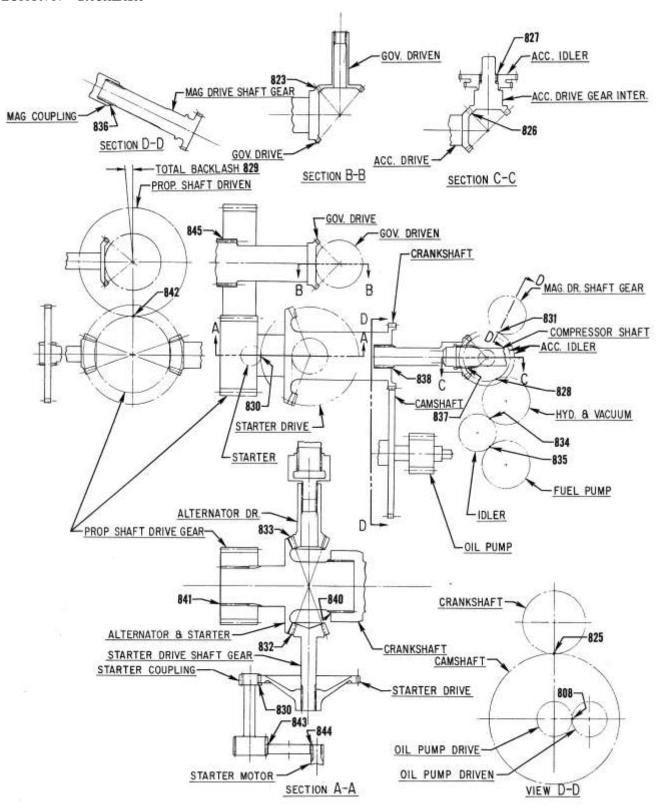
			Dime	nsions	Clear	ances
			Mfr.		Mfr.	
			Min. &	Service	Min. &	Service
Ref.	Chart	Nomenclature	Max.	Max.	Max.	Max.
841	AZ	Propeller Shaft Drive Gear and				
		Alternator and Starter Shaft Gear			<u>.001</u>	
		 Spline Backlash 			.004	.006
842	AZ	Propeller Shaft Drive Gear and			.008	
		Driven Gear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



Accessory Drives

PART II – INTEGRAL ACCESSORY DRIVE ENGINES

SECTION IV - BACKLASH



Accessory Drives

PART II – INTEGRAL ACCESSORY DRIVE ENGINES

SECTION V – SPECIAL TORQUE REQUIREMENTS

Ref.	Chart		Thread Size	Nomen	clature	Torque Limits
900	AQ-AZ		3/8-24	Connec	ting Rod Nuts – Tighten	-
				to Leng		2.255-2.256
903	AQ-AZ		3/8-24	Magnet	o – Nut (To attach drive	
				membe	r to magneto)	300 in. lbs.
904	AQ-AZ		10-32	Magnet	o – Plate Screws	15 in. lbs.
905	AQ-AZ (using a	silicone gasket)	1/4-20	Rocker	Box Screws	35 inlbs.
	AQ-AZ (using a	cork gasket)	1/4-20	Rocker	Box Screws	50 in. lbs.
907	AQ-AZ		18MM	Spark F		420 in. lbs.
909	AQ				tor Pulley Nut	450 in. lbs.
	AZ				tor Quill Shaft Nut	474 in. lbs.
910	AQ-AZ		1/4-28		tor Output Terminal Nut	85 in. lbs.
911	AQ-AZ		10-32		tor Auxiliary Nut	30 in. lbs.
912	AQ-AZ		5/16-24		Terminal Nut	2 in. lbs.
913	AQ-AZ		1/16-27 NPT	II .	Cooling Nozzle in	
				Cranke		100 in. lbs.
915	AQ-AZ		3/4-16	II .	er Bolt (AC Can and	200: "
	40.47		12/16/16	Elemen		300 in. lbs.
	AQ-AZ		13/16-16		er (Throw away type) ter Stud	240 in. lbs.
017	AQ-AZ		3/4-16 1.00-14			720 in. lbs. 300 in. lbs.
917 918	AQ-AZ AQ-AZ		1.00-14		oler Bypass Valve	300 in. lbs.
919	AQ-AZ AQ-AZ		1-1/4-12	Hose C		45 in. lbs.
921	AQ-AZ AQ-AZ		Exhaust V-Ban			45 III. 108.
921	AQ-AZ		Exhaust V-Dan	u Coupini	T-Bolt Split Type	1/4 In. Drilled Hex Nut
	Coupling Size	Lycoming Part			Locknut Torque In.	with Safety Wire
	Tube OD	No.	Vendor Par	t No.	Lbs.	Torque In. Lbs.
	2.00 in.	LW-12093-5	MVT69183		85	75
	2.25 in.	LW-12093-6	MVT-69183		85	75
	2.25 in.	LW-12125-3	MVT-6919'		85	
922	AZ		Turbocharger V	/-Band To	rque Data	
	Turbocharge	er Model No.	V-Clamp Pa	rt No.	V-Clamp Diameter	Torque In. Lbs.
	T18.	A21*	400500-9	925	9.25 in.	40-60
	* - AiResearch t					
		on of Service Instr				T
923	AZ		2-1/16-12	•	er Shaft Lock Nut	1000 ft. lbs.
924	AQ-AZ		7/16-20		jector Nozzles (In	
					on Housing)	210 in. lbs.
925	AQ-AZ		3/4-16		essor Drive Pulley Nut	240 in. lbs.
926	AZ		5/8-18		Drive Shaft Gear Nut	900 in. lbs.
927	AQ-AZ		1/4		Crankshaft Gear	96-120 in. lbs.
928	AQ-AZ		3/8-16		er Hold Down Studs	100 in 11-
			1/2-13		case Driving Torque) er Hold Down Studs (Cr	100 in. lbs.
			1/2-13		er Hold Down Studs (Cr e Driving Torque)	250 in. lbs.
929	AQ-AZ		3/8		er Hold Down Nuts	300 in. lbs.
121	110 112		1/2		er Hold Down Nuts	600 in. lbs.
	Cylinder Hold D	own Nut Tighteni			evision of Service Instructi	
932	AQ-AZ	own rut righten	5/16-18		t Transitions – Studs	01110, 1027.
			5,10 10	II .	g Torque)	100 in. lbs.
	1					
			3/8-16 Exhaust Transitions – Studs			

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PART II – INTEGRAL ACCESSORY DRIVE ENGINES

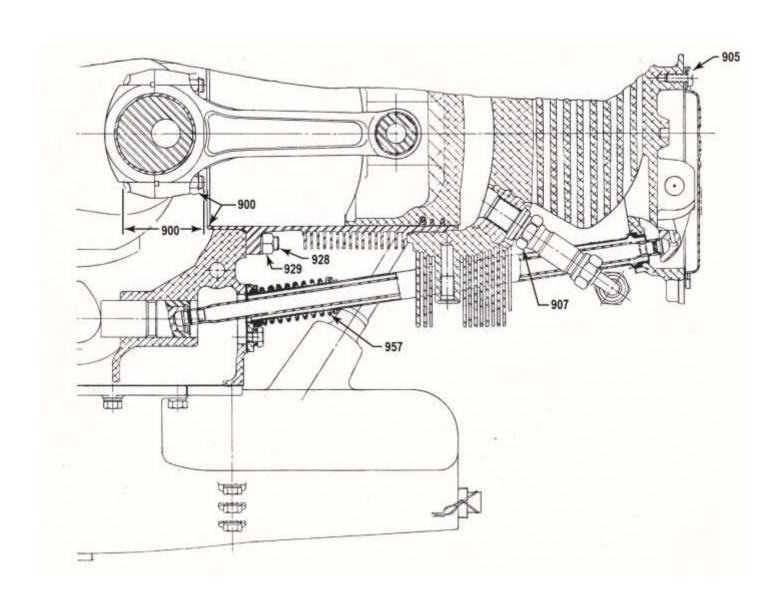
SECTION V – SPRINGS

							C	OMP. LOA	AD .
Ref.	Chart	Nomenc	lature	Lyc. Part No.	Wire Dia.	Length at Comp. Length	Mfr. Min.	Mfr. Max.	Service Max.
950	AQ-AZ	Outer Valve S	pring	LW-11798	.192	1.610 in.	136 lb.	144 lb.	133 lb.
				76351	.177	1.610 in.	136 lb.	144 lb.	min.
951	AQ-AZ	Auxiliary Valv	e Spring	LW-11799	.148	1.48 in.	86 lb.	94 lb.	83 lb.
				76352	.142	1.48 in.	86 lb.	94 lb.	min.
952	AQ-AZ	Oil Pressure R	elief						
		Valve Spring							
		Lycoming	Ident	ification					
		Part		Free					
		Numbers	Dye	Length			r	1	,
									7.1 lb.
		68668	Purple	2.04	.054	1.30 in.	7.1 lb.	7.8 lb.	min.
									10.5 lb.
		LW-11713	White	2.12	.059	1.44 in.	10.79 lb.	11.92 lb.	min.
		LW-11138	None	2.64	.051	1.44 in.	8.55 lb.	9.45 lb.	8.3 lb. min.
955	AQ-AZ	Fuel Drain Che				27.7.2	0.00	71.00	5.35 lb.
				78	.047	.75 in.	5.50 lb.	6.50 lb.	min.
956	AQ-AZ	Oil Filter Relie	ef Valve Sp	ring					3.00 lb.
			1	C	.054	1.93 in.	3.05 lb.	3.55 lb.	min.
957	AZ	Shroud Tube S	Spring						13 lb.
			1 0		.105	2.09 in.	14 lb.	16 lb.	min.
958	AQ-AZ	Pressurizing V	alve Spring	5					.63 lb.
					.032	.455485	.65 lb.	.75 lb.	min.
959	AZ	Spring Betwee	n Cranksha	ft and					46 lb.
		Starter and Alt	ernator Dri	ve Gear	.13	1.40 in.	48 lb.	52 lb.	min.
960	AZ	Alternator Driv	ve Coupling	g Spring					9 lb.
					.047	.83 in.	10 lb.	11 lb.	min.

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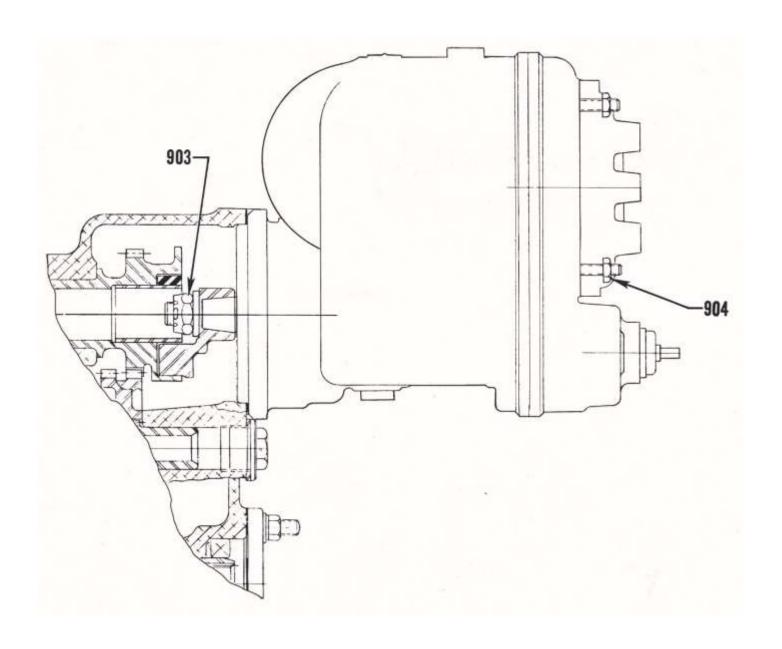
PART II – INTEGRAL ACCESSORY DRIVE ENGINES

 $SECTION\ V-SPECIAL\ TORQUE\ REQUIREMENTS$



PART II – INTEGRAL ACCESSORY DRIVE ENGINES

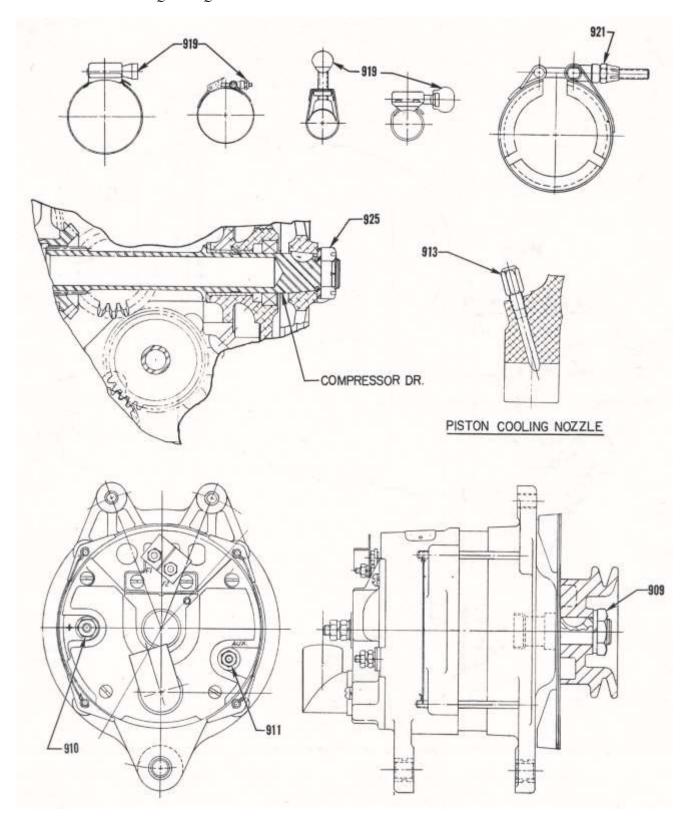
SECTION V – SPECIAL TORQUE REQUIREMENTS



Engine Accessories and Hardware

PART II – INTEGRAL ACCESSORY DRIVE ENGINES

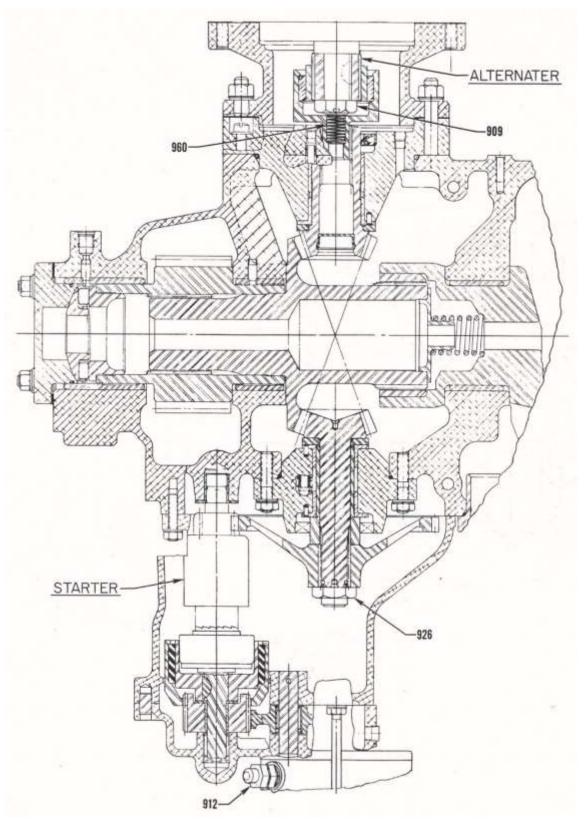
 $SECTION\ V-SPECIAL\ TORQUE\ REQUIREMENTS$



Engine Accessories and Hardware

PART II – INTEGRAL ACCESSORY DRIVE ENGINES

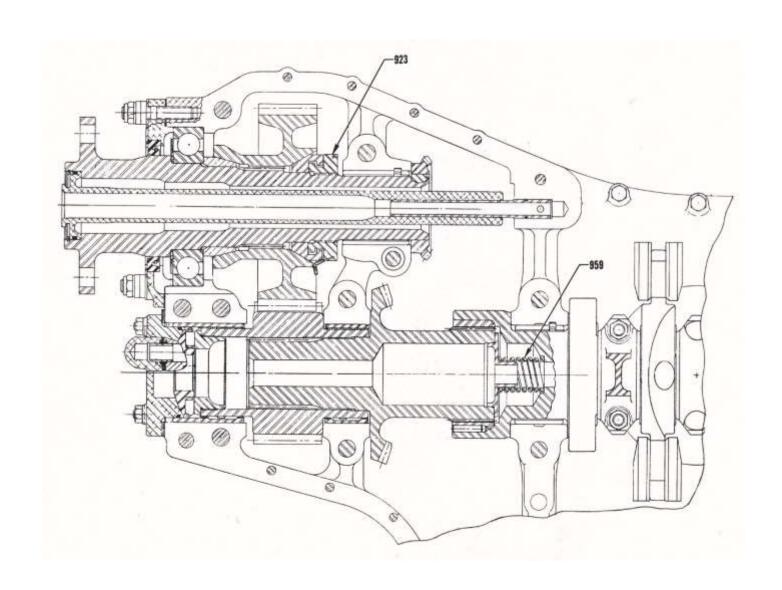
SECTION V – SPECIAL TORQUE REQUIREMENTS



Engine Accessories and Hardware

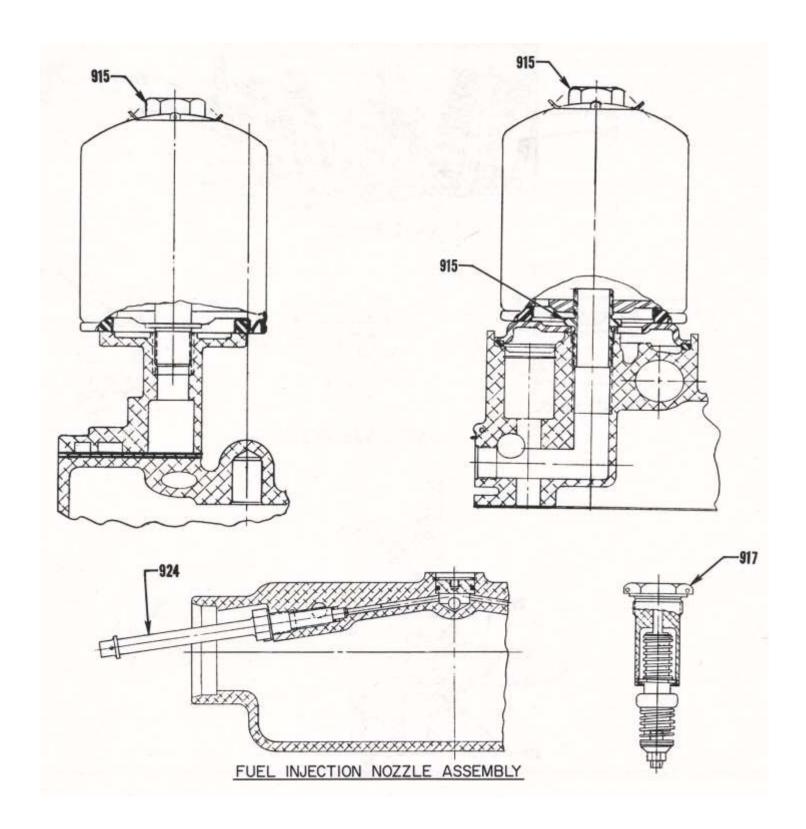
PART II – INTEGRAL ACCESSORY DRIVE ENGINES

SECTION V – SPECIAL TORQUE REQUIREMENTS



PART II – INTEGRAL ACCESSORY DRIVE ENGINES

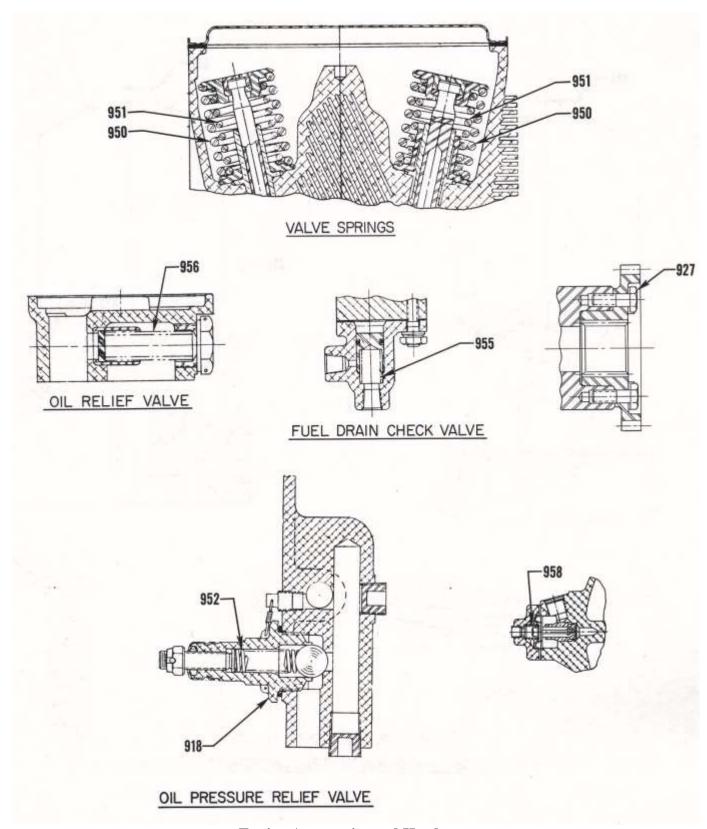
 $SECTION\ V-SPECIAL\ TORQUE\ REQUIREMENTS$



Engine Accessories and Hardware

PART II – INTEGRAL ACCESSORY DRIVE ENGINES

SECTION V – SPECIAL TORQUE REQUIREMENTS



Engine Accessories and Hardware

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).

		TAB	LE I			TAB	TABLE II		
	В	OLTS, SCRE	PIPE PLUGS						
Thread	Tor	que	Thread	Torq	ue	Thread	Torque		
Thread	In. Lb.	Ft. Lb.	Thread	In. Lb.	Ft. Lb.	Thread	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		
ти	IN NUTS (1/2	DIA OF DO	3/4-14 NPT	230 to 252					
111	IN NO 13 (1/2	Z DIA. OF BO	JL1) - 1/2	LISTED TORQ	UE	1-11-1/2 NPT	315 to 347		

TABLE III			TABLE IV				
CRUSH TYPE GAS		FLEXIBLE TUBE CONNECTIONS (SEALASTIC OR EQUIVALENT FITTINGS)					
Thread Pitch on Part to be Tightened	ANGLE OF TURN		Tube	Thread	Torque In. Lbs.		
Threads Per Inch	Aluminum	Copper	Size		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°		T	ABLE V		
28	360°	180°	S	TUDS MIN.	DRIVING TORQU	E	
NOTE: Install all crush type gas	skets except	the self	Thr	eads	Torque In.	Lbs.	
centering type, with the unbroken sur	face against tl	ne flange	1/4	l-20	15		
of the plug or part being tightened ag	5/10	6-18	25				
part until the sealing surfaces are in c	3/8-16 50						
to the angle of turn listed for the appr					•		
NOTE: Lubricate Threads Unless Of	herwise Speci	fied.					

	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

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STANDARD TORQUE (CONT.) UNLESS OTHERWISE LISTED

	TABLE VII										
	METAL TUBE FITTINGS										
	Minimum bend radii										
Dash Nos. Ref.	Tubing OD inches	Aluminum-	alloy tubing	Steel	Steel tubing Aluminum-allo (Flare MS33583 on oxygen lin		3583) for use	measured centerline. D incl	imension in		
		Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Alum. 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.	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	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		

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PART III – GEARED ENGINES

CHART	MODELS
Е	GO-435 ALL
E1	GO-435-C2B2, -C2B2-6
Н	GO-480, IGO-480 ALL
H1	GO-480-B
H2	GO-480-F1A6, -F2A6, -F4A6, -G2D6, -G2F6
Н3	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.

CRANKCASE, CRANKSHAFT & CAMSHAFT

500 SERIES

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

SSP-1776-5-PT3 April 13, 2020*

Tight fit; shrink or interference fit.

SECTION I

(T)

^{* -} Indicates cut-off date for data retrieved prior to publication.





