TEXTRON Lycoming

SERVICE TABLE OF LIMITS AND TORQUE VALUE RECOMMENDATIONS

DIRECT DRIVE

NOTICE

The basic Table of Limits, SSP2070 (including SSP2070-1, SSP2070-2, SSP2070-3 and SSP2070-3A) has been completely revised and reissued herewith as SSP1776. It is now 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 publications SSP2070, SSP2070-1, SSP2070-2, SSP2070-3 and SSP2070-3A; it is not to be used in conjunction with them. To make sure that SSP1776 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.

Additional copies of this revised Table of Limits, bound in a plastic cover, are available as indicated in the latest edition of Service Letter No. L114.

Reference numbers in the Table of Limits vary from previous Table of Limits therefore, the current as well as the old numbers are listed. The shaded columns contain the old reference numbers.

* - 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 Textron 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 Textron 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.
Ref. (2nd column)	Indicates the old reference number. There are no diagrams in this manual for these numbers. These numbers are only to be found in previous publications.
Chart (3rd column)	The letter or letter and number in this column are used as symbols to designate engine models to which the specific limits is applicable. A list of the letter or letter and number and the engine to which they refer is shown below.
Nomenclature (4th 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 (5th & 6th columns)	The dimensions shown in column 5 are the minimum and maximum dimensions for the part as manufactured. The dimensions shown in column 6 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 (7th & 8th columns)	Like the dimensions shown in the 5th and 6th 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 dimenional data has been deleted from the list; provided compliance with the change is not mandatory.

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 (or combinations of letters and numbers) without parenthesis indicate engine models. They are listed below with their 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 on piston rings must be measured with face of ring flush with piston .
(D)	The dimensions shown are measured at the bottom of the piston skirt at right angles to the piston pin.
(E)	Permissible wear of the crankshaft (rod and main bearing journals) to be minus 0.0015 on the diameter.
(L)	Loose fit; wherein a definite clearance is mentioned between the mating surfaces.
(T)	Tight fit; shrink or interference fit.
(WD)	Wide Deck Crankcase.

Introduction

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 edition of Service Instruction No. 1037.

PART I DIRECT DRIVE ENGINES (Including VO and IVO-360)

CHART	MODELS
A	0-235
A1	0-235-F, -G, -K, -L
B	0-290
B1	0-290-D2
D	0-435-A
BD	0-320-H (76 Series)
G	O, IO, LIO, AEIO-320
G1	O, IO-320 With Gov. at Front (0-320-E1F, -E1J, -D1F & IO-320-D1B)
G2	AIO-320
J	0-340
Y	VO, IVO-360
S	O, IO, LIO, HIO, LHIO, TO, TIO, AEIO-360
S1	TO-360
S2	AIO-360
S3	TIO-360
S4	0-360-A With Gov. at Front (0-360-A1H, -A1LD)
S5	IO, LIO-360-A, -C (Angle Valve)
S6	IO, LIO-360-A, -C With Gov. at Front (IO, LIO-360-C1E6 & IO-360-A1D6)
S7	HIO-360-D
S8	HIO-360-B
S9	HIO-360-C, -E
S10	HIO-360-A
T	O, IO, LIO, AEIO, TIO, LTIO-540
T1	0-540-G, -H & IO-540-N, -R (Large Mains - Parallel Valve)
T2	IO-540-A, -B, -E, -G, -P (Angle Valve)
T3	IO-540-K, -M, -S; TIO, LTIO-540-A, -F, -J, -N, -R (Large Mains - Angle Valve)
T4	TIO-540-C, -E, -G, -H
AF	IO-720
BE	O, LO-360-E (76 Series)

NOTE: In "Chart" column, a number appearing after a letter shows exception to the basic model.

SERVICE TABLE OF LIMITS

PART 1 DIRECT DRIVE ENGINES

SECTION I CRANKCASE, CRANKSHAFT, CAMSHAFT

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
500	501	A	All Main Bearings and Crankshaft			.0025L / .0055L	.0060L
		B-D-G-J-S-T-Y-BD-BE-AF	Main Bearings and Crankshaft (Thin Wall Bearing - .09 Wall Approx.)			.0015L / .0045L	.0060L
		B-G-J-S-T-Y-AF	Main Bearings and Crankshaft (Thick Wall Bearing - .16 Wall Approx.)			.0011L / .0041L	.0050L
		A	Diameter of Main Bearing Journal on Crankshaft	2.3735 / 2.375	(E)		
		B-D-G-J-S-T-Y-BD-BE	Diameter of Main Bearing Journal on Crankshaft (2-3/8 in. Main)	2.3745 / 2.376	(E)		
		T1-T3-AF	Diameter of Main Bearing Journal on Crankshaft (2-5/8 in. Main)	2.6245 / 2.626	(E)		
		S8-S10	Diameter of Front Main Bearing on Journal on Crankshaft (2-3/8 in. Main)	2.3750 / 2.3760	(E)		
		T1-T3-AF	Diameter of Front Main Bearing Journal on Crankshaft (2-5/8 in. Main)	2.6245 / 2.6255	(E)		
500	955	A-B-B1-D-G*-BD-BE	Crankcase Bearing Bore Diameter (All) (Thin Wall Bearing) (2-3/8 in. Main)	2.566 / 2.567	2.5685		
		G**-J-S-T-Y	Crankcase Bearing Bore Diameter (All Except Front) (Thick Wall Bearing) (2-3/8 in. Main)	2.6865 / 2.6875	2.6890		
		T1-T3-AF	Crankcase Bearing Bore Diameter (Front Only) (Thin Wall Bearing) (2-5/8 in. Main)	2.816 / 2.817	2.8185		
		T1-T3-AF	Crankcase Bearing Bore Diameters (All Except Front) (Thick Wall Bearing) (2-5/8 in. Main)	2.9365 / 2.9375	2.9390		
		S1-T-AF	Crankcase Bearing Bore Diameter (All) (Thin Wall Bearing) (2-5/8 in. Main)	2.816 / 2.817	2.8185		
		G**-J-S-T-Y * 0-320-A, -E Narrow Deck. ** 0-320-A, -E Wide Deck.	Crankcase Bearing Bore Diameter (Front Only) (Thin Wall Bearing) (2-3/8 in. Main)	2.566 / 2.567	2.5685		
501	502	ALL	Connecting Rod Bearing and Crankshaft			.0008L / .0038L	.0050L
		A-B-D-G-J-S-T-Y-BD	Diameter of Connecting Rod Journal on Crankshaft (2-1/8 in.)	2.1235 / 2.125	(E)		

SERVICE TABLE OF LIMITS

PART 1 DIRECT DRIVE ENGINES

SECTION I CRANKCASE, CRANKSHAFT, CAMSHAFT

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
501	502	S-T-AF	Diameter of Connecting Rod Journal on Crankshaft (2-1/4 in.)	2.2485 / 2.250	(E)		
	954	A-B-D-G-J-S-T-Y-BD-BE	Connecting Rod Bearing Bore Diameter (2-1/8 in.) (Measured At Axis 30° on Each Side)	2.2870 / 2.2875			
		S-T-AF	Connecting Rod Bearing Bore Diameter (2-1/4 in.) (Measured At Axis 30° on Each Side)	2.4205 / 2.4210			
502	564	ALL	Connecting Rod - Side Clearance			.004L / .010L	.016L
503	566	ALL	Connecting Rod - Alignment			.010 in 10 Inches	
504	567	ALL	Connecting Rod - Twist			.012 in 10 Inches	
505	556		Crankshaft Run-Out at Center Main Bearing				
		4 CYLINDER	Mounted on No. 1 and 4 Journals Max. Run-Out No. 2 Journal			.002	.002
			Mounted on No. 1 and 4 Journals Max. Run-Out No. 3 Journal			.005	.0075
			Mounted on No. 2 and 4 Journals Max. Run-Out No. 3 Journal			.003	.0045
		6 CYLINDER	Mounted on No. 2 and 5 Journals Max. Run-Out No. 1 Journal			.002	.002
			Mounted on No. 2 and 5 Journals Max. Run-Out No. 3 Journal			.005	.0075
			Mounted on No. 2 and 4 Journals Max. Run-Out No. 3 Journal			.003	.0045
			Mounted on No. 3 and 5 Journals Max. Run-Out No. 4 Journal			.003	.0045
		8 CYLINDER	Mounted on No. 2 and 6 Journals Max. Run-Out No. 1 Journal			.002	.002
			Mounted on No. 2 and 4 Journals Max. Run-Out No. 3 Journal			.003	.0045
			Mounted on No. 3 and 5 Journals Max. Run-Out No. 4 Journal			.003	.0045
			Mounted on No. 4 and 6 Journals Max. Run-Out No. 5 Journal			.003	.0045
			Mounted on No. 2 and 6 Journals Max. Run-Out No. 3,4 and 5 Journals			.005	.0075
506	568	ALL	Crankshaft and Crankcase Front End Clearance			.009L / .016L	.026L
507	938	ALL	Clearance - Front Face of Crankshaft Oil Slinger to Front Face of Recess in Crankcase (Crankshaft Against Thrust Face)			.002 / .007L	(A)

SERVICE TABLE OF LIMITS

PART 1 DIRECT DRIVE ENGINES

SECTION I CRANKCASE, CRANKSHAFT, CAMSHAFT

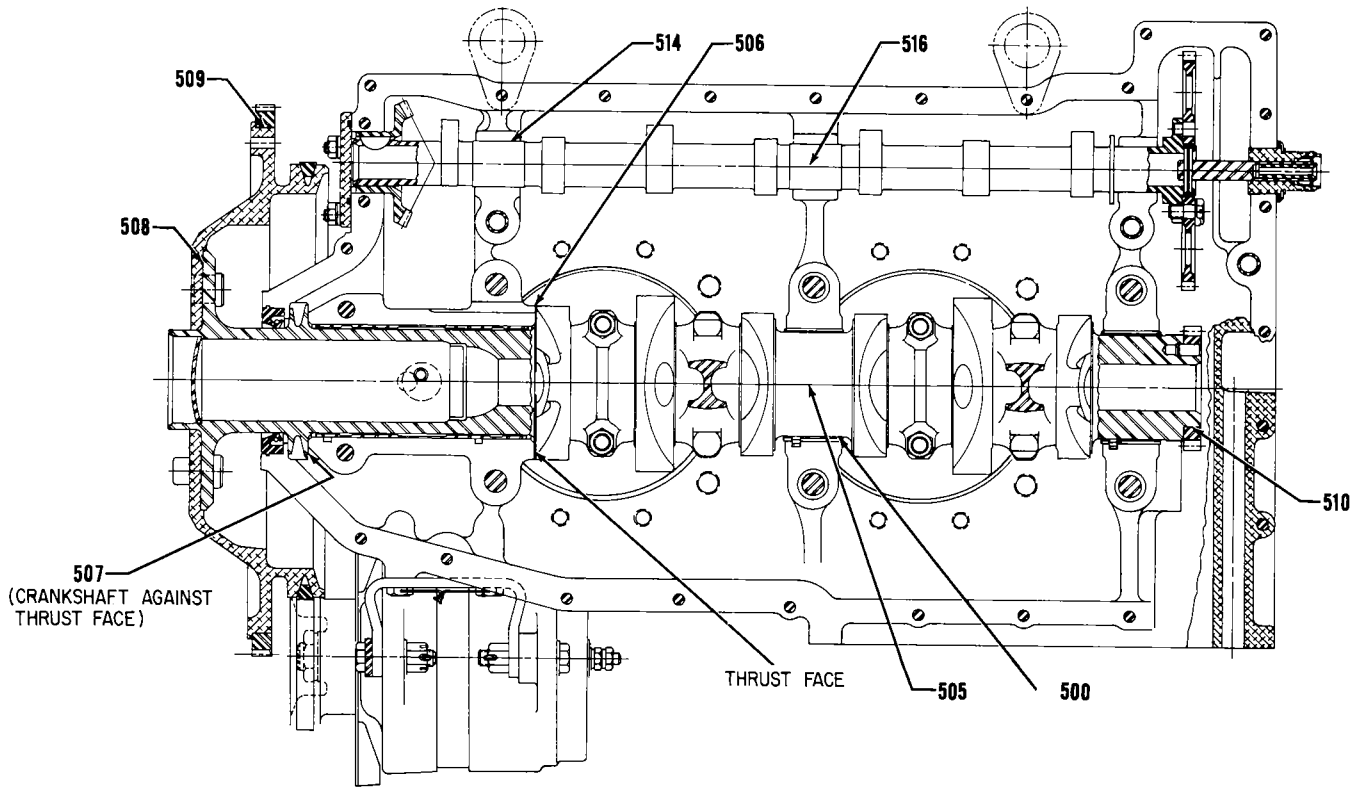
Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
508	607	ALL	Crankshaft Prop. Flange Run-Out			.002	.005
509	941	ALL	Starter Ring Gear and Support			.014T / .022T	(A)
510	504	A-B-D-G-J-S-T-Y-AF BD-BE	Crankshaft Timing Gear and Crankshaft			.0005T / .0010L	(A)
511	536	A-B-D-G-J-S-T-Y-AF	Tappet Body and Crankcase			.0010L / .0033L	.004L
		BD-BE	Tappet Body and Crankcase			.0010L / .0030L	.004L
		A-B	O.D. of Tappet	.6232 / .6240	.6229		
		B1-D-G-J-S-T-Y-AF	O.D. of Tappet	.7169 / .7177	.7166		
		BD-BE	O.D. of Tappet	.8740 / .8745	.8737		
		A-B	I.D. Tappet Bore in Crankcase	.6250 / .6263	.6266		
		B1-D-G-J-S-T-Y-AF	I.D. Tappet Bore in Crankcase	.7187 / .7200	.7203		
		BD-BE	I.D. Tappet Bore in Crankcase	.8755 / .8773	.8776		
512	559	B1-D-G-J-S-T-Y	Tappet Plunger Assembly and Body - Chilled			.0010L / .0047L	.0067L
		S7-S1-AF	Tappet Plunger Assembly and Body - Hyperbolic			.0010L / .0067L	.0087L
513	560	B1-D-G-J-S-T-Y	Tappet Socket and Body			.002L / .005L	.007L
		S7-S1-AF	Tappet Socket and Body (Hyperbolic)			.002L / .007L	.009L
514	537	ALL	Camshaft and Crankcase			.002L / .004L	.006L
515	538	ALL	Camshaft - End Clearance			.002L / .009L	.015L
516	539	ALL	Camshaft Run-Out at Center Bearing Journal			.000 / .001	.006
517	578	All Models Using Counterweights	Counterweight Bushing and Crankshaft			.0013T / .0026T	(A)
518	579	All Models Using Counterweights	Counterweight Roller - End Clearance			.007L / .025L	.038L
519	580	All Models Using Counterweights	Counterweight and Crankshaft - Side Clearance*			.003L / .013L	.017L
520	696	All Models Using Counterweights	Counterweight Bore and Washer O.D.			.0002L / .0030L	(A)
521	775	All Models Using Counterweights	I.D. of Counterweight Bushing	.7485 / .7505	.7512		
		* Measure below roller next to flat.					

SERVICE TABLE OF LIMITS

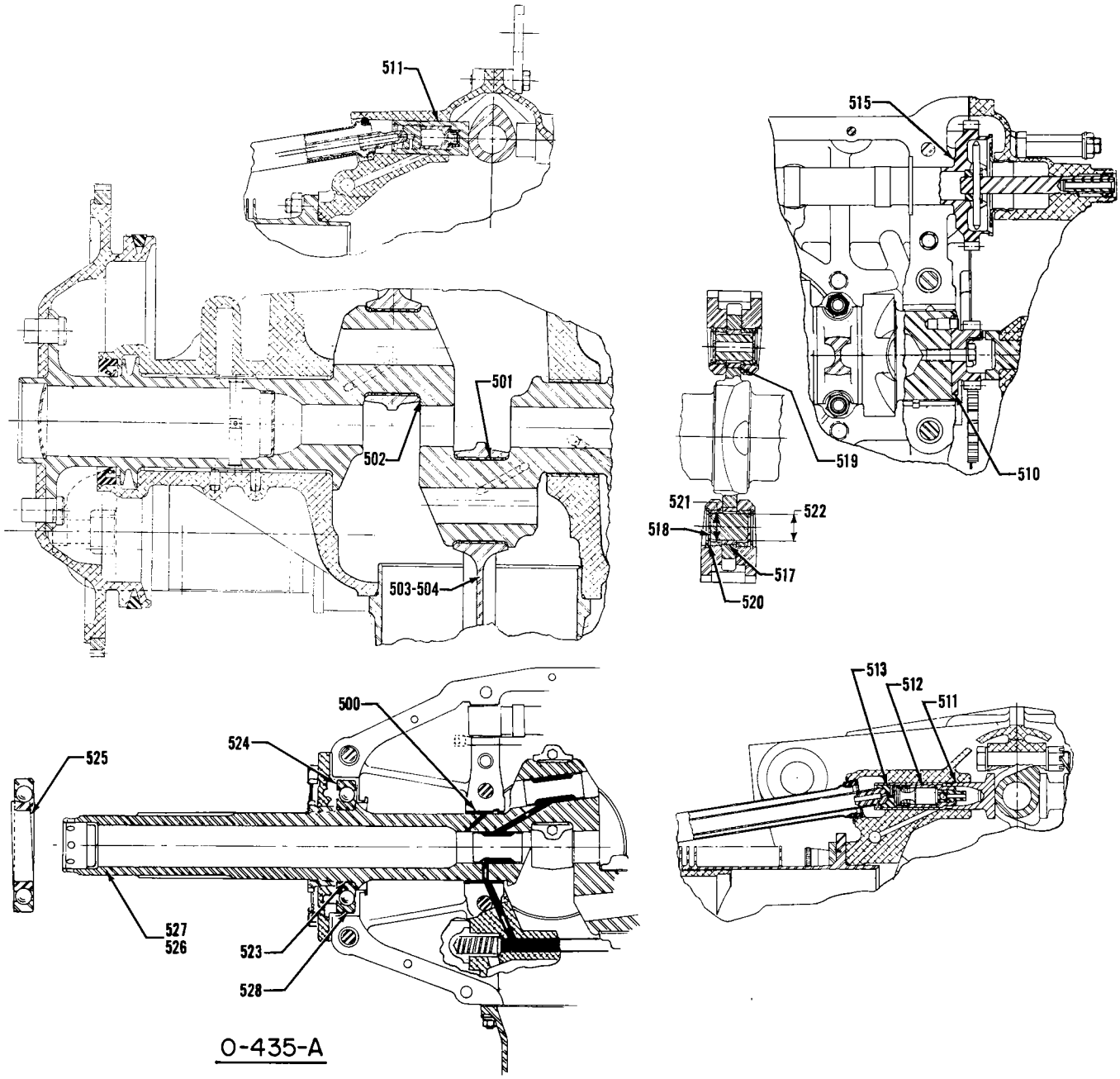
PART 1 DIRECT DRIVE ENGINES

SECTION I CRANKCASE, CRANKSHAFT, CAMSHAFT

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
522	774	ALL (AS APPLICABLE)	O.D. of Counterweight Roller (See latest edition of Service Instruction No. 1012)				
523	503	D	Thrust Bearing and Propeller Shaft			.0000 / .0012L	.002L
524	509	D	Thrust Bearing and Thrust Bearing Cap Clamp Fit (Shim to this Fit)			.003T / .005T	(A)
525	555	D	Thrust Bearing Tilt		.027 Tilt		
526	505	D	Crankshaft Run-Out - Rear Cone Location				.003
527	506	D	Crankshaft Run-Out - Front Cone Location				.007
528	508	D	Thrust Bearing and Thrust Bearing Cage			.0016L / .0034L	.0045L



Longitudinal Section Thru Engine



Crankcase, Crankshaft, Camshaft and Related Parts

SERVICE TABLE OF LIMITS

PART 1 DIRECT DRIVE ENGINES

SECTION II CYLINDERS

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions Mfr. Min. & Max.	Dimensions Serv. Max.	Clearances Mfr. Min. & Max.	Clearances Serv. Max.
600	510	ALL	Connecting Rod and Connecting Rod Bushing	Bushing To Be Burnished in Place			
		ALL	Finished I.D. of Connecting Rod Bushing	1.1254 / 1.1262			
601	510	A-B-D-G-J-BD	Length Between Connecting Rod Bearing Centers	6.4985 / 6.5015			
		S-T-Y-AF-BE	Length Between Connecting Rod Bearing Centers	6.7485 / 6.7515			
602	511	ALL	Connecting Rod Bushing and Piston Pin			.0008L / .0021L	.0025L
603	512	ALL	Piston Pin and Piston			.0003L / .0014L	.0018L
		ALL	Diameter of Piston Pin Hole in Piston	1.1249 / 1.1254			
		ALL	Diameter of Piston Pin	1.1241 / 1.1246			
604	513	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 Pin Plug	1.1242 / 1.1247			
605	513	B-D-G-J-S-T-Y-AF	Piston Pin and Piston Pin Plug (Optional)			.0005L / .0025L	.005L
		G-J-S-T-Y-AF	*Diameter of Piston Pin Plug	.5655 / .5665			
		B-D	Diameter of Piston Pin Plug (Thin Wall Pin)	.8405 / .8415			
		*See latest edition of Service Instruction No. 1267.					
606	514	A-B	Piston Ring and Piston - Side Clearance (Top Ring Comp.) (Plain) Full Wedge			.000 / .004L	.006L(B)
		B-D	Piston Ring and Piston - Side Clearance (Top Ring Comp.) (Chrome) Full Wedge			.0025L / .0065L	.008L(B)
		G-J-S-T-Y-AF-BD-BE	Piston Ring and Piston - Side Clearance (Top Ring Comp.) Half Wedge			.0025L / .0055L	.008L(B)
606	515	B	Piston Ring and Piston - Side Clearance (2nd Ring Comp.) (Chrome) Full Wedge			.0025L / .0065L	.008L(B)
		A-B-D-G-J-S-T-Y-AF-BD-BE	Piston Ring and Piston - Side Clearance (2nd Ring Comp.) Full or Half Wedge			.000 / .004L	.006L(B)
		J	Piston Ring and Piston - Side Clearance (3rd Ring Comp.) Half Wedge			.000 / .004L	.006L(B)
606	516	ALL	Piston Ring and Piston - Side Clearance (Oil Regulating)			.002L / .004L	.006L(B)

SERVICE TABLE OF LIMITS

PART 1 DIRECT DRIVE ENGINES

SECTION II CYLINDERS

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions Mfr. Min. & Max.	Dimensions Serv. Max.	Clearances Mfr. Min. & Max.	Clearances Serv. Max.
606	517	A	Piston Ring and Piston - Side Clearance (Bottom)			.003L / .0055L	.007L(B)
607	615	ALL	Piston Ring Gap (Compression) Plain and Chrome Cylinders (Straight Barrels)			.020 / .030	.047
		ALL	Piston Ring Gap (Compression) Nitrided and Chrome Cylinders (Choke Barrels)			.045 / .055	.067
		ALL	Piston Ring Gap (Oil Regulating) (All Barrels)			.015 / .030	.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.

		Engine and Piston Application		Min. Piston Diameter			Cylinder Barrel		
		Engine Chart Code Letter	Piston Number	Top	Bottom	Type of Piston	Type of Surface	Maximum Diameter	Max. Clearance Piston Skirt & Cyl.
608	519	A	61147, 73851	4.3470	4.3555	Cast-Round	P	4.3795	.021L
608	522		61333	4.3470	4.3555	Forged-Round	P	4.3795	.021L
609	520		LW-11621*, LW-13623*	4.3290	4.3605	Cast-Cam	N	4.3805	.018L
610	521	B	69841*, 69958, 70396	4.8290	4.8620	Cast-Cam	P - C	4.8805	.018L
		D	69958	4.8290	4.8620	Cast-Cam	P	4.8805	.018L
		G,S,T	73196, 74059, 75413	5.0790	5.1090	Cast-Cam	P-C-N	5.1305	.018L
		G	69337	5.0790	5.1090	Forged-Cam	P - C	5.1305	.018L
		J,S,Y,T	71594*, 72967*, 74530*, 75089*	5.0790	5.1090	Cast-Cam	P-C-N	5.1305	.018L
		B D	LW-15357*	5.0790	5.1090	Cast-Cam	N	5.1305	.018L
		S,T,AF	73264*, 75617*, 76966, 78203*, LW-10207*, LW-13358*, LW-14610*, LW-11487*, LW-10545	5.0790	5.1090	Forged-Cam	N - C	5.1305	.018L
		T	LW-13396*	5.0790	5.1090	Cast-Cam	N	5.1305	.018L

NOTES:

To find the average diameter of cylinder in an area 4" above bottom of barrel: First, measure diameter at right angles from plane in which valves are located. Second, measure diameter through the plane in which valves are located. Add both diameters; this sum, divided by 2, represents the average diameter of the cylinder.

*=High Compression.

Cylinder Barrel: P=plain steel, N=nitride hardened, C=chrome plated.

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.

Maximum taper and out-of-round permitted for cylinder in service is .0045 inch.

See Service Instruction No. 1243 for identification of cast and forged pistons. The suffix "S" that will be found with the part number on 76966, 78203, LW-10207, LW-10545, LW-11487, LW-13358, LW-14610 pistons indicates the piston weight is within the limits specified for any group of pistons and may be substituted for any like piston on a particular engine. Other pistons are manufactured within weight limits that do not require any weight controlled piston for replacement.

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. See Service Instruction No. 1243 for illustration.

SERVICE TABLE OF LIMITS

PART 1 DIRECT DRIVE ENGINES

SECTION II CYLINDERS

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
611	523	A	Exhaust Valve Seat and Cylinder Head			.0065T / .010T	(A)
		B-D-G-J-S-T-Y-BD-BE	Exhaust Valve Seat and Cylinder Head			.0045T / .008T	(A)
		S1-S2-S3-S5-S6-S7-S9-S10-T2-T3-AF	Exhaust Valve Seat and Cylinder Head			.0075T / .011T	(A)
		A	O.D. Exhaust Seat	2.0025 / 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-T2-T3-AF	O.D. Exhaust Seat	1.9355 / 1.937			
		A	I.D. Exhaust Seat Hole in Cylinder Head	1.994 / 1.996			
		B-D-G-J-S-T-Y-BD-BE	I.D. Exhaust Seat Hole in Cylinder Head	1.733 / 1.735			
611	523	S1-S2-S3-S5-S6-S7-S9-S10-T2-T3-AF	Exhaust Seat Hole in Cylinder Head	1.926 / 1.928			
612	524	A	Intake Valve Seat and Cylinder Head			.0070T / .0105T	(A)
		B-D-G-J-S-T-Y-AF-BD-BE	Intake Valve Seat and Cylinder Head			.0065T / .010T	(A)
		A	O.D. Intake Seat	2.0965 / 2.0975			
		A1-B-D	O.D. Intake Seat	1.9265 / 1.928			
		B1-C-J-S-T-Y-BD-BE	O.D. Intake Seat	2.0815 / 2.083			
		S1-S2-S3-S5-S6-S7-S9-S10-T2-T3-AF	O.D. Intake Seat	2.2885 / 2.290			
		A	I.D. Intake Seat Hole in Cylinder Head	2.087 / 2.089			
		A1-B-D	I.D. Intake Seat Hole in Cylinder Head	1.918 / 1.920			
		B1-G-J-S-T-Y-BD-BE	I.D. Intake Seat Hole in Cylinder Head	2.073 / 2.075			
		S1-S2-S3-S5-S6-S7-S9-S10-T2-T3-AF	I.D. Intake Seat Hole in Cylinder Head	2.280 / 2.282			
613	526	ALL	Exhaust Valve Guide and Cylinder Head			.001T / .0025T	(A)
613	527	A-B-D-G-J	O.D. Exhaust Valve Guide	.5933 / .5938			

SERVICE TABLE OF LIMITS

PART 1 DIRECT DRIVE ENGINES

SECTION II CYLINDERS

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
613	527	Y	O.D. Exhaust Valve Guide	.6267 / .6272			
		G-J-S-T-AF-BD-BE	O.D. Exhaust Valve Guide	.6633 / .6638			
		S1	O.D. Exhaust Valve Guide	.6953 / .6958			
		A-B-D-J	I.D. Exhaust Valve Guide Hole in Cylinder Head	.5913 / .5923			
613	527	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	527	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	528	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-T2-T3-AF	Exhaust Valve Stem and Valve Guide (Angle Valve Heads)			.0037L / .0050L	(A)
		S7-S9-S10	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)	.4935 / .4945	.4915		
		S1-S2-S3-S5-S6-S7-S9-S10-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.

SERVICE TABLE OF LIMITS

PART 1 DIRECT DRIVE ENGINES

SECTION II CYLINDERS

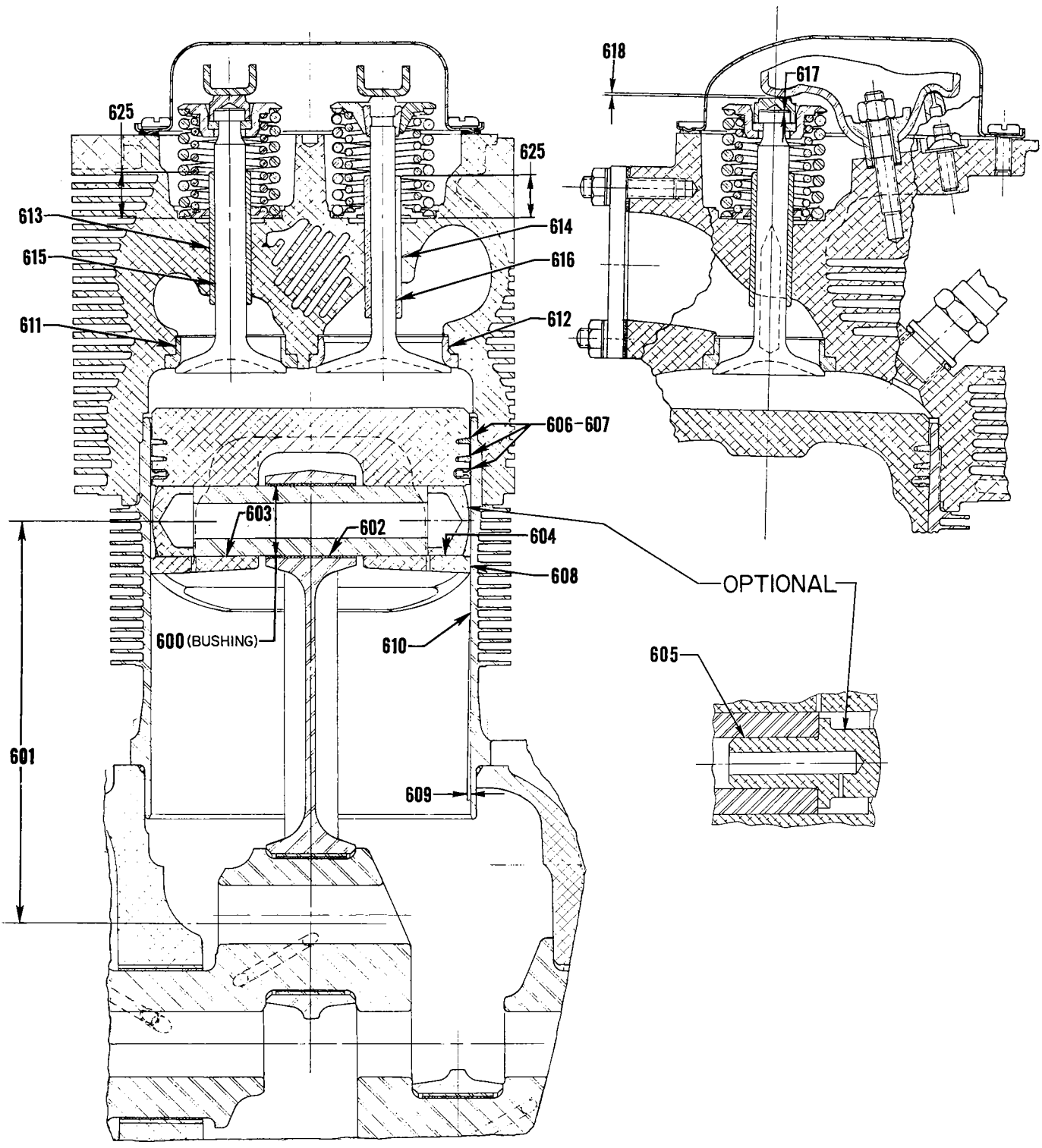
Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
615	527	A-B-D	Finished I.D. Exhaust Valve Guide	.4040 / .4050			
		A1-G-J	Finished I.D. Exhaust Valve Guide	.4370 / .4380			
		Y	Finished I.D. Exhaust Valve Guide	.4375 / .4385			
		G-J-S-T-BD-BE	Finished I.D. Exhaust Valve Guide (Parallel Valve Heads)	.4985 / .4995			
		S1-S2-S3-S5-S6-T2-T3-AF	Finished I.D. Exhaust Valve Guide (Angle Valve Heads)	.4995 / .5005			
		S7-S9-S10	Finished I.D. Exhaust Valve Guide (Angle Valve Heads - Helicopter)	.5000 / .5010			
		1/2 inch diameter exhaust valves may have exhaust valve guides that are .003 in. over the maximum inside diameter limit, anytime up to 300 hours of service. After 300 hours of service, inside diameter of exhaust valve guide may increase .001 in. during each 100 hours of operation up to the recommended overhaul time for the engine, or not to exceed .015 inch over the basic I.D. See latest edition of Service Instruction No. 1009 for recommended overhaul time.					
616	529	ALL	Intake Valve Stem and Valve Guide			.0010L / .0028L	.006L
		ALL	O.D. Intake Valve Stem	.4022 / .4030	.4010		
616	527	ALL	Finished I.D. Intake Valve Guide	.4040 / .4050			
617	951	ALL	Intake and Exhaust Valve and Valve Cap Clearance (Rotator Type Small Dia. Head)			.000 / .004L	.005L
618	952	A-B	Solid Tappet Clearance (After Engine in Run)			.006 / .012	
		G-D-J-S-T-Y-AF-BD-BE	Dry Tappet Clearance			.028 / .080	
619	530	A	Valve Rocker Shaft and Cylinder Head (No Bushing)			.0001L / .0013L	.0025L
619	611	B-D-J-S-T-Y	Valve Rocker Shaft and Valve Rocker Bushing (Parallel Valve Heads)			.0001L / .0013L	.0025L
		S1-S2-S3-S5-S6-S7-S9-S10-T2-T3-AF	Valve Rocker Shaft and Valve Rocker Bushing (Angle Valve Heads)			.0001L / .0013L	.0025L
619	530	A	Finished I.D. of Valve Rocker Shaft Bores in Cylinder Head (No Bushings)	.6246 / .6261	.6270		
619	611	B-D-G-J-S-T-Y	Finished I.D. of Valve Rocker Shaft (Bushing) in Cylinder Head (Parallel Valve Heads)	.6246 / .6261	.6270		

SERVICE TABLE OF LIMITS

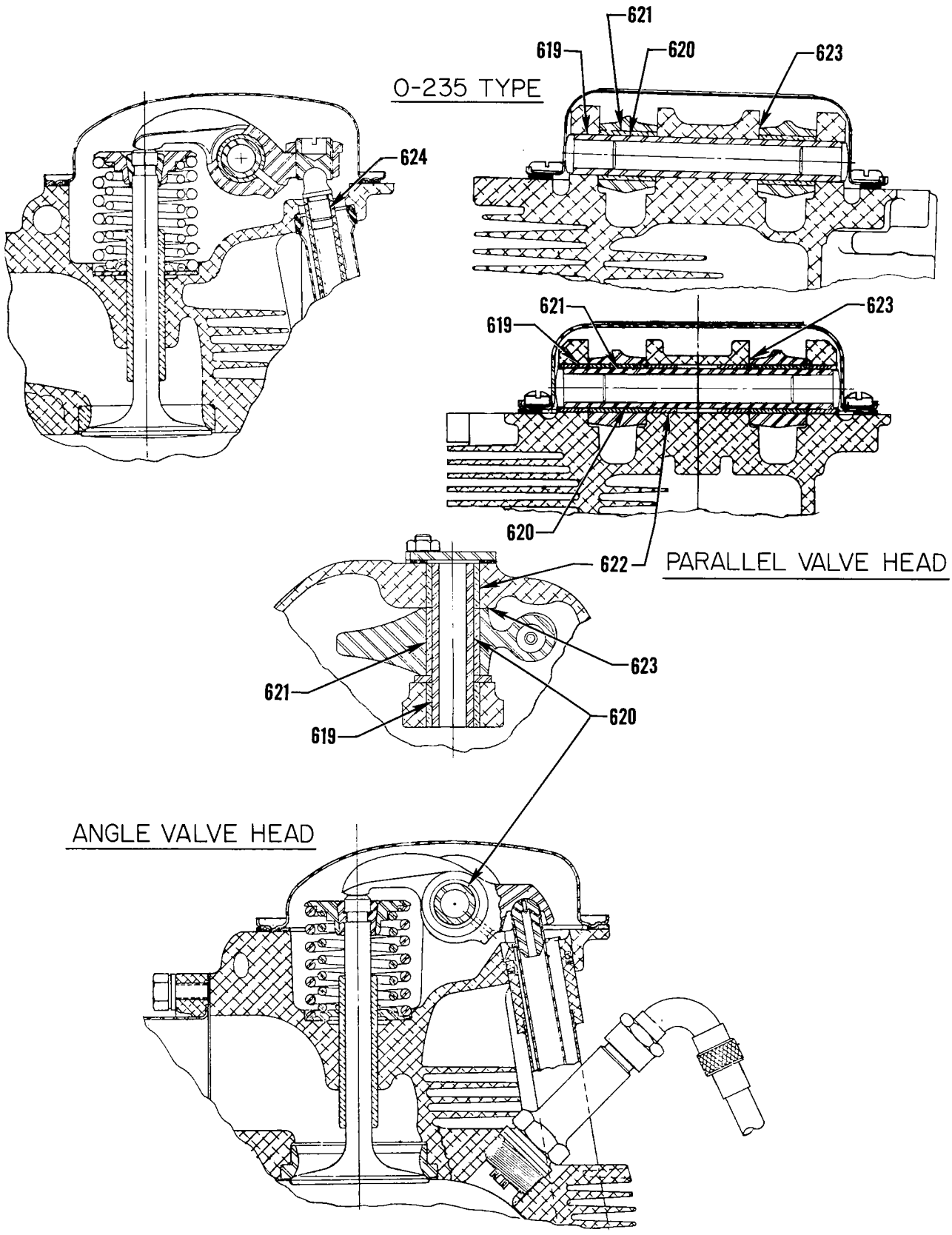
PART 1 DIRECT DRIVE ENGINES

SECTION II CYLINDERS

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
619	611	S1-S2-S3-S5-S6-S7-S9-S10-T2-T3-AF	Finished I.D. of Valve Rocker Shaft (Bushing) in Cylinder Head (Angle Valve Heads)	.6246 .6261	.6270		
620	531	ALL	Valve Rocker Shaft and Valve Rocker Bushing			.0007L .0017L	.004L
		ALL	Finished I.D. of Rocker Arm Bushing	.6252 .6263	.6270		
		ALL	O.D. Valve Rocker Shaft	.6241 .6245	.6231		
621	532	ALL	Valve Rocker Bushing and Valve Rocker	Bushing Must Be Burnished In Place			
622	612	ALL	Valve Rocker Shaft Bushing and Cylinder Head			.0022T .0038T	(A)
		ALL	Valve Rocker Shaft Bushing Hole in Cylinder Head	.7380 .7388			
623	533	A-B-D-G-J-Y-S-T	Valve Rocker and Cylinder Head - Side Clearance (Parallel Valve Heads)			.005L .013L	.016L
		S1-S2-S3-S5-S6-S7-S9-S10-T2-T3-AF	Valve Rocker and Cylinder Head - Side Clearance (Angle Valve Heads)			.002L .020L	.024L
624	535	A-B-J	Push Rod and Ball End			.0005T .0025T	(A)
625	971	A	Intake and Exhaust Valve Guide Height	.705 .725			
		ALL	Intake Valve Guide Height (Parallel Valve Heads)	.705 .725			
		ALL EXCEPT 0-235	Exhaust Valve Guide Height (Parallel Valve Heads)	.765 .785			
		ALL	Intake and Exhaust Valve Guide Height (Angle Valve Heads)	.914 .954			
			MEASURE VALVE GUIDE HEIGHT FROM THE VALVE SPRING SEAT COUNTERBORE IN THE CYLINDER HEAD TO THE TOP OF VALVE GUIDE.				



Cylinder, Piston and Valve Components



Cylinder, Piston and Valve Components

SERVICE TABLE OF LIMITS

PART 1 DIRECT DRIVE ENGINES

SECTION III GEAR TRAIN SECTION - OIL PUMP

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
700	545	ALL	Oil Pump Drive Shaft and Oil Pump Body or Cover			.0010L / .0025L	.004L
701	601	A-B-D-G-J-S-T-AF	Oil Pump Drive Shaft and and Accessory Housing			.0015L / .0030L	.006L
		Y	Oil Pump Drive Shaft and Accessory Case			.0015L / .0030L	.006L
		BD-BE	Oil Pump Drive Shaft and Crankcase			.0010L / .0025L	.004L
702	980	S-T-AF (DUAL MAGNETO)	Oil Pump Drive Shaft - End Clearance			.015L / .050L	.065L
		BD-BE	Oil Pump Drive Shaft - End Clearance			.017L / .037L	.047L
703	542	A-B-D-G-J-S-T-Y-AF	Oil Pump Impellers - Diameter Clearance			.002L / .006L	.008L
		BD-BE	Oil Pump Impellers - Diameter Clearance			.0035L / .0075L	.009L
704	543	ALL (Except BD-BE)	Oil Pump Impeller - Side Clearance			.002L / .0045L	.005L
		BD-BE	Oil Pump Impeller - Side Clearance			.003L / .005L	.006L
		AS APPLICABLE	Width of Oil Pump Impellers	.622 / .624	.621		
		AS APPLICABLE	Width of Oil Pump Impellers	.747 / .749	.746		
		AS APPLICABLE	Width of Oil Pump Impellers	.995 / .997	.994		
		BD-BE	Width of Oil Pump Impellers	.622 / .623	.620		
705	544	S-T-AF (DUAL MAGNETO)	Oil Pump Impeller and Idler Shaft			.0010L / .0025L	.004L
		A-B-D-G-J-S-T-Y-AF	Oil Pump Impeller and Idler Shaft			.001T / .003T	(A)
		BD-BE	Oil Pump Impeller and Idler Shaft			.002T / .004T	(A)
706	558	A-B-D-G-J-S-T-Y-AF	Oil Pump Idler Shaft and Oil Pump Body			.0005L / .0020L	.003L
		BD-BE	Oil Pump Idler Shaft and Oil Pump Body			.0010L / .0025L	.003L
		S-T-AF (DUAL MAGNETO)	Oil Pump Idler Shaft and Oil Pump Body			.0000 / .0015T	(A)
707	602	A-B-D-G-J-S-T-Y-AF	Oil Pump Idler Shaft and Accessory Housing			.0010L / .0025L	.0035L
		BD-BE	Oil Pump Idler Shaft and Crankcase			.0010L / .0025L	.0035L

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions Mfr. Min. & Max.	Dimensions Serv. Max.	Clearances Mfr. Min. & Max.	Clearances Serv. Max.
708	545	G2-S2	Scavenge Pump Drive Shaft and Adapter			.0010L / .0025L	.004L
709	546	G2-S2	Scavenge Pump - End Clearance			.000 / .045L	.060L
710	542	G2-S2	Scavenge Pump Impellers - Diameter Clearance			.007L / .011L	.014L
711	543	G2-S2	Scavenge Pump Impellers - Side Clearance			.003L / .005L	.006L
		G2-S2	Width of Impellers	1.496 / 1.498	1.495		
712	544	G2-S2	Scavenge Pump Impellers and Idler Shaft			.0010L / .0025L	.004L
713	544	G2-S2	Scavenge Pump Body and Idler Shaft			.0000 / .0015T	(A)
714	772	S3-T4-AF (WIDE DECK)	Turbocharger Scavenge Pump Drive and Adapter			.0010L / .0025L	.004L
715	986	S3-T4-AF (WIDE DECK)	Turbocharger Scavenge Pump Shaft and Adapter			.0010L / .0020L	.0035L
716	949	S3-T4-AF (WIDE DECK)	Gerotor Pump - Rotor - Side Clearance			.0015L / .003L	.004L
717	950	S3-T4-AF (WIDE DECK)	Gerotor Pump Housing and Adapter			.0005L / .0020L	(A)
718	985	S3-T4-AF (WIDE DECK)	Turbocharger Scavenge Pump - End Clearance			.0055L / .0365L	.0415L
		T4 (DUAL MAGNETO)	Turbocharger Scavenge Pump - End Clearance			.0105L / .0395L	.0445L
		SECTION III GEAR TRAIN SECTION - FUEL PUMP					
719	629	A-B-D-G-J-S-T	AC Fuel Pump Plunger and Accessory Housing			.0015L / .003L	.005L
720	619	J-S-T-AF	Crankshaft Idler Gear and Crankshaft Idler Gear Shaft			.001L / .003L	.005L
721	983	S-T-AF (DUAL MAGNETO)	Crankshaft Idler Gear Shaft and Accessory Housing			.0020L / .0035L	.0065L
		S-T-AF (DUAL MAGNETO)	Crankshaft Idler Gear Shaft and Crankcase			.0020L / .0035L	.0065L
722	767	S-T-AF	AN Fuel Pump Idler Gear and Shaft			.001L / .003L	.005L
723	984	S-T-AF (DUAL MAGNETO)	AN Fuel Pump Idler Gear Shaft and Accessory Housing and Crankcase			.0020L / .0035L	.0065L
		S-T-AF (DUAL MAGNETO)	AN Fuel Pump Idler Shaft and Crankcase			.0020L / .0035L	.0065L

SERVICE TABLE OF LIMITS

PART 1 DIRECT DRIVE ENGINES

SECTION III GEAR TRAIN SECTION - FUEL PUMP (CONT.)

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
724	620	A-B	Crankshaft Idler Gear - End Clearance			.003L / .043L	.058L
		G-J-S-Y	Crankshaft Idler Gear - End Clearance			.005L / .040L	.055L
		T-AF	Crankshaft Idler Gear - End Clearance			.007L / .037L	.052L
		S (DUAL MAGNETO)	Crankshaft Idler Gear - End Clearance			.020L / .030L	.040L
		T (DUAL MAGNETO)	Crankshaft Idler Gear - End Clearance			.015L / .038L	.046L
725	768	S	AN Fuel Pump Idler Gear - End Clearance			.010L / .045L	.055L
		T-AF	AN Fuel Pump Idler Gear - End Clearance			.002L / .018L	.024L
		S-T-AF (DUAL MAGNETO)	AN Fuel Pump Idler Gear - End Clearance			.015L / .038L	.045L
726	769	S-T-AF-Y	AN Fuel Pump Drive Shaft Gear and Adapter			.0010L / .0025L	.004L
727	770	S	AN Fuel Pump Drive Shaft Gear - End Clearance			.035L / .069L	.079L
		T-AF	AN Fuel Pump Drive Shaft Gear - End Clearance			.044L / .081L	.091L
		T-AF (DUAL MAGNETO)	AN Fuel Pump Drive Shaft Gear - End Clearance			.035L / .073L	.083L
		Y	AN Fuel Pump Drive Shaft Gear - End Clearance			.000L / .067L	.075L
		SECTION III GEAR TRAIN SECTION - GOVERNOR & HYDRAULIC PUMP					
728	668	T-AF (NARROW DECK)	Front Governor Drive Idler Shaft (Both Ends) and Crankcase			.0010L / .0025L	.004L
729	668	G1-G2-S2-S4-S6-T-AF (WIDE DECK)	Front Governor Idler Gear and Shaft			.0010L / .0025L	.004L
730	668	BD-BE	Front Governor Drive Gear and Crankcase			.0010L / .0025L	.004L
		BD-BE	Front Governor Drive Gear and and Camshaft			.0005L / .0025L	.004L
731	670	G1-G2-S-T-AF	Front Governor Gear and Crankcase			.0010L / .0025L	.004L
		BD	Front Governor Gear and Crankcase			.0010L / .0030L	.004L
732	674	G1-G2-S-T-AF	Front Governor Gear - End Clearance			.008L / .016L	.021L
		BD-BE	Front Governor Gear - End Clearance			.0045L / .0165L	.021L

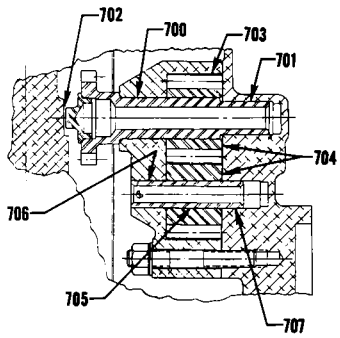
SECTION III GEAR TRAIN SECTION - GOVERNOR & HYDRAULIC PUMP (CONT.)

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
733	675	G-J-S	Rear Governor Gear and Adapter			.0010L / .0025L	.005L
		G-S (DUAL MAGNETO)	Rear Governor Gear and Accessory Housing			.0010L / .0025L	.005L
734	674	G-J-S	Rear Governor Gear - End Clearance			.002L / .024L	.034L
		G-S (DUAL MAGNETO)	Rear Governor Gear - End Clearance			.002L / .037L	.044L
735	772	T-AF	Hydraulic Pump Gear and Adapter			.0010L / .0025L	.004L
		T-AF (DUAL MAGNETO)	Hydraulic Pump Gear and Accessory Housing			.0010L / .0025L	.004L
736	773	T-AF	Hydraulic Pump Gear - End Clearance			.010L / .066L	.076L
		T-AF (DUAL MAGNETO)	Hydraulic Pump Gear - End Clearance			.007L / .032L	.039L
		SECTION III GEAR TRAIN SECTION - VACUUM & TACHOMETER					
737	622	A-B-G-J-S-T-Y-AF	Vacuum Pump Gear and Adapter			.0010L / .0030L	.0045L
737	989	S-T-AF (DUAL MAGNETO)	Vacuum Pump Gear and Accessory Housing			.0010L / .0025L	.004L
737	589	D	Vacuum Pump Gear and Accessory Housing			.0010L / .0025L	.006L
738	590	A-B-G-J-S-T-AF	Vacuum Pump Gear - End Clearance			.010L / .057L	.075L
		D	Vacuum Pump Gear - End Clearance			.003L / .020L	.030L
		Y	Vacuum Pump Gear - End Clearance			.000 / .067L	.075L
		S (DUAL MAGNETO)	Vacuum Pump Gear - End Clearance			.012L / .044L	.055L
		T-AF (DUAL MAGNETO)	Vacuum Pump Gear - End Clearance			.017L / .039L	.050L
739	625	A-B-Y	Tachometer Drive Shaft and Adapter			.0015L / .0035L	.006L
		BD-BE	Tachometer Drive Shaft and Adapter			.0010L / .0050L	.0065L
739	540	D-G-J-S-T-AF	Tachometer Drive Shaft and Accessory Housing			.0015L / .0035L	.006L
740		G-J-S (DUAL DRIVE)	Vacuum Pump Gear and Adapter			.0010L / .0025L	.004L
741	789	G-J-S (DUAL DRIVE)	Vacuum Pump Gear - End Clearance			.000 / .017L	.027L

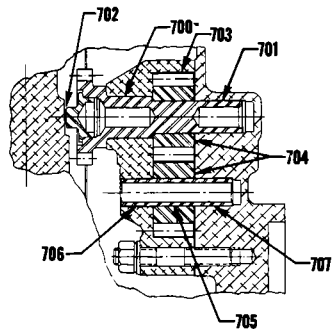
SECTION III GEAR TRAIN SECTION - VACUUM & TACHOMETER (CONT.)

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
742	791	G-J-S (DUAL DRIVE)	Idler Gear and Shaft			.0010L .0030L	.005L
743		G-J-S (DUAL DRIVE)	Idler Gear - End Clearance			.021L .041L	.060L
744	764	G-J-S (DUAL DRIVE)	Propeller Governor Gear and Adapter			.0013L .0028L	.005L
		G-J-S (DUAL DRIVE)	Hydraulic Pump Gear and Adapter			.0013L .0028L	.005L
745	794	G-J-S (DUAL DRIVE)	Propeller Governor or Hydraulic Pump - End Clearance			.000 .054L	.074L
		SECTION III GEAR TRAIN SECTION - MAGNETO, GENERATOR, STARTER					
746	677	T	Magneto Bearing and Gear			.0005T .0001L	.0005L
746	549	D	Magneto Bearing and Gear			.0008T .0001L	.0005L
747	677	T	Magneto Bearing and Crankcase			.0002T .0007L	(A)
747	561	D	Magneto Drive Bearing and Adapter			.0006T .0008T	(A)
748		S7	Magneto Bearing and Gear			.0001T .0010T	(A)
749		S7	Magneto Bearing and Adapter			.000 .0012L	.0015L
750	987	S-T-AF (DUAL MAGNETO)	Magneto Drive Gear and Crankcase			.0010L .0025L	.003L
751	988	S-T-AF (DUAL MAGNETO)	Magneto Drive Gear - End Clearance			.005L .073L	.083L
752		AF	Magneto Drive Gear and Shaft			.001L .003L	.005L
753		BD-BE	Magneto Drive Gear and Crankcase			.001L .003L	.005L
754	784	Y	Magneto Shaft Gear and Magneto Case			.001L .003L	.005L
755	786	Y	Magneto Shaft Gear and Support Assembly			.001L .003L	.005L
756		Y	Magneto Shaft Gear and Accessory Drive Shaft Gear - End Play			.0075 .0125	.015
757	787	Y	Accessory Drive Shaft Gear and Support Assembly			.001L .003L	.005L
758		S	Magneto Gear and Bushing (S4LN-21 and S4LN-1227)			.0005L .0020L	.0035L
		T	Magneto Gear and Bushing (S6LN-21 and S6LN-1227)			.0015L .0035L	.0055L

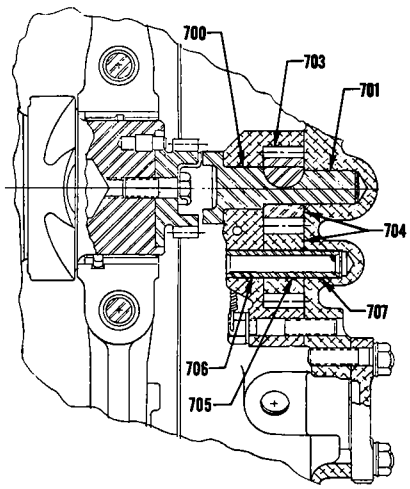
Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
758		T-AF (DUAL MAGNETO)	Magneto Gear and Bushing			.0015L / .0035L	.0055L
7095		BD, BE	Bushing - Magneto Drive and Crankcase			.0025T / .0045T	(A)
759	627	D	Generator Gear Bushing and Generator Gear			.0020T / .0035T	(A)
760	628	D	Generator Gear Bushing and Generator Drive Coupling Adapter			.001L / .0028L	.005L
761	632	D	Bendix Drive Gear Bushing and Crankcase			.0005T / .0025T	(A)
762	633	D	Bendix Drive Gear and Bendix Drive Gear Bushing			.0010L / .0025L	.005L
763	634	D	Bendix Drive Shaft and Bendix Drive Housing			.003L / .005L	.010L
764	637	D	Bendix Drive Shaft - End Clearance			.000 / .0059L	.080L



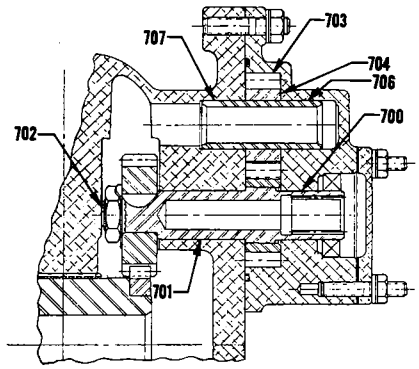
6 CYL-DUAL MAG



4 CYL-DUAL MAG

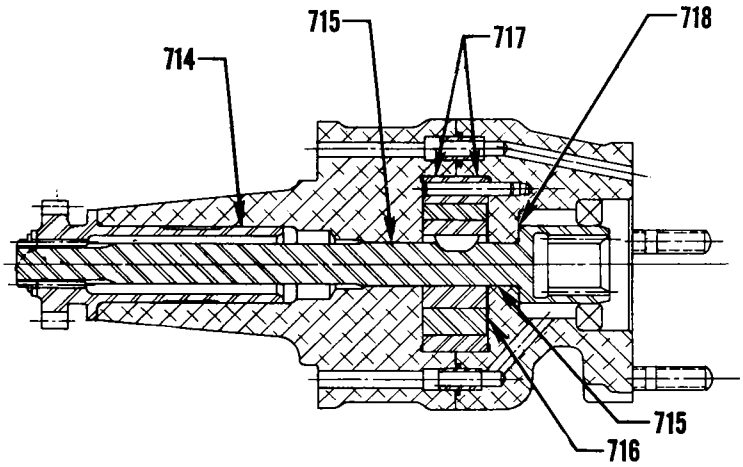


STANDARD TYPE

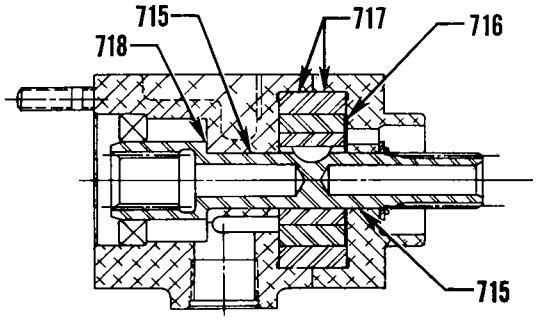


O-320-H,O,LO-360-E

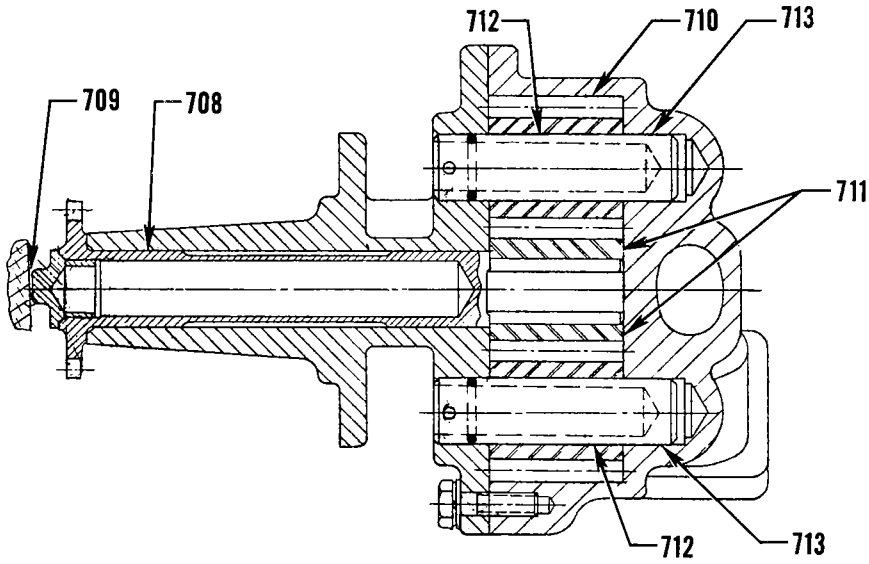
Oil Pumps



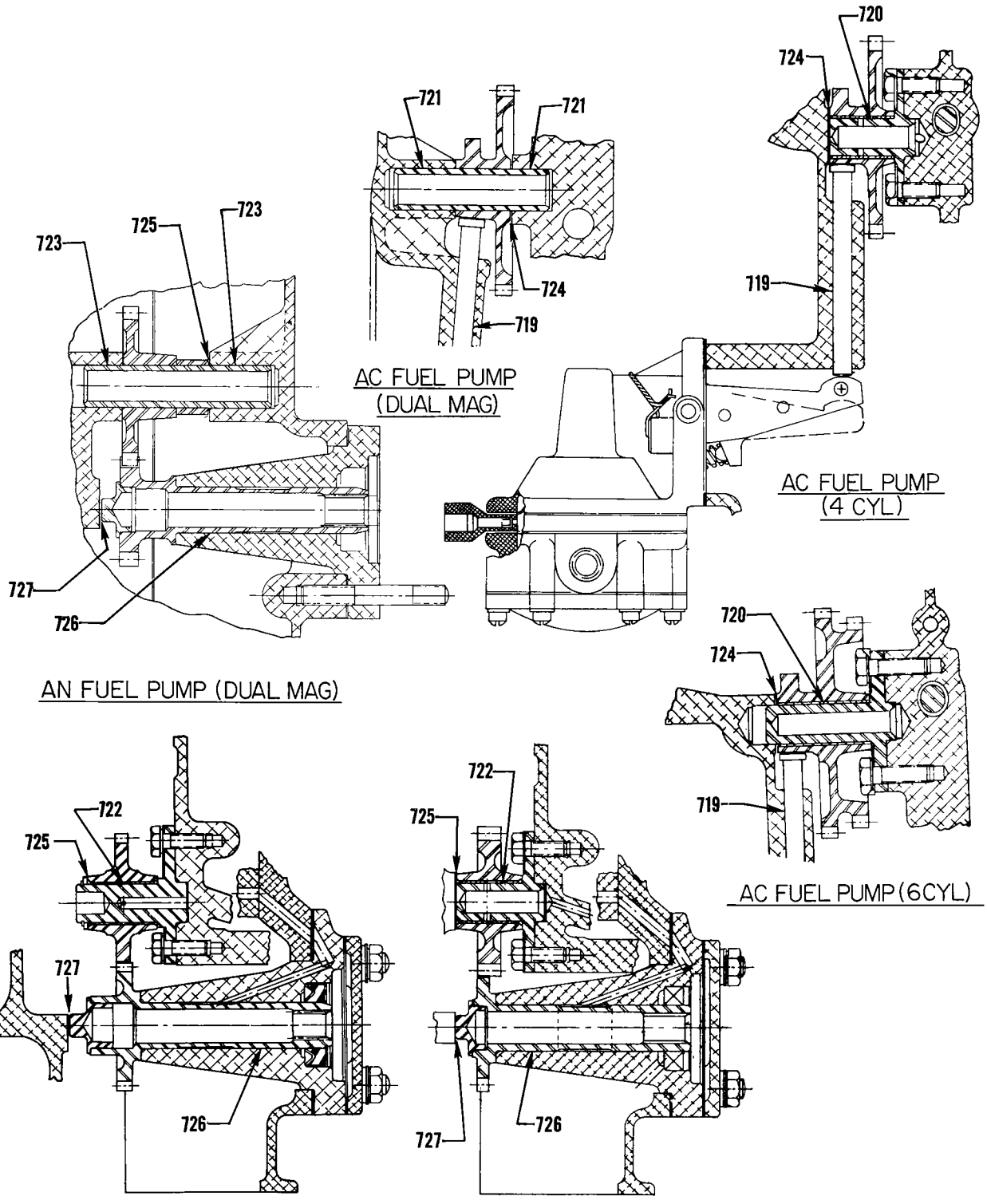
TURBO SCAVENGE PUMP & HYD PUMP (TIO-540-C)
TURBO SCAVENGE PUMP & GOV. (TIO-360)

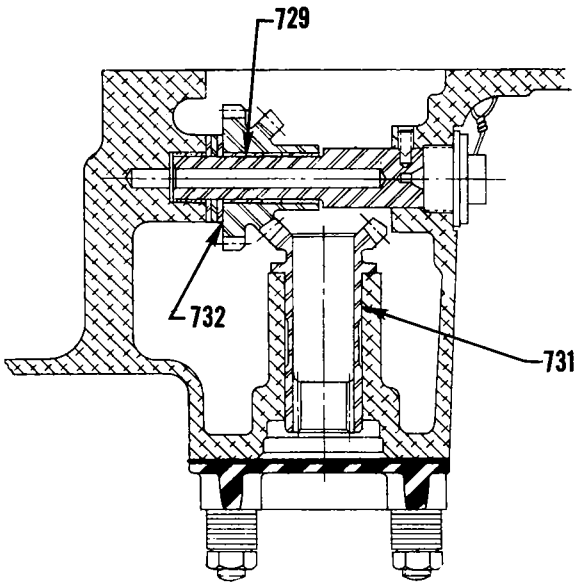


DUAL MAG: TURBO SCAVENGE PUMP & HYD. PUMP

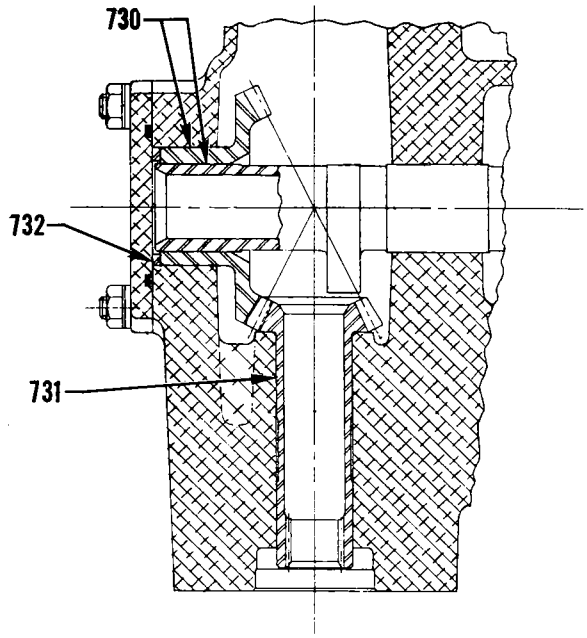


SCAVENGE PUMP AIO 320 & AIO-360

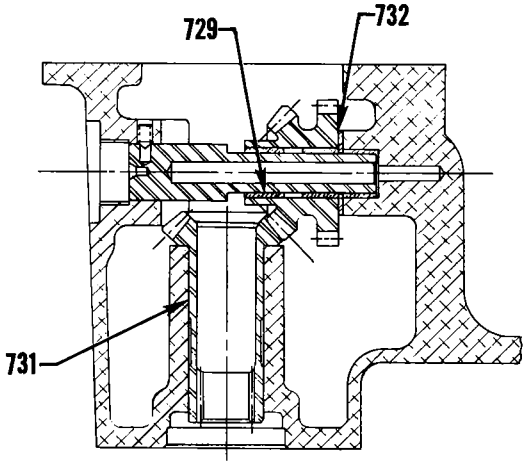

721
721
724
719
AC FUEL PUMP
(DUAL MAG)
720
724
719
AC FUEL PUMP
(4 CYL)
723
725
723
727
726
AN FUEL PUMP (DUAL MAG)
720
724
719
AC FUEL PUMP (6CYL)
722
725
727
726
AN FUEL PUMP (6&8 CYL)
722
725
727
726
AN FUEL PUMP (4CYL)



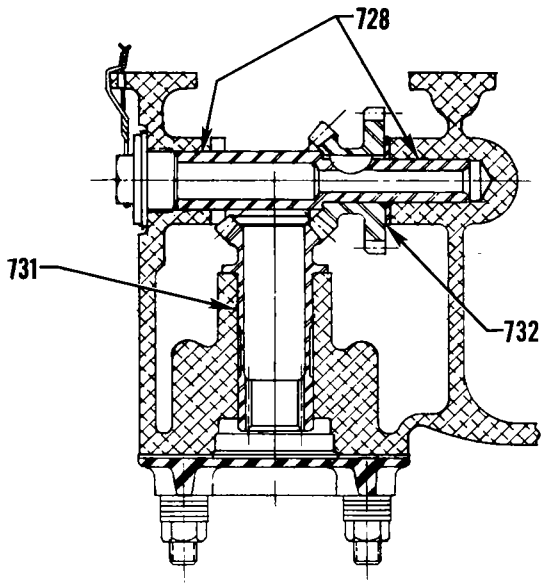
4 & 8 (WIDE DECK)



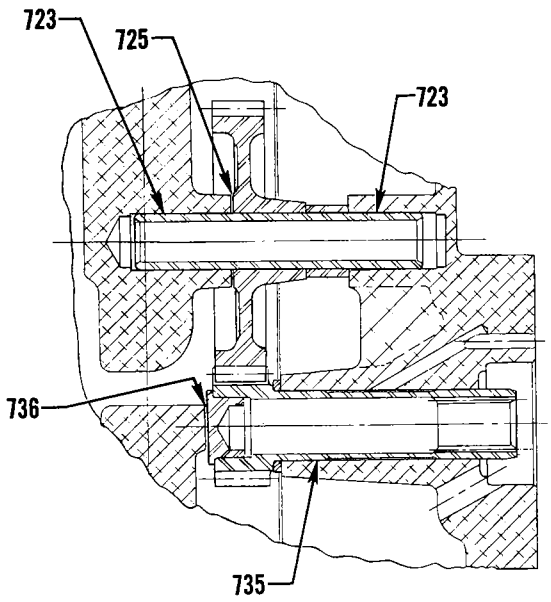
O-320-H O,LO-360-E



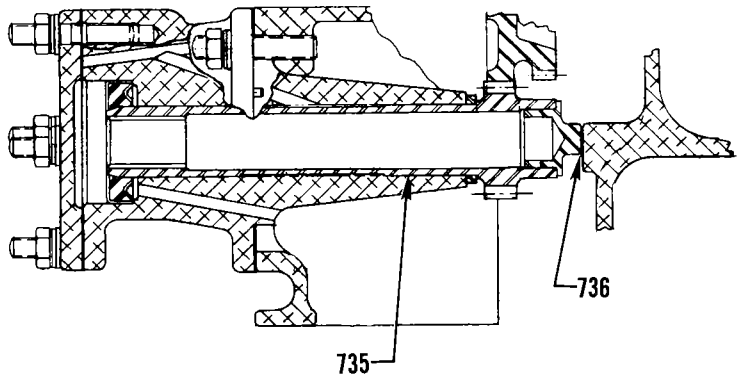
6 CYL. (WIDE DECK) (2200 LB.)



