

CHAPTER 6

Table of Limits

6-1. INTRODUCTION.

This chapter presents data regarding fits, clearances, tolerances and torque values for use when inspecting and reassembling the components listed.

6-2. TABLE OF LIMITS.

Refer to table 6-1 for details regarding fits, clearances and tolerances when reassembling the components list-

ed. The minimum and maximum tolerances are set up as ideal limits. Part measurements that do not fall outside the replacement minimum/maximum values may be continued in service. The table also contains values to be used for proper adjustment and setting of equipment during replacement or reassembly of the components listed.

Table 6-1. Table of Limits

Figure		Description	Min	Max	Replacement	
No.	Ref				Min	Max
Engine						
5-8	6,7 8	Armature shaft-to-bushing clearance A				0.0079
		Armature shaft-to-bushing clearance B				0.0177
		Armature shaft-to-bushing clearance C				0.0079
		Armature shaft-to-bushing clearance D				0.0079
		Armature shaft alignment				0.0039
		Commutator wear			0.016	
		Commutator insulation depth			0.0075	0.0075
		Brush wear				0.5
		Brush spring tension			1.87 fp	7.75 fp
5-23	34	Vane measurements - length	1.167	1.18		
	17	Vane measurements - width	0.492	0.55		
		Slip rings wear limit			1.20	
		Slip ring out-of-round				0.012
		Brush wear limit			0.295	
5-31		Battery specific gravity	1.250	1.265		
5-33	1	Alternator belt deflection	0.3	0.5		
5-34	29	Thermostat-maximum expansion temperature		180°F		
5-37	26	Fuel pump housing-to-piston clearance	10.539	10.551		
	33	Tappet assembly roller-to-pin clearance				0.0059
5-38	19	Nozzle and holder assembly injection start pressure	1422.3 psi			

Table 6-1. Table of Limits-Continued

Figure		Description	Min	Max	Replacement	
No.	Ref				Min	Max
Engine-Continued						
5-42	16	Plate assembly warp				0.0079
5-48	7	Backlash between camshaft and crankshaft gears	0.0028	0.0079		0.012
	11	Measured camshaft bend				0.0039
	11	Camshaft bend		0.0012		0.0024
	20,21, 23,24	Rocker valve-to-valve stem clearance (cold engine)				0.014
	20,21, 23,24	Rocker valve-to-shaft clearance				0.0059
	25	Rocker shaft bend				0.0118
	1	Camshaft lobe height	1.448			
	29	Lifter valve-to-bore clearance				0.0039
5-50	1	Glow plug resistance			0.13 ohms	0.19 ohms
5-52	5	Lateral runout of clutch contacting surface of flywheel		0.0059		
		Crankshaft end play - uncorrected				0.0157
		Crankshaft end play - corrected		0.0055		
		Crankshaft backlash			0.0028	0.0079
5-54	6,7	Between gears-to-cover clearance				0.0059
	6,7	Gear teeth tips-to-case clearance				0.0098
	6,7	Pump gear backlash				0.0197
	9,10	Shaft diameters	0.5889	0.5896		0.0039
	9	Drive shaft-to-body clearance	0.0049			
5-56	3	Piston ring clearance (1st compression ring)				0.02
	3	Piston ring clearance (2nd and 3rd compression ring)				0.012
	3	Oil ring clearance				0.0059
	3	Piston ring-to-cylinder gap				0.0059
		Connecting rod end play				0.0079

Table 6-1. Table of Limits-Continued

Figure		Description	Min	Max	Replacement			
No.	Ref				Min	Max		
Engine-Continued								
5-56 -cont.	2	Piston pin-to-bore clearance				0.0039		
		Bushing-to-piston pin clearance				0.0039		
		Bearing shell metal-to-connecting rod journal clearance				0.0059 +0.012/- 0.016		
		Piston top clearance						
		Main bearing journal out-of-round				0.004		
		Clearance between bearing shell and journal				0.0059		
		Circularity of connecting rod journal				0.0004		
		Clearance between connecting rod journal and connecting rod bearing shells				0.0059		
		Reground journal-to-bearing clearance-main bearing	0.0014	0.0037				
		Reground journal-to-bearing clearance connecting rod	0.0014	0.0034				
		Radius dimension - main journal				0.118		
		Radius dimension - connecting rod				0.138		
		5-68	14	Top surface of engine block - top surface angle:				
				-longitudinal		0.00389		
-transverse			0.00079					
6	Cylinder liner - wear				0.0119	0.00789		
	Vertical variation					0.00789		
14	Circularity							
	Cylinder block - height wear limit			10.54				
Transmission								
5-76	1	Transmission - end play	0.036	0.084				
5-80	26 9,13	Retaining ring thickness-rear clutch			0.25	0.45		
		front clutch			0.082	0.151		
		Rear clutch-to-front clutch thrust washer thickness			0.061	0.063		