TECHNICAL PUBLICATION REVISION

REVISION NO.	PUBLICATION	PUBLICATION NO. PUBLICATION D.				
SSP-1776-5-PT3	Service Table of Limits	SSP-1776	October 28, 2013			
PREVIOUS	REVISIONS	CURRENT	REVISION*			
Apı	ril 2018	April	1 2020			
3-9, 3	-47, 3-53	3.	-8			
 Deleted NOTES that refer Application Table Added Ref. number 930 to 	rence S.I. 1243 in Piston o Section V table and figure for on nut on stainless steel injector	 Revised burnishing instruction bushing in reference numbers Revised the Mfr. Min. & No. 	ctions for connecting rod ber 600 Max. Clearance for Piston Ring led Cylinders (Choke Barrels) in reference number 607			



PART III – GEARED ENGINES

SECTION I – CRANKCASE, CRANKSHAFT AND CAMSHAFT

			Dime	nsions	Clear	ances
Ref.	Chart	Nomenclature	Mfr. Min. & Max.	Service Max.	Mfr. Min. & Max.	Service Max.
500	E-H1-H2-H4	All Main Bearings and			.0015L	00.601
	Н3-Н5-Р-АВ-АС	Crankshaft Main Bearings and Crankshaft (Except Front)			.0045L .0011L .0041L	.0060L .0050L
	H3-H5-P-AB-AC	Front Main Bearings and Crankshaft			.0011L .0041L	.0050L
	Е-Н-Р	Diameter of Main Bearing Journal on Crankshaft	2.3745 2.376	(E)		
	E-H1-H2-H4	Crankcase Bearing Bore Diameters (All)	2.566 2.567	2.5685		
	H3-H5-P-AB-AC	Crankcase Bearing Bore Diameters (All)	2.6865 2.6875	2.6890		
501	ALL	Connecting Rod Bearings and Crankshaft			.0008L .0038L	.0050L
	ALL	Diameter of Connecting Rod Journal on Crankshaft (2-1/8 in.)	2.1235 2.125	(E)		
	ALL	Connecting Rod Bearing Bore Diameter (Measured at axis 30° on each side)	2.2870 2.2875			
502	ALL	Connecting Rod Side Clearance			<u>.004L</u> .010L	.016L
503	ALL	Connecting Rod Alignment			.010 in 1	0 Inches
504	ALL	Connecting Rod Twist			.012 in 1	0 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 Mounted on No. 2 and 4 Journals Max. Run-Out No. 3			.003	.0045
506	ALL	Journal Crankshaft and Crankcase Front			.003 .006L	.0045
510	E-H1-H2-H3	End Clearance Crankshaft Timing Gear and			.015L .0015L	.025L
	H4-H5-P-AB-AC	Crankshaft Crankshaft Timing Gear and Crankshaft			.0005T .0000 .0015T	(A) (A)
511	ALL	Tappet Body and Crankcase			.00131 .0010L .0033L	.004L
	ALL	O.D. of Tappet	<u>.7169</u> .7177	.7166	.003312	.007L
	ALL	I.D. Tappet Bore in Crankcase	<u>.7187</u> .7200	.7203		

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PART III – GEARED ENGINES

SECTION I – CRANKCASE, CRANKSHAFT, CAMSHAFT

			Dime	nsions	Clear	ances
			Mfr.		Mfr.	
			Min. &	Service	Min. &	Service
Ref.	Chart	Nomenclature	Max.	Max.	Max.	Max.
512	ALL	Tappet Plunger Assembly and			.0010L	
		Body (Hyperbolic)			.0067L	.0087L
513	ALL	Tappet Socket and Body			.002L	
		(Hyperbolic)			.007L	.009L
514	ALL	Camshaft and Crankcase			<u>.002L</u>	
					.004L	.006L
515	ALL	Camshaft – End Clearance			<u>.002L</u>	
					.009L	.015L
516	ALL	Camshaft Run-Out at Center			.000	
		Bearing Journal			.001	.006
517	ALL	Counterweight Bushing and			.0013T	
710		Crankshaft			.0026T	(A)
518	ALL	Counterweight Roller – End			.007L	0201
510	A Y Y	Clearance			.025L	.038L
519	ALL	Counterweight and Crankshaft – Side Clearance*			.003L	0171
	* M 1 1 11 6				.013L	.017L
72 0	* - Measure below roller next to f		1		0000	1
520	ALL	Counterweight Bore and Washer			.0002L	(4)
501	ATT	O.D.	7405		.0030L	(A)
521	ALL	I.D. of Counterweight Bushing	<u>.7485</u>	7512		
522	ALL	O.D. of Counterweight Roller	.7505	.7512		
322	ALL	(P/N 69433) (See latest revision	.5045			
		of Service Instruction No. 1012)	.5050			
	AC	O.D. of Counterweight Roller	.5050			
		(P/N 73287) (See latest revision	.5189			
		of Service Instruction No. 1012)	.5194			
	ALL	O.D. of Counterweight Roller				
		(P/N 70416) (See latest revision	.6945			
		of Service Instruction No. 1012)	.6950			
523	ALL	Thrust Bearing and Propeller			.0000	
		Shaft			.0012L	.002L
526	ALL	Thrust Bearing and Thrust				
		Bearing Cap Clamp Fit (Shim to			<u>.003T</u>	
		this fit)			.005T	(A)
527	ALL	Thrust Bearing Tilt			.027 Tilt	1
528	ALL	Thrust Bearing – End Play			<u>.006</u>	
					.008	.010
530	ALL	Propeller Shaft Run-Out (Rear				_
		Cone Location)				.003
531	ALL	Propeller Shaft Run-Out (Front				
		Cone Location) (Propeller Shaft				007
500	E 111 112 112	Installed)			00057	.007
532	E-H1-H2-H3	Starter Jaw and Crankshaft			.0005L	(4)
522	ATT	Throat Doning and Doding			.0040L	(A)
533	ALL	Thrust Bearing and Reduction			.0006L	00351
		Gear Housing	l		.0024L	.0035L

PART III – GEARED ENGINES

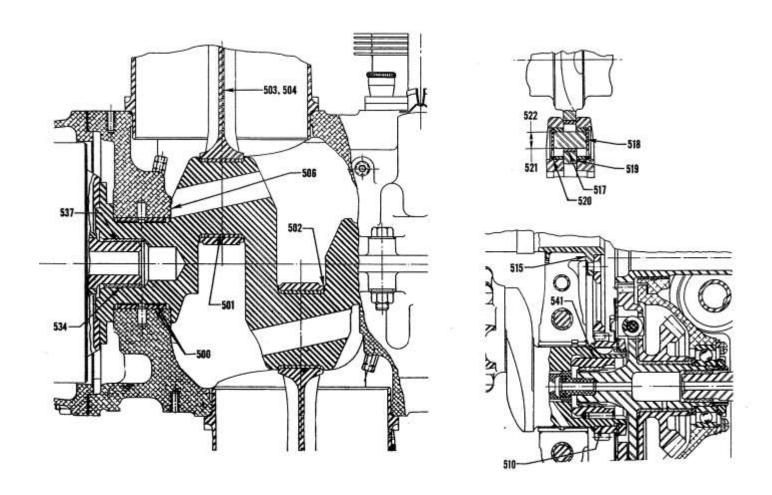
SECTION I – CRANKCASE, CRANKSHAFT, CAMSHAFT

			Dime	nsions	Clear	rances
Ref.	Chart	Nomenclature	Mfr. Min. & Max.	Service Max.	Mfr. Min. & Max.	Service Max.
534	ALL	Crankshaft and Crankcase Front Bushing			<u>.0010T</u> .0025T	(A)
535	ALL	Pinion – End Clearance			<u>.011</u> .016	.030
536	ALL	Pinion Shaft and Cage (See latest revision of Service Instruction No. 1236)			.0001T .0005T	
	ALL	Pinion Shaft and Cage (See latest revision of Service Instruction No. 1114)			Select for I Fit (C) .002	
537	ALL	Propeller Shaft and Crankshaft Bushing			.0020L .0035L	.005L
	ALL	I.D. Propeller Shaft Bushing in Crankshaft	1.251 1.2525	1.253		
				eter must being within .0	e concentric 03 in. TIR.	with Front
538	ALL	Stationary Gear and Plate – End Clearance			<u>.000</u> .004	.007
539	ALL	Ring Gear and Drive Plate – End Clearance			<u>.000</u> .004	.007
540	P-AB-AC	Reduction Gear Governor and Magneto Housing and Reduction Gear Housing Sleeve			<u>.004T</u> .006T	(A)
541	H4-H5-P-AB-AC	Rear Crankshaft Spline Bushing and Crankshaft			<u>.0002T</u> .0015T	(A)

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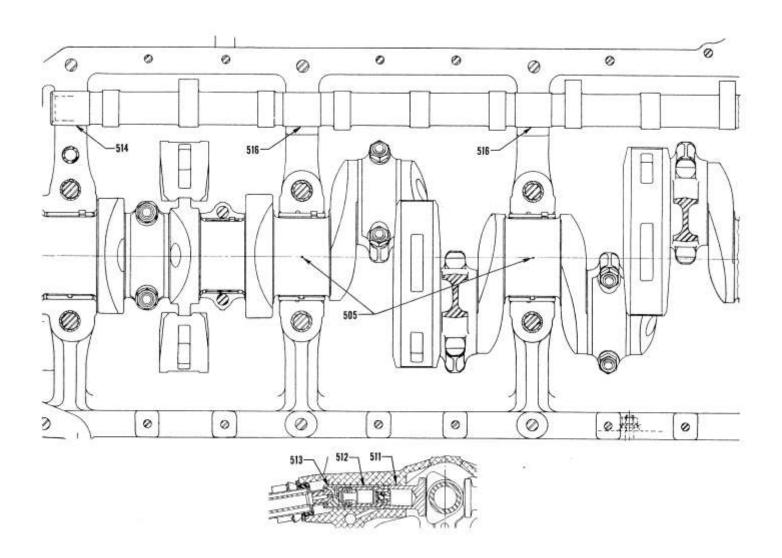
PART III – GEARED ENGINES

SECTION I – CRANKCASE, CRANKSHAFT AND CAMSHAFT



PART III – GEARED ENGINES

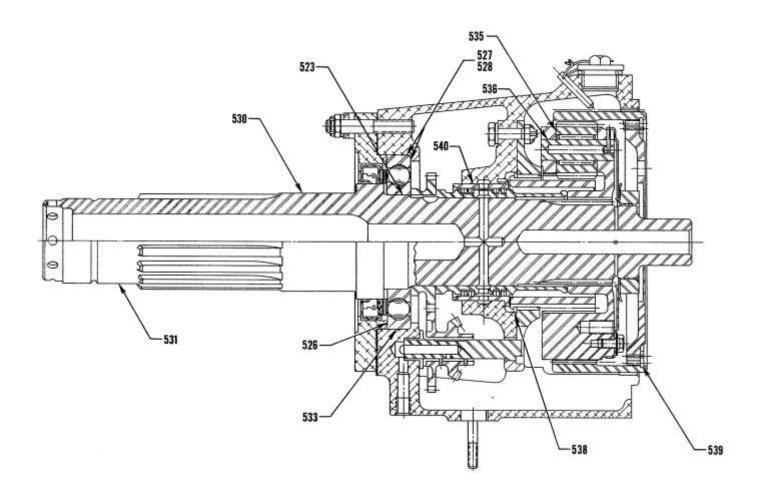
SECTION I – CRANKCASE, CRANKSHAFT, CAMSHAFT



3-5

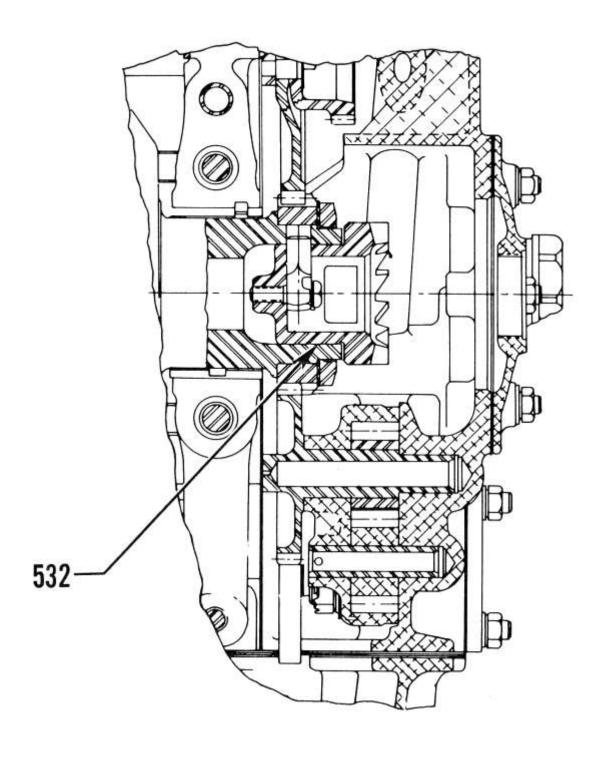
PART III – GEARED ENGINES

 $SECTION\ I-CRANKCASE,\ CRANKSHAFT,\ CAMSHAFT$



PART III – GEARED ENGINES

SECTION I – CRANKCASE, CRANKSHAFT, CAMSHAFT



Starter Jaw and Crankshaft

PART III – GEARED ENGINES

SECTION II – CYLINDERS

			Dimer	nsions	Clearances	
			Mfr. Min.		Mfr.	
	-		& Max.	Service	Min. &	Service
Ref.	Chart	Nomenclature		Max.	Max.	Max.
600	ALL	Connecting Rod and	Bushing P/N			
		Connecting Rod Bushing	Bushing P/N	01K28983 is	s <u>not</u> burnish	ed in place
		Finished I.D. of Connecting	<u>1.1254</u>			
CO1	EHP	Rod Bushing	1.1262			
601	Е-Н-Р	Length Between Connecting	6.4985 6.5015			
	AB-AC	Rod Bearing Centers Length Between Connecting	6.4785			
	AD-AC	Rod Bearing Centers	6.7515			
602	ALL	Connecting Rod Bushing and	0.7313		.0008L	
002	TABLE	Piston Pin			.0021L	.0025L
603	ALL	Piston Pin and Piston			.0003L	.00232
000		1 150011 1 111 11110 11			.0014L	.0018L
	ALL	Diameter of Piston Pin Hole in	1.1249			
		Piston	1.1254			
	ALL	Diameter of Piston Pin	1.1241			
			1.1246			
604	H-P-AB-AC	Piston and Piston Pin Plug			<u>.0002L</u>	
					.0010L	.002L
	H-P-AB-AC	*Diameter of Piston Pin Plug	1.1242			
			1.1247			
605	ALL	Piston Pin and Piston Pin Plug			<u>.0005L</u>	
		(Optional)			.0025L	.005L
	H-P-AB-AC	*Diameter of Piston Pin Plug	<u>.5655</u> .5665			
	Е	Diameter of Piston Pin Plug	.8405			
		(Thin Wall Pin)	.8415			
	*See latest revision of Service					
606	ALL	Piston Ring and Piston – Side				
		Clearance (Top Ring Comp.)			<u>.0025L</u>	
		Half Wedge			.0055L	.008L (B)
	ALL	Piston Ring and Piston – Side				
		Clearance (2 nd Ring Comp.)			.000 .004	00(1 (D)
	ALL (AC ADDITION DIE)	Full or Half Wedge			.004L	.006L (B)
	ALL (AS APPLICABLE)	Piston Ring and Piston – Side Clearance (3 rd Ring Comp.)			000	
		Half Wedge			.000 .004L	006I (P)
	ALL	Piston Ring and Piston – Side			.004L	.006L (B)
	ALL	Clearance (Oil Regulating)			.002L .004L	.006L (B)
	ALL (AS APPLICABLE)	Piston Ring and Piston – Side			.003L	.000L (B)
	ALL (AS AT LICABLE)	Clearance (Oil Scraper)			.005L	.007L (B)
607	ALL	Piston Ring Gap (Comp.) Plain			100002	10072 (2)
		and Chrome Cylinders (Straight			.020	
		Barrels)			.030	.047
	ALL	Piston Ring Gap (Comp.)				
		Nitrided and Chrome Cylinders			<u>.045</u>	
		(Choke Barrels)			.065	.067
	ALL	Piston Ring Gap (Oil			.015	
		Regulating) (All Barrels)			.040	.047

PART III - GEARED ENGINES

SECTION II - CYLINDERS

			Dime	Dimensions		Clearances	
			Mfr.	Carrias	Mfr.	Compies	
Ref.	Chart	Nomenclature	Min. & Max.	Service Max.	Min. & Max.	Service Max.	
607	ALL (AS APPLICABLE)	Piston Ring Gap (Oil Scraper)			.015		
		(All Barrels)			.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	d Piston Application	Min. Pisto	n Diameter		Cyline	der Barrel	Max.
	Engine Chart Code Letter	Piston Number	Тор	Bottom	Type of Piston	Type of Surface	Maximum Diameter	Clearance Piston Skirt & Cyl.
608	Е	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
609 610	Е	67266, 71553, 73620, 73628, 73932	4.8395	4.8540	Forged-Round	С	4.8805	.0225L
	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	С	5.1305	.024L
	H-P-AB-AC	71940, 72249*, 72578, 73947*, 73976	5.0905	5.1040	Forged-Round	С	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	С	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,	5.0500	7.1000	F 16	G.N.	5 1205	0101
		LW-10545	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.

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.

^{*=}High Compression.

PART III – GEARED ENGINES

SECTION II – CYLINDERS

			Dime	nsions	Clearances		
			Mfr.		Mfr.		
Ref.	Chart	Nomenclature	Min. & Max.	Service Max.	Min. & Max.	Service Max.	
611	ALL	Exhaust Valve Seat and Cylinder Head			<u>.0075T</u> .011T	(A)	
	ALL	O.D. Exhaust Seat	1.9355 1.937				
	ALL	I.D. Exhaust Seat Hole in Cylinder Head	1.926 1.928				
612	ALL	Intake Valve Seat and Cylinder Head			<u>.0065T</u> .010T	(A)	
	Е-Н-Р	O.D. Intake Seat	2.1675 2.169		.0101	(11)	
	AB-AC	O.D. Intake Seat	2.2885 2.290				
	Е-Н-Р	I.D. Intake Seat Hole in Cylinder Head	2.159 2.161				
	AB-AC	I.D. Intake Seat Hole in Cylinder Head	2.280 2.282				
613	ALL	Exhaust Valve Guide and Cylinder Head			<u>.001T</u> .0025T	(A)	
	ALL	O.D. Exhaust Valve Guide	<u>.6633</u> .6638		100=0	(= -/	
	ALL	I.D. Exhaust Valve Guide Hole in Cylinder Head	<u>.6613</u> .6623				
614	ALL	Intake Valve Guide and Cylinder Head			<u>.001T</u> .0025T	(A)	
	ALL	O.D. Intake Valve Guide	<u>.5933</u> .5938				
	ALL	I.D. Intake Valve Guide Hole in Cylinder Head	. <u>5913</u> .5923				
615	ALL	Exhaust Valve Stem and Valve Guide			.0037L .0050L		
	ALL	O.D. Exhaust Valve Stem	<u>.4957</u> .4965	.4937			
			Service all	owable limits	s of .4937 is		
				only to			
			nimonic va	lves.	_		
	ALL	Finished I.D. Exhaust Valve Guide	<u>.4995</u> .5005				
	limit, anytime up to 300 hours of s .001 inch during each 100 hours of	may have exhaust valve guides that a service. After 300 hours of service, inservice, in the service in the recommended of the revision of Service Instruction No. 1	side diameter verhaul time	r of exhaust vertor the engine	valve guide manne, or not to e	ay increase	
616	ALL	Intake Valve Stem and Valve	009 101 1600	mineriaca ov	<u>.0010L</u>	005	
	ALL	Guide O.D. Intake Valve Stem	.4022 .4030	.4010	.0028L	.006L	
	ALL	Finished I.D. Intake Valve Guide	.4030 .4040 .4050	.4010			

PART III – GEARED ENGINES

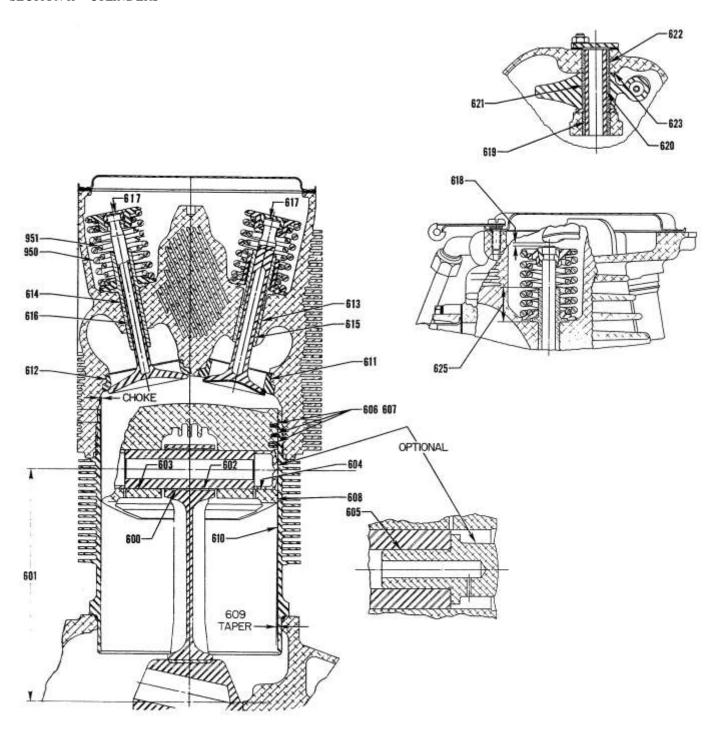
SECTION II – CYLINDERS

			Dime	nsions	Clear	rances
Ref.	Chart	Nomenclature	Mfr. Min. & Max.	Service Max.	Mfr. Min. & Max.	Service Max.
617	ALL	Valve and Valve Cap Clearance			<u>.000</u> .004L	.005L
618	ALL	Dry Tappet Clearance			.028 .080	
619	ALL	Valve Rocker Shaft and Valve Rocker Bushing			.0001L .0013L	.0025L
	ALL	Finished I.D. of Valve Rocker Shaft (Bushing) in Cylinder Head	<u>.6246</u> .6261	.6270		
620	ALL	Valve Rocker Shaft and Valve Rocker Bushing			<u>.0007L</u> .0017L	.004L
	ALL	O.D. Valve Rocker Shaft	<u>.6241</u> .6245	.6231		
	ALL	Finished I.D. of Rocker Arm Bushing	<u>.6252</u> .6263	.6270		
621	ALL	Valve Rocker Bushing and Valve Rocker	Bushing M	ust Be Burni	shed In Place	e
622	ALL	Valve Rocker Shaft Bushing and Cylinder Head			<u>.0022T</u> .0038T	(A)
	ALL	Valve Rocker Shaft Bushing and Hole in Cylinder Head	<u>.7380</u> .7388			
623	ALL	Valve Rocker and Cylinder Head – Side Clearance			<u>.002L</u> .020L	.024L
625	ALL	Intake and Exhaust Valve Guide Height	<u>.914</u> .954			
		MEASURE VALVE GUIDE FROM THE VALVE SPRIN COUNTERBORE IN THE COUNTERBORE IN THE COUNTERBOR				

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PART III – GEARED ENGINES

SECTION II – CYLINDERS



Cylinder, Piston, Connecting Rod and Valve Components

PART III – GEARED ENGINES

SECTION III – GEAR TRAIN

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

PART III – GEARED ENGINES

SECTION III – GEAR TRAIN

			Dimensions		Clearances	
Ref.	Chart	Nomenclature	Mfr. Min. & Max.	Service Max.	Mfr. Min. & Max.	Service Max.
FUEL	PUMP				<u> </u>	
727	E-H1-H2-H3	Fuel Pump Drive Gear – End Clearance			<u>.016L</u> .045L	.065L
781	E-H1-H2-H3	Fuel Pump Drive Gear and Accessory Housing			.0010L .0030L	.005L
782	H4-H5-P-AB-AC	Fuel Pump Drive Gear Bushing and Accessory Housing			<u>.001T</u> .004T	(A)
783	H4-H5-P	Fuel Pump Drive Shaft Gear – End Clearance			<u>.006L</u> .064L	.074L
784	H4-H5-P	Fuel Pump Drive Shaft Gear and Bushing			.001L .004L	.006L
785	P1	Injector Drive Gear and Accessory Housing Cover Bushing			.0036L .0048L	.006L
786	P1	Injector Drive Gear – End Clearance			.002L .020L	.030L
787	P1	Injector Idler Gear and Magneto Idler Ball Bearing			<u>.0005T</u> .0004L	(A)
788	P1	Injector Idler Shaft and Magneto Idler Ball Bearing			.0001T .0005L	(A)
789	AB	Injector Drive Shaftgear and Accessory Housing Bushing			<u>.001L</u> .003L	.005L
790	AC	Fuel Pump Drive Shaftgear and Accessory Housing Bushing			<u>.001L</u> .003L	.005L
791	AB	Injector Drive Shaftgear – End Clearance			<u>.006</u> .036	.048
792	AC	Fuel Pump Drive Shaftgear – End Clearance			<u>.006</u> .036	.048
VACU	UM PUMP & TACHOMETER					
737	E-H1-H2-H3	Vacuum Pump Gear and Accessory Housing			<u>.0010L</u> .0025L	.006L
738	E-H1-H2-H3	Vacuum Pump Gear – End Clearance			<u>.016L</u> .045L	.065L
	Reference No. 739 to follow Re	eference No. 7000.			•	
793	H4-H5-P	Vacuum Pump Shaftgear Bushing and Accessory Housing Cover			.0015T .0035T	(A)
794	H4-H5-P	Vacuum Pump Shaftgear Bushing (At Cover) and Vacuum Pump Shaftgear			<u>.002L</u> .004L	.006L
795	H4-H5-P	Vacuum Pump Shaftgear Bushing and Accessory Housing			.0015T .0035T	(A)
796	H4-H5-P	Vacuum Pump Shaftgear Bushing (At Accessory Housing) and Vacuum Pump Shaftgear			.0020L .0045L	.006L
797	H4-H5-P	Vacuum Pump Shaftgear – End Clearance			.008 .030	.050
798	AB-AC	Vacuum Pump Drive Gear and Vacuum Pump Spline Coupling – End Clearance			.008 .045	.065

