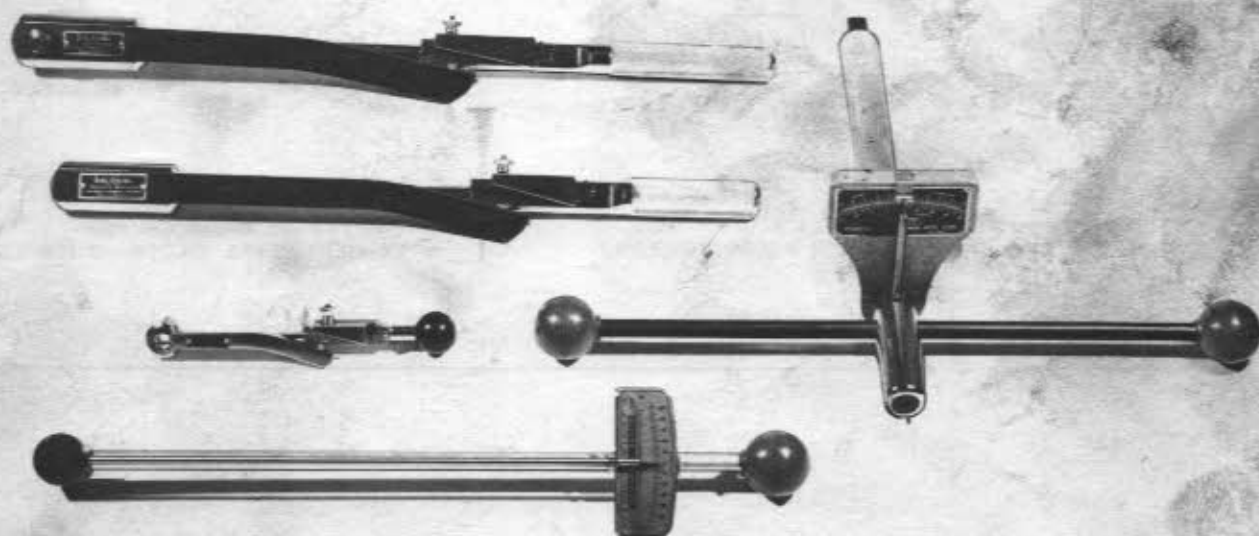


1969 EDITION



TENSION WRENCHES

APPLICATION DATA &
TECHNICAL INFORMATION



WARREN & BROWN PTY. LTD.

(A Division of Repco Limited)

113-119 BALLARAT ROAD, FOOTSCRAY, VICTORIA



PRINTED IN AUSTRALIA

TECHNICAL DATA MANUAL

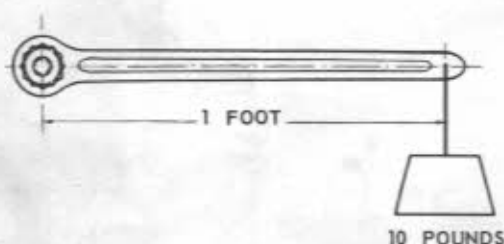
This manual has been compiled to assist users of W & B Tension Wrenches. Information has come from sources believed to be reliable but NO RESPONSIBILITY WILL BE ACCEPTED FOR ERRORS OR OMISSIONS. Notification of such, or additional information, however, will be welcomed.

This information supersedes information in previous manuals.

WHAT IS TORQUE?

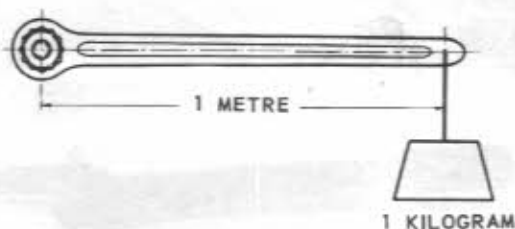
When tightening threaded components torque is applied to bring about tension in the bolt. This tension holds the parts together.

The amount of torque applied can be defined as the figure obtained by multiplying the load applied to a wrench by the distance from the centre of the bolt to the point where the load is applied.



$$\begin{aligned}\text{TORQUE} &= 1 \text{ FOOT} \times 10 \text{ POUNDS} \\ &= 10 \text{ FOOT POUNDS (FT/LBS.)} \\ \text{OR} &= 12'' \times 10 \text{ LBS.} = 120 \text{ INCH POUNDS (IN/LBS.)}\end{aligned}$$

FIG. 1



$$\begin{aligned}\text{TORQUE} &= 1 \text{ METRE} \times 1 \text{ KILOGRAM} \\ &= 1 \text{ METRE KILOGRAM (1M/KG.)} \\ \text{OR} &= 100 \text{ CENTIMETRE KILOGRAMS (CM/KG.)}\end{aligned}$$

FIG. 2

UNITS OF TORQUE

The figures above illustrate the conventional units of torque, for inch and metric systems.