Table 6-1. Table of Limits-Continued

Figure		Description	Min	Max	Replacement	
No.	Ref				Min	Max
Transmission-Continued						
5-81	2	Pump rotor surface clearance	0.001	0.003		
	2	Pump rotor tip clearance	0.004	0.008		
Steering						
5-103		Steering gear ring end gap	4 in.-lb 8 in.-lb			
		Pitman shaft drag torque	to previously measured wormshaft bearing			
		adjustment: new gears - add	preload. Do not exceed combined total of 14 in.-lb.			
		Used gears (400 or more miles)-add	4 in.-lb 5 in.-lb			
			to previously measured wormshaft bearing			
		Caster	4° (+1°)			
		Camber	0° (+1/2°)			
		Toe-in	3/64 to 3/32 in.			
		Turning angle	19° (±1/2°)			
		Frame height	26 in. (± 1/2 in.)			
Rear Axle						
5-126		Rear axle housing spreader indicator setting	0.015			
		Flange runout	0.002			
		Ring gear-to-carrier flange clearance	0.0015			
		Carrier flange-to-bearings clearance	0.0015			
Brakes						
5-135		Front brake disc thickness			1.215	
		Disc lateral runout				0.005
		Disc thickness variation				0.001

6-1. MISCELLANEOUS TABLE.

Refer to table 6-2 for torque values and spring pressures on particular assemblies or components. Standard torque specifications are listed separately in table 6-3 and may be used when specific

torque references are not given for a part. Torque values listed are based on use of clean and dry threads. Reduce torque by 10 percent when threads are lubricated with engine oil and by 20 percent if new plated screws are used.

Table 6-2. Specific Torque Values

Capscrews And Nuts				
Location	Ref	Figure No.	Torque ft-lb (Nm)	
			Min	Max
Exhaust and intake manifold	3	5-5	10.8(14.9)	13.0(17.6)
Exhaust pipe to manifold	3	5-5	20.0(27.1)	27.0(36.6)
Starter motor mounting bolts	18	5-7	18.0(24.4)	
Alternator hex head capscrow	2	5-7	20.0(27.1)	
Alternator mounting screw	1,7	5-7	30.0(40.6)	
Starting motor attaching bolts		5-8	18.0(24.4)	
Pulley nut	2	5-23	50.0(67.7)	
Battery cable assembly connections		5-31	75(101.6)	
Thermostat housing mounting screws	21	5-34	9.0(12.2)	
Waterpump mounting screws	12,13,14	5-34	25.0(33.8)	
Feed pump stud bolt		5-37	2.2(2.7)	2.9(4.0)
Feed pump lock nut		5-37	3.6(5.4)	5.1(6.7)
Spill tube nut	12	5-38	72.3(97.6)	86.8(117.9)
Overflow nut	11	5-38	28.9(39.3)	36.2(48.8)
Oil cooler center bolt	7	5-41	18.08(24.4)	21.7(29.8)
Oil cooler pipe bolts	26,30,31	5-41	7.23(9.4)	9.4(12.2)
Oil cooler mounting bolts	28,29	5-41	7.23(9.4)	9.4(12.2)
Front plate assembly mounting bolts	3	5-42	7.23(9.4)	9.4(12.2)
Timing gear case	3,2,4,5	5-42	7.23(9.4)	9.4(12.2)
Crankshaft pulley nut	5-42	216.9(294.2)	238.6(324.0)	
Timing gear cover	8,9	5-42	7.23(9.4)	9.24(12.2)
Main cylinder head screws	8	5-46	43.4(58.3)	
Sub-cylinder head screws	9	5-46	21.7(29.8)	
Center bolt	3	5-48	32.6(44.7)	36.2(48.8)
Rocker shaft bolts	13	5-48	14.5(20.3)	18.1(24.4)
Attaching bolts	9	5-48	2.9(4.0)	4.3(5.4)
Flywheel	6	5-52	32.6(44.7)	36.2(48.8)
Oil pan mounting (engine)	2,3	5-53	5.0(6.7)	6.5(9.4)
Oil pan drain plug	5,6	5-53	36.2	43.4
Oil pump strainer	3	5-54	4.34(5.4)	5.06(6.7)
Oil pump cover	5	5-54	9.4(12.2)	13.74(17.6)
Oil pump mounting	1	5-54	9.4(12.2)	13.74(17.6)
Connecting rod	4	5-56	37.6(51.5)	41.2(55.5)
Crankshaft	8	5-56	216.9(294.2)	238.6(324.0)
Adapter to transmission	9	5-76	26.0(35.2)	

