

# SERVICE BULLETIN

Compliance Will Enhance Safety, Maintenance or Economy of Operation

**SB96-7C**

Technical Portions  
FAA APPROVED

**SUBJECT: TORQUE LIMITS**

**PURPOSE:** This bulletin provides torque values for fasteners utilized on all TCM engines.

**COMPLIANCE:** During all maintenance, repair or overhaul events.

**WARNING**

Proper torquing practices cannot be over emphasized. Torque values are provided as a convenient method of achieving correct pre-loading of highly stressed fasteners. If the fasteners are not properly plated, the fastener threads are not clean and free of deformation or are not properly lubricated, the correct fastener pre-load will not be achieved even though the given torque value is reached. For this reason, it is critical that all fasteners be inspected for proper plating, thread form and correctly lubricated prior to torquing. Failure to verify a fastener's serviceability or to correctly lubricate the fastener prior to assembly and torquing will result in the fastener not being properly pre-loaded and subsequent failure of the fastener may occur.

**MODELS**

**AFFECTED:** All

**GENERAL INFORMATION**

The torque values provided must be used for the specific application. If an application is not listed, then the general torque value must be used. **TORQUE VALUES LISTED ARE FOR USE WITH CLEAN 50 WEIGHT AVIATION ENGINE OIL APPLIED TO THE THREADS, UNLESS OTHERWISE SPECIFIED.** Refer to appropriate manufacturer's accessory overhaul manuals for specified torque on accessories.

If cotter pin holes must be aligned, set torque wrench at low limit and tighten nut to first hole beyond this torque, but do not exceed the maximum torque limit specified. This torquing procedure must be followed for all applications requiring cotter pin hole alignment, except for

connecting rod nuts. Special instructions are provided in Notes at rear of bulletin.

**NOTE: When you see the text notation (AR) it refers to "As Required."**

**WARNING**

**THE USE OF SEALANTS OR LUBRICANTS OTHER THAN THOSE SPECIFIED BY TCM ON MATING THREADS AND BETWEEN MATING SURFACES CAN CAUSE INCORRECT TORQUE APPLICATION AND SUBSEQUENT ENGINE DAMAGE OR FAILURE.**

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## CYLINDER TORQUE PROCEDURES:

Proper cylinder installation requires a multiple step torquing process. Cylinder base stud threads, through bolt threads and nuts must be lubricated with clean 50 weight aviation oil. Through bolt nuts at cadmium plated washers require a lower torque value to achieve the same pre-load on the through bolt since the lubricity of the cadmium plating reduces the friction in the fastener joint.

1. Torque cylinder base nuts to 1/2 of the specified torque value for the fastener.
2. Torque the cylinder through bolt nuts and cylinder base stud nuts to the specified torque value for the **cylinder base stud nuts**. Through bolt nuts must be torqued on both sides of the engine, even if only one cylinder is being installed.

WARNING

**Failure to torque through bolt nuts on both sides of the engine can result in a loss of main bearing crush with main bearing shift and subsequent engine failure.**

3. Torque through bolt nuts, on both sides of the engine, to the specified value for the fastener
4. Engines which incorporate the 7<sup>th</sup> cylinder deck stud, install the 7<sup>th</sup> stud cylinder bracket and conical stud nut. Torque the stud nut to the value specified for the fastener.

NOTE: Through bolt nuts P/N's 634505 and 649496 have been superseded by nut P/N 652541. Nut P/N 634505 is a flanged 6 point (hex) nut requiring a torque value of 690-710 inch pounds. Nut P/N 649496 is a flanged 6 point (hex) nut requiring a torque value of 790-810. Nut P/N 652541 is a flanged 12-point nut requiring a torque value of 790-810 inch lbs. At engine overhaul all P/N 634505 and 649496 flanged through bolt nuts must be replaced with P/N 652541 flanged 12 point nuts. If replacing P/N 634505 or 649496 nuts in less than a complete set prior to engine overhaul torque nut P/N 652541 to the required value of the original fastener (P/N 634505 or 649496).