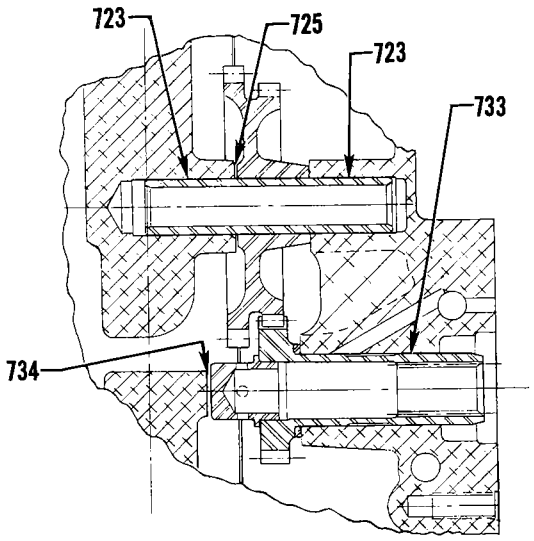
NARROW DECK (6 & 8 CYL.



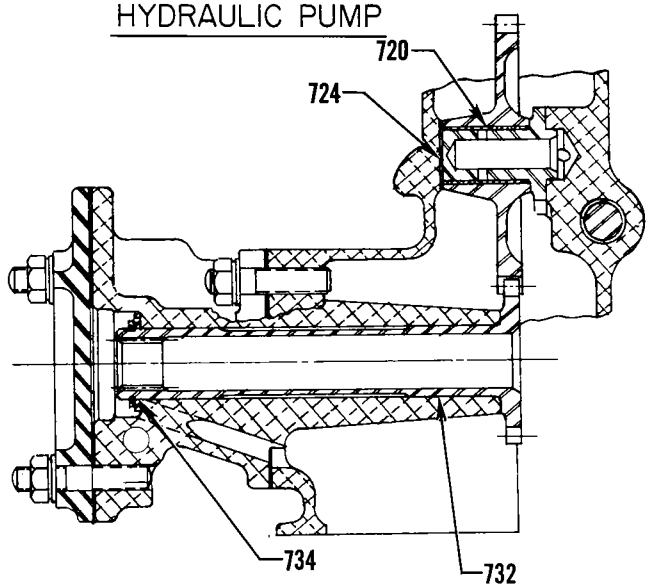
HYDRAULIC PUMP-DUAL MAG



HYDRAULIC PUMP

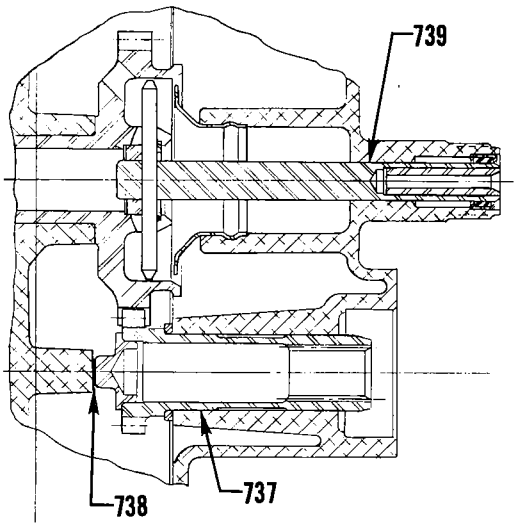


REAR PROP. GOV. (4 CYL.)
(DUAL MAG.)

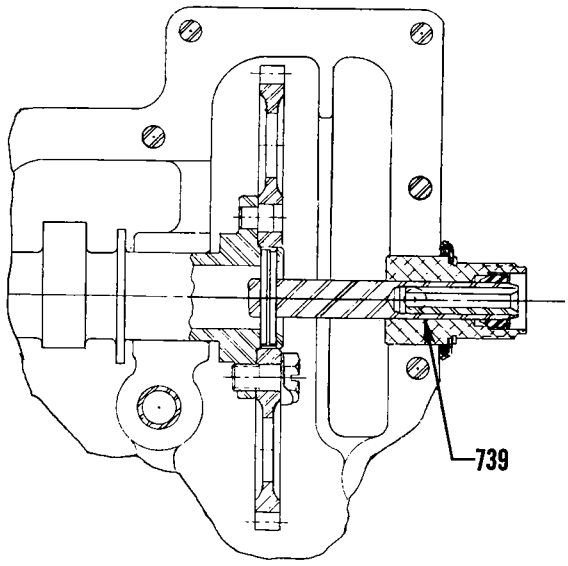


REAR PROP. GOV. (4 CYL.)
(STANDARD)

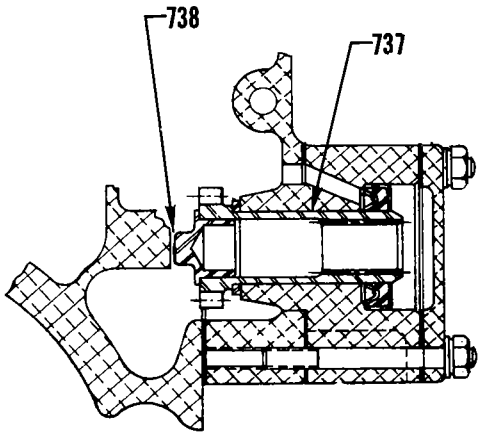
Rear Governor and Hydraulic Pumps



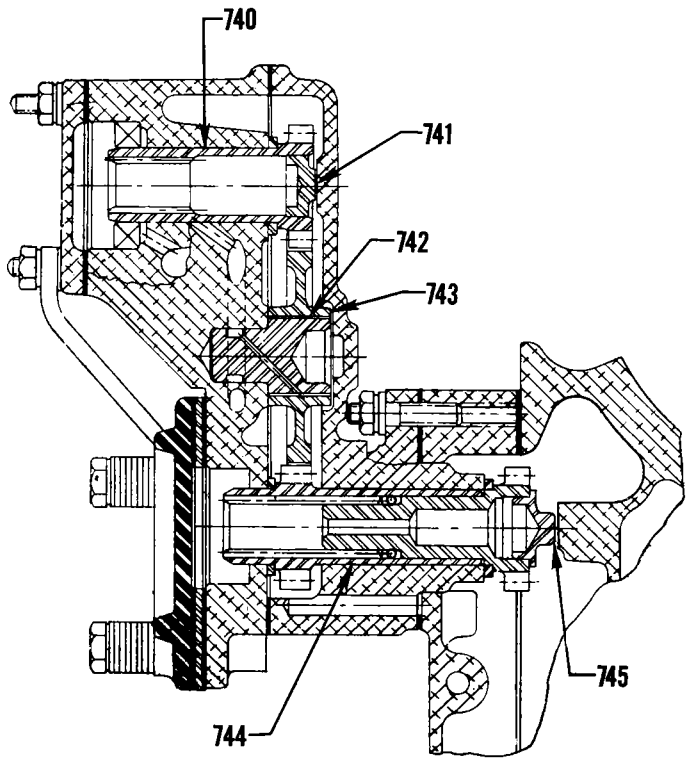
VACUUM PUMP & TACHOMETER



TACHOMETER DRIVE

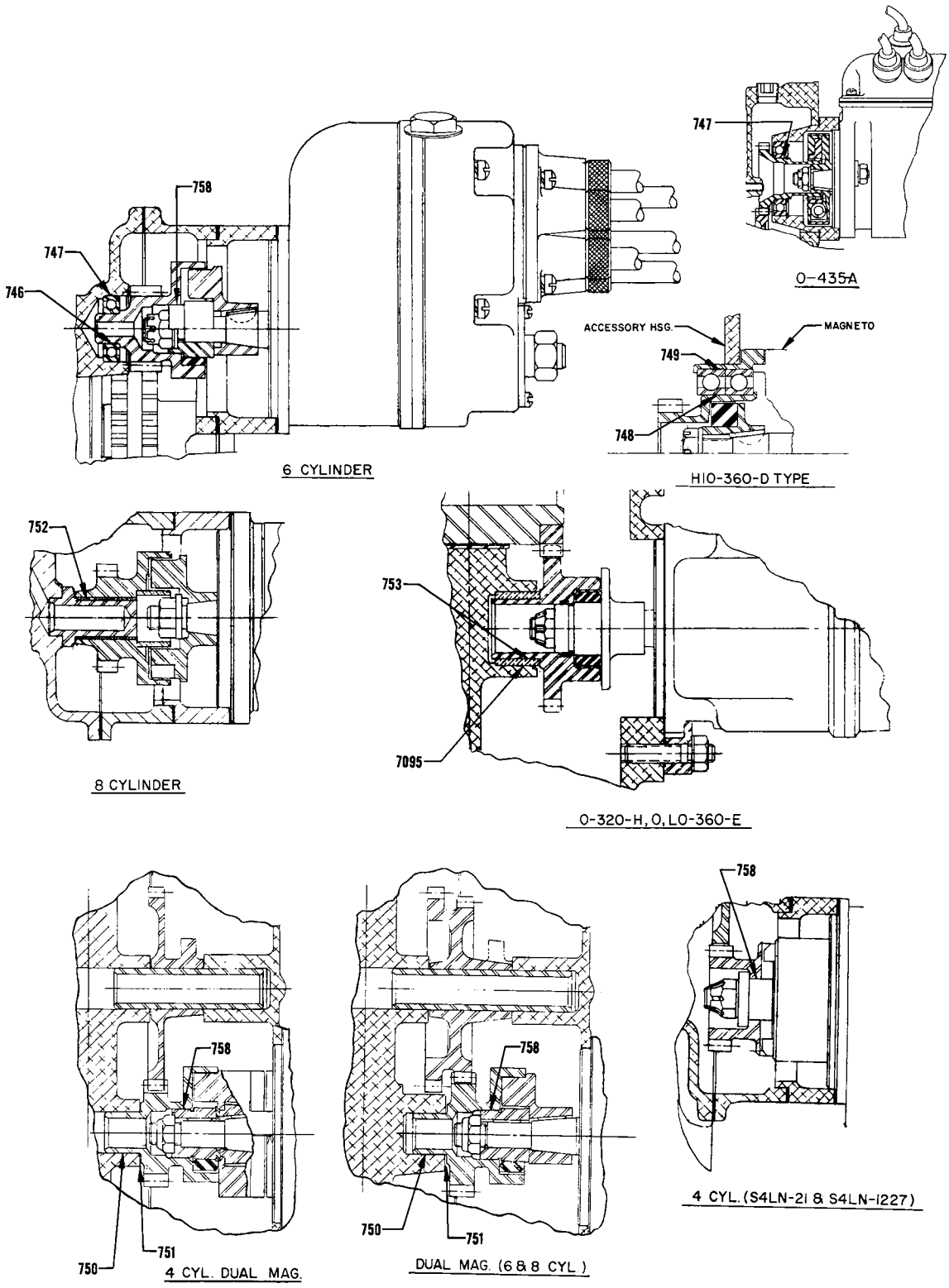


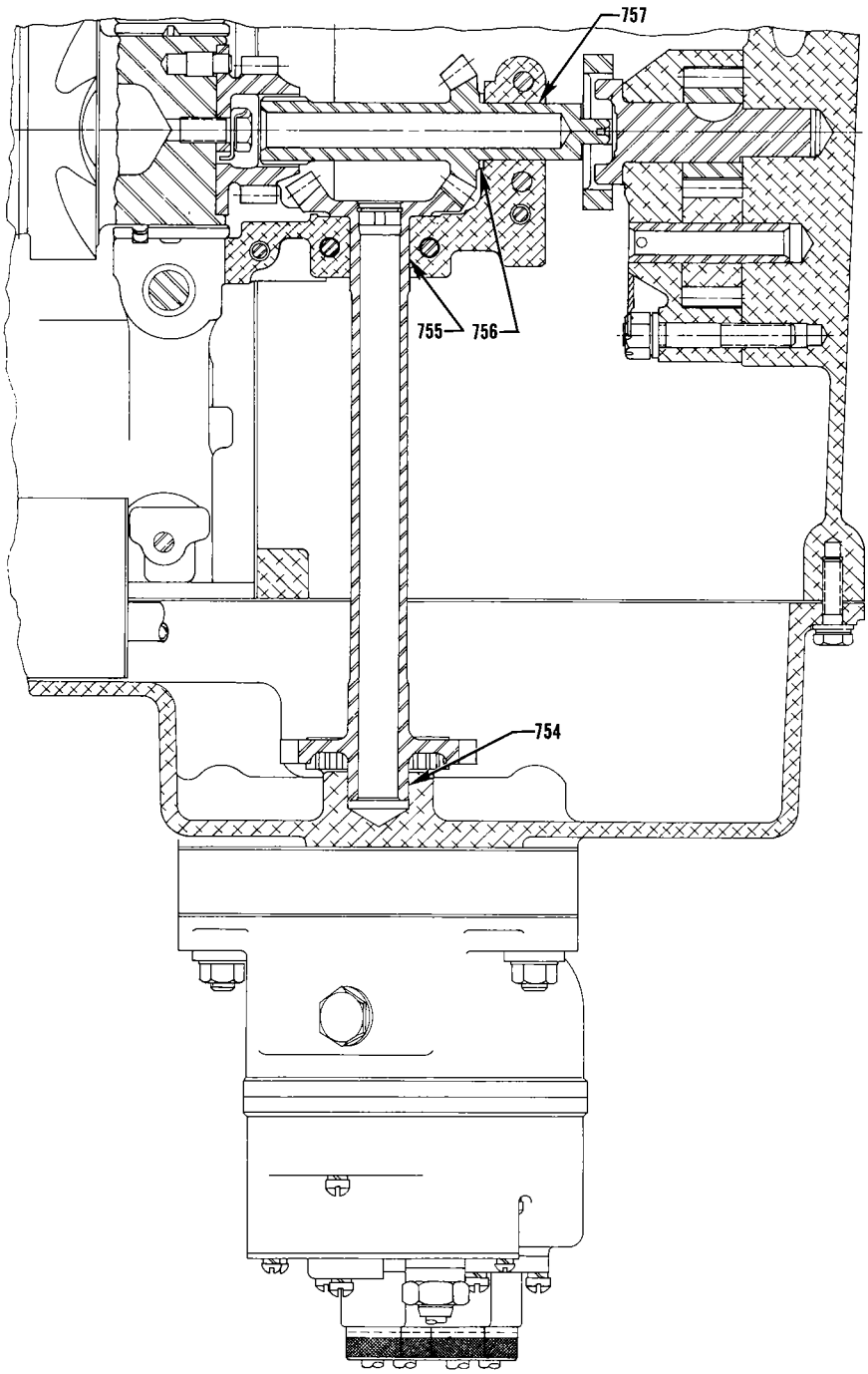
VACUUM PUMP



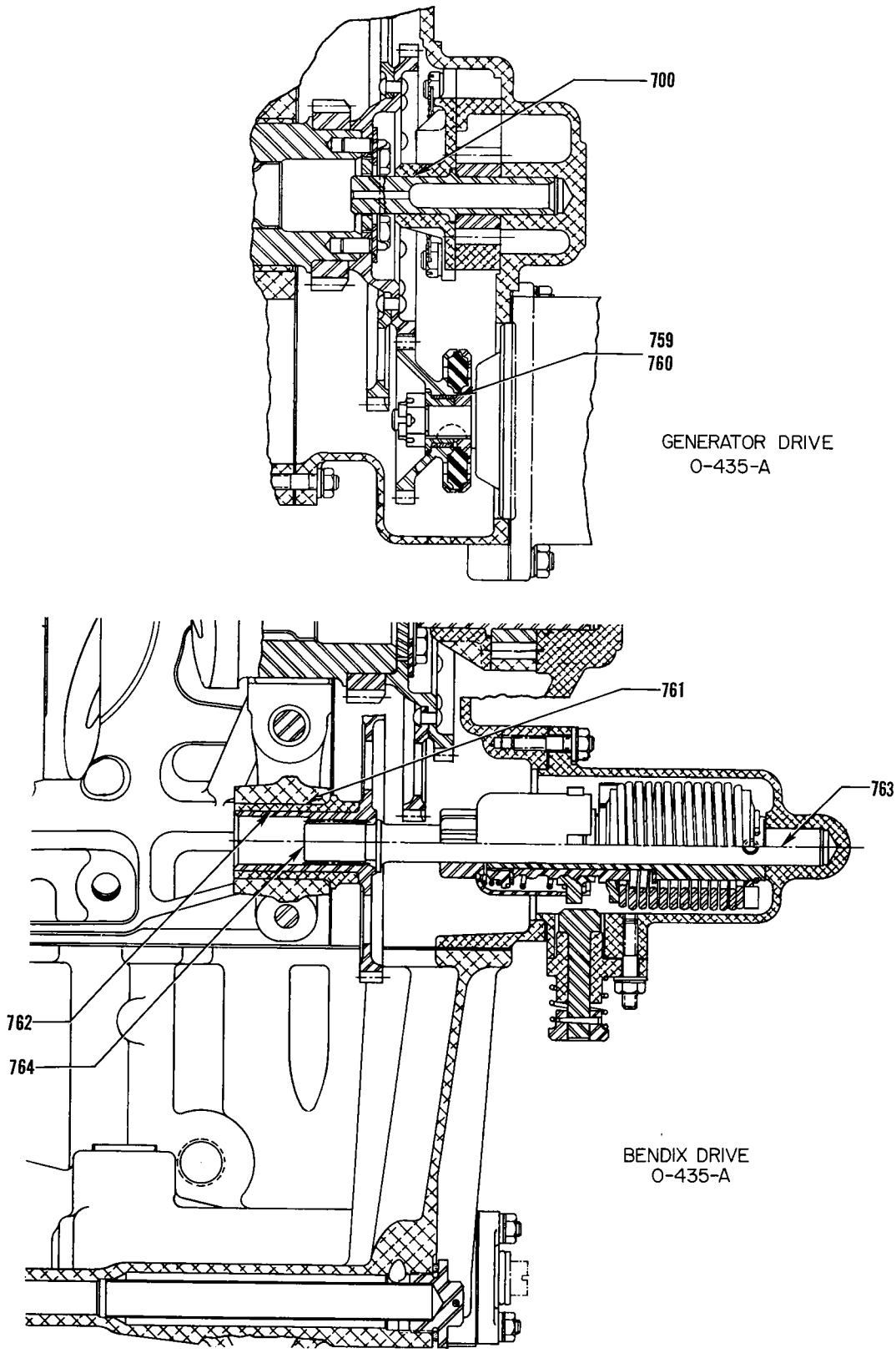
DUAL DRIVE (VACUUM PUMP & PROP. GOV.)
OR (VACUUM PUMP & HYD. PUMP)

Tachometer Drives, Vacuum and Hydraulic Pumps


747
O-435A
758
747
746
6 CYLINDER
ACCESSORY HSG.
MAGNETO
749
748
HIO-360-D TYPE
752
8 CYLINDER
753
7095
O-320-H, O, LO-360-E
758
758
750
751
4 CYL. DUAL MAG.
758
750
751
DUAL MAG. (6 & 8 CYL.)
758
4 CYL. (S4LN-21 & S4LN-1227)



VO, IVO-360



Generator and Bendix Drive

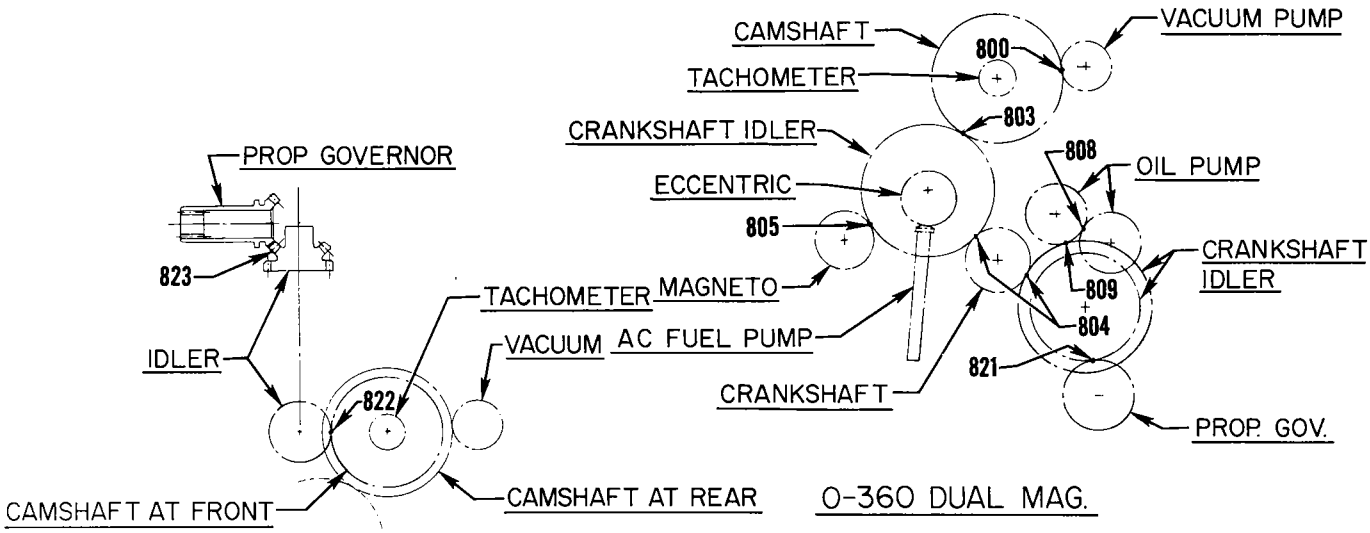
SERVICE TABLE OF LIMITS

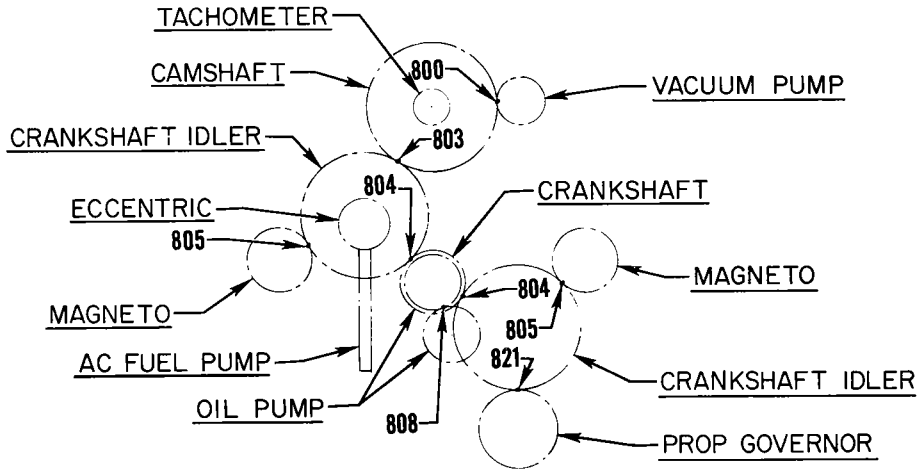
PART 1 DIRECT DRIVE ENGINES

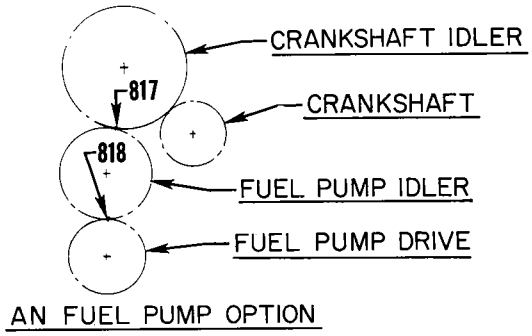
SECTION IV BACKLASH

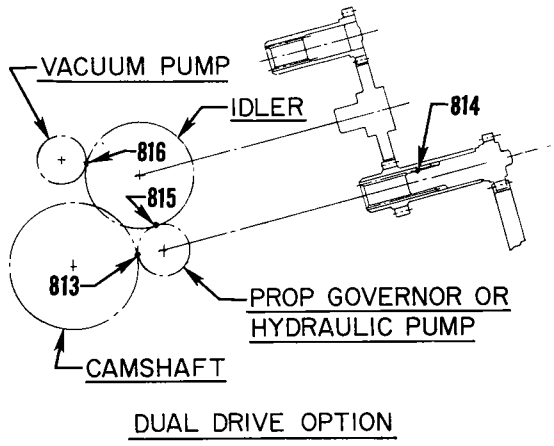
Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
800	623 979	A-B-G-J-S-T-Y-AF	Camshaft and Vacuum Pump - Backlash			.004 .015	.020
801	1002	BD-BE	Camshaft and Vacuum and Oil Pump Drive - Backlash			.006 .014	.020
802	623	Y	Camshaft and Fuel Pump - Backlash			.004 .015	.020
803	616 978	A-B-G-J-S-T-Y-AF	Camshaft and Crankshaft Idler - Backlash			.004 .015	.020
804	617 972	A-B-G-J-S-T-Y-AF	Crankshaft and Crankshaft Idler - Backlash			.004 .015	.020
805	618 977	A-B-G-J-S-T-AF	Magneto Drive and Crankshaft Idler - Backlash			.004 .015	.020
806	1004	BD-BE	Magneto Drive and Crankshaft Gear - Backlash			.006 .014	.020
807	1003	BD-BE	Crankshaft Gear and Vacuum and Oil Pump Drive - Backlash			.006 .014	.020
808	553	A-B-D-G-J-S-T-Y-AF	Oil Pump Impellers - Backlash			.008 .015	.020
		BD-BE	Oil Pump Impellers - Backlash			.008 .012	.020
809	975	S-T-AF (DUAL MAGNETO)	Oil Pump Drive and Crankshaft Idler - Backlash			.004 .015	.020
810	783	Y	Magneto and Magneto Shaft Gear - Backlash			.004 .015	.020
811	785	Y	Accessory Drive Shaft Gear and Magneto Driven Shaft Gear - Backlash			.003 .005	.012
812	788	Y	Crankshaft Gear and Accessory Drive Shaft Gear - Spline Backlash			.002 .005	.015
813		G-J-S (DUAL DRIVE)	Camshaft and Propeller Governor or Hydraulic Pump - Backlash			.004 .015	.020
814	793	G-J-S (DUAL DRIVE)	Governor or Hydraulic Pump Drive and Drive Gear - Spline Backlash			.0013 .0073	.010
815	792	G-J-S (DUAL DRIVE)	Governor or Hydraulic Pump and Idler - Backlash			.004 .015	.020
816	790	G-J-S (DUAL DRIVE)	Vacuum Pump and Idler - Backlash			.004 .015	.020
817	765	S-T-AF	AN Fuel Pump Idler and Crankshaft Idler - Backlash			.004 .015	.020
818	766 976	S-T-AF	AN Fuel Pump Idler and Fuel Pump Drive - Backlash			.004 .015	.020

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
819	973	S-T-AF (DUAL MAGNETO)	Crankshaft Gear and AN Fuel Pump Idler - Backlash			.004 / .015	.020
820	974	T-AF	Hydraulic Pump and Crankshaft Idler - Backlash			.004 / .015	.020
821	676	G-J-S	Propeller Governor Drive and Crankshaft Idler - Backlash (Rear Governor)			.004 / .015	.020
822		G1-G2-S2-S4-S6-T-AF	Propeller Governor Idler and Camshaft - Backlash (Front Governor)			.004 / .015	.020
823	669	G1-G2-S2-S4-S6-T-AF	Propeller Governor Drive and Idler - Backlash (Bevel Gears) (Front Governor)			.004 / .008	.015
824	669	BD-BE	Propeller Governor Drive and Camshaft - Backlash (Bevel Gears) (Front Governor)			.003 / .011	.015
825	550	D	Crankshaft Timing Gear and Camshaft Gear - Backlash			.004 / .015	.020
826	551	D	Camshaft Gear and Generator Gear - Backlash			.004 / .015	.020
827	552	D	Crankshaft Gear and Generator Gear - Backlash			.004 / .015	.020
828	562	D	Magneto Coupling Spline - Backlash			.001 / .005	.0075
829	621	D	Vacuum Pump Gear and Vacuum Pump Drive Gear - Backlash			.004 / .015	.020
830	635	D	Starter Drive and Bendix Drive Gear - Backlash			.004 / .015	.020
831	636	D	Bendix Drive Shaft Spline and Bendix Drive Gear Spline - Backlash			.001 / .006	.015
832	766	S	Injector Pump Idler Gear and Injector Pump Drive Shaft Gear - Backlash			.004 / .015	.020



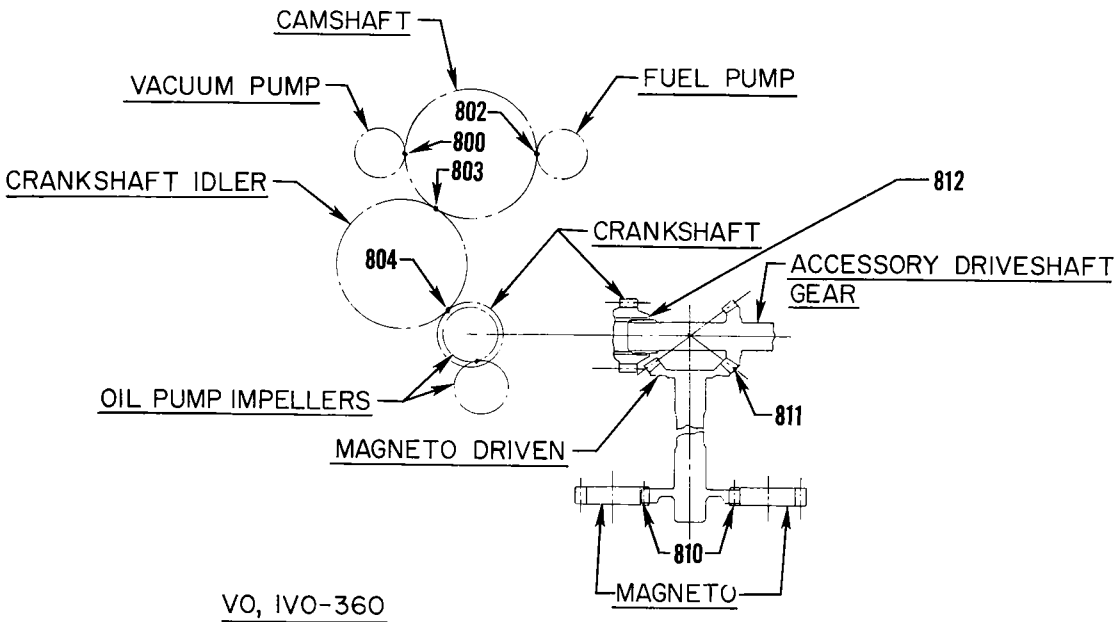




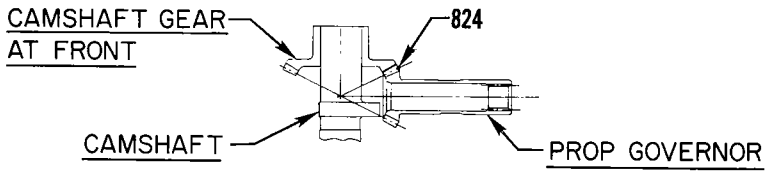


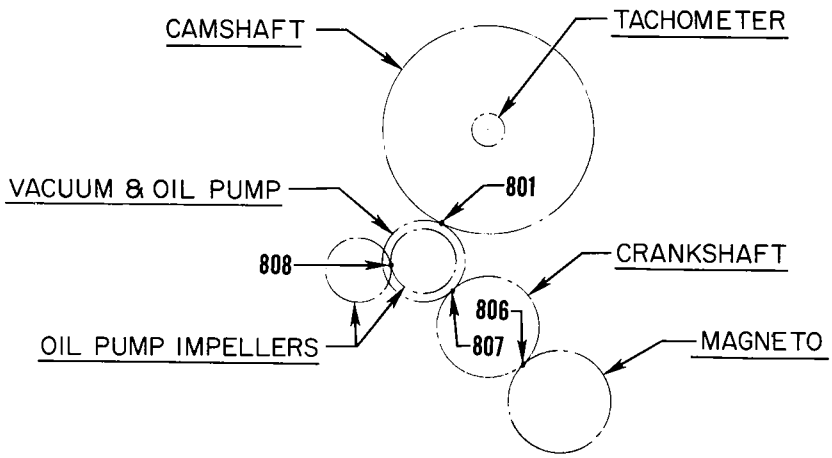
0-235, 0-320, 0-340 & 0-360
ALL VIEWS SHOWN FROM REAR OF ENGINE

Backlash (Accessory Drives)



VO, IVO-360

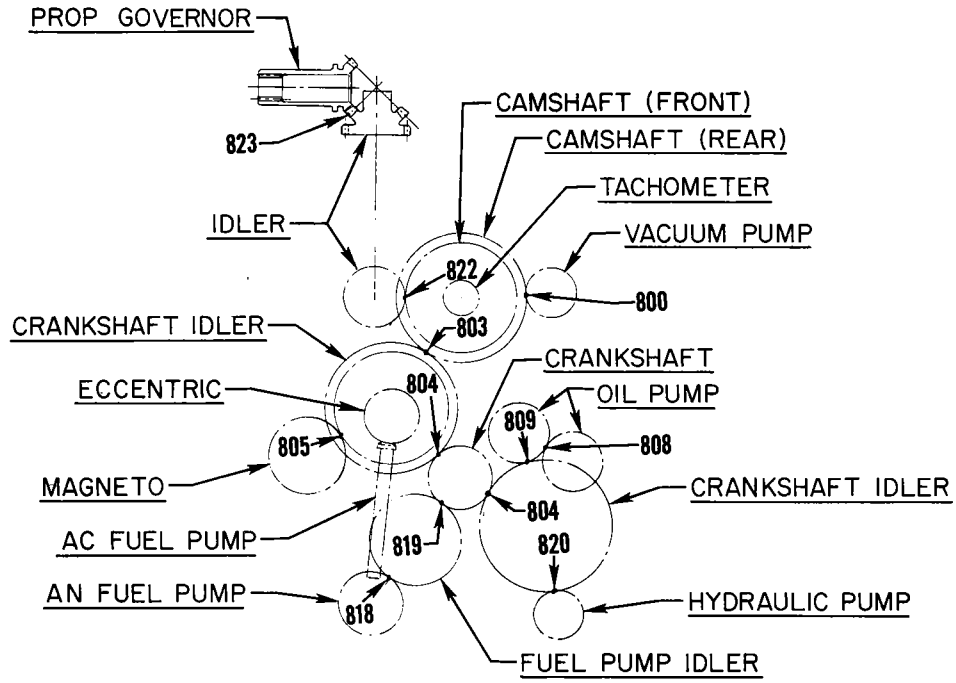




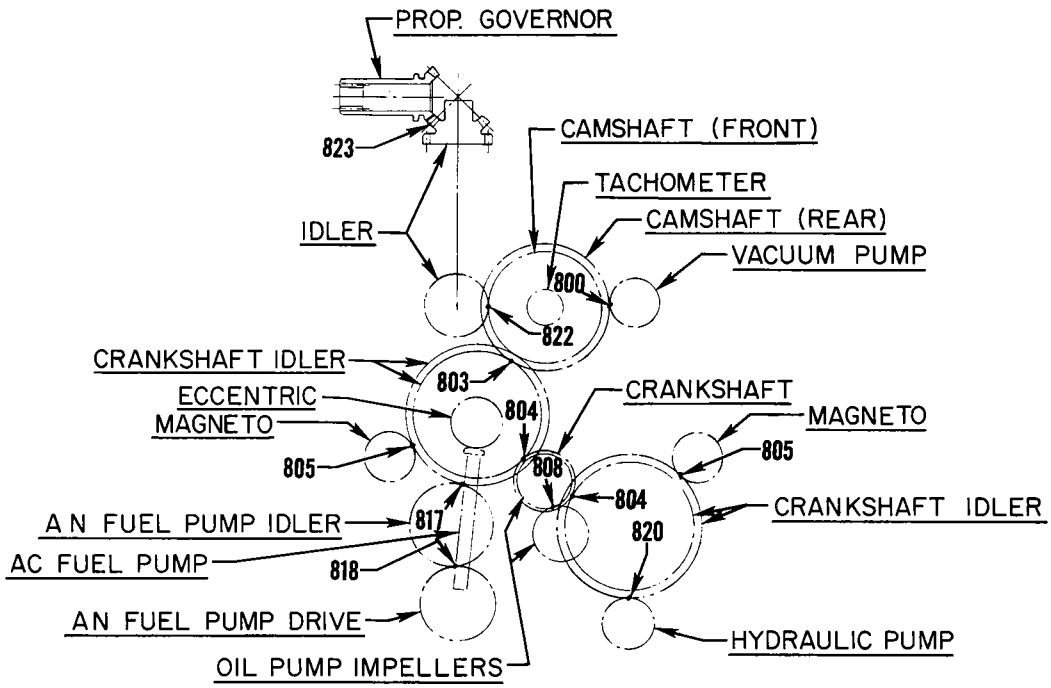
O-320-H, O, LO-360-E

ALL VIEWS SHOWN FROM REAR OF ENGINE

Backlash (Accessory Drives)



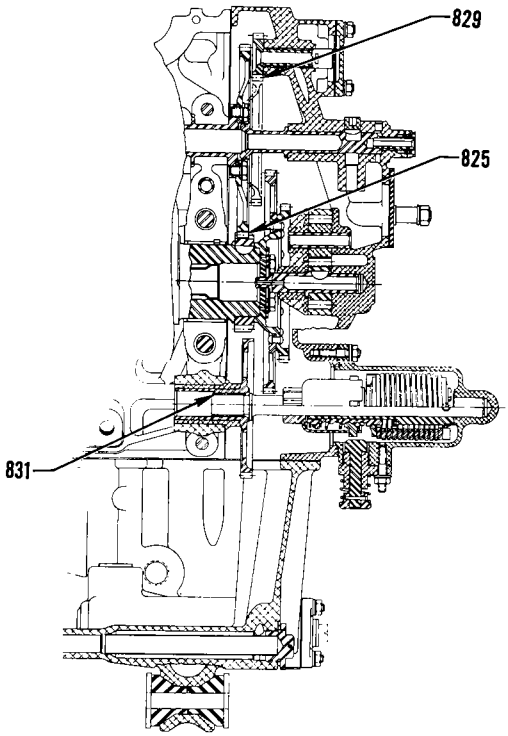
O-540 & IO-720 DUAL MAG.



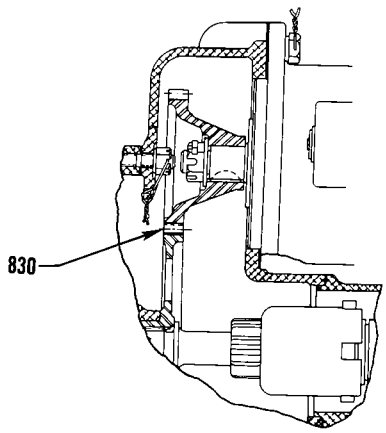
O-540 & IO-720

ALL VIEWS FROM REAR OF ENGINE

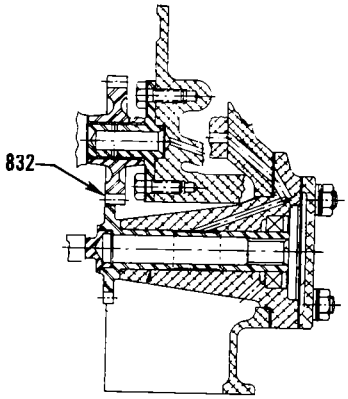
Backlash (Accessory Drives)

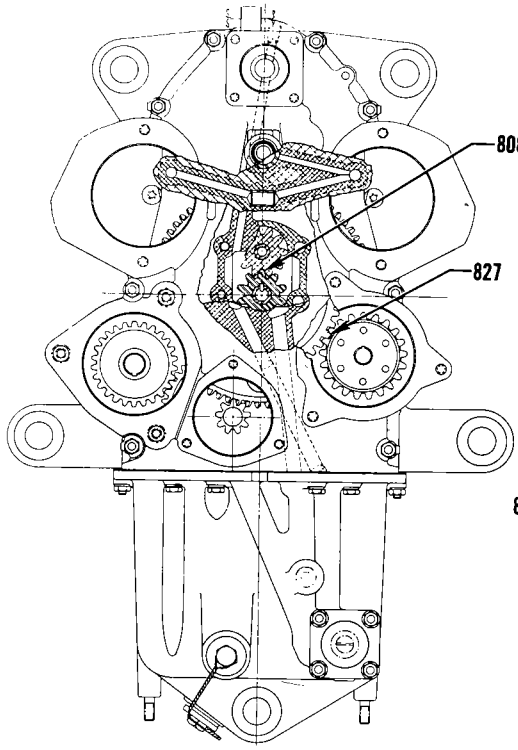


ACCESSORY HOUSING
O-435-A

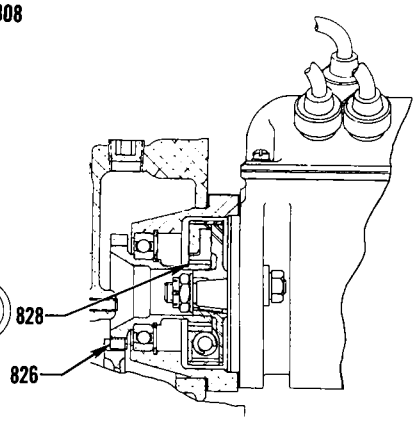


STARTER DRIVE
O-435-A





SECTION THRU REAR
OF ENGINE



MAGNETO DRIVE
O-435-A

Backlash (Accessory Drives)

SERVICE TABLE OF LIMITS

PART 1 DIRECT DRIVE ENGINES

SECTION V SPECIAL TORQUE REQUIREMENTS

Ref. New	Ref. Old	Chart	Thread Size	Nomenclature	Torque Limits
900	829	A-B-D-G-Y-S-T-BD-BE	3/8-24	Connecting Rod Nuts	480 in. lbs.
		J	3/8-24	Connecting Rod Nuts	360 in. lbs.
		S1-S3-S5-S6-S7-S9-T3-AF	3/8-24	Connecting Rod Bolts - Tighten to Length	2.255 - 2.256
901	878	BD-BE	9/16-18	Oil Pump Shaft Nut	660 in. lbs.
902	877	BD-BE	5/16-24	Rocker Stud Nut	150 in. lbs.
903	840	ALL (AS APPLICABLE) (EXCEPT S7)	3/8-24	Magneto Nut (To attach drive member to magneto) - Bendix - Sintered Bushing - Gray	120 - 150 in. lbs.
				Magneto Nut (To attach drive member to magneto) - Bendix - Steel Bushing	170 - 300 in. lbs.
				Magneto Nut (To attach drive member to magneto) - Slick	120 - 300 in. lbs.
		S7	1/2-20	Magneto Nut (To attach drive member to magneto)	170 - 300 in. lbs.
904	839	ALL	10-32	Magneto Plate Screws (To attach ignition cable outlet plate to magneto)	15 in. lbs.
905	853	ALL	1/4-20	Rocker Box Screws	50 in. lbs.
906	852	ALL	5/16-18	Exhaust Port Studs	40 in. lbs. min.
907	830	ALL	18MM	Spark Plugs	420 in. lbs.
908	860	ALL	1/8-27 NPT	Fuel Pump Vent Fitting (Approximately two turns beyond finger tight)	96 in. lbs.
909	862	ALL	5/8-32	Alternator Pulley Nut	450 in. lbs.
910	864	ALL	1/4-28	Alternator Output Terminal Nut	85 in. lbs.
911	865	ALL	10-32	Alternator Auxiliary Terminal Nut	30 in. lbs.
912		ALL	5/16-24	Starter Terminal Nut	24 in. lbs.
913	857	ALL (AS APPLICABLE)	1/16-27 NPT	Piston Cooling Nozzle in Crankcase	100 in. lbs.
914	854	Y-S-T-AF	1/8-27 NPT	Injector Nozzle in Cylinder Head	60 in. lbs.
915	869	ALL (AS APPLICABLE)	3/4-16	Oil Filter Bolt (AC Can and Element Type)	300 in. lbs.
		ALL (AS APPLICABLE)	13/16-16	Oil Filter (Throw Away Type)	240 in. lbs.
	874	ALL (AS APPLICABLE)	3/4-16	Converter Stud	720 in. lbs.
916		ALL (AS APPLICABLE)	3/4-18 NPT	Carburetor Drain Plug	144 in. lbs.
917		ALL (AS APPLICABLE)	1.00-14	Oil Cooler Bypass Valve	300 in. lbs.
918		ALL (AS APPLICABLE)	1 1/4-12	Oil Pressure Relief Valve	300 in. lbs.

Ref. New	Ref. Old	Chart	Thread Size	Nomenclature	Torque Limits
919	871	ALL	1/4 Hex Head and Below	Hose Clamps (Worm Type)	20 in. lbs.
			5/16 Hex Head and Above	Hose Clamps (Worm Type)	45 in. lbs.
920	875	ALL		Cylinder Head Drain Back Hose Clamps	10 in. lbs.

921 — S-T — Exhaust V-Band Coupling Torque Data

Coupling Size Tube OD	Avco Lycoming Part No.	Vendor Part No.	T-Bolt Split Type Locknut Torque In. Lbs.	1/4 In. Drilled Hex Nut With Safety Wire Torque In. Lbs.
1.75 in.	LW-12093-4	MVT69183-175	65	75
2.00 in.	LW-12093-5	MVT69183-200	85	75
2.25 in.	LW-12093-6	MVT69183-225	85	75
2.25 in.	LW-12125-3	MVT69197-225	85	
3.69 in.	LW-13464	U4204-55-369M	70	
3.69 in.	LW-14985	ANH1000902-10	70	

922 — ALL — Turbocharger V-Band Torque Data

Turbocharger Model No.	V-Clamp Part No.	V-Clamp Diameter	Torque In. Lbs.
TO-473*	400500-600	6.00 in.	40-80
TEO659*	400500-685	6.85 in.	40-50
THO8A60*	400500-775	7.75 in.	40-60
THO8A69*	400500-775	7.75 in.	40-60
301E10-2**	TC-6-15	6.50 in.	15-20

* - AiResearch turbocharger.
** - Rajay turbocharger.

See latest edition of Service Instruction No. 1238 for assembly procedure.

Ref. New	Ref. Old	Chart	Thread Size	Nomenclature	Torque Limits
927	863	ALL DUAL MAGNETO MODELS	1/2-20	Crankshaft Gear Bolt	660 in. lbs.
		BD	1/4	Crankshaft Gear Bolts	96 - 120 in. lbs.
928		ALL	3/8-16	Cylinder Hold Down Studs (Crankcase Driving Torque)	100 in. lbs.
			7/16-14	Cylinder Hold Down Studs (Crankcase Driving Torque)	200 in. lbs.
			1/2-13	Cylinder Hold Down Studs (Crankcase Driving Torque)	250 in. lbs.
929	858	A-B-D-BD-BE-J-G-Y-S-T-AF	3/8	Cylinder Hold Down Nuts	300 in. lbs.
		A1	7/16	Cylinder Hold Down Nuts	420 in. lbs.
		B-D-BD-BE-J-G-Y-S-T-AF	1/2	Cylinder Hold Down Nuts	600 in. lbs.
		Cylinder Hold Down and Crankcase Parting Flange Nuts' Tightening Procedures - See latest edition of Service Instruction No. 1029.			

Ref. New	Ref. Old	Chart	Thread Size	Nomenclature	Torque Limits
930	849	ALL	3/8	Allen Head Screw (Diaphragm Fuel Pump)	225 - 250 in. lbs.
931		A	9/16	Locking Nut (Valve Adjusting Screw)	450 in. lbs.
932	858	ALL	5/16-18	Exhaust Transitions - Studs (Driving Torque)	100 in. lbs.
		ALL	3/8-16	Exhaust Transitions - Studs (Driving Torque)	200 in. lbs.

SECTION V SPRINGS

		Chart	Nomenclature	Avco Lyc. Part No.	Wire Dia.	Length At Comp. Length	COMP. LOAD Mfr. Min.	Mfr. Max.	Serv. Max.
950	800	A-B-D-G-J-S-T-Y-BD-BE	Outer Valve Springs (Parallel)	76994 LW-11800	.177	1.30 in.	112 lb.	122 lb.	109 lb. min.
		A-B-D-G-J-S-T-Y-BD-BE	Outer Valve Springs (Parallel)	65427	.162	1.30 in.	82 lb.	89 lb.	79 lb. min.
		S1-S2-S3-S5-S6-S7-S9-S10-T2-T3	Outer Valve Springs (Angle)	68326	.177	1.46 in.	103 lb.	111 lb.	100 lb. min.
		S1-S2-S3-S5-S6-S7-S9-S10-T2-T3	Outer Valve Springs (Angle)	LW-11796	.182	1.43 in.	116 lb.	124 lb.	113 lb. min.
951	801	A-B-D-G-J-S-T-Y-BD-BE	Auxilliary Valve Spring (Parallel)	65567 LW-11795	.135	1.17 in.	61 lb.	67 lb.	58 lb. min.
		S1-S2-S3-S5-S6-S7-S9-S10-T2-T3-AF	Auxilliary Valve Spring (Angle)	68328 LW-11797	.142	1.33 in.	75 lb.	83 lb.	72 lb. min.
952	802 803	ALL (AS APPLICABLE)	Oil Pressure Relief Valve Spring						
		Avco Lycoming Part Numbers	Identification: Dye	Free Length					
		61084	None	2.18	.054	1.30 in.	8.5 lb.	9.5 lb.	8.3 lb. min.
		65703	None	2.16	.063	1.47 in.	17.8 lb.	19.4 lb.	18.0 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	811	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	806	D	Magneto Coupling Spring		.091	.603 in.	20 lb.	22 lb.	19 lb. min.

SERVICE TABLE OF LIMITS

STANDARD TORQUE
UNLESS OTHERWISE LISTED

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

TABLE I

BOLTS, SCREWS AND NUTS

Thread	Torque In. Lb.	Torque Ft. Lb.	Thread	Torque In. Lb.	Torque Ft. Lb.
10	49	------	1/2	900	75
1/4	96	------	9/16	1320	110
5/16	204	17	5/8	1800	150
3/8	360	30	3/4	3240	270
7/16	600	50			

THIN NUTS (1/2 DIA OF BOLT) - 1/2 LISTED TORQUE

TABLE II

PIPE PLUGS

Thread	Torque In. Lbs.
1/16-27 NPT	40
1/8-27 NPT	40
1/4-18 NPT	85
3/8-18 NPT	110
1/2-14 NPT	160
3/4-14 NPT	230
1-11 1/2 NPT	315

TABLE III

CRUSH TYPE ASBESTOS GASKETS

Thd. Pitch On Part To Be Tightened Threads Per Inch	ANGLE OF TURN Aluminum Asbestos	Copper Asbestos
8	135°	67°
10	135°	67°
12	180°	90°
14	180°	90°
16	270°	135°
18	270°	135°
20	270°	135°
24	360°	180°
28	360°	180°

NOTE

Install all crush type gaskets except the self centering type, with the unbroken surface against the flange of the plug or part being tightened against the seal. Turn the part until the sealing surfaces are in contact and then tighten to the angle of turn listed for the appropriate thread size.

NOTE: Lubricate Threads Unless Otherwise Specified.

TABLE IV

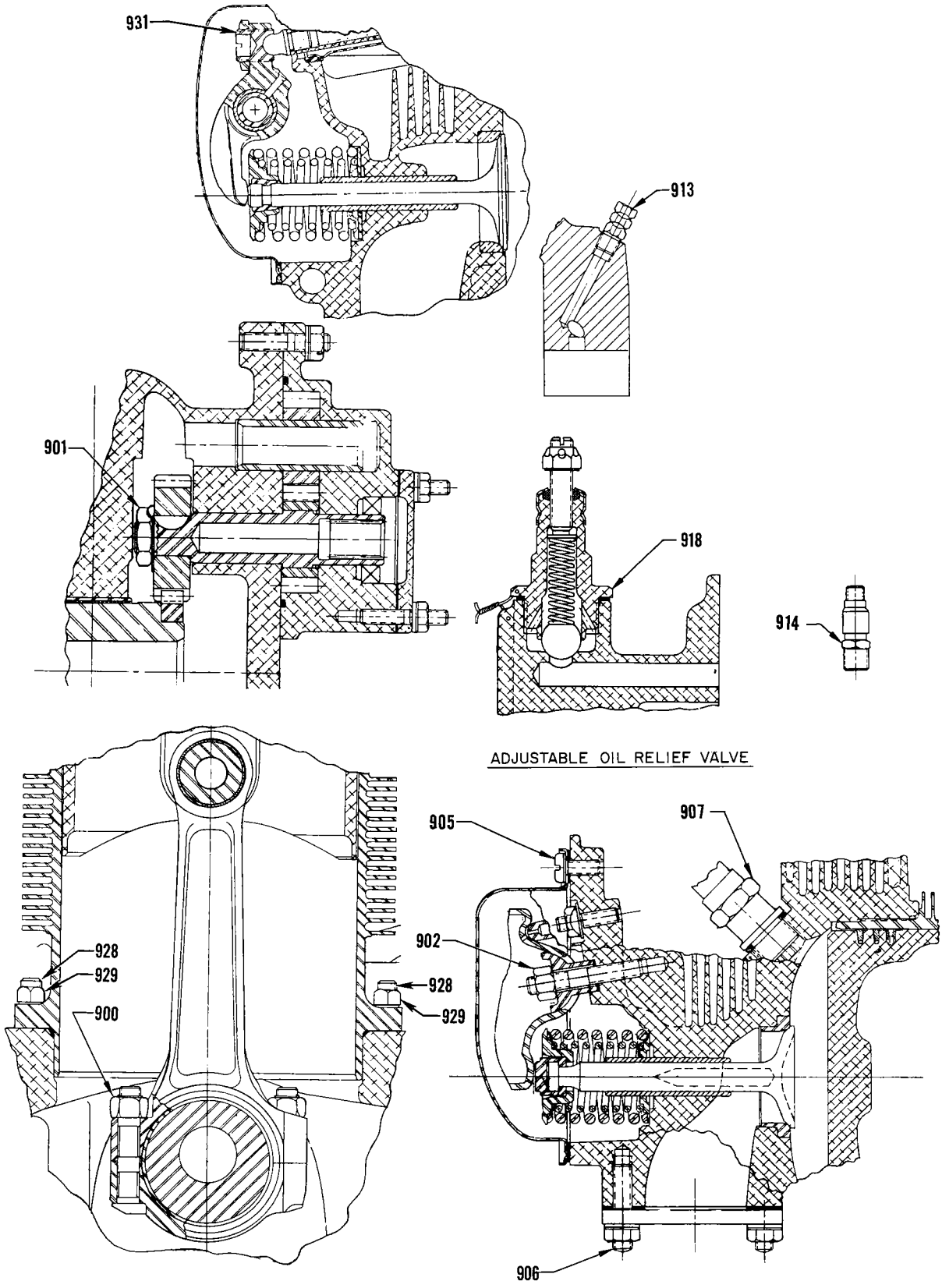
FLEXIBLE HOSE OR TUBE FITTINGS

Tube Size	Thread	Torque In. Lbs.
(-3) 3/16	3/8-24	30
(-4) 1/4	7/16-20	30
(-5) 5/16	1/2-20	35
(-6) 3/8	9/16-18	35
(-8) 1/2	3/4-16	60
(-10) 5/8	7/8-14	70

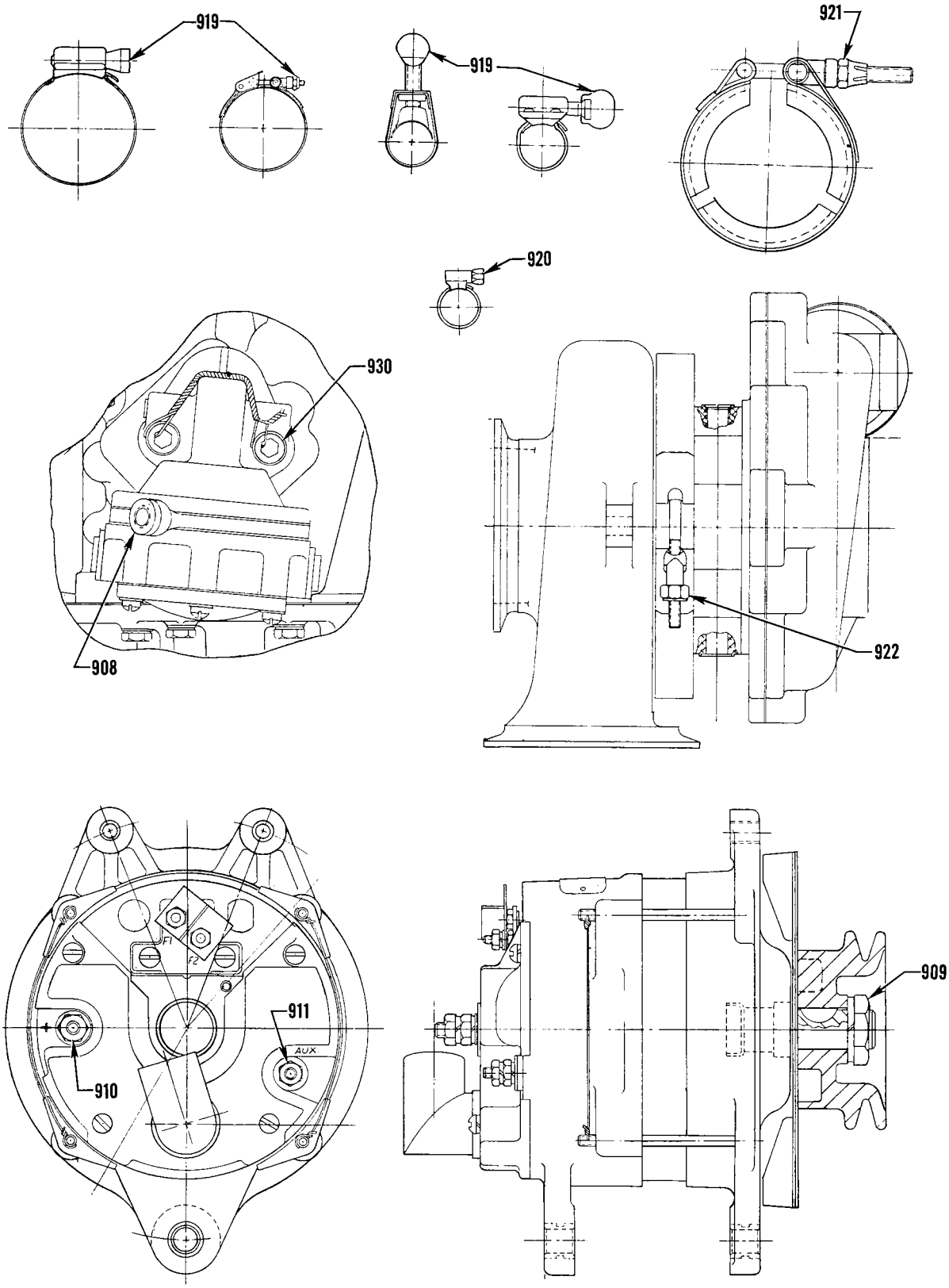
TABLE V

STUDS
MIN. DRIVING TORQUE

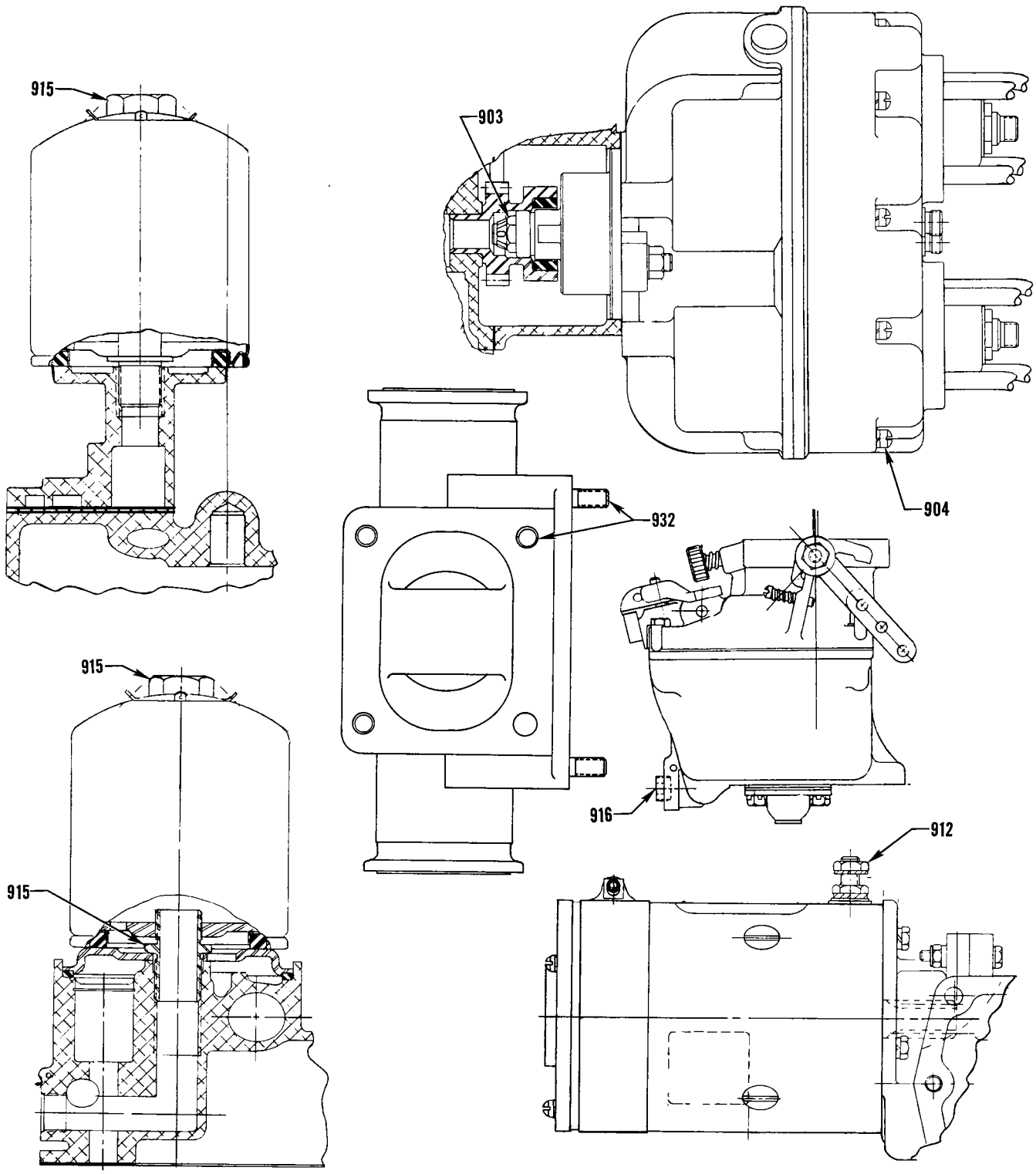
Threads	Torque In. Lb s.
1/4-20	15
5/16-18	25
3/8-16	50