Table 6-2. Specific Torque Values - Continued

Capscrews And Nuts				
Location	Ref	Figure No.	Torque ft-lb (Nm)	
			Min	Max
Transmission assembly to engine	20	5-76	28.0(37.9)	21.7(29.8)
Oil filter center bolt	7	5-41	18.08(24.4)	
Oil filter tube mounting	4	5-76	150.0(203.3)	
Oil pan mounting	17	5-76	150.0 in. -lb (16.94)	
Drive plate/adaptor/flywheel assembly to crankshaft	4	5-79	52.0(70.5)	21.7(29.8)
Drive plate to torque converter	2	5-79	23.0(31)	
Valve body mounting	41	5-78	8.3(10.8)	
Kickdown band		5-80	35.0(47.4)	
Rear band		5-80	35.0(47.4)	
Reaction shaft support assembly	8	5-81	160.0(216.9)	
Oil pump housing mounting	3	5-81	175.0(237.2)	
Bearing strap	2	5-82	15.0(20.3)	
Low range lockplate	19	5-83	30.0(40.6)	
Case half attaching	12	5-83	23.0(31.1)	
Retainer bolts	10	5-83	23.0(31.1)	
Transfer case to transmission		5-83	40.0(54.2)	
Yoke nut	35,36	5-84	120.0(162.6)	
Plate	2	5-95	18.0(24.4)	
Pump mounting bracket	15	5-112	30.0(40.6)	
Bracket assembly	10,12,19	5-112	30.0(40.6)	
Mounting stud nuts		5-115	35.0(47.5)	
Adjusting bracket nuts		5-115	20.0(27.1)	
Front shock absorber	3 (upper)	5-116	35.0(47.4)	
	3 (lower)	5-116	45.0(61.0)	
Front stabilizer bar	3	5-117	55.0(74.5)	
Front stabilizer bar	11	5-117	35.0(47.4)	
Knuckle assembly	15	5-121	100.0(135.5)	
Spring U-bolt	3 (4.2")	5-121	44.0(59.6)	
Spring U-bolt	3 (3.6")	5-121	100.0(135.5)	
Spring shackle and pivot	7,8	5-121	100.0(135.5)	
Rear shock absorber (upper)	3	5-122	35(47.4)	
Rear shock absorber (lower)	3	5-122	45(61.0)	
Rear spring	2,6,9	5-125	35(47.4)	
Bearing assembly locknut		5-128	50.0(67.7)	
Axle shaft capscrew		5-128	30.0(40.6)	
Wheel mounts	8	5-130	80(108.4)	
Master cylinder	2	5-131	30(40.6)	
Power brake booster	17,19	5-131	35(47.4)	
Brake pedal screw and nut		5-131	35(47.4)	