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## CRANKCASE

**CAUTION: The correct torque sequence from the latest version of the appropriate Overhaul Manual must be followed for correct crankcase and cylinder assembly.**

SIZE	FASTENER	TORQUE VALUE		MODELS AFFECTED
		IN/LB.	FT/LB.	
.25 - 28	Nut-Crankcase Flange	100-125	8.3-10.4	A, C, & E Series, O-200, O-300, O-470(AR) IO-240, IOF-240
.25 - 28	Nut-Tie bolt prop shaft cages	90-110	7.5-9.2	GO-300
.25 - 28	Nut-Engine leg bushing	90-100	7.5-8.3	C-125, C-145-, O-300
.31 - 18	Bolt- Oil sump flange	155-175	12.9-14.6	IO-346, O-470, IO-470, GIO-470, TSIO-470, IO-520, L&TSIO-520, GTSIO-520, IOF-550, IO-550, TSIO-550, TSIOL-550, TSIOF-550
.31 - 24	Nut- Crankcase Flange	180-220	15.0-18.3	IO-346, O-470(AR), IO-470, GIO-470, TSIO-470, IO-520, L&TSIO-520, GTSIO-520, IO-550, IOF-550, TSIO-550, TSIOF-550, TSIOL-550
.31 - 24	Nut-Crankcase flange (Stainless Steel Only)	240-280	20.0-23.3	(AR) Stainless Steel Hardware Only
.31 - 24	Nut-Crankcase through bolts	180-220	15.0-18.3	O-470 (AR), E-Series
.31 - 24	Nut-Magneto Flange	100-120	8.3-10.0	All Engine Models
.31 - 24	Nut-Shaft, magneto gear support to case	190-210	15.8-17.5	IO-360, L&TSIO-360
.38 - 16	Bolt-Engine mount to crankcase.	220-260	18.3-21.7	IO-550-G, IO-550-N
.38 - 24	Nut-Cylinder to crankcase stud	410-430	34.2-35.8	A, C, & E Series, O-200, O-300 GO-300, O-470
.38 - 24	Nut-Cylinder to Crankcase studs	440-460	36.7-38.3	IO-240, IOF-240, IO-360, L&TSIO-360,
.38 - 24	Nut-Crankcase tie bolts	370-390	30.8-32.5	All models (AR) EXCEPT 360's & IO-240 and IOF240
.38 - 24	Nut-Crankcase tie bolts	275-325	22.9-27.1	All 360's, IO-240, IOF240
.38 - 24	Nut-Crankcase through bolts-front.	370-390	30.8-32.5	O-470 (AR) & E-Series
.38 - 24	Nut-Crankcase though studs.	275-325	22.9-27.1	A-Series, C-75, C-85, C-90 and O-200.
.38-24	Nut-Mounting brackets to crankcase	275-325	22.9-27.1	All models(AR)
.38-24	Bolt-Crankcase thru front main only.	275-325.	22.9-27.1	GO-300
.38-24	Nut-Through bolt, upper rear	275-325	22.9-27.1	All 470's, All 520's, All 550's
.44-20	Nut-Cyl. to crankcase studs.(includes 7th stud)	490-510	40.8-42.5	All models (except TSIOL-550)
.44-20	Nut-Cyl. to crankcase studs.	590-610	49.2-50.8	TSIOL-550
.44-20	Nut-Through bolts at cadmium plated washer	440-460	36.6-38.3	All models (AR)

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**CRANKCASE (continued)**

SIZE	FASTENER	TORQUE VALUE		MODELS AFFECTED
		IN/LB.	FT/LB.	
.44-20	Nut-Crankcase tie bolts-nose & below camshaft	440-460	36.6-38.3	All models(AR)
.44-20	Nut-Cyl. to crankcase through studs	400-450	33.3-37.5	A-Series, C-75, C-85 & C-90
.44-20	Nut- Front and Rear Crankcase bearing thru studs	490-510	40.8-42.5	O-200
.44-20	Nut-thru stud at Cyl. Flange	490-510	40.8-42.5	O-200
.44-20	Nut-Tie bolts at nose and prop shaft cages.	340-360	28.3-30.0	GO-300.
.44-20	Nut-Through bolt at cylinder flange	490-510	40.8-42.5	All models (AR) EXCEPT 360's, IO-240, IOF-240
.44-20	Nut-Through bolt at cylinder flange	590-610	49.2-50.8	All 360's, IO-240, IOF-240
.50-20	Nut-Through bolt at cad plated washer	615-635	51.2-52.9	IO-346, O-470, IO-470 TSIO-470, IO-520, L/TSIO-520 GTSIO-520, IO-550, IOF-550, TSIO-550, TSIOF-550, GIO-470
.50-20	Nut-6 Point-Through bolt at cylinder flange (P/N 634505 .33 in. high)	690-710	57.5-59.2	IO-346, All 470, 520, 550, (Except TSIOL-550)
.50-20	Nut-Through bolt at plated washers	690-710	57.5-59.2	TSIOL-550
.50-20	Nut-12 Point-Thru bolt at cylinder flange (P/N 652541)	790-810	65.8-67.5	IO-346, All 470, 520 & 550.
.50-20	Nut-Tall 6 point-thru bolt at cylinder flange. (P/N 649496 .43 inch high)	790-810	65.8-67.5	TSIOL-550.
.50-20	Nut-Crankcase tie bolts-nose	640-660	53.3-55.0	All models(AR)
.62-18	Plug-(using crush washer)	190-210	15.8-17.5	All models(AR)