Over the years the automotive trade has adopted the terms "foot pounds" and "inch pounds" rather than the engineering "pounds feet" and "pounds inches" but the final result is the same and the terms are interchangeable.

CONVERSIONS:

Some useful conversions are listed:

- 1 foot pound = .138 meter Kilograms or 13.8 centimeter kilograms
- 1 meter kilogram = 7.23 foot pounds or 86.76 inch pounds
- 1 centimeter kilogram = .0723 foot pounds or .867 inch pounds.

FOOT-POUNDS INTO METRE-KILOGRAMS

Foot lb.	Metre Kilograms	Foot lb.	Metre Kilograms	Foot lb.	Metre Kilograms	Foot lb.	Metre Kilograms	Foot lb.	Metre Kilograms	Foot lb.	Metre Kilograms
1	0.138	17	2.349	34	4.698	51	7.048	68	9.397	85	11.747
2	0.276	18	2.487	35	4.837	52	7.186	69	9.535	86	11.885
3	0.415	19	2.625	36	4.975	53	7.324	70	9.674	87	12.023
4	0.553	20	2.764	37	5.113	54	7.462	71	9.812	88	12.161
5	0.691	21	2.902	38	5.251	55	7.601	72	9.950	89	12.300
6	0.829	22	3.040	39	5.389	56	7.739	73	10.088	90	12.438
7	0.967	23	3.178	40	5.528	57	7.877	74	10.227	91	12.576
8	1.106	24	3.316	41	5.666	58	8.015	75	10.365	92	12.714
9	1.244	25	3.455	42	5.804	59	8.153	76	10.503	93	12.855
10	1.382	26	3.593	43	5.942	60	8.292	77	10.641	94	12.991
11	1.520	27	3.731	44	6.080	61	8.430	78	10.779	95	13.129
12	1.658	28	3.869	45	6.219	62	8.568	79	10.918	96	13.267
13	1.796	29	4.007	46	6.357	63	8.706	80	11.056	97	13.405
14	1.934	30	4.146	47	6.495	64	8.844	81	11.194	98	13.544
15	2.073	31	4.284	48	6.633	65	8.983	82	11.332	99	13.682
16	2.211	32	4.422	49	6.771	66	9.121	83	11.470	100	13.820
		33	4.560	50	6.910	67	9.259	84	11.609		

METRE-KILOGRAMS INTO FOOT-POUNDS

Metre Kilograms	Foot lb.	Metre Kilograms	Foot lb.	Metre Kilograms	Foot lb.	Metre Kilograms	Foot lb.	Metre Kilograms	Foot lb.	Metre Kilograms	Foot lb.
1	7.23	17	122.97	34	245.93	51	368.89	68	491.87	85	614.85
2	14.47	18	130.20	35	253.17	52	376.12	69	499.10	86	622.09
3	21.70	19	137.43	36	260.41	53	383.36	70	506.34	87	629.41
4	28.93	20	144.67	37	267.63	54	390.59	71	513.57	88	636.55
5	36.17	21	151.90	38	274.87	55	397.82	72	520.80	89	643.78
6	43.40	22	159.13	39	282.10	56	405.07	73	528.04	90	651.00
7	50.63	23	166.37	40	289.34	57	412.30	74	535.27	91	658.23
8	57.87	24	173.60	41	296.57	58	419.53	75	542.50	92	665.46
9	65.10	25	180.84	42	303.79	59	426.76	76	549.75	93	672.70
10	72.33	26	188.08	43	311.04	60	434.00	77	556.98	94	679.93
11	79.57	27	195.30	44	318.27	61	441.23	78	564.21	95	687.17
12	86.80	28	202.54	45	325.50	62	448.45	79	571.44	96	694.41
13	94.03	29	209.57	46	332.75	63	455.70	80	578.68	97	701.63
14	101.27	30	217.00	47	339.98	64	462.93	81	585.91	98	708.87
15	108.50	31	224.23	48	347.21	65	470.17	82	593.14	99	716.10
16	115.74	32	231.46	49	354.44	66	477.41	83	600.38	100	723.34
		33	238.70	50	361.66	67	484.64	84	607.61		

TENSION OR TORQUE WRENCHES

These tools provide a quick and accurate means of measuring the torque applied. Of course tension wrenches cannot always be made one foot long as in Fig. 1, so the manufacturer calibrates the wrench according to its range and size.

WRENCH EXTENSIONS

It is sometimes convenient to extend the range of a wrench by increasing its length. In other cases a special adaptor is necessary to get into an awkward place or to fit a special application. Fig. 3 shows a typical case and the formula to use when calculating the extension or wrench scale reading.