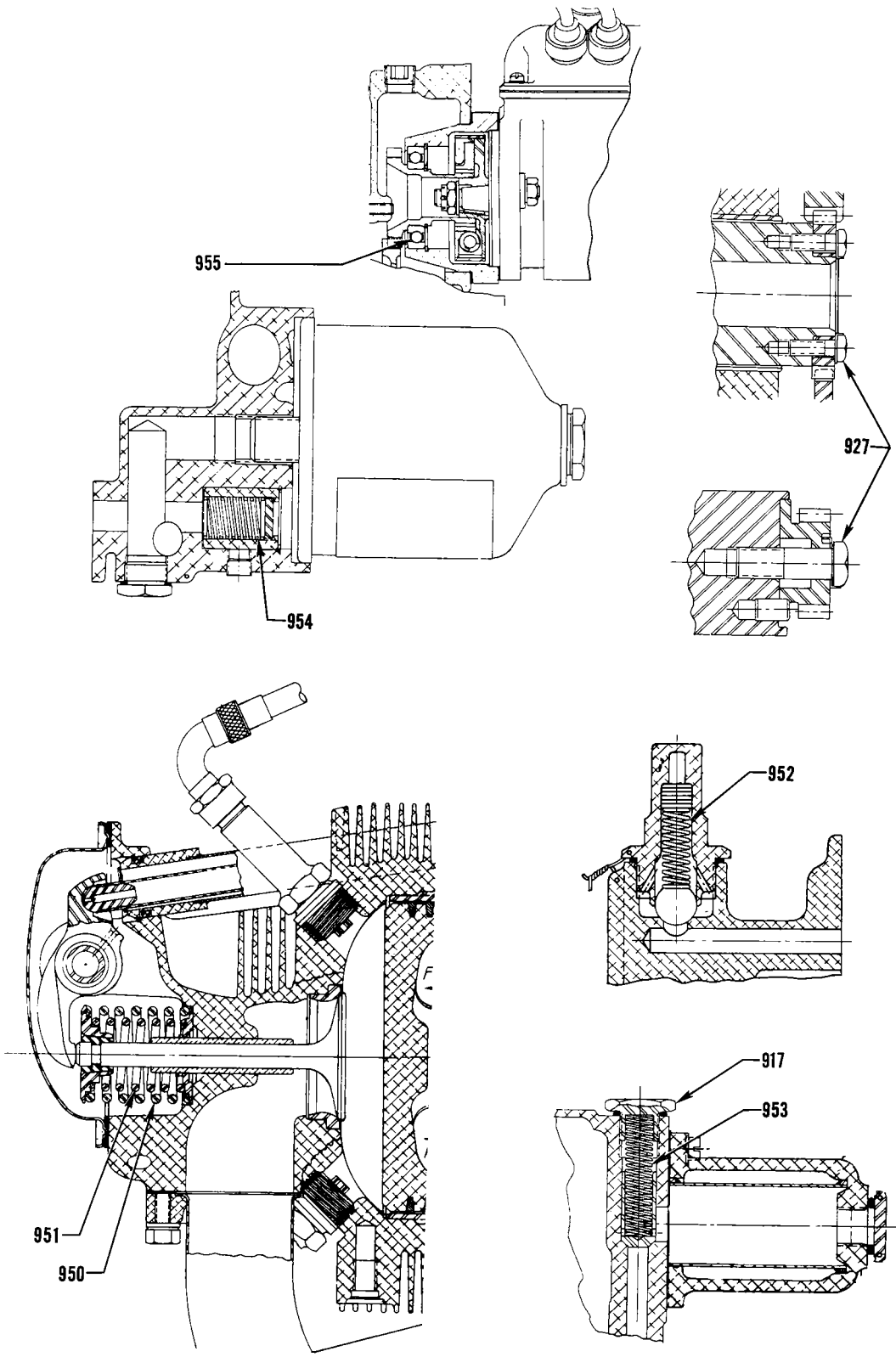
Engine Accessories and Hardware



Engine Accessories and Hardware



Engine Accessories and Hardware



Engine Springs and Hardware

SERVICE TABLE OF LIMITS

PART II INTEGRAL ACCESSORY DRIVE ENGINES

CHART	MODELS
AQ	TIO-541
AZ	TIGO-541

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

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

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

SERVICE TABLE OF LIMITS

PART II INTEGRAL ACCESSORY DRIVE ENGINES

SECTION I CRANKCASE, CRANKSHAFT, CAMSHAFT

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
500	501	AQ	Main Bearings and Crankshaft (Except Front)			.0011L / .0041L	.0050L
		AZ	Main Bearings and Crankshaft			.0011L / .0041L	.0050L
		AQ	Front Main Bearings and Crankshaft			.0021L / .0046L	.0050L
		AQ-AZ	Diameter of Main Bearing Journal on Crankshaft (2-5/8 Main)	2.6245 / 2.626	(E)		
		AQ	Diameter of Front Main Bearing Journal on Crankshaft (2-5/8 Main)	2.6240 / 2.6250	(E)		
500	955	AQ-AZ	Crankcase Bearing Bore Diameter	2.9365 / 2.9375	2.9390		
501	502	AQ-AZ	Connecting Rod Bearing and Crankshaft			.0008L / .0038L	.0050L
		AZ	Diameter of Connecting Rod Journal on Crankshaft (2-1/8)	2.1235 / 2.125	(E)		
		AQ	Diameter of Connecting Rod Journal on Crankshaft (2-1/4)	2.2485 / 2.250	(E)		
501	954	AZ	Connecting Rod Bearing Bore Diameter (2-1/8) (Measure at Axis 30° on each side)	2.2870 / 2.2875			
		AQ	Connecting Rod Bearing Bore Diameter (2-1/4) (Measure at Axis 30° on each side)	2.4205 / 2.4210			
502	564	AQ-AZ	Connecting Rod - Side Clearance			.004L / .010L	.016L
503	566	AQ-AZ	Connecting Rod - Alignment			.010 in 10 Inches	
504	567	AQ-AZ	Connecting Rod - Twist			.012 in 10 Inches	
505	556		Crankshaft Run-Out At Center Main Bearings				
		AZ	Mounted on No. 1 and 4 Journals Max. Run-Out No. 2 and 3 Journals			.005	.0075
			Mounted on No. 1 and 3 Journals Max. Run-Out No. 2 Journal			.003	.0045
			Mounted on No. 2 and 4 Journals Max. Run-Out No. 3 Journal			.003	.0045
		AQ	Mounted on No. 2 and 5 Journals Max. Run-Out No. 1 Journal			.002	.002
			Mounted on No. 2 and 5 Journals Max. Run-Out No. 3 Journal			.005	.0075
			Mounted on No. 2 and 4 Journals Max. Run-Out No. 3 Journal			.003	.0045

SERVICE TABLE OF LIMITS

PART II INTEGRAL ACCESSORY DRIVE ENGINES

SECTION I CRANKCASE, CRANKSHAFT, CAMSHAFT

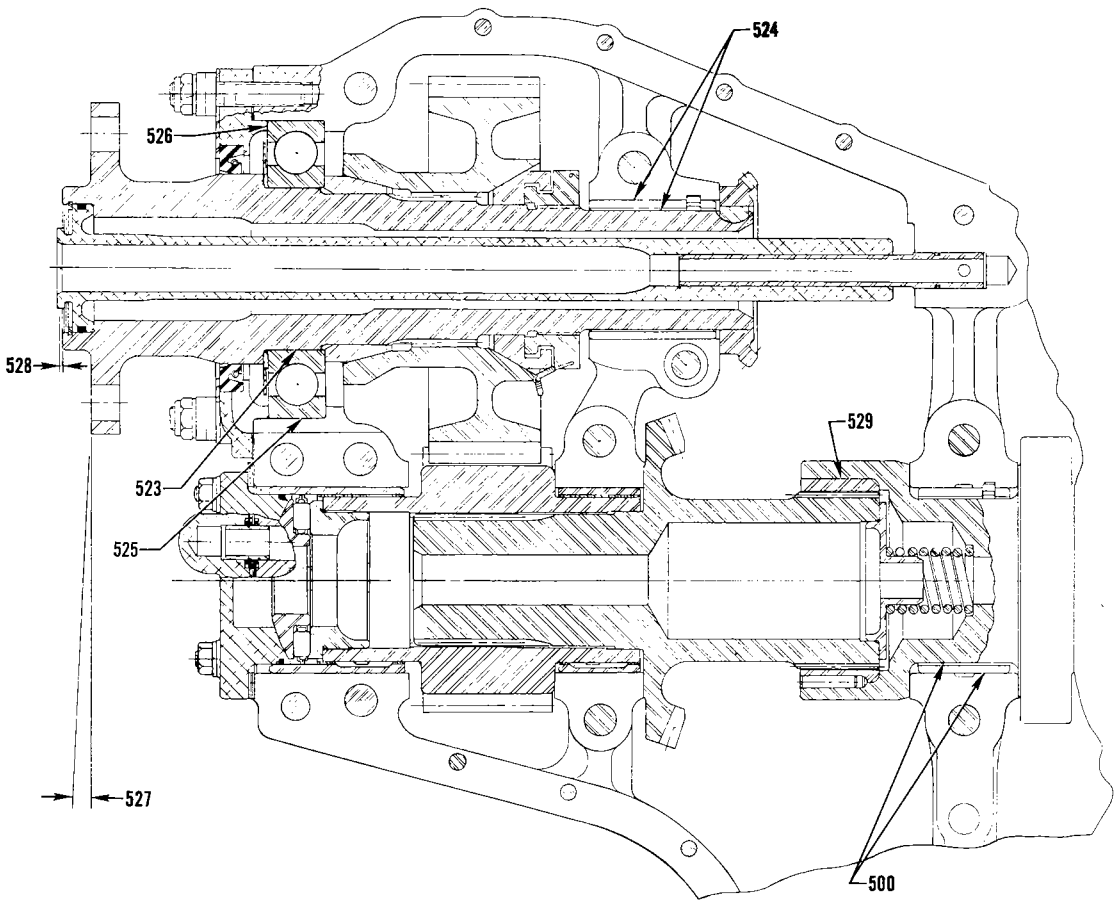
Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
506	556	AQ (Cont.)	Mounted on No. 3 and 5 Journals Max. Run-Out No. 4 Journal			.003	.0045
506	568	AQ-AZ	Crankshaft and Crankcase - Front End Clearance			.005L / .016L	.026L
507	938	AQ	Clearance - Front Face of Crankshaft Oil Slinger to Front Face of Recess in Crankcase (Crankshaft Against Thrust Face)			.002 / .007	(A)
508	607	AQ-AZ	Crankshaft Propeller Flange Run-Out				.005
509	941	AQ	Starter Ring Gear and Support			.014T / .022T	(A)
510	504	AQ-AZ	Crankshaft Timing Gear and Crankshaft			.002L / .0005L	(A)
511	536	AQ-AZ	Tappet Body and Crankcase			.0010L / .0030L	.004L
		AQ-AZ	O.D. of Tappet	.9990 / .9995	.9987		
		AQ-AZ	I.D. Tappet Bore in Crankcase	1.0005 / 1.0018	1.0021		
514	537	AQ-AZ	Camshaft and Crankcase			.002L / .004L	.006L
515	538	AQ-AZ	Camshaft - End Clearance			.002L / .009L	.015L
516	539	AQ-AZ	Camshaft Run-Out At Center Bearing Journal			.000 / .001	.006
517	578	AQ-AZ	Counterweight Bushing and Crankshaft			.0013T / .0026T	(A)
518	579	AQ-AZ	Counterweight Roller - End Clearance			.003L / .025L	.038L
519	580	AQ-AZ	Counterweight and Crankshaft - Side Clearance (Measure Below Roller Next To Flat)			.003L / .013L	.017L
520	696	AQ-AZ	Counterweight Bore and Washer O.D.			.0002L / .0030L	(A)
521	775	AQ-AZ	I.D. Counterweight Bushing	.7485 / .7505	.7512		
		AZ	I.D. Counterweight Bushing (2nd Order)	1.030 / 1.032	1.0327		
522	774	AQ-AZ	O.D. of Counterweight Roller (See latest edition of Service Instruction No. 1012)				
523	503	AZ	Thrust Bearing and Propeller Shaft			.0001L / .0012L	.002L

SERVICE TABLE OF LIMITS

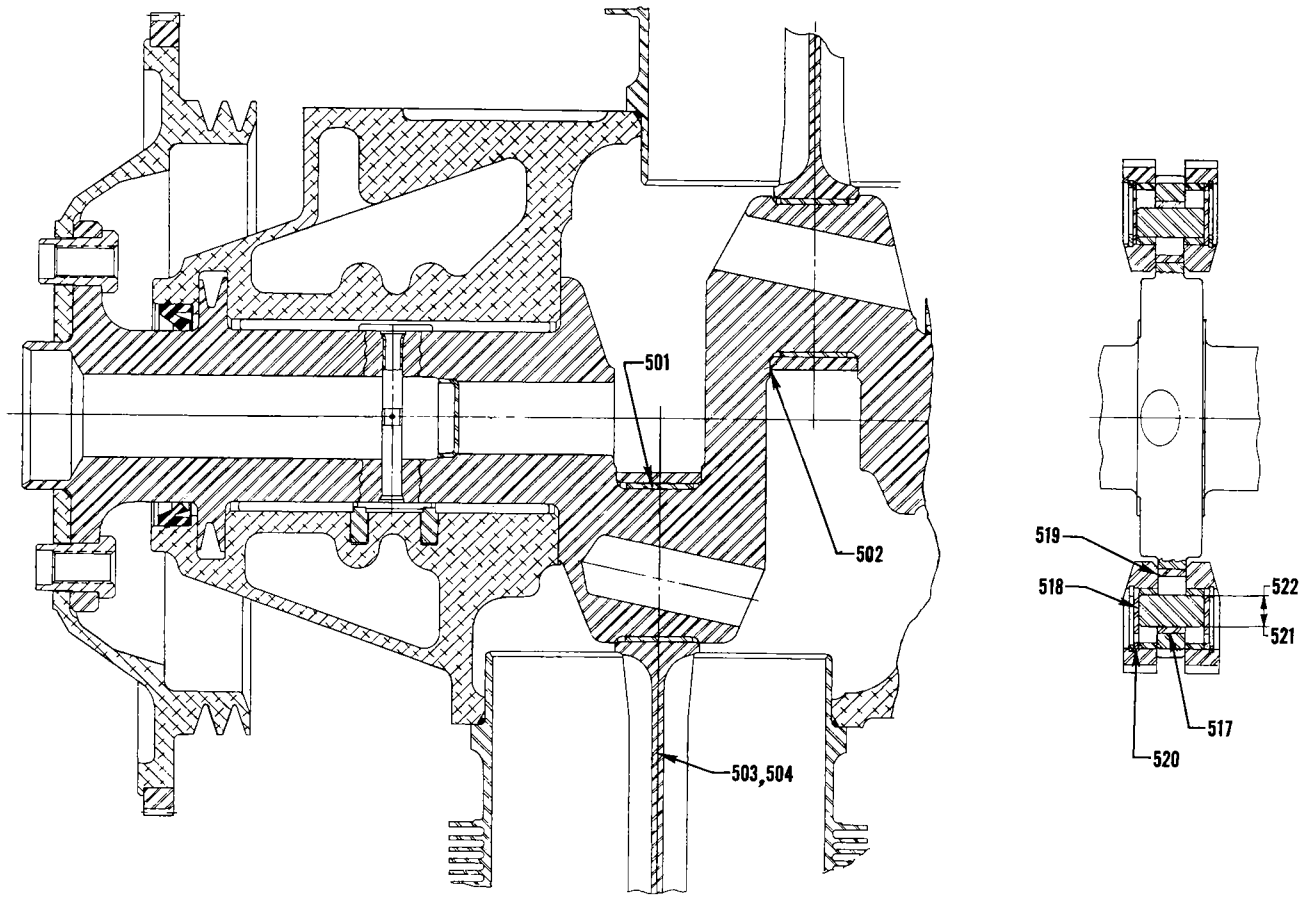
PART II INTEGRAL ACCESSORY DRIVE ENGINES

SECTION I CRANKCASE, CRANKSHAFT, CAMSHAFT

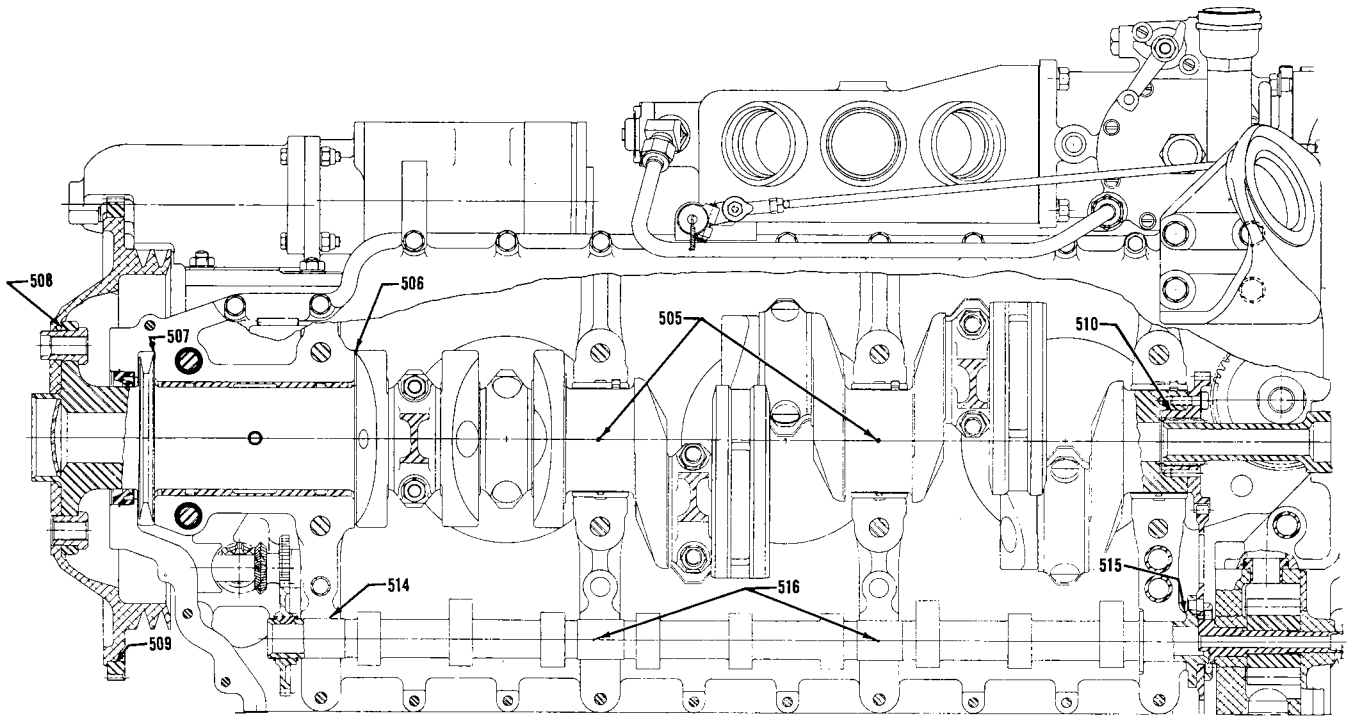
Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
524	958	AZ	Propeller Shaft and Rear Bearing			.0015L / .0030L	.0040L
524	965	AZ	Propeller Shaft Bearing Bore Diameter	2.1865 / 2.1875	2.1885		
525		AZ	Thrust Bearing and Crankcase			.0006L / .0010T	(A)
526	509	AZ	Thrust Bearing and Thrust Bearing Cap Clamp Fit (Shim to this Fit)			.003T / .005T	(A)
527	555	AZ	Thrust Bearing Tilt At 4 Foot	.027 Tilt			
528	556	AZ	Thrust Bearing End Play			.006 / .008	.010
529	569	AZ	Crankshaft and Crankshaft Front Bearing			.0002T / .0015T	(A)



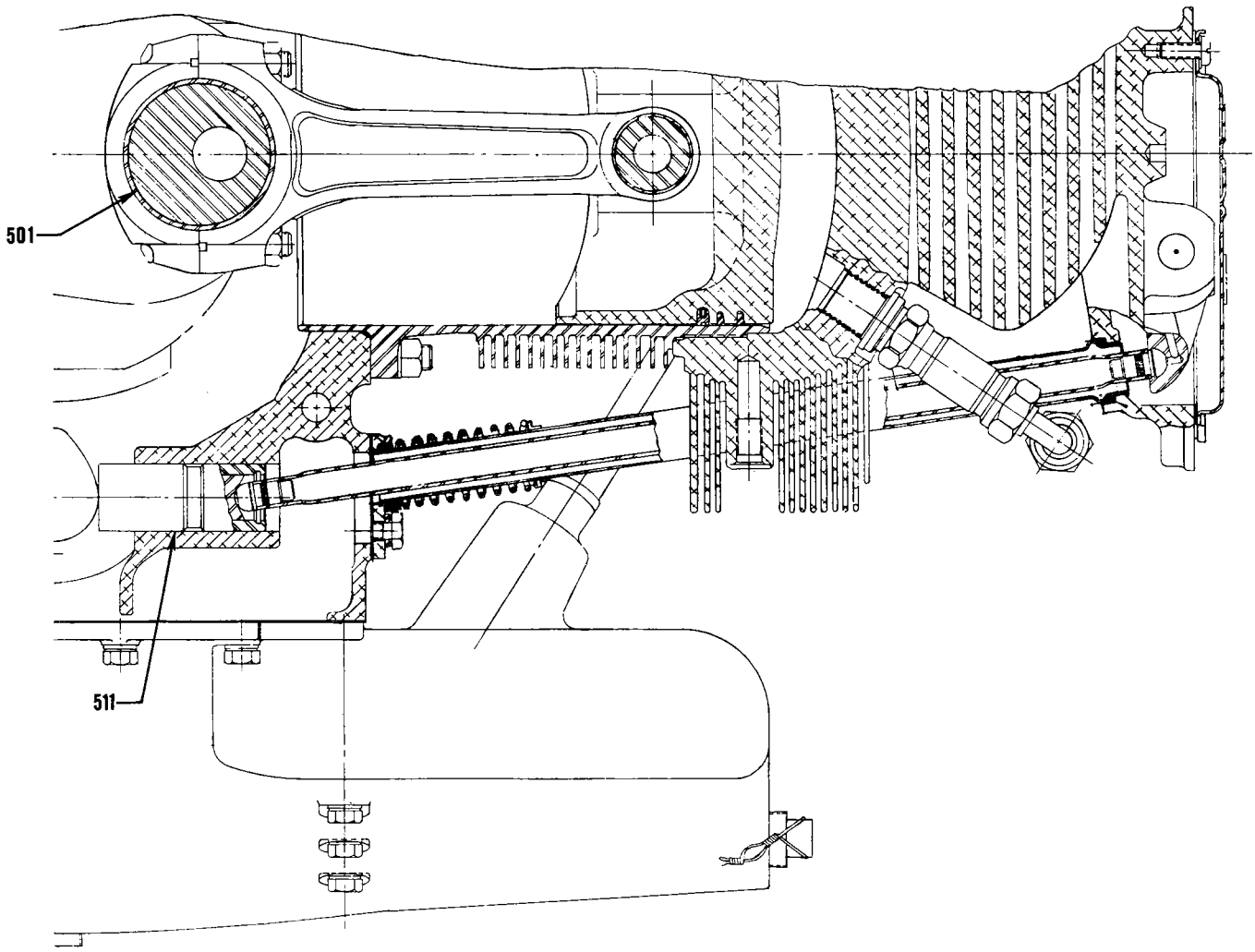
Section Thru Prop. Shaft, Crankshaft and Front Bearings



Connecting Rod, Counterweights and Related Parts



Longitudinal Section Thru Engine



Connecting Rod Bearing, Tappet Body and Crankcase

SERVICE TABLE OF LIMITS

PART II INTEGRAL ACCESSORY DRIVE ENGINES

SECTION II CYLINDERS

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions Mfr. Min. & Max.	Dimensions Serv. Max.	Clearances Mfr. Min. & Max.	Clearances Serv. Max.
600	510	AQ-AZ	Connecting Rod and Connecting Rod Bushing	Bushing To Be Burnished In Place			
		AQ-AZ	Finished I.D. of Connecting Rod Bushing	1.1254 / 1.1262			
601	510	AQ-AZ	Length Between Connecting Rod Bearing Centers	6.7485 / 6.7515			
602	511	AQ-AZ	Connecting Rod Bushing and Piston Pin			.0008L / .0021L	.0025L
603	512	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	513	AQ-AZ	Piston and Piston Pin Plug			.0002L / .0010L	.002L
		AQ-AZ	*Diameter of Piston Pin Plug	1.1242 / 1.1247			
605	513	AQ-AZ	Piston Pin and Piston Pin Plug - Nitrided and Chrome Cylinders			.0005L / .0025L	.005L
		AQ-AZ	*Diameter of Piston Pin Plug	.5655 / .5665			
		* See latest edition of Service Instruction No. 1267.					
606	514	AQ-AZ	Piston Ring and Piston - Side Clearance (Top Ring Comp.)			.0025L / .0055L	.008L(B)
606	515	AQ-AZ	Piston Ring and Piston - Side Clearance (2nd Ring Comp.)			.000L / .004L	.006L(B)
606	516	AQ-AZ	Piston Ring and Piston - Side Clearance (Oil Regulating)			.002L / .004L	.006L(B)
607	615	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 / .055	.067
		AQ-AZ	Piston Ring Gap (Oil Regulating) (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.					

SERVICE TABLE OF LIMITS

PART II INTEGRAL ACCESSORY DRIVE ENGINES

SECTION II CYLINDERS

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions Mfr. Min. & Max.	Dimensions Serv. Max.	Clearances Mfr. Min. & Max.	Clearances Serv. Max.

		Engine and Piston Application		Min. Piston Diameter			Cylinder Barrel		
		Engine Chart Code Letter	Piston Number	Top	Bottom	Type of Piston	Type of Surface	Maximum Diameter	Max. Clearance Piston Skirt & Cyl.
608 608 609 610	519 522 520 521	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.

Cylinder Barrel: N=nitride hardened, C=Chrome plated.

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.

Maximum taper and out-of-round permitted for cylinder in service is .0045 inch.

See Service Instruction No. 1243 for identification of forged pistons. The suffix "S" that will be found with the part number on 76966 and LW-10545 pistons indicates the piston weight is within the limits specified for any group of pistons and may be substituted for any like piston on a particular engine. Other pistons are manufactured within weight limits that do not require any weight controlled piston for replacement.

Piston diameter at top is measured at top ring land (between top and second compression ring grooves) at right anles to piston pin hole; diameter at bottom of piston is measured at the bottom of the piston skirt at right angles of the piston pin. See Service Instruction No. 1243 for illustration.

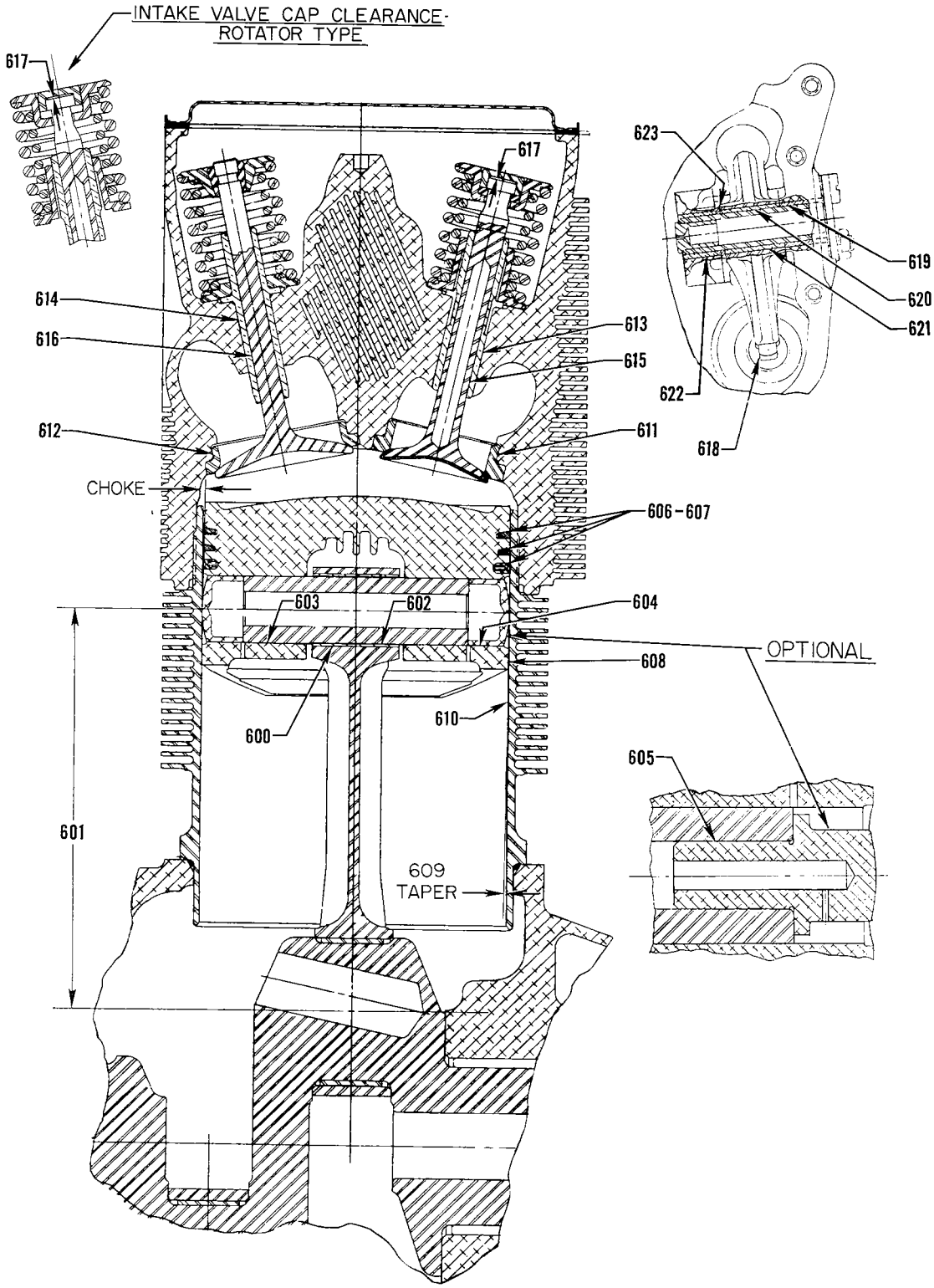
Ref. New	Ref. Old	Chart	Nomenclature	Dimensions Mfr. Min. & Max.	Dimensions Serv. Max.	Clearances Mfr. Min. & Max.	Clearances Serv. Max.
611	523	AQ-AZ	Exhaust Valve Seat and Cylinder Head			.0075T / .011T	(A)
		AQ-AZ	O.D. Exhaust Seat	1.9355 / 1.937			
		AQ-AZ	I.D. Exhaust Seat Hole in Cylinder Head	1.926 / 1.928			
612	524	AQ-AZ	Intake Valve Seat and Cylinder Head			.0065T / .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	526	AQ-AZ	Exhaust Valve Guide and Cylinder Head			.0011T / .0030T	(A)
613	527	AQ-AZ	O.D. Exhaust Valve Guide	.6954 / .6963			
		AQ-AZ	I.D. Exhaust Valve Guide Hole in Cylinder Head	.6933 / .6943			

SERVICE TABLE OF LIMITS

PART II INTEGRAL ACCESSORY DRIVE ENGINES

SECTION II CYLINDERS

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
614	527	AQ-AZ	Intake Valve Guide and Cylinder Head			.0010T / .0025T	
		AQ-AZ	O.D. Intake Valve Guide	.5933 / .5938			
		AQ-AZ	I.D. Intake Valve Guide Hole in Cylinder Head	.5913 / .5923			
615	528	AQ-AZ	Exhaust Valve Stem and Valve Guide			.0037L / .0050L	(A)
		AQ-AZ	O.D. Exhaust Valve Stem	.4955 / .4965	.4937		
615	527	AQ-AZ	Finished I.D. Exhaust Valve Guide	.4995 / .5005			
		1/2 inch diameter exhaust valves may have exhaust valve guides that are .003 in. over the maximum inside diameter limit, anytime up to 300 hours of service. After 300 hours of service, inside diameter of exhaust valve guide may increase .001 in. during each 100 hours of operation up to the recommended overhaul time for the engine, or not to exceed .015 inch over the basic I.D. See latest edition of Service Instruction No. 1009 for recommended overhaul time.					
616	529	AQ-AZ	Intake Valve Stem and Valve Guide			.0010L / .0028L	.006L
		AQ-AZ	O.D. Intake Valve Stem	.4022 / .4030	.4010		
616	527	AQ-AZ	Finished I.D. Intake Valve Guide	.4040 / .4050			
617	951	AQ-AZ	Intake and Exhaust Valve and Valve Cap - Clearance (Rotator Type With Small Diameter Head)			.000 / .004L	.005L
618	952	AQ-AZ	Dry Tappet Clearance			.040 / .105	
619	611	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	.6246 / .6261	.6270		
620	531	AQ-AZ	Valve Rocker Shaft and Valve Valve Rocker Bushing			.0007L / .0017L	.004L
		AQ-AZ	Finished I.D. of Rocker Arm Bushing	.6252 / .6263	.6270		
		AQ-AZ	O.D. Valve Rocker Shaft	.6241 / .6245	.6231		
621	532	AQ-AZ	Valve Rocker Bushing and Valve Rocker	Bushing Must Be Burnished In Place			
622	612	AQ-AZ	Valve Rocker Shaft Bushing and Cylinder Head			.0022T / .0038T	(A)
		AQ-AZ	Valve Rocker Shaft Bushing Hole in Cylinder Head	.7380 / .7388			
623	533	AQ-AZ	Valve Rocker and Cylinder Head - Side Clearance			.002L / .020L	.024L



Cylinder, Piston and Valve Components

SERVICE TABLE OF LIMITS

PART II INTEGRAL ACCESSORY DRIVE ENGINES

SECTION III GEAR TRAIN

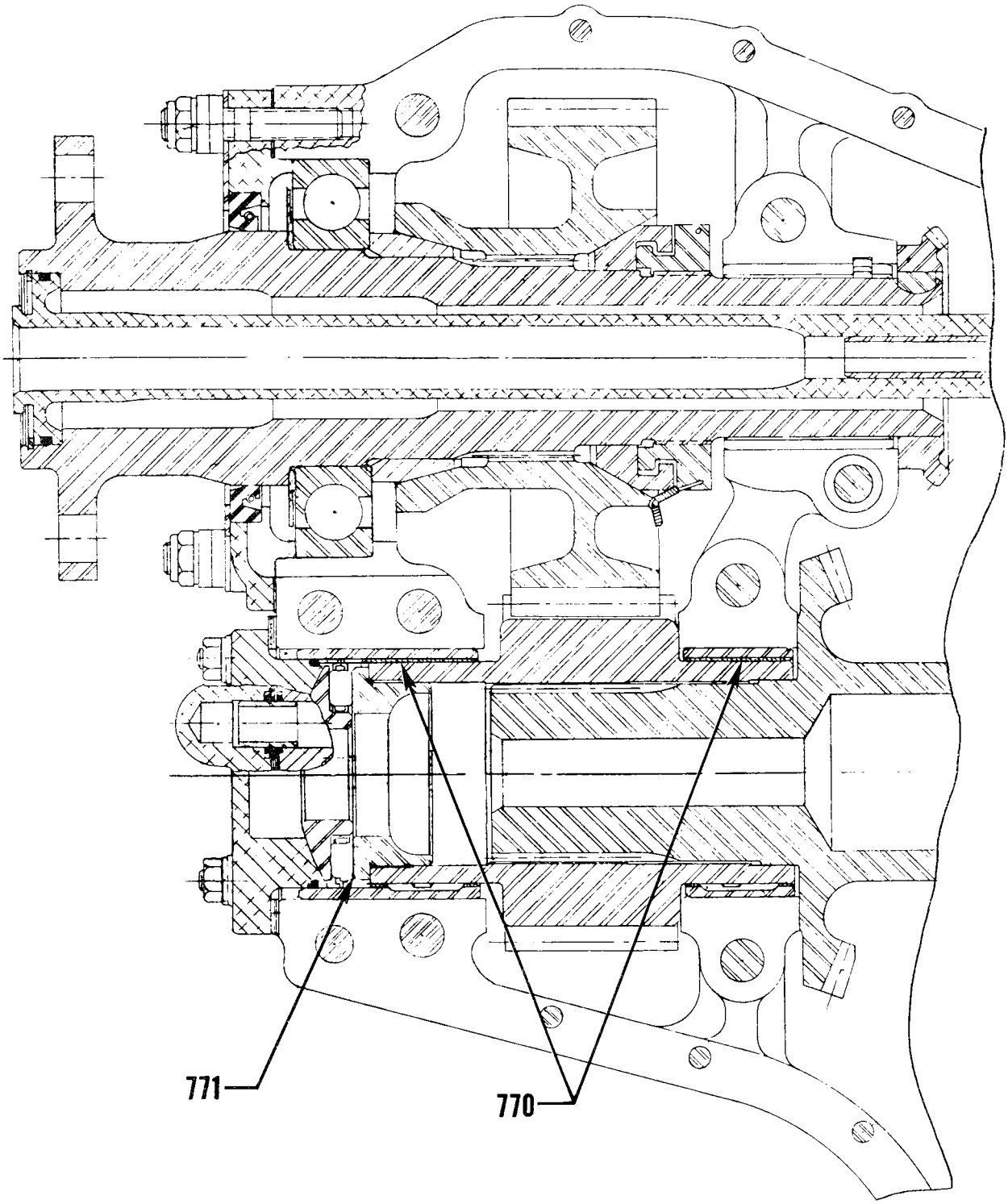
Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
700	545	AQ-AZ	Oil Pump Drive Shaft and Oil Pump Body			.0010L / .0030L	.004L
701		AQ-AZ	Oil Pump Drive Shaft and Oil Pump Cover			.0035L / .0050L	.0065L
703	542	AQ-AZ	Oil Pump Impellers - Diameter Clearance			.002L / .005L	.008L
704	543	AQ-AZ	Oil Pump Impellers - Side Clearance			.002L / .0045L	.005L
			Width of Oil Pump Impellers	1.372 / 1.374	1.371		
705	544	AQ-AZ	Oil Pump Driven Impellers and Idler Shaft			.0005L / .002L	.004L
722	767	AQ-AZ	Fuel Pump Idler Gear and Shaft			.001L / .003L	.005L
725		AQ-AZ	Fuel Pump Idler Gear - End Clearance			.002L / .028L	.038L
726	769	AQ-AZ	Fuel Pump Drive Shaft Gear and Crankcase			.0010L / .0025L	.004L
727	770	AQ-AZ	Fuel Pump Drive Shaft Gear - End Clearance			.0015L / .0385L	.0485L
728	668	AQ	Front Governor Drive Idler Shaft (Both Ends) and Crankcase			.0010L / .0025L	.004L
731	670	AQ-AZ	Governor Driven Gear and Crankcase			.0010L / .0025L	.004L
732	674	AQ-AZ	Propeller Governor Drive Gear - End Clearance			.008L / .016L	.021L
739	540	AZ	Tachometer Drive Shaft and Adapter			.0015L / .0035L	.006L
759	589	AQ-AZ	Vacuum and Hydraulic Pump Drive Shaft Gear and Crankcase			.0010L / .0025L	.006L
760	590	AQ-AZ	Vacuum and Hydraulic Pump Drive Shaft Gear - End Clearance			.018L / .028L	.035L
761	711	AQ-AZ	Magneto Coupling and Crankcase			.0010L / .0030L	.004L
762	711	AQ-AZ	Magneto Drive Shaft Gear and Crankcase			.0010L / .0030L	.004L
763	586	AQ-AZ	Accessory Drive Gear Intermediate and Crankcase (2 Places)			.0010L / .0030L	.005L
764	587	AQ-AZ	Accessory Drive Gear - End Clearance			.016L / .018L	.020L
765	586	AQ-AZ	Accessory Drive Gear and Crankcase			.0010L / .0030L	.005L

SERVICE TABLE OF LIMITS

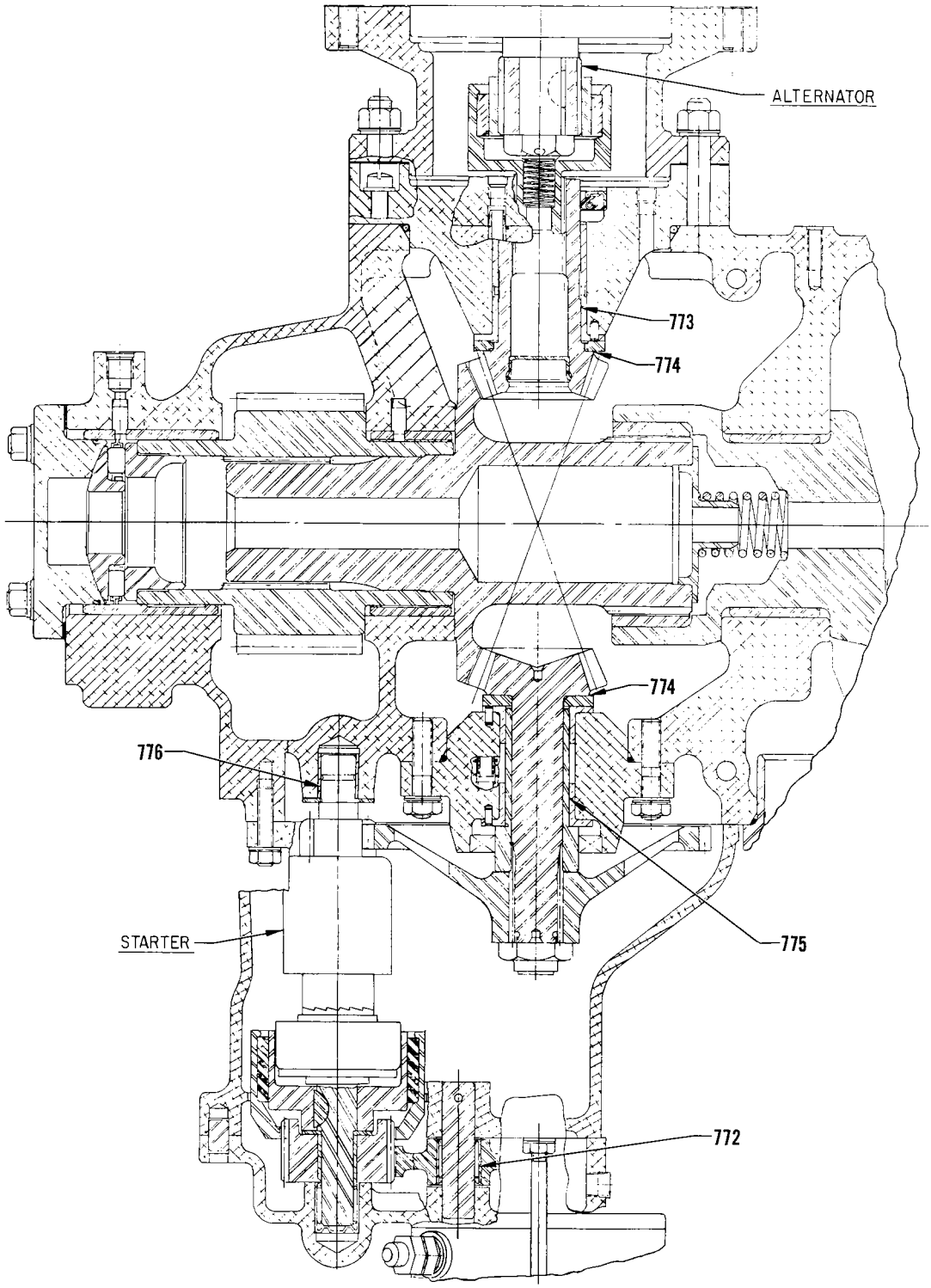
PART II INTEGRAL ACCESSORY DRIVE ENGINES

SECTION III GEAR TRAIN

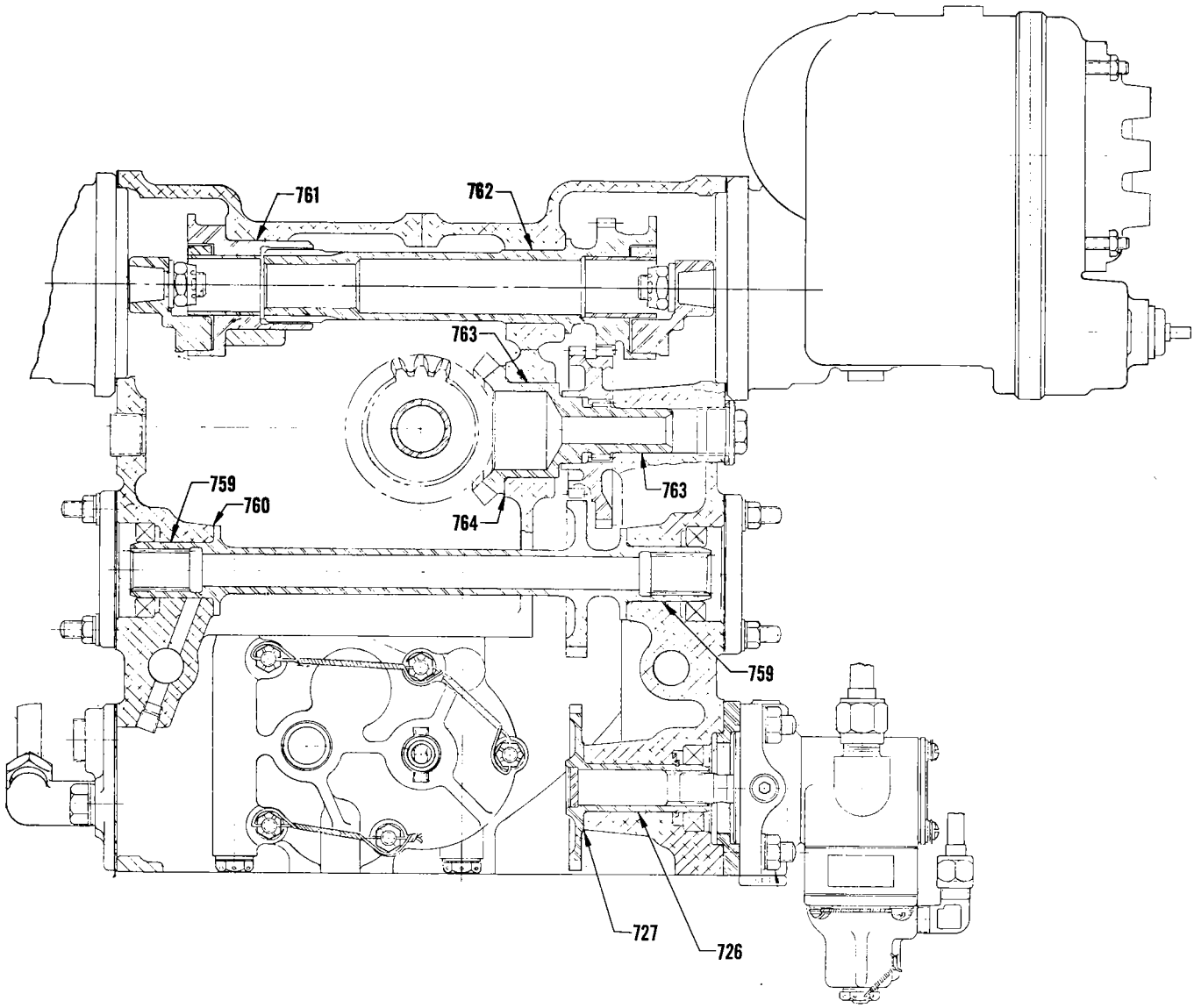
Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
766	786	AQ-AZ	Compressor Drive Shaft and Compressor Drive Adapter			.0010L / .0030L	.005L
767	970	AQ-AZ	Compressor Drive Shaft - End Play			.0005 / .0295	.040
768	948	AQ-AZ	Breather Slinger Gear and Shaft			.0021L / .0035L	.005L
769	945	AQ-AZ	Breather Slinger Gear - End Play			.008 / .017	.025
770	959	AZ	Propeller Shaft Drive Gear and Bearings			.0025L / .0050L	.0060L
771	1000	AZ	Propeller Shaft Drive Gear - End Play			.005 / .015	.022
772	958	AZ	Propeller Shaft and Rear Bearing			.0015L / .0030L	.0040L
773	583	AZ	Alternator Driven Gear and Adapter Bushing			.0025L / .0045L	.0065L
774	966	AZ	Starter Drive and Alternator Drive Gear - End Play			.004 / .008	.011
775	723	AZ	Starter Driven Gear and Adapter Bushing			.0015L / .0030L	.005L
776	633	AZ	Starter Drive Shaft (Slip Coupling) and Crankcase			.0015L / .0040L	.007L
777	967	AZ	Starter Idler Gear and Idler Gear Bearing			.0005L / .0020L	.005L



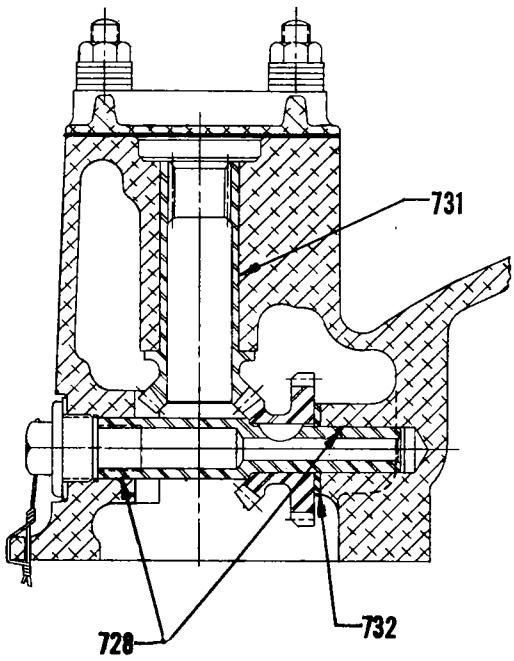
Prop. Shaft Drive Gear



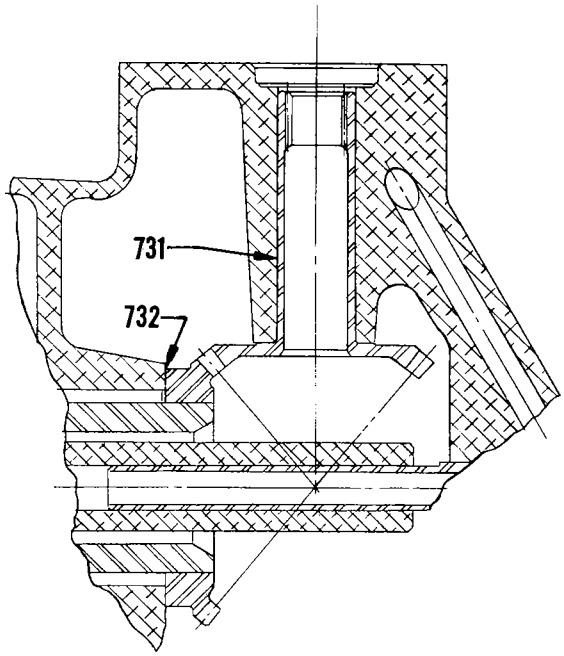
Alternator, Starter and Propeller Shaft



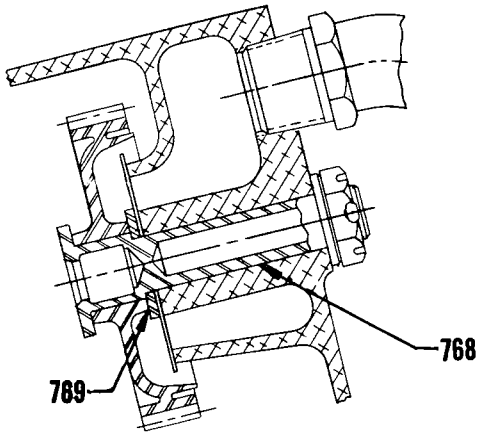
Fuel Pump, Magneto, Vacuum and Hydraulic Pump



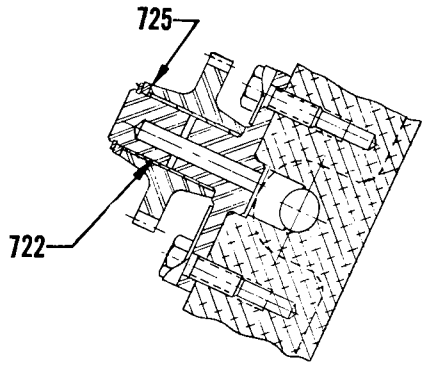
TIGO-541
PROP. GOVERNOR



TIGO-541
PROP. GOVERNOR

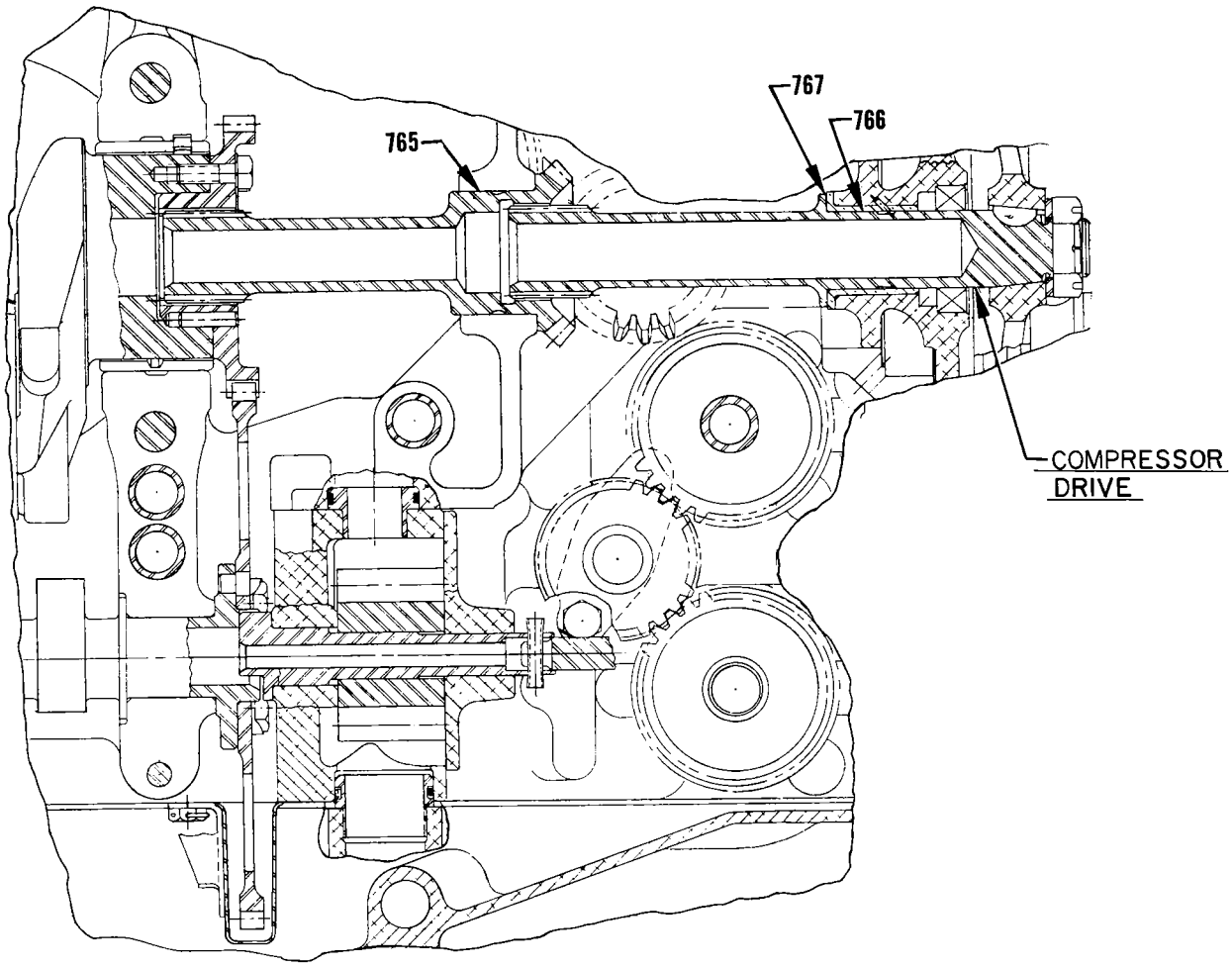


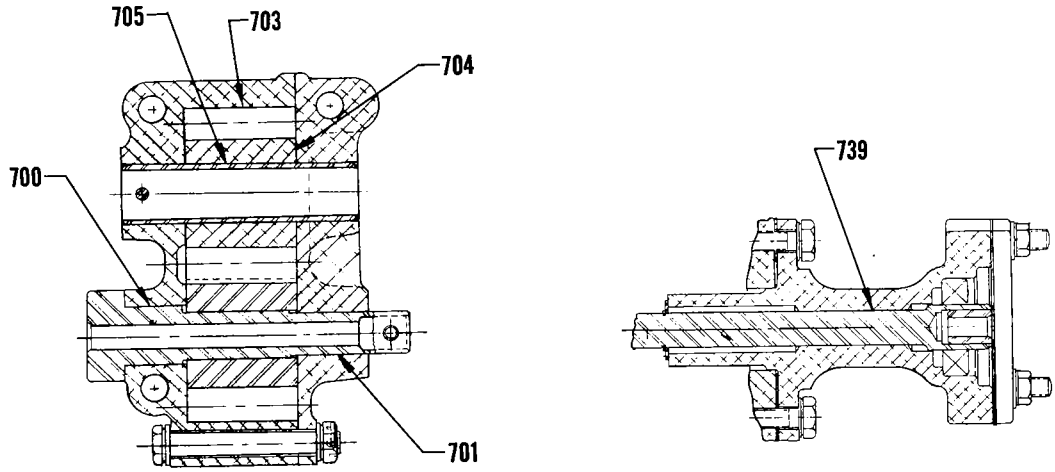
BREATHER GEAR
TIO-541 ONLY



FUEL PUMP IDLER GEAR

Gov., Fuel Pump and Breather Gear





Oil Pump, Tachometer and Compressor

SERVICE TABLE OF LIMITS

PART II INTEGRAL ACCESSORY DRIVE ENGINES

SECTION IV BACKLASH

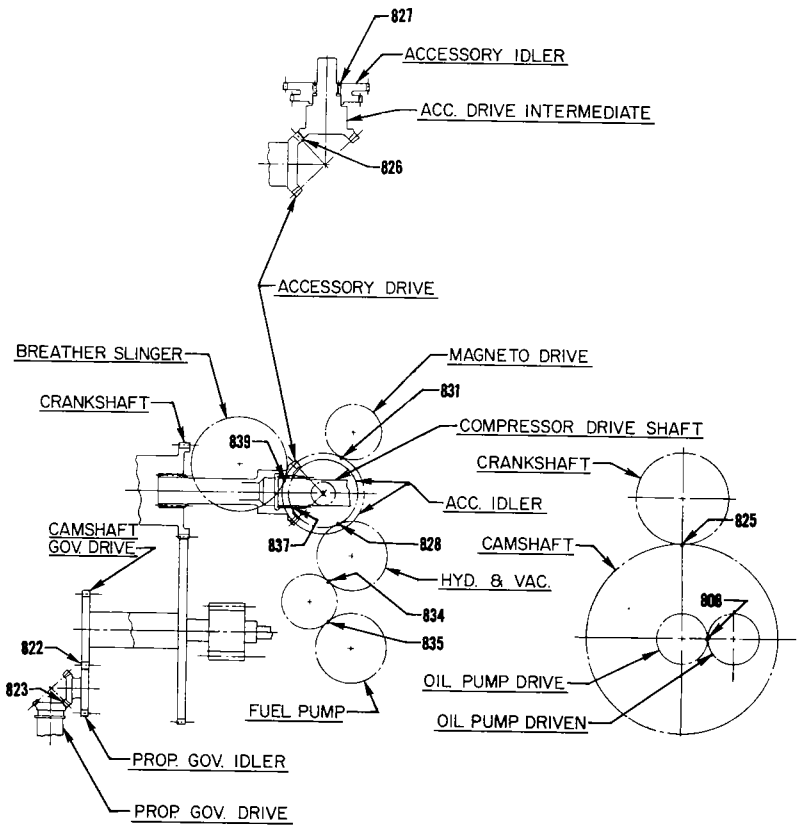
Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
808	553	AQ-AZ	Oil Pump Impellers - Backlash			.008 .013	.020
822	667	AQ	Propeller Governor Idler and Camshaft - Backlash			.005 .015	.020
823	669	AQ-AZ	Propeller Governor Drive and Idler - Backlash			.004 .008	.015
825	550	AQ-AZ	Crankshaft Timing Gear and Camshaft - Backlash			.005 .015	.020
826	588	AQ-AZ	Accessory Drive and Accessory Drive Intermediate			.004L .006L	.010L
827	588	AQ-AZ	Accessory Drive Gear Intermediate and Idler - Spline Backlash			.002 .005	.007
828	591	AQ-AZ	Accessory Idler and Vacuum and Hydraulic Pump Gear - Backlash			.004 .011	.016
829	603	AZ	Propeller Shaft - Reduction Gear Total Backlash At 4 Foot Radius			.38 .75	.90
830	635	AZ	Starter (Bendix - Slip Coupling) and Starter Drive Gear - Backlash			.016 .031	.045
831	709	AQ-AZ	Accessory Idler and Magneto Drive Shaftgear - Backlash			.005 .015	.020
832	720	AZ	Starter Drive Gear and Starter and Alternator Drive Shaft Gear - Backlash			.004 .008	.015
833	720	AZ	Alternator Drive Gear and Starter and Alternator Drive Shaft Gear - Backlash			.003 .008	.012
834	765	AQ-AZ	Fuel Pump Idler Gear and Vacuum and Hydraulic Pump Drive Gear - Backlash			.002 .015	.020
835	766	AQ-AZ	Fuel Pump Idler Gear and Fuel Pump Drive - Backlash			.0006 .0160	.021
836	716	AQ-AZ	Magneto Drive Shaft Gear and Magneto Coupling - Spline Backlash			.0010 .0045	.0075
837	785	AQ-AZ	Accessory Drive Gear and Compressor Drive Shaft - Spline Backlash			.0040 .0076	.014
838	788	AQ-AZ	Crankshaft Gear and Accessory Drive Shaft Gear - Spline Backlash			.0040 .0076	.014
839	944	AQ	Breather Slinger Gear and Accessory Idler - Backlash			.005 .015	.020

SERVICE TABLE OF LIMITS

PART II INTEGRAL ACCESSORY DRIVE ENGINES

SECTION IV BACKLASH

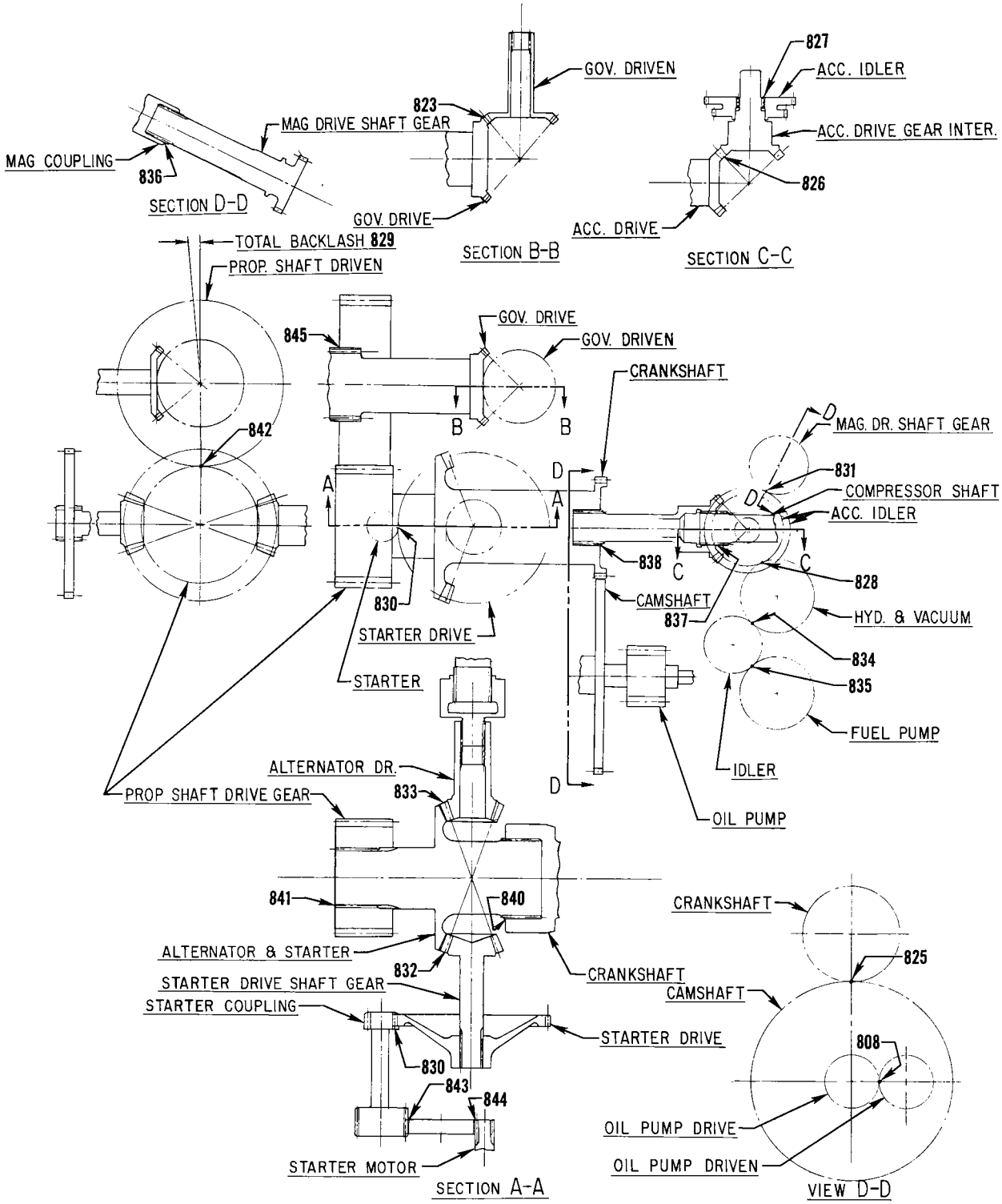
Ref. New	Ref. Old	Chart	Nomenclature	Dimensions Mfr. Min. & Max.	Dimensions Serv. Max.	Clearances Mfr. Min. & Max.	Clearances Serv. Max.
840	956	AZ	Front Crankshaft Spline Bushing and Alternator and Starter Shaft Gear - Spline Backlash			.001 .005	.006
841	957	AZ	Propeller Shaft Drive Gear and Alternator and Starter Shaft Gear - Spline Backlash			.001 .004	.006
842	960	AZ	Propeller Shaft Drive Gear and Driven Gear - Backlash			.008 .014	.016
843	968	AZ	Starter Slip Coupling Gear and Starter Idler - Backlash			.0002 .0045	.0075
844	969	AZ	Bendix Starter Motor Shaft Gear and Idler - Backlash			.0002 .0045	.0075
845	999	AZ	Propeller Shaft Spline and Propeller Shaft Driven Gear - Spline Backlash			.008 .011	.015
			(When Measured At O.D. Of Propeller Gear)			.020 .028	.036



T10-541

(Accessory Drives)

SECTION IV
Integral Accessory Drive


GOV. DRIVEN
823
MAG DRIVE SHAFT GEAR
MAG COUPLING
836
SECTION D-D
GOV. DRIVE
SECTION B-B
827
ACC. IDLER
ACC. DRIVE GEAR INTER.
826
ACC. DRIVE
SECTION C-C
TOTAL BACKLASH 829
PROP. SHAFT DRIVEN
845
GOV. DRIVE
GOV. DRIVEN
CRANKSHAFT
842
B
B
A
A
D
D
MAG. DR. SHAFT GEAR
831
COMPRESSOR SHAFT
ACC. IDLER
C
C
838
828
CAMSHAFT
837
HYD. & VACUUM
834
835
830
STARTER DRIVE
STARTER
FUEL PUMP
IDLER
OIL PUMP
ALTERNATOR DR.
PROP SHAFT DRIVE GEAR
833
841
840
ALTERNATOR & STARTER
832
STARTER DRIVE SHAFT GEAR
STARTER COUPLING
CRANKSHAFT
CRANKSHAFT
825
CAMSHAFT
STARTER DRIVE
808
830
843
844
OIL PUMP DRIVE
OIL PUMP DRIVEN
STARTER MOTOR
SECTION A-A
VIEW D-D

SERVICE TABLE OF LIMITS

PART II INTEGRAL ACCESSORY DRIVE ENGINES

SECTION V SPECIAL TORQUE REQUIREMENTS

Ref. New	Ref. Old	Chart	Thread Size	Nomenclature	Torque Limits
900	829	AQ-AZ	3/8-24	Connecting Rod Nuts - Tighten To Length	2.255 - 2.256
903	840	AQ-AZ	3/8-24	Magneto - Nut (To attach drive member to magneto)	300 in. lbs.
904	839	AQ-AZ	10-32	Magneto - Plate Screws	15 in. lbs.
905	853	AQ-AZ	1/4-20	Rocker Box Screws	50 in. lbs.
907	830	AQ-AZ	18MM	Spark Plugs	420 in. lbs.
909	862	AQ		Alternator Pulley Nut	450 in. lbs.
		AZ		Alternator Quill Shaft Nut	474 in. lbs.
910	864	AQ-AZ	1/4-28	Alternator Output Terminal Nut	85 in. lbs.
911	865	AQ-AZ	10-32	Alternator Auxiliary Nut	30 in. lbs.
912		AQ-AZ	5/16-24	Starter Terminal Nut	2 in. lbs.
913	857	AQ-AZ	1/16-27 NPT	Piston Cooling Nozzle in Crankcase	100 in. lbs.
915	869	AQ-AZ	3/4-16	Oil Filter Bolt (AC Can & Element Type)	300 in. lbs.
		AQ-AZ	13/16-16	Oil Filter (Throw Away Type)	240 in. lbs.
		AQ-AZ	3/4-16	Converter Stud	720 in. lbs.
917		AQ-AZ	1.00-14	Oil Cooler Bypass Valve	300 in. lbs.
918		AQ-AZ	1 1/4-12	Oil Pressure Relief Valve	300 in. lbs.
919	871	AQ-AZ		Hose Clamps	45 in. lbs.
921		AQ-AZ	Exhaust V-Band Coupling Torque Data		

Coupling Size Tube OD	Avco Lycoming Part No.	Vendor Part No.	T-Bolt Split Type Locknut Torque In. Lbs.	1/4 In. Drilled Hex Nut With Safety Wire Torque In. Lbs.
2.00 in.	LW-12093-5	MVT69183-200	85	75
2.25 in.	LW-12093-6	MVT69183-225	85	75
2.25 in.	LW-12125-3	MVT69197-225	85	

922 — AZ — Turbocharger V-Band Torque Data

Turbocharger Model No.	V-Clamp Part No.	V-Clamp Diameter	Torque In. Lbs.
T18A21*	400500-925	9.25 in.	40-60

* - AiResearch turbocharger.