**GEARS**

SIZE	FASTENER	TORQUE VALUE		MODELS AFFECTED
		IN/LB.	FT/LB.	
.25-28	Bolt-Gear to camshaft	140-160	11.7-13.3	A,C, & E-Series, O-200,O-300 O-470, IO-240, IOF-240
.25-28	Bolt-Gear to crankshaft (P/N 22532) (SEE NOTE 6)	140-160	11.7-13.3	A & C-Series, O-200, O-300, GO-300 , IO-240, IOF-240
.25-28	Bolt-Gear to crankshaft. (P/N 534904) (SEE NOTE 6)	170-175	14.2-14.6	E-Series, O-470 Numerical O-470-A, E.
.25-28	Bolt-Quill Shaft Retaining Plate (P/N 646920)	90-110	7.5-9.2	GTSIO-520
.31-24	Bolt-Gear to camshaft	240-260	20.0-21.7	E-Series, IO-360, L/TSIO 360, IO-346, O-470, IO-470, IOF-550 TSIO-470, IO-520, L/TSIO- 520 GTSIO-520, IO-550, TSIO-550, TSIOL-550, TSIOF-550

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### GEARS (continued)

SIZE	FASTENER	TORQUE VALUE		MODELS AFFECTED
		IN/LB.	FT/LB.	
.31-24	Bolt-Gear to crankshaft (Lower hardness bolts identified with green dykem) (SEE NOTE 6)	240-260	20.0-21.7	E-Series, IO-360 L/TSIO-360, IO-346
.31-24	Bolt-Gear to crankshaft. (Bolt hardness RC 38-42) (SEE NOTE 6).	380-420	31.7-35.0	O-470, IO-470, TSIO-470, IO-520, L/TSIO 520, IOF-550 GTSIO-520, IO-550, TSIO-550, TSIOL-550, TSIOF-550
.31-24	Bolt-Face gear to crankshaft.	140-150	11.7-12.5	IO-346, GIO-470, IO-520(AR) L/TSIO-520(AR), GTSIO-520, IO-550, IOF-550, TSIO-550, TSIOL- 550.
.31-24	Nut-Generator or alternator gear	175-200	14.6-16.7	A, C & E Series, O-200,O-300 GO-300, IO-360, L&TSIO-360.
.31-24	Nut-Generator gear-(531231) With washer-(401507)	175-195	14.6-16.3	E-Series
.31-24	Bolt-Vac & fuel pump gear to camshaft	275-325	22.9-27.1	IO-240, IOF-240

### CONNECTING RODS

SIZE	FASTENER	TORQUE VALUE		MODELS AFFECTED
		IN/LB.	FT/LB.	
.38-24 3/8-24	Nut-Connecting rod (Nuts: 24804, 626140 with bolt P/N 530213) (SEE NOTES 1&8)	400-475	33.3-39.6	A & C-Series, O-200, O-240, O-300, GO-300, IO-360, L & TSIO-360, IO-240, IOF- 240
.38-24 3/8-24	Nut-Connecting rod (Nuts: P/N 626140 with bolt P/N 35972) (SEE NOTES 1 & 8)	400-475	33.3-39.6	E-185, E-205, E-225, IO-346, O-470 Numbered and Lettered engines IO-470, TSIO-470 with 628751 Connecting Rod
.38-24 3/8 -24	Nut -Connecting rod Spirallock (Nut P/N 654487 with bolt P/N 654693)	490-510	40.8-42.5	O-200, 240, O-300, GO-300, IO-240, IOF-240, IO-360, L & TSIO-360
.38-24 3/8 -24	Nut -Connecting rod Spirallock (Nut P/N 654487 with bolt P/N 654811)	490-510	40.8-42.5	E-185, E-205, E-225, IO-346, O-470 Numbered and Lettered engines IO-470, TSIO-470
.44-20 7/16-20	Nut-Connecting rod- Spirallock (Nut hex P/N 643215 with bolt P/N 643112)	550-600	45.8-50.0	L & IO-520-P, L & TSIO-520 AE & CE, IO-550, IOF-550, TSIO-550, TSIOF-550, TSIOL-550
.44-20 7/16-20	Nut-Connecting rod Spirallock (12 Point Nut P/N 654490)	690-710	57.5-59.2	FOR SPECIFIC APPLICATION SEE NOTE 9 ON PAGE 13