Table 6-2. Specific Torque Values-Continued

Capscrews And Nuts-Continued				
Location	Ref	Figure No.	Torque ft-lb (Nm)	
			Min	Max
Front brake caliper (brake lines)	(bolts) 14 (9/16 in.) 14 (1/2 in.) 2	5-134	13(17.6)	35(47.4)
Front brake caliper		5-134	35(47.4)	
Rear spring		5-134	100(135.5)	
Rear spring		5-134	55(74.5)	
Horn mounting screw		5-162	15(20.3)	
Front seat frame mounting screws		5-166	15(20.3)	
Seat and shoulder belts attaching bolts		5-169	25(33.8)	
Steering wheel nut		5-190	35(47.4)	
Steering System Components				
Steering gear clamp mounting screws	28	5-103	10(13.5)	
Adjuster plug locknut	4	5-103	85(115.2)	
Adjuster plug	5	5-103	20(27.1)	
Sidecover mounting capscrews	20	5-103	45(61.0)	
End plug	34	5-103	75(101.6)	
Locknut	4	5-103	85(45.2)	
	10	5-103		
Locknut	15	5-103	20(27.1)	
Stubshaft tubing clamp screw		5-103	30(40.6)	
Gear mounting capscrews	2	5-103	70(94.9)	
Pitman arm nut	25	5-103	185(250.8)	
Steering gear hose clamp screws (pressure & return)		5-103	25(33.8)	
Capscrews	27	5-110	30(40.6)	
Tie rod	23	5-110	60(81.3)	
Connecting rod to tie rod	4	5-110	70(94.9)	
Power steering arm	16	5-110	185(250.8)	
Connecting rod to power steering arm	12	5-110	70(94.9)	
Tie rod bracket assembly	3	5-111	30(40.6)	
Tie rod bracket assembly	4	5-111	30(40.6)	
Shroud to housing attaching screws		5-100	(18 in.-lb)(2.03)	
Upper housing mounting	23	5-100	(60 in.-lb)(6.7)	
Turn signal mounting	16	5-100	(35 in.-lb)(3.9)	
Lever attaching screw	21	5-100	(35 in.-lb)(3.9)	
Steering wheel locknut	2	5-100	30(40.6)	
Lower shaft mounting	43	5-102	45(61.0)	
Steering shaft mounting	34	5-102	45(61.0)	

Table 6-2. Specific Torque Values-Continued

Capscrews And Nuts-Continued				
Location	Ref	Figure No.	Torque ft-lb (Nm)	
			Min	Max
Ignition switch mounting	11	5-102	(35 in.-lb)(3.9)	
Plate mounting	18,20	5-102	(60 in.-lb)(6.7)	
Bracket assembly to column mounting	13	5-102	20(27.1)	
Bracket assembly to instrument panel mounting	14	5-102	20(27.1)	
Steering wheel locknut	2	5-99	30(40.6)	

Table 6-3. General Torque Values

Capscrew Body Size inches-thread	SAE Grade 1 Of 2 Torque ft-lb(Nm)	SAE Grade 5 Torque ft-lb(Nm)	SAE Grade 6 Or 7 Torque ft-lb(Nm)	SAE Grade 8 Torque ft-lb(Nm)
1/4-20	5(6.7)	8(10.8)	10(13.5)	12(16.2)
-28	6(8.1)	10(13.5)		14(18.9)
5/16-18	11(14.9)	17(23.0)	19(25.7)	24(32.5)
-24	13(17.6)	19(25.7)		27(36.6)
3/8-16	18(24.4)	31(42.0)	34(46.0)	44(59.6)
-24	20(27.1)	35(47.4)		49(66.4)
7/16-14	28(37.9)	49(66.4)	55(74.5)	70(94.9)
-20	30(40.6)	55(74.5)		78(105.7)
1/2-13	39(52.8)	75(101.6)	85(115.2)	105(142.3)
-20	41(55.5)	85(115.2)		120(162.6)
9/16-12	51(69.1)	110(149.1)	120(162.6)	155(210.1)
-18	55(74.5)	120(162.6)		170(230.4)
5/8-11	83(112.5)	150(203.3)	167(226.4)	210(284.7)
-18	95(128.8)	170(230.4)		240(325.3)
3/4-10	105(142.3)	270(366.0)	280(379.6)	375(508.4)
-16	115(155.9)	295(399.9)		420(569.4)
7/8-9	160(216.9)	395(535.5)	440(596.5)	605(820.2)
-14	175(237.2)	535(725.3)		675(915.1)
1-8	235(318.6)	590(799.9)	660(894.8)	910(1233.7)
-14	250(338.9)	660(894.8)		990(1342.2)