See latest edition of Service Instruction No. 1238 for assembly procedure.

923		AZ	2 1/16-12	Propeller Shaft Lock Nut	1000 FT. LBS.
924		AQ-AZ	7/16-20	Fuel Injector Nozzles (In Induction Housing)	210 in. lbs.
925	867	AQ-AZ	3/4-16	Compressor Drive Pulley Nut	240 in. lbs.

SERVICE TABLE OF LIMITS

PART II INTEGRAL ACCESSORY DRIVE ENGINES

SECTION V SPECIAL TORQUE REQUIREMENTS

Ref. New	Ref. Old	Chart	Thread Size	Nomenclature	Torque Limits
926	861	AZ	5/8-18	Starter Drive Shaft Gear Nut	900 in. lbs.
927	863	AQ-AZ	1/4	Bolts - Crankshaft Gear	96 - 120 in. lbs.
928		AQ-AZ	3/8-16	Cylinder Hold Down Studs (Crankcase Driving Torque)	100 in. lbs.
			1/2-13	Cylinder Hold Down Studs (Crankcase Driving Torque)	250 in. lbs.
929	858	AQ-AZ	3/8	Cylinder Hold Down Nuts	300 in. lbs.
			1/2	Cylinder Hold Down Nuts	600 in. lbs.
		Cylinder Hold Down Nut Tightening Procedure - See latest edition of Service Instruction No. 1029.			
932		AQ-AZ	5/16-18	Exhaust Transitions - Studs (Driving Torque)	100 in. lbs.
			3/8-16	Exhaust Transitions - Studs (Driving Torque)	200 in. lbs.

SECTION V SPRINGS

Ref. New	Ref. Old	Chart	Nomenclature	Avco Lyc. Part No.	Wire Dia.	Length At Comp. Length	Mfr. Min.	COMP. LOAD Mfr. Max.	Serv. Max.
950	800	AQ-AZ	Outer Valve Spring	LW-11798 76351	.192 .177	1.610 in. 1.610 in.	136 lb. 136 lb.	144 lb. 144 lb.	133 lb. min. 133 lb. min.
951	801	AQ-AZ	Auxiliary Valve Spring	LW-11799 76352	.148 .142	1.48 in. 1.48 in.	86 lb. 86 lb.	94 lb. 94 lb.	83 lb. min. 83 lb. min.
952	812	AQ-AZ	Oil Pressure Relief Valve Spring						
		Avco Lycoming Part Numbers	Identification: Dye	Identification: Free Length					
		68668	Purple	2.04	.054	1.30 in.	7.1 lb.	7.8 lb.	7.1 lb. min.
		LW-11713	White	2.12	.059	1.44 in.	10.79 lb.	11.92 lb.	10.5 lb. min.
		LW-11138	None	2.64	.051	1.44 in.	8.55 lb.	9.45 lb.	8.3 lb. min.
955	810	AQ-AZ	Fuel Drain Check Valve Spring		.047	.75 in.	5.50 lb.	6.50 lb.	5.35 lb. min.
956	807	AQ-AZ	Oil Filter Relief Valve Spring		.054	1.93 in.	3.05 lb.	3.55 lb.	3.00 lb. min.
957		AZ	Shroud Tube Spring		.105	2.09 in.	14 lb.	16 lb.	13 lb. min.
958	817	AQ-AZ	Pressurizing Valve Spring		.032	.455-.485	.65 lb.	.75 lb.	.63 lb. min.
959	816	AZ	Spring Between Crankshaft and Starter and Alternator Drive Gear		.13	1.40 in.	48 lb.	52 lb.	46 lb. min.
960		AZ	Alternator Drive Coupling Spring		.047	.83 in.	10 lb.	11 lb.	9 lb. min.

SERVICE TABLE OF LIMITS

STANDARD TORQUE

UNLESS OTHERWISE LISTED

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

TABLE I

BOLTS, SCREWS AND NUTS

Thread	Torque In. Lb.	Torque Ft. Lb.	Thread	Torque In. Lb.	Torque Ft. Lb.
10	49	------	1/2	900	75
1/4	96	------	9/16	1320	110
5/16	204	17	5/8	1800	150
3/8	360	30	3/4	3240	270
7/16	600	50			

THIN NUTS (1/2 DIA OF BOLT) - 1/2 LISTED TORQUE

TABLE II

PIPE PLUGS

Thread	Torque In. Lbs.
1/16-27 NPT	40
1/8-27 NPT	40
1/4-18 NPT	85
3/8-18 NPT	110
1/2-14 NPT	160
3/4-14 NPT	230
1-11 1/2 NPT	315

TABLE III

CRUSH TYPE ASBESTOS GASKETS

Thd. Pitch On Part To Be Tightened Threads Per Inch	ANGLE OF TURN Aluminum Asbestos	ANGLE OF TURN Copper Asbestos
8	135°	67°
10	135°	67°
12	180°	90°
14	180°	90°
16	270°	135°
18	270°	135°
20	270°	135°
24	360°	180°
28	360°	180°

NOTE

Install all crush type gaskets except the self centering type, with the unbroken surface against the flange of the plug or part being tightened against the seal. Turn the part until the sealing surfaces are in contact and then tighten to the angle of turn listed for the appropriate thread size.

NOTE: Lubricate Threads Unless Otherwise Specified.

TABLE IV

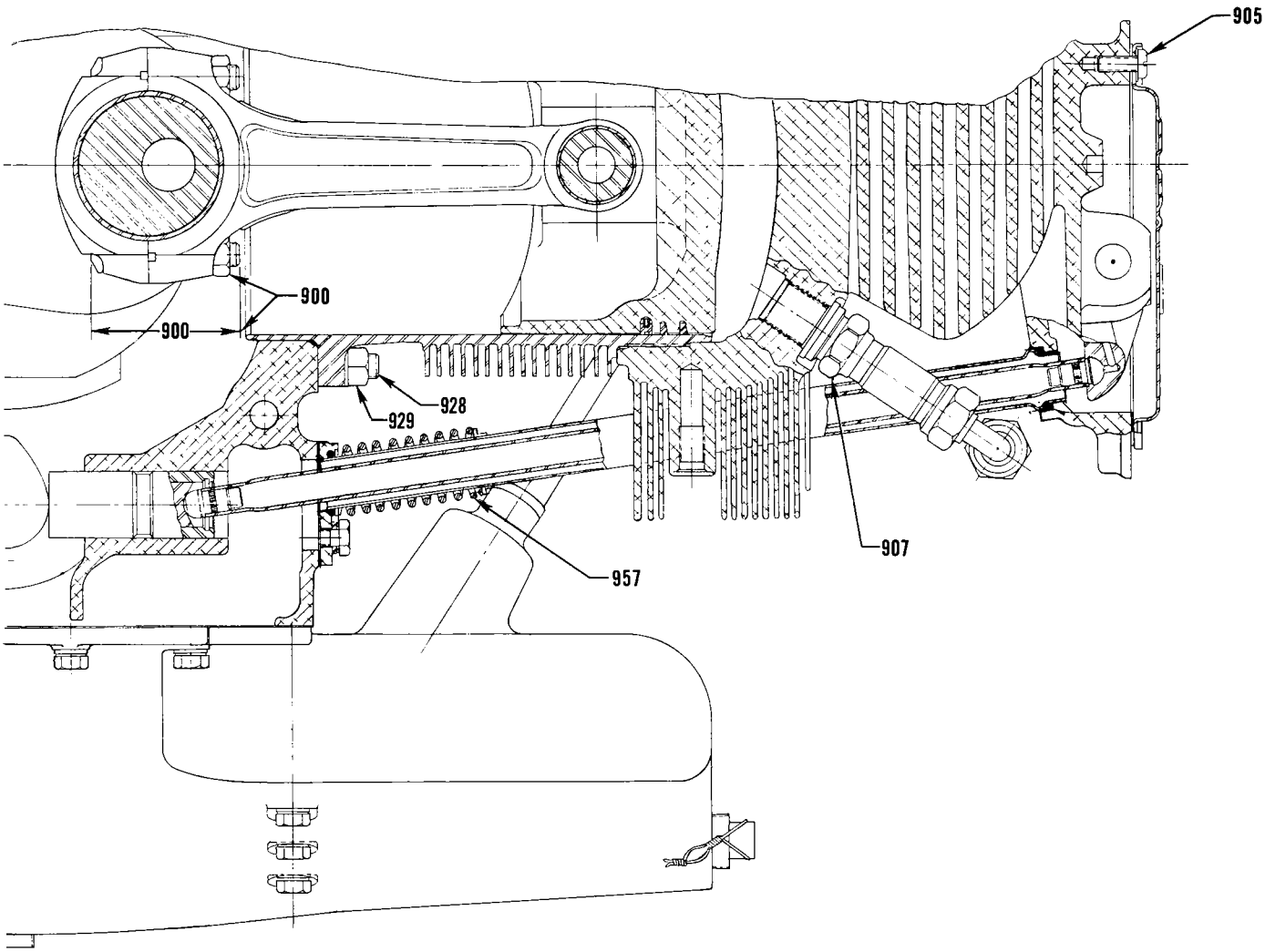
FLEXIBLE HOSE OR TUBE FITTINGS

Tube Size	Thread	Torque In. Lbs.
(-3) 3/16	3/8-24	30
(-4) 1/4	7/16-20	30
(-5) 5/16	1/2-20	35
(-6) 3/8	9/16-18	35
(-8) 1/2	3/4-16	60
(-10) 5/8	7/8-14	70

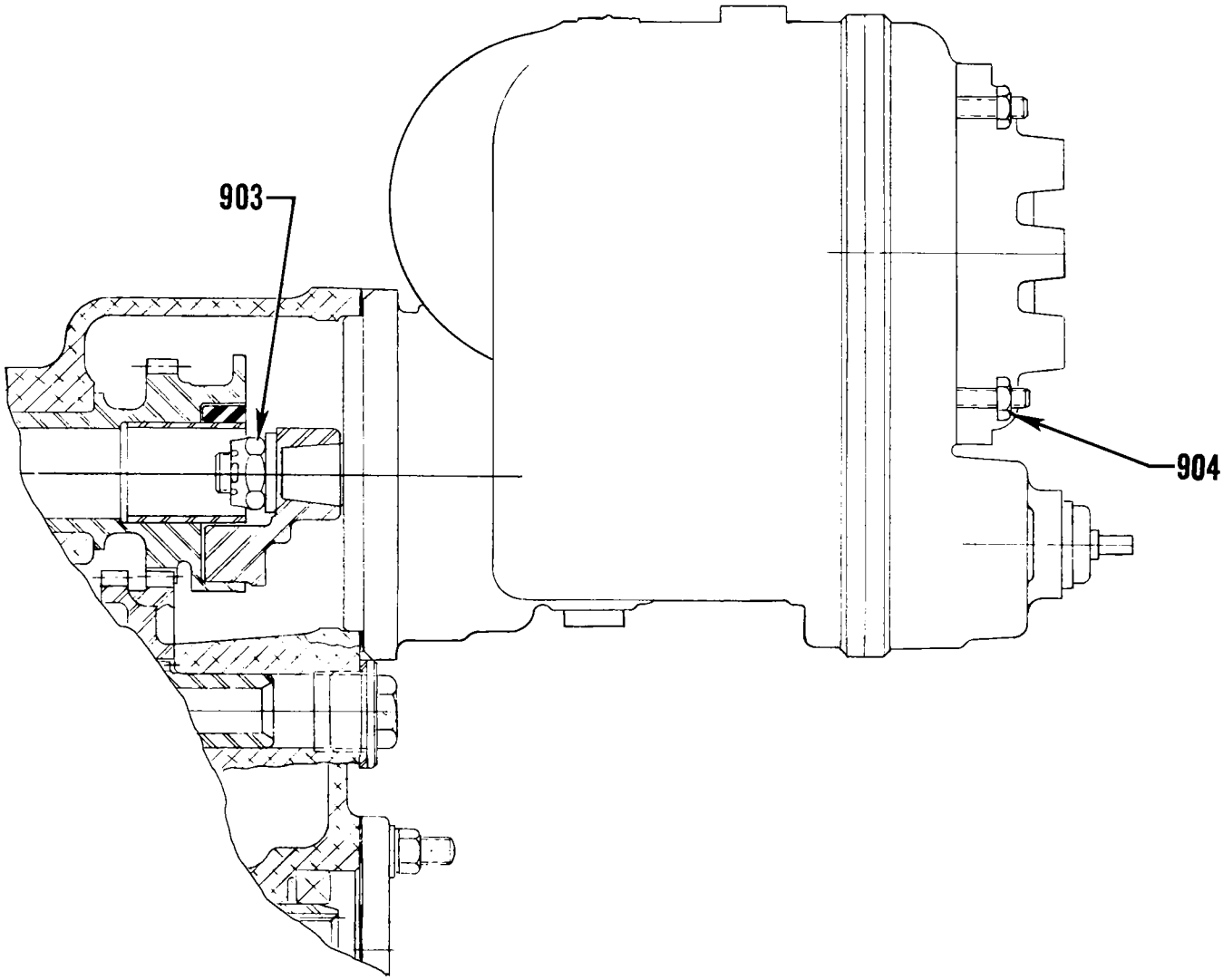
TABLE V

STUDS MIN. DRIVING TORQUE

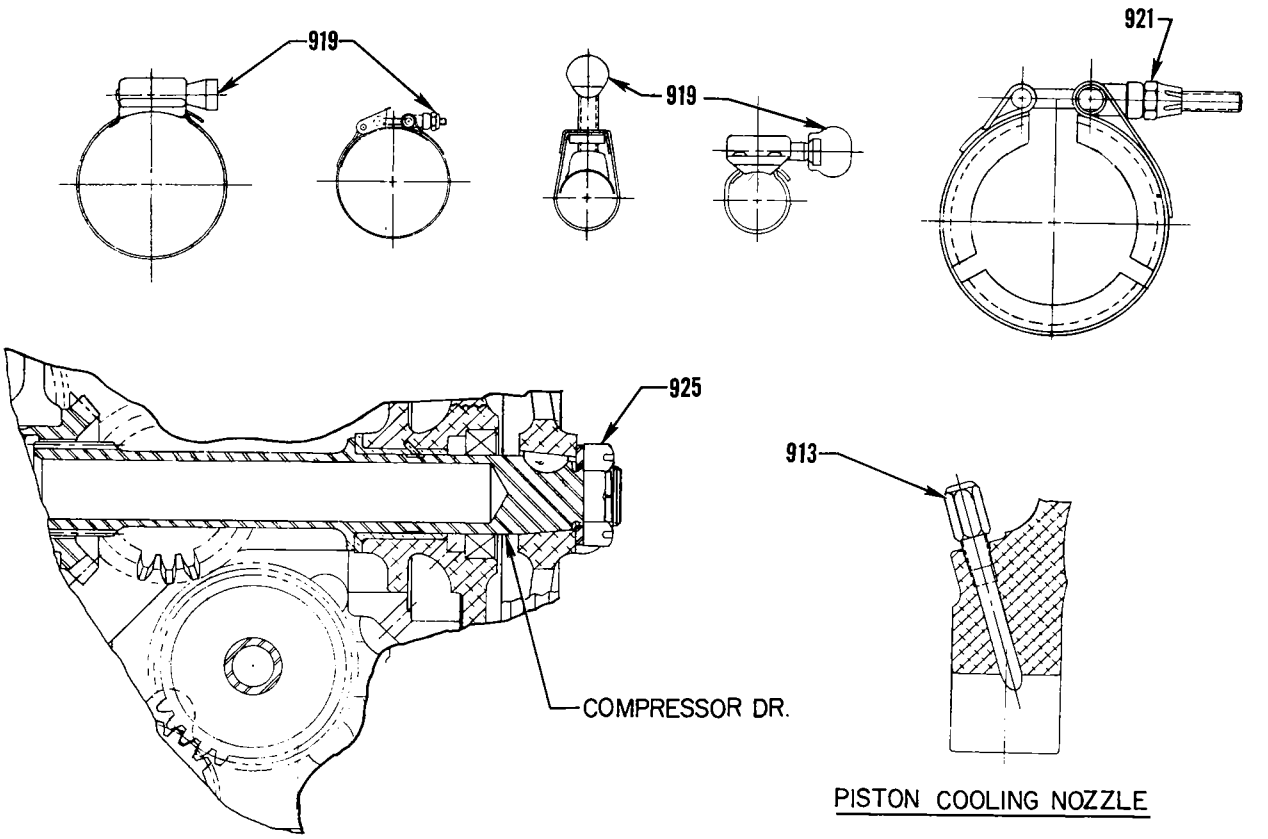
Threads	Torque In. Lb s.
1/4-20	15
5/16-18	25
3/8-16	50

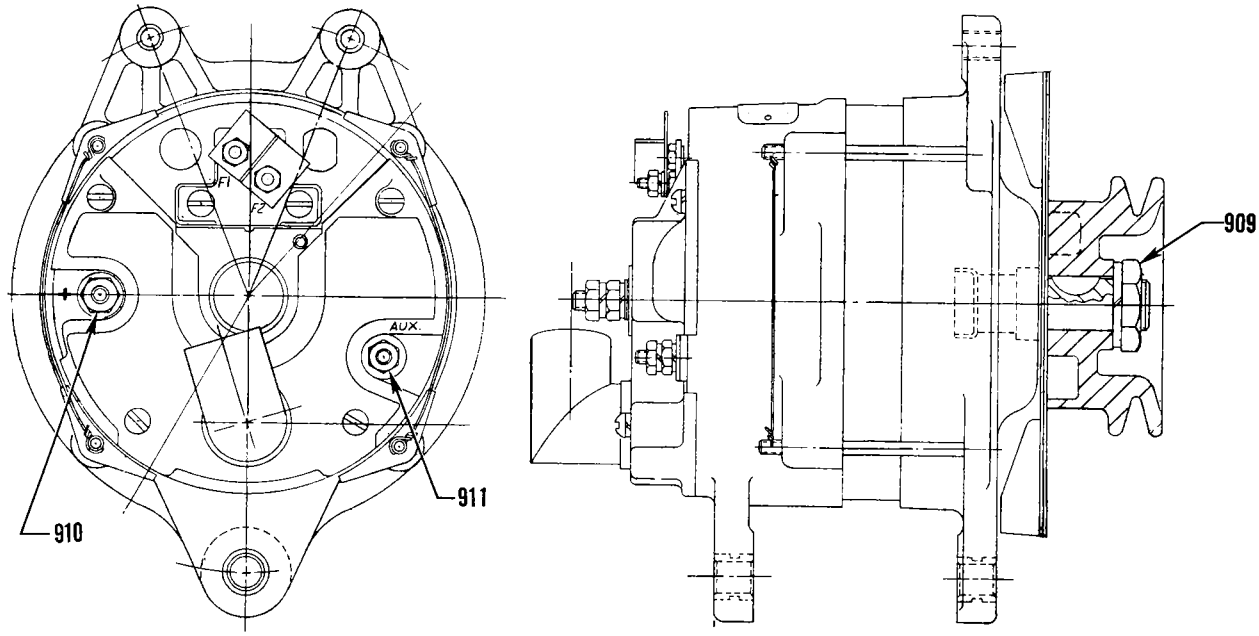


Engine Accessories and Hardware

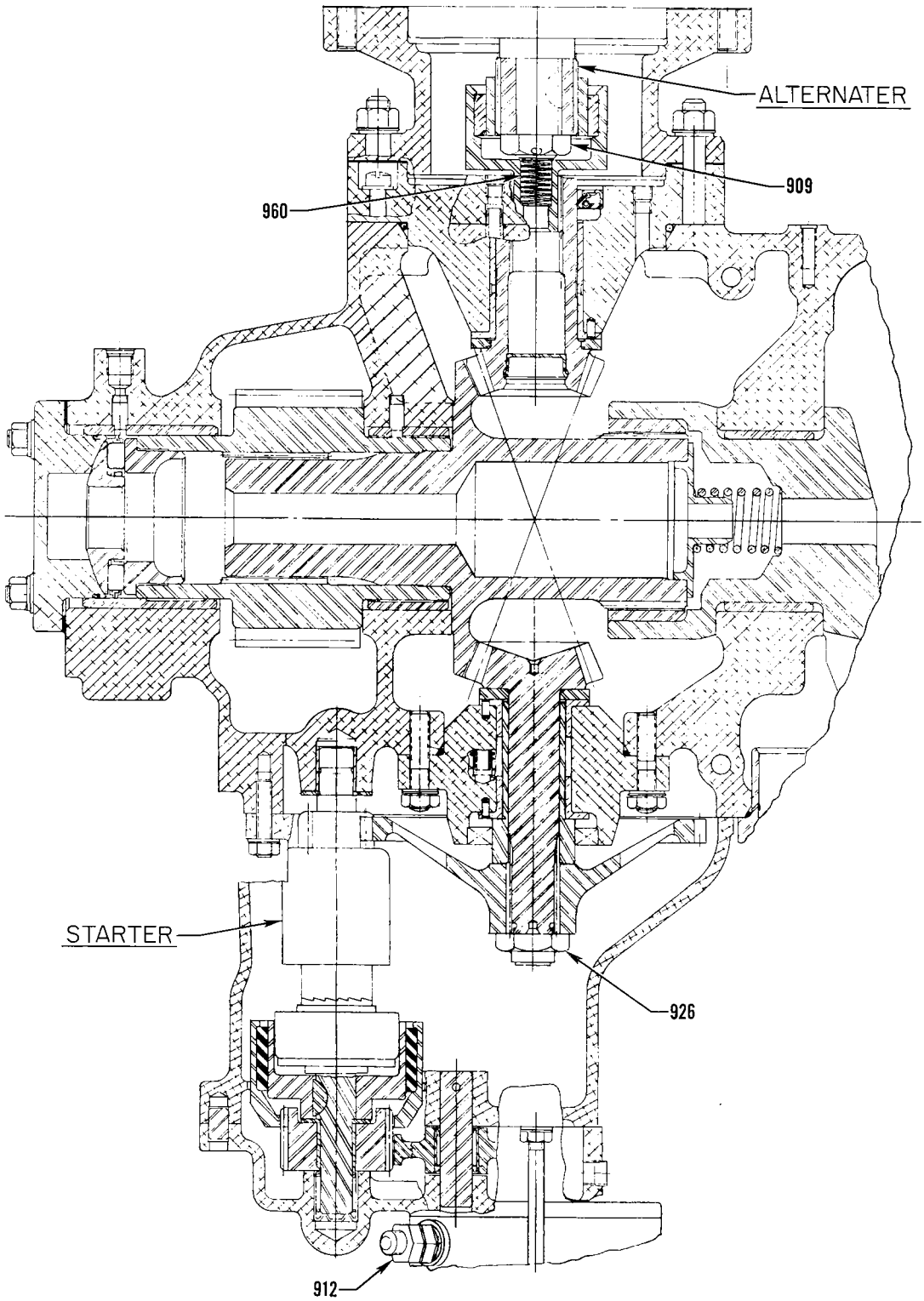


Engine Accessories and Hardware

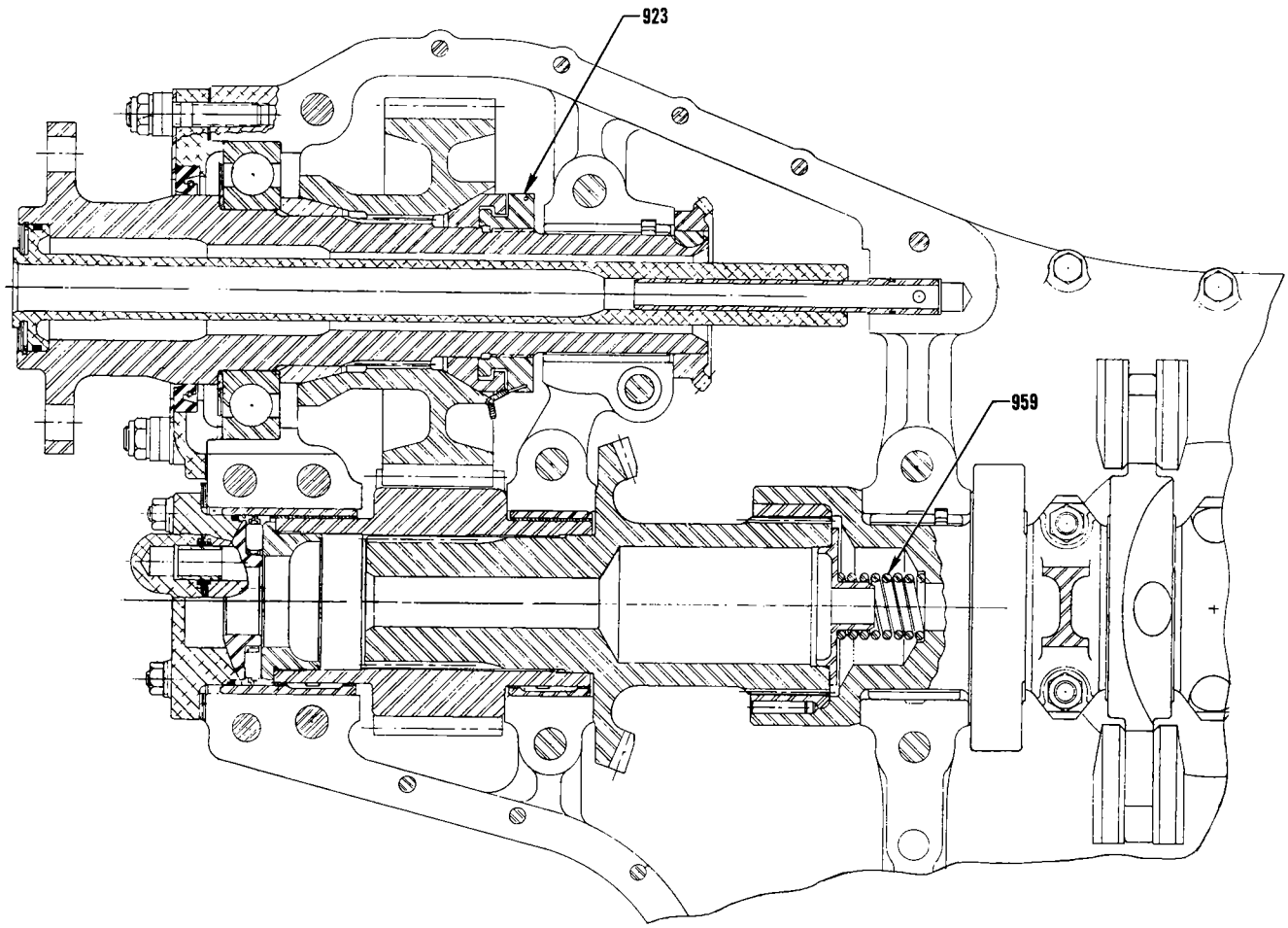


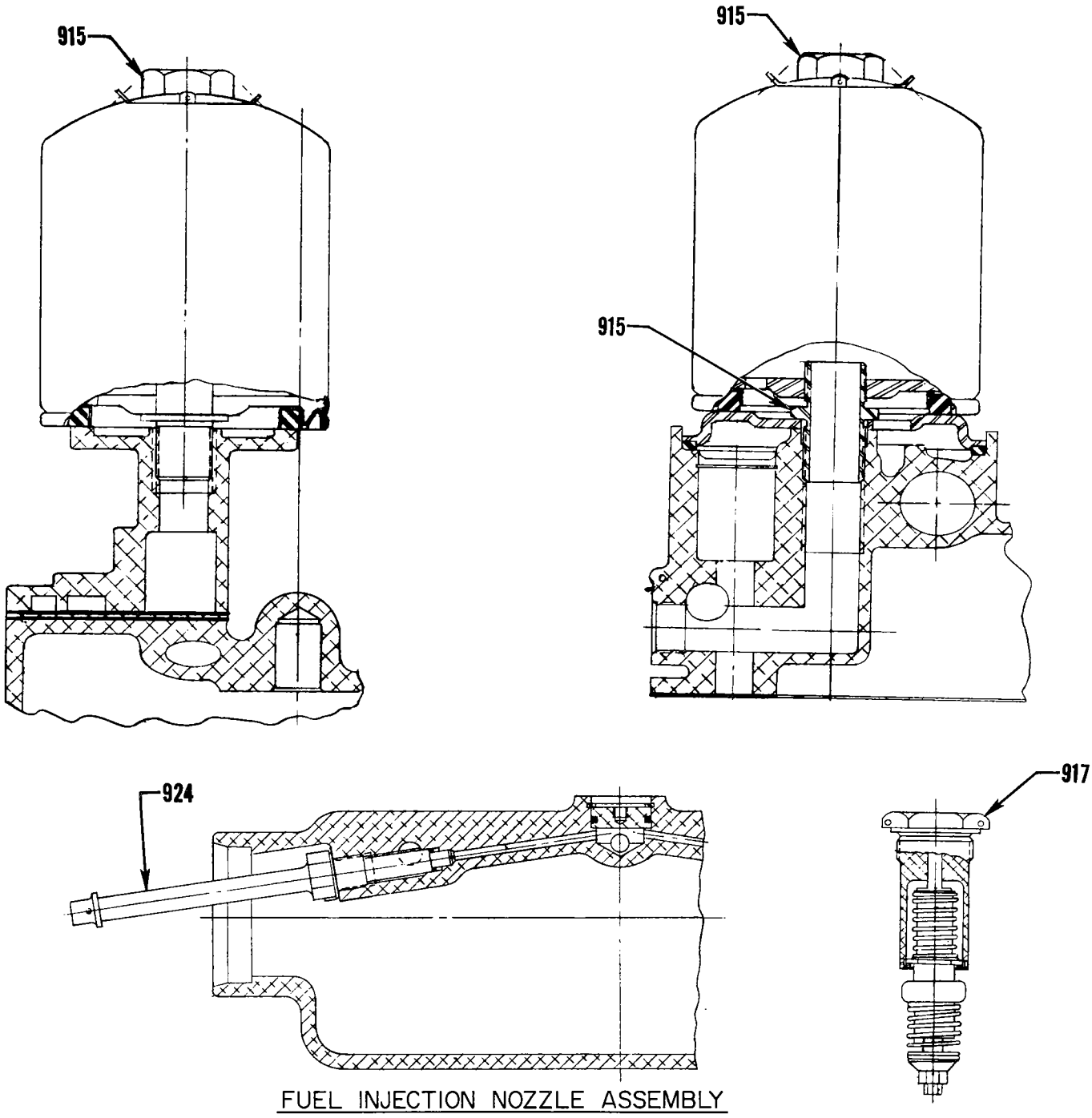


Engine Accessories and Hardware

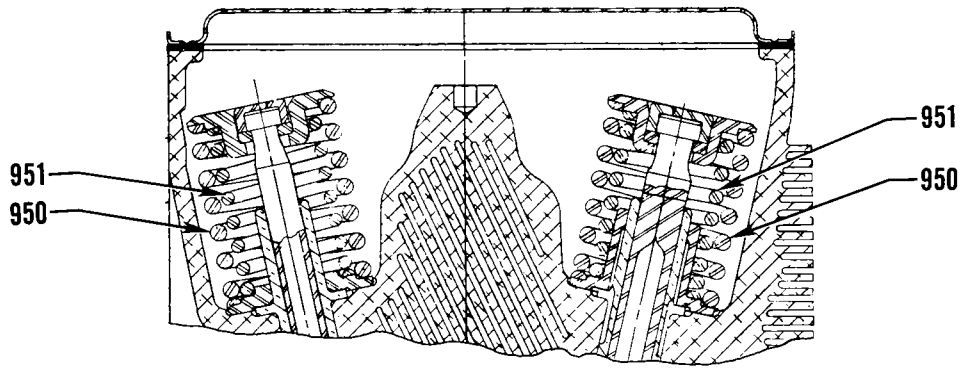


Engine Accessories and Hardware

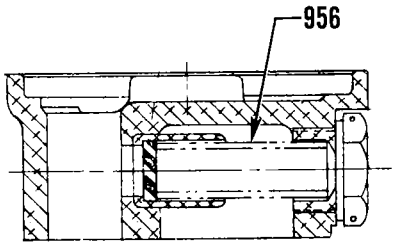

923
959



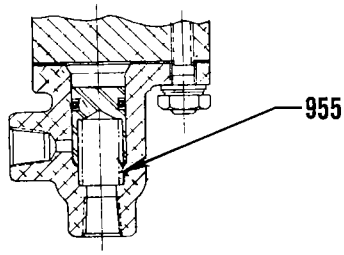
FUEL INJECTION NOZZLE ASSEMBLY

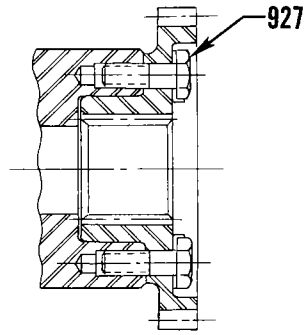


VALVE SPRINGS

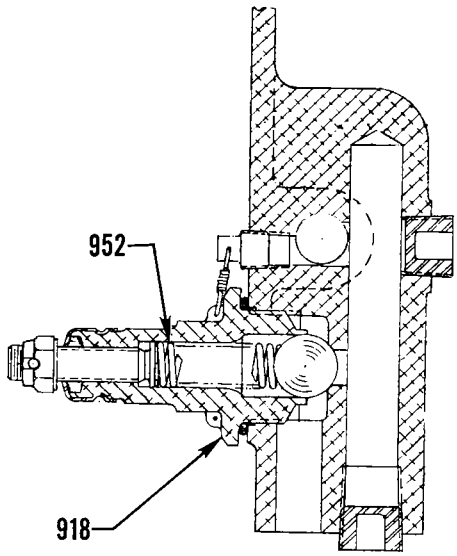


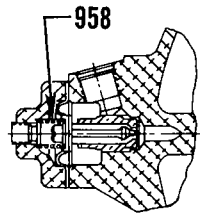
OIL RELIEF VALVE





FUEL DRAIN CHECK VALVE





OIL PRESSURE RELIEF VALVE

Engine Springs and Hardware

PART III GEARED ENGINES

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

NOTE

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

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

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

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

SERVICE TABLE OF LIMITS

PART III GEARED ENGINES

SECTION I CRANKCASE, CRANKSHAFT, CAMSHAFT

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
500	501	E-H1-H2-H4	All Main Bearings and Crankshaft			.0015L / .0045L	.0060L
		H3-H5-P-AB-AC	Main Bearings and Crankshaft (Except Front)			.0011L / .0041L	.0050L
		H3-H5-P-AB-AC	Front Main Bearings and Crankshaft			.0011L / .0041L	.0050L
		E-H-P	Diameter of Main Bearing Journal on Crankshaft	2.3745 / 2.376	(E)		
500	955	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	502	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)		
501	954	ALL	Connecting Rod Bearing Bore Diameter (Measured at axis 30° on each side)	2.2870 / 2.2875			
502	564	ALL	Connecting Rod Side Clearance			.004L / .010L	.016L
503	566	ALL	Connecting Rod Alignment			.010 in 10 Inches	
504	567	ALL	Connecting Rod Twist			.012 in 10 Inches	
505	556	ALL	Crankshaft Run-Out At Center Main Bearings				
			Mounted on No. 1 and 4 Journals Max. Run-Out No. 2 and 3 Journals			.005	.0075
			Mounted on No. 1 and 3 Journals Max. Run-Out No. 2 Journal			.003	.0045
			Mounted on No. 2 and 4 Journals Max. Run-Out No. 3 Journal			.003	.0045
506	568	ALL	Crankshaft and Crankcase Front End Clearance			.006L / .015L	.025L
510	504	E-H1-H2-H3	Crankshaft Timing Gear and Crankshaft			.0015L / .0005T	(A)
		H4-H5-P-AB-AC	Crankshaft Timing Gear and Crankshaft			.0000 / .0015T	(A)
511	536	ALL	Tappet Body and Crankcase			.0010L / .0033L	.004L

SERVICE TABLE OF LIMITS

PART III GEARED ENGINES

SECTION I CRANKCASE, CRANKSHAFT, CAMSHAFT

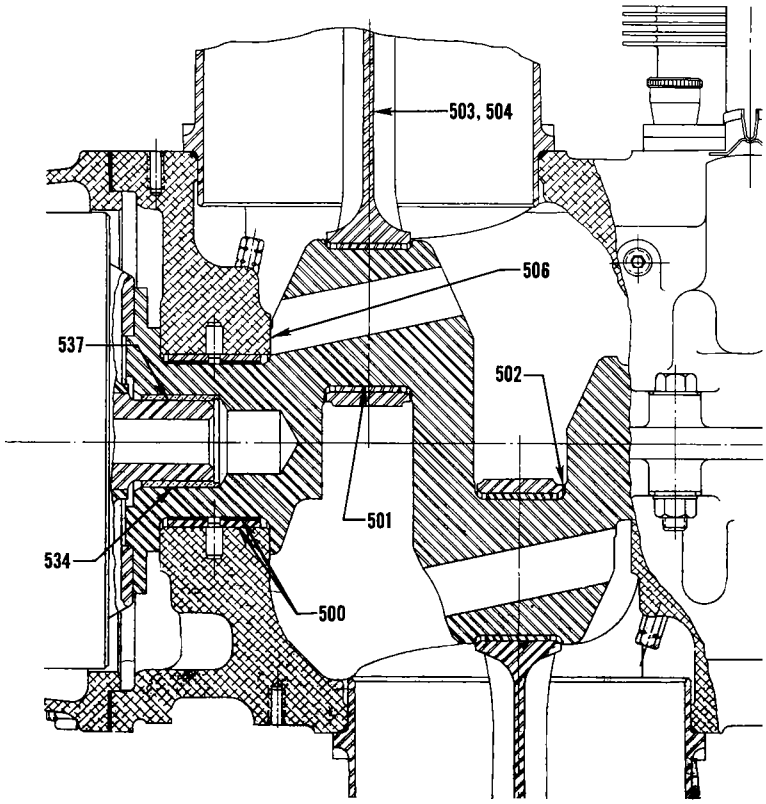
Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
511	536	ALL	O.D. of Tappet	.7169 / .7177	.7166		
511	536	ALL	I.D. Tappet Bore in Crankcase	.7187 / .7200	.7203		
512	559	ALL	Tappet Plunger Assembly and Body (Hyperbolic)			.0010L / .0067L	.0087L
513	560	ALL	Tappet Socket and Body (Hyperbolic)			.002L / .007L	.009L
514	537	ALL	Camshaft and Crankcase			.002L / .004L	.006L
515	538	ALL	Camshaft - End Clearance			.002L / .009L	.015L
516	539	ALL	Camshaft Run-Out At Center Bearing Journal			.000 / .001	.006
517	578	ALL	Counterweight Bushing and Crankshaft			.0013T / .0026T	(A)
518	579	ALL	Counterweight Roller - End Clearance			.007L / .025L	.038L
519	580	ALL	Counterweight and Crankshaft - Side Clearance*			.003L / .013L	.017L
		* Measure below roller next to flat.					
520	696	ALL	Counterweight Bore and Washer O.D.			.0002L / .0030L	(A)
521	775	ALL	I.D. of Counterweight Bushing	.7485 / .7505	.7512		
522	774	ALL	O.D. of Counterweight Roller (P/N 69433) (See latest edition of Service Instruction No. 1012)	.5045 / .5050			
		AC	O.D. of Counterweight Roller (P/N 73287) (See latest edition of Service Instruction No. 1012)	.5189 / .5194			
		ALL	O.D. of Counterweight Roller (P/N 70416) (See latest edition of Service Instruction No. 1012)	.6945 / .6950			
523	503	ALL	Thrust Bearing and Propeller Shaft			.0000 / .0012L	.002L
526	509	ALL	Thrust Bearing and Thrust Bearing Cap Clamp Fit (Shim to This Fit)			.003T / .005T	(A)
527	555	ALL	Thrust Bearing Tilt		.027 Tilt		

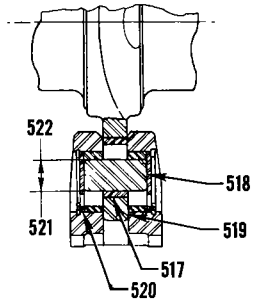
SERVICE TABLE OF LIMITS

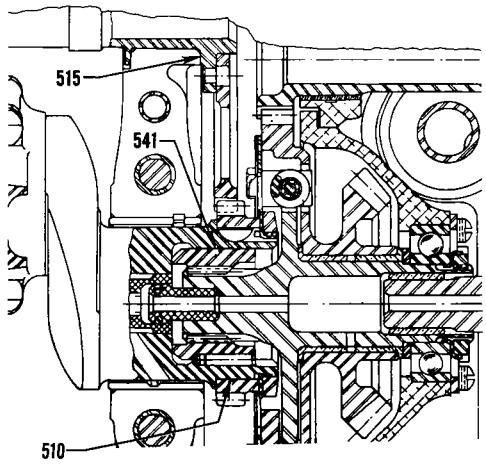
PART III GEARED ENGINES

SECTION I CRANKCASE, CRANKSHAFT, CAMSHAFT

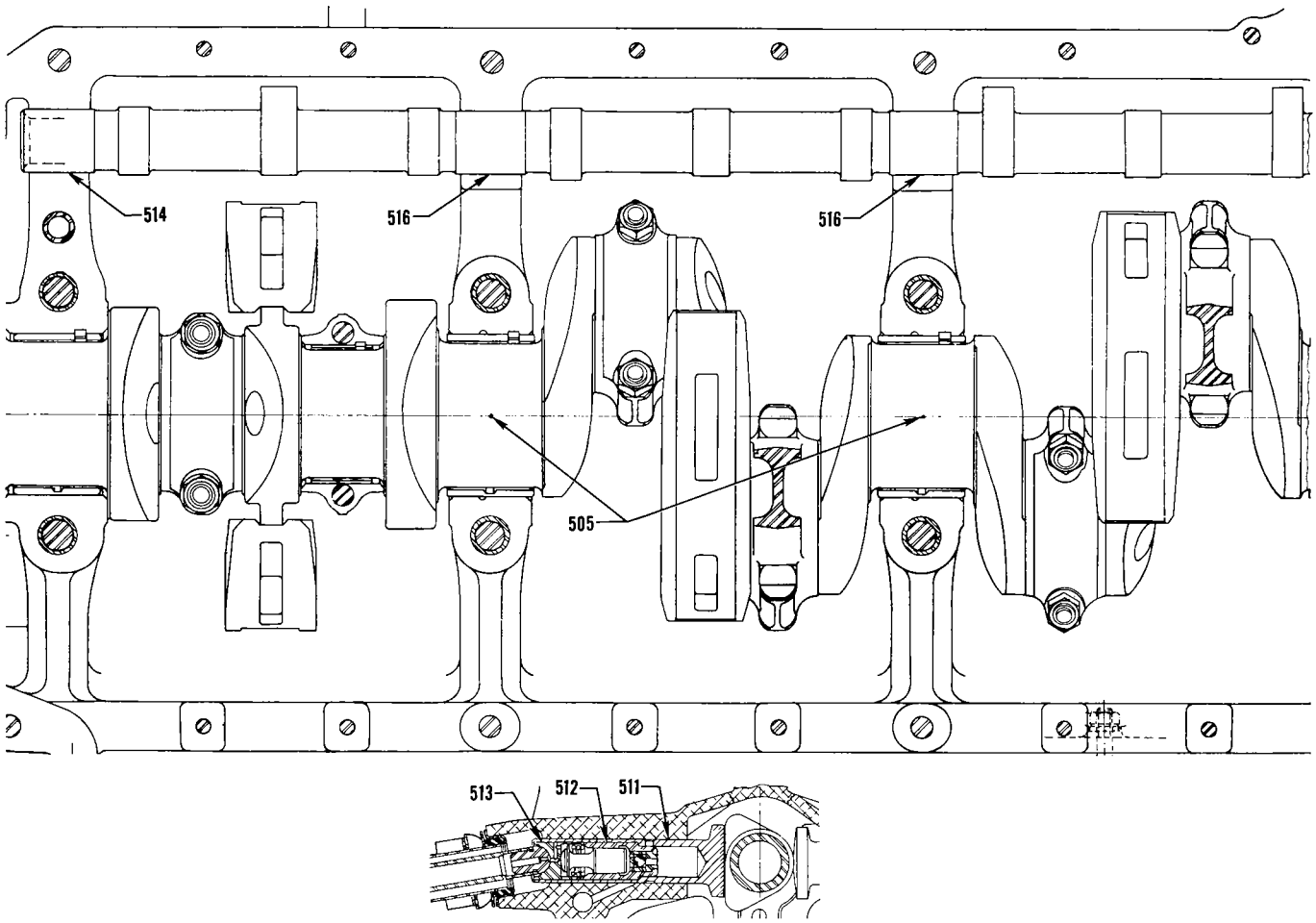
Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
528	555	ALL	Thrust Bearing - End Play			.006 / .008	.010
530	505	ALL	Propeller Shaft Run-Out (Rear Cone Location)				.003
531	506	ALL	Propeller Shaft Run-Out (Front Cone Location) (Propeller Shaft Installed)				.007
532	507	E-H1-H2-H3	Starter Jaw and Crankshaft			.0005L / .0040L	(A)
533	508	ALL	Thrust Bearing and Reduction Gear Housing			.0006L / .0024L	.0035L
534	569	ALL	Crankshaft and Crankcase Front Bushing			.0010T / .0025T	(A)
535	570	ALL	Pinion - End Clearance			.011 / .016	.030
536	571	ALL	Pinion Shaft and Cage (See latest edition of Service Instruction No. 1236)			.0001T / .0005T	
536	571	ALL	Pinion Shaft and Cage (See latest edition of Service Instruction No. 1114)			Select for Hand Push Fit (C) .002	
537	573	ALL	Propeller Shaft and Crankshaft Bushing			.0020L / .0035L	.005L
537	940	ALL	I.D. Propeller Shaft Bushing In Crankshaft	1.251 / 1.2525	1.253	This Diameter must be concentric with Front Main Bearing within .003 in. TIR.	
538	575	ALL	Stationary Gear and Plate - End Clearance			.000 / .004	.007
539	577	ALL	Ring Gear and Drive Plate - End Clearance			.000 / .004	.007
540	900	P-AB-AC	Reduction Gear Governor and Magneto Housing and Reduction Gear Housing Sleeve			.004T / .006T	(A)
541	718	H4-H5-P-AB-AC	Rear Crankshaft Spline Bushing and Crankshaft			.0002T / .0015T	(A)



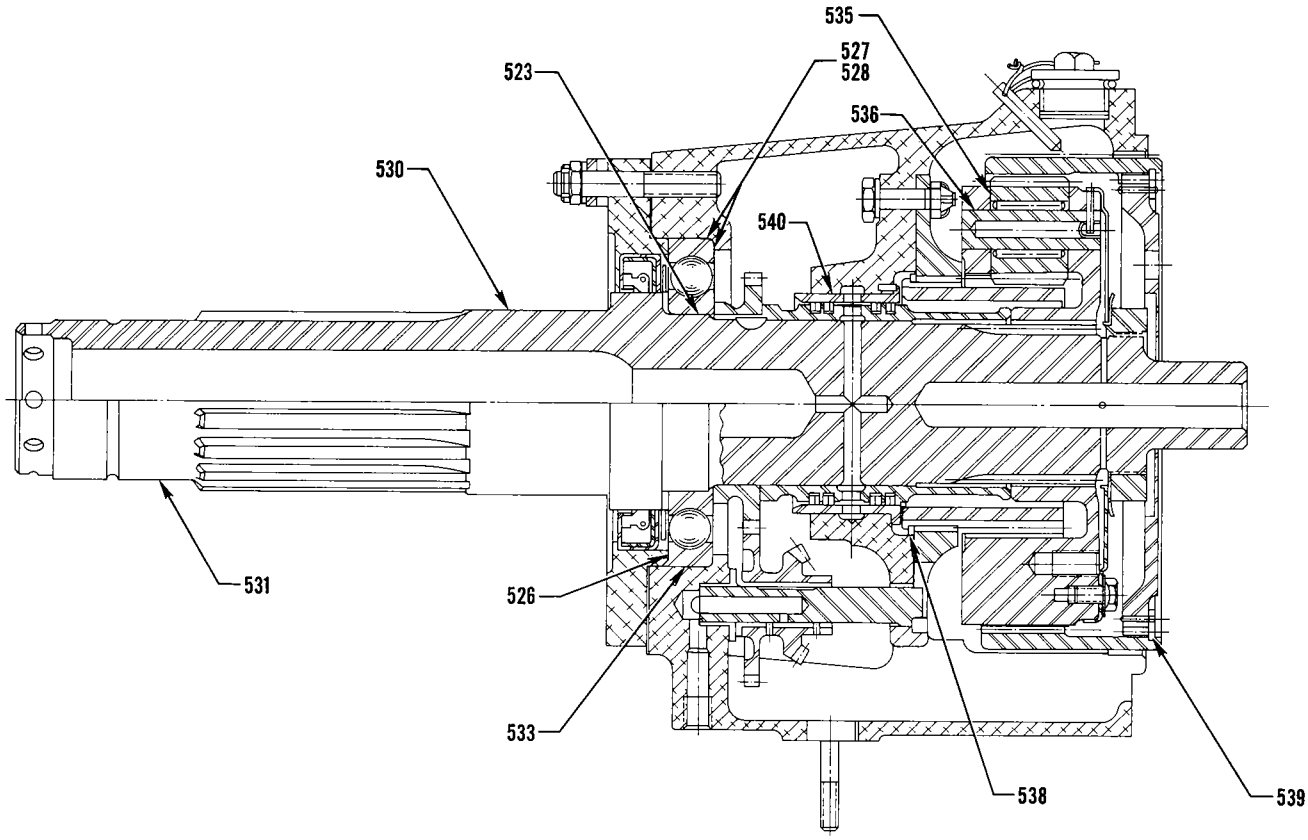




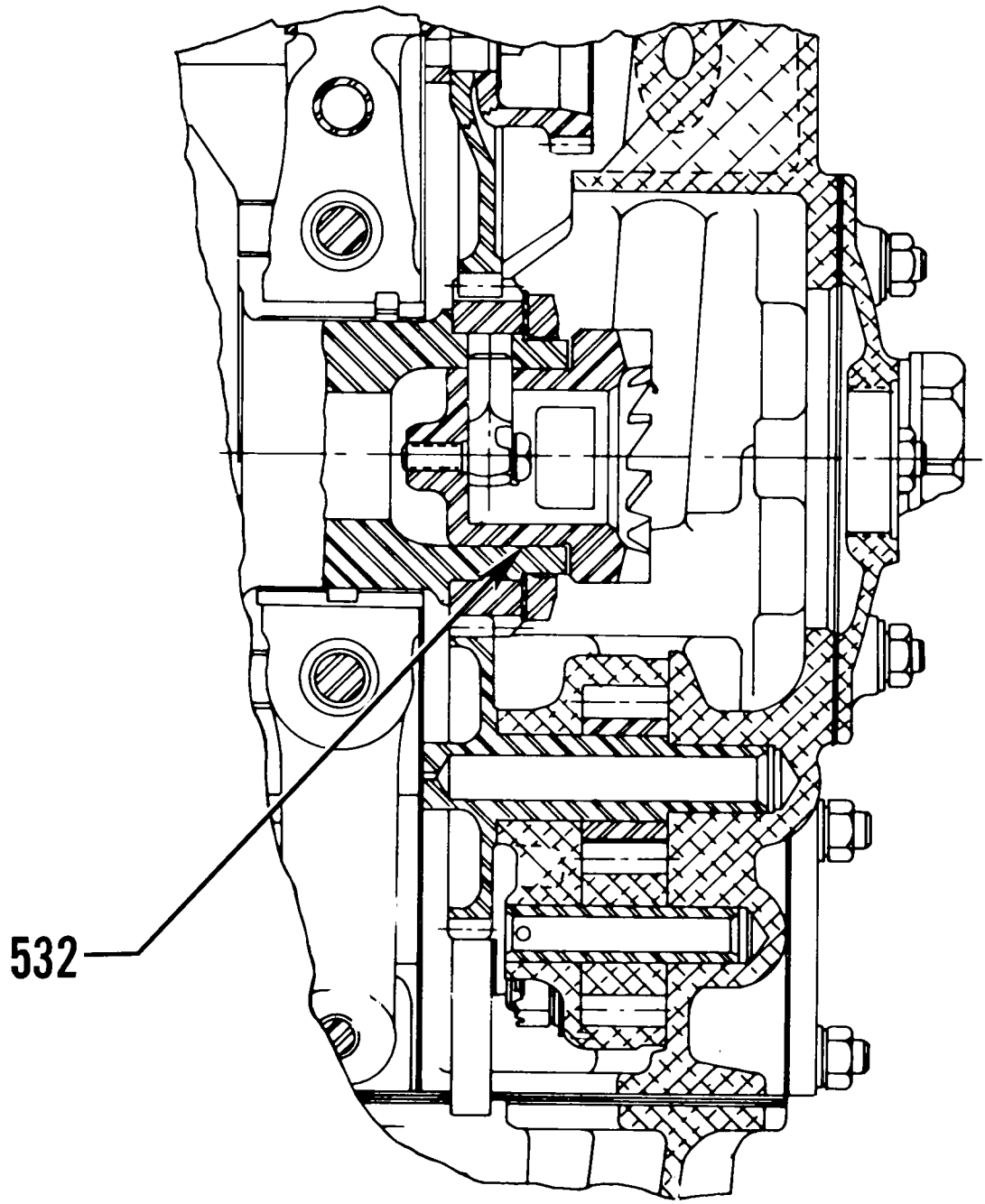
Crankcase, Crankshaft, Bearings, Camshaft,
Tappets and Counterweights



Longitudinal Section Thru Engine, Camshaft, Tappet Body and Crankshaft



Reduction Gear and Related Parts



Starter Jaw and Crankshaft

SERVICE TABLE OF LIMITS

PART III GEARED ENGINES

SECTION II CYLINDERS

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
600	510	ALL	Connecting Rod and Connecting Rod Bushing	Bushing To Be Burnished In Place			
			Finished I.D. of Connecting Rod Bushing	1.1254 / 1.1262			
601	510	E-H-P	Length Between Connecting Rod Bearing Centers	6.4985 / 6.5015			
		AB-AC	Length Between Connecting Rod Bearing Centers	6.4785 / 6.7515			
602	511	ALL	Connecting Rod Bushing and Piston Pin			.0008L / .0021L	.0025L
603	512	ALL	Piston Pin and Piston			.0003L / .0014L	.0018L
		ALL	Diameter of Piston Pin Hole in Piston	1.1249 / 1.1254			
		ALL	Diameter of Piston Pin	1.1241 / 1.1246			
604	513	H-P-AB-AC	Piston and Piston Pin Plug			.0002L / .0010L	.002L
		H-P-AB-AC	*Diameter of Piston Pin Plug	1.1242 / 1.1247			
605	513	ALL	Piston Pin and Piston Pin Plug (Optional)			.0005L / .0025L	.005L
		H-P-AB-AC	*Diameter of Piston Pin Plug	.5655 / .5665			
		E	Diameter of Piston Pin Plug (Thin Wall Pin)	.8405 / .8415			
		* See latest edition of Service Instruction No. 1267.					
606	514	ALL	Piston Ring and Piston - Side Clearance (Top Ring Comp.) Half Wedge			.0025L / .0055L	.008L(B)
606	515	ALL	Piston Ring and Piston - Side Clearance (2nd Ring Comp.) Full or Half Wedge			.000 / .004L	.006L(B)
		ALL (AS APPLICABLE)	Piston Ring and Piston - Side Clearance (3rd Ring Comp.) Half Wedge			.000 / .004L	.006L(B)
606	516	ALL	Piston Ring and Piston - Side Clearance (Oil Regulating)			.002L / .004L	.006L(B)
	517	ALL (AS APPLICABLE)	Piston Ring and Piston - Side Clearance (Oil Scraper)			.003L / .0055L	.007L(B)

SERVICE TABLE OF LIMITS

PART III GEARED ENGINES

SECTION II CYLINDERS

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions Mfr. Min. & Max.	Dimensions Serv. Max.	Clearances Mfr. Min. & Max.	Clearances Serv. Max.
607	615	ALL	Piston Ring Gap (Compression) Plain and Chrome Cylinders (Straight Barrels)			.020 / .030	.047
		ALL	Piston Ring Gap (Compression) Nitrided and Chrome Cylinders (Choke Barrels)			.045 / .055	.067
		ALL	Piston Ring Gap (Oil Regulating) (All Barrels)			.015 / .030	.047
		ALL (AS APPLICABLE)	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.

Ref. New	Ref. Old	Engine and Piston Application: Engine Chart Code Letter	Engine and Piston Application: Piston Number	Min. Piston Diameter: Top	Min. Piston Diameter: Bottom	Type of Piston	Cylinder Barrel: Type of Surface	Cylinder Barrel: Maximum Diameter	Max. Clearance Piston Skirt & Cyl.
608	519	E	67266, 71553	4.8395	4.8540	Forged-Round	P	4.8805	.018L
608	522	E	73620, 73628	4.8395	4.8540	Forged-Round	N	4.8805	.018L
609	520	E	67266, 71553, 73620, 73628, 73932	4.8395	4.8540	Forged-Round	C	4.8805	.0225L
610	521	E	75984	4.8395	4.8590	Forged-Cam	C-N	4.8805	.018L
		H-P	69236	5.0905	5.1040	Forged-Round	P-C	5.1305	.0225L
		H-P	71545, 71608*	5.0905	5.1025	Forged-Round	C	5.1305	.024L
		H-P-AB-AC	71940, 72249*, 72578, 73947*, 73976	5.0905	5.1040	Forged-Round	C	5.1305	.0225L
		H-AC	71940, 72249*, 73947*, 73976	5.0905	5.1040	Forged-Round	N	5.1305	.023L
		H-P-AB	74242, 75617*	5.0790	5.1090	Forged-Cam	C	5.1305	.018L
		H-P-AB-AC	74242, 76258*	5.0790	5.1090	Forged-Cam	N	5.1305	.018L
		AC	75617*, 76258*	5.0790	5.1090	Forged-Cam	C-N	5.1305	.018L
		H-P-AB-AC	73264*, 75961, 76966, 78203*, 78762, LW-10207*, LW-10208, LW-10545	5.0790	5.1090	Forged-Cam	C-N	5.1305	.018L

NOTES:

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: P=Plain steel, N=nitride hardened, C=chrome plated.

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.

Maximum taper and out-of-round permitted for cylinder in service is .0045 inch.

See Service Instruction No. 1243 for identification of cast and forged pistons. The suffix "S" that will be found with the part number on 73947, 74242, 75984, 75961, 76966, 78203, 78762, LW-10207, LW-10208, LW-10545 pistons indicates the piston weight is within the limits specified for any group of pistons and may be substituted for any like piston on a particular engine. Other pistons are manufactured within weight limits that do not require any weight controlled piston for replacement.

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. See Service Instruction No. 1243 for illustration.

SERVICE TABLE OF LIMITS

PART III GEARED ENGINES

SECTION II CYLINDERS

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
611	523	ALL	Exhaust Valve Seat and Cylinder Head			.0075T / .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	524	ALL	Intake Valve Seat and Cylinder Head			.0065T / .010T	(A)
		E-H-P	O.D. Intake Seat	2.1675 / 2.169			
		AB-AC	O.D. Intake Seat	2.2885 / 2.290			
		E-H-P	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	526	ALL	Exhaust Valve Guide and Cylinder Head			.001T / .0025T	(A)
	527	ALL	O.D. Exhaust Valve Guide	.6633 / .6638			
		ALL	I.D. Exhaust Valve Guide Hole in Cylinder Head	.6613 / .6623			
614	527	ALL	Intake Valve Guide and Cylinder Head			.001T / .0025T	(A)
		ALL	O.D. Intake Valve Guide	.5933 / .5938			
		ALL	I.D. Intake Valve Guide Hole in Cylinder Head	.5913 / .5923			
615	528	ALL	Exhaust Valve Stem and Valve Guide			.0037L / .0050L	
		ALL	O.D. Exhaust Valve Stem	.4957 / .4965	.4937		
				Service allowable limits of .4937 is applicable only to inconel or nimonic valves.			
	527	ALL	Finished I.D. Exhaust Valve Guide	.4995 / .5005			
		1/2 inch diameter exhaust valves may have exhaust valve guides that are .003 inch over the maximum inside diameter limit, anytime up to 300 hours of service. After 300 hours of service, inside diameter of exhaust valve guide may increase .001 inch during each 100 hours of operation up to the recommended overhaul time for the engine, or not to exceed .015 inch over the basic I.D. See latest edition of Service Instruction No. 1009 for recommended overhaul time.					

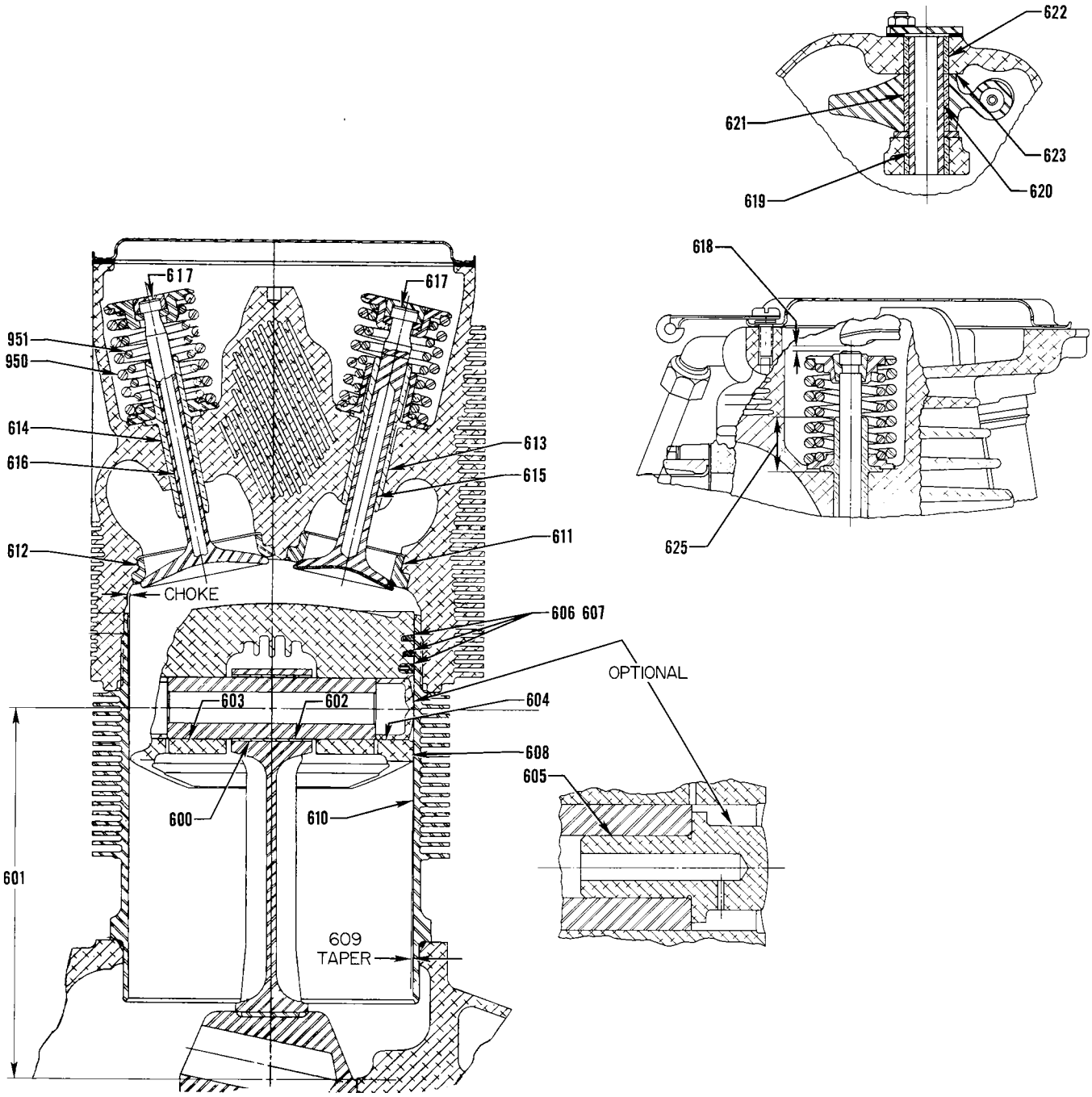
SERVICE TABLE OF LIMITS

PART III GEARED ENGINES

SECTION II CYLINDERS

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
616	529	ALL	Intake Valve Stem and Valve Guide			.0010L / .0028L	.006L
		ALL	O.D. Intake Valve Stem	.4022 / .4030	.4010		
		ALL	Finished I.D. Intake Valve Guide	.4040 / .4050			
617	951	ALL	Valve and Valve Cap Clearance			.000 / .004L	.005L
618	952	ALL	Dry Tappet Clearance			.028 / .080	
619	611	ALL	Valve Rocker Shaft and Valve Rocker Bushing			.0001L / .0013L	.0025L
		ALL	Finished I.D. of Valve Rocker Shaft (Bushing) in Cylinder Head	.6246 / .6261	.6270		
620	531	ALL	Valve Rocker Shaft and Valve Rocker Bushing			.0007L / .0017L	.004L
		ALL	O.D. Valve Rocker Shaft	.6241 / .6245	.6231		
		ALL	Finished I.D. of Rocker Arm Bushing	.6252 / .6263	.6270		
621	532	ALL	Valve Rocker Bushing and Valve Rocker	Bushing Must Be Burnished In Place			
622	612	ALL	Valve Rocker Shaft Bushing and Cylinder Head			.0022T / .0038T	(A)
		ALL	Valve Rocker Shaft Bushing Hole in Cylinder Head	.7380 / .7388			
623	533	ALL	Valve Rocker and Cylinder Head - Side Clearance			.002L / .020L	.024L
625	971	ALL	Intake and Exhaust Valve Guide Height	.914 / .954			

MEASURE VALVE GUIDE HEIGHT FROM THE VALVE SPRING SEAT COUNTERBORE IN THE CYLINDER HEAD TO THE TOP OF VALVE GUIDE.