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### CONNECTING RODS (continued)

SIZE	FASTENER	TORQUE VALUE		MODELS AFFECTED
		IN/LB.	FT/LB.	
.44-28 7/16-28	Nut-Connecting Rod (rod P/N 646474, bolt P/N 631794 nut 631554) (SEE NOTE 1)	550-575	45.8-47.9	GIO-470, GTSIO-520.
.44-28 7/16-28	Nut-Connecting Rod (rod P/N 646476, bolt P/N 629340 nut-P/N 628109 (SEE NOTE 1)	475-525	39.6-43.8	IO-346, O-470, IO-470, TSIO-470, IO-520, TSIO-520 (except L/TSIO-520 AE & CE),

### MISCELLANEOUS FUEL INJECTION

SIZE	FASTENER	TORQUE VALUE		MODELS AFFECTED
		IN/LB.	FT/LB.	
#8-32	Screw-Manifold Cover hold down (AN503-8-12)	22-26	1.8-2.2	All fuel injected models, as required
#8-32	Screw-Aneroid body hold down (AN500-8-14)	17.5-22.5	1.5-1.9	All fuel injected models, as required
.125-27	Fitting-Cover vapor separator fuel pump	60-80	5.0-6.7	All fuel injected models, as required
.125-27	Nozzle-Fuel injector(with anti-seize compound)	55-65	4.6-5.4	All fuel injected models, as required
.19-24	Through-bolt, fuel pump	29-31	2.4 -2.6	All fuel injected models, as required
.25-28	Ejector - Fuel Pump Vapor Separator Cover	90-100	7.5-8.3	All fuel injected models (AR)
.25-48	Nut-Aneroid stem jam	25-30	2.1-2.5	All fuel injected models, as required
.31-24	Nozzle-Fuel injector(with anti-seize compound)	55-65	4.6-5.4	All fuel injected models, as required
.31-24	Nut- Throttle and mixture control levers to shaft	100-120	8.3-10.0	All fuel injected models, as required
.31-32	Nut-Fuel injection line	40-45	3.3-3.7	All fuel injected models, as required
.50-24	Nut; Air reference sleeve "B" nut to air reference line	Snug nut finger tight to set seal between nut and male connector, then tighten additional ¾ to 1 turn		All Turbocharged models
.38-24	Nut-Fuel injection line	55-60	4.5-5.0	All fuel injected models, as required
.62-18	Plug & Screen assy. Metering Unit new gasket	120-130	10.0-10.8	All fuel injected models, as required

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### MISCELLANEOUS LUBRICATION

SIZE	FASTENER	TORQUE VALUE		MODELS AFFECTED
		IN/LB.	FT/LB.	
.25-20	Bolt-Oil cooler to adapter	100-110	8.3-9.2	IO-360, L/TSIO-360, O-470, IO-470, TSIO-470, IO-520, TSIO-520(AR), IO-550, IOF-550, TSIO-550, TSIOL-550, TSIOF-550
.25-20	Bolt-Oil pump cover crankcase	75-85	6.3-7.1	All models as required
.25-28	Nut-Collar assembly governor oil transfer.	75-85	6.3-7.1	O-470, IO-470, TSIO-470, IO-520, TSIO-520, IO-550, IOF-550, TSIO-550, TSIOL-550, TSIOF-550
.38-24	Tach-Shaft to oil pump drive gear.	280-300	23.3-25.0	IO-360-D, TSIO-360
.38-24 LH Thread	Tach-Shaft to oil pump drive gear.	280-300	23.3-25.0	LTSIO-360 (Left Hand Thread)
.62-18	Plug-Oil cooler (using crush washer)	190-210	15.8-17.5	All models, as required.
.62-18	Plug-Oil suction tube (using crush washer)	190-210	15.8-17.5	All models, as required.
.62-18	Plug-Oil sump drain	190-210	15.8-17.5	All models as required
.62-18	Oil filter-Cartridge	180-216	15.0-18.0	All models as required
.75-16	Oil filter-Disposable type.	192-216	16.0-18.0	All models as required
.75-16	Plug-Oil sump drain.	190-210	15.8-17.5	IO-470-M, IO-520-E
.88-16	Cap-Oil pressure relief valve	190-210	15.8-17.5	O-200, IO-240, O-300, TSIO-360, LTSIO-360.
.88-16	Plug-Oil bypass.	240-260	20.0-21.7	O-470, IO-470, TSIO-470, IO-520, TSIO-520, GTSIO-520, IO-550,, IOF-550, TSIO-550, TSIOL-550, TSIOF-550
1.00-14	Vernatherm-(Oil temperature control valve)	440-460	36.7-38.3	All models, as required.
1.00-18	Screen Assy-Scavenge oil	200-210	16.7-17.5	O-300(AR), IO-360(AR), L & TSIO-360(AR)
1.12-18	Housing-Oil pressure relief valve	240-260	20.0-21.7	IO-346, O-470, IO-470, TSIO-470, IO-520, TSIO-520, GTSIO-520, IO-550, IOF-550, TSIO-550, TSIOL-550, TSIOF-550
1.375-16 LH Thread	Housing tach drive	250-350	20.8-29.2	All models as required
1.25-18	Plug – Special (Vernatherm)	310-320	25.8-26.7	All models as required
1.25-18	Vernatherm.	410-420	34.2-35.0	All models as required
1.75-16	Oil filter adapter lock nut	500-520	41.6-43.3	O-300(AR), IO-360(AR), L & TSIO-360(AR).
1.75-16	Oil filter screen using new crush gasket ( install gasket with parting line up against screen face)	500-520	41.6-43.3	All models as required