PART III – GEARED ENGINES

PART III – GEAR TRAIN

Ref. Chart Nomenclature Min. & Service Max. Min. & Service Max.				Dimensions		Clearances	
Ref. Chart Nomenclature Max.							
VACUUM PUMP & TACHOMETER (CONT.) 799 AB-AC Vacuum Pump Drive Gear Bushing and Accessory Housing .003T (A) 7000 AB-AC Vacuum Pump Drive Gear .003L .006L 800 Bushing and Vacuum Pump Drive Gear .003L .006L 739 E-H1-H2-H3 Tachometer Drive Gear End .000 .002SL .006L 7001 E-H1-H2-H3 Tachometer Drive Gear End .000 .000 .000L 7002 E-H1 Tachometer Drive Gear and .001SL .005SL .005S	D.e	Cl 4	Nil- 4				
AB-AC				Max.	Max.	Max.	Max.
Bushing and Accessory Housing	VACUU	UM PUMP & TACHOMETER (CO	NT.)				
Toology AB-AC Vacuum Pump Drive Gear Bushing and Vacuum Pump 0.021 .004L .006L	799	AB-AC					
Bushing and Vacuum Pump .002L .006L						.003T	(A)
Drive Gear	7000	AB-AC				000	
Tachometer Drive Gear and Accessory Housing							0061
Accessory Housing	720	E 111 112 112					.006L
Tachometer Drive Gear - End	/39	E-H1-H2-H3					0061
Clearance	7001	E U1 U2 U2					.006L
Tachometer Driven Gear and Adapter	7001	E-H1-H2-H3					0401
Adapter	7002	F-H1					.040L
Tachometer Cover and Adapter	7002						.005L
Tachometer Gear - End	7003	E-H1					10002
Tachometer Gear - End	, 002						(A)
Clearance	7004	E-H1	Tachometer Gear – End				
End Clearance			Clearance				.060L
Tought T	7005	H1-H2-H3	Electric Tachometer Idler Gear –			<u>.005L</u>	
Gear - End Clearance .027L .047L						.052L	.065L
Tour Tachometer Driven Count C	7006	H1-H2-H3					
Gear - End Clearance .025L .047L							.047L
Total Tota	7006	H4-H5-P-AB-AC					
Shaft and Idler Gear Bushing							.047L
Tools	7007	H1-H2-H3					00.47
Gear and Adapter	7000	111 112 112					.004L
Tachometer Drive Idler Gear Bushing and Tachometer Drive Idler Gear Bushing and Tachometer Drive Idler Gear	7008	H1-H2-H3					0061
Bushing and Tachometer Drive Bushing To Be Burnished In Place Idler Gear	7000	AD AC				.0033L	.006L
Idler Gear	7009	AB-AC		Ruching To	n Re Rurnich	ed In Place	
Tachometer Drive Idler Gear Bushing and Tachometer Drive Idler Gear Bushing and Tachometer Drive Idler Gear - Bushing and Governor Drive Idler Gear Bushing Bushing Bushing Idler Gear Idler Gear Idler Governor Drive Gear and Governor Drive Adapter Bushing Idler Gear Governor Idler Gear Governor Idler Gear Governor Drive Bushing Idler Gear Idler Ge				Dusning 10	be Burnish	ed III I lace	
Bushing and Tachometer Drive Idler Shaft .003L .004L	7010	AB-AC					
Idler Shaft						.001L	
End Clearance .014L .024L .024L .012 .001L .003L .004L .002L .004L .002L .004L .002L .004L .002L .004L .003L .004L .003L							.004L
Total	7011	AB-AC	Tachometer Drive Idler Gear –			.005L	
And Accessory Housing Cover .003L .004L						.014L	.024L
GOVERNOR 7013 ALL Governor Drive Idler Gear Bushing and Governor Drive Idler Shaft .000L .004L 7014 ALL Governor Driven Gear and Governor Drive Adapter Bushing .001L .004L 7015 ALL Reduction Gear Governor and Magneto and Governor Drive Bushing .002T .004T 7016 ALL Governor Drive Idler Gear and Governor Drive Idler Gear Bushing .001T .001T 7017 ALL Governor Adapter and Governor .001T .001T	7012	H1-H5-P-AB-AC					
7013 ALL Governor Drive Idler Gear Bushing and Governor Drive Idler Shaft .000L .004L 7014 ALL Governor Driven Gear and Governor Drive Adapter Bushing .001L .003L .004L 7015 ALL Reduction Gear Governor and Magneto and Governor Drive Bushing .002T .004T (A) 7016 ALL Governor Drive Idler Gear and Governor Drive Idler Gear Bushing .001T .003T (A) 7017 ALL Governor Adapter and Governor .001T .003T (A)			and Accessory Housing Cover			.003L	.004L
Bushing and Governor Drive 1000L	GOVE	RNOR					
Idler Shaft	7013	ALL					
7014 ALL Governor Driven Gear and Governor Drive Adapter Bushing .001L .003L .004L 7015 ALL Reduction Gear Governor and Magneto Housing and Magneto and Governor Drive Bushing .002T .004T (A) 7016 ALL Governor Drive Idler Gear and Governor Drive Idler Gear Bushing .001T .001T .003T (A) 7017 ALL Governor Adapter and Governor .001T							
Governor Drive Adapter Bushing .003L .004L							.004L
7015 ALL Reduction Gear Governor and Magneto and Governor Drive Bushing .002T	7014	ALL					0047
Magneto Housing and Magneto .002T and Governor Drive Bushing .004T (A)	7015	ATT				.003L	.004L
and Governor Drive Bushing .004T (A)	7015	ALL				000	
7016 ALL Governor Drive Idler Gear and Governor Drive Idler Gear Bushing .001T							(A)
Governor Drive Idler Gear .001T .003T (A)	7016	AII				.0041	(A)
Bushing .003T (A) 7017 ALL Governor Adapter and Governor .001T	/010	ALL				001T	
7017 ALL Governor Adapter and Governor001T							(A)
	7017	ALL					(- - /
			Drive Adapter Bushing				(A)

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PART III – GEARED ENGINES

SECTION III – GEAR TRAIN

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

PART III – GEARED ENGINES

SECTION III – GEAR TRAIN

			Dimensions		Clear	ances
			Mfr. Min. &	Service	Mfr. Min. &	Service
Ref.	Chart	Nomenclature	Max.	Max.	Max.	Max.
MAGN	ETO, GENERATOR, STARTER (Co	ONT.)				
7040	E1-H1-H3	Angle Generator Drive –				
		Generator Driven Gear Bushing			<u>.001T</u>	
		and Generator Housing			.003T	(A)
7041	Е1-Н1-Н3	Angle Generator Drive –				
		Generator Driven Gear and			.002L	0061
7042	E1 H1 H2	Bushing			.004L	.006L
7042	E1-H1-H3	Angle Generator Drive – Generator Housing and			0011	
		Generator Drive Gear			.001L .003L	.004L
7043	H4-H5-P-AB-AC	Generator Drive Gear Bushing			.003E	.004L
7043	114-115-1 -AD-AC	and Accessory Housing Cover			.0035T	(A)
7044	H4-H5-P-AB-AC	Generator Drive Gear Bushing			.00331	(11)
7011		(At Cover) and Generator Drive			.002L	
		Gear			.004L	.006L
7045	H4-H5-P-AB-AC	Generator Drive Gear Bushing			.002T	
		and Accessory Housing			.004T	(A)
7046	H4-H5-P-AB-AC	Generator Drive Gear Bushing				
		(At Accessory Housing) and			<u>.0025L</u>	
		Generator Drive Gear			.0045L	.006L
7047	H4-H5-P-AB-AC	Generator Drive Gear – End			<u>.010</u>	
		Clearance			.038	.050
7048	H4-H5-P-AB-AC	Starter Drive Gear Bushings and			<u>.002T</u>	
=0.40		Adapter			.004T	(A)
7049	H4-H5-P-AB-AC	Starter Drive Gear Bushings and			.002L	00.61
7050	HA HE DAD AC	Starter Drive Gear			.004L	.006L
7050	H4-H5-P-AB-AC	Starter Drive Adapter and			.0005L .0025L	(4)
7051	E1-H1-H2-H3	Accessory Housing Cover Oil Relief Plunger and Oil Relief				(A)
7031	E1-H1-H2-H3	Valve Plug			.0015L .0035L	.005L
	H4-H5-P-AB-AC	Oil Relief Valve Plunger and			.001L	.003L
	114-115-1 -AB-AC	Sleeve			.001L	.005L
ACCES	SSORY DRIVE	Biceve			.003L	.003E
7053	H4-H5-AC	Accessory Idler Gear Bearing			.0001L	
7033	114-113-AC	and Accessory Drive Gear			.0001L	(A)
	P	Accessory Drive Gear Bearing			.0001L	(11)
		and Accessory Drive Shaft			.0007T	(A)
	AB	Accessory Idler Gear Bearing				(- */
		and Supercharger and Accessory			.0001L	
		Drive Gear			.0007T	(A)
7054	P-AB	Supercharger and Accessory			<u>.001T</u>	
		Drive Gear and Bushing			.003T	(A)
7055	H1-H5-P-AB-AC	Accessory Idler Gear Bearing				
		and Accessory Drive Shaft			<u>.0005T</u>	
		Adapter			.0005L	(A)
7056	P-AB	Supercharger and Accessory			0.0	
		Drive Gear Bushing and			.0005L	00.47
		Accessory Drive Shaft			.0017L	.004L

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PART III – GEARED ENGINES

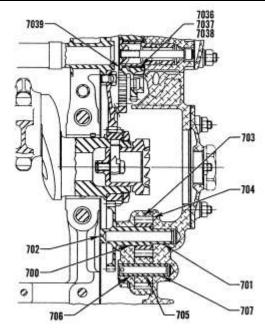
SECTION III – GEAR TRAIN

			Dimensions		Clearances			
			Mfr.		Mfr.			
			Min. &	Service	Min. &	Service		
Ref.	Chart	Nomenclature	Max.	Max.	Max.	Max.		
ACCESSORY DRIVE (CONT.)								
7056	P-AB	Finished I.D. of Supercharger						
		and Accessory Drive Gear	1.3295					
		Bushing	1.3305	1.3312				
7057	P-AB	Supercharger and Accessory			<u>.004L</u>			
		Drive Gear – End Clearance			.012L	.017L		
7058	P	Accessory Drive Shaft and			<u>.001T</u>			
		Bushing			.003T	(A)		
	P	Finished I.D. of Accessory Drive	<u>.750</u>					
		Shaft Bushing	.7515	.752				
7059	P-AB	Supercharger Drive Shaftgear						
		and Accessory Drive Shaft			<u>.002L</u>			
		Bushing			.004L	.006L		
7060	P-AB	Supercharger Drive Shaftgear			<u>.0038L</u>			
		and Supercharger Shaft Bearing			.0050L	.008L		
7061	P-AB	Supercharger Drive Shaftgear –						
		End Clearance (Use 1 Spacer if			<u>.011L</u>			
		Necessary to Maintain Fit)			.020L	.020L		
7062	P-AB	Impeller and Supercharger Air			<u>.040L</u>			
		Inlet Adapter – Clearance			.070L			
7063	P	Intermediate Supercharger Drive			.0040L	00751		
7064	D. A.D.	Shaftgear and Bushing			.0055L	.0075L		
7064	P-AB	Accessory Housing and			0015			
		Intermediate Supercharger Drive			.001T	(4)		
7065	DAD	Shaftgear Bushing			.003T	(A)		
7065	P-AB	Intermediate Supercharger Drive Gear and Bushing			<u>.002L</u> .004L	0061		
7066	P	Intermediate Supercharger Drive			.004L .011L	.006L		
7000	P	Gear – End Clearance			.026L	.030L		
	AB	Intermediate Supercharger Drive			.020L .009L	.030L		
	Ab	Gear – End Clearance			.020L	.024L		
7067	AB	Accessory Housing Adapter and			.0006L	.024L		
7007		Bearing Bearing			.0006T	.0016L		
7068	AB	Supercharger and Accessory			.0002T	.0010L		
7000		Drive Gear Support and Bearing			.0013T	(A)		
7069	AB	Supercharger and Accessory			.001T	\/		
		Drive Gear Support and Bushing			.003T	(A)		
7070	P-AB	Supercharger Shaft Bearing and			.0005L			
		Supercharger Housing			.002L	(A)		
7071	AB	Supercharger and Accessory				, ,		
		Drive Gear and Accessory Drive			<u>.001L</u>			
		Shaft – End Clearance			.015L	.020L		
7072	AB-AC	Oil Pressure and Scavenge Pump						
		Idler Gear Bushing and Fuel						
		Injector or Fuel Pump Drive			<u>.001L</u>			
		Shaftgear (As Applicable)			.003L	.005L		
7073	AB-AC	Oil Pressure and Scavenge Pump			<u>.001T</u>			
		Idler Gear and Bushing			.003T	(A)		

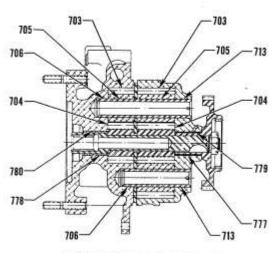
PART III – GEARED ENGINES

SECTION III – GEAR TRAIN

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



REAR MOUNTED ACCESSORY HSG.

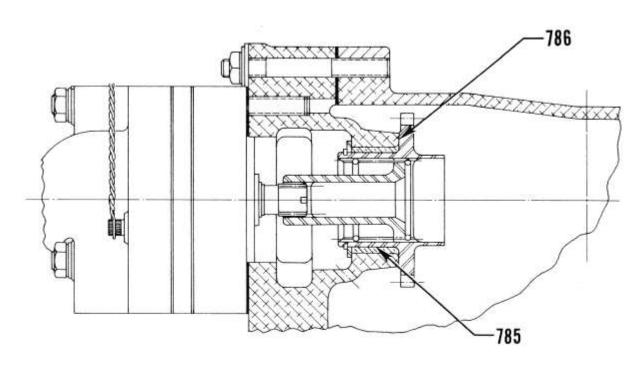


CROSSWISE ACCESSORY HSG.

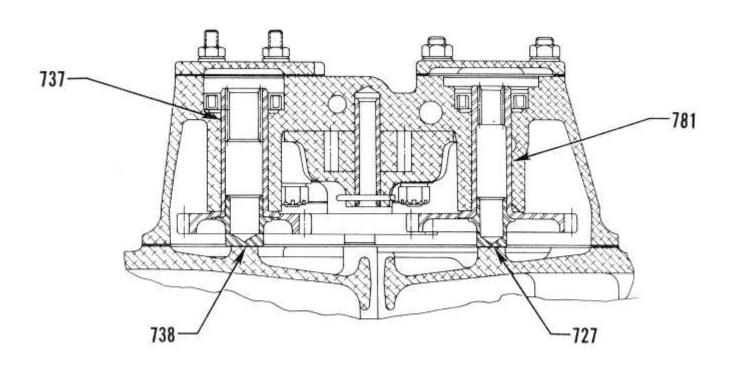
Oil Pumps

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PART III – GEARED ENGINES

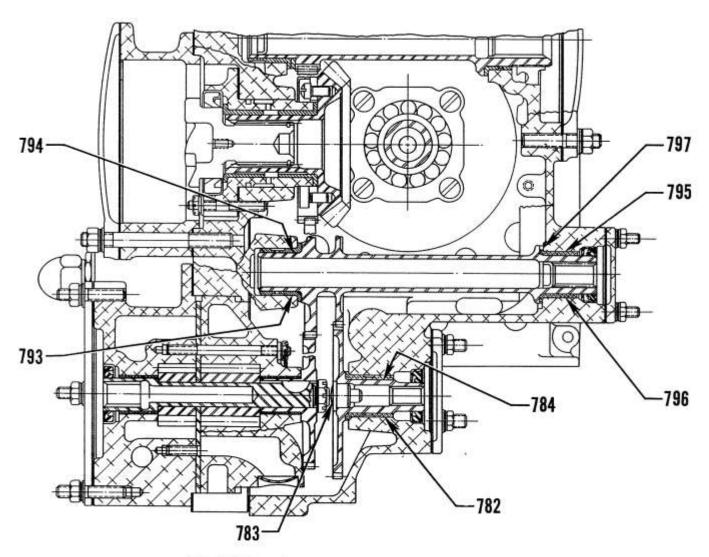


Simmonds Injector



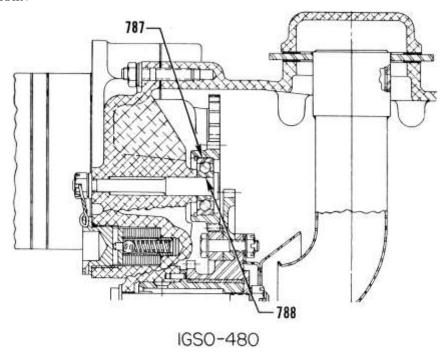
Vacuum and Fuel Pump Drives

PART III – GEARED ENGINES

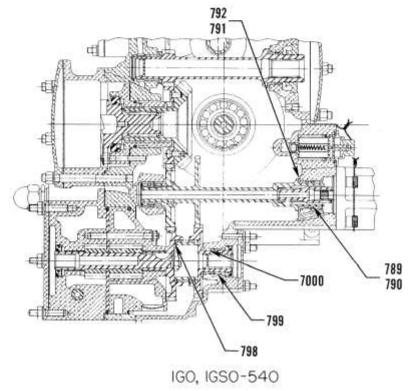


CROSSWISE ACCESSORY HSG.

PART III – GEARED ENGINES



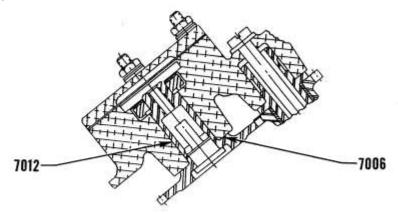
Fuel Injector and Magneto Idler Bearing



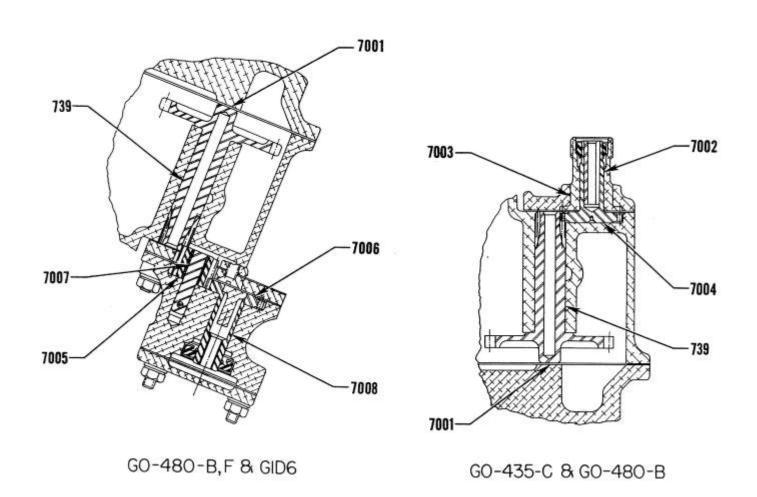
Fuel Injector and/or Fuel Pump, Vacuum Pump Drives

PART III – GEARED ENGINES

SECTION III – GEAR TRAIN



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

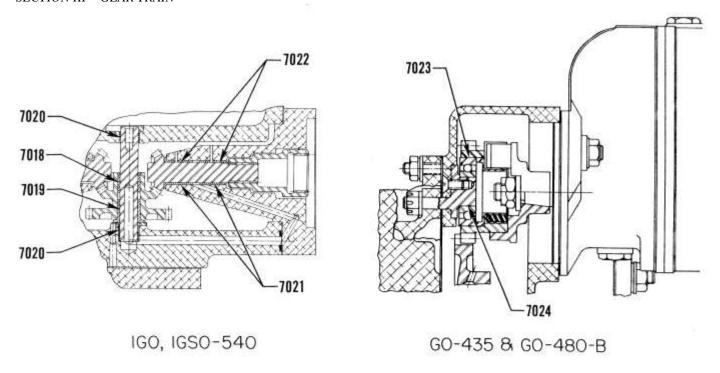


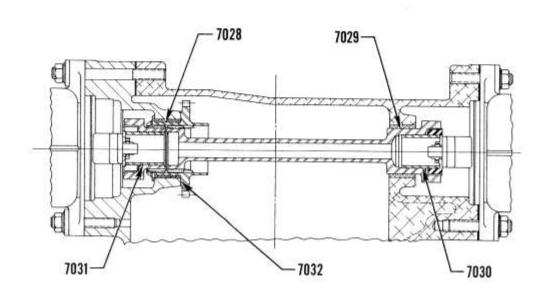
Tachometer Drives

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PART III – GEARED ENGINES

SECTION III – GEAR TRAIN



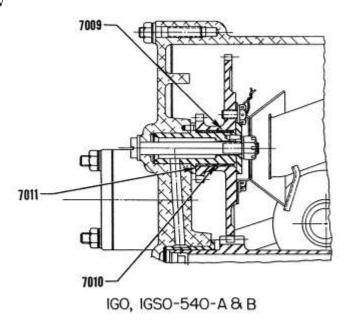


GO-480-D, GSO, IGSO-480

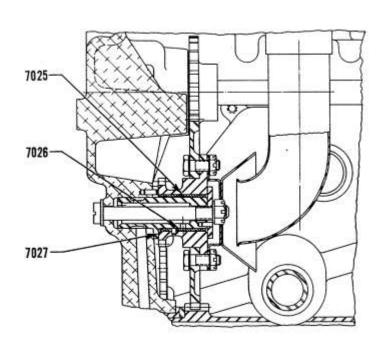
Magneto Drives

PART III – GEARED ENGINES

SECTION III – GEAR TRAIN



Tachometer Drives

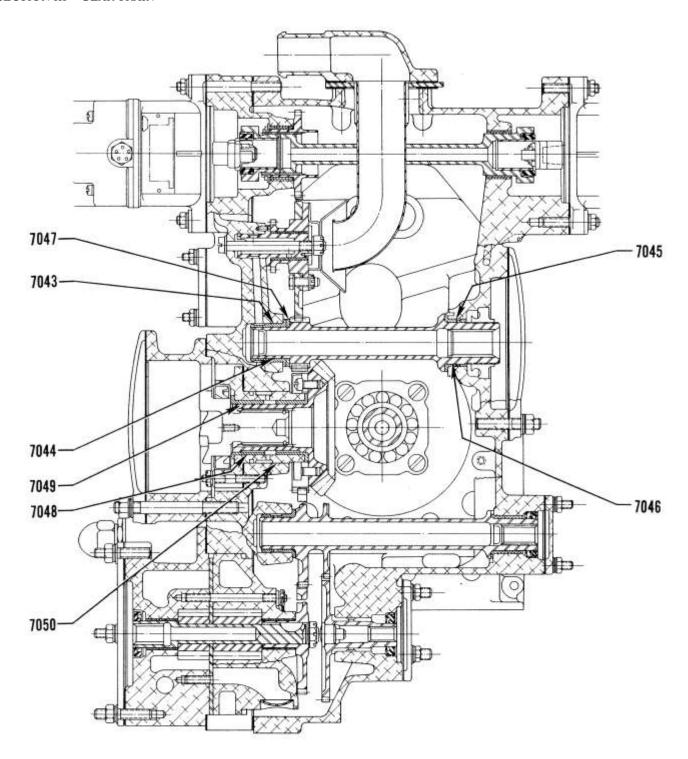


GO-480-B, GIB6, GSO, IGSO-480

Magneto and Tachometer Idler Gear

PART III – GEARED ENGINES

SECTION III – GEAR TRAIN

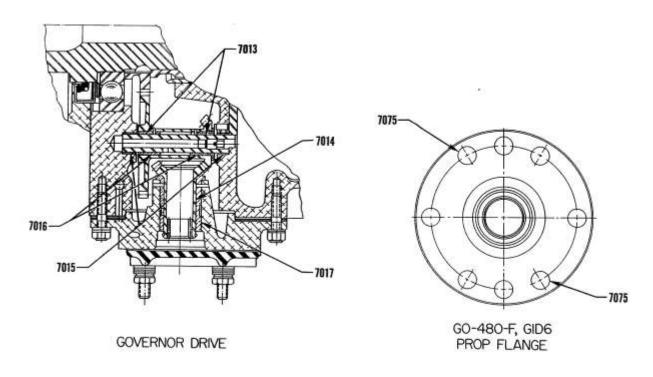


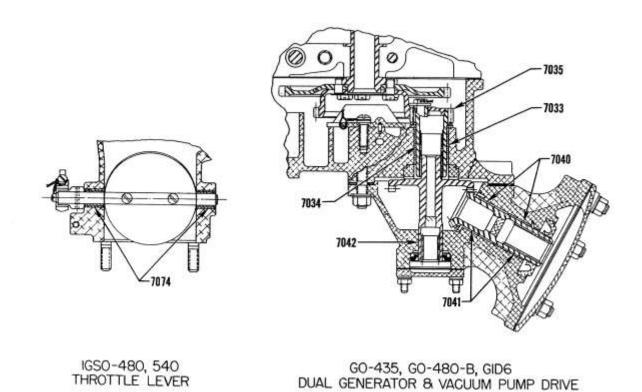
GO-480-B, GSO, IGSO-480 & IGO, IGSO-540

Generator and Starter Drives

PART III – GEARED ENGINES

SECTION III – GEAR TRAIN

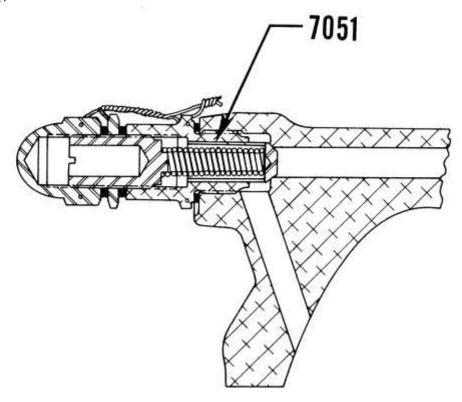


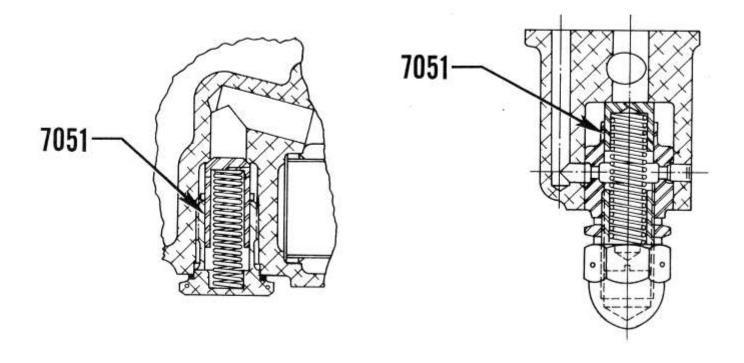


Governor Drive, Prop. Flange, Throttle Lever, Dual Generator and Vacuum Pump Drive