Cylinder, Piston, Connecting Rod and Valve Components

SERVICE TABLE OF LIMITS

PART III GEARED ENGINES

SECTION III GEAR TRAIN SECTION - OIL & SCAVENGE PUMP

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
700	545	E-H1-H2-H3	Oil Pump Drive Gear and Oil Pump Body			.0010L / .0025L	.004L
701	545	E-H1-H2-H3	Oil Pump Drive Gear and Accessory Housing			.0015L / .0030L	.006L
702	546	E-H1-H2-H3	Oil Pump Drive Gear - End Clearance			.008L / .042L	.060L
		H4-H5-P-AB-AC	Oil Pump and Scavenge Pump Gear - End Clearance			.007L / .030L	.045L
703	542	E-H1-H2-H3	Oil Pump Impeller - Diameter Clearance			.002L / .005L	.008L
703	542	H4-H5-P-AB-AC	Oil Pump and Scavenge Pump Impellers - Diameter Clearance			.007L / .011L	.014L
704	543	E-H1-H2-H3	Oil Pump Impeller - Side Clearance			.002L / .0045L	.005L
704	543	H4-H5-P-AB-AC	Oil Pump and Scavenge Pump Impellers - Side Clearance			.003L / .0055L	.006L
704	543	E-H1-H2-H3	Width of Oil Pump Impellers	.747 / .749	.746		
704	543	H4-H5-P-AB-AC	Width of Oil Pump Impellers	.995 / .997	.994		
704	543	H4-H5-P-AB-AC	Width of Oil Scavenge Pump Impellers	1.496 / 1.498	1.495		
705	544	E-H1-H2-H3	Oil Pump Driven Impellers and Idler Shaft			.0010L / .0025L	.004L
705	544	H4-H5-P-AB-AC	Oil Pump and Oil Scavenge Pump Driven Impellers and Idler Shaft			.0010L / .0025L	.004L
706	558	E-H1-H2-H3	Oil Pump Idler Shaft and Oil Pump Body			.0000 / .0025T	(A)
706	558	H4-H5-P-AB-AC	Oil Pump Idler Shaft and Oil Pump Body			.0000 / .0015T	(A)
707	602	E-H1-H2-H3	Oil Pump Idler Shaft and Accessory Housing			.0005L / .0025L	.0035L
713	739	H4-H5-P-AB-AC	Oil Pump Idler Shaft and Scavenge Pump Body			.0000 / .0015T	(A)
777	697	H4-H5-P-AB-AC	Oil Pump Drive Shaft Bushing and Scavenge Pump Body			.001T / .003T	(A)
778	698	H4-H5-P-AB-AC	Oil Pump Drive Shaft Bushing and Oil Pump Body			.001T / .003T	(A)
779	699	H4-H5-P-AB-AC	Oil Pump Drive Shaft Bushing and Oil Pressure and Scavenge Pump Gear			.0015L / .0035L	.005L
780	700	H4-H5-P-AB-AC	Oil Pump Drive Shaft Bushing and Oil Pump Shaft			.0015L / .0035L	.005L

SECTION III Geared

SERVICE TABLE OF LIMITS

PART III GEARED ENGINES

SECTION III GEAR TRAIN SECTION - FUEL PUMP

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
727	587	E-H1-H2-H3	Fuel Pump Drive Gear - End Clearance			.016L / .045L	.065L
781	586	E-H1-H2-H3	Fuel Pump Drive Gear and Accessory Housing			.0010L / .0030L	.005L
782	701	H4-H5-P-AB-AC	Fuel Pump Drive Gear Bushing and Accessory Housing			.001T / .004T	(A)
783	702	H4-H5-P	Fuel Pump Drive Shaft Gear - End Clearance			.006L / .064L	.074L
784	763	H4-H5-P	Fuel Pump Drive Shaft Gear and Bushing			.001L / .004L	.006L
785	778	P1	Injector Drive Gear and Accessory Housing Cover Bushing			.0036L / .0048L	.006L
786	779	P1	Injector Drive Gear - End Clearance			.002L / .020L	.030L
787	781	P1	Injector Idler Gear and Magneto Idler Ball Bearing			.0005T / .0004L	(A)
788	782	P1	Injector Idler Shaft and Magneto Idler Ball Bearing			.0001T / .0005L	(A)
789	926	AB	Injector Drive Shaftgear and Accessory Housing Bushing			.001L / .003L	.005L
790	926	AC	Fuel Pump Drive Shaftgear and Accessory Housing Bushing			.001L / .003L	.005L
791	933	AB	Injector Drive Shaftgear - End Clearance			.006 / .036	.048
792	933	AC	Fuel Pump Drive Shaftgear - End Clearance			.006 / .036	.048
		SECTION III GEAR TRAIN SECTION - VACUUM & TACHOMETER					
737	589	E-H1-H2-H3	Vacuum Pump Gear and Accessory Housing			.0010L / .0025L	.006L
738	590	E-H1-H2-H3	Vacuum Pump Gear - End Clearance			.016L / .045L	.065L
		New Reference No. 739 to follow New Reference No. 7000.					
793	731	H4-H5-P	Vacuum Pump Shaftgear Bushing and Accessory Housing Cover			.0015T / .0035T	(A)
794	732	H4-H5-P	Vacuum Pump Shaftgear Bushing (At Cover) and Vacuum Pump Shaftgear			.002L / .004L	.006L
795	733	H4-H5-P	Vacuum Pump Shaftgear Bushing and Accessory Housing			.0015T / .0035T	(A)
796	734	H4-H5-P	Vacuum Pump Shaftgear Bushing (At Accessory Housing) and Vacuum Pump Shaftgear			.0020L / .0045L	.006L

SERVICE TABLE OF LIMITS

PART III GEARED ENGINES

SECTION III GEAR TRAIN SECTION - VACUUM & TACHOMETER (CONT.)

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
797	735	H4-H5-P	Vacuum Pump Shaftgear - End Clearance			.008 .030	.050
798	934	AB-AC	Vacuum Pump Drive Gear and Vacuum Pump Spline Coupling - End Clearance			.008 .045	.065
799	935	AB-AC	Vacuum Pump Drive Gear Bushing and Accessory Housing			.001T .003T	(A)
7000	936	AB-AC	Vacuum Pump Drive Gear Bushing and Vacuum Pump Drive Gear			.002L .004L	.006L
739	540	E-H1-H2-H3	Tachometer Drive Gear and Accessory Housing			.0010L .0025L	.006L
7001	541	E-H1-H2-H3	Tachometer Drive Gear - End Clearance			.000 .030L	.040L
7002	565	E-H1	Tachometer Driven Gear and Adapter			.0015L .0035L	.005L
7003	603	E-H1	Tachometer Cover and Adapter			.001T .003T	(A)
7004	606	E-H1	Tachometer Gear - End Clearance			.001L .040L	.060L
7005	683	H1-H2-H3	Electric Tachometer Idler Gear - End Clearance			.005L .052L	.065L
7006	684	H1-H2-H3	Electric Tachometer Driven Gear - End Clearance			.005L .027L	.047L
7006	684	H4-H5-P-AB-AC	Electric Tachometer Driven Gear - End Clearance			.007L .025L	.047L
7007	685	H1-H2-H3	Electric Tachometer Idler Gear Shaft and Idler Gear Bushing			.001L .0025L	.004L
7008	686	H1-H2-H3	Electric Tachometer Driven Gear and Adapter			.0015L .0035L	.006L
7009	704	AB-AC	Tachometer Drive Idler Gear Bushing and Tachometer Drive Idler Gear	Bushing To Be Burnished In Place			
7010	705	AB-AC	Tachometer Drive Idler Gear Bushing and Tachometer Drive Idler Shaft			.001L .003L	.004L
7011	706	AB-AC	Tachometer Drive Idler Gear - End Clearance			.005L .014L	.024L
7012	707	H1-H5-P-AB-AC	Electric Tachometer Driven Gear and Accessory Housing Cover			.001L .003L	.004L
		SECTION III GEAR TRAIN SECTION - GOVERNOR & HYDRAULIC PUMP					
7013	668	ALL	Governor Drive Idler Gear Bushing and Governor Drive Idler Shaft			.000L .002L	.004L
7014	670	ALL	Governor Driven Gear and Governor Drive Adapter Bushing			.001L .003L	.004L

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
7015	901	ALL	Reduction Gear Governor and Magneto Housing and Magneto and Governor Drive Bushing			.002T / .004T	(A)
7016	902	ALL	Governor Drive Idler Gear and Governor Drive Idler Gear Bushing			.001T / .003T	(A)
7017	903	ALL	Governor Adapter and Governor Drive Adapter Bushing			.001T / .003T	(A)
		SECTION III GEAR TRAIN SECTION - MAGNETO, GENERATOR, STARTER					
7018	905	AB-AC	Magneto Drive Idler Gear and Magneto Drive Idler Bushing			.001T / .003T	(A)
7019	906	AB-AC	Magneto Drive Idler Shaft and Magneto Drive Idler Bushings			.001L / .003L	.005L
7020	904	AB-AC	Reduction Gear Housing Magneto Drive Bushings and Magneto Drive Idler Shaft			.000 / .002L	.004L
7021	907	AB-AC	Magneto Drive Adapter and Magneto Adapter Bushings			.001T / .003T	(A)
7022	909	AB-AC	Magneto Drive Gear and Magneto Adapter Bushings			.001L / .003L	.005L
7023	677	E-H1-H2-H3	Magneto Drive Bearing and Magneto Gear			.001T / .0005L	.001L
7024	677	E-H1-H2-H3	Magneto Drive Bearing and Support			.0001T / .0007L	(A)
7025	704	H4-H5-P	Magneto Drive Idler Gear Hub Bushing and Magneto Drive Idler Gear Hub	Bushing Must Be Burnished In Place			
7026	705	H4-H5-P	Magneto Drive Idler Gear Hub Bushing and Magneto Drive Idler Shaft			.001L / .003L	.004L
7027	706	H4-H5-P	Magneto Drive Idler Gear Hub - End Clearance			.005L / .014L	.024L
7028	710	H4-H5-P	Magneto Drive Shaft and Accessory Housing Cover Bushing			.0020L / .0045L	.006L
7029	711	H4-H5-P	Magneto Drive Shaft and Accessory Housing Bushing			.0025L / .0045L	.006L
7030	712	H4-H5-P	Magneto Drive Shaft Sleeve and Magneto Drive Shaft			.001T / .004T	(A)
7031	713	H4-H5-P	Magneto Drive Shaft Sleeve and Magneto Drive Coupling			.001T / .004T	(A)
7032	714	H4-H5-P	Magneto Drive Shaft Gear - End Clearance			.002L / .020L	.030L
7033	681	E-H1-H2-H3	Generator Driven Gear Bushing and Accessory Housing			.001T / .003T	(A)

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
7034	583	E-H1-H2-H3	Generator Driven Gear and Bushing			.002L / .004L	.006L
7035	584	E-H1-H2-H3	Generator Driven Gear - End Clearance			.005L / .049L	.060L
7036	678	H1	Generator Drive Idler Gear and Bushing (Hi-Speed)			Bushing Must Be Burnished In Place	
7037	678	H1	Finished I. D. of Idler Gear Bushing	1.000 / 1.001	1.002		
7038	679	H1	Generator Drive Countershaft and Bushing			.0015L / .0035L	.005L
7039	680	H1	Generator Drive Idler Gear - End Clearance			.004L / .010L	.020L
7040	689	E1-H1-H3	Angle Generator Drive - Generator Driven Gear Bushing and Generator Housing			.001T / .003T	(A)
7041	690	E1-H1-H3	Angle Generator Drive - Generator Driven Gear and Bushing			.002L / .004L	.006L
7042	692	E1-H1-H3	Angle Generator Drive - Generator Housing and Generator Drive Gear			.001L / .003L	.004L
7043	726	H4-H5-P-AB-AC	Generator Drive Gear Bushing and Accessory Housing Cover			.0015T / .0035T	(A)
7044	727	H4-H5-P-AB-AC	Generator Drive Gear Bushing (At Cover) and Generator Drive Gear			.002L / .004L	.006L
7045	728	H4-H5-P-AB-AC	Generator Drive Gear Bushing and Accessory Housing			.002T / .004T	(A)
7046	729	H4-H5-P-AB-AC	Generator Drive Gear Bushing (At Accessory Housing) and Generator Drive Gear			.0025L / .0045L	.006L
7047	730	H4-H5-P-AB-AC	Generator Drive Gear - End Clearance			.010 / .038	.050
7048	722	H4-H5-P-AB-AC	Starter Drive Gear Bushings and Adapter			.002T / .004T	(A)
7049	723	H4-H5-P-AB-AC	Starter Drive Gear Bushings and Starter Drive Gear			.002L / .004L	.006L
7050	920	H4-H5-P-AB-AC	Starter Drive Adapter and Accessory Housing Cover			.0005L / .0025L	(A)
7051	557	E1-H1-H2-H3	Oil Relief Plunger and Oil Relief Valve Plug			.0015L / .0035L	.005L
7051	717	H4-H5-P-AB-AC	Oil Relief Valve Plunger and Sleeve			.001L / .003L	.005L
7053	721	H4-H5-AC	Accessory Idler Gear Bearing and Accessory Drive Gear			.0001L / .0007T	(A)

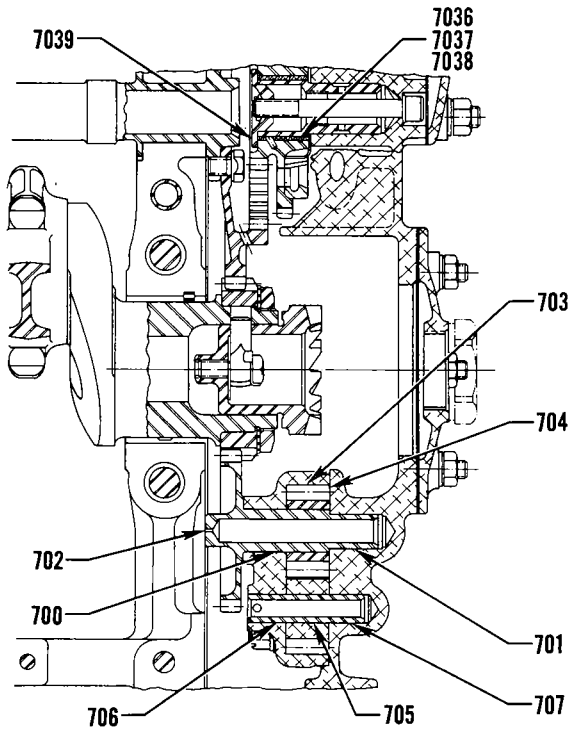
SERVICE TABLE OF LIMITS

PART III GEARED ENGINES

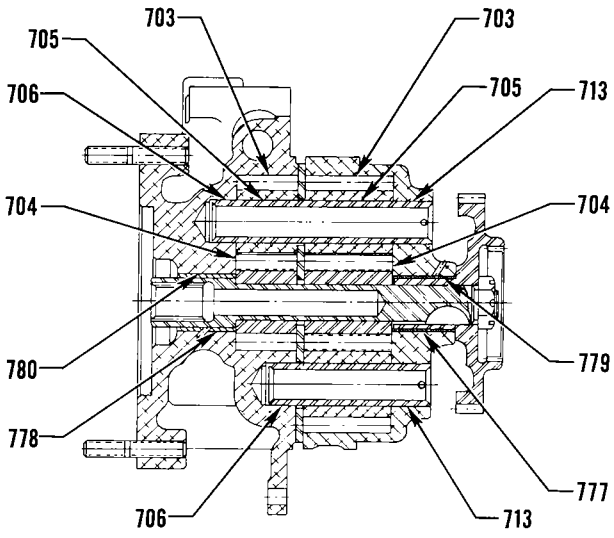
SECTION III GEAR TRAIN SECTION - ACCESSORY DRIVE

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
7053	721	P	Accessory Drive Gear Bearing and Accessory Drive Shaft			.0001L / .0007T	(A)
7053	721	AB	Accessory Idler Gear Bearing and Supercharger and Accessory Drive Gear			.0001L / .0007T	(A)
7054	746	P-AB	Supercharger and Accessory Drive Gear and Bushing			.001T / .003T	(A)
7055	747	H1-H5-P-AB-AC	Accessory Idler Gear Bearing and Accessory Drive Shaft Adapter			.0005T / .0005L	(A)
7056	748	P-AB	Supercharger and Accessory Drive Gear Bushing and Accessory Drive Shaft			.0005L / .0017L	.004L
7056	943		Finished I.D. of Supercharger and Accessory Drive Gear Bushing	1.3295 / 1.3305	1.3312		
7057	750	P-AB	Supercharger and Accessory Drive Gear - End Clearance			.004L / .012L	.017L
7058	751	P	Accessory Drive Shaft and Bushing			.001T / .003T	(A)
7058	942		Finished I.D. of Accessory Drive Shaft Bushing	.750 / .7515	.752		
7059	752	P-AB	Supercharger Drive Shaft Gear and Accessory Drive Shaft Bushing			.002L / .004L	.006L
7060	754	P-AB	Supercharger Drive Shaft Gear and Supercharger Shaft Bearing			.0038L / .0050L	.008L
7061	755	P-AB	Supercharger Drive Shaftgear - End Clearance (Use 1 Spacer If Necessary to Maintain Fit)			.011L / .020L	.020L
7062	756	P-AB	Impeller and Supercharger Air Inlet Adapter - Clearance			.040L / .070L	
7063	757	P	Intermediate Supercharger Drive Shaft Gear and Bushing			.0040L / .0055L	.0075L
7064	758	P-AB	Accessory Housing and Intermediate Supercharger Drive Shaft Gear Bushing			.001T / .003T	(A)
7065	759	P-AB	Intermediate Supercharger Drive Gear and Bushing			.002L / .004L	.006L
7066	762	P	Intermediate Supercharger Drive Gear - End Clearance			.011L / .026L	.030L
7066	762	AB	Intermediate Supercharger Drive Gear - End Clearance			.009L / .020L	.024L
7067	912	AB	Accessory Housing Adapter and Bearing			.0006L / .0006T	.0016L

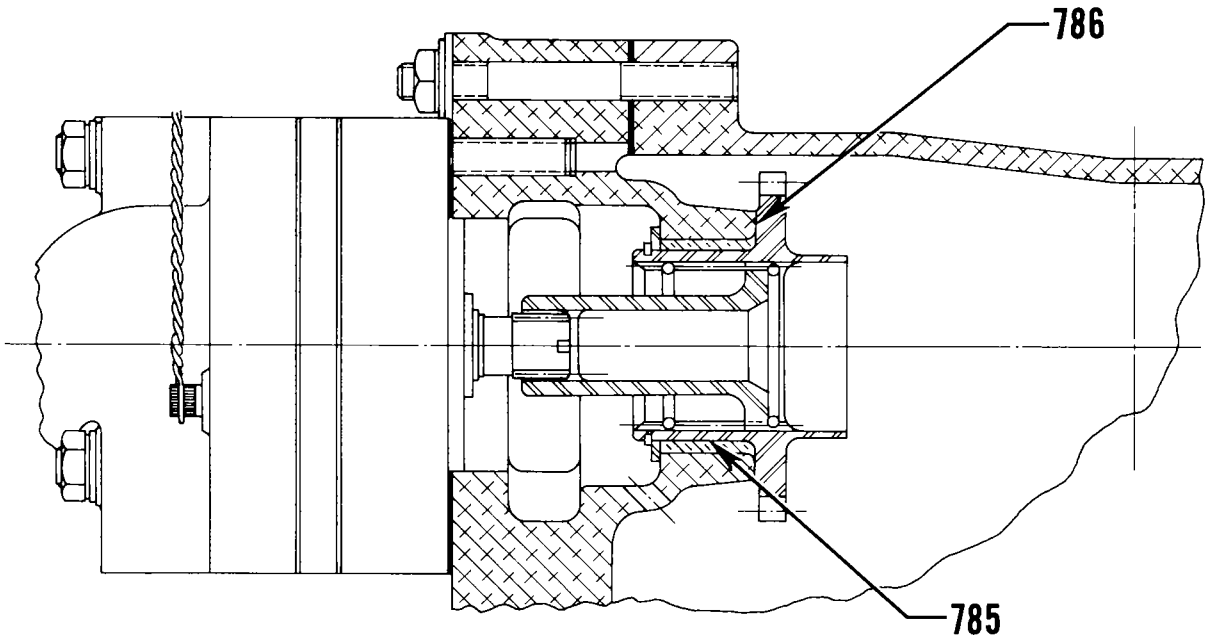
Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
7068	913	AB	Supercharger and Accessory Drive Gear Support and Bearing			.0002T .0013T	(A)
7069	914	AB	Supercharger and Accessory Drive Gear Support and Bushing			.001T .003T	(A)
7070	916	P-AB	Supercharger Shaft Bearing and Supercharger Housing			.0005L .002L	(A)
7071	918	AB	Supercharger and Accessory Drive Gear and Accessory Drive Shaft - End Clearance			.001L .015L	.020L
7072	925	AB-AC	Oil Pressure and Scavenge Pump Idler Gear Bushing and Fuel Injector or Fuel Pump Drive Shaftgear (As Applicable)			.001L .003L	.005L
7073	924	AB-AC	Oil Pressure and Scavenge Pump Idler Gear and Bushing			.001T .003T	(A)
7074	939	P1	Throttle Shaft and Supercharger Air Inlet Housing Bushing			.001L .003L	.005L
7074	939	AB	Throttle Shaft and Supercharger Air Inlet Housing Bushing			.0005L .0025L	.005L
7075	953	H2-H3	Propeller Flange Two Locator Holes	.5000 .5005	.5008		



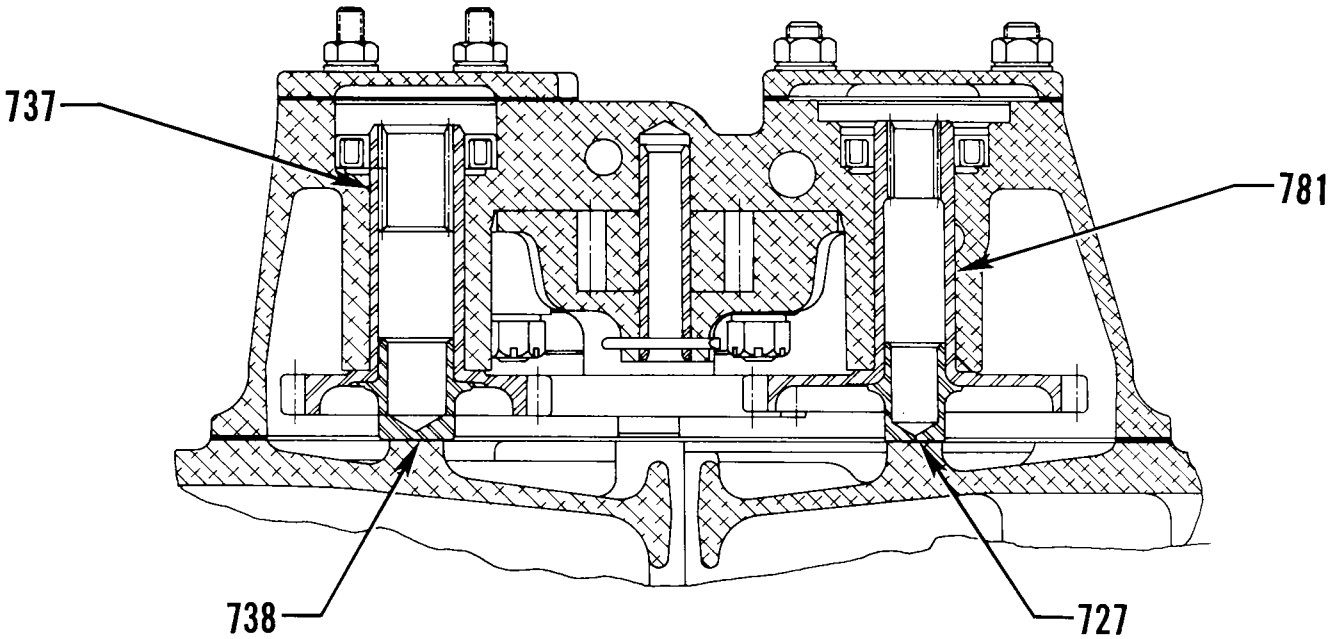
REAR MOUNTED ACCESSORY HSG.



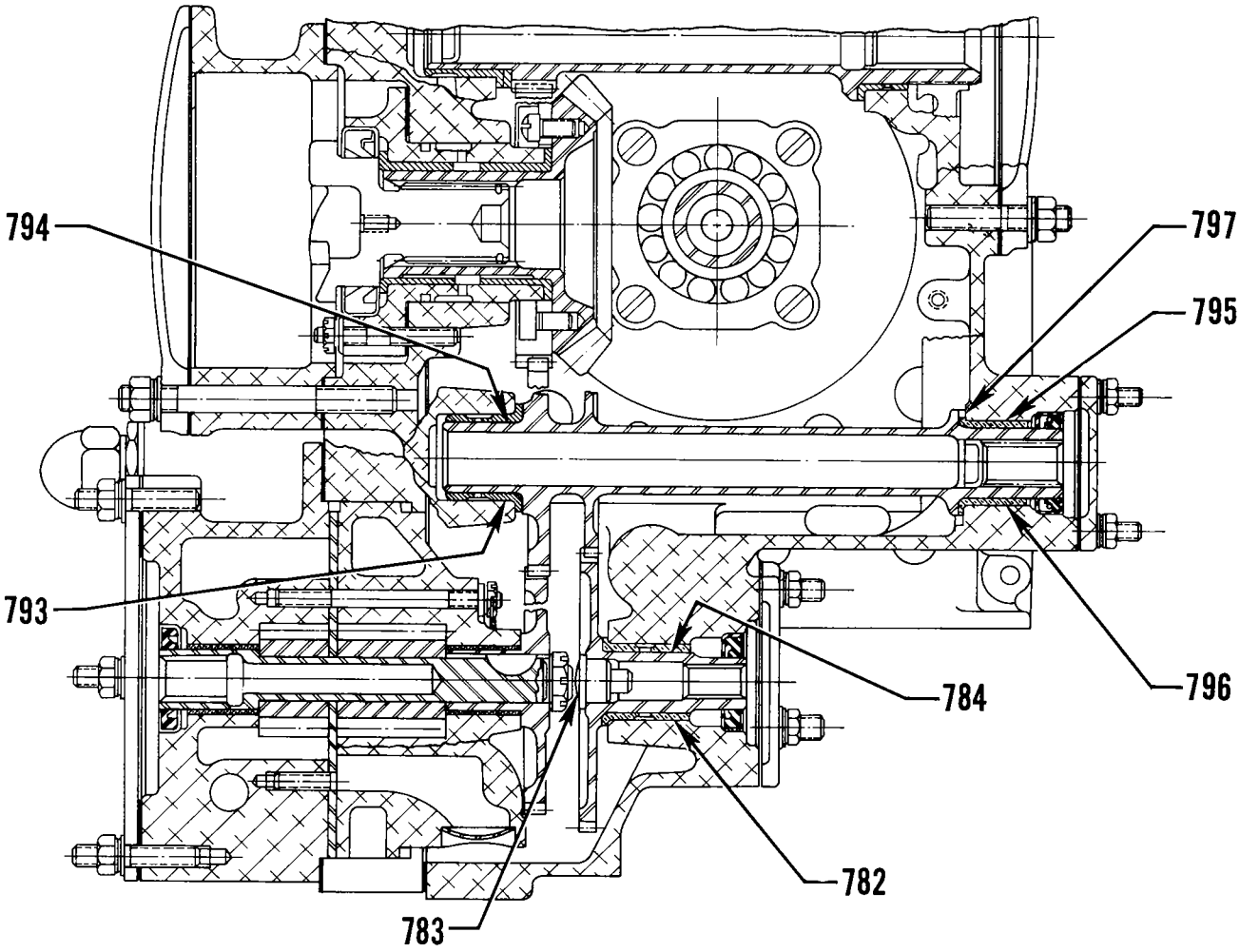
CROSSWISE ACCESSORY HSG.



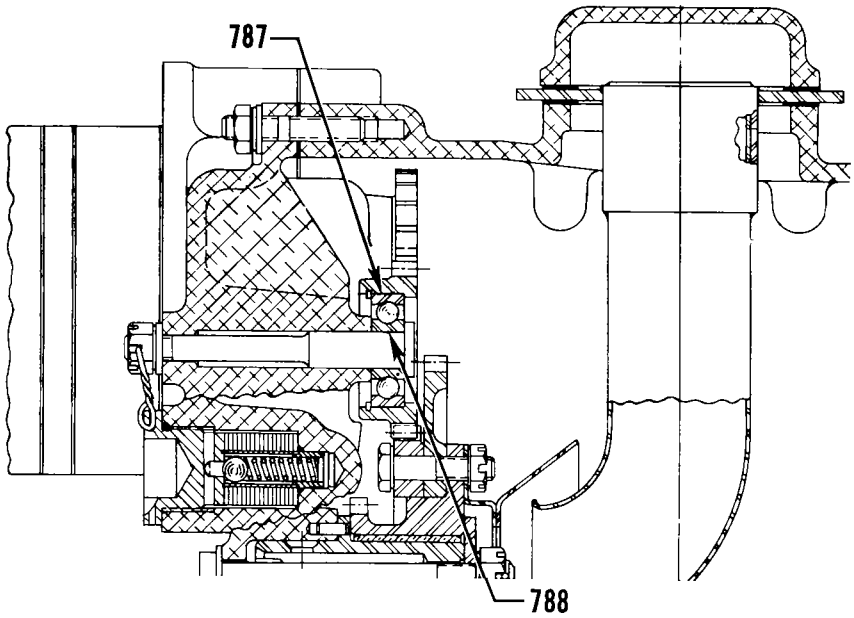
Simmonds Injector



Vacuum and Fuel Pump Drives

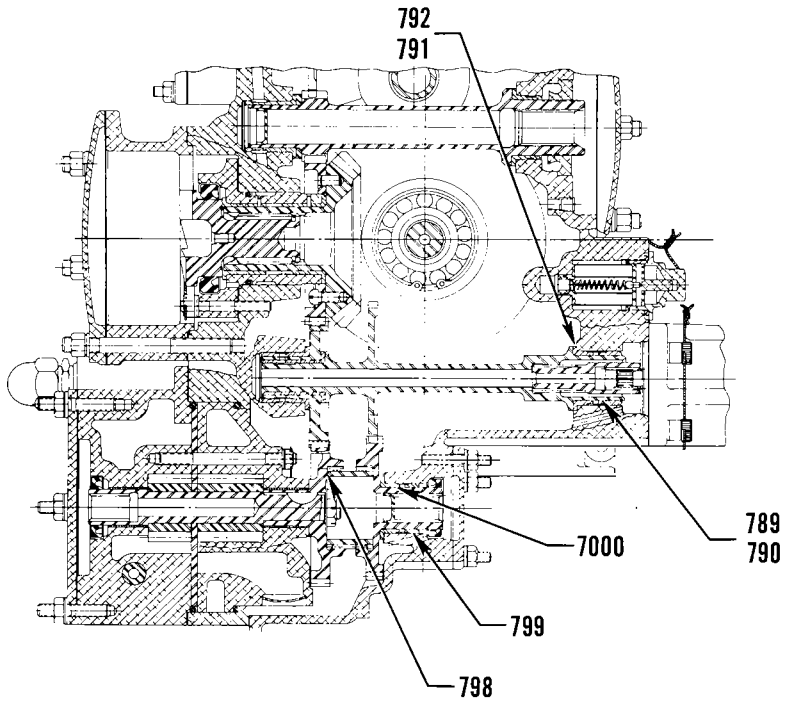


CROSSWISE ACCESSORY HSG.



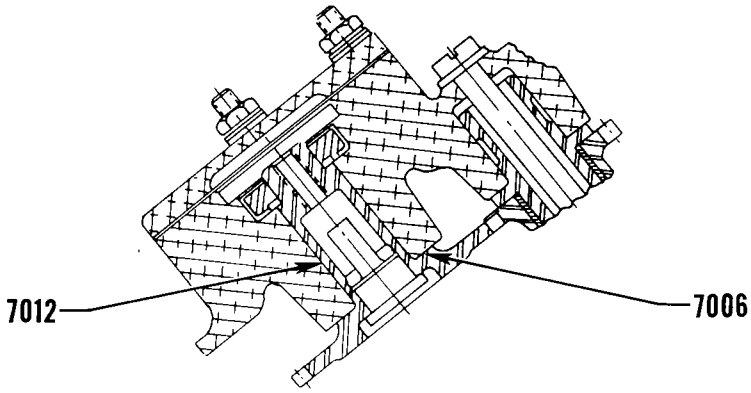
IGSO-480

Fuel Injector and Magneto Idler Bearing

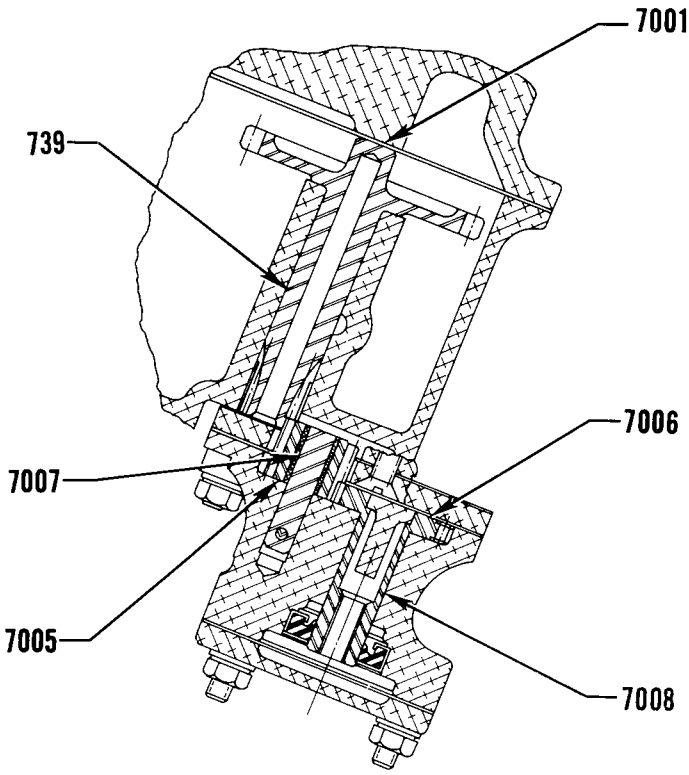


IGO, IGSO-540

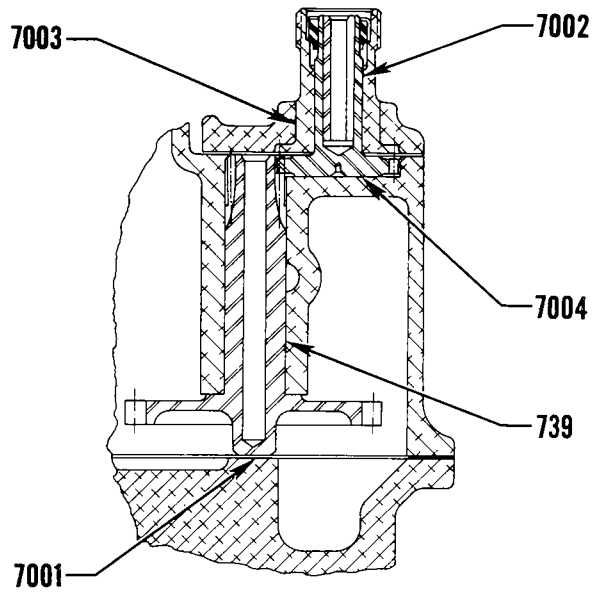
Fuel Injector and/or Fuel Pump, Vacuum Pump Drives



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

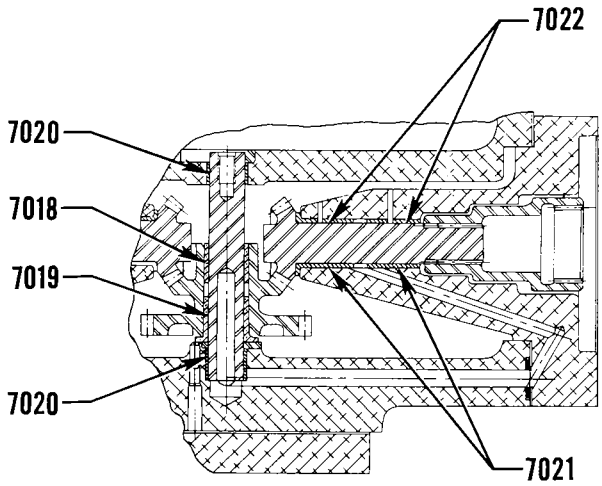


GO-480-B,F & GID6

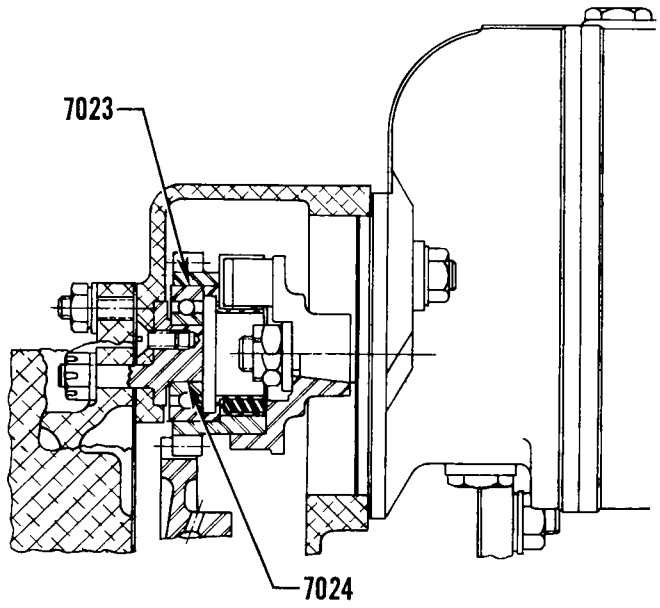


GO-435-C & GO-480-B

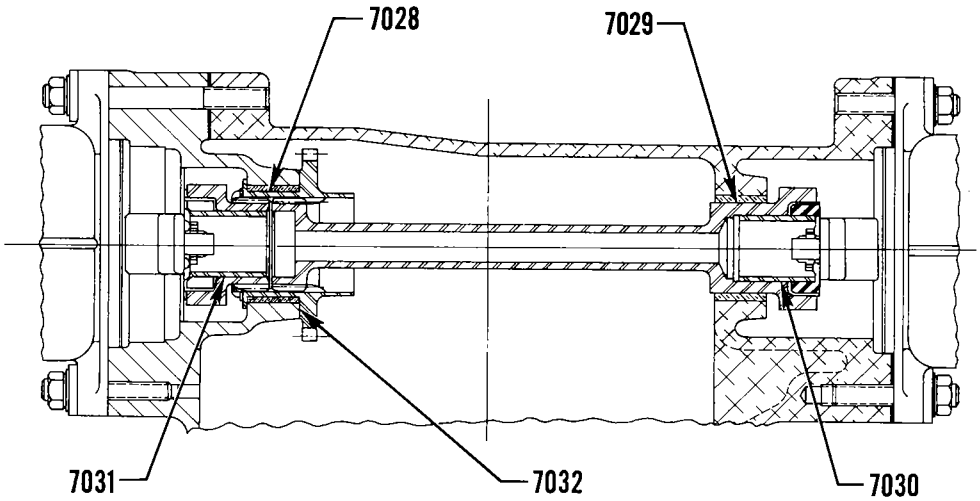
Tachometer Drives



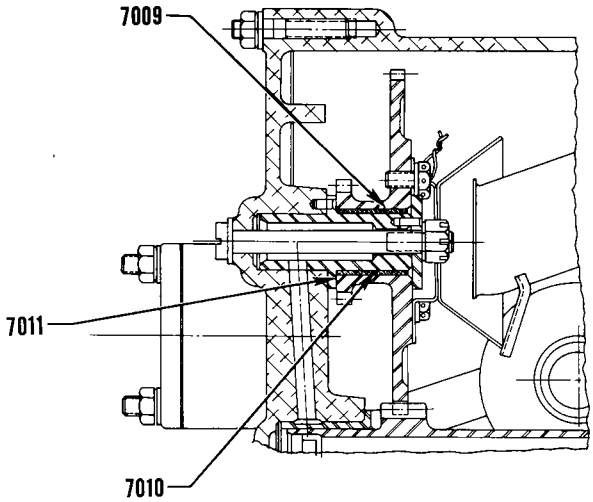
IGO, IGSO-540



GO-435 & GO-480-B

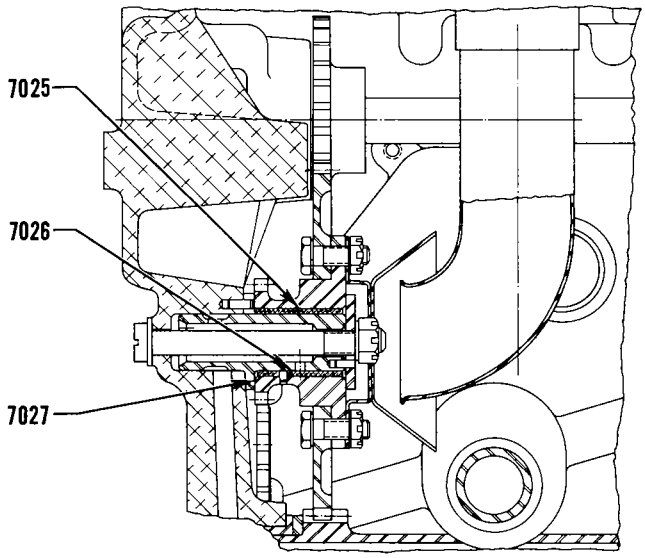


GO-480-D, GSO, IGSO-480



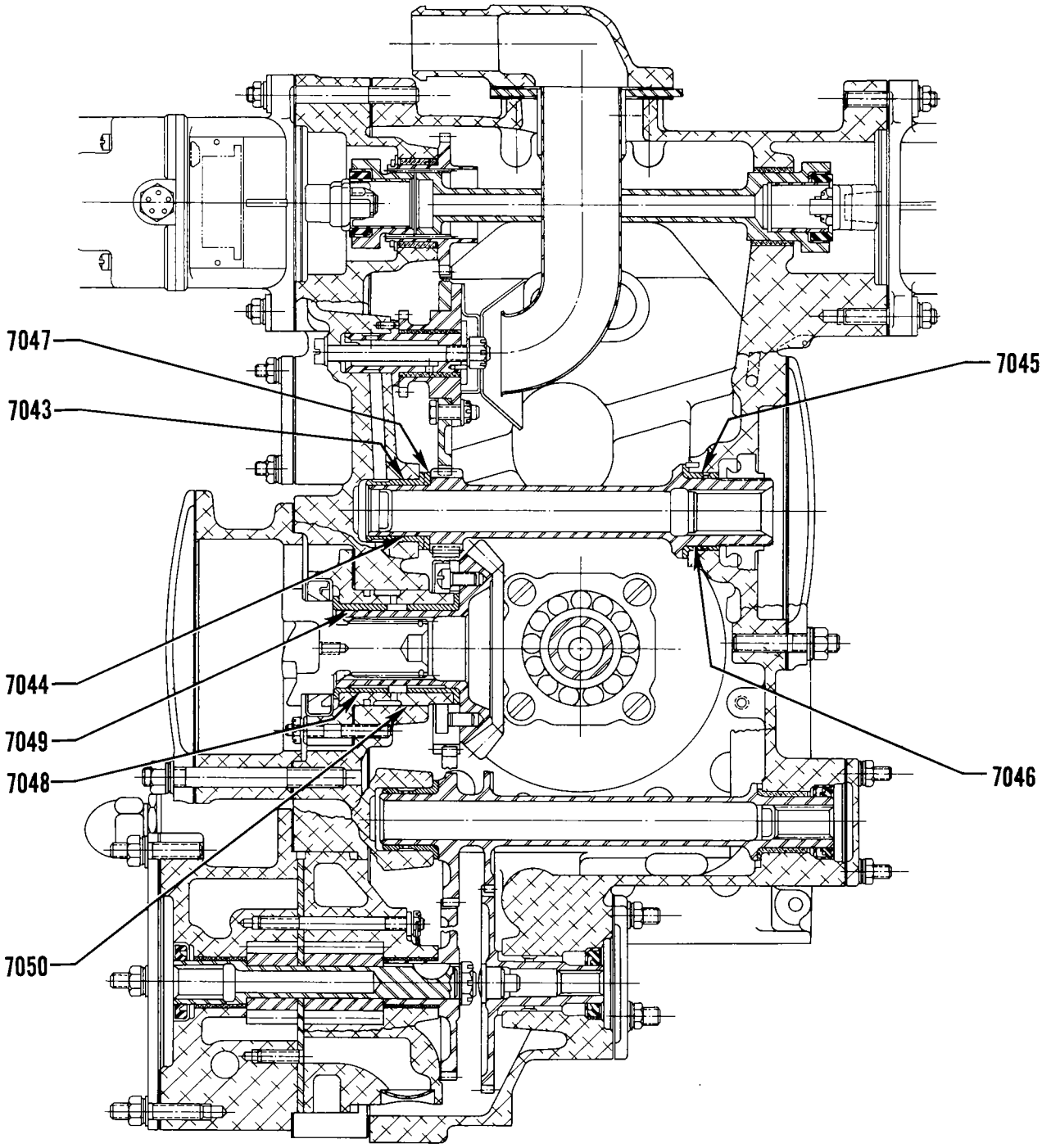
IGO, IGSO-540-A & B

Tachometer Drives

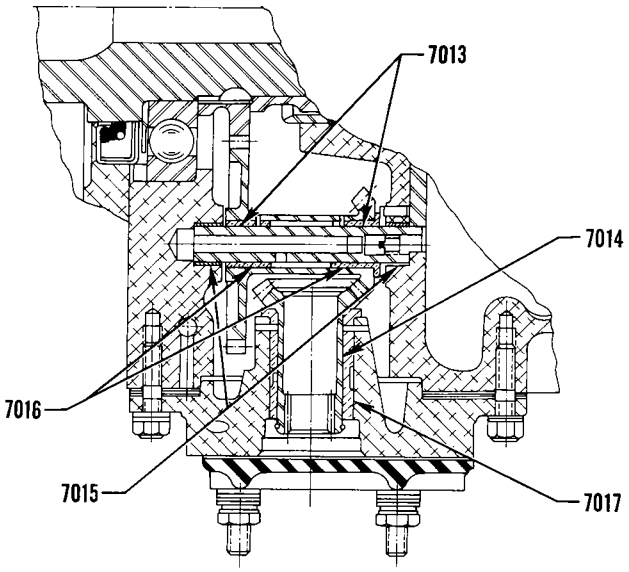


GO-480-B, GIB6, GSO, IGSO-480

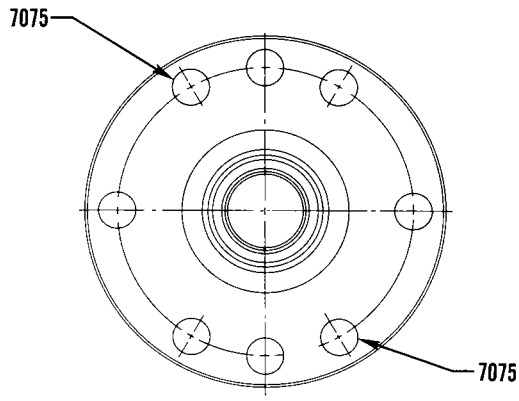
Magneto and Tachometer Idler Gear



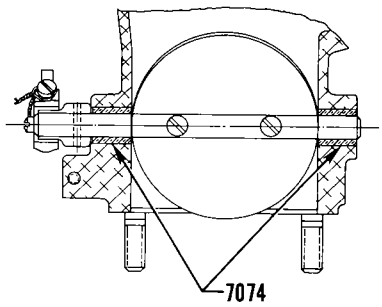
GO-480-B, GSO, IGSO-480 & IGO, IGSO-540



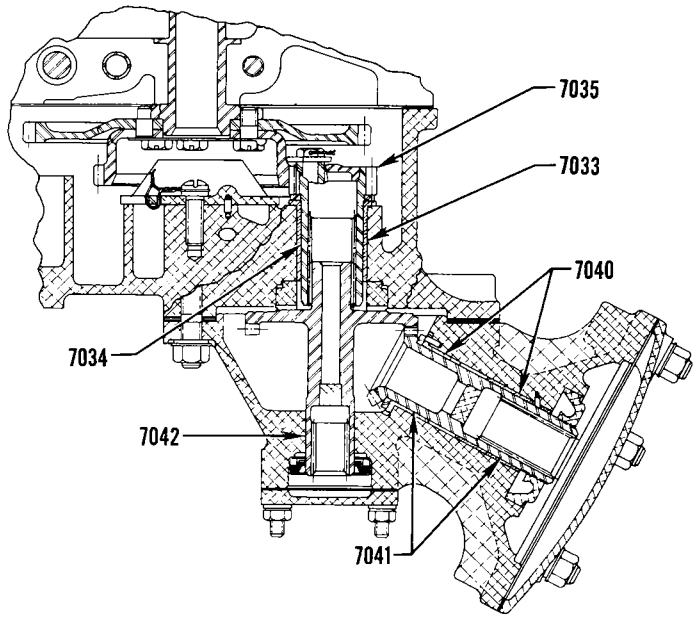
GOVERNOR DRIVE



GO-480-F, GID6
PROP FLANGE

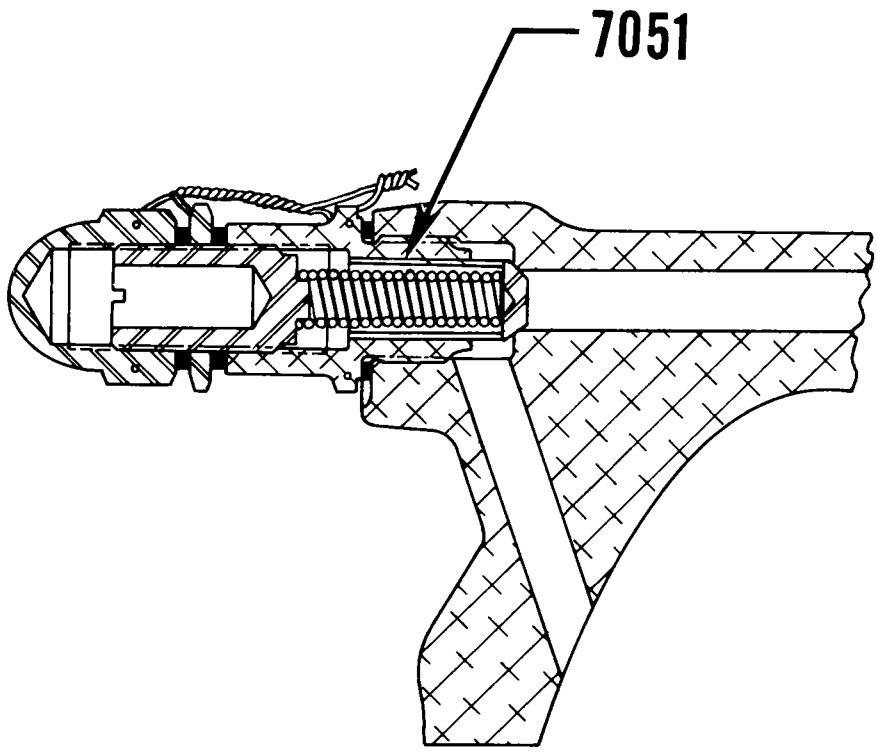


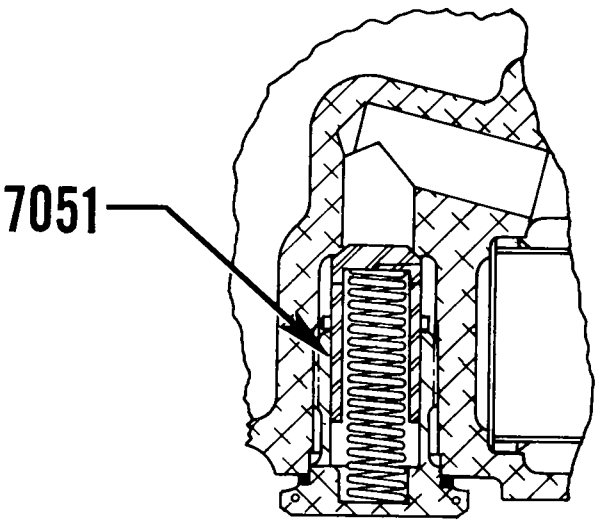
IGSO-480, 540
THROTTLE LEVER

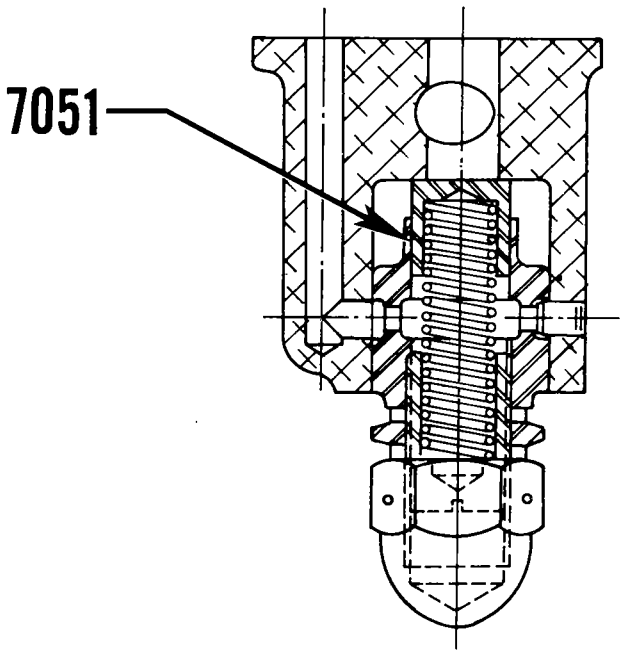


GO-435, GO-480-B, GID6
DUAL GENERATOR & VACUUM PUMP DRIVE

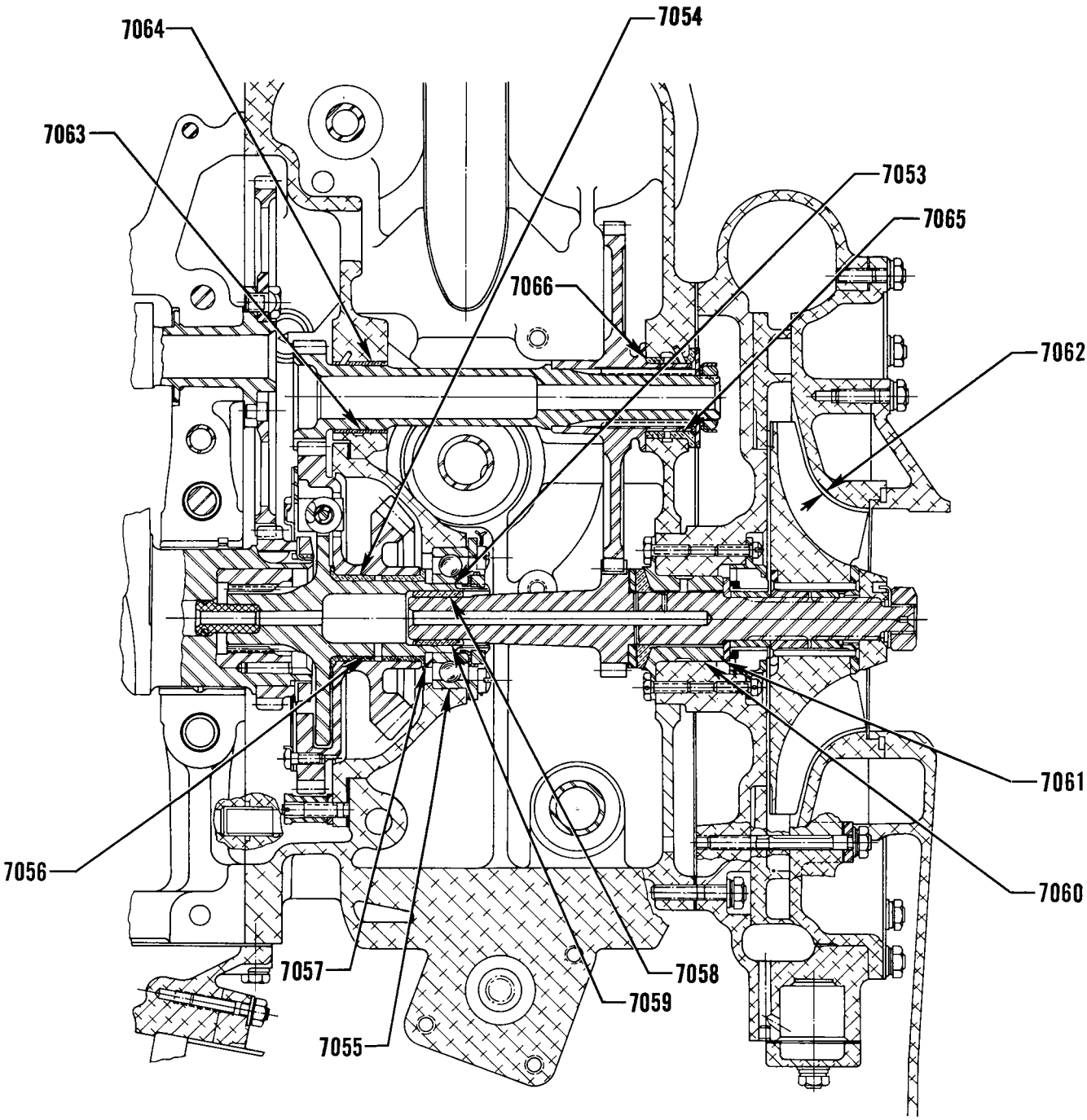
Governor Drive, Prop. Flange, Throttle Lever,
Dual Generator and Vacuum Pump Drive



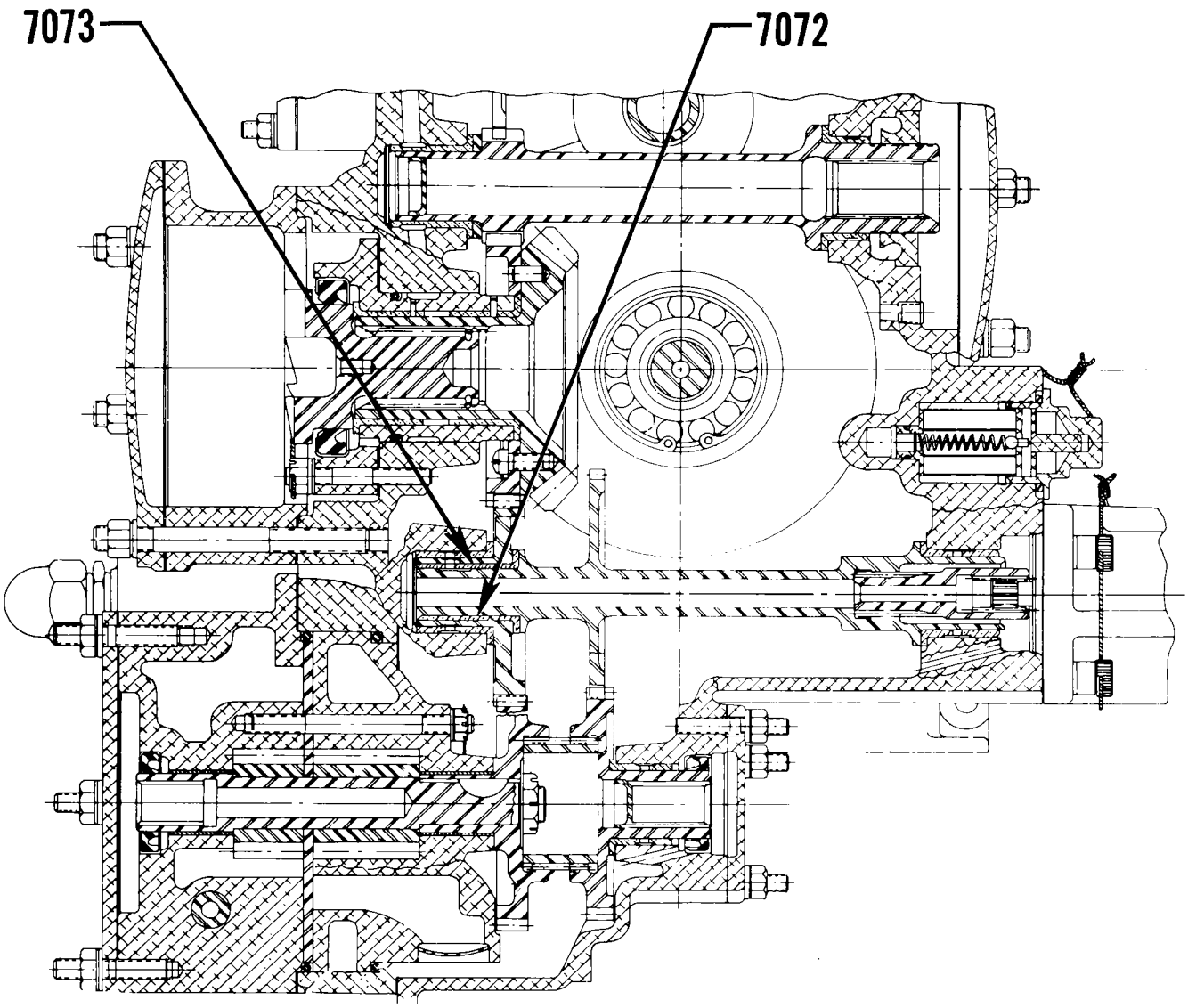




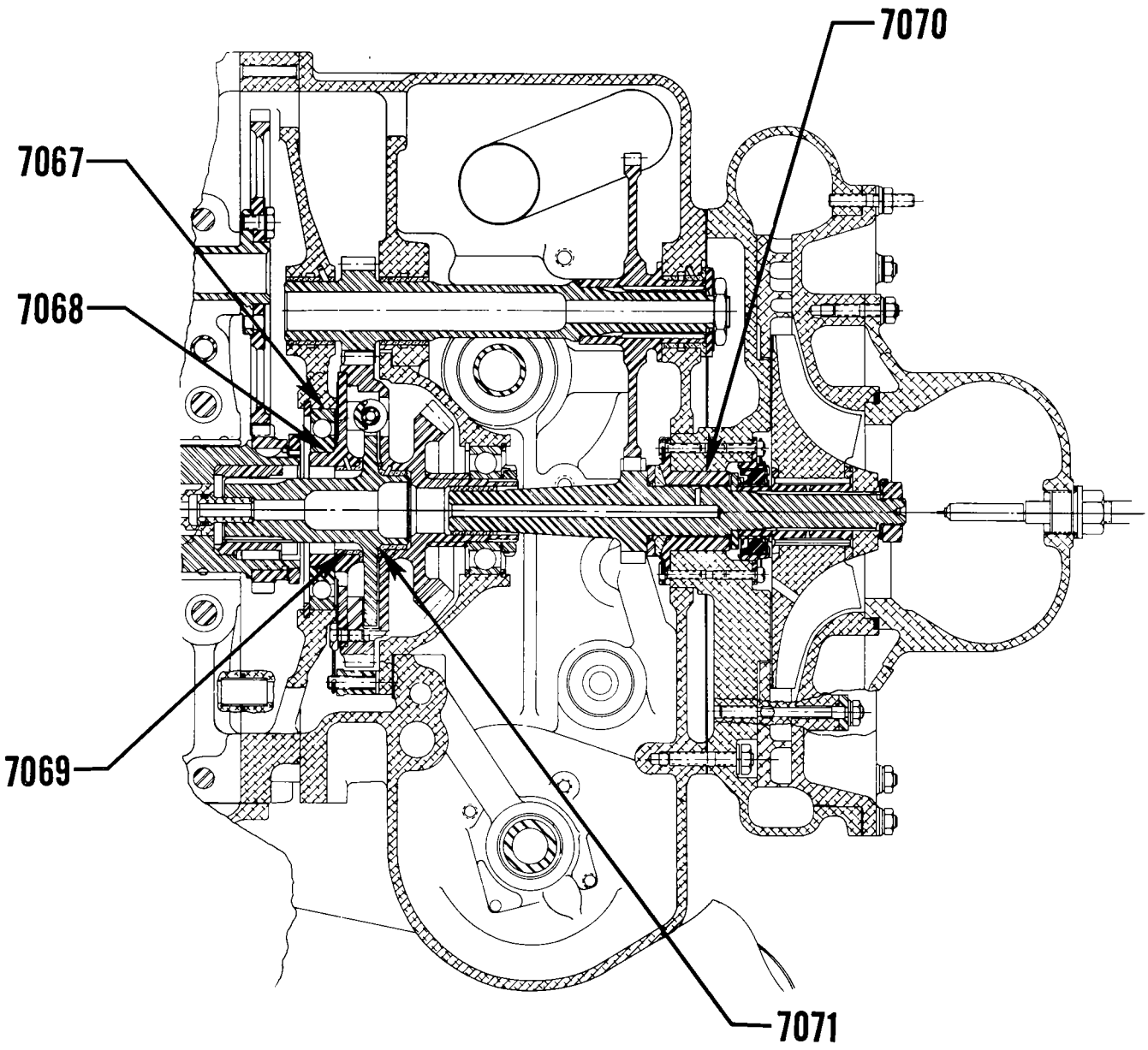
Oil Relief Valves



Supercharger and Components



Oil Scavenge Pump and Drives



Supercharger Housing

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
807	547	E-H1-H2-H3	Oil Pump Drive Gear and Crankshaft Timing Gear			.004 / .015	.020
808	553	E-H1-H2-H3	Oil Pump Impellers			.008 / .015	.020
808	553	E-H1-H2-H3	Oil Pump and Scavenge Pump Impellers			.008 / .015	.020
825	550	ALL	Crankshaft Timing Gear and Camshaft Gear			.004 / .015	.020
829	608	ALL	Propeller Shaft - Reduction Gear - Total Backlash (At 4 ft. Radius)				.50
846	551	E-H1-H2-H3	Camshaft Gear and Magneto Gear			.004 / .015	.020
847	548	E-H1-H2-H3	Tachometer Drive Gear and Crankshaft Timing Gear			.004 / .015	.020
848	554	E-H1	Tachometer Driven Gear and Tachometer Drive Gear			.004 / .015	.020
849	574	ALL	Stationary Gear and Stationary Gear Drive Plate			.002 / .005	.010
850	576	ALL	Ring Gear and Ring Gear Drive Plate			.001 / .004	.010
851	585	E-H2-H3	Generator Drive Gear and Generator Driven Gear			.004 / .015	.020
852	588	E-H1-H2-H3	Oil Pump Drive Gear and Accessory (Fuel Pump) Drive Gear			.004 / .015	.020
853	591	E-H1-H2-H3	Oil Pump Drive Gear and Vacuum Pump Drive Gear			.004 / .015	.020
854	660	ALL	Pinion Gear and Stationary Gear			.004 / .0077	.012(C)
855	661	ALL	Pinion Gear and Ring Gear			.003 / .0065	.012(C)
856	667	ALL	Governor and Magneto Drive Gear and Governor Drive Idler Gear			.004 / .015	.020
857	667	AB-AC	Governor and Magneto Drive Gear and Magneto Drive Idler Gear			.004 / .015	.020
858	669	ALL	Governor Drive Idler Gear (Bevel Gear End) and Governor Driven Gear			.004 / .008	.015
859	681	H1	Camshaft Gear and Generator Drive Idler Gear			.004 / .015	.020
860	682	H1	Generator Drive Idler Gear and Generator Driven Gear			.004 / .015	.020