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### MISCELLANEOUS CYLINDER HARDWARE

SIZE	FASTENER	TORQUE VALUE		MODELS AFFECTED
		IN/LB.	FT/LB.	
.125-27	Connector – Cylinder Drain	60-80	5.0-6.7	All Models (AR)
.25-20	Set Screw; Rocker shaft locking	45-55	3.8-4.6	O-200, O-300
.25-20	Screw- rocker box cover (tighten 2 lower screws first)	55-65	4.6-5.4	IO-240, IOF-240, IO-360, L & TSIO-360
.25-20	Screw-Rocker box cover..	55-65	4.6-5.4	All models, as required
.25-20	Screw-Intake flange.	85-110	7.1-9.2	All models, as required.
.25-20	Bolt-Rocker shaft hold down	85-110	7.1-9.2	O-470-2,4,13, 13A O-470B(AR)
.25-20	Bolt-Thru bolted rocker shaft	90-100	7.5-8.3	O-470, IO-470, TSIO-470, IO-520, IO-550 and IOF-550 (except G, N, P, R), TSIO-520 (except BE), TSIOL-550
.25-28	Nut-Rocker shaft hold down.	110-120	9.2-10.0	All 360's, IO-240, IOF-240
.25-28	Nut-Exhaust coupling, "V" band clamp (SEE NOTE 2).	42		TSIO-520-L, LB, TSIO-520-WB
.25-28	Nut-Exhaust manifold flange. (Spirotallic gasket)	100-110	8.3-9.2	All models, as required.
.31-18	Bolt-Rocker shaft. (SEE NOTE 3).	190-210	15.8-17.5	IO-550 and IOF-550 (G, N, P and R) TSIO-520-BE, TSIO-550, GTSIO-520
.31-24	Nut-Induction tube flange.	50-70	4.2-5.8	All 360's, IO-240, IOF-240
.31-24	Bolt-Rocker shaft hold down (SEE NOTE 4)	85-110	7.1-9.2	O-470, IO-470 TSIO-470, IO-520, IO-550, IOF-550 (except G, N, P, R), TSIO-520 (except BE), TSIOL-550, TSIOF-550
.31-24	Nut-Exhaust manifold flange (Spirotallic gasket)	200-210	16.7-17.5	All models as required
.44-20	Plug – Cylinder Drain (With O-Ring)	50-70	4.2-5.8	TSIOL-550 Series
18 MM	Spark plug (SEE NOTE 7)	300-360	25.0-30.0	All models

### MISCELLANEOUS FASTENERS

SIZE	FASTENERS	TORQUE VALUE		MODELS AFFECTED
		IN/LB.	FT/LB.	
.25-.62	Clamp, Hose, Oil Gage Rod	12-16	.3-1.3	IO-360, TSIO-360 (AR)
.25-.62	Clamp, Hose, Magneto Pressurization	10-14	.8-1.17	As Required
.38-16	Bolt-Turbocharger to bracket	310-350	25.8-29.2	TSIO-520-L1.
.31-18	Bracket-Turbocharger	220-250	18.3-20.8	GTSIO-520-F & K
.31-18	Bolt-Alternator mounting	150-180	12.5-15.0	IO-346, GIO-470, All 520's(AR), All 550's(AR).
.31-24	Nut, Generator Gear	175-200	14.6-16.7	A,C & E-Series, O-200, 0-300 GO-300, IO-360, TSIO-360
.31-24	Nut, Generator Gear (531231), washer (401507)	175-195	14.6-16.3	E-Series
.31-24	Nut; Starter Pinion Pivot & Magneto Gear Support	180-220	15.0-18.3	PE & E-Series