PART III – GEARED ENGINES

SECTION III – GEAR TRAIN

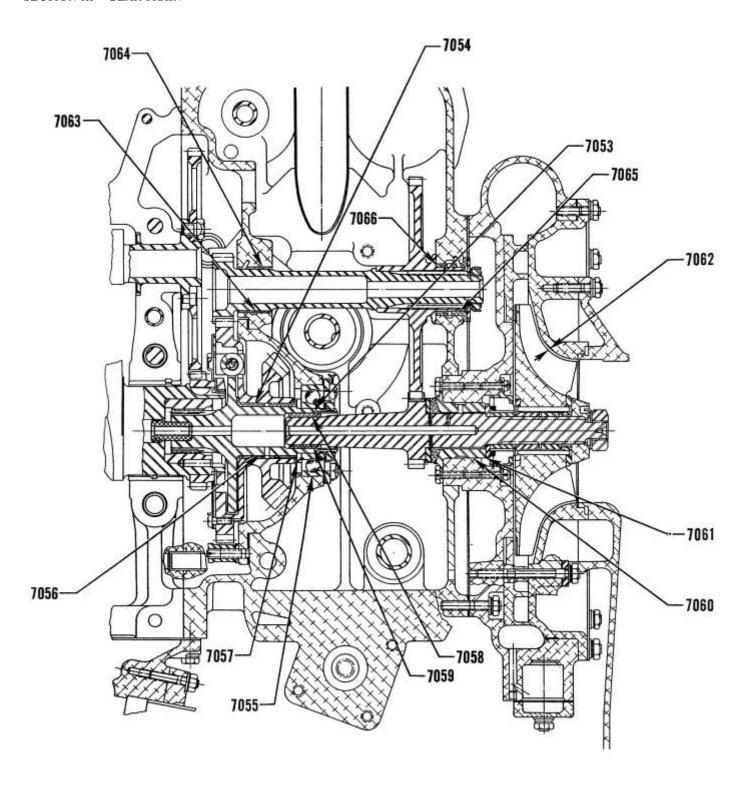




Oil Relief Valves

PART III – GEARED ENGINES

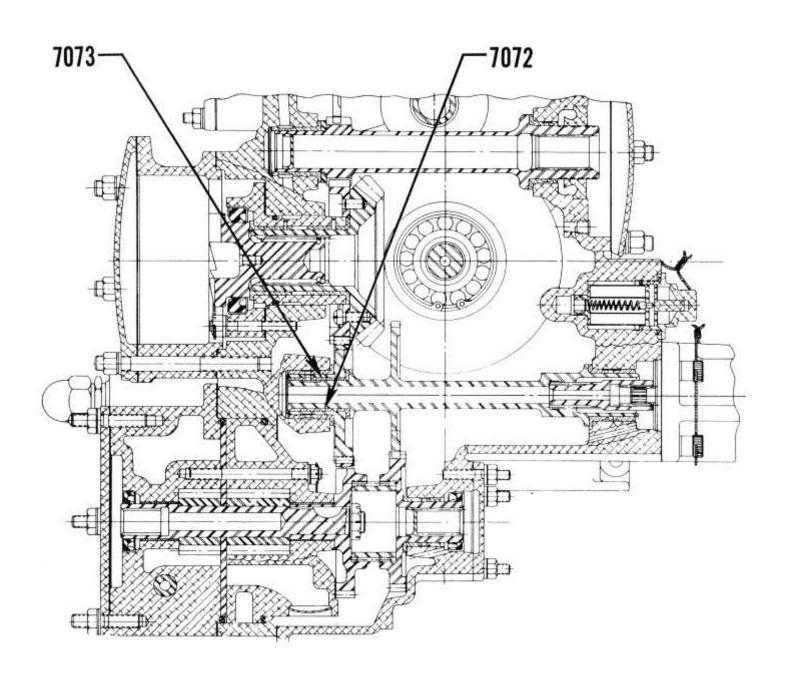
SECTION III – GEAR TRAIN



Supercharger and Components

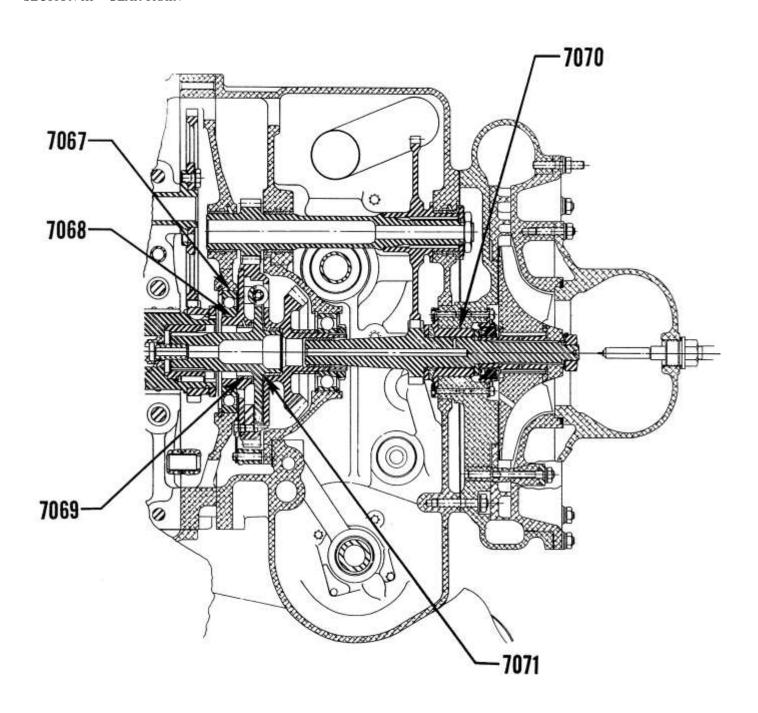
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PART III – GEARED ENGINES



PART III – GEARED ENGINES

SECTION III – GEAR TRAIN



Supercharger Housing

PART III – GEARED ENGINES

$SECTION\ IV-BACKLASH$

		Dimensions				ances
			Mfr.		Mfr.	
			Min. &	Service	Min. &	Service
Ref.	Chart	Nomenclature	Max.	Max.	Max.	Max.
807	E-H1-H2-H3	Oil Pump Drive Gear and			<u>.004</u>	
		Crankshaft Timing Gear			.015	.020
808	E-H1-H2-H3	Oil Pump Impellers			<u>.008</u>	
					.015	.020
	E-H1-H2-H3	Oil Pump and Scavenge Pump			.008	
		Impellers			.015	.020
825	ALL	Crankshaft Timing Gear and			<u>.004</u>	
		Camshaft Gear			.015	.020
829	ALL	Propeller Shaft – Reduction				
		Gear – Total Backlash (At 4 ft.				
		Radius)				.50
846	E-H1-H2-H3	Camshaft Gear and Magneto			<u>.004</u>	
		Gear			.015	.020
847	E-H1-H2-H3	Tachometer Drive Gear and			<u>.004</u>	
		Crankshaft Timing Gear			.015	.020
848	E-H1	Tachometer Driven Gear and			<u>.004</u>	
		Tachometer Drive Gear			.015	.020
849	ALL	Stationary Gear and Stationary			.002	010
0.50		Gear Drive Plate			.005	.010
850	ALL	Ring Gear and Ring Gear Drive			.001	010
0.71		Plate			.004	.010
851	E-H2-H3	Generator Drive Gear and			.004	020
0.50	E 111 112 112	Generator Driven Gear			.015	.020
852	E-H1-H2-H3	Oil Pump Drive Gear and			004	020
		Accessory (Fuel Pump) Drive			.004 .015	.020
853	E-H1-H2-H3	Gear				
855	E-H1-H2-H3	Oil Pump Drive Gear and			.004 .015	020
051	ALL	Vacuum Pump Drive Gear				.020
854	ALL	Pinion Gear and Stationary Gear			.004 .0077	012 (C)
855	ALL	Pinion Gear and Ring Gear			.0077	.012 (C)
833	ALL	r inion Gear and King Gear			.005	.012 (C)
856	ALL	Governor and Magneto Drive			.0003	.012 (C)
650	ALL	Gear and Governor Drive Idler			.004	
		Gear			.015	.020
857	AB-AC	Governor and Magneto Drive			.015	.020
057		Gear and Magneto Drive Idler			.004	
		Gear			.015	.020
858	ALL	Governor Drive Idler Gear				
		(Bevel Gear End) and Governor			<u>.004</u>	
		Driven Gear			.008	.015
859	H1	Camshaft Gear and Generator			.004	
		Drive Idler Gear			.015	.020
860	H1	Generator Drive Idler Gear and			.004	
		Generator Driven Gear			.015	.020
861	E1-H1-H2-H3	Electric Tachometer Idler Gear			.004	
		and Driven Gear			.015	.020
862	E1-H1-H2-H3	Electric Tachometer Idler Gear			.004	
		and Tachometer Drive Gear			.015	.020

PART III – GEARED ENGINES

SECTION IV – BACKLASH

			Dime	nsions	Clear	rances
			Mfr.		Mfr.	
			Min. &	Service	Min. &	Service
Ref.	Chart	Nomenclature	Max.	Max.	Max.	Max.
863	E1-H1	Angle Generator Drive Gear and			<u>.002</u>	
		Generator Driven Gear			.004	.010
864	E1-H1	Angle Generator Drive Gear and			.003	
		Generator Drive Gear Spline			.007	.009
865	P1	Generator Drive Gear and			<u>.004</u>	
		Magneto Drive Idler Gear			.015	.020
	H4-H5-P-AB-AC	Generator Drive Gear and			<u>.004</u>	
		Tachometer Drive Idler Gear			.015	.020
866	P1	Electric Tachometer Drive Gear				
		(Magneto Idler Hub) and			<u>.004</u>	
		Tachometer Driven Gear			.015	.020
	H4-H5-P-AB-AC	Tachometer Drive Idler Gear			<u>.004</u>	
		and Tachometer Driven Gear			.015	.020
867	H4-H5-P	Tachometer Drive Idler Gear			<u>.004</u>	
		and Magneto Drive Shaftgear			.015	.020
868	H4-H5-P	Magneto Drive Shaft (Spline)				
		and Magneto Drive Shaftgear			.001 .015	
		(Spline)			.015	.008
869	H4-H5-P	Magneto Drive Shaftgear				
		(Spline) and Magneto Drive			<u>.001</u>	
		Coupling (Spline)			.005	.008
870	H4-H5-AC	Rear Crankshaft (Spline				
		Bushing) and Accessory Drive			<u>.002</u>	
		Gear (Spline)			.0073	.018
	P-AB	Rear Crankshaft (Spline				
		Bushing) and Accessory Drive			<u>.002</u>	
		Shaft (Spline)			.0073	.018
871	H4-H5-AC	Accessory Idler Gear and Starter			<u>.004</u>	
		Drive Gear			.008	.015
871	P-AB	Supercharger and Accessory				
		Drive Gear and Starter and			<u>.004</u>	
		Accessory Drive Gear			.008	.015
872	H4-H5-P-AB-AC	Accessory Drive Gear and			<u>.004</u>	
		Generator Drive Gear			.015	.020
873	H4-H5-P	Accessory Drive Gear and			<u>.004</u>	
		Vacuum Pump Shaftgear			.015	.020
874	H4-H5-P	Vacuum Pump Shaftgear and Oil				
		Pressure and Scavenge Pump			<u>.004</u>	0.20
		Gear			.015	.020
875	Е	Scavenge Pump Driven Gear			<u>.004</u>	000
6= :		and Accessory Drive Gear			.015	.020
876	Е	Scavenge Pump Impellers			.008	020
077	D A D	0 1			.015	.020
877	P-AB	Supercharger and Accessory			007	
		Drive Gear and Intermediate			<u>.006</u>	020
070	D AD	Supercharger Drive Shaftgear			.015	.020
878	P-AB	Supercharger Drive Shaftgear			006	
		and Intermediate Supercharger			<u>.006</u>	020
		Drive Gear	<u> </u>		.015	.020

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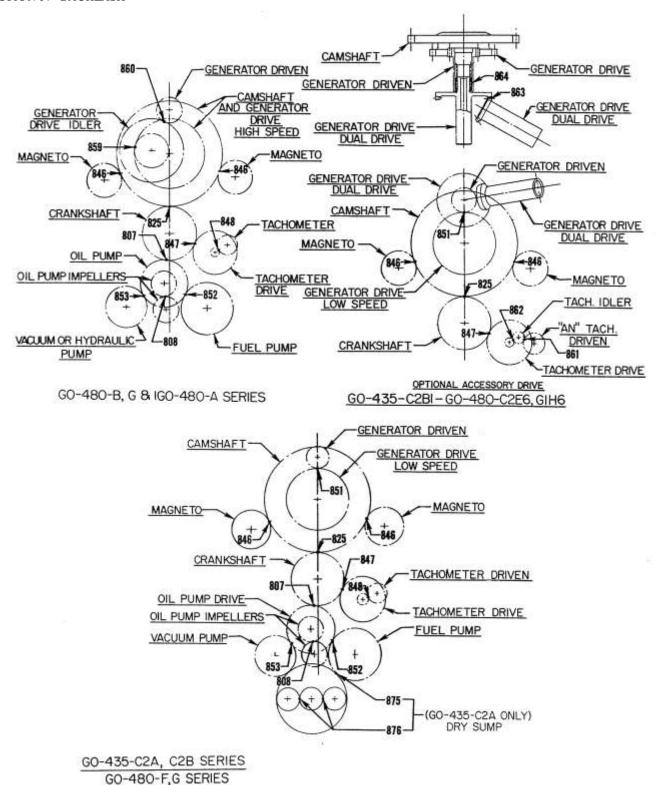
PART III – GEARED ENGINES