SERVICE TABLE OF LIMITS

PART III GEARED ENGINES

SECTION IV - BACKLASH

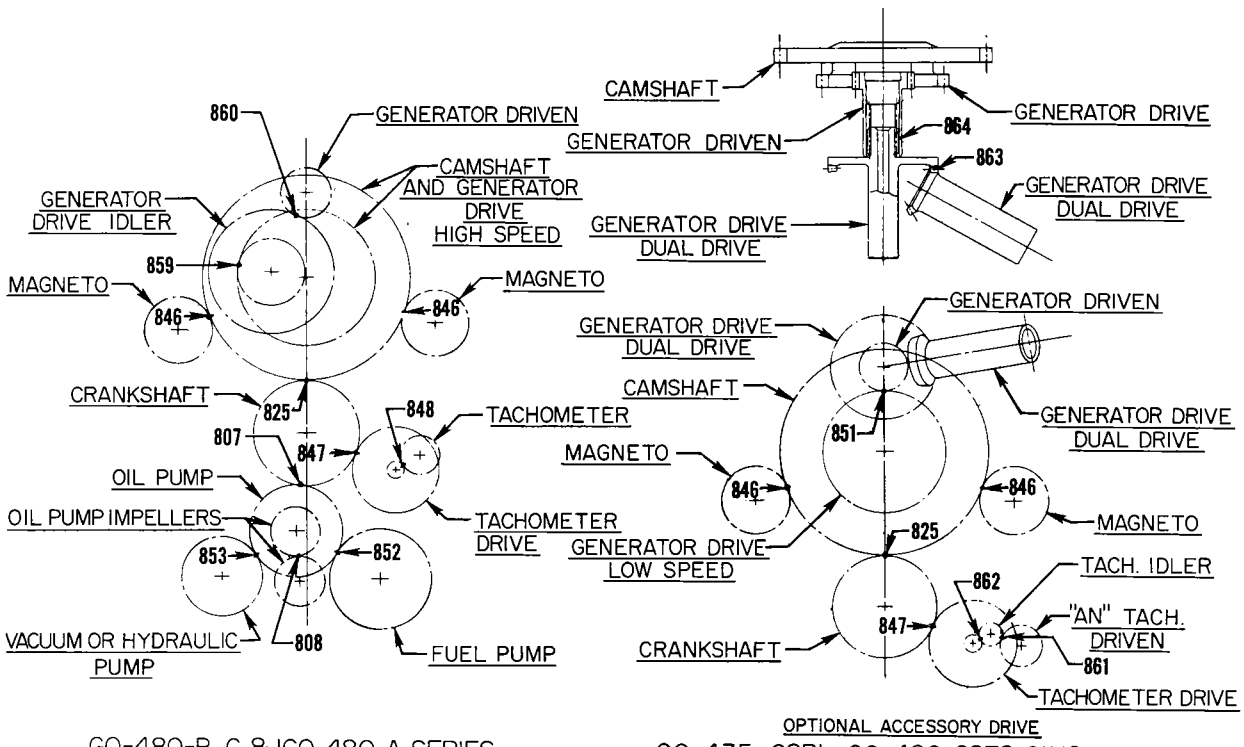
Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
861	687	E1-H1-H2-H3	Electric Tachometer Idler Gear and Driven Gear			.004 / .015	.020
862	688	E1-H1-H2-H3	Electric Tachometer Idler Gear and Tachometer Drive Gear			.004 / .015	.020
863	691	E1-H1	Angle Generator Drive Gear and Generator Driven Gear			.002 / .004	.010
864	693	E1-H1	Angle Generator Drive Gear and Generator Drive Gear Spline			.003 / .007	.009
865	703	P1	Generator Drive Gear and Magneto Drive Idler Gear			.004 / .015	.020
865	703	H4-H5-P-AB-AC	Generator Drive Gear and Tachmeter Drive Idler Gear			.004 / .015	.020
866	708	P1	Electric Tachometer Drive Gear (Magneto Idler Hub) and Tachometer Driven Gear			.004 / .015	.020
866	708	H4-H5-P-AB-AC	Tachometer Drive Idler Gear and Tachometer Driven Gear			.004 / .015	.020
867	709	H4-H5-P	Tachometer Drive Idler Gear and Magneto Drive Shaftgear			.004 / .015	.020
868	715	H4-H5-P	Magneto Drive Shaft (Spline) and Magneto Drive Shaft Gear (Spline)			.001 / .005	.008
869	716	H4-H5-P	Magneto Drive Shaft Gear (Spline) and Magneto Drive Coupling (Spline)			.001 / .005	.008
870	719	H4-H5-AC	Rear Crankshaft (Spline Bushing) and Accessory Drive Gear (Spline)			.002 / .0073	.018
870	719	P-AB	Rear Crankshaft (Spline Bushing) and Accessory Drive Shaft (Spline)			.002 / .0073	.018
871	720	H4-H5-AC	Accessory Idler Gear and Starter Drive Gear			.004 / .008	.015
871	720	P-AB	Supercharger and Accessory Drive Gear and Starter and Accessory Drive Gear			.004 / .008	.015
872	724	H4-H5-P-AB-AC	Accessory Drive Gear and Generator Drive Gear			.004 / .015	.020
873	725	H4-H5-P	Accessory Drive Gear and Vacuum Pump Shaftgear			.004 / .015	.020
874	736	H4-H5-P	Vacuum Pump Shaftgear and Oil Pressure and Scavenge Pump Gear			.004 / .015	.020
875	737	E	Scavenge Pump Driven Gear and Accessory Drive Gear			.004 / .015	.020
876	745	E	Scavenge Pump Impellers			.008 / .015	.020
877	749	P-AB	Supercharger and Accessory Drive Gear and Intermediate Supercharger Drive Shaftgear			.006 / .015	.020

SERVICE TABLE OF LIMITS

PART III GEARED ENGINES

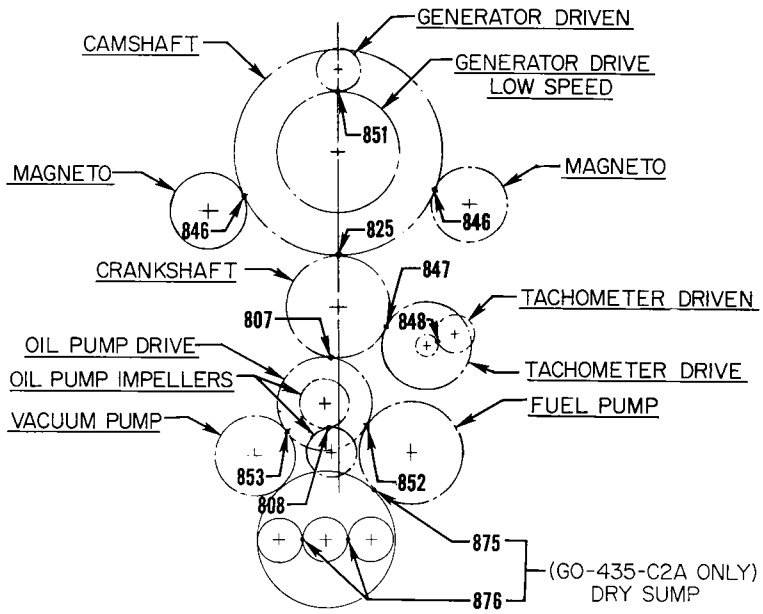
SECTION IV - BACKLASH

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
878	753	P-AB	Supercharger Drive Shaftgear and Intermediate Supercharger Drive Gear			.006 .015	.020
879	761	P-AB	Intermediate Supercharger Drive Shaftgear (Spline) and Intermediate Supercharger Drive Gear (Spline)			.000 .002	.005
880	776	P1	Fuel Injector Idler Gear and Magneto Drive Shaftgear			.004 .015	.020
881	777	P1	Fuel Injector Drive Idler Gear and Fuel Injector Idler Gear			.004 .015	.020
882	780	P1	Injector Drive Shaft (Spline) and Fuel Injector Pump (Spline)			.0005 .0056	.008
883	780	P1	Magneto Drive Shaftgear (Spline) and Fuel Injector Drive Shaft (Spline)			.002 .006	.008
884	908	AB-AC	Magneto Drive Idler Gear (Bevel End) and Magneto Driven Gear			.004 .008	.015
885	910	AB-AC	Magneto Driven Gear (Spline) and Magneto Drive Coupling (Spline)			.001 .004	.007
886	911	AB-AC	Magneto Drive Coupling (Spline) and Magneto Coupling (Spline)			.001 .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			.004 .015	.020
889		AB-AC	Oil Pressure and Scavenge Pump Idler and Oil Pressure and Scavenge Pump Gear			.004 .015	.020
890	927	AB	Fuel Injector Drive Shaftgear (Spline) and Fuel Injector Drive Coupling (Spline)			.003 .007	.012
891	928	AB	Fuel Injector Drive Coupling (Spline) and Fuel Injector Pump (Spline)			.002 .005	.010
892	929	AB-AC	Oil Pressure and Scavenge Pump Gear (Spline) and Vacuum Pump Coupling (Spline)			.003 .0065	.010
893	930	AB-AC	Vacuum Pump Drive Gear (Spline) and Vacuum Pump Coupling (Spline)			.003 .0065	.010
894	931	AB	Vacuum Pump Drive Gear and Fuel Injector Drive Shaftgear			.004 .015	.020
895	937	H4-H5-P-AC	Vacuum Pump Shaftgear and Fuel Pump Drive Shaftgear			.004 .015	.020

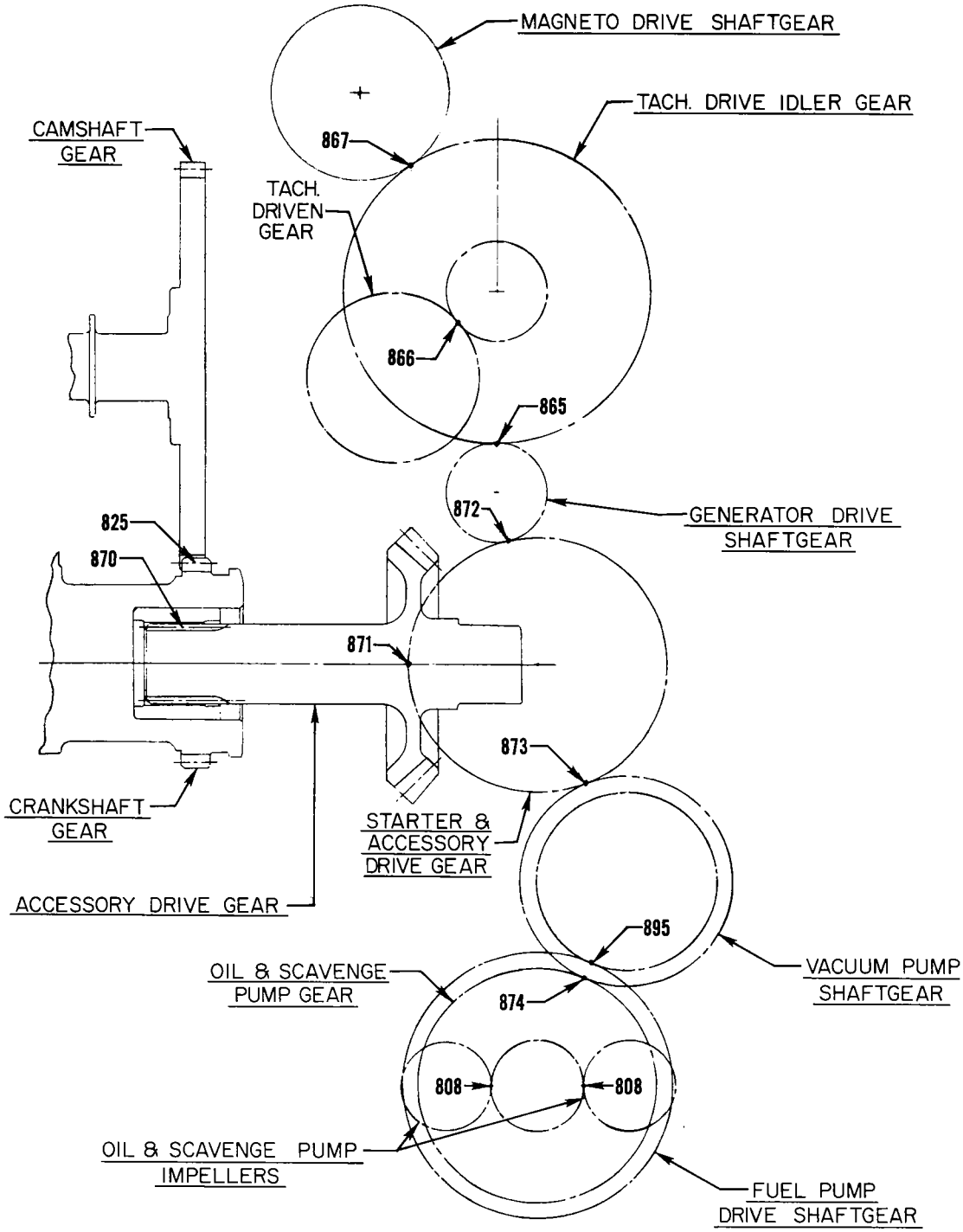


GO-480-B, G & IGO-480-A SERIES

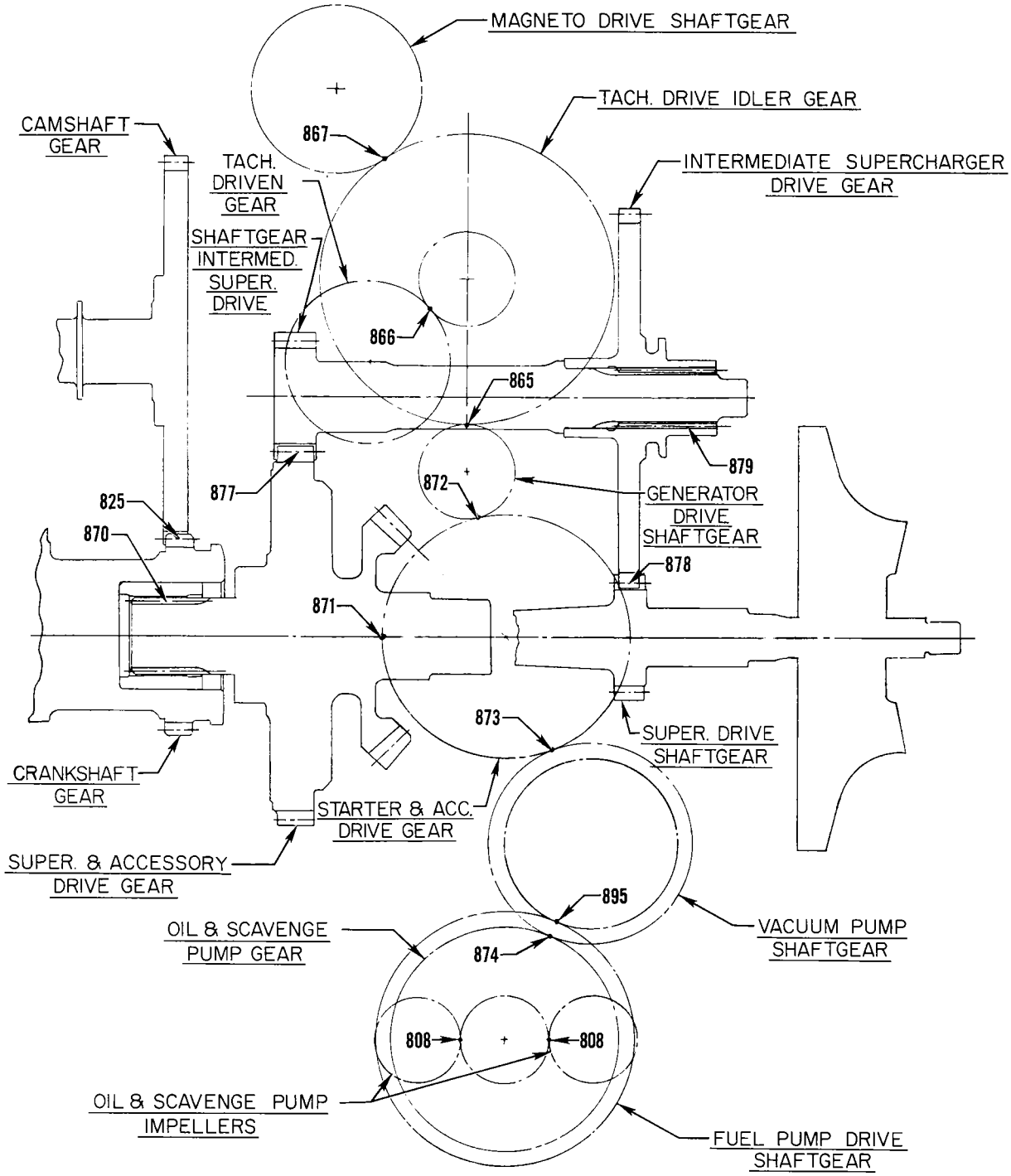
GO-435-C2B1 - GO-480-C2E6, G1H6



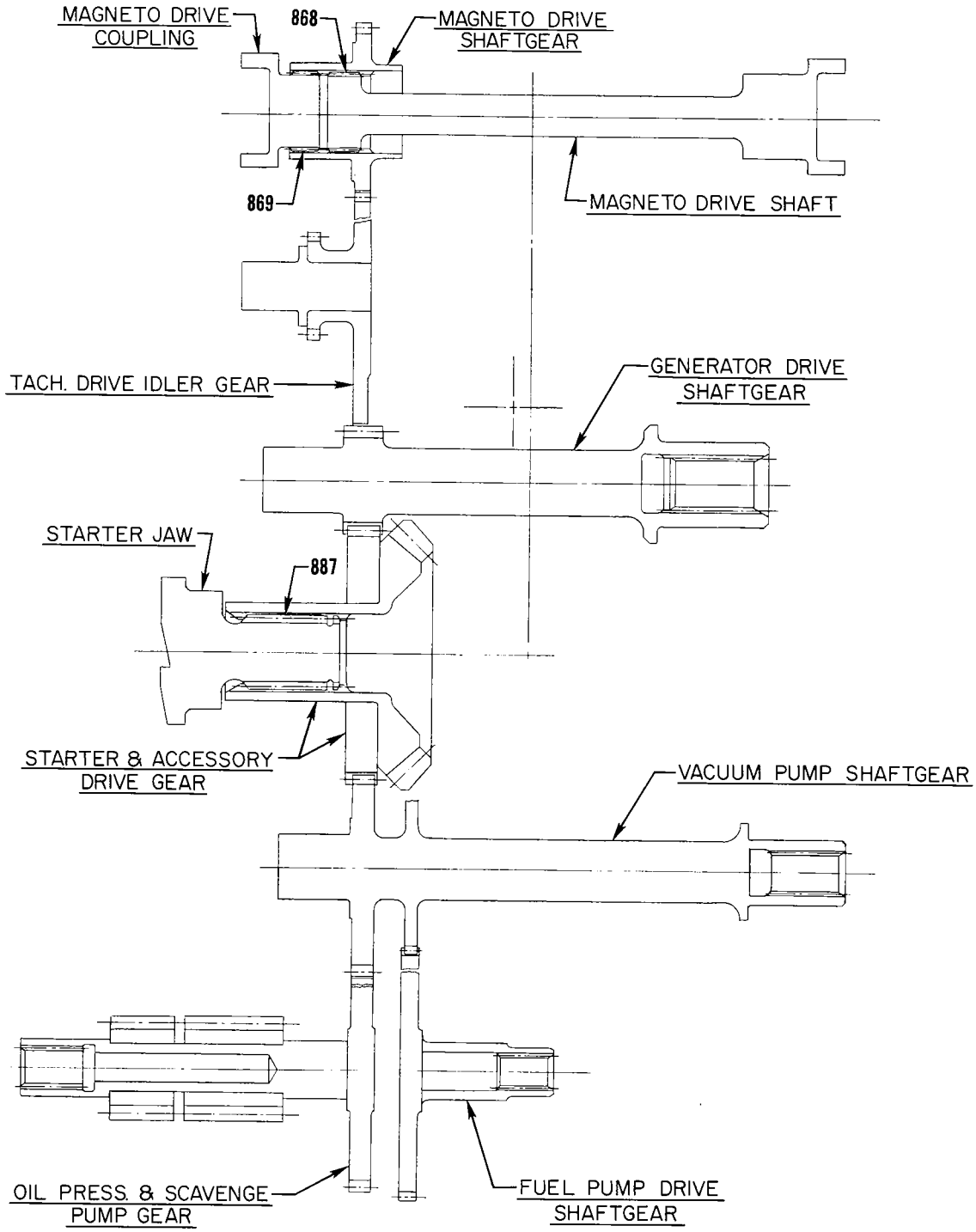
GO-435-C2A, C2B SERIES
GO-480-F,G SERIES



GO-480-D
VIEWING LEFT SIDE OF ENGINE

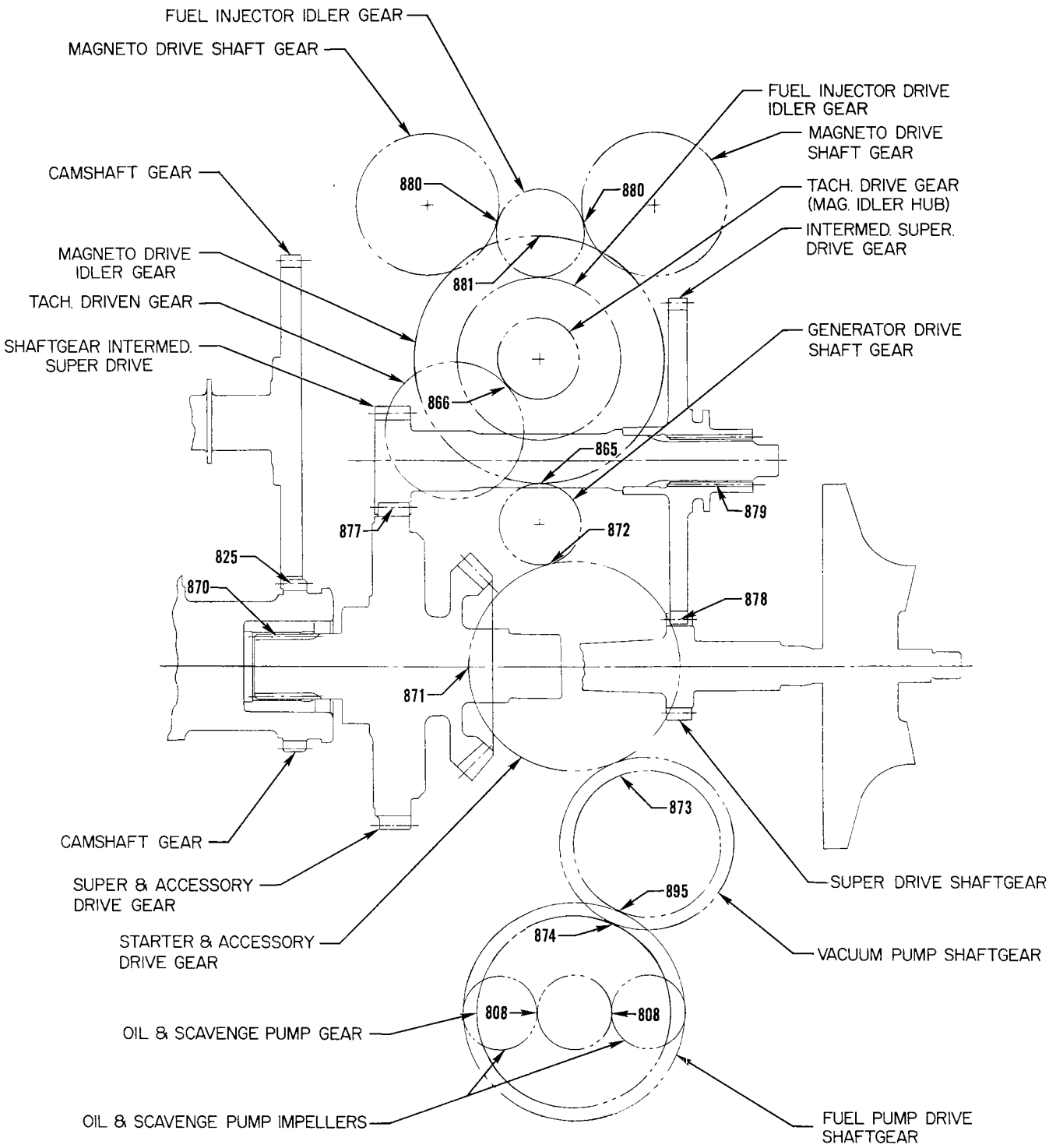


VIEWING LEFT SIDE OF ENGINE



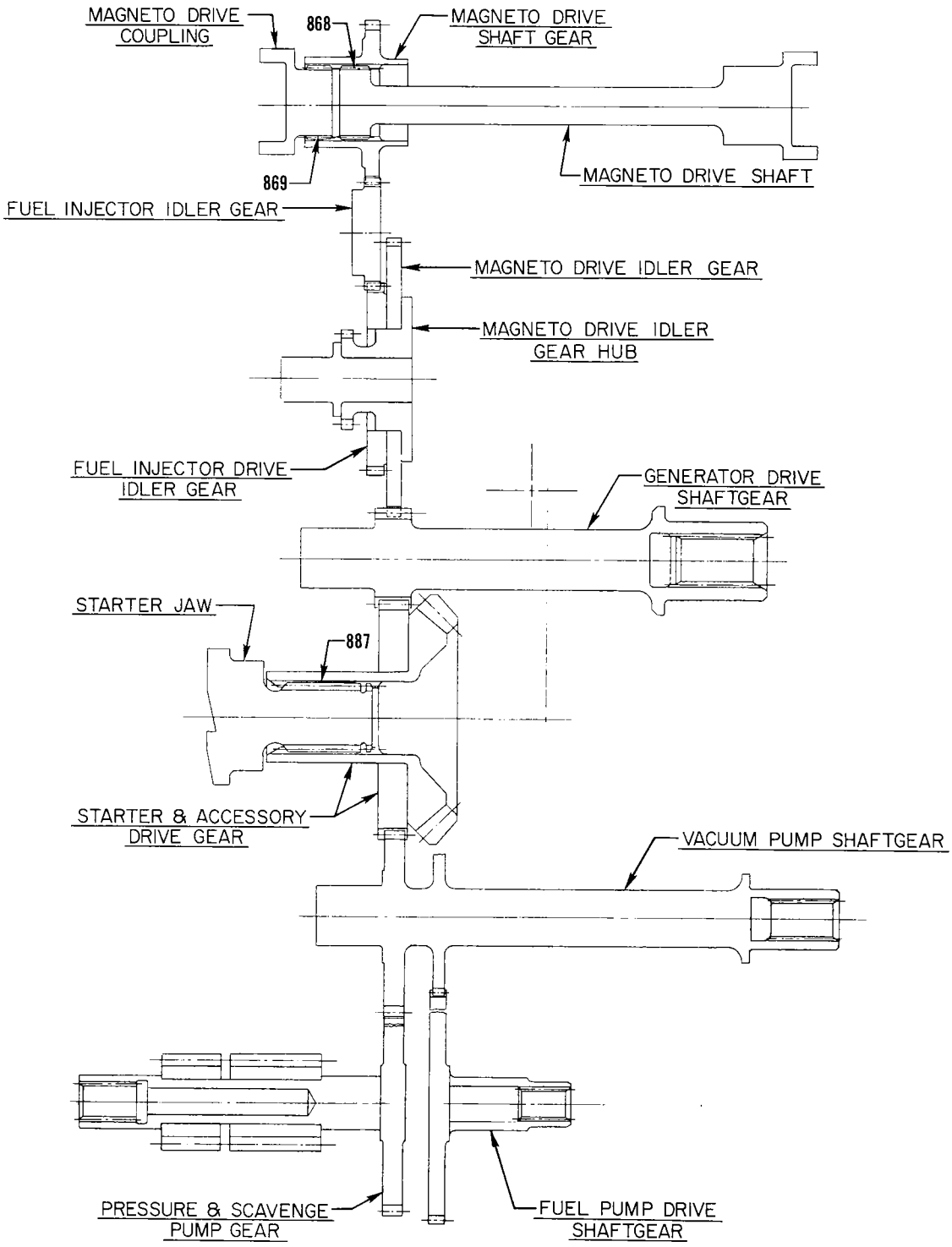
GO-480-D, GSO-480-B

Accessory Drives

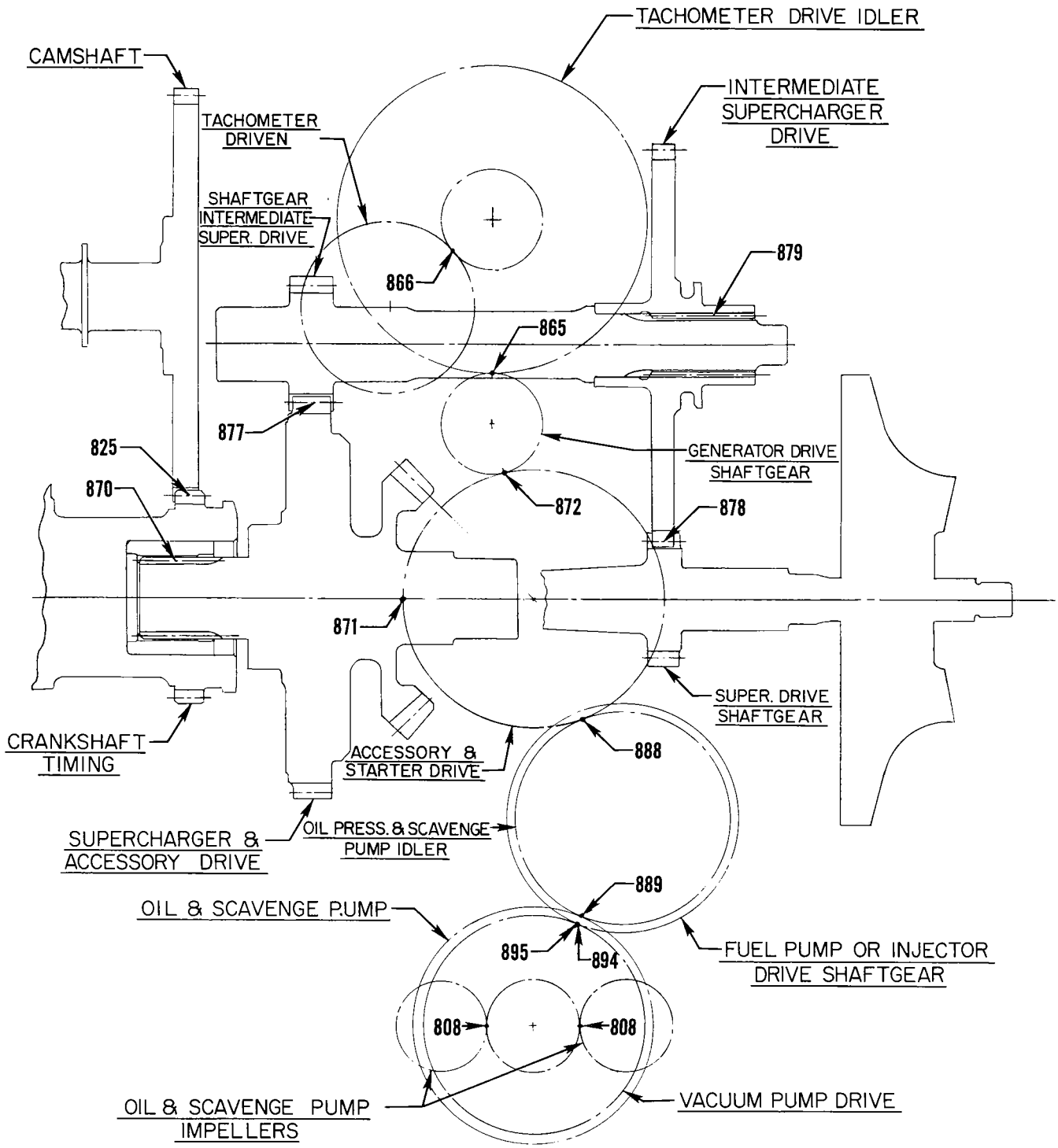


IGSO-480-A

VIEWING LEFT SIDE OF ENGINE

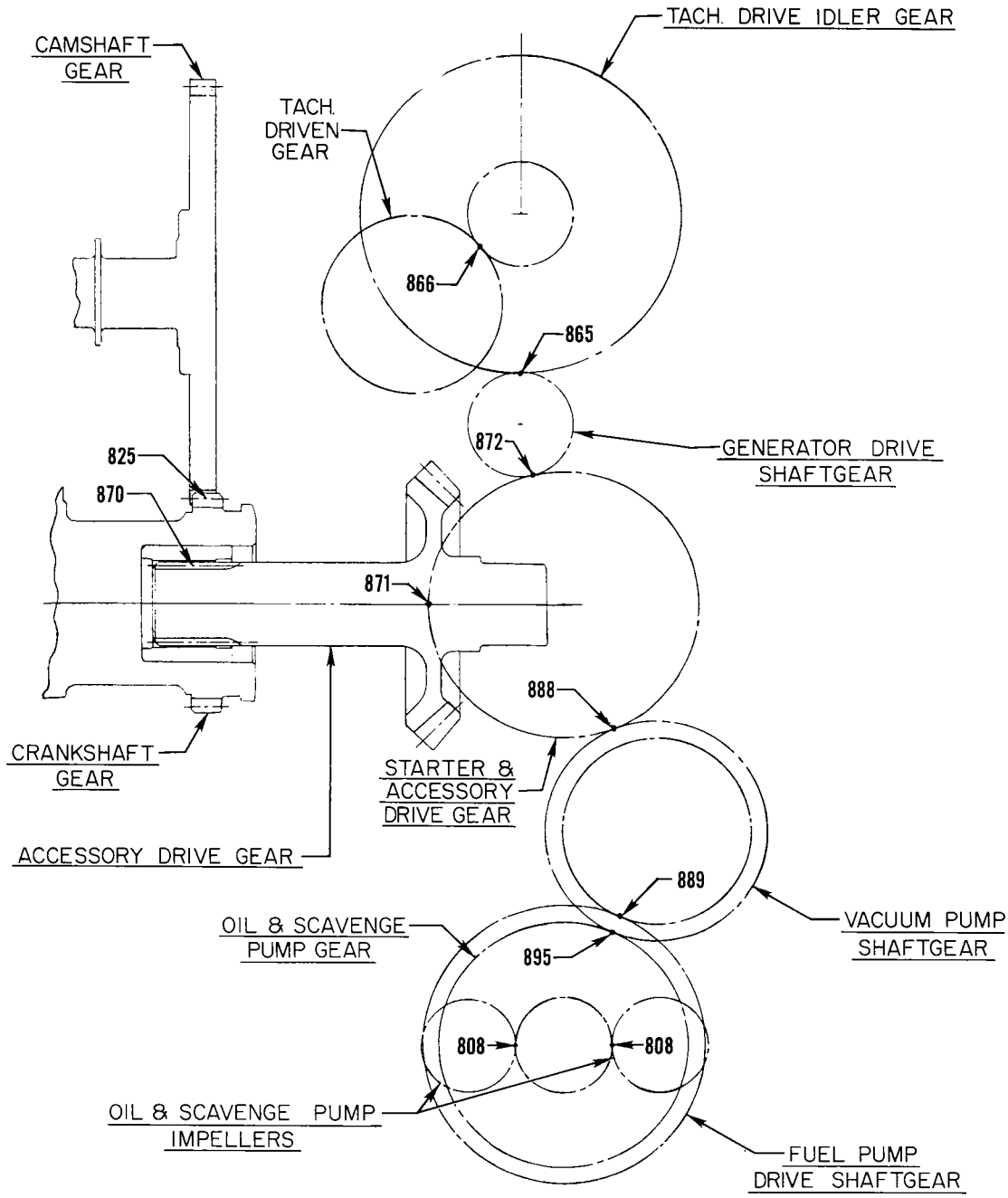


IGSO-480-A SERIES

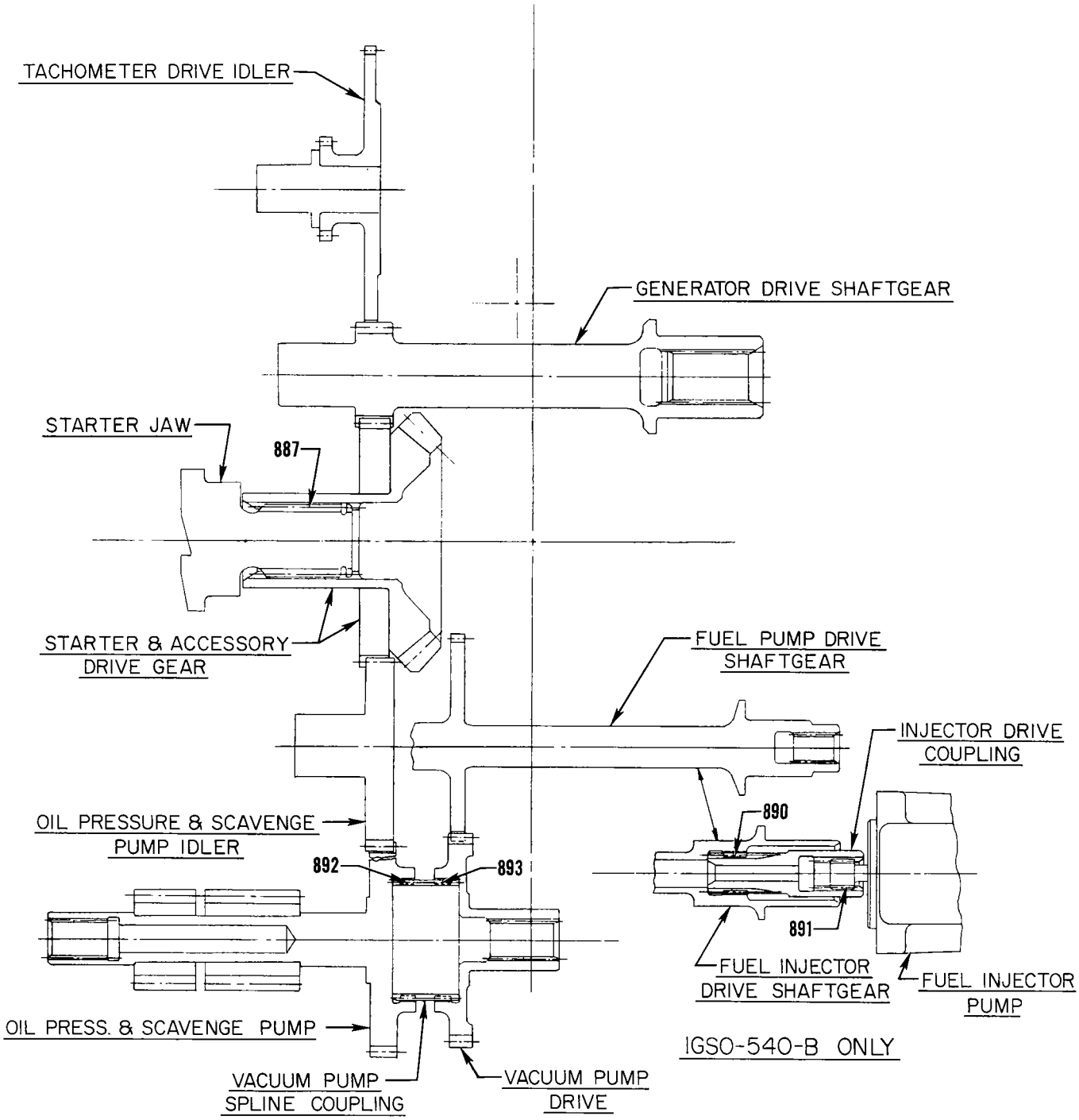


IGSO-540
VIEWING LEFT SIDE OF ENGINE

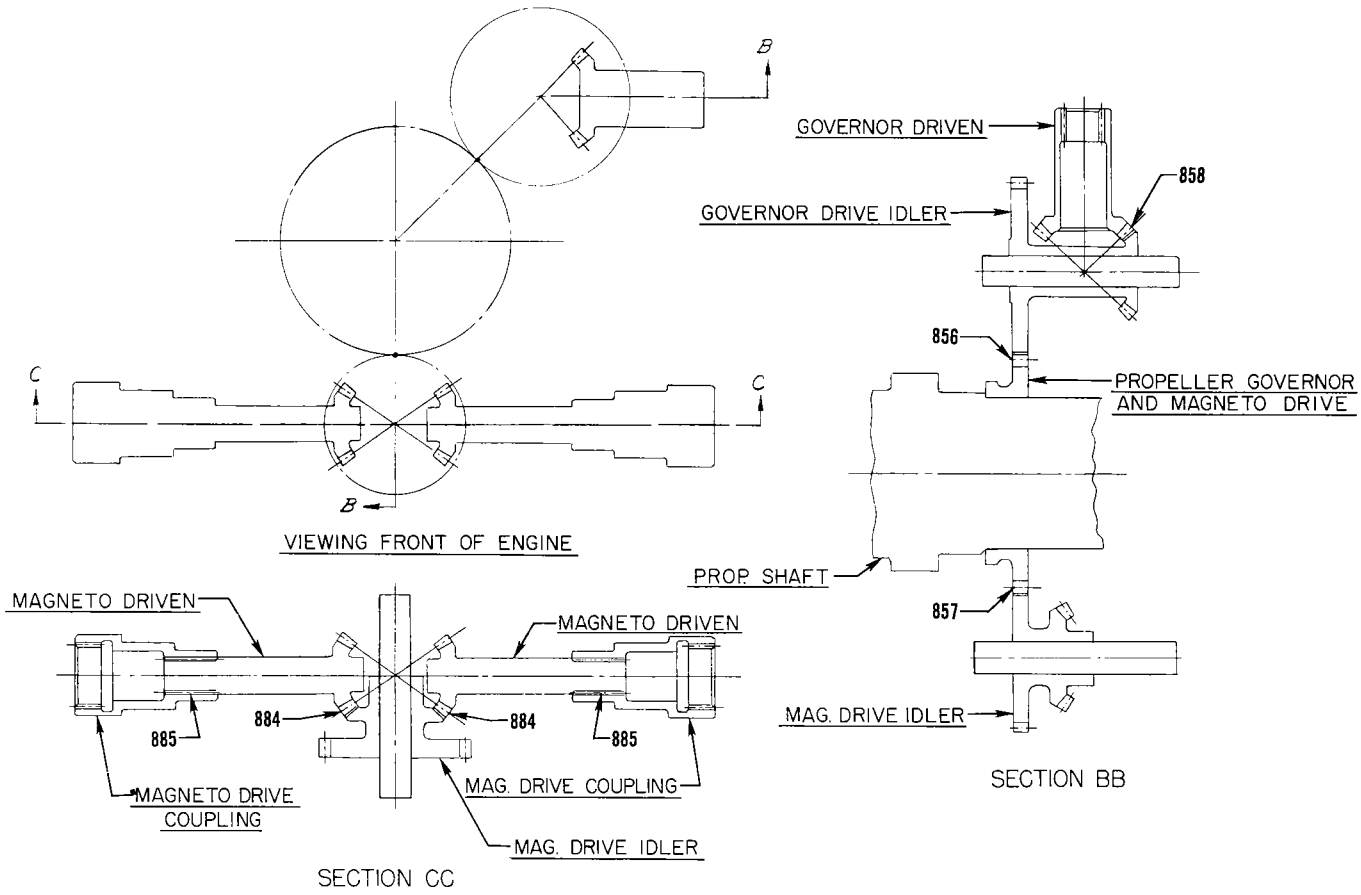
Accessory Drives



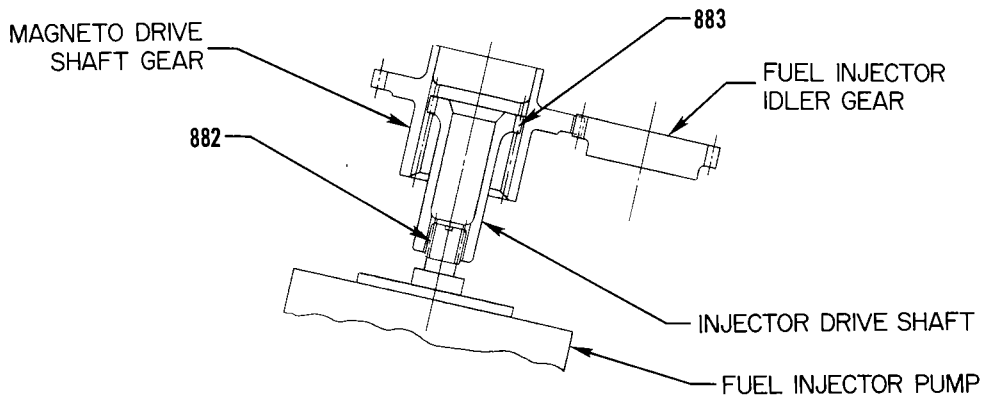
IGO-540
VIEWING LEFT SIDE OF ENGINE



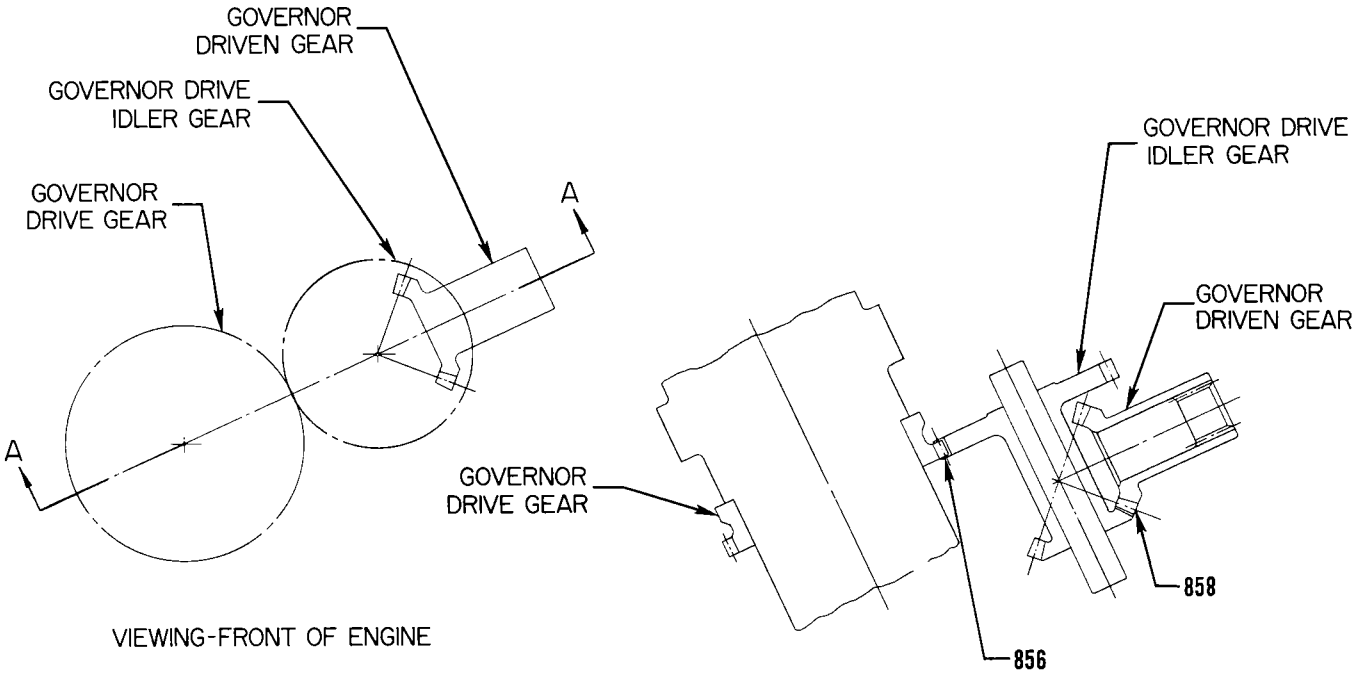
IGO-540, IGSO-540-A,B


B
C
C
B
VIEWING FRONT OF ENGINE
GOVERNOR DRIVEN
858
GOVERNOR DRIVE IDLER
856
PROPELLER GOVERNOR AND MAGNETO DRIVE
PROP. SHAFT
857
MAG. DRIVE IDLER
SECTION BB
MAGNETO DRIVEN
MAGNETO DRIVEN
884
884
885
885
MAGNETO DRIVE COUPLING
MAG. DRIVE COUPLING
MAG. DRIVE IDLER
SECTION CC

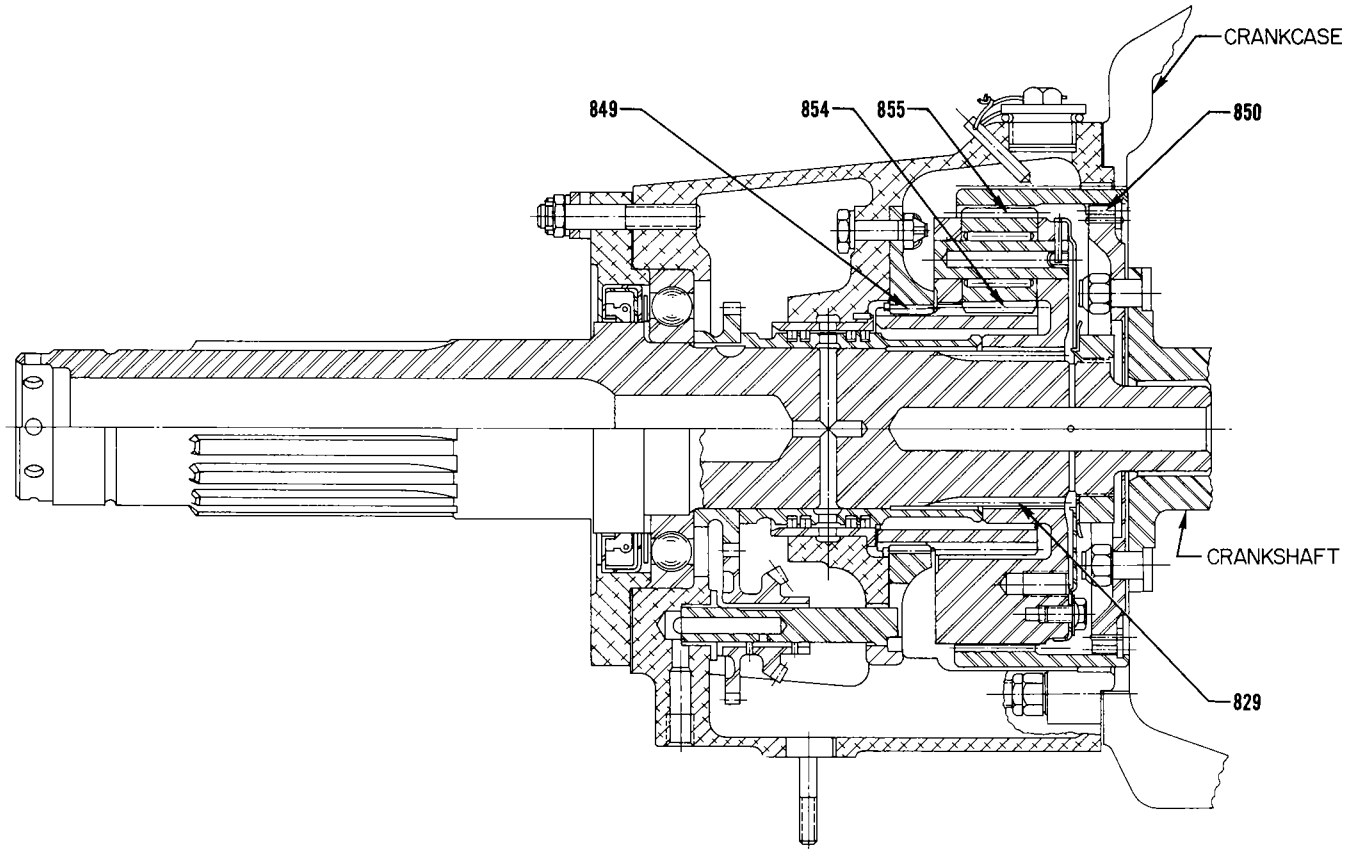
IGO, IGSO-540



IGSO-480-B



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



SECTION THRU REDUCTION GEAR

SERVICE TABLE OF LIMITS

PART III GEARED ENGINES

SECTION V - SPECIAL TORQUE REQUIREMENTS

Ref. New	Ref. Old	Chart	Thread Size	Nomenclature	Torque Limits
900	829	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	846	H4-H5-P-AB-AC	1/2-20	Oil Pump Shaft Nut	360 - 480 in. lbs.
903	840	E-H	3/8-24	Magneto Nut (To attach drive member to magneto) - Steel Bushing	300 in. lbs.
904	839	H-P1	10-32	Screw Plate Nuts (To attach ignition cable outlet plate to magneto)	15 in. lbs.
905	853	ALL	1/4-20	Rocker Box Screws	50 in. lbs.
906	852	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	830	ALL	18MM	Spark Plugs	420 in. lbs.
909	862	ALL	5/8-32	Alternator Pulley Nut	450 in. lbs.
		ALL	5/8-32	Alternator Nut (Quill Shaft)	474 in. lbs.
910	864	AC	1/4-28	Alternator Output Terminal Nut	85 in. lbs.
911	865	AC	10-32	Alternator Auxiliary Terminal Nut	30 in. lbs.
913	857	H3-H5-P-AB-AC	1/16-27 NPT	Piston Cooling Nozzle in Crankcase	100 in. lbs.
914	854	AC	1/8-27 NPT	Injector Nozzle in Cylinder Head	60 in. lbs.
919	871	ALL	1/4 Hex Head and Below	Hose Clamps (Worm Type)	20 in. lbs.
		ALL	5/16 Hex Head and Above	Hose Clamps (Worm Type)	45 in. lbs.
919-1		ALL		"T" Bolt Hose Clamps - Initial Torque ..... Retorque After Engine Test ..	35 in. lbs. 25 in. lbs.
920	875	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	858	ALL	3/8	Cylinder Hold Down Nuts	300 in. lbs.
		ALL	1/2	Cylinder Hold Down Nuts	600 in. lbs.
		Cylinder Hold Down and Crankcase Parting Flange Nuts' Tightening Procedures - See latest edition of Service Instruction No. 1029.			
931	837	ALL	2.000-16	Pinion Cage Retaining Nut	400 FT. LBS.

Ref. New	Ref. Old	Chart	Thread Size	Nomenclature	Torque Limits
932	826	E-H1-H4-H5-P-AB-AC		Propeller Retaining Nut	450 - 500 FT. LBS.
933	841	H4-H5-P-AB-AC		Accessory Drive Shaft Nut	75 - 125 FT. LBS.
934	842	H4-H5-P-AB-AC		Crankshaft Gear Retaining Nut	150 FT. LBS.
936	845	P-AB		Supercharger - Intermediate Drive Shaft Nut	75 FT. LBS.
937	847	P-AB		Supercharger - Impeller Locknut	(600 in. lbs. Plus Torque Req'd. to Reach Next Locking Slot)
938	848	H4-H5-P-AB-AC	1/4-28	Thin Slotted Nut	(38 in. lbs. Plus Torque Req'd. to Reach Next Locking Slot)
940	855	ALL		Ring Gear Assembly - Attaching Nuts	360 in. lbs.
941	856	ALL		Reduction Gear Assembly - Attaching Nuts	300 in. lbs.
942	866	E1-H1	1/4-18 NPT	Carburetor Drain Plug	120 - 144 in. lbs.
		E-H-P	1/8-27 NPT	Carburetor Drain Plug	50 - 60 in. lbs.
943	859	P	10-32	Screws (To attach Accessory Drive Coupling Plate)	25 - 30 in. lbs.

SECTION V - SPRINGS

		Chart	Nomenclature	Avco Lyc. Part No.	Wire Dia.	Length At. Comp. Length	COMP. LOAD Mfr. Min.	Mfr. Max.	Serv. Max.
950	800	ALL	Outer Valve Springs (Angle)	68326	.177	1.46 in.	103 lb.	111 lb.	100 lb. min.
		ALL	Outer Valve Springs (Angle)	LW-11796	.182	1.43 in.	114 lb.	124 lb.	111 lb. min.
951	801	ALL	Auxilliary Valve Springs (Angle)	68328 LW-11797	.142 .142	1.33 in. 1.33 in.	75 lb. 73 lb.	83 lb. 83 lb.	72 lb. min. 70 lb. min.
952	810	H4-H5-P-AB-AC	Check Valve Springs						
			Avco Lycoming Part Numbers	Free Length					
			654-B	----------	.031	1.03 in.	.74 lb.	.94 lb.	.69 lb. min.
			73761	2.065	.041	1.03 in.	3.15 lb.	3.35 lb.	3.10 lb. min.
953	811		Oil Pressure Relief Valve Spring						
			Avco Lycoming Part Numbers	Identification: Dye	Free Length				
		H4-H5-P-AB-AC	68542	None	2.38	.067	1.66 in.	15 lb.	17 lb.	14 lb. min.
		H4-H5-P-AB-AC	LW-14029	White	2.28	.072	1.66 in.	20 lb.	22 lb.	17 lb. min.
		E1-H1-H2-H3	60476	None	2.38	.047	1.44 in.	7.15 lb.	7.65 lb.	7.00 lb. min.
		E1-H1-H2-H3	66920	None	2.54	.047	1.44 in.	8.35 lb.	8.85 lb.	8.20 lb. min.
		E1-H1-H2-H3	74596	None	2.96	.047	1.44 in.	11.65 lb.	12.15 lb.	11.50 lb. min.

Ref. New	Ref. Old	Chart	Thread Size	Nomenclature	Torque Limits

SECTION V SPRINGS (CONT.)

Chart	Nomenclature	Avco Lyc. Part No.	Wire Dia.	Length At. Comp. Length	Mfr. Min.	COMP. LOAD Mfr. Max.	COMP. LOAD Serv. Max.
954	Supercharger Drive Coupling Spring						
	Avco Lycoming Part Numbers	Free Length					
P	68830	1.25	.148	1.10 in.	168 lb.	184 lb.	165 lb. min.
P	LW-12303	1.28	.148	1.13 in.	168 lb.	184 lb.	165 lb. min.
AB	72774	1.23	.177	1.10 in.	249 lb.	275 lb.	244 lb. min.
AB	LW-12301	1.26	.177	1.13 in.	255 lb.	270 lb.	250 lb. min.

SERVICE TABLE OF LIMITS

STANDARD TORQUE

UNLESS OTHERWISE LISTED

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

TABLE I

BOLTS, SCREWS AND NUTS

Thread	Torque In. Lb.	Torque Ft. Lb.	Thread	Torque In. Lb.	Torque Ft. Lb.
10	49	------	1/2	900	75
1/4	96	------	9/16	1320	110
5/16	204	17	5/8	1800	150
3/8	360	30	3/4	3240	270
7/16	600	50			

THIN NUTS (1/2 DIA OF BOLT) - 1/2 LISTED TORQUE

TABLE II

PIPE PLUGS

Thread	Torque In. Lbs.
1/16-27 NPT	40
1/8-27 NPT	40
1/4-18 NPT	85
3/8-18 NPT	110
1/2-14 NPT	160
3/4-14 NPT	230
1-11 1/2 NPT	315

TABLE III

CRUSH TYPE ASBESTOS GASKETS

Thd. Pitch On Part To Be Tightened Threads Per Inch	ANGLE OF TURN Aluminum Asbestos	Copper Asbestos
8	135°	67°
10	135°	67°
12	180°	90°
14	180°	90°
16	270°	135°
18	270°	135°
20	270°	135°
24	360°	180°
28	360°	180°

NOTE

Install all crush type gaskets except the self centering type, with the unbroken surface against the flange of the plug or part being tightened against the seal. Turn the part until the sealing surfaces are in contact and then tighten to the angle of turn listed for the appropriate thread size.

NOTE: Lubricate Threads Unless Otherwise Specified.