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**MISCELLANEOUS FASTENERS (continued)**

SIZE	FASTENERS	TORQUE VALUE		MODELS AFFECTED
		IN/LB.	FT/LB.	
.38-24	Nut-Starter to adapter	200-220	16.7-18.3	O-300 (AR), GO-300 (AR), IO-346, All 470's, All 520's All 550's
.44-20	Nut-Alt. sheave to starter shaft	600-720	50-60	TSIO-520-B as required
.56-18	Nut-Starter shaft gear. (SEE NOTE 5)	450-500	37.5-41.6	IO-520-BA, BB, TSIO-520-BB, N, NB, L, LB, WB, BE UB, IO-550-B, C, IOF-550 B,C TSIO-550-A, B, C, E
.56-18	Nut-Starter jaw, crankshaft.	575-625	47.9-52.1	O-470 Numeral
.56-18	Nut-Generator pulley drive	450-500	37.5-41.7	IO-346, All 470's, IO-520, TSIO-520, IO-550, IOF-550, TSIOL-550 TSIO-550, TSIOF-550
.62-32	Nut-Alternator hub assembly.	300-450	25.0-37.5	IO-346, GIO-470, IO-520(AR) TSIO-520(AR), IO-550, IOF-550, GTSIO-520 (AR), TSIOL-550, TSIO-550, TSIOF-550
.66-20	Nut-Alternator or generator pulley	450-500	37.5-41.7	O-470, IO-470, IO-520 (AR), TSIO-520 (AR), TIARA (AR) IO-550, IOF-550, TSIOL-550, TSIO-550.
.75-16	Nut-Starter shaft gear viscous dampener		180-220	GTSIO-520
.88-18	Adapter-Tach reduction gear	120-180	10.0-15.0	All 360 series, IO-240, IOF-240

**Pipe Plugs**

SIZE		TORQUE	
Dec.	In.	IN/LB.	FT/LB.
.062 - 27	1/16-27	30 - 40	2.5 - 3.3
.125 - 27	1/8-27	60 - 80	5.0 - 6.7
.250 - 18	1/4-18	130 - 150	10.8 - 12.5
.375 - 18	3/8-18	185 - 215	15.4 - 18.0
.500 - 14	1/2-14	255 - 285	21.3 - 23.8
.750 - 14	3/4-14	310 - 350	25.8 - 29.2

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**General Torque Specifications  
Bolts, Nuts and Screws**

SIZE		TORQUE	
Dec.	In.	IN/LB.	FT/LB.
#2-56	-56	1.4-2.6	N/A
#4-40	-40	2.9-5.5	N/A
#6-32	-32	5.3-10.1	N/A
#8-32	-32	17.5 - 22.5	1.5 - 1.9
#10-32	-32	36 - 50	3.0 - 4.2
#10-24	-24	21 - 25	1.7 - 2.0
.25 - 20	1/4	75 - 85	6.3 - 7.1
.25 - 28	1/4-28	90 - 100	7.5 - 8.3
.3125 - 18	5/16-18	155 - 175	12.9 - 14.6
.3125 - 24	5/16-24	180 - 220	15.0 - 18.3
.375 - 16	3/8-16	220 - 260	18.3 - 21.7
.375 - 24	3/8-24	275 - 325	22.9 - 27.1
.44 - 20	7/16-20	400 - 450	33.3 - 37.5
.50 - 20	1/2-20	550 - 600	45.8 - 50.0

**Driving Studs**

SIZE		TORQUE	
Dec.	In.	IN/LB.	FT/LB.
.25 - 20	1/4	50 - 70	4.2 - 5.8
.3125 - 18	5/16-18	100 - 150	8.3 - 12.5
.375 - 16	3/8-16	200 - 275	16.7 - 22.9
.44 - 14	7/16-14	300 - 425	25.0 - 35.4

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## HYDRAULIC LINE TORQUE SPECIFICATIONS

SIZE	HOSE ASSEMBLY	TORQUE IN / LB.	MODELS
.44-20	Nut-Self locking #4 hose	115-165	TSIO-520-L, LB, WB.
.56-18	Nut-Self locking #6 hose	185-335	TSIO-520-L, LB, WB.
.75-16	Nut-Self locking #8 hose	360-570	TSIO-520-L, LB, WB.