SECTION IV – BACKLASH

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

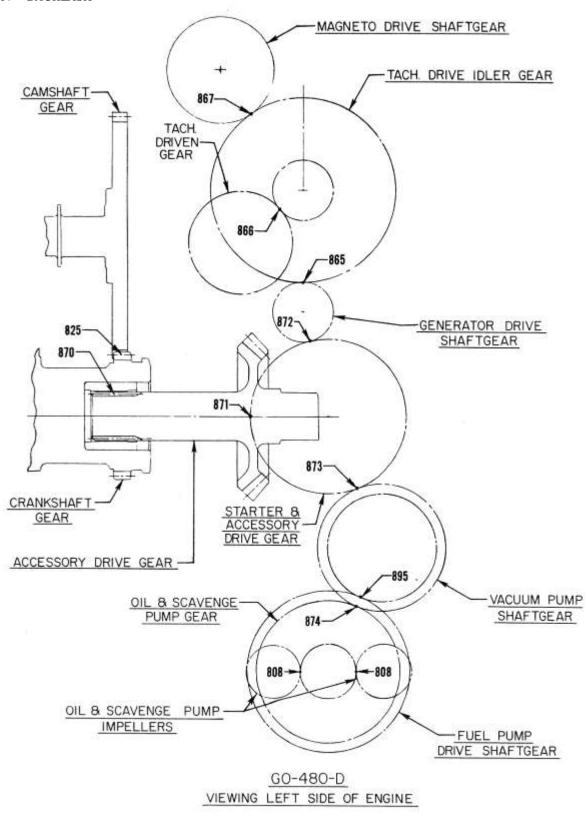
PART III - GEARED ENGINES

SECTION IV- BACKLASH



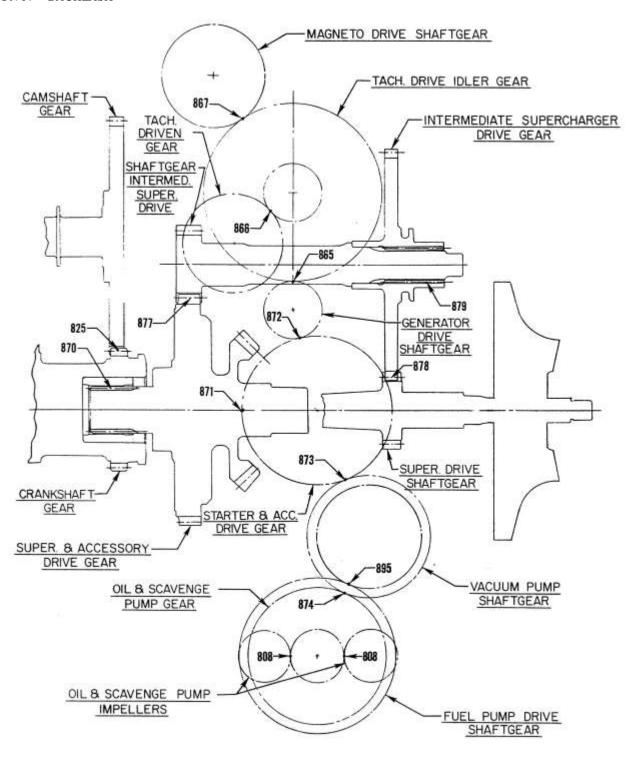
PART III – GEARED ENGINES

SECTION IV - BACKLASH



PART III – GEARED ENGINES

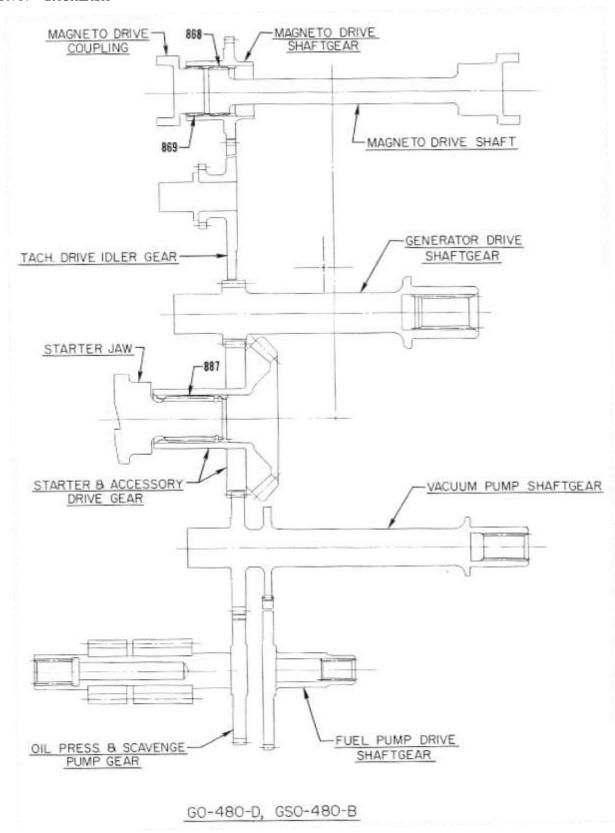
SECTION IV - BACKLASH



VIEWING LEFT SIDE OF ENGINE

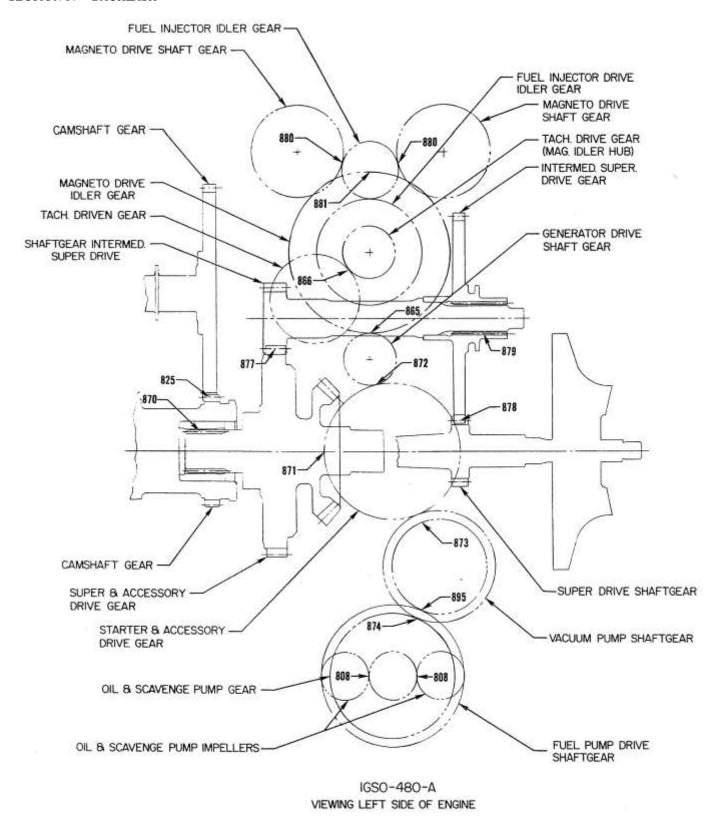
PART III – GEARED ENGINES

SECTION IV - BACKLASH



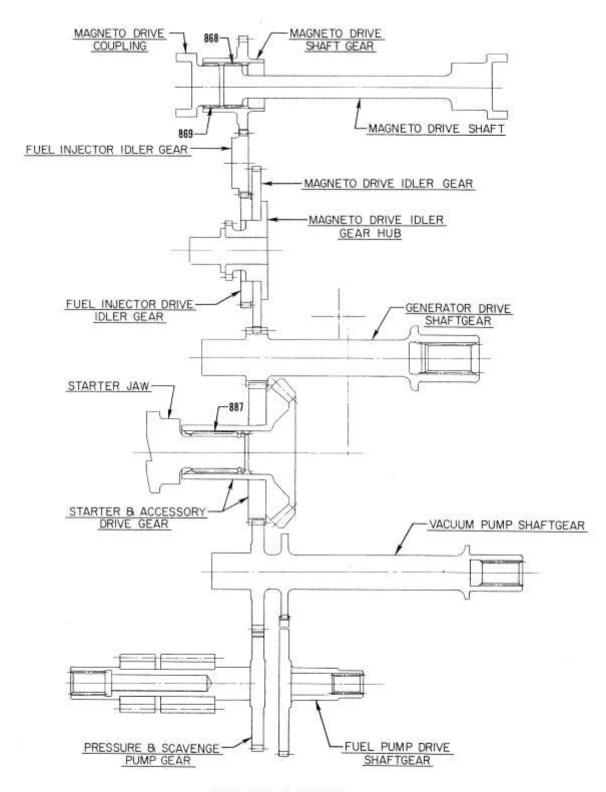
PART III – GEARED ENGINES

SECTION IV - BACKLASH



PART III – GEARED ENGINES

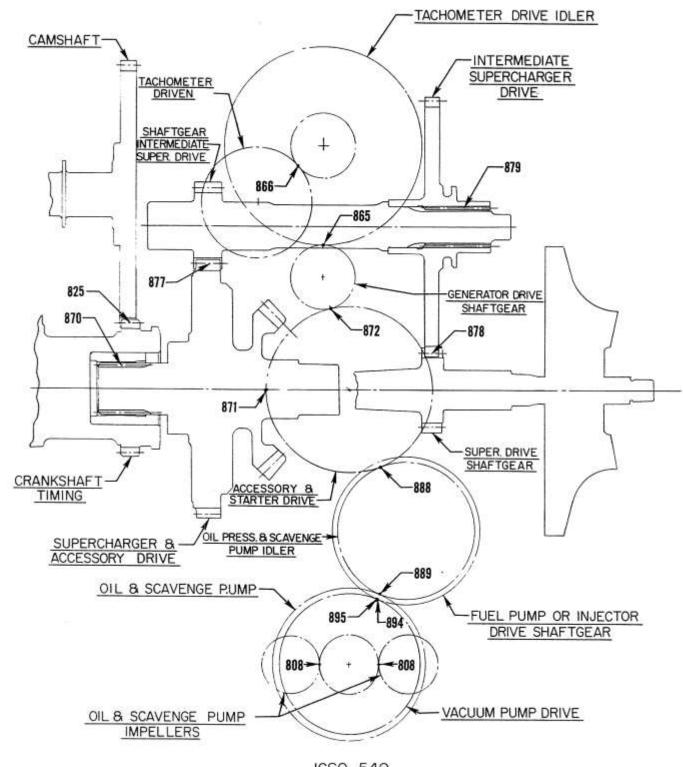
SECTION IV - BACKLASH



IGSO-480-A SERIES

PART III – GEARED ENGINES

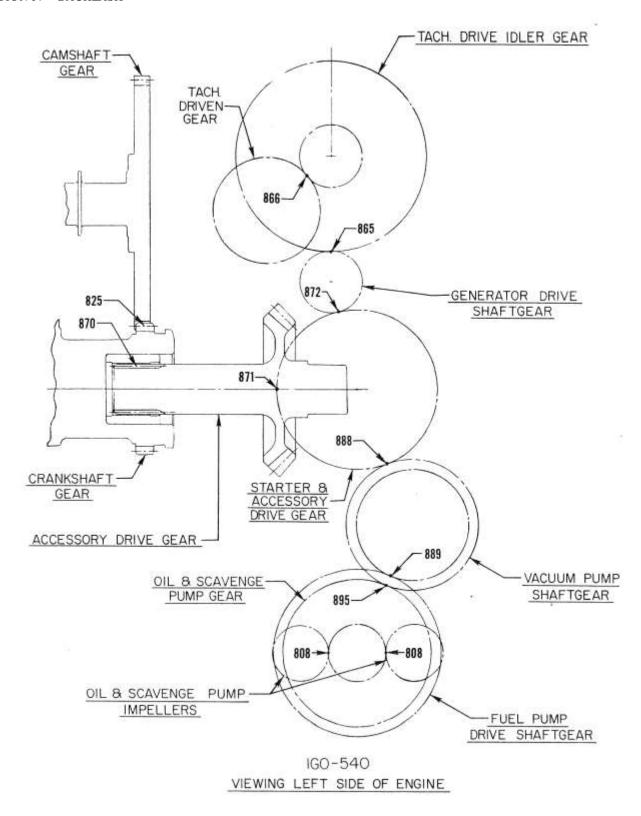
SECTION IV - BACKLASH



IGSO-540 VIEWING LEFT SIDE OF ENGINE

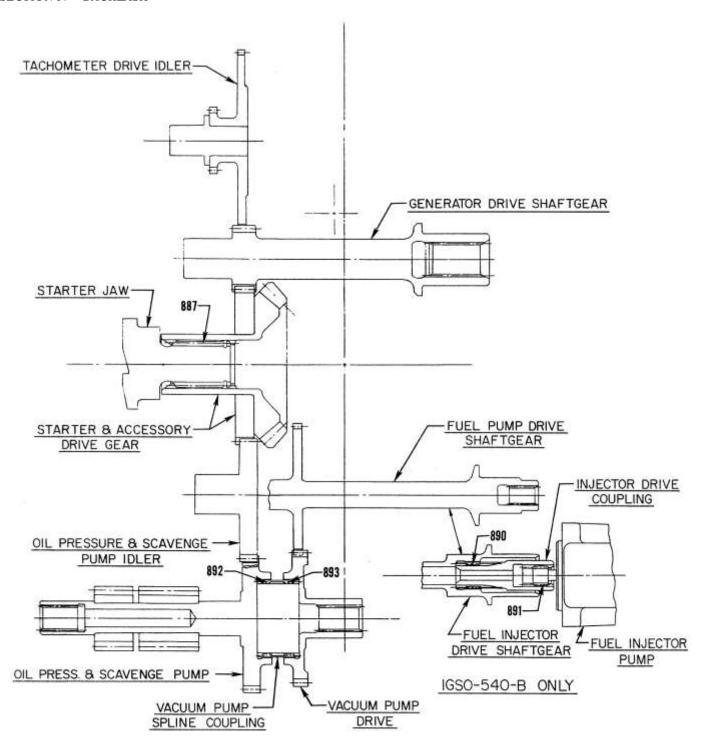
PART III – GEARED ENGINES

SECTION IV - BACKLASH



PART III – GEARED ENGINES

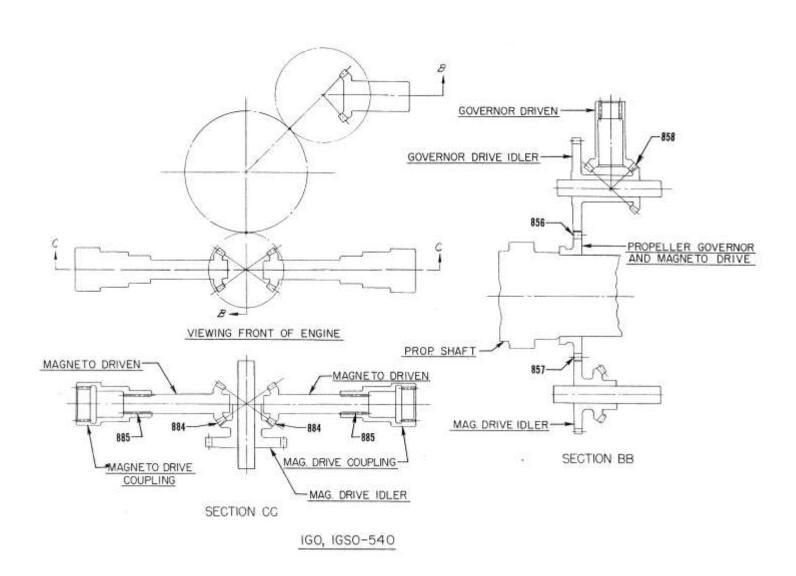
SECTION IV - BACKLASH



IGO-540, IGSO-540-A,B

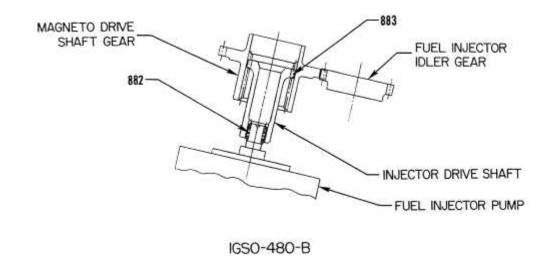
PART III – GEARED ENGINES

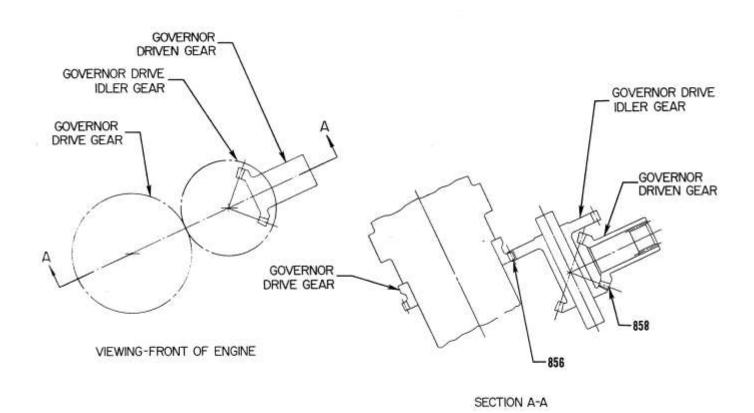
SECTION IV - BACKLASH



PART III – GEARED ENGINES

SECTION IV - BACKLASH

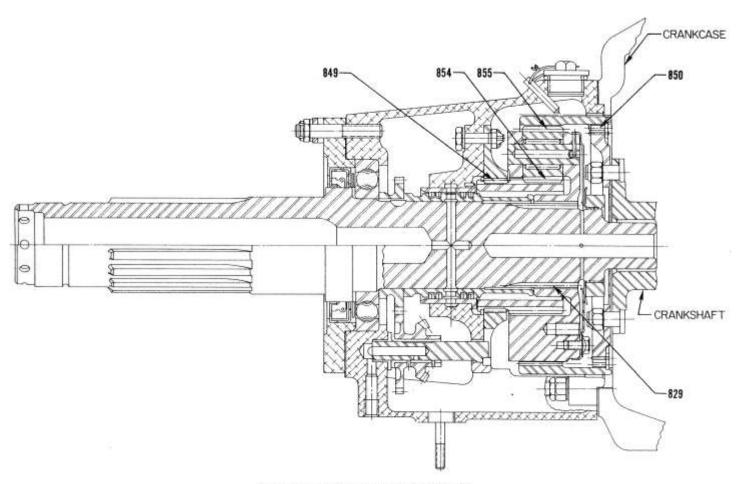




GO-435, GO, GSO & IGSO-480-A

PART III – GEARED ENGINES

SECTION IV – BACKLASH



SECTION THRU REDUCTION GEAR

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	Е-Н	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)	
007				15 in. lbs.
905	ALL (using a silicone gasket)	1/4-20	Rocker Box Screws	35 inlbs.
	ALL (using a cork gasket)	1/4-20	Rocker Box Screws	50 inlbs.
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	20: 11
010	112 115 D 1 D 1 G	1/1 < 27 NDT		30 in. lbs.
913	H3-H5-P-AB-AC	1/16-27 NPT	Piston Cooling Nozzle in Crankcase	100 ' 11
014	AC	1/0 27 NDT	Interest and the Control of the standard	100 in. lbs.
914	AC	1/8-27 NPT	Injector Nozzle in Cylinder Head	60 in. lbs.
919	ALL	1/4 Hex Head	Hose Clamps (Worm Type)	00 III. 108.
919	ALL	and Below	Hose Clamps (World Type)	45 in. lbs.
	ALL	5/16 Hex Head	Hose Clamps (Worm Type)	+3 III. 103.
	THE CONTRACTOR OF THE CONTRACT	and Above	Tiose Clamps (Worm Type)	45 in. lbs.
919-1	ALL	una ricove	"T" Bolt Hose Clamps –	13 111 105.
7171			Initial Torque	35 in. lbs.
			Retorque After Engine Test	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.
1	ALL	1/2	Cylinder Hold Down Nuts	600 in. lbs.
930	ALL	5/16-32	Brass union nut on stainless steel	25-50 inlbs.*
			injector/primer fuel line (Both Ends)	
			r tight, then continue tightening the nut v in excess of 50 inlbs. can result in dam	
			Nuts' Tightening Procedures – See late	
	Instruction No. 1029.	ase I arming I minge	1 ightening 1 location become	SECTION OF SECULO
931	ALL	2.000-16	Pinion Cage Retaining Nut	400 ft. lbs.
932	E-H1-H4-H5-P-AB-AC	2.000 10	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.
///	11.110 1 110 110	1	Crambinate Com rectaining reat	150 16. 105.

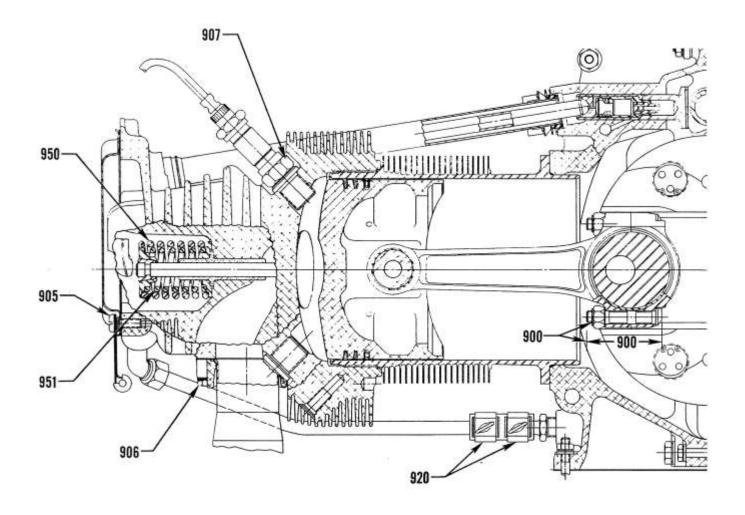
PART III – GEARED ENGINES

 $SECTION\ V-SPECIAL\ TORQUE\ REQUIREMENTS$

Ref.	Chart	~	Thread	Size	Nomer	clature				Tore	que Lin	nits	
936	P-AB		Tircua	Dize		harger –	Interr	nediate		1070	Torque Zimus		
750	T AID					Shaft Nut		iicaiate		75 ft. lbs.			
937	P-AB					harger –		ler Loc	knut	(600) in. lbs	s. Plu	Torque
					1	C				Req'd. to Reach Next			
											Locking Slot)		
938	H4-H5-P-AB-AC		1/4-28					(38 in. lbs. Plus Torque					
											'd. to F		Next
0.40	A T T				D: C					Loc.	king Sl	ot)	
940	ALL				_	ear Asse ing Nuts	embly	_				2	60 in. lbs.
941	ALL					tion Gear	· Λ εερ	mhlv				ے ۔	00 111. 108.
771	ALL					ing Nuts	Assc	illoly –				3	00 in. lbs.
942	E1-H1		1/4-18	NPT		etor Drai	in Plu	g					44 in. lbs.
	E-H-P		1/8-27			etor Drai							60 in. lbs.
943	P		10-32			s (To Atta			у				
					Drive	Coupling	Plate)				25-	30 in. lbs.
			S	ECTIO:	NV-1	SPRING	GS						
							Lei	ngth		C	OMP.	LOA	D
				I	yc.	Wire		omp.	M	fr.	Mf	r.	Service
Ref.	Chart	Nomeno	lature		t No.	Dia.		ngth	M	in.	Ma	х.	Max.
950	ALL	Outer Valve	Springs										100 lb.
		(Angle)		6832	26	.177	1.4	6 in.	103	lb.	111	lb.	min.
	ALL	Outer Valve	Springs										111 lb.
0.5.1	ATT	(Angle)	•		11796	.182	82 1.43 in.			114 lb. 124 75 lb.		lb.	min.
951	ALL	Auxiliary Va Springs (Ang		6832	.8 11797	.142	42 1.33 in.			75 lb. 83		h	72 lb. min.
952	H4-H5-P-AB-AC	Check Valve		L W-	11/9/	.142	1.3	J III.	73	10.	0.5 1	υ.	111111.
752	II+ II3 I AD AC	Lycomir		F	ree								
		Numb			ngth								
						021	1.0	2 :	7.4	11	0.4.1	11	.69 lb.
		654-	ъ			.031	1.0	3 in.	./4	lb.	.94	ID.	min.
		7376	51	2	.065	.041	1.0	3 in.	2 14	5 lb.	3.35	1h	3.10 lb.
		7370	<i>J</i> 1	۷.	.003	.041	1.0	J III.	3.1.	<i>J</i> 10.	3.33	10.	min.
953		Oil Pressur											
		Valve S											
		Lycoming	Identi	fication	4								
		Part Numbers	Desa	Free									
	H4-H5-P-AB-AC	68542	Dye None	Length 2.38	.067	1.66	in T	1.5	lb.		17 lb.	1	4 lb. min.
	H4-H5-P-AB-AC	LW-14029	White	2.28	.072	1.66			lb.		22 lb.		7 lb. min.
	E1-H1-H2-H3	60476	None	2.38	.047	1.44 i		7.15			65 lb.		0 lb. min.
	E1-H1-H2-H3	66920	None	2.54	.047						85 lb.		0 lb. min.
	E1-H1-H2-H3	74596	None	2.96	.047				15 lb.		60 lb. min.		
954		Supercharger			.017	1 2.117		11.00	20.	12.	-0 10.	11	. 10. 11111.
		Spring		T8									
		Lycoming											
		Part	_										
		Numbers		Length	4 : =	1 4 4 5 1		4 -0 -			,,		
	P P	68830		.25	.148	1.10		1681		184			b. min.
		LW-12303		.28	.148	1.13		1681		184			b lb. min.
	AB AB	72774 LW-12301		.23 .26	.177	1.10 i		249 l 255 l		275 270			lb. min. lb. min.
<u> </u>	ן אם ו	L VV -123U1	1.	.40	.1//	1.13	111.	ا درے	υ.	270	ııu.	∠ي(ı iv. IIIII.

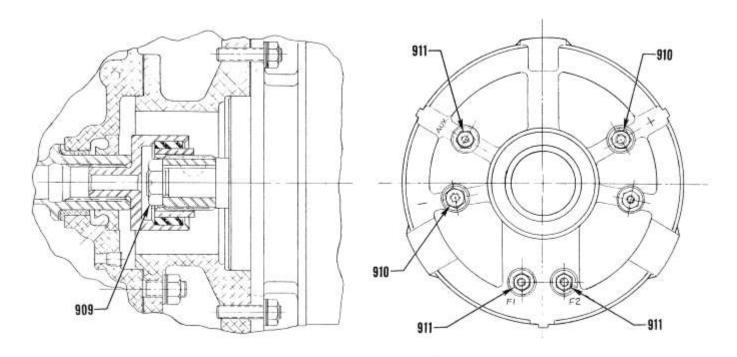
PART III – GEARED ENGINES

SECTION V – SPECIAL TORQUE REQUIREMENTS

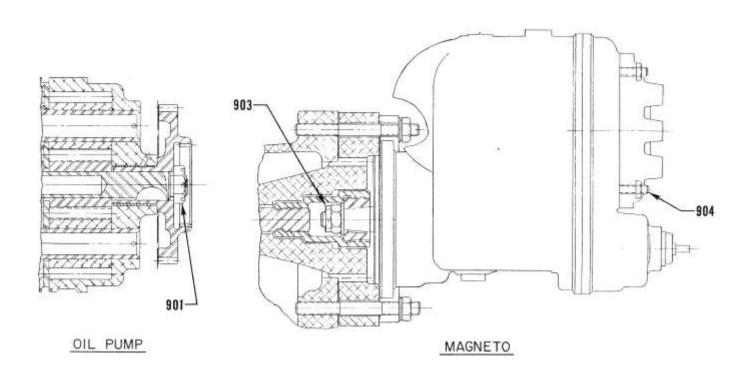


PART III – GEARED ENGINES

SECTION V – SPECIAL TORQUE REQUIREMENTS



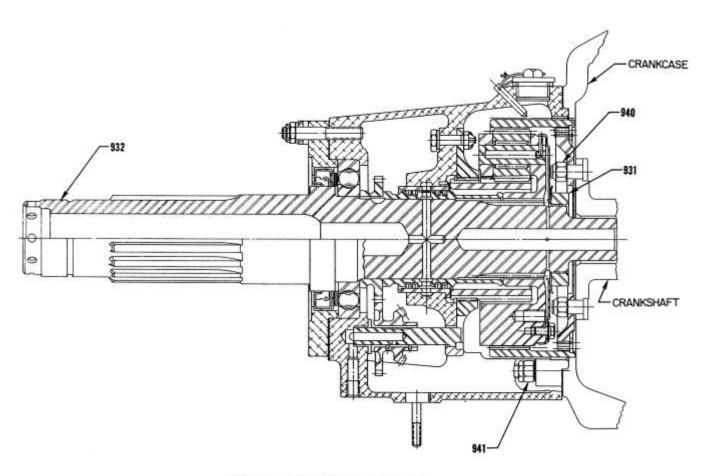
ALTERNATOR & ALTERNATOR DRIVE



Engine Accessories and Hardware

PART III – GEARED ENGINES

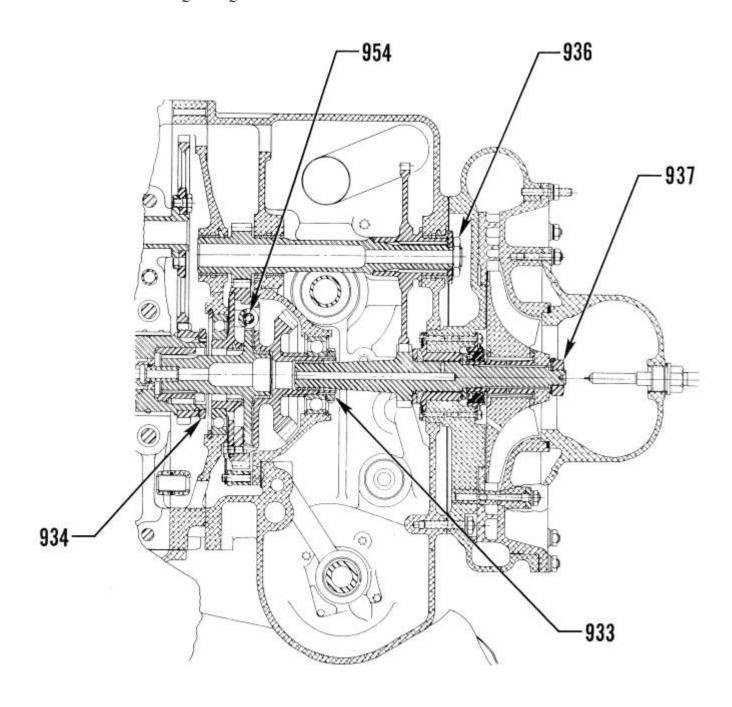
 $SECTION\ V-SPECIAL\ TORQUE\ REQUIREMENTS$



SECTION THRU REDUCTION GEAR

PART III – GEARED ENGINES

SECTION V – SPECIAL TORQUE REQUIREMENTS

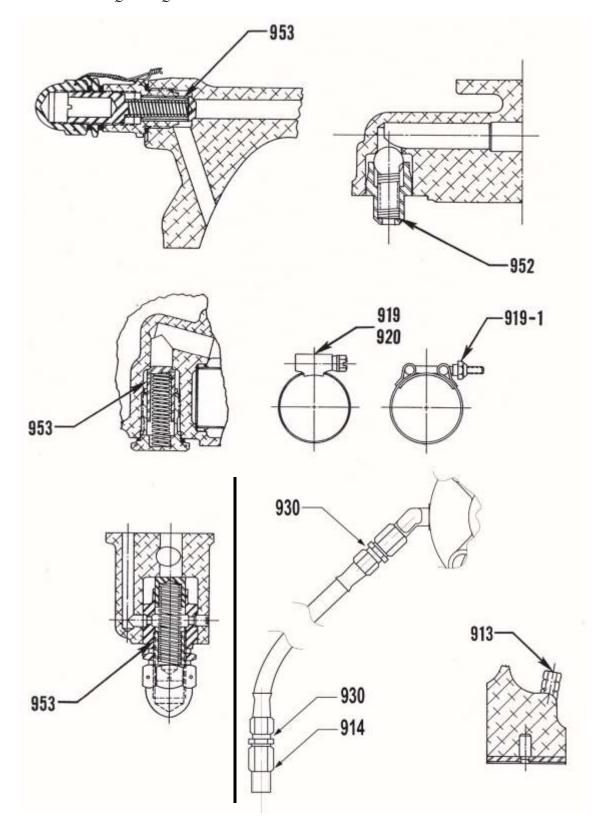


SECTION THRU ACCESSORY HSG. & SUPERCHARGER

Engine Accessories and Hardware

PART III – GEARED ENGINES

 $SECTION\ V-SPECIAL\ TORQUE\ REQUIREMENTS$



Engine Springs and Hardware

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).