TABLE IV

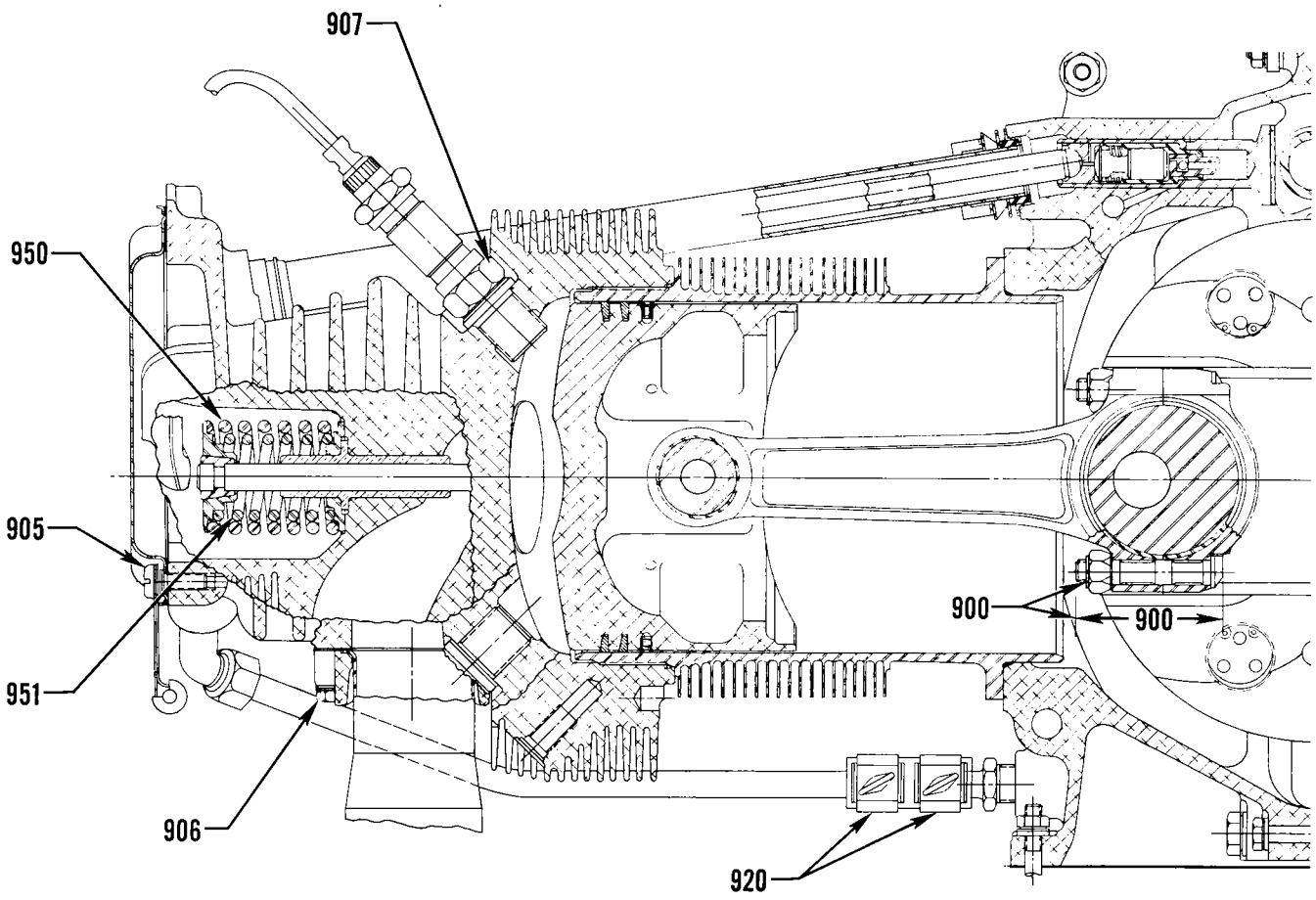
FLEXIBLE HOSE OR TUBE FITTINGS

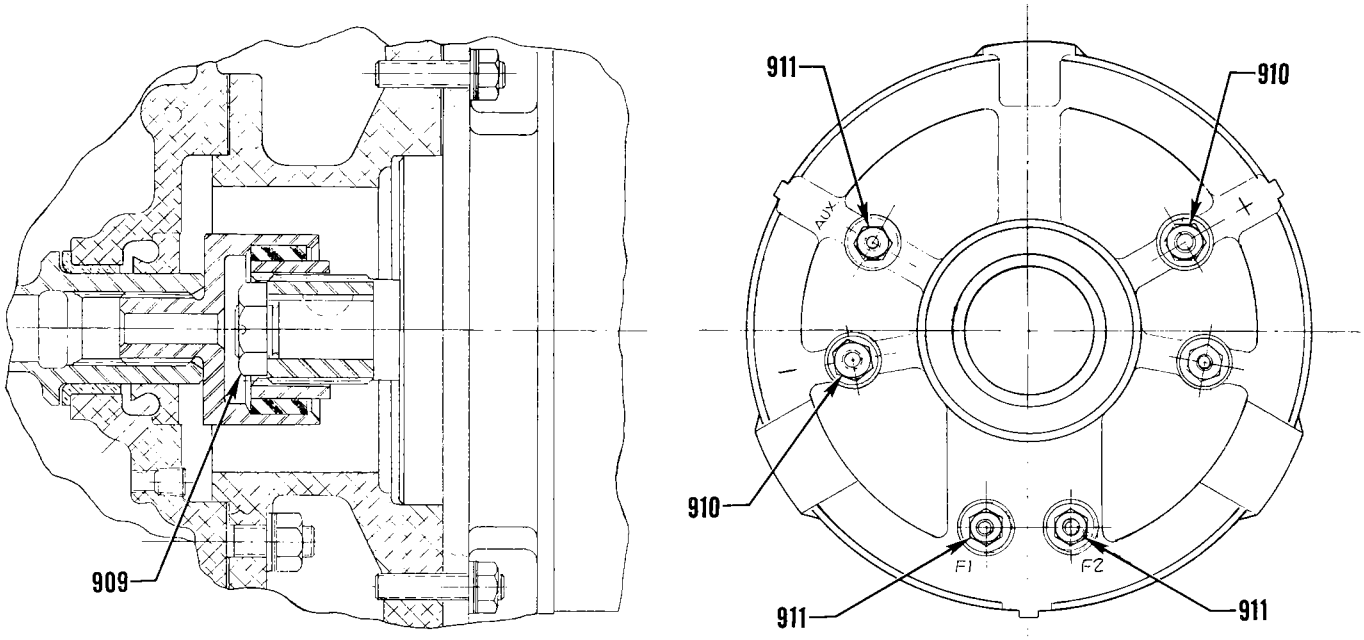
Tube Size	Thread	Torque In. Lbs.
(-3) 3/16	3/8-24	30
(-4) 1/4	7/16-20	30
(-5) 5/16	1/2-20	35
(-6) 3/8	9/16-18	35
(-8) 1/2	3/4-16	60
(-10) 5/8	7/8-14	70

TABLE V

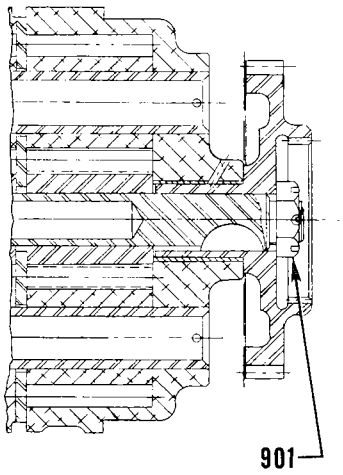
STUDS MIN. DRIVING TORQUE

Threads	Torque In. Lb s.
1/4-20	15
5/16-18	25
3/8-16	50

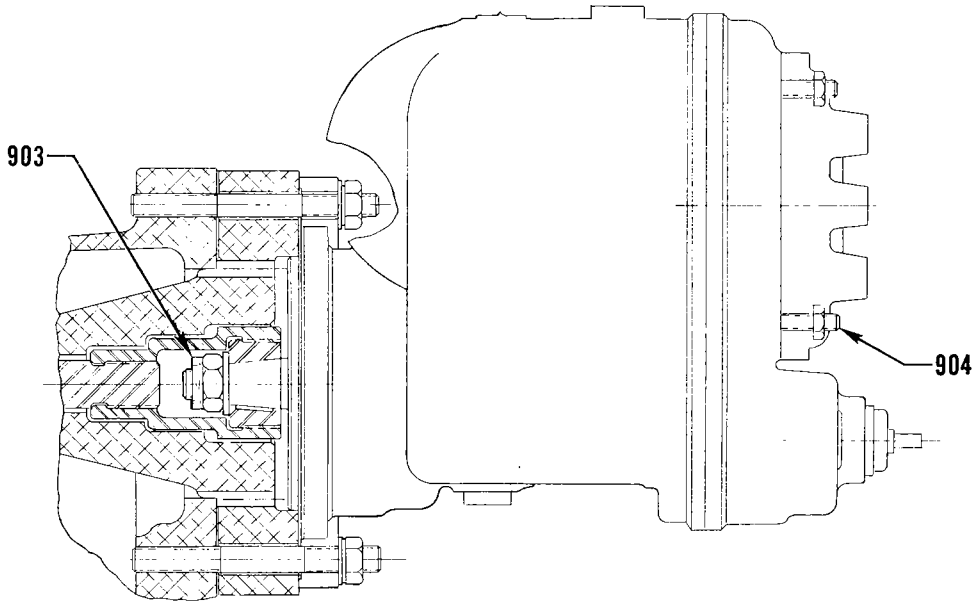

907
950
905
951
906
900
900
920



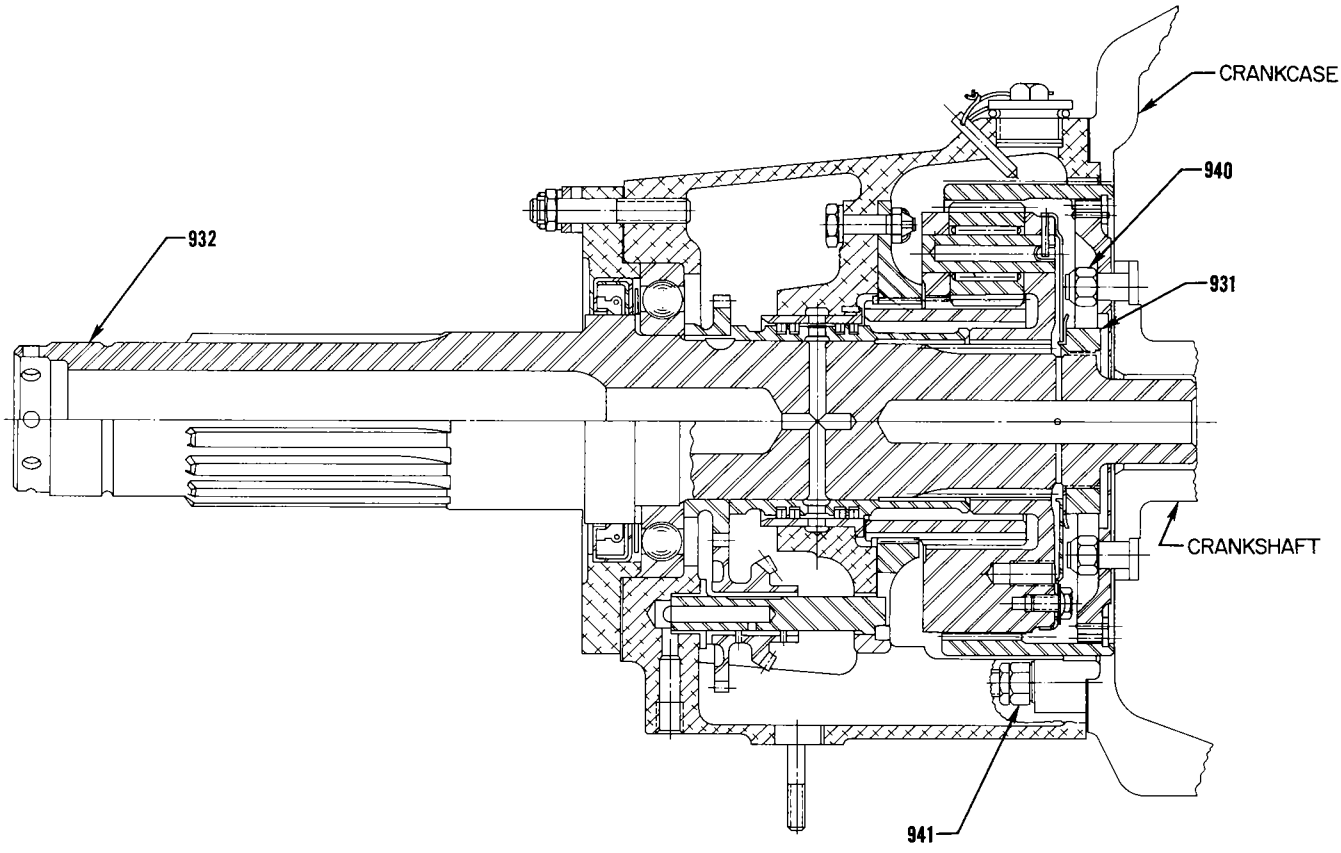
ALTERNATOR & ALTERNATOR DRIVE



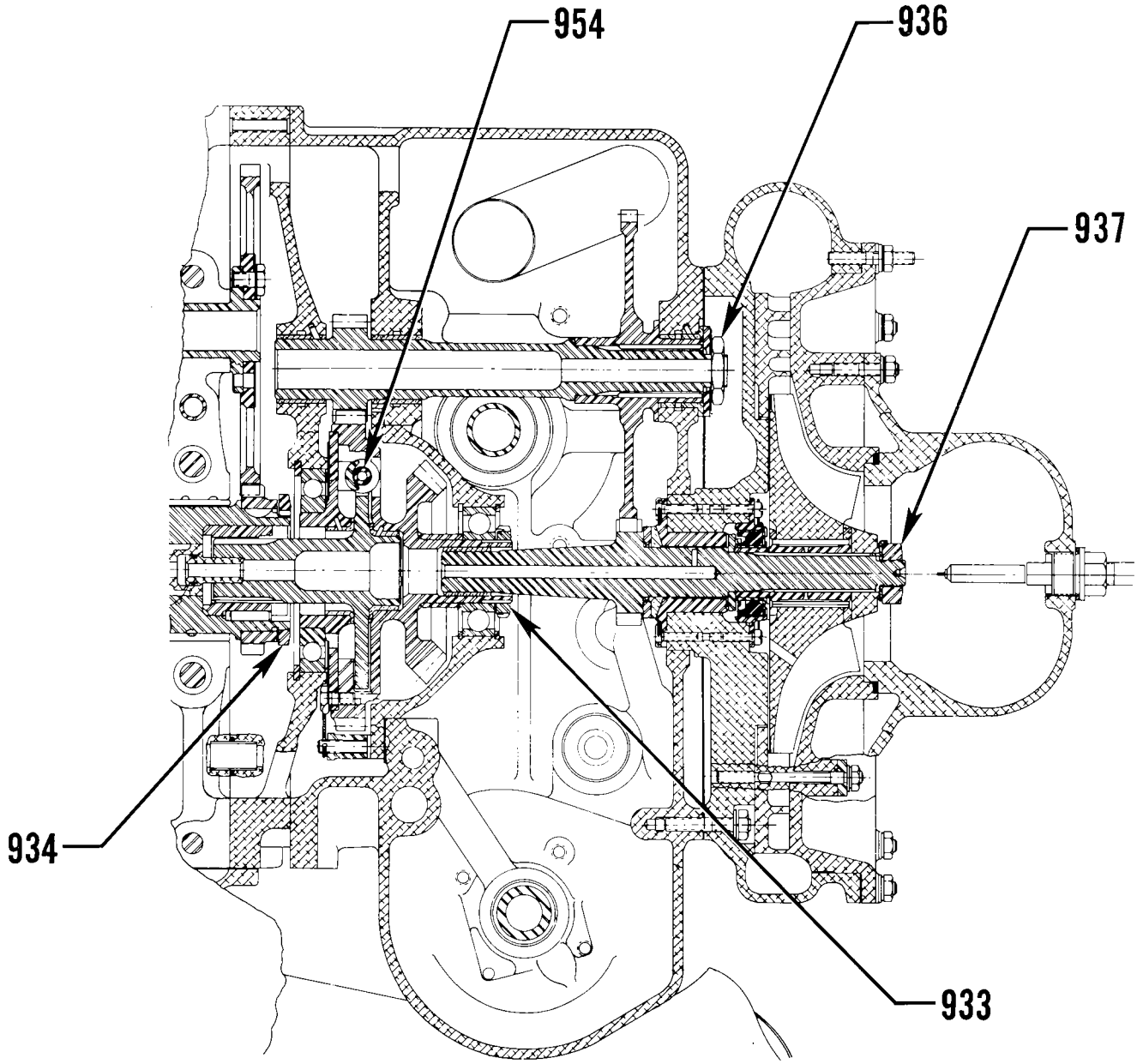
OIL PUMP



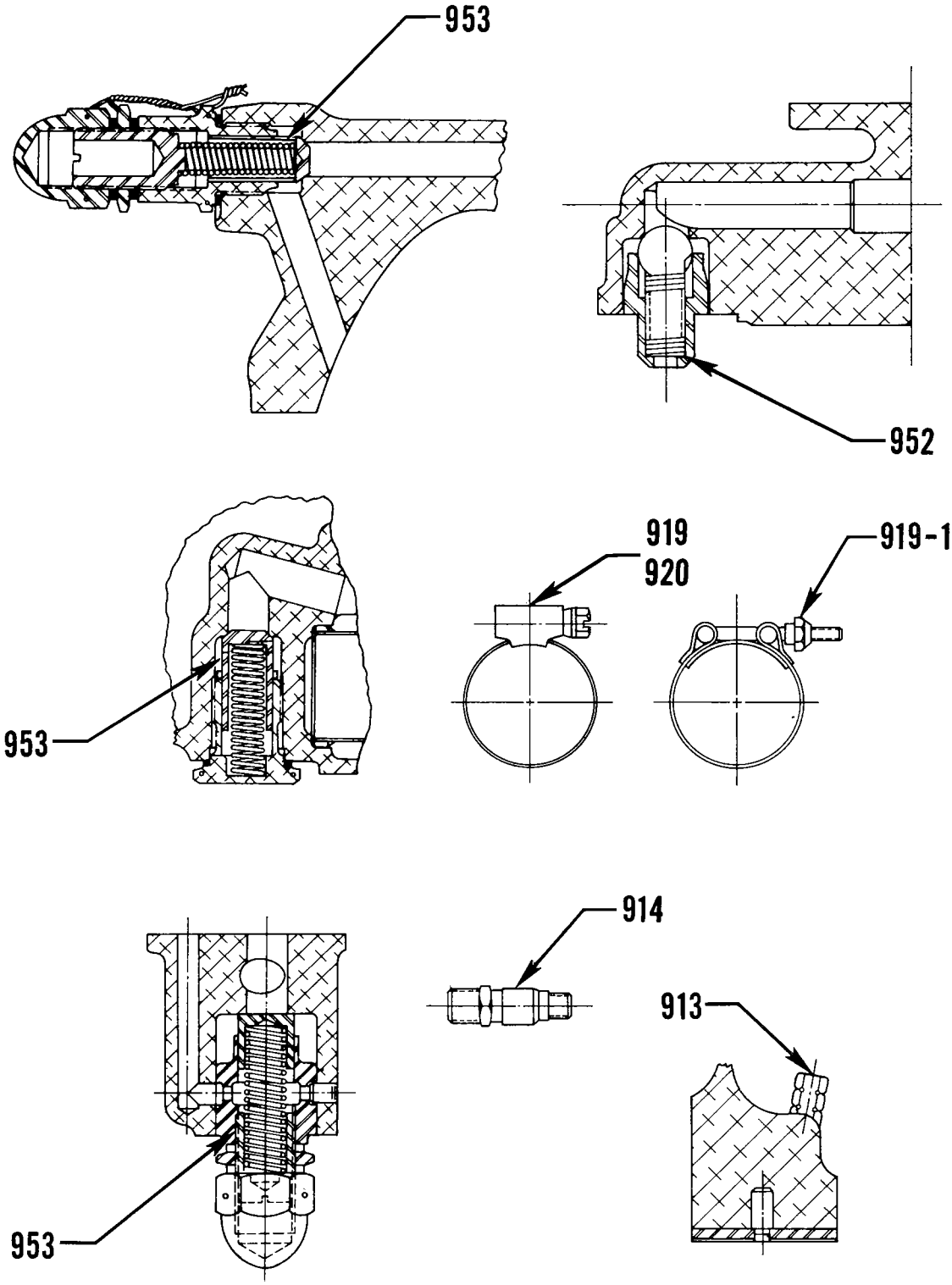
MAGNETO



SECTION THRU REDUCTION GEAR



SECTION THRU ACCESSORY HSG. & SUPERCHARGER



Engine Springs and Hardware

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 1	500 SERIES	CRANKCASE, CRANKSHAFT & CAMSHAFT
SECTION 11	600 SERIES	CYLINDERS
SECTION 111	700 & 7000 SERIES	GEAR TRAIN
SECTION IV	800 & 8000 SERIES	BACKLASH (GEAR TRAIN)
SECTION V	900 SERIES	TORQUE AND SPRINGS

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

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

SERVICE TABLE OF LIMITS

PART IV VERTICAL ENGINES
SECTION I CRANKCASE, CRANKSHAFT AND CAMSHAFT

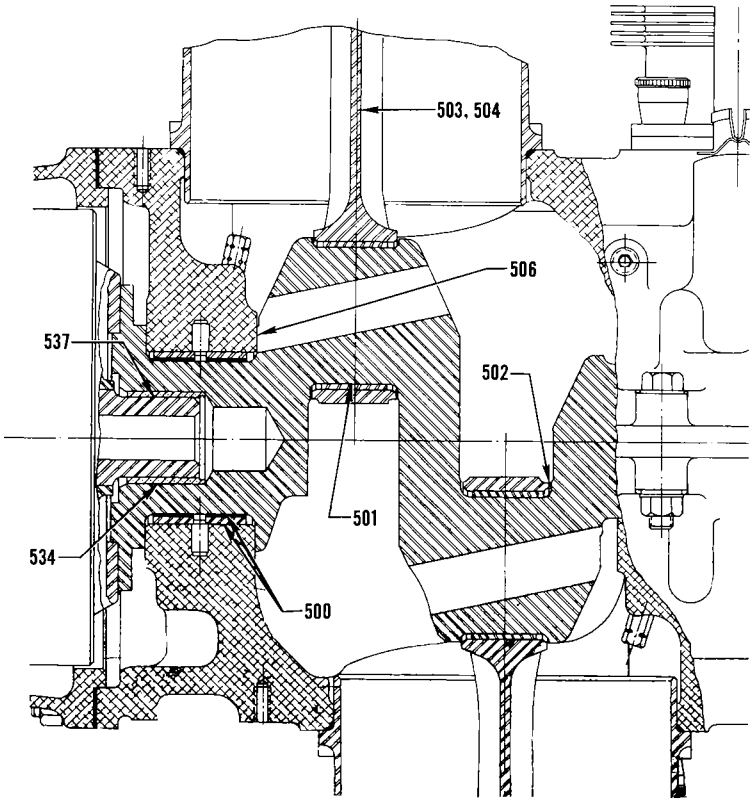
Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
500	501	L	All Main Bearings and Crankshaft			.0015L / .0045L	.0060L
		L1-V	Main Bearings and Crankshaft (Except Front)			.0011L / .0041L	.0050L
		V	Front Main Bearing and Crankshaft			.0011L / .0041L	.0050L
		L1	Front Main Bearing and Crankshaft			.0015L / .0045L	.0050L
		ALL	Diameter of Main Bearing Journal on Crankshaft	2.3745 / 2.376	(E)		
500	955	L	Crankcase Bearing Bore Diameter (All)	2.566 / 2.567	2.5685		
		V	Crankcase Bearing Bore Diameter (All)	2.6865 / 2.6875	2.6890		
501	502	ALL	Connecting Rod Bearing and Crankshaft			.0008L / .0038L	.0050L
		ALL	Diameter of Connecting Rod Journal on Crankshaft (2-1/8 in.)	2.1235 / 2.125	(E)		
501	954	ALL	Connecting Rod Bearing Bore Diameter (2-1/8 in.) (Measured at Axis 30° on Each Side)	2.2870 / 2.2875			
502	564	ALL	Connecting Rod - Side Clearance			.004L / .010L	.016L
503	566	ALL	Connecting Rod - Alignment			.010 in 10 Inches	
504	567	ALL	Connecting Rod - Twist			.012 in 10 Inches	
505	556	ALL	Crankshaft Run-Out at Center Main Bearings				
			Mounted on No. 1 and 4 Journals Max. Run-Out No.2 and 3 Journals			.005	.0075
			Mounted on No. 1 and 3 Journals Max. Run-Out No. 2 Journal			.003	.0045
			Mounted on No. 2 and 4 Journals Max. Run-Out No. 3 Journal			.003	.0045
506	568	ALL	Crankshaft and Crankcase Front End Clearance			.006L / .015L	.025L
508	607	ALL	Crankshaft Propeller Flange Run-Out			.002	.005
510	504	ALL	Crankshaft Timing Gear and Crankshaft			.0000 / .0015T	(A)
511	536	ALL	Tappet Body and Crankcase			.0010L / .0033L	.004L

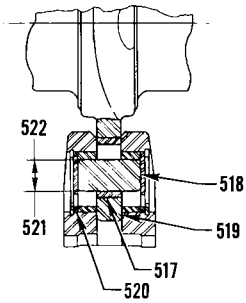
SERVICE TABLE OF LIMITS

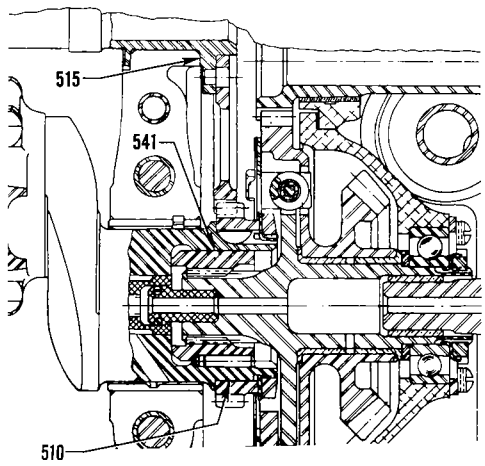
PART IV VERTICAL ENGINES
SECTION 1 CRANKCASE, CRANKSHAFT AND CAMSHAFT

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
511	536	ALL	O. D. of Tappet	.7169 .7177	.7166		
		ALL	I. D. Tappet Bore in Crankcase	.7187 .7200	.7203		
512	559	ALL	Tappet Plunger Assembly and Body - Hyperbolic			.0010L .0067L	.0087L
513	560	ALL	Tappet Socket and Body (Hyperbolic)			.002L .007L	.009L
514	537	ALL	Camshaft and Crankcase			.002L .004L	.006L
515	538	ALL	Camshaft - End Clearance			.002L .009L	.015L
516	539	ALL	Camshaft Run-Out at Center Bearing Journal			.000 .001	.006
517	578	V	Counterweight Bushing and Crankshaft			.0013T .0026T	(A)
518	579	V	Counterweight Roller - End Clearance			.007L .025L	.038L
519	580	V	Counterweight and Crankshaft Side Clearance*			.003L .013L	.017L
520	696	V	Counterweight Bore and Washer O. D.			.0002L .0030L	(A)
521	775	V	I. D. of Counterweight Bushing	.7485 .7505	.7512		
522	774	V	O. D. of Counterweight Roller (P/N 73338) (See latest edition of Service Instruction No. 1012)	.5255 .5260			
541	718	ALL	Rear Crankshaft Spline Bushing and Crankshaft			.0002T .0015T	(A)

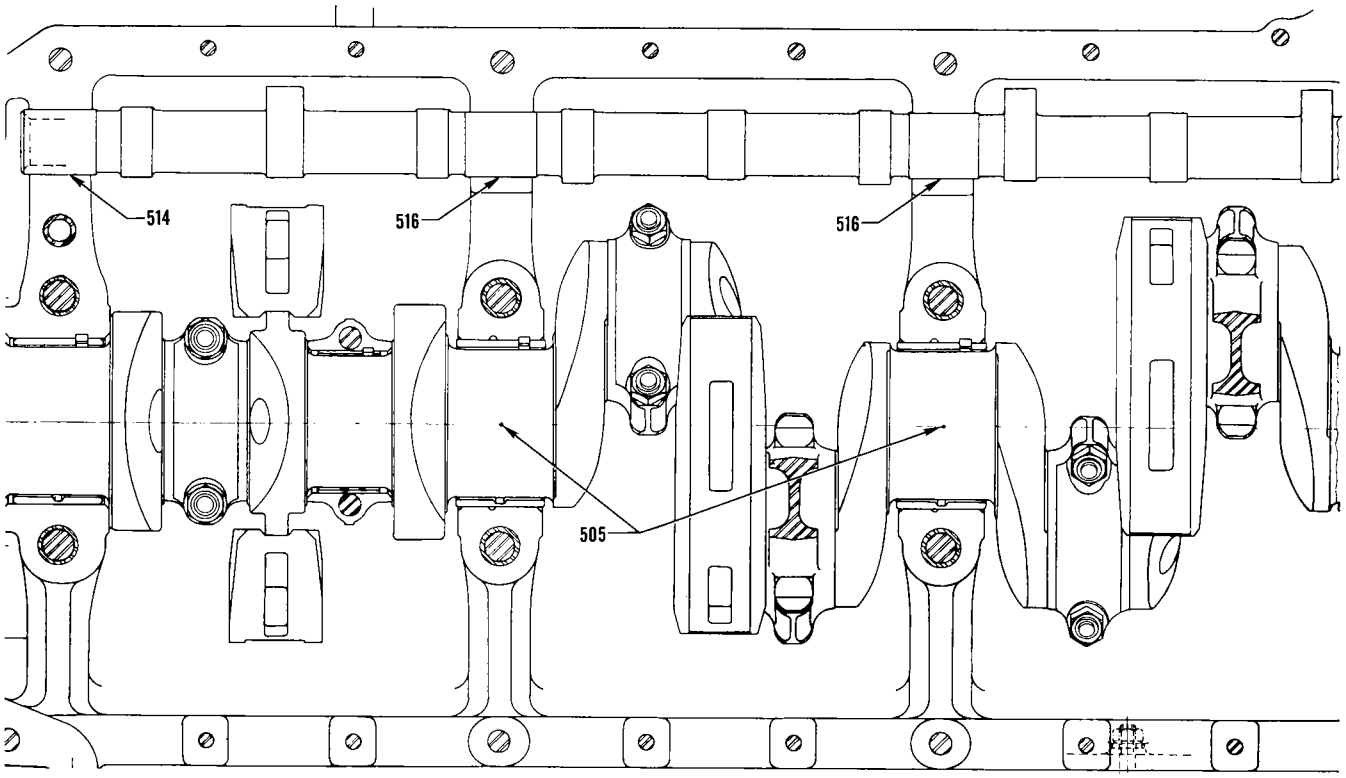
*Measure below roller next to flat.

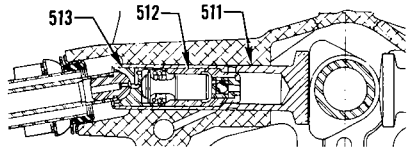






Crankcase, Crankshaft, Bearings, Camshaft
and Counterweights





Longitudinal Section Thru Engine
Camshaft, Tappet Body and Crankshaft

PART IV VERTICAL ENGINES
SECTION II CYLINDERS

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
600	510	ALL	Connecting Rod and Connecting Rod Bushing	Bushing to be Burnished in Place			
		ALL	Finished I. D. of Connecting Rod Bushing	1.1254 1.1262			
601	510	L	Length Between Connecting Rod Bearing Centers	6.4985 6.5015			
		V	Length Between Connecting Rod Bearing Centers	6.7485 6.7515			
602	511	ALL	Connecting Rod Bushing and Piston Pin			.0008L .0021L	.0025L
603	512	ALL	Piston Pin and Piston			.0003L .0014L	.0018L
		ALL	Diameter of Piston Pin Hole in Piston	1.1249 1.1254			
		ALL	Diameter of Piston Pin	1.1241 1.1246			
604	513	V	Piston and Piston Pin Plug			.0002L .0010L	.002L
		V	Diameter of Piston Pin Plug*	1.1242 1.1247			
605	513	ALL	Piston Pin and Piston Pin Plug (Nitrided and Chome Cylinders)			.0005L .0025L	.005L
		V	Diameter of Piston Pin Plug*	.5655 .5665			
		L	Diameter of Piston Pin Plug**	.7605 .7615			
		L	Diameter of Piston Pin Plug** (Thin Wall Pin)	.8405 .8415			
		*See latest edition of Service Instruction No. 1267. **See latest edition of Service Bulletin No. 316.					
606	514	ALL	Piston Ring and Piston - Side Clearance (Top Ring Comp.) Half Wedge			.0025L .0055L	.008L(B)
606	515	ALL (As Applicable)	Piston Ring and Piston - Side Clearance (2nd Ring Comp.) Full or Half Wedge			.000 .004L	.006L(B)
606	516	ALL	Piston Ring and Piston - Side Clearance (Oil Regulating)			.002L .004L	.006L(B)
		ALL (As Applicable)	Piston Ring and Piston - Side Clearance (Oil Scraper)			.003L .0055L	.007L(B)
		ALL (As Applicable)	Piston Ring and Piston - Side Clearance (3rd Ring Comp.) Half Wedge			.000 .004L	.006L(B)

SERVICE TABLE OF LIMITS

PART IV VERTICAL ENGINES
SECTION II CYLINDERS

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions Mfr. Min. & Max.	Dimensions Serv. Max.	Clearances Mfr. Min. & Max.	Clearances Serv. Max.
607	615	ALL	Piston Ring Gap (Compression) Chrome Cylinders (Straight Barrels)			.020 .030	.047
		ALL	Piston Ring Gap (Compression) Nitrided and Chrome Cylinders (Choke Barrels)			.045 .055	.067
		ALL	Piston Ring Gap (Oil Regulating) (All Barrles)			.015 .030	.047
		ALL (As Applicable)	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.

Engine and Piston Application			Min. Piston Diameter		Cylinder Barrel			
Engine Chart Code Letter	Piston Number		Top	Bottom	Type of Piston	Type of Surface	Maximum Diameter	Max. Clearance Piston Skirt & Cyl.
608 519 L	67266, 71553, 73620		4.8395	4.8540	Forged-Round	C	4.8805	.0225L
608 522 L	73932		4.8395	4.8540	Forged-Round	N	4.8805	.0225L
609 520 L	75984		4.8395	4.8590	Forged-Cam	C	4.8805	.018L
610 521 L	75984, 76172*		4.8395	4.8590	Forged-Cam	N	4.8805	.018L
V	71940, 72249, 72578, 73947*, 73976		5.0905	5.1040	Forged-Round	C	5.1305	.0225L
V	71940, 72249, 73947, 73976		5.0905	5.1040	Forged-Round	N	5.1305	.023L
V	74242, 75617		5.0790	5.1090	Forged-Cam	C-N	5.1305	.018L
V	78203, 78762, LW-10207*, LW-10208		5.0790	5.1090	Forged-Cam	C-N	5.1305	.018L

NOTES:

To find the average diameter of cylinder in an area 4" above bottom of barrel: First, measure diameter at right angles from plane in which valves are located. Second, measure diameter through the plane in which valves are located. Add both diameters; this sum, divided by 2, represents the average diameter of the cylinder.

*=High Compression.

Cylinder Barrel: N=nitride hardened, C=chrome plated.

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.

Maximum taper and out-of-round permitted for cylinder in service is .0045 inch.

See Service Instruction No. 1243 for identification of cast and forged pistons. The suffix "S" that will be found with the part number on 73947, 73976, 74242, 75984, 78203, 78762, LW-10207, LW-10208 pistons indicates the piston weight is within the limits specified for any group of pistons and may be substituted for any like piston on a particular engine. Other pistons are manufactured within weight limits that do not require any weight controlled piston for replacement.

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. See Service Instruction No. 1243 for illustration.

PART IV VERTICAL ENGINES
SECTION II CYLINDERS

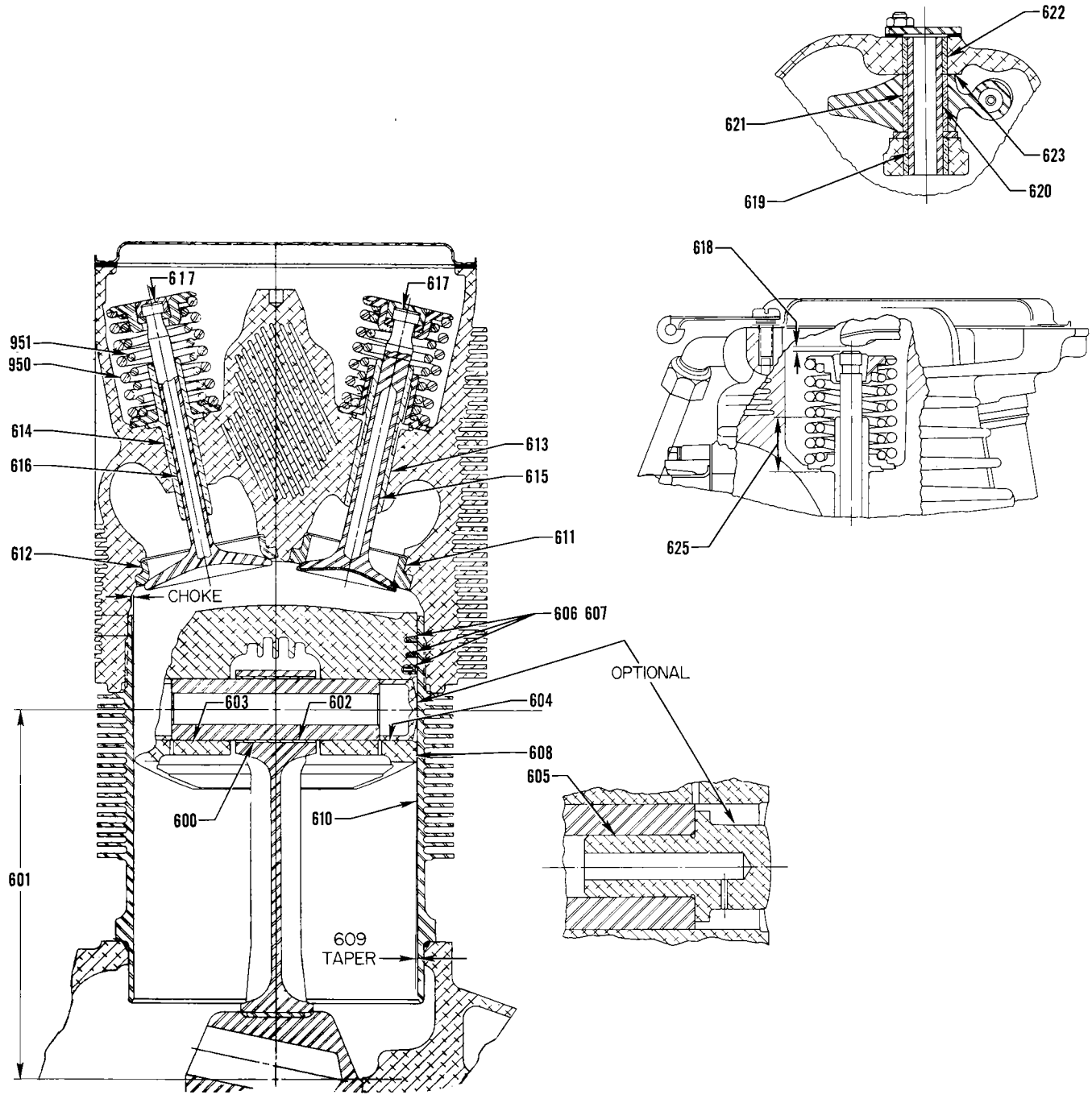
Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
611	523	L	Exhaust Valve Seat and Cylinder Head (Flat Seat)			.0065T / .010T	(A)
		ALL	Exhaust Valve Seat and Cylinder Head (Allison Seat)			.0075T / .011T	(A)
		ALL	O. D. Exhaust Seat (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	524	ALL	Intake Valve Seat and Cylinder Head			.0065T / .010T	(A)
		L	O. D. Intake Seat (Allison Seat)	2.1675 / 2.169			
		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	526	ALL	Exhaust Valve Guide and Cylinder Head			.001T / .0025T	(A)
613	527	ALL	O. D. Exhaust Valve Guide (1/2 in. Exhaust Valve)	.6633 / .6638			
		L	O. D. Exhaust Valve Guide (7/16 in. Exhaust Valve)	.5933 / .5938			
		ALL	I. D. Exhaust Valve Guide Hole in Cylinder Head (1/2 in. Exhaust Valve)	.6613 / .6623			
		L	I. D. Exhaust Valve Guide Hole in Cylinder Head (7/16 in. Exhaust Valve)	.5913 / .5923			
614	527	ALL	Intake Valve Guide and Cylinder Head			.001T / .0025T	(A)
		ALL	O. D. Intake Valve Guide	.5933 / .5938			

PART IV VERTICAL ENGINES
SECTION II CYLINDERS

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
614	527	ALL	I. D. Intake Valve Guide Hole in Cylinder Head	.5913 .5923			
615	528	ALL	Exhaust Valve Stem and Valve Guide			.0035L .0053L	(A)
		ALL	O. D. Exhaust Valve Stem	.4957 .4965 .4937 Service allowable limits of .4937 is applicable only to inconel or nimonic valves.			
		L	O. D. Exhaust Valve Stem (7/16 in. Exhaust Valve)	.4332 .4340			
615	527	ALL	Finished I. D. Exhaust Valve Guide (1/2 in. Exhaust Valve)	.5000 .5010			
		L	Finished I. D. Exhaust Valve Guide (7/16 in. Exhaust Valve)	.4360 .4370			
		1/2 inch diameter exhaust valves may have exhaust valve guides that are .003 in. over the maximum inside diameter limit, anytime up to 300 hours of service. After 300 hours of service, inside diameter of exhaust valve guide may increase .001 in. during each 100 hours of operation up to the recommended overhaul time for the engine, or not to exceed .015 inch over the basic I. D. See latest edition of Service Instruction No. 1009 for recommended overhaul time.					
616	529	ALL	Intake Valve Stem and Valve Guide			.0010L .0028L	.006L
		ALL	O. D. Intake Valve Stem	.4022 .4030	.4010		
616	527	ALL	Finished I. D. Intake Valve Guide	.4040 .4050			
617	951	ALL	Valve and Valve Cap Clearance			.000 .004L	.005L
618	952	ALL	Dry Tappet Clearance			.028 .080	
619	611	ALL	Valve Rocker Shaft and Valve Rocker Bushing			.0001L .0013L	.0025L
619	530	ALL	Finished I. D. of Valve Rocker Shaft Bushing in Cylinder Head	.6246 .6261	.6270		
620	531	ALL	Valve Rocker Shaft and Valve Rocker Bushings			.0007L .0017L	.004L
		ALL	O. D. Valve Rocker Shaft	.6241 .6245	.6231		
		ALL	Finished I. D. of Rocker Arm Bushing	.6252 .6263	.6270		
621	532	ALL	Valve rocker Bushing and Valve Rocker	Bushing must be burnished in place.			
622	612	ALL	Valve Rocker Shaft Bushing and Cylinder Head			.0022T .0038T	(A)

PART IV VERTICAL ENGINES
SECTION II CYLINDERS

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
622	612	ALL	Valve Rocker Shaft Bushing Hole in Cylinder Head	.7380 / .7388			
623	533	ALL	Valve Rocker and Cylinder Head - Side Clearance			.002L / .020L	.024L
625	971	ALL	Intake and Exhaust Valve Guide Height	.914 / .954			
			MEASURE THE VALVE GUIDE HEIGHT FROM THE VALVE SPRING SEAT COUNTERBORE IN THE CYLINDER HEAD TO THE TOP OF VALVE GUIDE.				



Cylinder, Piston, Connecting Rod and Valve Components

PART IV VERTICAL ENGINES
SECTION III GEAR TRAIN - OIL PUMP

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
702	546	L-V	Oil Pump and Scavenge Pump Gear - End Clearance			.007L .030L	.045L
		L1	Oil Pump Drive Gear - End Clearance			.010L .035L	.060L
703	542	L-V	Oil Pump and Scavenge Pump Impellers - Dia. Clearance			.007L .011L	.014L
		L1	Oil Pump Impellers - Dia. Clearance			.007L .011L	.014L
704	543	L-V	Oil Pump and Scavenge Pump Impellers - Side Clearance			.003L .0055L	.006L
		L1	Oil Pump Impellers - Side Clearance			.003L .0055L	.006L
		ALL	Width of Oil Pump Impellers	.995 .997	.994		
		ALL	Width of Oil Scavenge Pump Impellers	1.496 1.498	1.495		
705	544	L-V	Oil Pump and Oil Scavenge Pump Driven Impeller and Idler Shaft			.001L .0025L	.004L
		L1	Oil Pump Driven Impeller and Idler Shaft			.0010L .0025L	.004L
706	558	ALL	Oil Pump Idler Shaft and Oil Pump Body			.0000 .0015T	(A)
		L1	Oil Pump Idler Shaft and Oil Pump Cover			.0000 .0015T	(A)
713		L-V	Oil Pump Idler Shaft and Scavenge Pump Body			.0000 .0015T	(A)
777	697	L-V	Oil Pump Drive Shaft Bushing and Scavenge Pump Body			.001T .003T	(A)
		L1	Oil Pump Drive Shaft Bushing and Oil Pump Body			.001T .003T	(A)
778	698	ALL	Oil Pump Drive Shaft Bushing and Oil Pump Body			.001T .003T	(A)
		L1	Oil Pump Drive Shaft Bushing and Oil Pump Cover			.001T .003T	(A)
779	699	L-V	Oil Pump Drive Bushing and Oil Scavenge Pump Gear			.0015L .0035L	.005L
		L1	Oil Pump Drive Gear and Oil Pump Cover			.0015L .0035L	.005L
780	700	ALL	Oil Pump Drive Shaft Bushing and Oil Pump Shaft			.0015L .0035L	.005L
7051	717	ALL	Oil Relief Valve Plunger and Sleeve			.001L .003L	.005L

PART IV VERTICAL ENGINES
SECTION III GEAR TRAIN - OIL PUMP

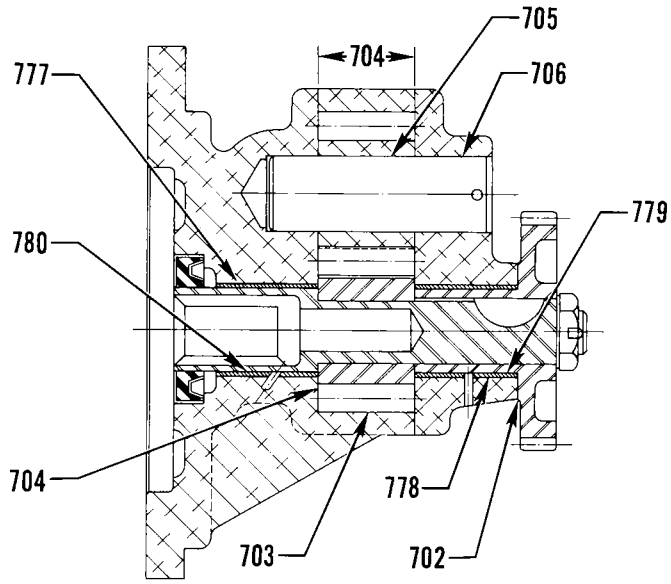
Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
7076		L1	Oil Pump Drive Gear Bushing and Accessory Housing			.002T .004T	(A)
7077		L1	Oil Pump Drive Gear and Accessory Housing Bushing			.0015L .0035L	.005L
			SECTION III GEAR TRAIN - FUEL PUMP				
782	701	L-V	Fuel Pump Drive Shaftgear Bushing and Accessory Housing			.001T .004T	(A)
783	702	L-V	Fuel Pump Drive Shaftgear - End Clearance			.006 .064	.074
784	763	L-V	Fuel Pump Drive Shaftgear and Bushing			.001L .004L	.006L
			SECTION III GEAR TRAIN - VACUUM PUMP				
793	731	L-V	Vacuum Pump Shaftgear Bushing and Accessory Housing Cover			.0015T .0035T	(A)
794	732	L-V	Vacuum Pump Shaftgear Bushing (At Cover) and Vacuum Pump Shaftgear			.002L .004L	.006L
795	733	L-V	Vacuum Pump Shaftgear Bushing and Accessory Housing			.0015T .0035T	(A)
		L1	Vacuum Pump Shaftgear Bushing and Accessory Housing			.0025T .0045T	(A)
796	734	ALL	Vacuum Pump Shaftgear Bushing (At Accessory Housing) and Vacuum Pump Shaftgear			.002L .0045L	.006L
797	735	L-V	Vacuum Pump Shaftgear - End Clearance			.008 .030	.050
799	733	L1	Vacuum Pump Drive Gear Bushing and Accessory Housing			.002T .004T	(A)
7000	936	L1	Vacuum Pump Drive Gear Bushing and Vacuum Pump Drive Gear			.0025L .0045L	.006L
7078		L1	Vacuum Pump Drive Gear and Cover			.0013L .0033L	.005L
7079		L1	Vacuum Pump Drive Gear - End Clearance			.010 .032	.037
			SECTION III GEAR TRAIN - TACHOMETER				
7002	565	L1	Tachometer Driven Gear and Adapter			.001L .003L	.0045L
7006	684	L-V	Electric Tachometer Driven Gear - End Clearance			.007 .025	.047
7012	707	L-V	Electric Tachometer Driven Gear and Accessory Housing Cover			.001L .003L	.004L

PART IV VERTICAL ENGINES
SECTION III GEAR TRAIN - TACHOMETER

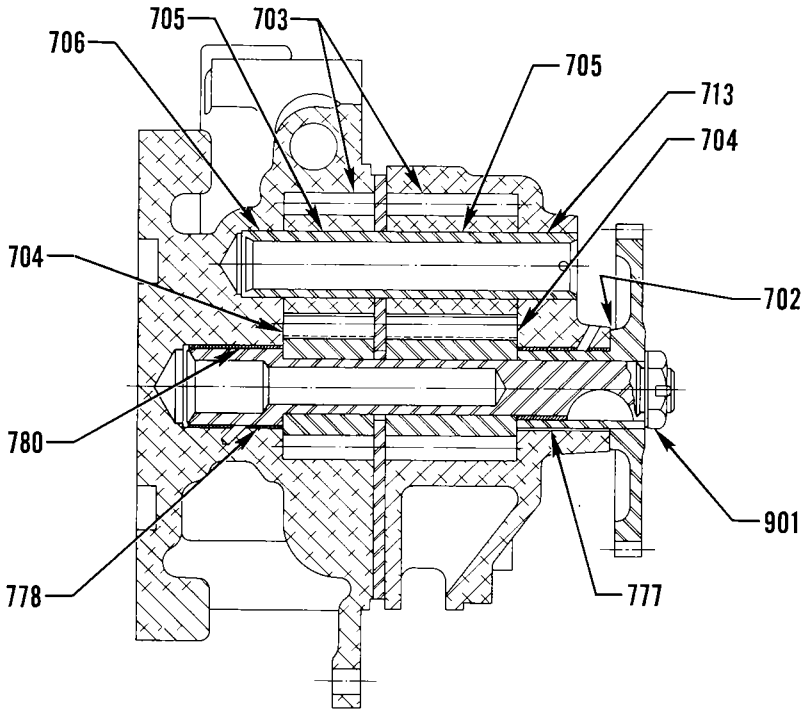
Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
7088		L1	Tachometer Adapter and Accessory Housing			.0005L .0025L	.0035L
		SECTION III GEAR TRAIN - MAGNETO					
7025	704	L-V	Magneto Drive Idler Gear Hub Bushing and Magneto Drive Idler Gear Hub	Bushing must be burnished in place.			
7026	705	L-V	Magneto Drive Idler Gear Hub Bushing and Magneto Drive Idler Shaft			.001L .003L	.004L
7027	706	L-V	Magneto Drive Idler Gear Hub - End Clearance			.005 .014	.024
7028	710	L-V	Magneto Drive Shaft and Accessory Housing Cover			.002L .0045L	.006L
7029	711	L-V	Magneto Drive Shaft and Accessory Housing			.0025L .0045L	.006L
7030	712	ALL	Magneto Drive Shaft Sleeve and Magneto Drive Shaft			.001T .004T	(A)
7031	713	ALL	Magneto Drive Shaft Sleeve and Magneto Drive Coupling			.001T .004T	(A)
7032	714	L-V	Magneto Drive Shaft Gear - End Clearance			.002 .020	.030
7039		L1	Magneto Drive Idler Gear - End Clearance			.002 .030	.040
7080	705	L1	Magneto Drive Idler Gear Bushing and Magneto Drive Idler Shaft			.001L .003L	.004L
7081		L1	Magneto Drive Idler Gear and Magneto Drive Idler Gear Bushing			.0005T .0025T	(A)
7082	706	L1	Magneto Drive Gear Bushing and Accessory Housing			.002T .004T	(A)
7083	711	L1	Magneto Drive Coupling and Accessory Housing Bushing			.001L .003L	.004L
7084	710	L1	Magneto Drive Gear and Accessory Housing Bushing			.001L .003L	.004L
		SECTION III GEAR TRAIN - GENERATOR					
7043	726	L-V	Generator Drive Gear Bushing and Accessory Housing Cover			.0015T .0035T	(A)
7044	727	L-V	Generator Drive Gear Bushing (At Cover) and Generator Drive Gear			.002L .004L	.006L
7045	728	L-V	Generator Drive Gear Bushing and Accessory Housing			.002T .004T	(A)

PART IV VERTICAL ENGINES
SECTION III GEAR TRAIN - GENERATOR

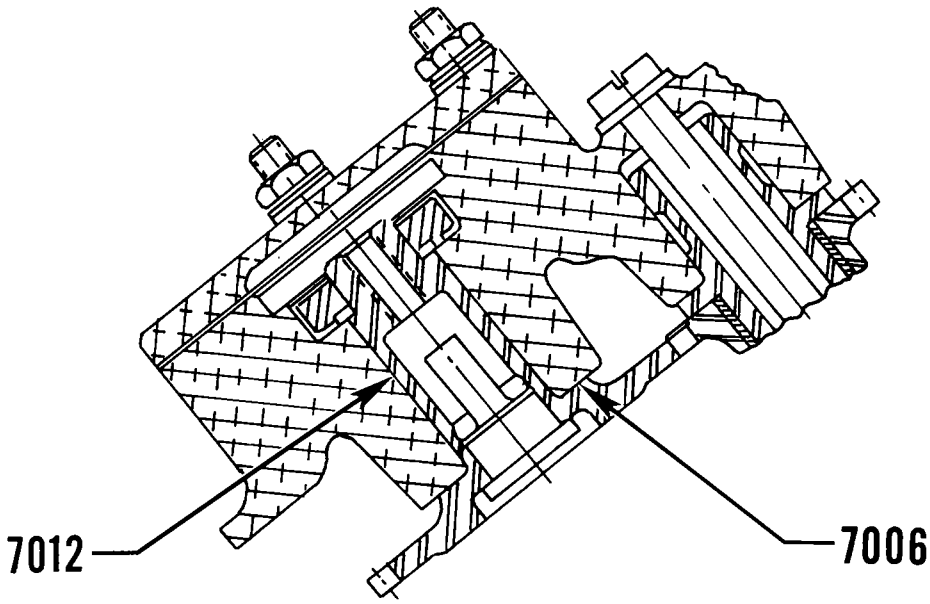
Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
7046	729	L-V	Generator Drive Gear Bushing (At Accessory Housing) and Generator Drive Gear			.0025L .0045L	.006L
7047	730	L-V	Generator Drive Gear - End Clearance			.010 .038	.050
			SECTION III GEAR TRAIN - STARTER				
7048	722	L-V	Starter Drive Gear Bushing and Adapter			.002T .004T	(A)
		L1	Starter Drive Spacer Bushing and Adapter			.002T .004T	(A)
7049	723	L-V	Starter Drive Gear Bushings and Starter Drive Gear			.002L .004L	.006L
		L1	Starter Drive Spacer and Starter Drive Adapter Bushing			.0015L .003L	.004L
7050		L-V	Starter Drive Adapter and Accessory Housing Cover			.0005L .0025L	(A)
7089		L1	Starter Drive Gear - End Clearance			.007 .011	.015
7090	633	L1	Bendix Drive Shaft (Slip Coupling) and Accessory Housing Bushing			.0015L .0045L	.005L
			SECTION III GEAR TRAIN - ACCESSORY DRIVE				
7053	721	L-V	Accessory Idler Gear Bearing and Accessory Drive Gear			.0001L .0007T	(A)
7054	746	V	Accessory Drive Gear and Bushing			.001T .003T	(A)
7055	747	L-V	Accessory Idler Gear Bearing and Accessory Drive Shaft Adapter			.0005T .0005L	(A)
7056	748	V	Accessory Drive Gear Bushing and Accessory Drive Shaft			.0005L .0017L	.004L
7057	750	V	Accessory Drive Gear - End Clearance			.004 .012	.017
7086	721	L1	Accessory Drive Shaftgear Bushing and Accessory Housing			.002T .004T	(A)
7087	721	L1	Accessory Drive Shaftgear and Accessory Housing Bushing			.002L .004L	.006L
7091	995	L1	Dual Accessory Idler Gear and Idler Shaft			.001L .003L	.0045L
7092	996	L1	Dual Accessory Idler Gear - End Clearance			.009 .018	.023L
7093	991	L1	Dual Accessory Drive Gear - End Clearance			.005 .062	.077
7094	992	L1	Dual Accessory Drive Gear and Adapter			.0013L .0028L	.0034L



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

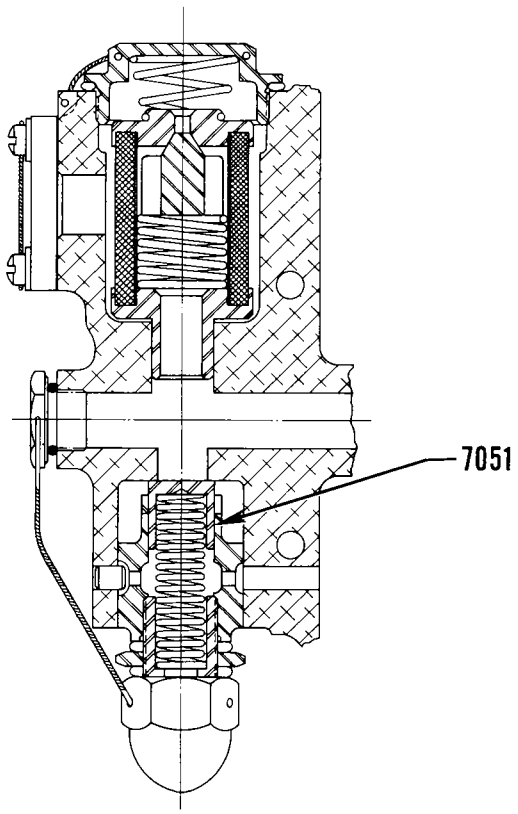


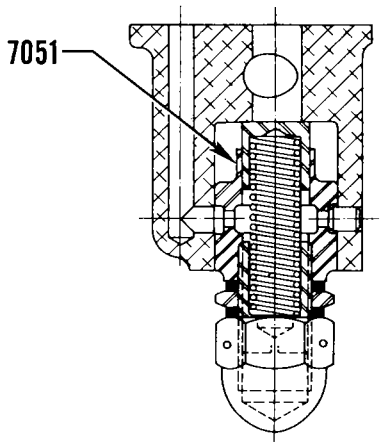
CROSSWISE ACC. HSG.



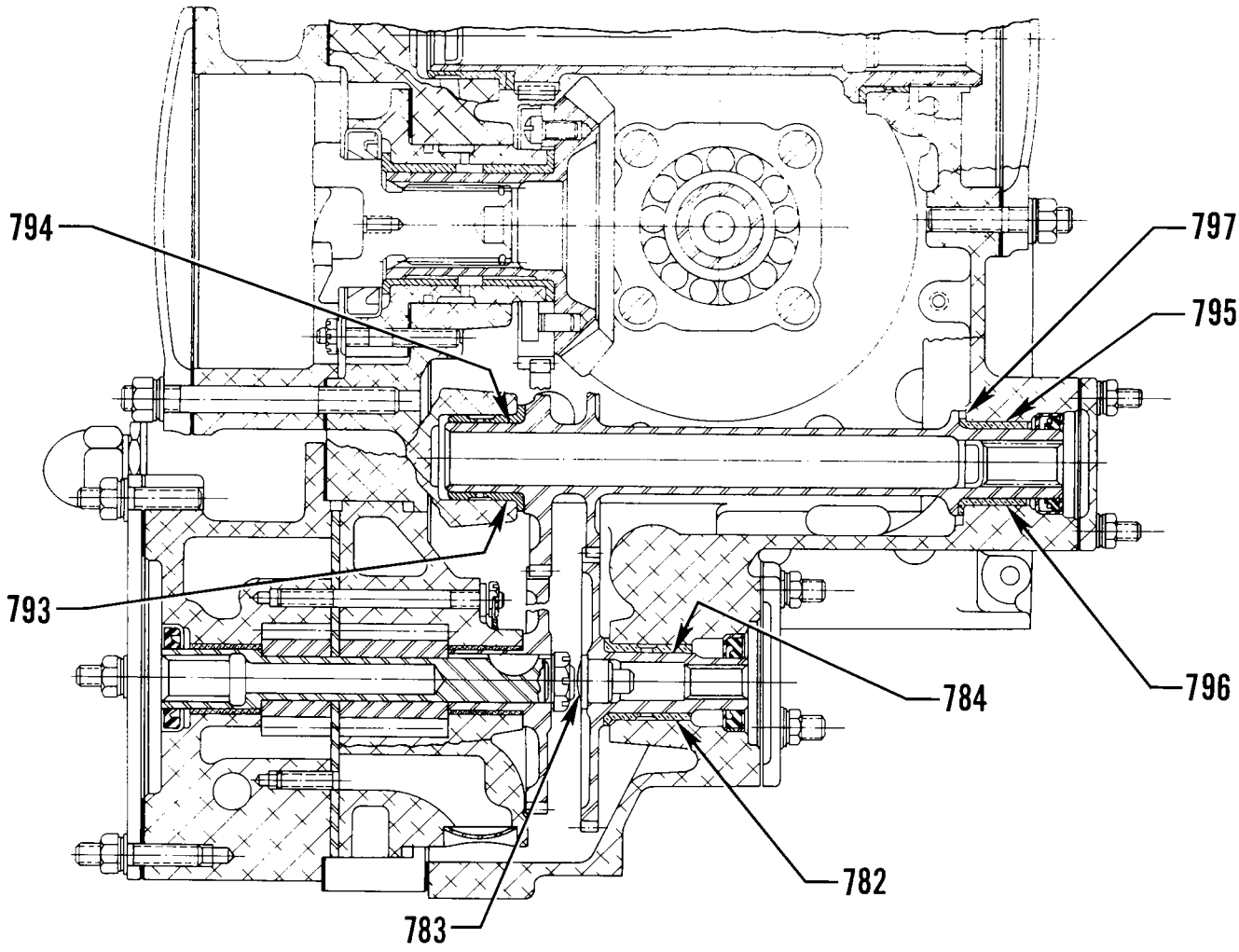
VO, TVO-435-A & VO, TVO-540

Tachometer Drive

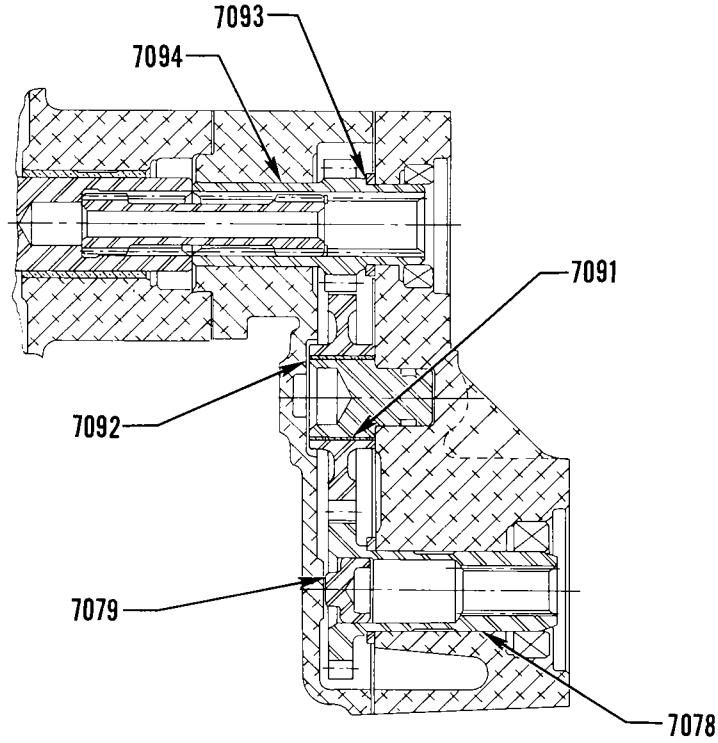




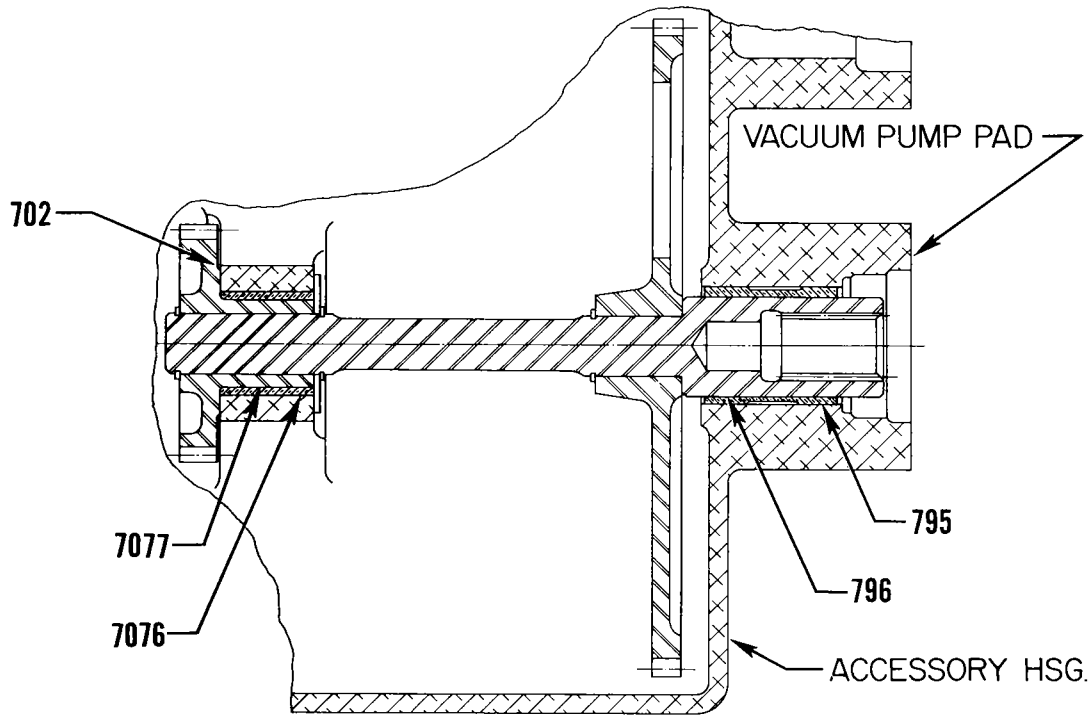
Oil Relief Valves



CROSSWISE ACCESSORY HSG.



