

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 7th cylinder deck stud, install the 7th 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 that 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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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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