		TAE	LE I			TAB	LE II	
	В	OLTS, SCRE	PIPE PLUGS					
Thread	Torque		hread Torque Thread Torque		Torque Torque		Thread	Torque
Thread	In. Lb.	Ft. Lb.	Tillead	In. Lb.	Ft. Lb.	Tilread	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	
ти	IIN NUTS (1/2	DIA OF DO	3/4-14 NPT	230 to 252				
1 1 1	IIIN INU IS (1/2	L DIA. OF BU	1-11-1/2 NPT	315 to 347				

TABLE III			TABLE IV				
CRUSH TYPE GAS	CRUSH TYPE GASKETS					NS ΓINGS)	
Thread Pitch on Part to be Tightened	ANGLE OF TURN		Tube	Thread	Torque In.	Lbs.	
Threads Per Inch	Aluminum	Copper	Size		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°		Т	ABLE V		
28	360°	180°	S	TUDS MIN.	DRIVING TORQU	E	
NOTE: Install all amuch type and	leata avaamt	the colf	Thr	eads	Torque In.	Lbs.	
NOTE: Install all crush type gas			1/4	-20	15		
	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 c	5/16-18 3/8-16		50				
to the angle of turn listed for the appr							
NOTE: Lubricate Threads Unless Ot							

	TABLE VI								
JAM	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							

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STANDARD TORQUE (CONT.) UNLESS OTHERWISE LISTED

	TABLE VII											
	METAL TUBE FITTINGS											
	Wrench torque for tightening AN-818 Nut (pound inches)											
Dash Nos. Ref.	Tubing OD inches	Aluminum-alloy tubing		Steel tubing		Aluminum-alloy tubing (Flare MS33583) for use on oxygen lines only		measured to tubing centerline. Dimension in inches				
		Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Alum. 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			

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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 II SECTION III SECTION IV	500 SERIES 600 SERIES 700 & 7000 SERIES 800 & 8000 SERIES 900 SERIES	CRANKCASE, CRANKSHAFT & CAMSHAFT CYLINDERS GEAR TRAIN BACKLASH (GEAR TRAIN) TORQUE AND SPRINGS
(A)		ink fits controlled by machining, fits that may readily be ear does not normally occur, in each case the fit must be held rance.
(B)	Side clearance on piston i	rings must be measured with face of ring flush with piston.
(D)	These dimensions shown piston pin.	are measured at bottom of piston skirt at right angles to
(E)	Permissible wear of the cron the diameter.	rankshaft (rod and main bearing journals) to be minus 0.0015
(L)	Loose fit; wherein a defin	nite clearance is mentioned between the mating surfaces.
(T)	Tight fit; shrink or interfe	erence fit.

SSP-1776-5-PT4 April 13, 2020*

^{* -} Indicates cut-off date for data retrieved prior to publication.





TECHNICAL PUBLICATION REVISION

REVISION NO.	PUBLICATION	PUBLICATION NO.	PUBLICATION DATE			
SSP-1776-5-PT4	Service Table of Limits	SSP-1776	October 28, 2013			
PREVIOUS	S REVISIONS	CURRENT REVISION*				
Apr	ril 2018	April 2020				
4-6, 4	-35, 4-39	4-5,	4-6			
	o Section V table and figure for on nut on stainless steel injector		oer 600 Max. Clearance for Piston Ring ed Cylinders (Choke Barrels) in reference number 607			



PART IV – VERTICAL ENGINES

SECTION I – CRANKCASE, CRANKSHAFT AND CAMSHAFT

			Dime	nsions	Clearances		
			Mfr.		Mfr.		
			Min. &			Service	
Ref.	Chart	Nomenclature	Max.	Max.	Max.	Max.	
500	L	All Main Bearings and			<u>.0015L</u>	00.40*	
	7.4.77	Crankshaft			.0045L	.0060L	
	L1-V	Main Bearings and Crankshaft			.0011L	00501	
	V	(Except Front)			.0041L	.0050L	
	V	Front Main Bearing and Crankshaft			.0011L .0041L	.0050L	
	L1	Front Main Bearing and			.0015L	.0030L	
	Li	Crankshaft			.0015L	.0050L	
	ALL	Diameter of Main Bearing	2.3745		.0043L	.0030L	
		Journal on Crankshaft	$\frac{2.3715}{2.376}$	(E)			
	L	Crankcase Bearing Bore	2.566	(2)			
		Diameter (All)	2.567	2.5685			
	V	Crankcase Bearing Bore	2.6865				
		Diameter (All)	2.6875	2.6890			
501	ALL	Connecting Rod Bearing and			.0008L		
		Crankshaft			.0038L	.0050L	
	ALL	Diameter of Connecting Rod	<u>2.1235</u>				
		Journal on Crankshaft (2-1/8 in.)	2.125	(E)			
	ALL	Connecting Rod Bearing Bore					
		Diameter (2-1/8 in.) (Measured	2.2870				
		at Axis 30° on Each Side)	2.2875				
502	ALL	Connecting Rod – Side			<u>.004L</u>	01.0	
502	ATT	Clearance			.010L	.016L	
503	ALL ALL	Connecting Rod – Alignment				0 Inches	
504 505	ALL	Connecting Rod – Twist Crankshaft Run-Out at Center			.012 in 1	2 Inches	
303	ALL	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			1000		
		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			<u>.006L</u>	0.5 ==	
		End Clearance			.015L	.025L	
508	ALL	Crankshaft Propeller Flange			000	007	
510	ALL	Run-Out			.002	.005	
510	ALL	Crankshaft Timing Gear and Crankshaft			<u>.0000</u> .0015T	(A)	
511	ALL	Tappet Body and Crankcase			.00131 .0010L	(A)	
511	ALL	Tappet Body and Crankcase			.0033L	.004L	
	ALL	O.D. of Tappet	.7169		.00551	.outl	
		C.D. of Tappet	.7177	.7166			
	ALL	I.D. Tappet Bore in Crankcase	.7187		1		
		11	.7200	.7203			

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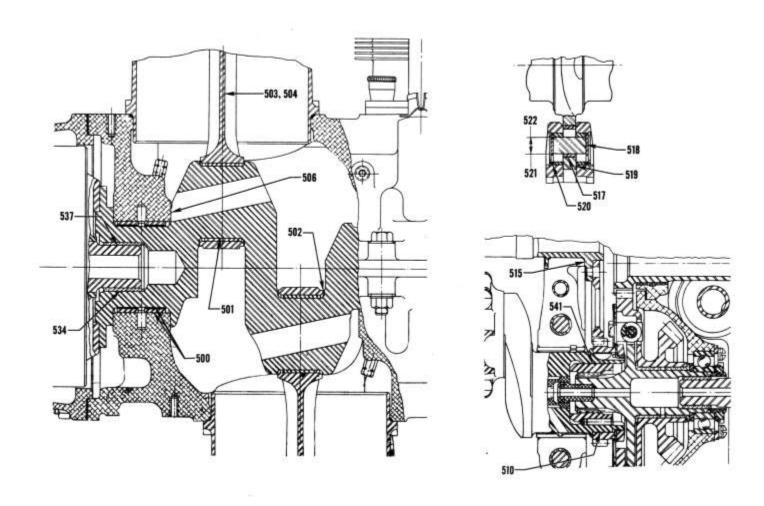
PART IV – VERTICAL ENGINES

 $SECTION\ I-CRANKCASE,\ CRANKSHAFT\ AND\ CAMSHAFT$

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

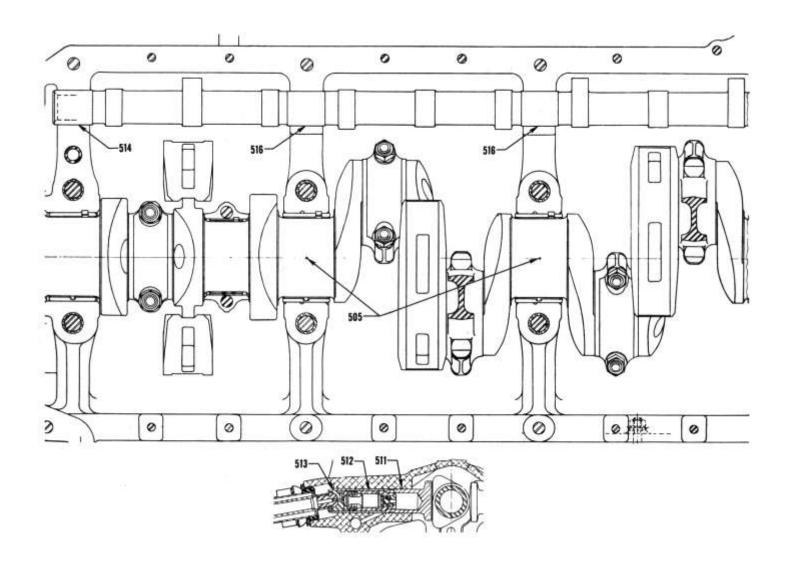
PART IV – VERTICAL ENGINES

SECTION I – CRANKCASE, CRANKSHAFT AND CAMSHAFT



PART IV – VERTICAL ENGINES

SECTION I – CRANKCASE, CRANKSHAFT AND CAMSHAFT



PART IV – VERTICAL ENGINES

SECTION II – CYLINDERS

			Dimer	nsions	Clear	rances
					Mfr.	
			& Max.	Service	Min. &	Service
Ref.	Chart	Nomenclature		Max.	Max.	Max.
600	ALL	Connecting Rod and Connecting	Bushing P/N	LW-13923 t	o be burnishe	d in place
		Rod Bushing	Bushing P/N	01K28983 is	not burnishe	d in place
	ALL	Finished I.D. of Connecting Rod	<u>1.1254</u>			
		Bushing	1.1262			
601	L	Length Between Connecting Rod	6.4985			
	XX	Bearing Centers	6.5015			
	V	Length Between Connecting Rod	6.7485			
(02	ALL	Bearing Centers Connecting Rod Bushing and	6.7515		00001	
602	ALL	Piston Pin			<u>.0008L</u> .0021L	.0025L
603	ALL	Piston Pin and Piston			.0021L .0003L	.0023L
003	ALL	Fiston Fin and Fiston			.0003L .0014L	.0018L
	ALL	Diameter of Piston Pin Hole in	1.1249		.0014L	.0010L
		Piston	1.1254			
	ALL	Diameter of Piston Pin	1.1241			
			1.1246			
604	V	Piston and Piston Pin Plug			.0002L	
					.0010L	.002L
	V	Diameter of Piston Pin Plug*	1.1242			
			1.1247			
605	ALL	Piston Pin and Piston Pin Plug			<u>.0005L</u>	
		(Nitrided and Chrome Cylinders)			.0025L	.005L
	V	Diameter of Piston Pin Plug*	<u>.5655</u>			
	T	D' CD' D' D' W	.5665			
	L	Diameter of Piston Pin Plug**	<u>.7605</u>			
	L	Diameter of Piston Pin Plug**	.7615 .8405			
	L	(Thin Wall Pin)	.8415			
	*See latest revision of Serv		.0413			
	**See latest revision of Serv					
606	ALL	Piston Ring and Piston – Side				
		Clearance (Top Ring Comp.)			.0025L	
		Half Wedge			.0055L	.008L (B)
	ALL (AS APPLICABLE)	Piston Ring and Piston – Side				
		Clearance (2 nd Ring Comp.) Full			.000	
		or Half Wedge			.004L	.006L (B)
	ALL	Piston Ring and Piston – Side			<u>.002L</u>	
	111 (13 1PP) (3 1P) (1	Clearance (Oil Regulating)			.004L	.006L (B)
	ALL (AS APPLICABLE)	Piston Ring and Piston – Side			.003L	0071 (D)
	ALL (AC ADDITION DIE)	Clearance (Oil Scraper)			.0055L	.007L (B)
	ALL (AS APPLICABLE)	Piston Ring and Piston – Side Clearance (3 rd Ring Comp.) Half			000	
		Wedge			.000 .004L	.006L (B)
607	ALL	Piston Ring Gap (Compression)			.007L	.000L (D)
007		Chrome Cylinders (Straight			.020	
		Barrels)			.030	.047
	ALL	Piston Ring Gap (Compression)			1.	
		Nitrided and Chrome Cylinders			<u>.045</u>	
		(Choke Barrels)			.065	.067

PART IV – VERTICAL ENGINES

SECTION II – CYLINDERS

			Dimensions		Clear	ances
Ref.	Chart	Nomenclature	Mfr. Min. & Max.	Service Max.	Mfr. Min. & Max.	Service Max.
607	ALL	Piston Ring Gap (Oil	1716226	171424	<u>.015</u>	IVIUA
007		Regulating) (All Barrels)			.040	.047
	ALL (AS APPLICABLE)	Piston Ring Gap (Oil Scraper)			.015	
		(All Barrels)			.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 an	ad Piston Application	tion Min. Piston Diameter			Cylinde	er Barrel	
	Engine Chart Code Letter	Piston Number	Top	Bottom	Type of Piston	Type of Surface	Maximum Diameter	Max. Clearance Piston Skirt & Cyl.
608	Ŧ	67266, 71553, 73620	4.8395	4.8540	Forged-Round	С	4.8805	.0225L
608	L	73932	4.8395	4.8540	Forged-Round	N	4.8805	.0225L
609		75984	4.8395	4.8590	Forged-Cam	С	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	С	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*,	5.0700	5 1000	F 10	G.N.	5 1205	0101
		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.

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.

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^{*=}High Compression.

PART IV – VERTICAL ENGINES

SECTION II – CYLINDERS

			Dime	nsions	Clear	ances
			Mfr.		Mfr.	
Ref.	Chart	Nomenclature	Min. & Max.	Service Max.	Min. & Max.	Service Max.
611	L	Exhaust Valve Seat and Cylinder Head (Flat Seat)			<u>.0065T</u> .010T	(A)
	ALL	Exhaust Valve Seat and Cylinder Head (Allison Seat)			<u>.0075T</u> .011T	(A)
	ALL	O.D. Exhaust Seat (Allison Seat)	1.9355 1.937			` ′
	L	O.D. Exhaust Seat (Flat Seat)	2.0965 2.098			
	ALL	I.D. Exhaust Seat Hole in Cylinder Head (Allison Seat)	1.926 1.928			
	L	I.D. Exhaust Seat Hole in Cylinder Head (Flat Seat)	2.088 2.090			
612	ALL	Intake Valve Seat and Cylinder Head	2.090		<u>.0065T</u> .010T	(A)
	L	O.D. Intake Seat (Allison Seat)	2.1675 2.169		.0101	(11)
	L	O.D. Intake Seat (Flat Seat)	2.3145 2.316			
	V	O.D. Intake Seat	2.2885 2.290			
	L	I.D. Intake Seat Hole in Cylinder Head (Allison Seat)	2.159 2.161			
	L	I.D. Intake Seat Hole in Cylinder Head (Flat Seat)	2.306 2.308			
	V	I.D. Intake Seat Hole in Cylinder Head	2.280 2.282			
613	ALL	Exhaust Valve Guide and Cylinder Head	2.202		<u>.001T</u> .0025T	(A)
	ALL	O.D. Exhaust Valve Guide (1/2 in. Exhaust Valve)	<u>.6633</u> .6638		.00231	(A)
	L	O.D. Exhaust Valve Guide (7/16	.5933			
	ALL	in. Exhaust Valve) I.D. Exhaust Valve Guide Hole in Cylinder Head (1/2 in.	.5938 .6613			
	L	Exhaust Valve) I.D. Exhaust Valve Guide Hole in Cylinder Head (7/16 in. Exhaust Valve)	.6623 .5913 .5923			
614	ALL	Intake Valve Guide and Cylinder Head	.3743		<u>.001T</u> .0025T	(A)
	ALL	O.D. Intake Valve Guide	.5933 .5938		.00231	(11)
	ALL	I.D. Intake Valve Guide Hole in Cylinder Head	.5913 .5923			
615	ALL	Exhaust Valve Stem and Valve Guide			.0035L .0053L	(A)

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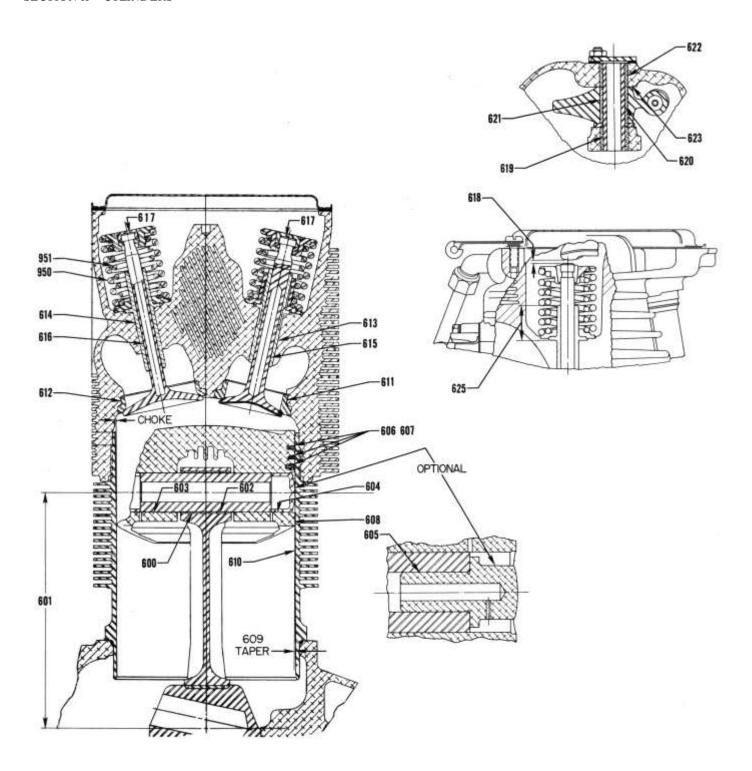
PART IV – VERTICAL ENGINES

SECTION II – CYLINDERS

			Dime	nsions	Clearances	
			Mfr.		Mfr.	
			Min. &	Service	Min. &	Service
Ref.	Chart	Nomenclature	Max.	Max.	Max.	Max.
615	ALL	O.D. Exhaust Valve Stem	.4957			
			.4965	.4937		
4	<u> </u>			owable limits	of 4937 is	
				only to		
			nimonic va		inconer of	
į	L	O.D. Exhaust Valve Stem (7/16	.4332	1105.		
ļ	L	in. Exhaust Valve)	.4340			
ļ	ALL	Finished I.D. Exhaust Valve	.5000			
ļ	ALL	Guide (1/2 in. Exhaust Valve)	.5010			
ļ	L	Finished I.D. Exhaust Valve	.4360			
ļ	L	Guide (7/16 in. Exhaust Valve)	.4370			
	1/ 1 1 1 1 1 1	,				. 1
		ay have exhaust valve guides that are				
		e. After 300 hours of service, inside d				
		ation up to the recommended overha				a .015 inch
<i>(1)</i>		ion of Service Instruction No. 1009	or recomme	naea overhai		
616	ALL	Intake Valve Stem and Valve			.0010L	00.67
		Guide	40.55		.0028L	.006L
	ALL	O.D. Intake Valve Stem	<u>.4022</u>			
ļ			.4030	.4010		
ļ	ALL	Finished I.D. Intake Valve	<u>.4040</u>			
		Guide	.4050			
617	ALL	Valve and Valve Cap Clearance			<u>.000</u>	
					.004L	.005L
618	ALL	Dry Tappet Clearance			<u>.028</u>	
					.080	
619	ALL	Valve Rocker Shaft and Valve			<u>.0001L</u>	
ļ		Rocker Bushing			.0013L	.0025L
	ALL	Finished I.D. of Valve Rocker	<u>.6246</u>			
		Shaft Bushing in Cylinder Head	.6261	.6270		
620	ALL	Valve Rocker Shaft and Valve			<u>.0007L</u>	
ļ		Rocker Bushings			.0017L	.004L
ļ	ALL	O.D. Valve Rocker Shaft	<u>.6241</u>			
			.6245	.6231		
	ALL	Finished I.D. of Rocker Arm	.6252			
		Bushing	.6263	.6270		
621	ALL	Valve Rocker Bushing and				
621	ALL	ŭ	Bushi	ng Must Be	Burnished In	Place
621 622	ALL ALL	Valve Rocker Bushing and	Bushi	ng Must Be	Burnished In	Place
		Valve Rocker Bushing and Valve Rocker	Bushi	ng Must Be		Place (A)
		Valve Rocker Bushing and Valve Rocker Valve Rocker Shaft Bushing and	Bushi	ng Must Be	<u>.0022T</u>	
	ALL	Valve Rocker Bushing and Valve Rocker Valve Rocker Shaft Bushing and Cylinder Head		ng Must Be	<u>.0022T</u>	
	ALL	Valve Rocker Bushing and Valve Rocker Valve Rocker Shaft Bushing and Cylinder Head Valve Rocker Shaft Bushing	<u>.7380</u>	ng Must Be	<u>.0022T</u>	
622	ALL ALL	Valve Rocker Bushing and Valve Rocker Valve Rocker Shaft Bushing and Cylinder Head Valve Rocker Shaft Bushing Hole in Cylinder Head Valve Rocker and Cylinder	<u>.7380</u>	ng Must Be	.0022T .0038T	
622	ALL ALL	Valve Rocker Bushing and Valve Rocker Valve Rocker Shaft Bushing and Cylinder Head Valve Rocker Shaft Bushing Hole in Cylinder Head Valve Rocker and Cylinder Head – Side Clearance	<u>.7380</u> .7388	ng Must Be	.0022T .0038T	(A)
622	ALL ALL	Valve Rocker Bushing and Valve Rocker Valve Rocker Shaft Bushing and Cylinder Head Valve Rocker Shaft Bushing Hole in Cylinder Head Valve Rocker and Cylinder Head – Side Clearance Intake and Exhaust Valve Guide	.7380 .7388	ng Must Be	.0022T .0038T	(A)
622	ALL ALL	Valve Rocker Bushing and Valve Rocker Valve Rocker Shaft Bushing and Cylinder Head Valve Rocker Shaft Bushing Hole in Cylinder Head Valve Rocker and Cylinder Head – Side Clearance Intake and Exhaust Valve Guide Height	.7380 .7388 .914 .954	ng Must Be	.0022T .0038T	(A)
622	ALL ALL	Valve Rocker Bushing and Valve Rocker Valve Rocker Shaft Bushing and Cylinder Head Valve Rocker Shaft Bushing Hole in Cylinder Head Valve Rocker and Cylinder Head – Side Clearance Intake and Exhaust Valve Guide Height MEASURE THE VALVE GUID	.7380 .7388 .914 .954 E HEIGHT	ng Must Be	.0022T .0038T	(A)
622	ALL ALL	Valve Rocker Bushing and Valve Rocker Valve Rocker Shaft Bushing and Cylinder Head Valve Rocker Shaft Bushing Hole in Cylinder Head Valve Rocker and Cylinder Head – Side Clearance Intake and Exhaust Valve Guide Height	.7380 .7388 .914 .954 E HEIGHT	ng Must Be	.0022T .0038T	(A)

PART IV – VERTICAL ENGINES

SECTION II – CYLINDERS



Cylinder, Piston, Connecting Rod and Valve Components

PART IV – VERTICAL ENGINES

			Dime	nsions	Clearances	
			Mfr.		Mfr.	
			Min. &	Service	Min. &	Service
Ref.	Chart	Nomenclature	Max.	Max.	Max.	Max.
OIL PU	UMP					
702	L-V	Oil Pump and Scavenge Pump			.007L	
		Gear – End Clearance			.030L	.045L
	L1	Oil Pump Drive Gear – End			.010L	10.02
		Clearance			.035L	.060L
703	L-V	Oil Pump and Scavenge Pump			.007L	.0002
, 00		Impellers – Dia. Clearance			.011L	.014L
	L1	Oil Pump Impellers – Dia.			.007L	
		Clearance			.011L	.014L
704	L-V	Oil Pump and Scavenge Pump			.003L	
		Impellers – Side Clearance			.0055L	.006L
	L1	Oil Pump Impellers – Side			.003L	
		Clearance			.0055L	.006L
	ALL	Width of Oil Pump Impellers	.995			
			.997	.994		
	ALL	Width of Oil Scavenge Pump	1.496			
		Impellers	1.498	1.495		
705	L-V	Oil Pump and Oil Scavenge				
		Pump Driven Impeller and Idler			<u>.001L</u>	
		Shaft			. 0025 L	.004L
	L1	Oil Pump Driven Impeller and			.0010L	
		Idler Shaft			.0025L	.004L
706	ALL	Oil Pump Idler Shaft and Oil			.0000	
		Pump Body			.0015T	(A)
	L1	Oil Pump Idler Shaft and Oil			.0000	
		Pump Cover			.0015T	(A)
713	L-V	Oil Pump Idler Shaft and			.0000	
		Scavenge Pump Body			.0015T	(A)
777	L-V	Oil Pump Drive Shaft Bushing			<u>.001T</u>	
		and Scavenge Pump Body			.003T	(A)
	L1	Oil Pump Drive Shaft Bushing			.001T	
		and Oil Pump Body			.003T	(A)
778	ALL	Oil Pump Drive Shaft Bushing			<u>.001T</u>	
		and Oil Pump Body			.003T	(A)
	L1	Oil Pump Drive Shaft Bushing			<u>.001T</u>	
		and Oil Pump Cover			.003T	(A)
779	L-V	Oil Pump Drive Bushing and Oil			<u>.0015L</u>	
		Scavenge Pump Gear			.0035L	.005L
	L1	Oil Pump Drive Gear and Oil			<u>.0015L</u>	
		Pump Cover			.0035L	.005L
780	ALL	Oil Pump Drive Shaft Bushing			<u>.0015L</u>	
		and Oil Pump Shaft			.0035L	.005L
7051	ALL	Oil Relief Valve Plunger and			<u>.001L</u>	
		Sleeve			.003L	.005L
7076	L1	Oil Pump Drive Gear Bushing			<u>.002T</u>	
		and Accessory Housing			.004T	(A)
7077	L1	Oil Pump Drive Gear and]	<u>.0015L</u>	
		Accessory Housing Bushing	1		.0035L	.005L