## ASSEMBLY TORQUE SPECIFICATIONS FOR FITTING

SIZE	FITTING & MATERIAL	TUBE O.D.	TORQUE IN / LB.	MODELS
.31-24	#2 Brass / Aluminum	.125	15-30	All Models (AR)
.31-24	#2 Steel	.125	15-30	All Models (AR)
.38-24	#3 Brass / Aluminum	.188	40-65	All Models (AR)
.38-24	#3 Steel	.188	50-90	All Models (AR)
.44-20	#4 Brass / Aluminum	.250	60-80	All Models (AR)
.44-20	#4 Steel	.250	70-120	All Models (AR)
.44-24	Steel	.190	60-80	All Models (AR)
.56-18	#6 Brass / Aluminum	.375	75-125	All Models (AR)
.56-18	#6 Steel	.375	90-150	All Models (AR)
.75-16	#8 Brass / Aluminum	.500	150-250	All Models (AR)
.75-16	#8 Steel	.500	135-250	All Models (AR)
.88-14	#10 Brass / Aluminum	.625	200-350	All Models (AR)
.88-14	#10 Steel	.625	300-400	All Models (AR)

## TORQUE SPECIFICATIONS FOR HOSE FITTINGS ("B" NUTS)

HOSE SIZE	HOSE END FITTING MATERIAL	TORQUE IN / LB.	MODELS
#2 (.31-24)	BRASS / ALUMINUM FITTING	50-80	All Models (AR)
#2 (.31-24)	STEEL FITTING	75-120	All Models (AR)
#3 (.38-24)	BRASS / ALUMINUM FITTING	70-105	All Models (AR)
#3 (.38-24)	STEEL FITTING	95-140	All Models (AR)
#4 (.4375-20)	BRASS / ALUMINUM FITTING	100-140	All Models (AR)
#4 (.4375-20)	STEEL FITTING	135-190	All Models (AR)
#5 (.500-20)	BRASS / ALUMINUM FITTING	130-180	All Models (AR)
#5 (.500-20)	STEEL FITTING	170-240	All Models (AR)
#6 (.5625-18)	BRASS / ALUMINUM FITTING	150-195	All Models (AR)
#6 (.5625-18)	STEEL FITTING	215-280	All Models (AR)
#8 (.750-16)	BRASS / ALUMINUM FITTING	270-350	All Models (AR)
#8 (.750-16)	STEEL FITTING	470-550	All Models (AR)
#10 (.875-14)	BRASS / ALUMINUM FITTING	360-430	All Models (AR)
#10 (.875-14)	STEEL FITTING	620-745	All Models (AR)
#12 (1.063-12)	BRASS / ALUMINUM FITTING	460-550	All Models (AR)
#12 (1.063-12)	STEEL FITTING	855-1055	All Models (AR)

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**TORQUE VALUES FOR FADEC COMPONENTS  
ALL FADEC ENGINES**

Hardware	Torque (inch-lbs)
ECU 50-Pin Connector Securing Screws	10-15
SSA 25-Pin Connector Securing Screws	10-15
Fuel Pressure Sensors	130-150
Manifold Pressure Sensors	130-150
Cylinder Head Temp Sensor	55-65
Manifold Air Temp Adapter (Sensor Nut)	70-120
Manifold Air Temp Compression Fitting (Ferrule Nut)	145-155
Exhaust Gas Temperature Sensor Band Clamp	30-35
Lead To ECU Spark Tower "B" Nut	110-120

**NOTES**

- NOTE (1) -** Torque to low limit. If cotter pin will not enter, increase torque gradually up to high limit only. If cotter pin will not enter in this range, replace nut and repeat. **IN NO CASE SHALL NUTS BE TIGHTENED BELOW THE MINIMUM TORQUE LIMIT OR OVER THE MAXIMUM TORQUE LIMIT.** Reference the most current revision of TCM Service Bulletin SIL 93-15 as applicable for special instructions for cotter pinning the 360 model engine connecting rods.
- NOTE (2) -** Strike outer periphery of coupling band lightly to distribute load. Then tighten to 50-60 in/lb. for P/N 641284 Clamp and 60-70 in/lb. for P/N 653832 Clamp.
- NOTE (3) -** Do not realign hex cap screw to suit tab washer.
- NOTE (4) -** Must be reworked to through bolt rocker shaft configuration in accordance with TCM Service Bulletin M92-6 or current revision as applicable.
- NOTE (5) -** Align and tension belt in accordance with TCM Service Bulletin M89-6 or current revision as applicable.
- NOTE (6) -** Crankgear must be heated to 300° Fahrenheit, then installed on crankshaft. Assure that the gear seats tightly against the end of the crankshaft by tapping lightly with a brass hammer.