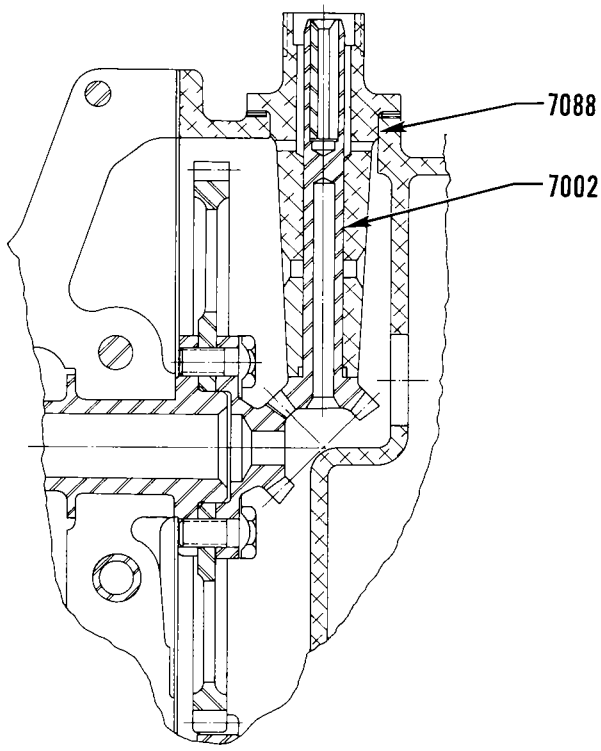
TVO-435-F
Vacuum Pump and Fuel Pump Dual Drive



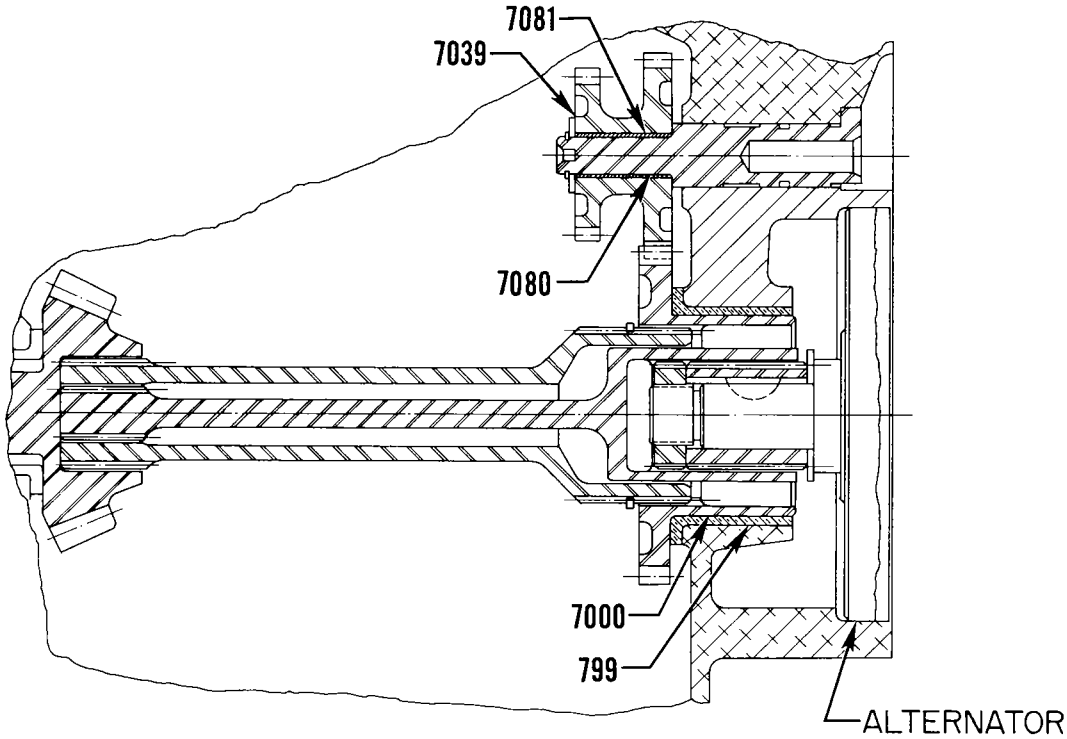
VO-435-BIA & TVO-435-F

Vacuum Pump Drive

PART IV VERTICAL ENGINES
SECTION III GEAR TRAIN

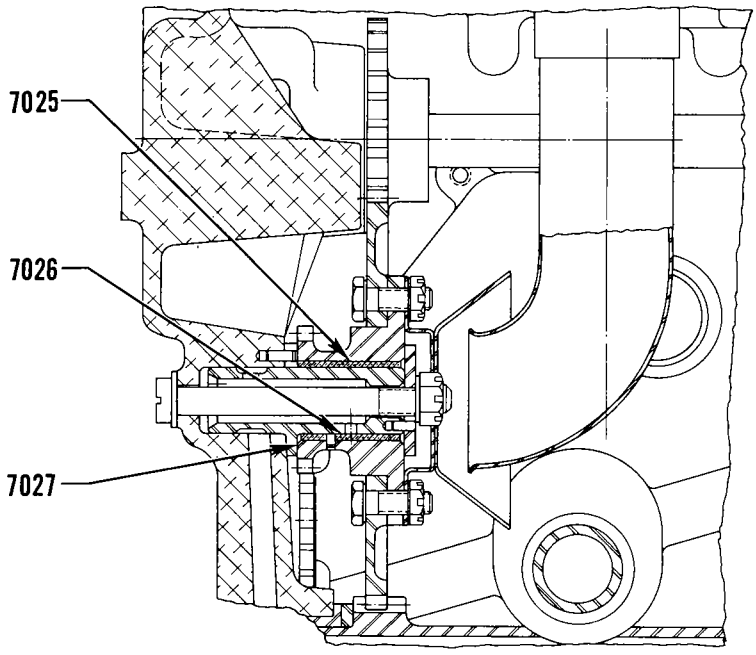


VO-435-B & TVO-435-F
Tachometer Drive



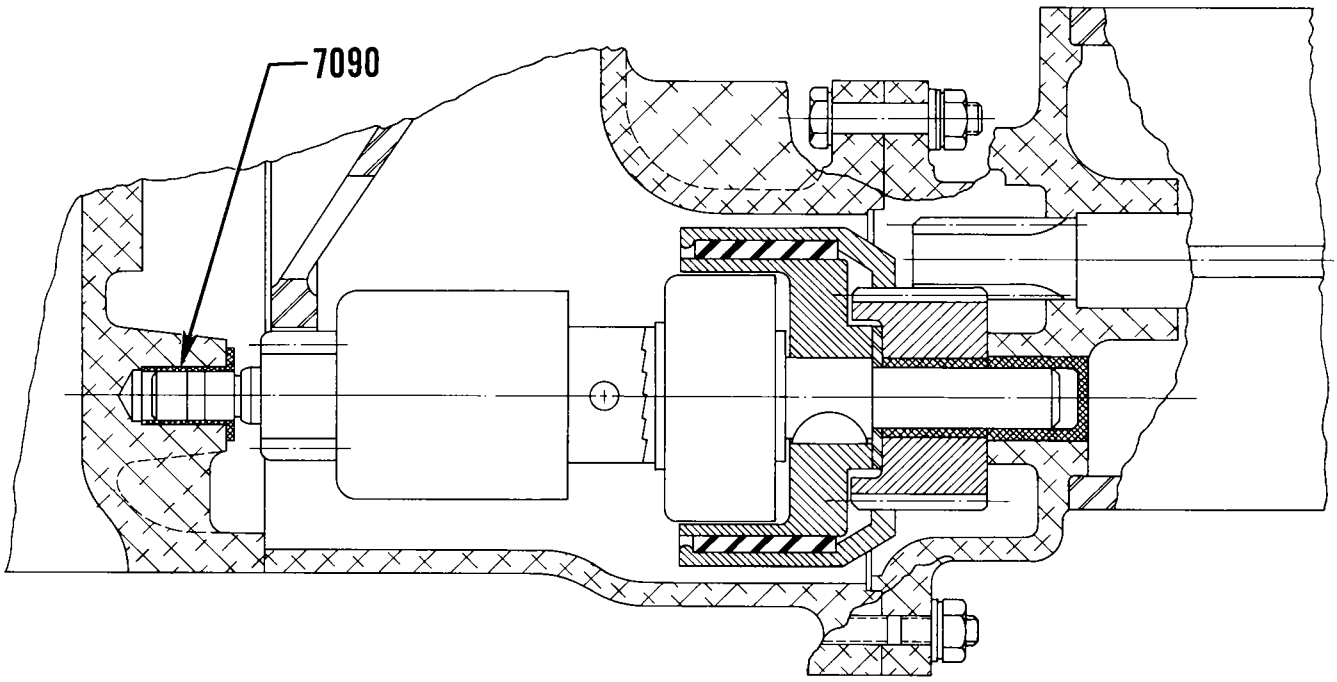
VO-435-B & TVO-435-F

Vacuum, Magneto and Alternator Drive



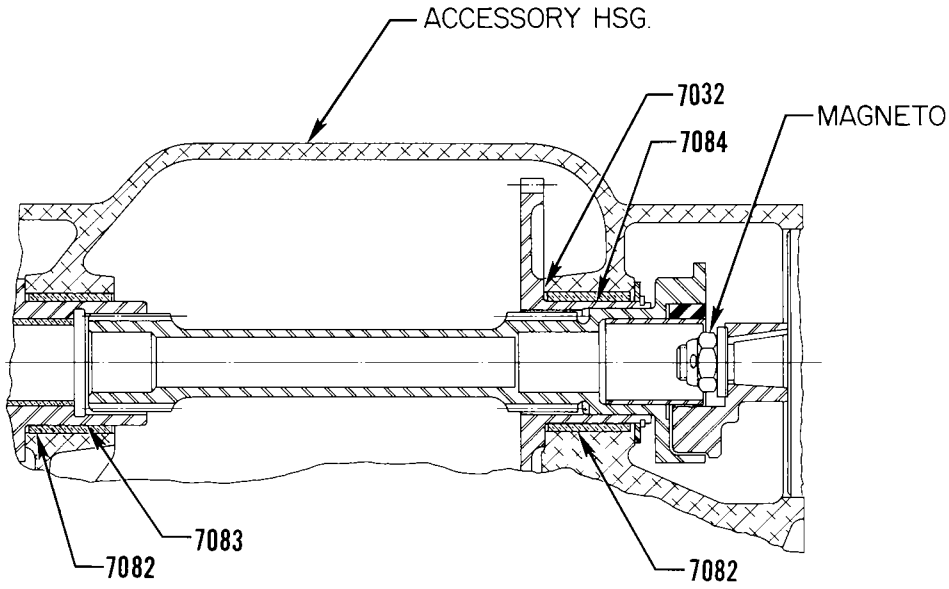
VO, TVO-435-A & VO, TVO-540

Magneto and Tachometer Idler Gear

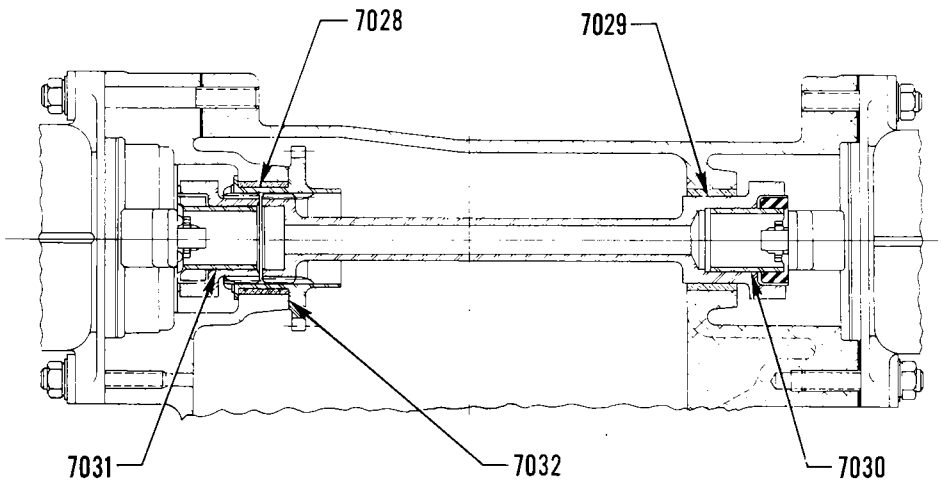


VO-435-B & TVO-435-F

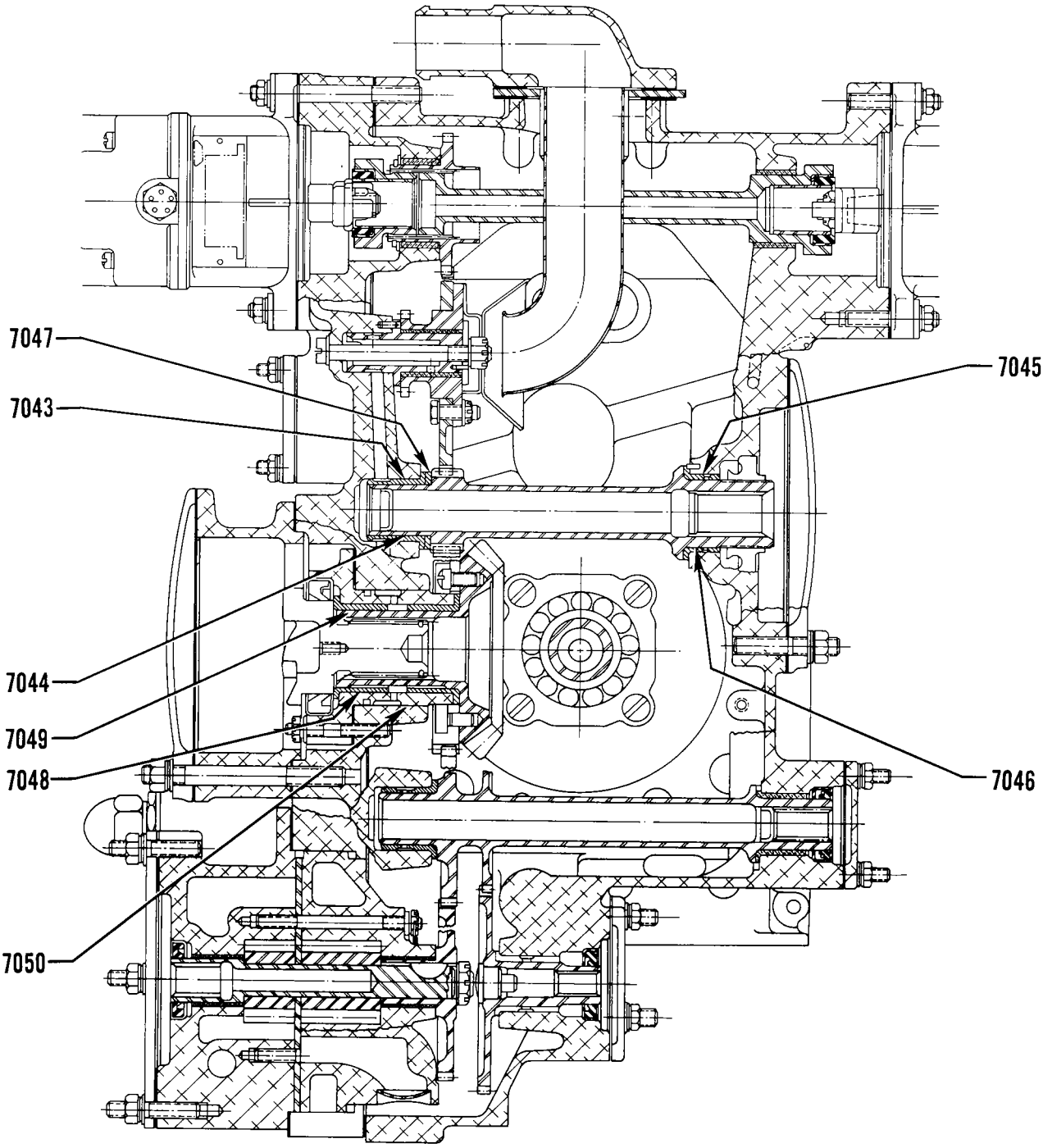
Bendix Drive



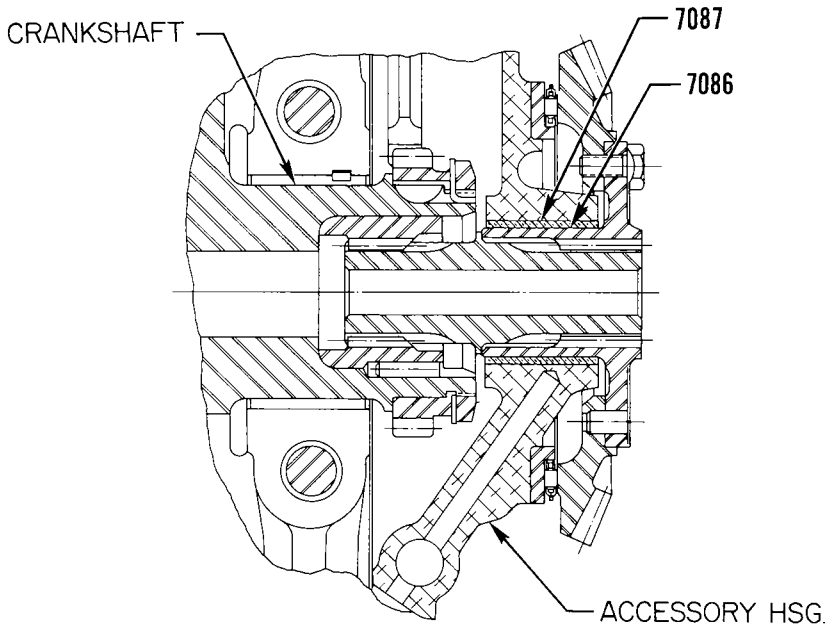
VO-435-BIA



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

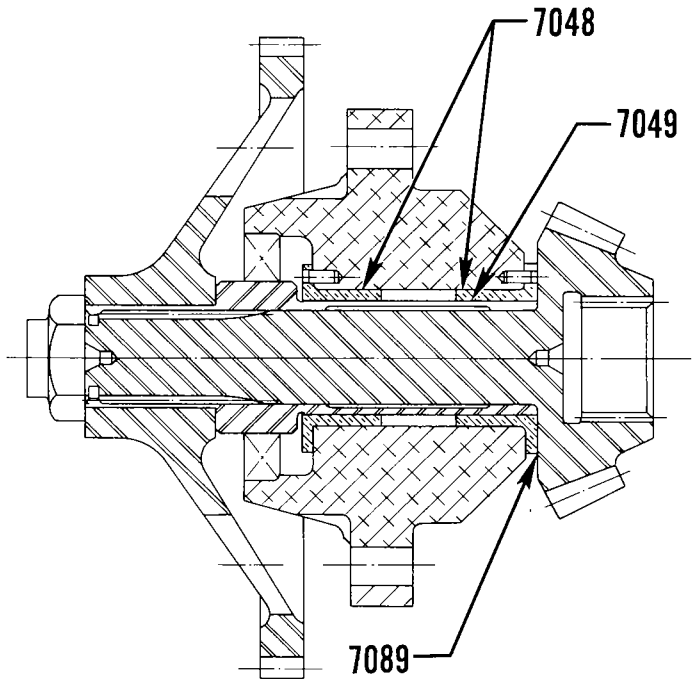


VO, TVO-435-A & VO, TVO-540



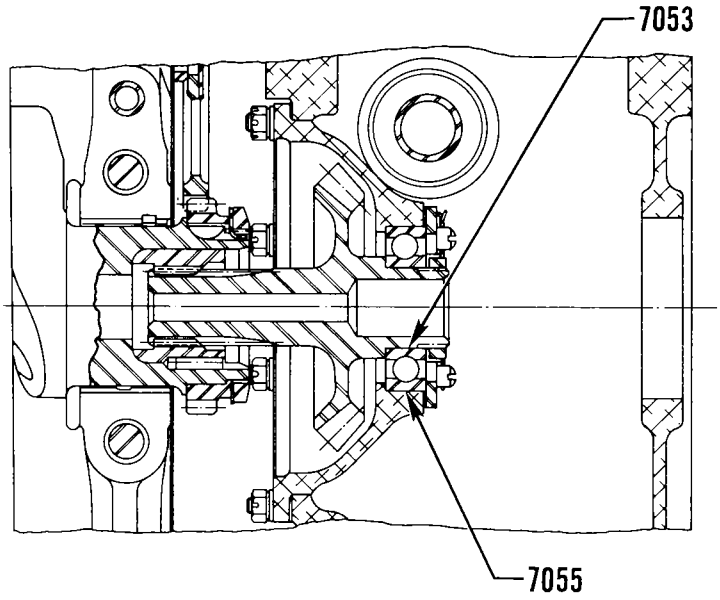
VO-435-BIA

Accessory Drive Gear

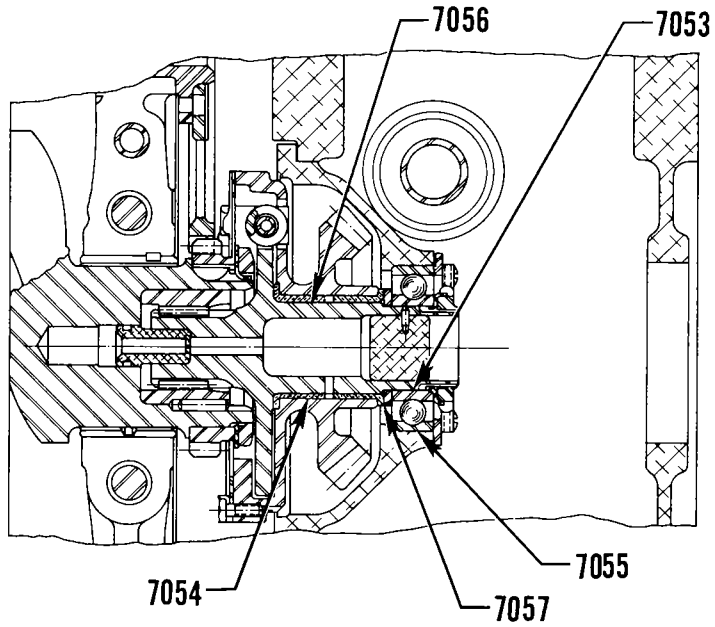


VO-435-BIA

Starter Drive



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



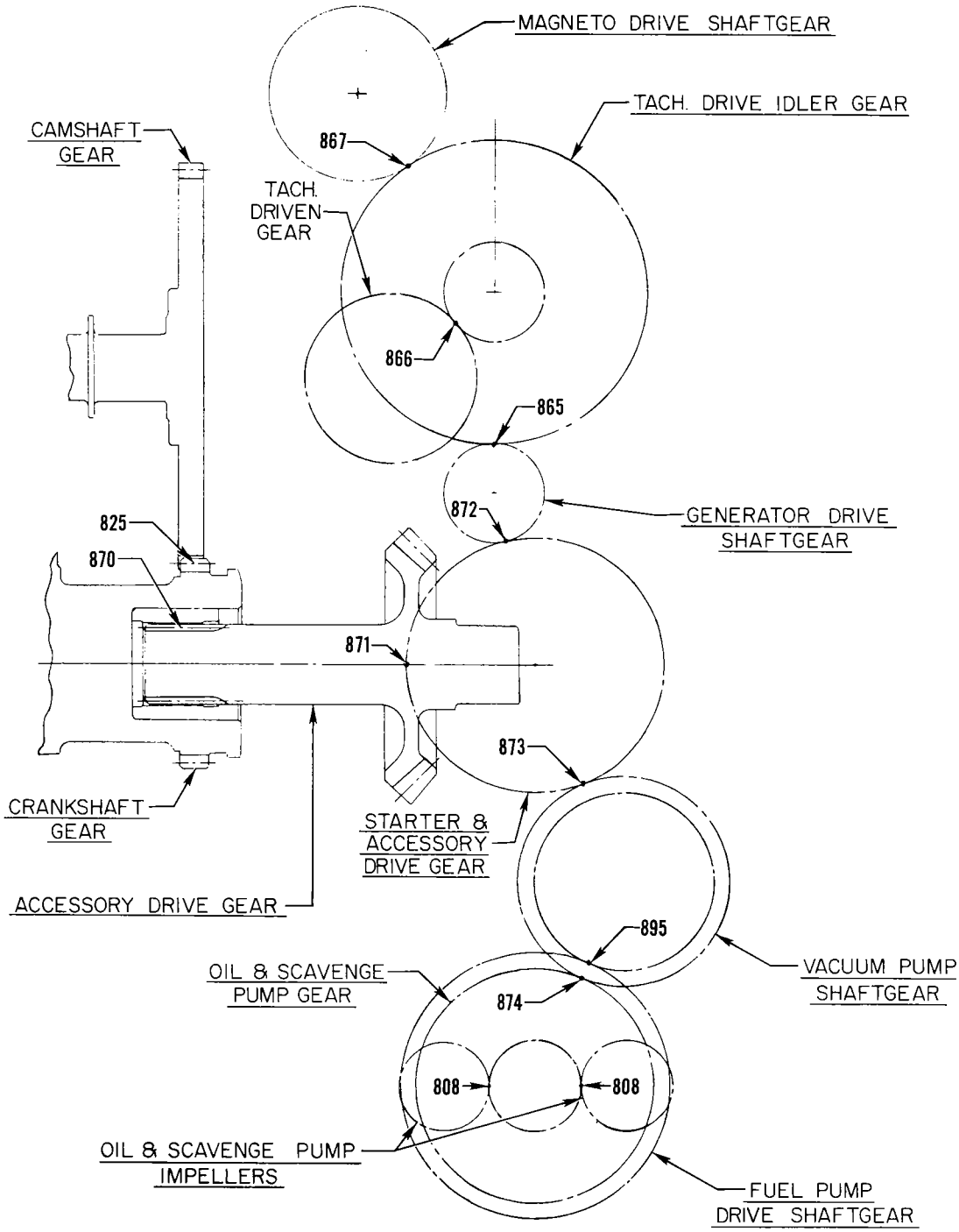
VO-540

PART IV VERTICAL ENGINES
SECTION IV BACKLASH

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
808	553	L1	Oil Pump Impellers			.005 / .015	.020
		L-V	Oil Pump and Scavenge Pump Impellers			.008 / .015	.020
825	550	ALL	Crankshaft Timing Gear and Camshaft Gear			.004 / .015	.020
866	708	L-V	Electric Tachometer Drive Gear (Magneto Idler Hub) and Tachometer Driven Gear			.004 / .015	.020
867	709	L-V	Generator Drive Gear and Magneto Drive Idler Gear			.004 / .015	.020
868	715	L-V	Magneto Drive Shaft (Spline) and Magneto Drive Shaftgear (Spline)			.001 / .005	.008
869	716	L-V	Magneto Drive Shaftgear (Spline) and Magneto Drive Coupling (Spline)			.001 / .005	.008
		L1	Magneto Drive Shaft (Spline) and Magneto Drive Coupling (Spline)			.001 / .0045	.0075
870	719	L-V1	Rear Crankshaft Spline Bushing and Accessory Gear (Spline)			.002 / .0073	.018
		L1	Rear Crankshaft Spline Bushing and Accessory Drive Quill Shaft (Spline)			.004 / .0073	.018
		V	Rear Crankshaft Spline Bushing and Accessory Drive Shaft (Spline)			.002 / .0073	.018
871	720	L-V	Accessory Drive Gear and Starter Drive Gear			.004 / .008	.015
		L1	Accessory Drive Gear and Starter Drive Gear			.002 / .016	.022
		L1	Starter Drive Shaftgear and Starter Drive Gear (Spline)			.000 / .002	.004
872	724	L-V	Accessory Drive Gear and Generator Drive Gear			.004 / .015	.020
		L1	Alternator Drive Shaft (Spline) and Vacuum and Magneto Drive Shaft (Spline)			.001 / .004	.006
		L1	Alternator Drive Shaft (Spline) and Alternator (Spline)			.001 / .005	.007
873	725	L-V	Accessory Drive Gear and Vacuum Pump Shaftgear			.004 / .015	.020

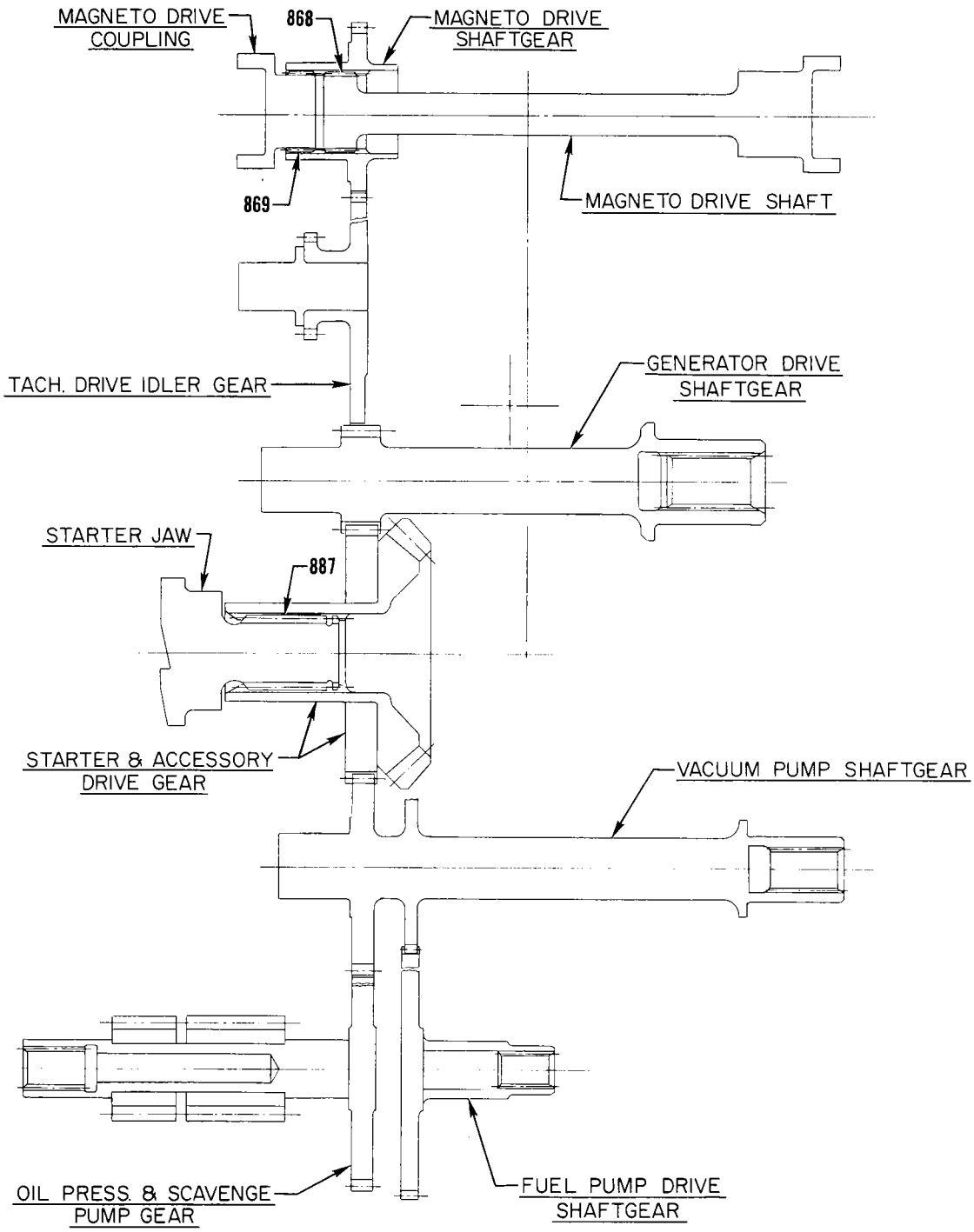
PART IV VERTICAL ENGINES
SECTION IV BACKLASH

Ref. New	Ref. Old	Chart	Nomenclature	Dimensions		Clearances	
				Mfr. Min. & Max.	Serv. Max.	Mfr. Min. & Max.	Serv. Max.
874	736	L-V	Vacuum Pump Shaftgear and Oil Pressure Scavenge Pump Gear			.004 / .015	.020
884		L1	Magneto Drive Idler Gear and Magneto Driven Gear			.006 / .014	.020
		L1	Magneto Drive Gear and Magneto Idler Drive Gear			.006 / .014	.020
895		L-V	Vacuum Pump Shaftgear and Fuel Pump Drive Shaftgear			.004 / .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 Shaft Gear (Spline) and Vacuum, Magneto Shaft (Spline)			.001 / .004	.007
8001		L1	Accessory Drive Quill Shaft (Spline) and Accessory Drive Gear (Spline)			.004 / .0073	.011
8002		L1	Vacuum Pump Drive Gear (Spline) and Shaft Vacuum Pump Magneto Drive (Spline)			.001 / .004	.007
8003		L1	Vacuum, Oil Pump Drive Shaft Gear and Vacuum Pump Drive Gear			.005 / .015	.020
8004	993	L1	Dual Accessory Drive Gear and Idler			.004 / .015	.020
8005	635	L1	Starter Drive Gear and Bendix Drive (Slip Coupling) Gear			.016 / .026	.031
8006	994	L1	Dual Accessory Idler Gear and Vacuum Pump Drive Gear			.004 / .015	.020

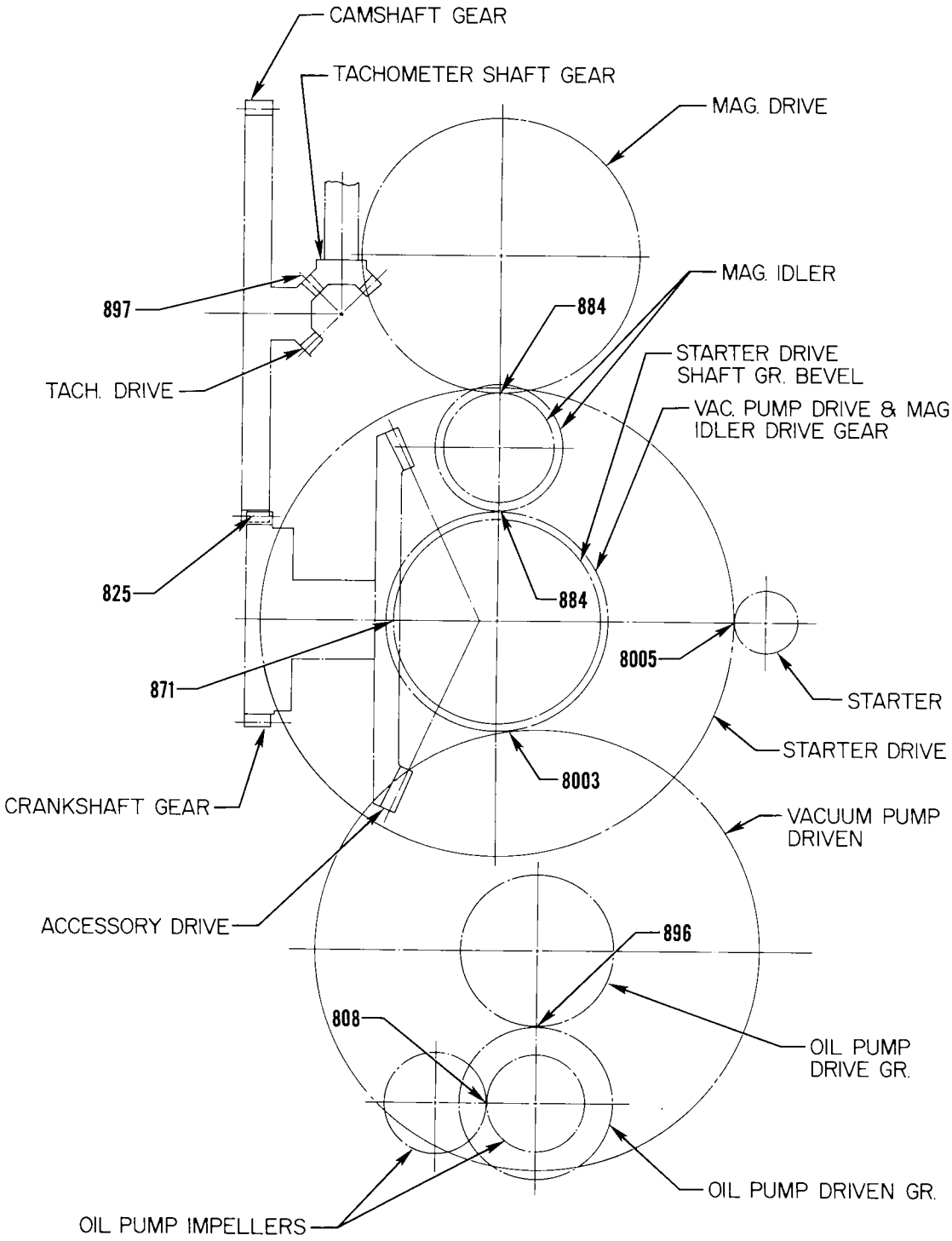


VO, TVO-435-A & VO, TVO-540

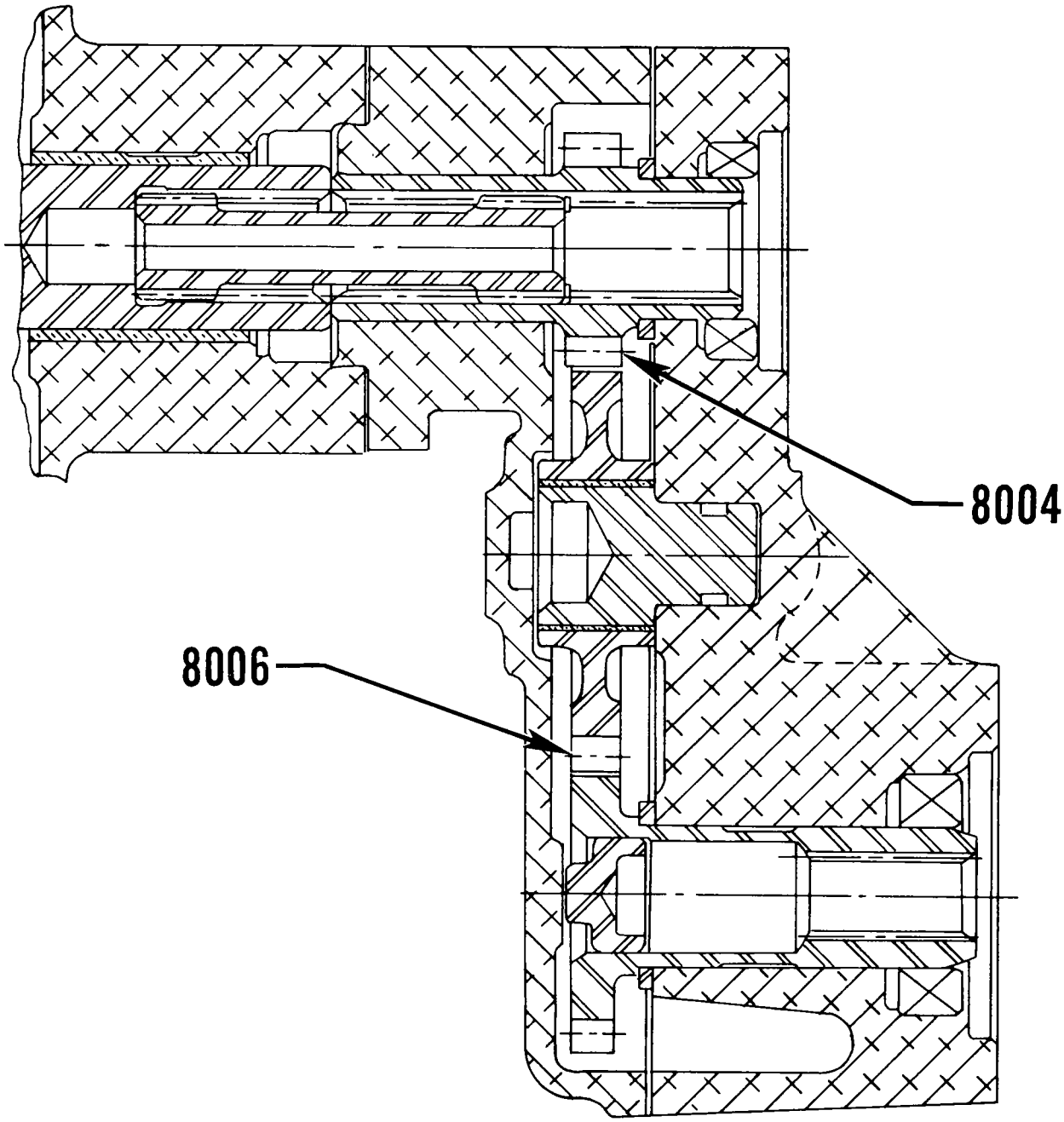
VIEWING LEFT SIDE OF ENGINE



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

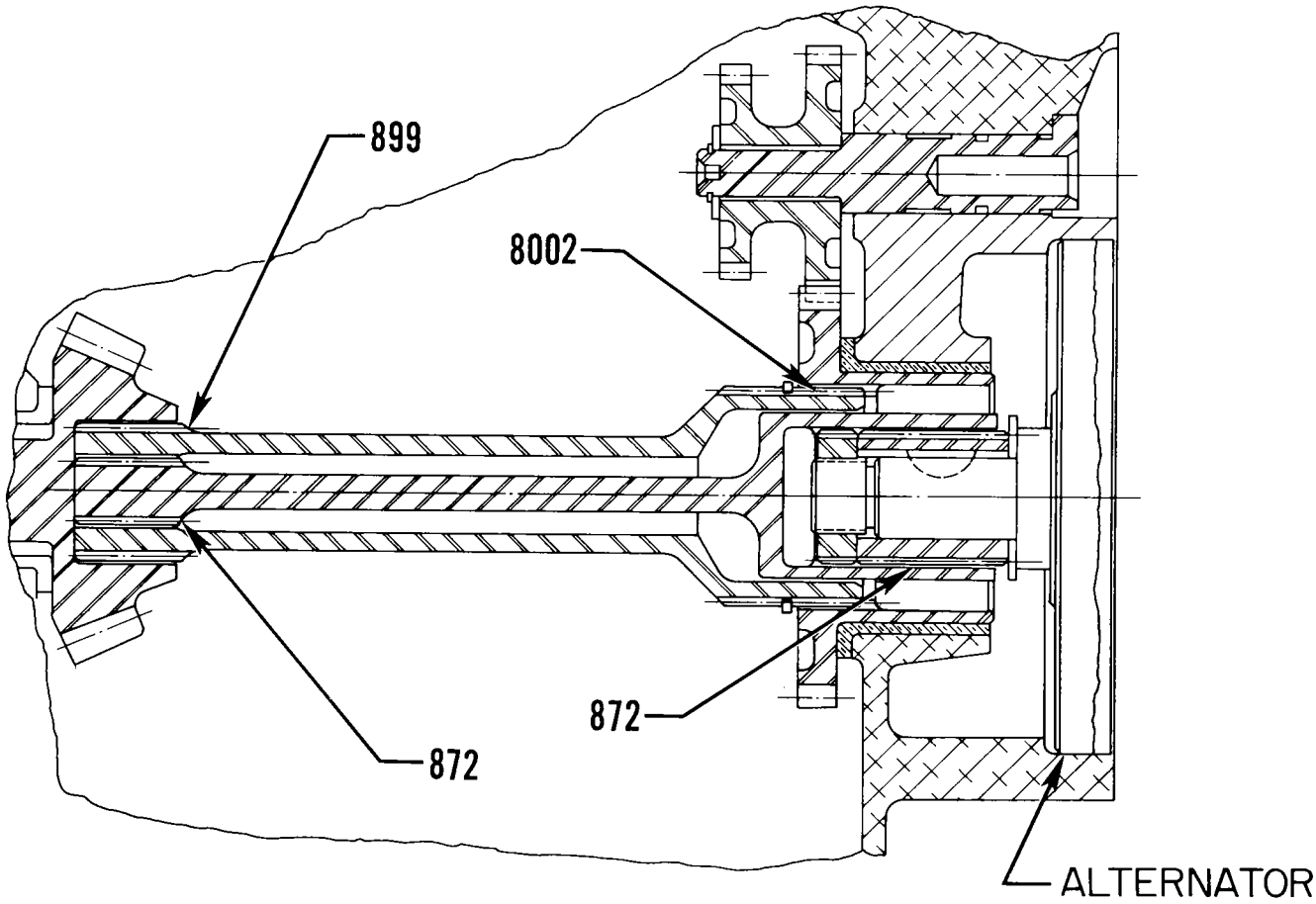


VO-435-BIA
LEFT SIDE OF ENGINE

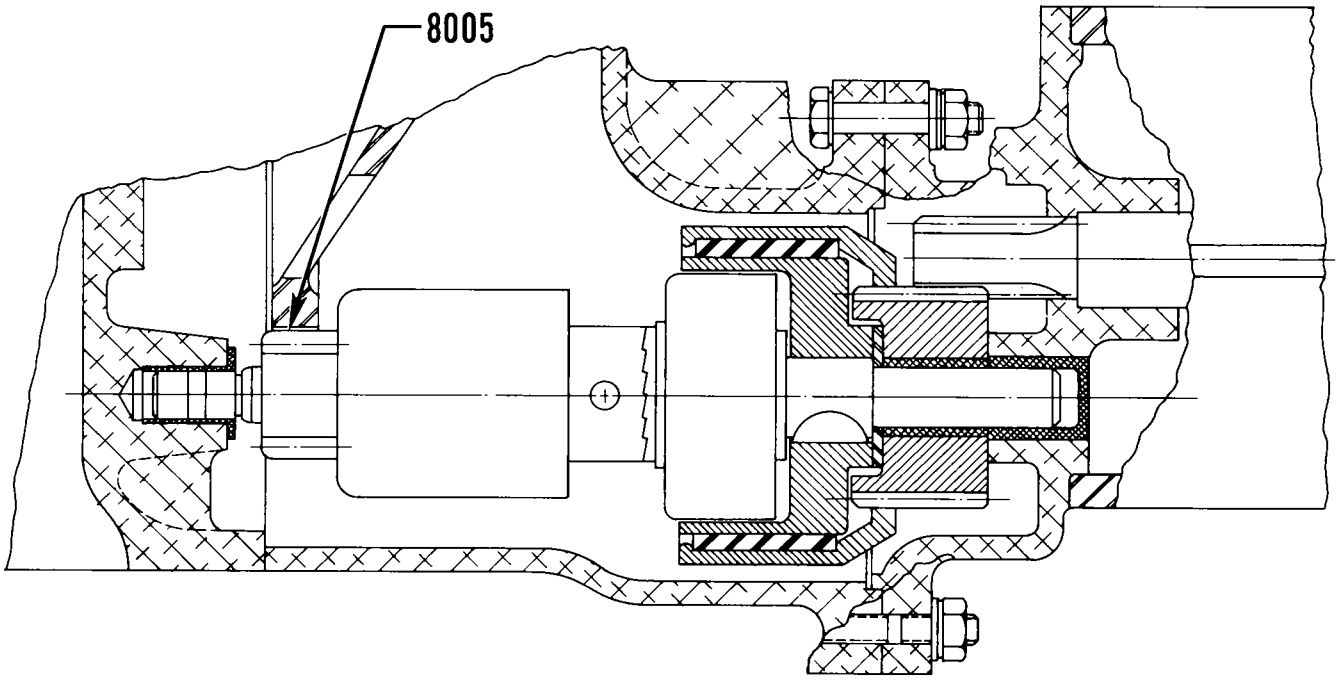


TVO-435-F

Vacuum Pump and Fuel Pump Dual Drives

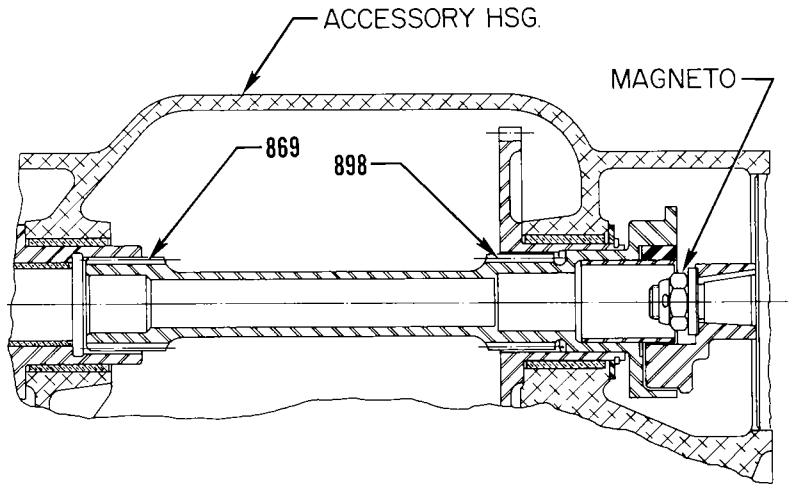


VO-435-B & TVO-435-F

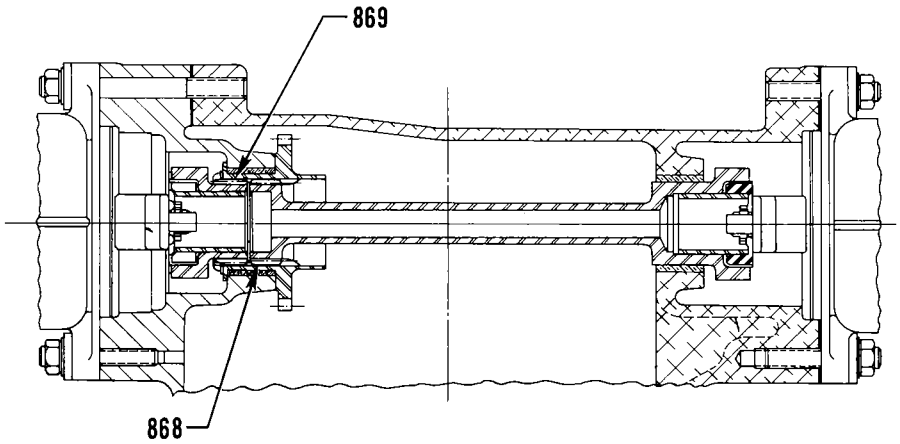


VO-435-B & TVO-435-F

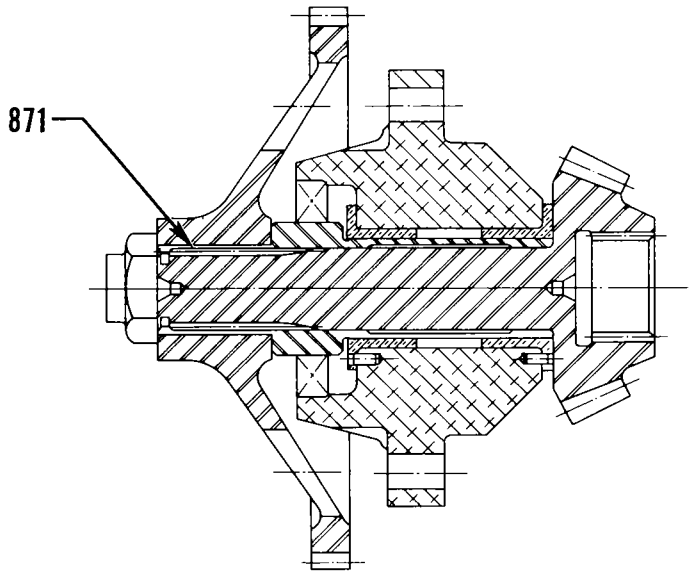
Bendix Drive



VO-435-BIA

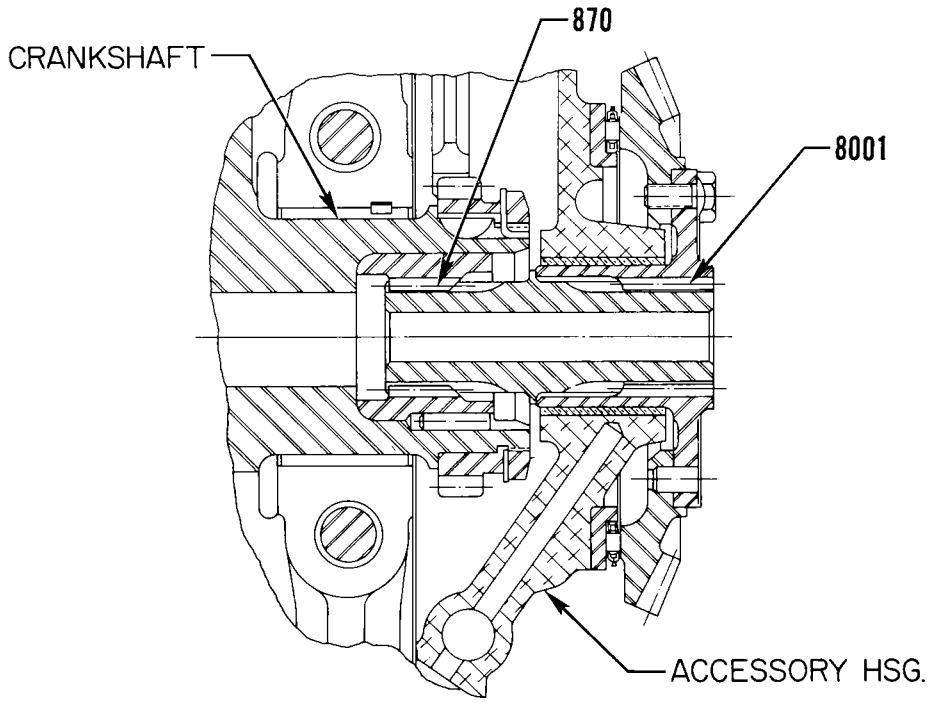


VO, TVO-435-A & VO, TVO-540



VO-435-BIA

Starter Drives



VO-435-BIA

Accessory Drive Gear

PART IV VERTICAL ENGINES
SECTION V - SPECIAL TORQUE REQUIREMENTS

Ref. New	Ref. Old	Chart	Thread Size	Nomenclature	Torque Limits
900	829	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	846	ALL	1/2-20	Oil Pump Shaft Nut	360 - 480 in. lbs.
903	840	ALL	3/8-24	Magneto Nut (To attach drive member to magneto) - Steel Bushing	300 in. lbs.
904	839	ALL	10-32	Screw Plate Nuts (To attach ignition cable outlet plate to magneto)	15 in. lbs.
905	853	ALL	1/4-20	Rocker Box Screws	50 in. lbs.
906	852	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	830	ALL	18MM	Spark Plugs	420 in. lbs.
909	862	L-V	5/8-32	Alternator Pulley Nut	450 in. lbs.
		L1	5/8-32	Alternator Nut (Quill Shaft)	474 in. lbs.
910	864	L1	1/4-28	Alternator Output Terminal Nut	85 in. lbs.
911	865	L1	10-32	Alternator Auxiliary Terminal Nut	30 in. lbs.
913	857	L1-L2-V	1/16-27 NPT	Piston Cooling Nozzle in Crankcase	100 in. lbs.
914	854	V-V1	1/8-27 NPT	Injector Nozzle in Cylinder Head	60 in. lbs.
919	871	ALL	1/4 Hex Head and Below	Hose Clamps (Worm Type)	20 in. lbs.
		ALL	5/16 Hex Head and Above	Hose Clamps (Worm Type)	45 in. lbs.
919-1		ALL		"T" Bolt Hose Clamps Initial Torque..... Retorque After Run-in.....	 35 in. lbs. 25 in. lbs.
920	875	ALL		Cylinder Head Drain Back Hose Clamp	10 in. lbs.
921		L2-V1		Exhaust Clamp - Coupling - V-Band (See Service Instruction No. 1238)	
928	858	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	858	ALL	3/8-16	Cylinder Hold Down Nuts	300 in. lbs.
		ALL	1/2-13	Cylinder Hold Down Nuts	600 in. lbs.
		Cylinder Hold Down and Crankcase Parting Flange Nuts' Tightening Procedures - See latest edition of Service Instruction No. 1029.			

PART IV VERTICAL ENGINES
SECTION V - SPECIAL TORQUE REQUIREMENTS

Ref. New	Ref. Old	Chart	Thread Size	Nomenclature	Torque Limits
933	841	L-V		Accessory Drive Shaft Nut	75 - 125 ft. lbs.
934	842	ALL		Crankshaft Gear Retaining Nut	150 ft. lbs.
938	848	ALL	1/4-28	Thin Slotted Nut (38 in. lbs. plus torque required to reach next locking slot.)	38 in. lbs.
942	866	ALL	1/8-27 NPT	Carburetor Drain Plug	50 - 60 in. lbs.
943	859	V	10-32	Screws (To attach accessory drive coupling plate)	25 - 30 in. lbs.
944	851	V		Carburetor Throttle Lever Screw	20 - 28 in. lbs.
945	870	L1		Accessory Drive Shaft and Accessory Drive Gear Attaching Screw	100 - 120 in. lbs.

SECTION V - SPRINGS

		Chart	Nomenclature	Avco Lyc. Part No.	Wire Dia.	Length At Comp. Length	COMP. LOAD		
							Mfg. Min.	Mfg. Max.	Serv. Max.
950	800	ALL	Outer Valve Springs (Angle)	68326	.177	1.46 in.	103 lb.	111 lb.	100 lb. min.
		ALL	Outer Valve Springs (Angle)	LW-11796	.182	1.43 in.	114 lb.	124 lb.	111 lb. min.
951	801	ALL	Auxiliary Valve Springs (Angle)	68328	.142	1.33 in.	75 lb.	83 lb.	72 lb. min.
		ALL	Auxiliary Valve Springs (Angle)	LW-11797	.142	1.33 in.	73 lb.	83 lb.	70 lb. min.
952	810	L-V	Check Valve Springs						
			Lycoming Part Numbers	Free Length					
			654-B	.....	.031	1.03 in.	.74 lb.	.94 lb.	.69 lb. min.
			73761	2.065	.041	1.03 in.	3.15 lb.	3.35 lb.	3.10 lb. min.
953	811		Oil Pressure Relief Valve Spring						
			Lycoming Part Numbers	Identification: Dye	Free Length				
		L-V	68542	None	2.38	.067	1.66 in.	15 lb.	17 lb.	14 lb. min.
		L-V	LW-14029	White	2.28	.072	1.66 in.	20 lb.	22 lb.	17 lb. min.
954	814		Accessory Drive Coupling Spring						
			Lycoming Part Numbers	Free Length					
		V - AS APPLICABLE	74616	1.25	.092	1.10	23 lb.	26 lb.	20 lb.

SERVICE TABLE OF LIMITS

STANDARD TORQUE

UNLESS OTHERWISE LISTED

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

TABLE I

BOLTS, SCREWS AND NUTS

Thread	Torque In. Lb.	Torque Ft. Lb.	Thread	Torque In. Lb.	Torque Ft. Lb.
10	49	------	1/2	900	75
1/4	96	------	9/16	1320	110
5/16	204	17	5/8	1800	150
3/8	360	30	3/4	3240	270
7/16	600	50			

THIN NUTS (1/2 DIA OF BOLT) - 1/2 LISTED TORQUE

TABLE II

PIPE PLUGS

Thread	Torque In. Lbs.
1/16-27 NPT	40
1/8-27 NPT	40
1/4-18 NPT	85
3/8-18 NPT	110
1/2-14 NPT	160
3/4-14 NPT	230
1-11 1/2 NPT	315

TABLE III

CRUSH TYPE ASBESTOS GASKETS

Thd. Pitch On Part To Be Tightened Threads Per Inch	ANGLE OF TURN Aluminum Asbestos	Copper Asbestos
8	135°	67°
10	135°	67°
12	180°	90°
14	180°	90°
16	270°	135°
18	270°	135°
20	270°	135°
24	360°	180°
28	360°	180°

NOTE

Install all crush type gaskets except the self centering type, with the unbroken surface against the flange of the plug or part being tightened against the seal. Turn the part until the sealing surfaces are in contact and then tighten to the angle of turn listed for the appropriate thread size.

NOTE: Lubricate Threads Unless Otherwise Specified.

TABLE IV

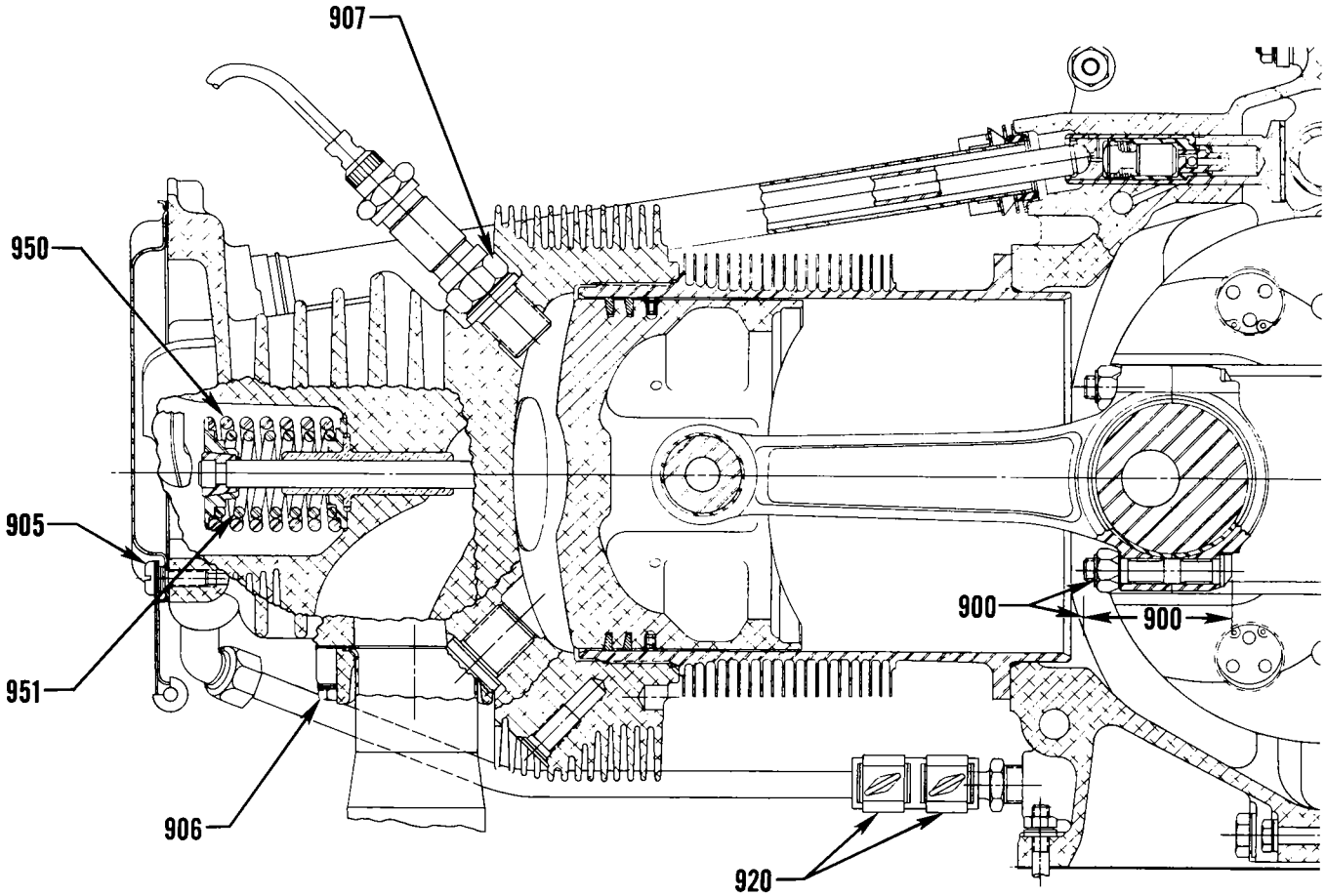
FLEXIBLE HOSE OR TUBE FITTINGS

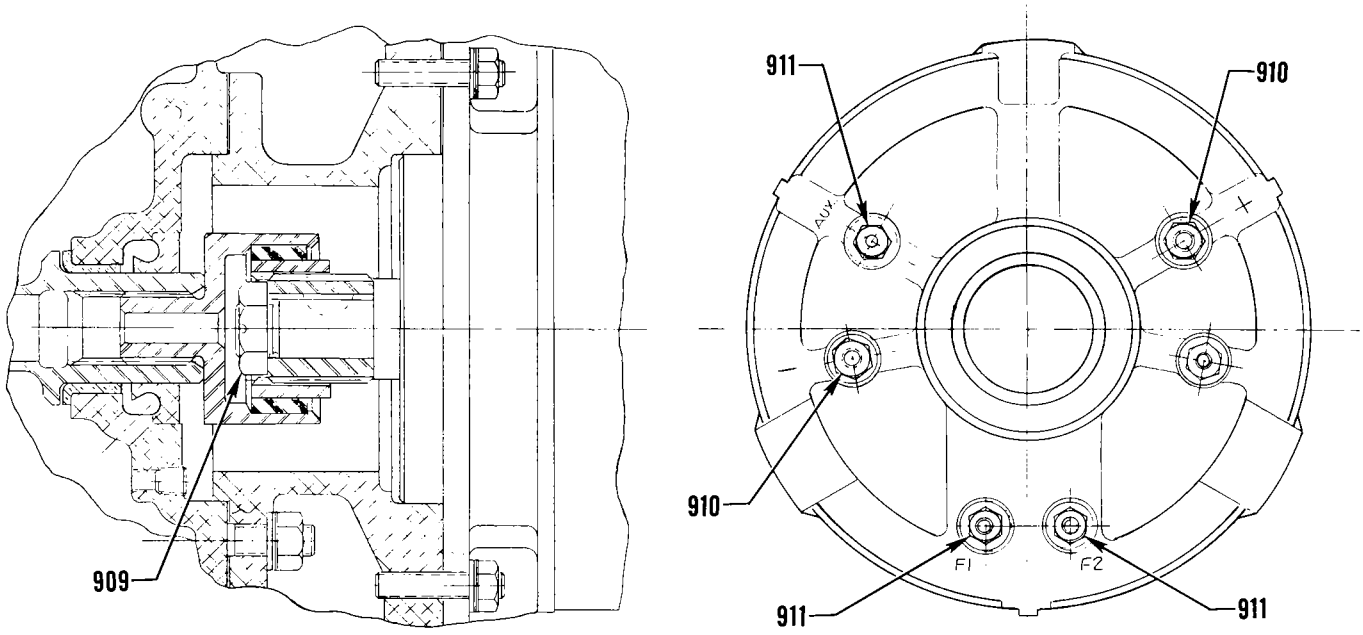
Tube Size	Thread	Torque In. Lbs.
(-3) 3/16	3/8-24	30
(-4) 1/4	7/16-20	30
(-5) 5/16	1/2-20	35
(-6) 3/8	9/16-18	35
(-8) 1/2	3/4-16	60
(-10) 5/8	7/8-14	70

TABLE V

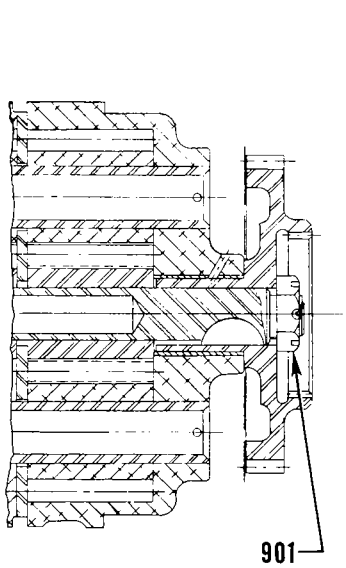
STUDS MIN. DRIVING TORQUE

Threads	Torque In. Lb s.
1/4-20	15
5/16-18	25
3/8-16	50

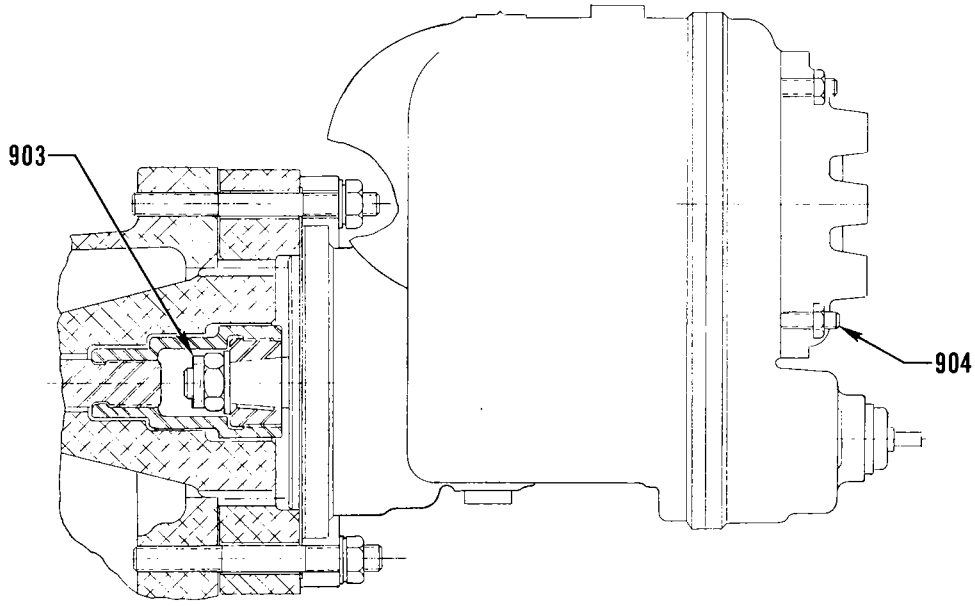

907
950
905
951
906
900
900
920



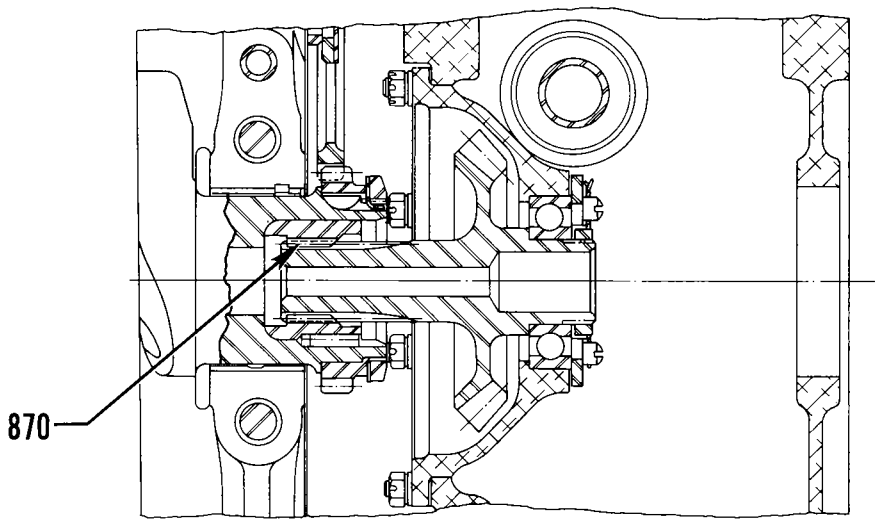
ALTERNATOR & ALTERNATOR DRIVE



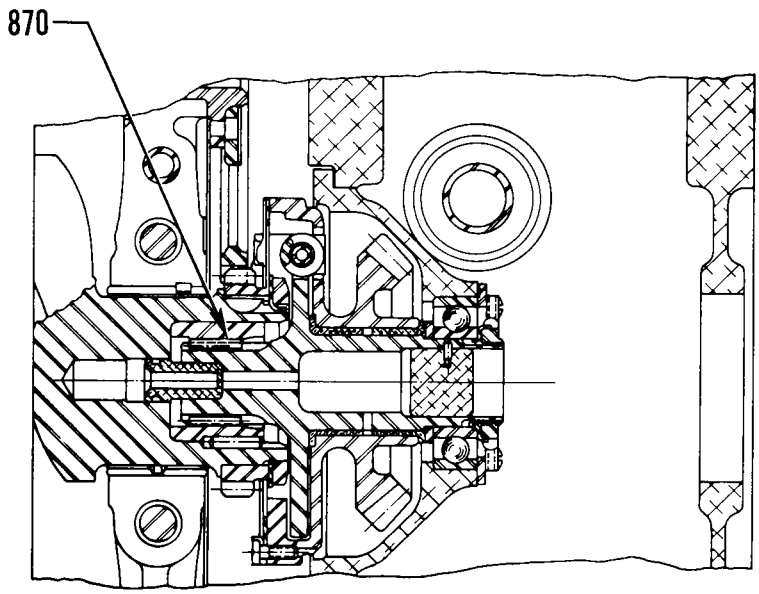
OIL PUMP



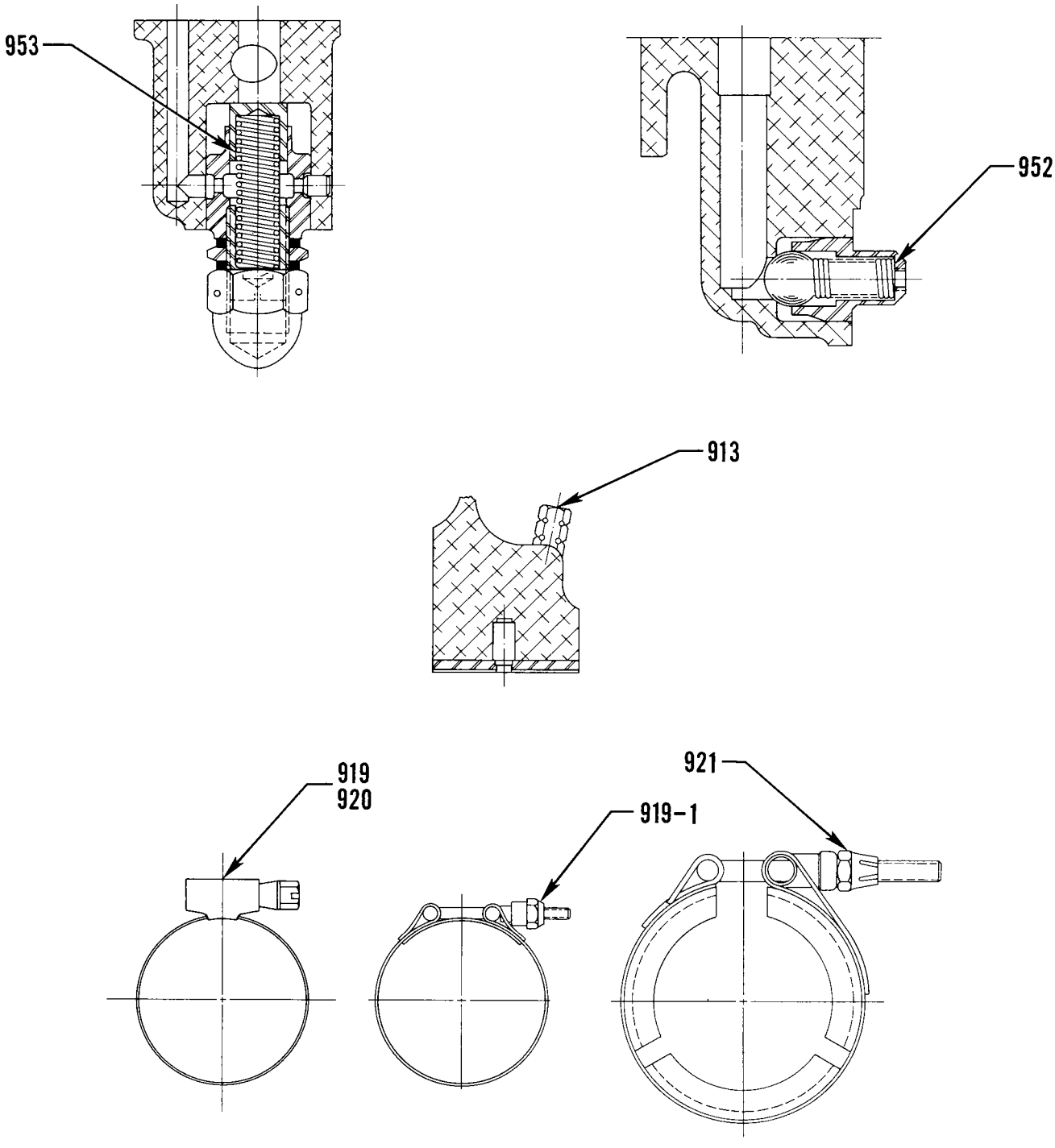
MAGNETO



VO, TVO-435-A & TVO-540



VO-540


953
952
913
919
920
919-1
921