PART IV – VERTICAL ENGINES

SECTION III – GEAR TRAIN

Ref.			Mfr.		Mfr.	
	Chart	Nomenclature	Min. & Max.	Service Max.	Min. & Max.	Service Max.
FUEL P	PUMP					
782	L-V	Fuel Pump Drive Shaftgear			<u>.001T</u>	
500	* * * *	Bushing and Accessory Housing			.004T	(A)
783	L-V	Fuel Pump Drive Shaftgear –			<u>.006</u>	07.4
784	L-V	End Clearance Fuel Pump Drive Shaftgear and			.064	.074
/84	L-V	Bushing			<u>.001L</u> .004L	.006L
VACUU	IM PUMP	<u> </u>				•
	L-V	Vacuum Pump Shaftgear				
173	L V	Bushing and Accessory Housing			<u>.0015T</u>	
		Cover			.0035T	(A)
794	L-V	Vacuum Pump Shaftgear				
		Bushing (At Cover) and Vacuum			.002L	
		Pump Shaftgear			.004L	.006L
795	L-V	Vacuum Pump Shaftgear			<u>.0015T</u>	
		Bushing and Accessory Housing			.0035T	(A)
	L1	Vacuum Pump Shaftgear			<u>.0025T</u>	
		Bushing and Accessory Housing			.0045T	(A)
796	ALL	Vacuum Pump Shaftgear				
		Bushing (At Accessory Housing)			<u>.002L</u>	
		and Vacuum Pump Shaftgear			.0045L	.006L
797	L-V	Vacuum Pump Shaftgear – End			.008	
		Clearance			.030	.050
799	L1	Vacuum Pump Drive Gear			<u>.002T</u>	
		Bushing and Accessory Housing			.004T	(A)
7000	L1	Vacuum Pump Drive Gear			00051	
		Bushing and Vacuum Pump			.0025L	0061
7078	L1	Drive Gear			.0045L	.006L
7078	LI	Vacuum Pump Drive Gear and Cover			<u>.0013L</u> .0033L	.005L
7079	L1	Vacuum Pump Drive Gear – End				.003L
1019	LI	Clearance			<u>.010</u> .032	.037
TACHO	METER	Cicaranec			.032	.037
TACHO.		T. 1 . D. C. 1			0017	
7002	L1	Tachometer Driven Gear and			.001L	00451
7006	L-V	Adapter Electric Tachometer Driven			.003L	.0045L
7006	L-V	Gear – End Clearance			<u>.007</u> .025	.047
7012	L-V	Electric Tachometer Driven			.023	.047
7012	E- v	Gear and Accessory Housing			<u>.001L</u>	
		Cover			.003L	.004L
7088	L1	Tachometer Adapter and			.0005L	.0012
7000	21	Accessory Housing			.0025L	.0035L
MAGNE	ETO	¥ Q			-	
	L-V	Magneto Drive Idler Gear Hub				
1023	L Y	Bushing and Magneto Drive	Ruchi	ng Must Be l	Rurniched In	Place
		Idler Gear Hub	Dusiii	ng must be i	Juliiolicu III	1 lacc
		10101 0001 1100				l
7026	L-V	Magneto Drive Idler Gear Hub				
7026	L-V	Magneto Drive Idler Gear Hub Bushing and Magneto Drive			<u>.001L</u>	

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PART IV – VERTICAL ENGINES

			Dime	nsions	Clear	ances
			Mfr.		Mfr.	
Ref.	Chart	Nomenclature	Min. &	Service	Min. &	Service
		Nomenciature	Max.	Max.	Max.	Max.
	ETO (CONT.)	M · D: III C III			007	
7027	L-V	Magneto Drive Idler Gear Hub – End Clearance			.005 .014	024
7028	L-V	Magneto Drive Shaft and			.002L	.024
7028	L- V	Accessory Housing Cover			.002L .0045L	.006L
7029	L-V	Magneto Drive Shaft and			.0025L	.000L
7027		Accessory Housing			.0045L	.006L
7030	ALL	Magneto Drive Shaft Sleeve and			.001T	
		Magneto Drive Shaft			.004T	(A)
7031	ALL	Magneto Drive Shaft Sleeve and			<u>.001T</u>	
		Magneto Drive Coupling			.004T	(A)
7032	L-V	Magneto Drive Shaftgear – End			<u>.002</u>	
		Clearance			.020	.030
7039	L1	Magneto Drive Idler Gear – End			.002	0.40
7000	L1	Clearance			.030	.040
7080	LI	Magneto Drive Idler Gear Bushing and Magneto Drive			0011	
		Idler Shaft			.001L .003L	.004L
7081	L1	Magneto Drive Idler Gear and			.003L	.00+L
7001		Magneto Drive Idler Gear			.0005T	
		Bushing			.0025T	(A)
7082	L1	Magneto Drive Gear Bushing			.002T	
		and Accessory Housing			.004T	(A)
7083	L1	Magneto Drive Coupling and			<u>.001L</u>	
		Accessory Housing Bushing			.003L	.004L
7084	L1	Magneto Drive Gear and			<u>.001L</u>	
		Accessory Housing Bushing			.003L	.004L
	RATOR		•			
7043	L-V	Generator Drive Gear Bushing			<u>.0015T</u>	
		and Accessory Housing Cover			.0035T	(A)
7044	L-V	Generator Drive Gear Bushing			0001	
		(At Cover) and Generator Drive			.002L .004L	0061
7045	L-V	Gear Generator Drive Gear Bushing			.004L .002T	.006L
7043	L-V	and Accessory Housing			.002T	(A)
7046	L-V	Generator Drive Gear Bushing			.00+1	(A)
7010		(At Accessory Housing) and			.0025L	
		Generator Drive Gear			.0045L	.006L
7047	L-V	Generator Drive Gear – End			.010	
		Clearance			.038	.050
START	TER					
7048	L-V	Starter Drive Gear Bushing and			<u>.002T</u>	
		Adapter			.004T	(A)
	L1	Starter Drive Spacer Bushing			<u>.002T</u>	
		and Adapter			.004T	(A)
7049	L-V	Starter Drive Gear Bushings and			<u>.002L</u>	
		Starter Drive Gear			.004L	.006L
	L1	Starter Drive Spacer and Starter			.0015L	00.47
		Drive Adapter Bushing	<u> </u>		.003L	.004L

PART IV – VERTICAL ENGINES

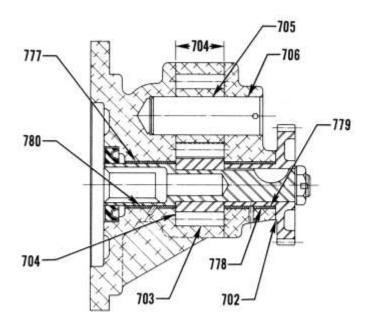
$SECTION\:III-GEAR\:TRAIN$

			Dime	nsions	Clear	ances
			Mfr.		Mfr.	
			Min. &	Service	Min. &	Service
Ref.	Chart	Chart Nomenclature			Max.	Max.
START	ER (CONT.)					
7050	L-V	Starter Drive Adapter and			<u>.0005L</u>	
		Accessory Housing Cover			.0025L	(A)
7089	L1	Starter Drive Gear – End			<u>.007</u>	
		Clearance			.011	.015
7090	L1	Bendix Drive Shaft (Slip				
		Coupling) and Accessory			<u>.0015L</u>	
		Housing Bushing			.0045L	.005L
ACCES	SSORY DRIVE					
7053	L-V	Accessory Idler Gear Bearing			.0001L	
		and Accessory Drive Gear			.0007T	(A)
7054	V	Accessory Drive Gear and			.001T	
		Bushing			.003T	(A)
7055	L-V	Accessory Idler Gear Bearing				
		and Accessory Drive Shaft			.0005T	
		Adapter			.0005L	(A)
7056	V	Accessory Drive Gear Bushing			<u>.0005L</u>	
		and Accessory Drive Shaft			.0017L	.004L
7057	V	Accessory Drive Gear – End			<u>.004</u>	
		Clearance			.012	.017
7086	L1	Accessory Drive Shaftgear			<u>.002T</u>	
		Bushing and Accessory Housing			.004T	(A)
7087	L1	Accessory Drive Shaftgear and			<u>.002L</u>	
		Accessory Housing Bushing			.004L	.006L
7091	L1	Dual Accessory Idler Gear and			<u>.001L</u>	
		Idler Shaft			.003L	.0045L
7092	L1	Dual Accessory Idler Gear – End			<u>.009</u>	
		Clearance			.018	.023L
7093	L1	Dual Accessory Drive Gear –			<u>.005</u>	
		End Clearance			.062	.077
7094	L1	Dual Accessory Drive Gear and			<u>.0013L</u>	
		Adapter			.0028L	.0034L

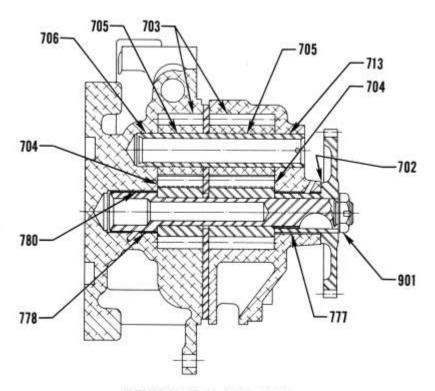
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PART IV – VERTICAL ENGINES

SECTION III – GEAR TRAIN



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

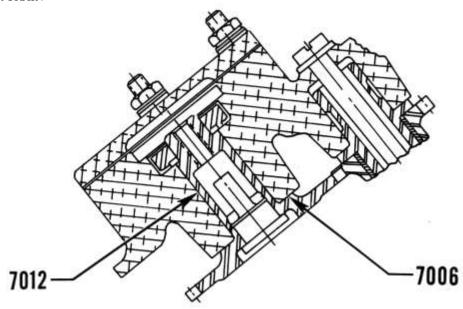


CROSSWISE ACC. HSG.

Oil Pumps

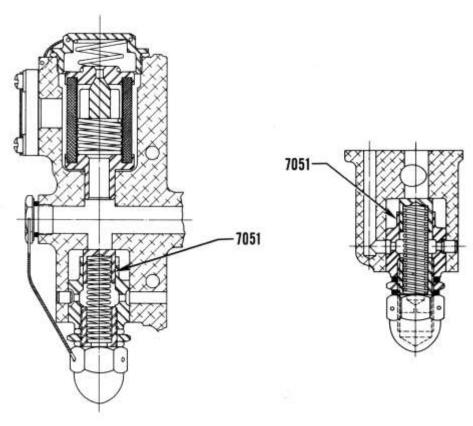
PART IV – VERTICAL ENGINES

SECTION III – GEAR TRAIN



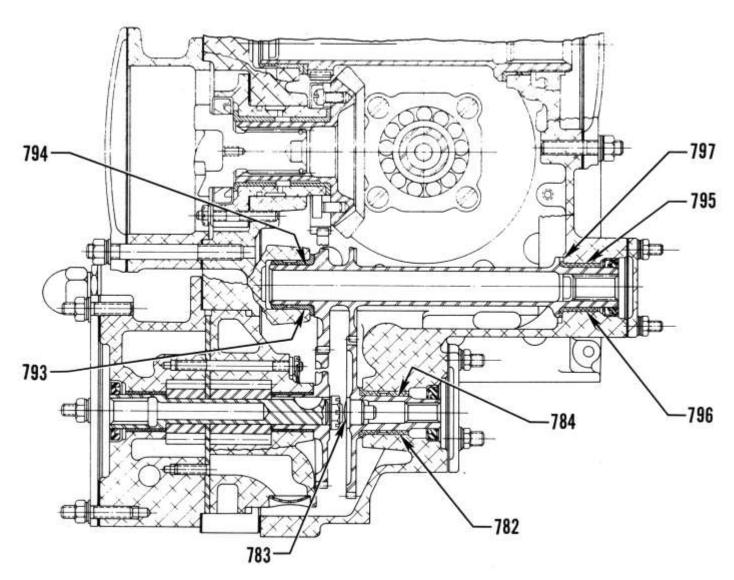
VO, TVO-435-A & VO, TVO-540

Tachometer Drive



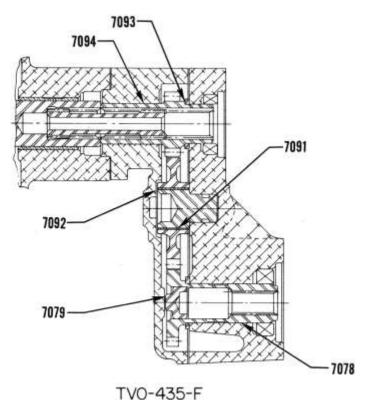
Oil Relief Valves

PART IV – VERTICAL ENGINES

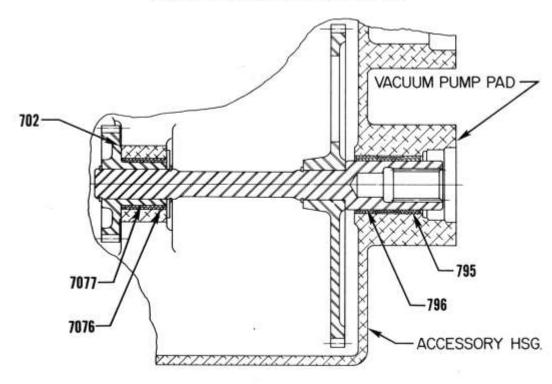


CROSSWISE ACCESSORY HSG.

PART IV – VERTICAL ENGINES

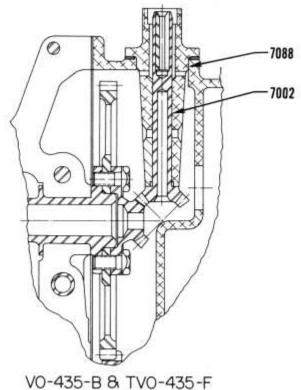


Vacuum Pump and Fuel Pump Dual Drive

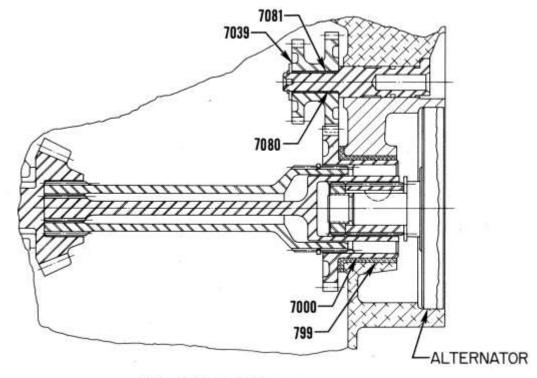


VO-435-BIA & TVO-435-F Vacuum Pump Drive

PART IV – VERTICAL ENGINES



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

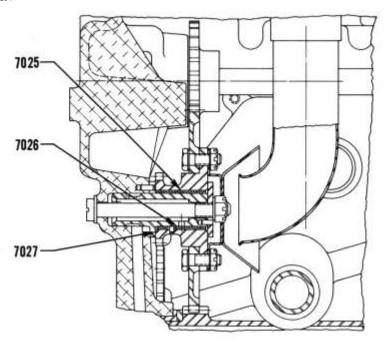


VO-435-B & TVO-435-F

Vacuum, Magneto and Alternator Drive

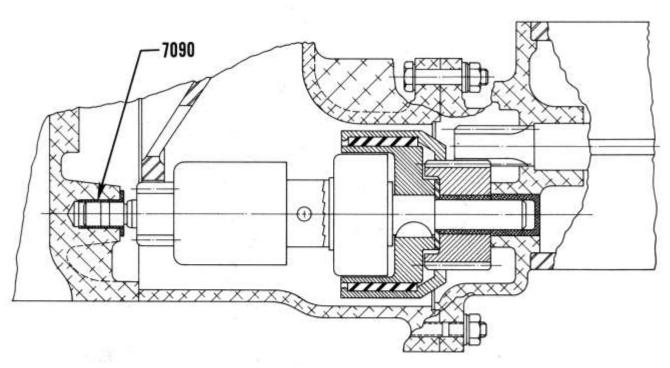
PART IV – VERTICAL ENGINES

SECTION III – GEAR TRAIN



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

Magneto and Tachometer Idler Gear



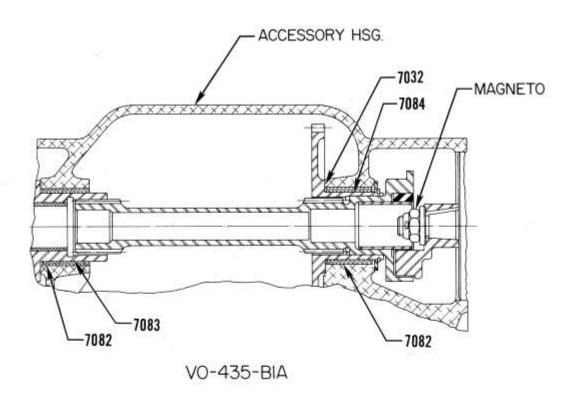
VO-435-B & TVO-435-F

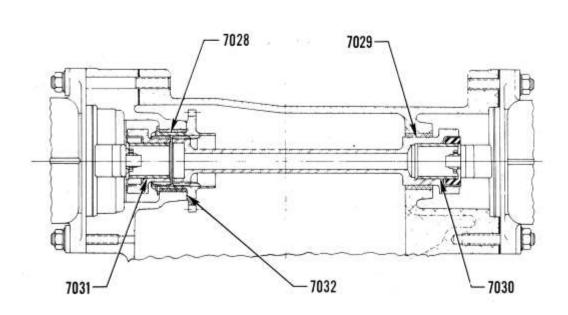
Bendix Drive

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PART IV – VERTICAL ENGINES

SECTION III – GEAR TRAIN



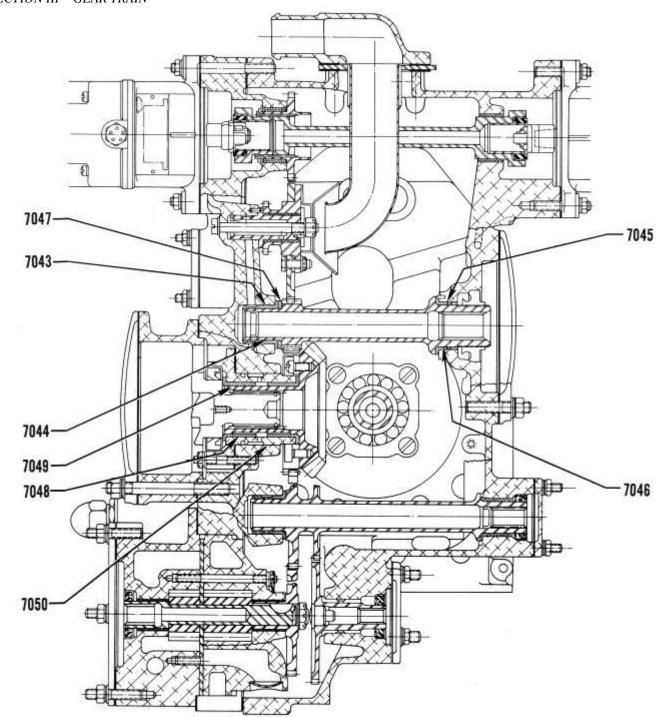


VO, TVO-435-A & VO, TVO-540

Magneto Drives

PART IV – VERTICAL ENGINES

SECTION III – GEAR TRAIN

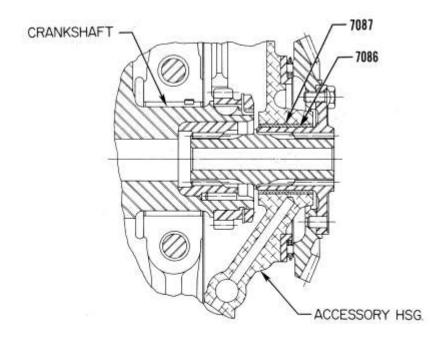


VO, TVO-435-A & VO, TVO-540

Generator and Starter Drives

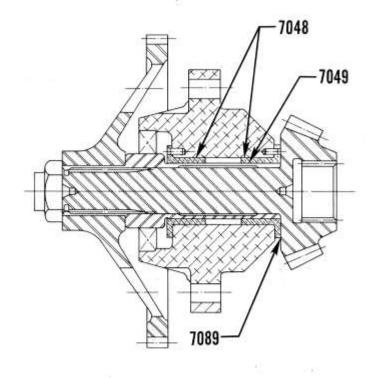
PART IV – VERTICAL ENGINES

SECTION III – GEAR TRAIN



VO-435-BIA

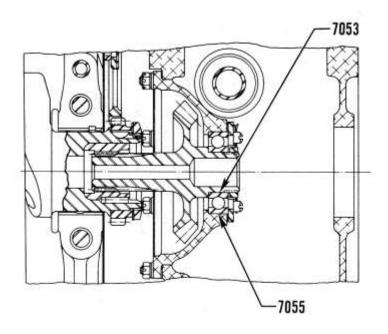
Accessory Drive Gear



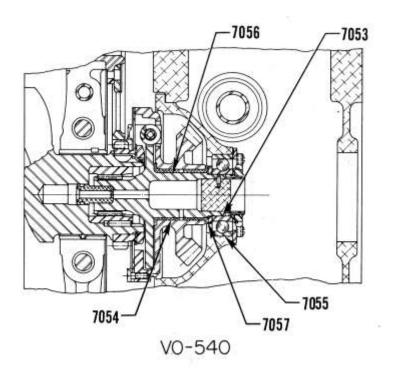
VO-435-BIA

Starter Drive

PART IV – VERTICAL ENGINES



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



Accessory Drives

PART IV – VERTICAL ENGINES

SECTION IV – BACKLASH

Ref. 808 825 866	Chart L1 L-V ALL	Nomenclature Oil Pump Impellers Oil Pump and Scavenge Pump	Mfr. Min. & Max.	Service Max.	Mfr. Min. &	Service
808 825 866	L1 L-V	Oil Pump Impellers				
808 825 866	L1 L-V	Oil Pump Impellers	Max.	Max.	3.7	
825 866	L-V				Max.	Max.
866		Oil Pump and Scavenge Pump			.005	
866		Oil Pump and Scavenge Pump			.015	.020
866	ALI.				<u>.008</u>	
866	AI.I.	Impellers			.015	.020
	1111	Crankshaft Timing Gear and			<u>.004</u>	
		Camshaft Gear			.015	.020
9.67	L-V	Electric Tachometer Drive Gear				
967		(Magneto Idler Hub) and			.004	020
	Y XY	Tachometer Driven Gear			.015	.020
867	L-V	Generator Drive Gear and			.004	020
0.60	Y X7	Magneto Drive Idler Gear			.015	.020
868	L-V	Magneto Drive Shaft (Spline)			001	
		and Magneto Drive Shaftgear			.001 .005	000
960	L-V	(Spline)			.005	.008
869	L-V	Magneto Drive Shaftgear (Spline) and Magneto Drive			001	
		Coupling (Spline)			.001 .005	.008
-	L1	Magneto Drive Shaft (Spline)			.003	.008
	Li	and Magneto Drive Coupling			.001	
		(Spline)			.0045	.0075
870	L-V1	Rear Crankshaft Spline Bushing			.002	.0075
070	2 11	and Accessory Gear (Spline)			.0073	.018
-	L1	Rear Crankshaft Spline Bushing			.0073	.010
	21	and Accessory Drive Quill Shaft			.004	
		(Spline)			.0073	.018
_	V	Rear Crankshaft Spline Bushing				
		and Accessory Drive Shaft			<u>.002</u>	
		(Spline)			.0073	.018
871	L-V	Accessory Drive Gear and			.004	
		Starter Drive Gear			.008	.015
	L1	Accessory Drive Gear and			<u>.002</u>	
		Starter Drive Gear			.016	.022
	L1	Starter Drive Shaftgear and			<u>.000</u>	
		Starter Drive Gear (Spline)			.002	.004
872	L-V	Accessory Drive Gear and			<u>.004</u>	
_		Generator Drive Gear			.015	.020
	L1	Alternator Drive Shaft (Spline)				
		and Vacuum and Magneto Drive			<u>.001</u>	006
_	Y 1	Shaft (Spline)			.004	.006
	L1	Alternator Drive Shaft (Spline)			<u>.001</u>	007
972	T 37	and Alternator (Spline)			.005	.007
873	L-V	Accessory Drive Gear and			.004 015	020
974	L-V	Vacuum Pump Shaftgear			.015	.020
874	L-V	Vacuum Pump Shaftgear and Oil			.004 .015	020
884	L1	Pressure Scavenge Pump Gear Magneto Drive Idler Gear and				.020
004	LI	Magneto Drive Idler Gear and Magneto Driven Gear			<u>.006</u> .014	.020
-	L1	Magneto Driven Gear Magneto Drive Gear and			.014	.020
	LI	Magneto Idler Drive Gear			.006 .014	.020