**CAUTION**

**Improper heating of the crankshaft gear will result in damage to the gear and may lead to subsequent engine failure. The instructions contained in the latest revision of the appropriate overhaul manual must be used for crankshaft gear installation.**

- NOTE (7) -** Lubricate threads with Champion thread lubricant P/N 2612 or equivalent only.
- NOTE (8) -** (A) P/N 530184 connecting rod (Identified by forging number 530186), P/N A35159 (identified by forging number 5561) and P/N A35160 (also identified by forging number 5561) must be serviced as follows: P/N 530213 bolt, P/N 24804 or P/N 626140 Nut and P/N 639292 cotter pin.
- (B) P/N A36121 connecting rod assemblies utilizing the P/N 632041 forging must be serviced in accordance with the part numbers indicated in the current technical data. P/N A36121 connecting rod assemblies utilizing the P/N 40742 forging

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must be serviced as follows: P/N 35972 connecting rod bolt, P/N 24804 nut and P/N MS24665-132 cotter pin.

**NOTE (9)** Connecting Rod Application:

<p><b>ROD P/N 655000</b>  <b>Superseded by 655910</b>  <b>(Nut 654490 &amp; Bolt 643112)</b></p> <p>IO-520-P          LIO-520-P          TSIO-520-AE          LTSIO-520-AE</p>	<p><b>ROD P/N 655001</b>  <b>Superseded by 655911</b>  <b>(Nut 654490 &amp; Bolt 643112)</b></p> <p>IO-550-A, B, C, D, E, F, G,          L, N, P, R          TSIOL-550-A, B, C          TSIO-520-CE          TSIO-550A, B, C, E</p>	<p><b>ROD P/N 655003</b>  <b>SETOF 6 BALANCED P/N</b>  <b>655004 Con-Rods</b>  <b>Superseded by 655913</b>  <b>(Nut 654490 &amp; Bolt 643112)</b></p> <p>IO-550-B, C          Special Edition Only</p>
<p><b>ROD P/N 655004</b>  <b>Superseded By 655910</b>  <b>(Nut 654490 &amp; Bolt 654068)</b>  <b>Bolt 654068 Superseded To</b>  <b>Bolt 655961</b></p> <p>O-470-J, R, S, U          IO-470-C, D, E, F, K, L, M,          N, S, U, V,          IO-520-A, BA, C, D, E, F, J,          K, L, M,          TSIO-520-A, B, C, D, E, G,          H, J, L, M, N, P, R, T          GTSIO-520-C, D, F, H, K, L,          M, N, R</p>	<p><b>ROD P/N 655005</b>  <b>Superseded By 655911</b>  <b>(Nut 654490 &amp; Bolt 654068)</b>  <b>Bolt 654068 Superseded to</b>  <b>Bolt 655967</b></p> <p>IO-520-BB, CB, MB,          TSIO-520-BB, BE, DB, EB,          JB, KB, LB, NB, UB, VB,          WB</p>	<p><b>ROD P/N 655007</b>  <b>(SETOF 6 BALANCED P/N</b>  <b>655005 Con-Rods)</b>  <b>Superseded By 655913 (Nut</b>  <b>654490 &amp; Bolt 654068)</b>  <b>Bolt 654068 Superseded By</b>  <b>Bolt 655961</b></p> <p>TSIO-520-UB Special Edition</p>
<p><b>ROD P/N 655910</b>  <b>(Nut 654490 &amp; Bolt 655958)</b></p> <p>O-470 J,R,S,U          IO-470 C,D,E,F,K,L,M,          N,S,U,V</p> <p>IO-520-A,BA,C,D,E,F,J,          K,L,M,P          L&amp;TSIO-520-A,AE,B,C,D,          E,G,J,M,N,P,R,T          GTSIO-520-C,D,F,H,K,L,          M,N,R</p>	<p><b>ROD P/N 655911</b>  <b>(Nut 654490 &amp; Bolt 655958)</b></p> <p>IO-520-BB, CB, MB          TSIO520CE          TSIO-520-BB, BE, DB, EB,          JB, KB, LB, NB,UB, VB,WB</p> <p>IOF-550-ALL          TSIO-550-A,B,C,E          TSIOL-550-A,B,C          TSIOF-550-ALL</p>	<p><b>ROD P/N 655913</b>  <b>(SETOF 6 BALANCED P/N</b>  <b>655911 Con-Rods)</b>  <b>(Nut 654490 &amp; Bolt 655958)</b></p> <p>IO-550-B,C,D,F,G,N Special          Edition, Platinum          TSIO-520-UB Special Edition,          Platinum          IOF-550-B,C,N Platinum</p>

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