PART IV – VERTICAL ENGINES

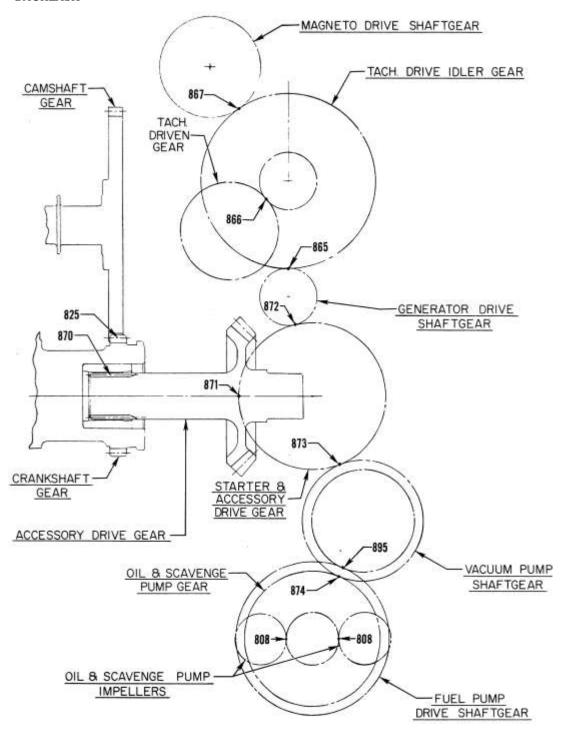
SECTION IV - BACKLASH

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

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PART IV – VERTICAL ENGINES

SECTION IV - BACKLASH

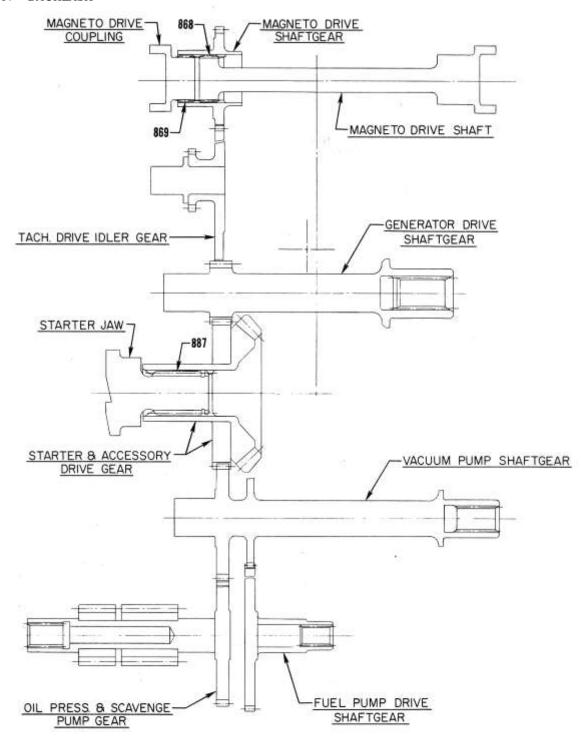


VO, TVO-435-A & VO, TVO-540
VIEWING LEFT SIDE OF ENGINE

Accessory Drives

PART IV – VERTICAL ENGINES

SECTION IV - BACKLASH

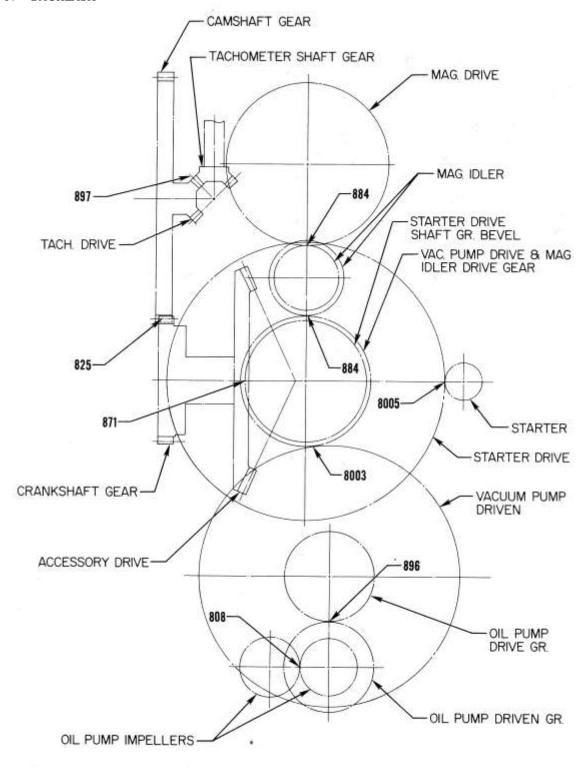


VO-TVO-435-A & VO, TVO-540 REAR OF ENGINE

Accessory Drives

PART IV – VERTICAL ENGINES

SECTION IV - BACKLASH

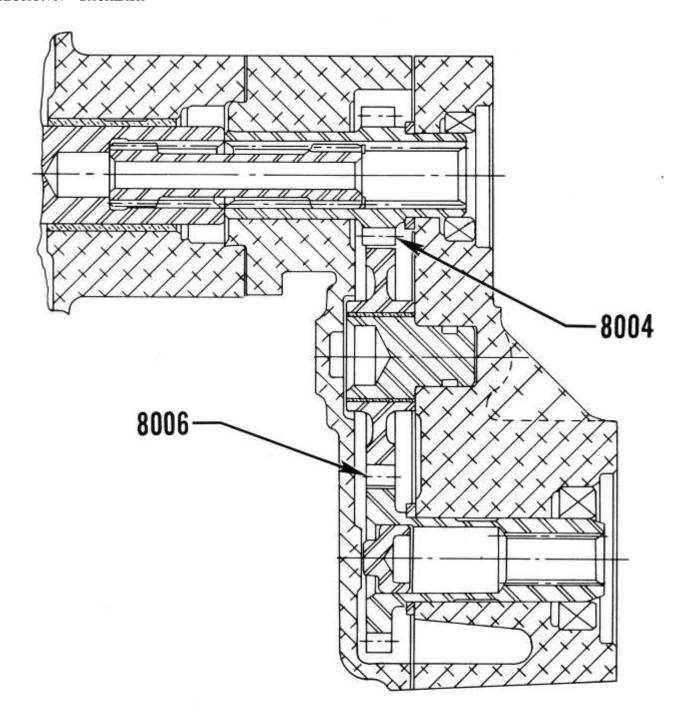


VO-435-BIA LEFT SIDE OF ENGINE

Accessory Drives

PART IV – VERTICAL ENGINES

SECTION IV – BACKLASH

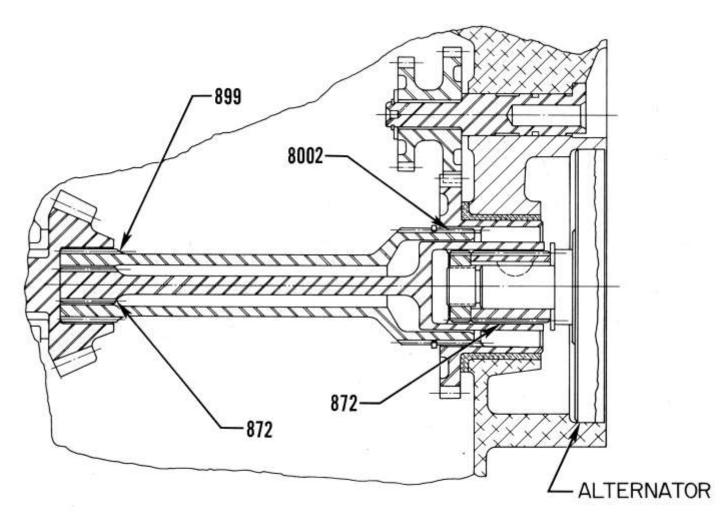


TVO-435-F

Vacuum Pump and Fuel Pump Dual Drives

PART IV – VERTICAL ENGINES

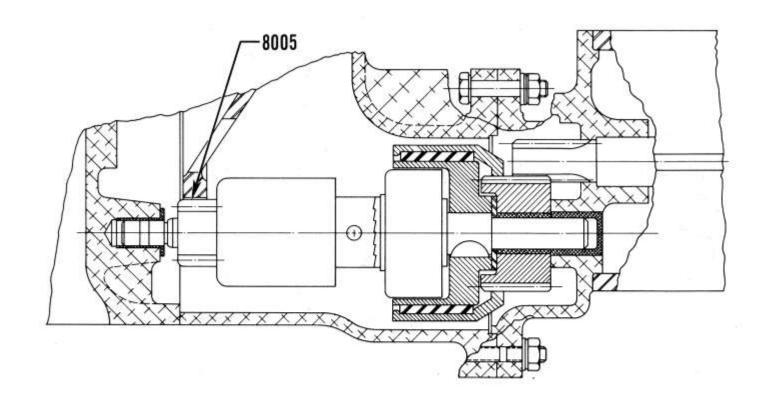
SECTION IV - BACKLASH



VO-435-B & TVO-435-F

PART IV – VERTICAL ENGINES

SECTION IV – BACKLASH

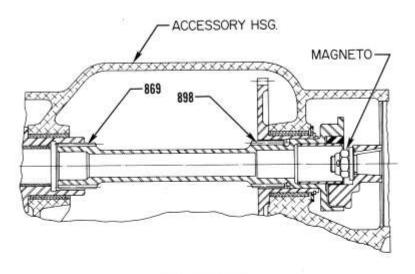


VO-435-B & TVO-435-F

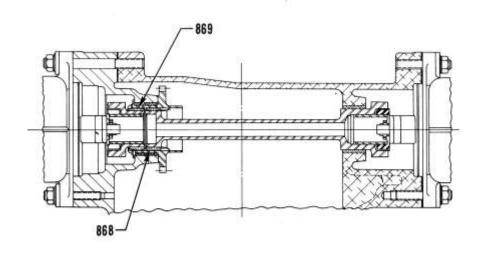
Bendix Drive

PART IV – VERTICAL ENGINES

SECTION IV – BACKLASH



VO-435-BIA

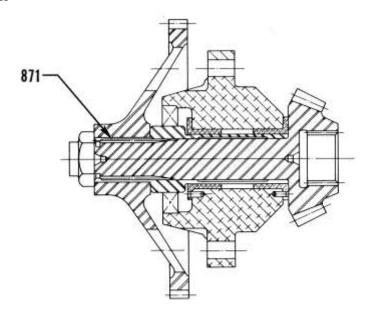


VO, TVO-435-A & VO, TVO-540

Magneto Drives

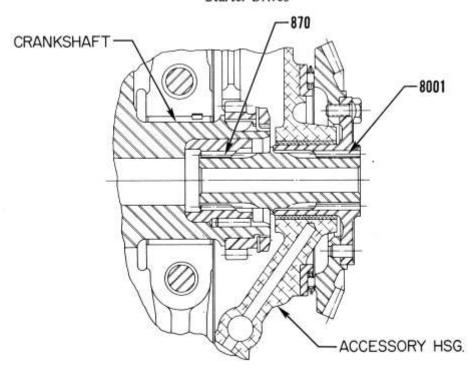
PART IV – VERTICAL ENGINES

SECTION IV – BACKLASH



VO-435-BIA

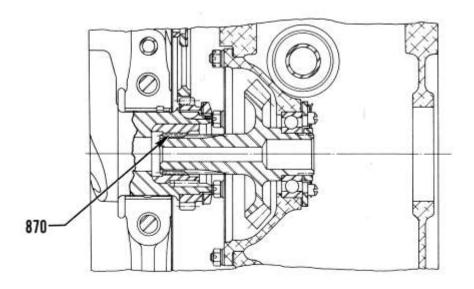
Starter Drives



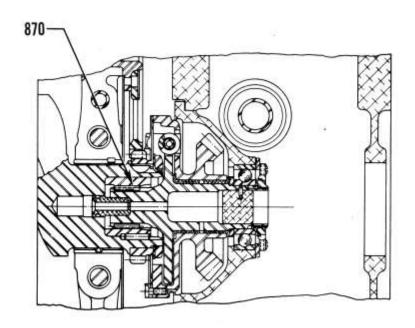
VO-435-BIA Accessory Drive Gear

PART IV – VERTICAL ENGINES

SECTION IV – BACKLASH



VO, TVO-435-A & TVO-540



VO-540

Accessory Drives

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 inlbs.
	ALL (using a cork gasket)	1/4-20	Rocker Box Screws	50 inlbs.
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	Hose Clamps (Worm Type)	
		and Below		20 in. lbs.
	ALL	5/16 Hex Head	Hose Clamps (Worm Type)	
		and Above		45 in. lbs.
919-1	ALL		"T" Bolt Hose Clamps	
			Initial Torque	35 in. lbs.
0.00	1		Retorque After Run-In	25 in. lbs.
920	ALL		Cylinder Head Drain Back Hose	40.1
021	X 0 X X 4		Clamp	10 in. lbs.
921	L2-V1		Exhaust Clamp – Coupling – V-Band	
			(See latest revision of Service	
020	ATT	2/0.16	Instruction No. 1238)	
928	ALL	3/8-16	Cylinder Hold Down Studs (Crankcase Driving Torque)	100 : 11
	ALL	1/2 12		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.
747	ALL	1/2-13	Cylinder Hold Down Nuts	600 in. lbs.
930	ALL	5/16-32	Brass union nut on stainless steel	
930	ALL	3/10-32	injector/primer fuel line (Both Ends)	25-50 inlbs.*
* T4 :	lee normiesikle to tickter the first	ing union put fire		ith a remanch ar
			r tight, then continue tightening the nut w	
additi			in excess of 50 inlbs. can result in dam	
		case Parting Flange	Nuts' Tightening Procedures – See lates	st revision of Service
022	Instruction No. 1029.		D: 0: 237	75 105 0 11
933	L-V		Accessory Drive Shaft Nut	75-125 ft. lbs.
934	ALL		Crankshaft Gear Retaining Nut	150 ft. lbs.

PART IV – VERTICAL ENGINES

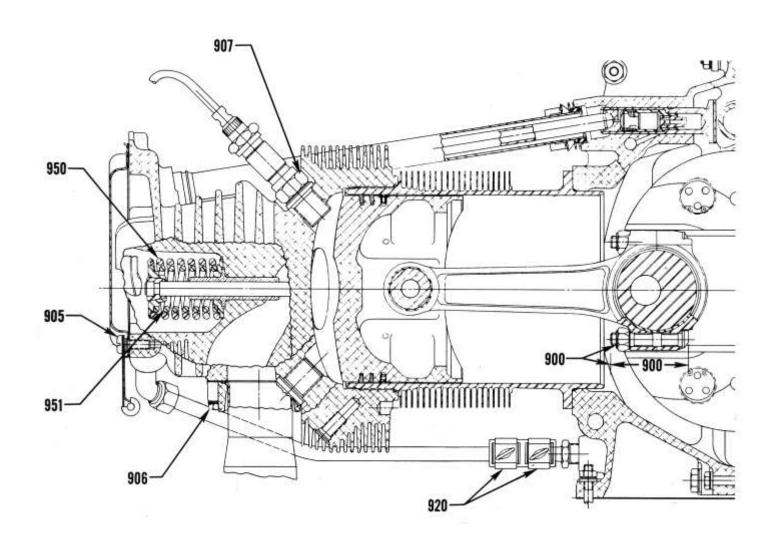
 $SECTION\ V-SPECIAL\ TORQUE\ REQUIREMENTS$

Ref.	Chart	Thi	read Size		Nomenclature					To	rque L	imits
938	ALL	1/4	28			Slotted Nut (38 in. lbs. plus torque red to reach next locking slot)					38	8 in. lbs.
942	ALL	1/8	-27 NPT		Carbure	tor Drain	Plug) in. lbs.
943	V		-32		Screws plate)	(To attac	h necessary		couplin	ıg	25-30) in. lbs.
944	V						tle Lever Sc				20-28	3 in. lbs.
945	L1			TECTIO	Drive G	ear Attac	Shaft and A	ccess	ory	1	00-120) in. lbs.
			5	SECTIC)N V –	SPRING	<u>GS</u>	1		01.7D 7	0.45	
Ref.	Chart	Nomenclature			Lyc. rt No.	Wire Dia.	Length at Comp. Length		Ifr. Iin.	OMP. I Mfr Max	. 5	Service Max.
950	ALL	Outer Valve										100 lb.
		(Angle)			26	.177	1.46 in.	10	3 lb.	1111	b.	min.
	ALL	Outer Valve Springs (Angle)		LW	-11796	.182	1.43 in.	11	4 lb.	124 1		111 lb. min.
951	ALL	Auxiliary Valve Springs (Angle)		683 LW	28 -11797	.142	1.33 in.		5 lb. 3 lb.	83 lt).	70 lb. min.
952	L-V	Check Valve Lycomin Numb	ng Part		Free ength		1		ı			
		654-	-B			.031	1.03 in.	.7	4 lb.	.94 11	o	.69 lb. min.
		7370	73761		2.065	.041	1.03 in.	3.1	5 lb.	3.35 1		3.10 lb. min.
953		Oil Pressu Valve S	pring									
		Lycoming Part Numbers	Identi Dye	fication Free Length	<u> </u>							
	L-V	68542	None	2.38	.067	1.66	in. 1	5 lb.	1	7 lb.	14	lb. min.
	L-V	LW-14029	White	2.28	.072	1.66		0 lb.		22 lb.		lb. min.
954		Accessory Dr	rive Coup	oling Spr	ing							
		Lycoming Part Numbers	From Langth									
	V – AS APPLICABLE	74616	1.25	i	.092	1.10	in. 23	lb.	26	lb.	20) lb.

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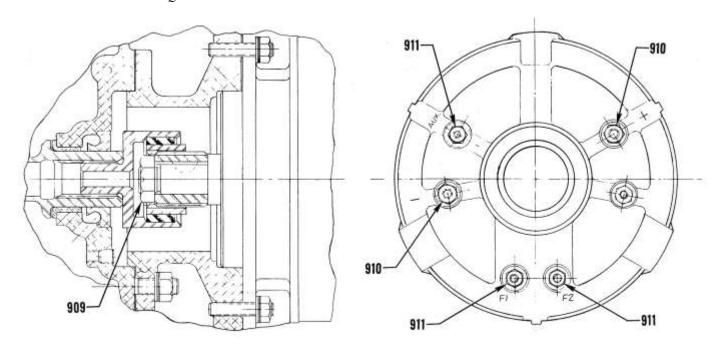
PART IV – VERTICAL ENGINES

 $SECTION\ V-SPECIAL\ TORQUE\ AND\ SPRINGS$

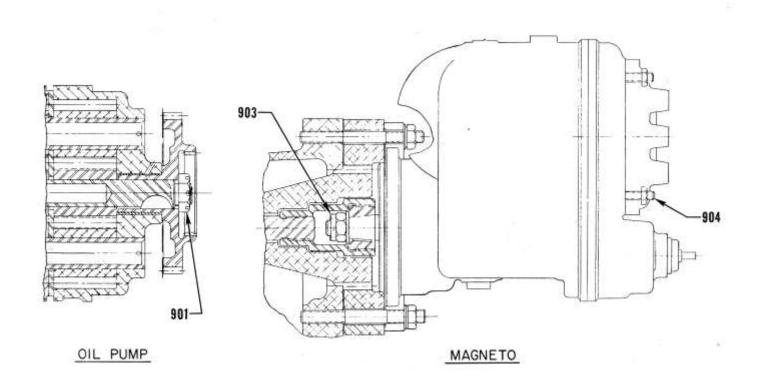


PART IV – VERTICAL ENGINES

SECTION V – SPECIAL TORQUE AND SPRINGS



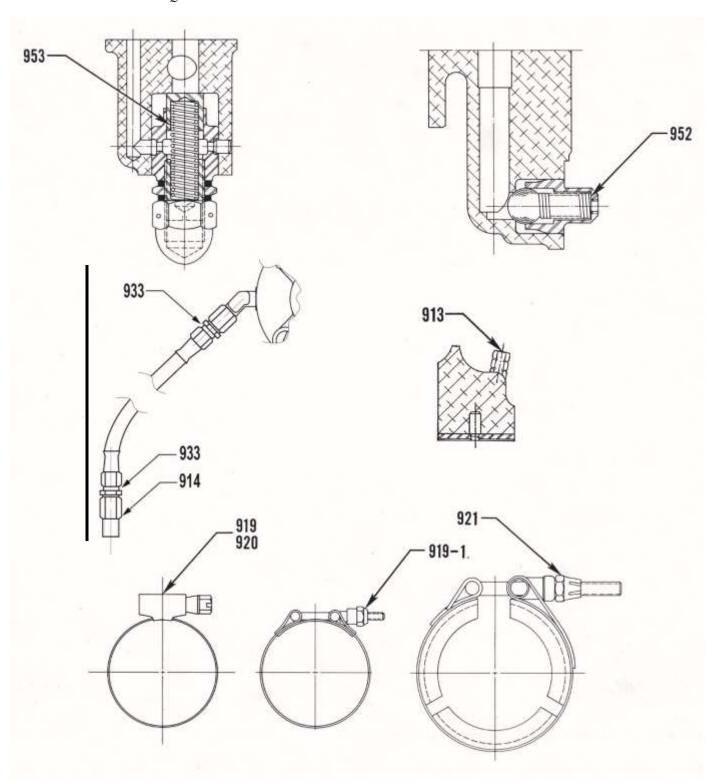
ALTERNATOR & ALTERNATOR DRIVE



Engine Accessories and Hardware

PART IV – VERTICAL ENGINES

SECTION V – SPECIAL TORQUE AND SPRINGS



Engine Accessories and Hardware

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).

		TAB		TABLE II				
	В	OLTS, SCRE	W AND N	IUTS		PIPE PLUGS		
Thread	Torque		Thusad	Torq	ue	Thread	Torque	
Thread	In. Lb.	Ft. Lb.	Thread	In. Lb.	Ft. Lb.	Tillead	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	
тц	IN NUTS (1/2	DIA OF BO	3/4-14 NPT	230 to 252				
111	111 110 13 (1/2	L DIA. OF BO	1-11-1/2 NPT	315 to 347				

TABLE III			TABLE IV				
CRUSH TYPE GAS	KETS		FLEXIBLE TUBE CONNECTIONS (SEALASTIC OR EQUIVALENT FITTINGS)				
Thread Pitch on Part to be Tightened	ANGLE OF TURN		Tube	Thread	Torque In. Lbs.		
Threads Per Inch	Aluminum	Copper	Size		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°	S	TUDS MIN.	DRIVING TORQU	E	
NOTE: Install all crush type gas	skets except	the self	Thr	eads	Torque In.	Lbs.	
centering type, with the unbroken sur	face against tl	ne flange	1/4	l-20	15		
of the plug or part being tightened ag	ainst the seal.	Turn the	5/10	6-18	25		
part until the sealing surfaces are in co	3/8-16 50						
to the angle of turn listed for the appr							
NOTE: Lubricate Threads Unless Of	herwise Speci	fied.					

	TABLE VI									
JAM	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								

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SERVICE TABLE OF LIMITS PART IV – VERTICAL ENGINES

STANDARD TORQUE (CONT.) UNLESS OTHERWISE LISTED

	TABLE VII											
	METAL TUBE FITTINGS											
			Minimum bend radii									
Dash Nos. Ref.	Tubing OD inches	Aluminum-alloy tubing Steel t		tubing	Aluminum- (Flare MS33 on oxygen	3583) for use	measured to tubing centerline. Dimension in inches					
	Minimum Maximum Minimum Maximum		Maximum	Minimum	Maximum	Alum. 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			

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