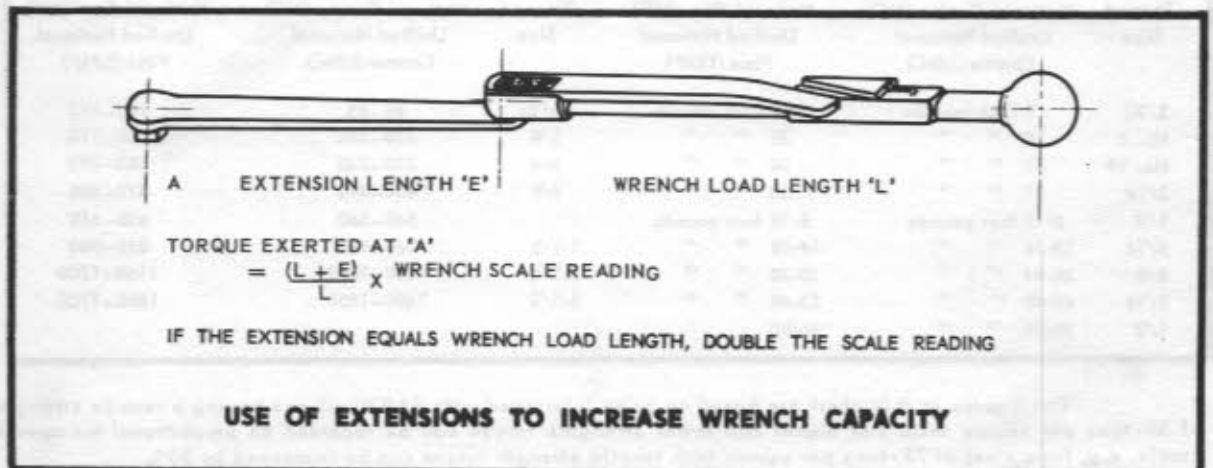


FIG. 3

REQUIREMENTS FOR CORRECT TORQUING OF THREADS

1. Reliable equipment.

W & B tension wrenches are made to accurate tolerances, and every wrench is tested and calibrated on special test fixtures.

2. Reliable information.

Vehicle manufacturers information should be used where it is available. This book will assist in cases where this is not to hand.

3. Threads in good order.

Threads should be in good condition and no "necking" should be present. Nuts should be hand free and studs should screw in freely.

4. Correct lubrication.

Since friction accounts for 90% of the torque applied, any factor that alters it becomes important. Generally speaking, bolts and studs are used as they come from the pack but some listings specify the lubricant to be used. The manufacturers recommendation should be followed where available. Graphite or molybdenum based greases or oils decrease friction considerably and should be used only where indicated or according to manufacturers charts.

5. Correct sequence of tightening.



FIG. 4

Fig. 4 shows two typical tightening sequences. Some manufacturers specify two or three tightening stages. As a general rule, tighten to about $\frac{1}{2}$ or $\frac{3}{4}$ of full torque, then to full torque, going around in sequence until no change occurs.

Caution: Steel gaskets call for special techniques. Consult the vehicle manual.

6. Correct "follow-up" torquing.

After an engine has been run, the bolts of the head and manifolds should be retightened. A general recommendation is:

Cast Iron Heads. Run for about 100 miles or a day or two then retighten while the engine is hot.

Aluminium Heads. Run for the same time, allow the engine to cool, then retighten.

Because recommendations vary, consult the vehicle manual if in doubt.

WHAT TO DO IF TORQUE IS NOT KNOWN

If correct torque is not known the chart below will be useful. Caution should be exercised in applying it, because in some cases it may not be possible to utilise all the torque a bolt will stand because of distorting surrounding parts.

The figures therefore should be used only as a guide

Whitworth			B S F		
Thread Size	National Coarse (NC) Unified National Coarse (UNC)	National Fine (NF) Unified National Fine (UNF)	Thread Size	National Coarse (NC) Unified National Coarse (UNC)	National Fine (NF) Unified National Fine (UNF)
5/32	9 inch pounds	11 inch pounds	9/16	85-95	105-112
No. 8	18 " "	20 " "	5/8	130-140	160-170
No. 10	21 " "	30 " "	3/4	230-240	285-295
3/16	21 " "	30 " "	7/8	400-410	470-480
1/4	6- 9 foot pounds	8-10 foot pounds	1"	540-560	620-650
5/16	12-16 " "	14-19 " "	1-1/8	760-790	850-900
3/8	28-34 " "	33-38 " "	1-1/4	1000-1050	1150-1200
7/16	44-48 " "	55-60 " "	1-1/2	1500-1550	1650-1700
1/2	70-75 " "	80-90 " "			

The figures in this chart are based on bolts lubricated with SAE30 oil and having a tensile strength of 50-tons per square inch. For higher and lower strengths torque can be regarded as proportional for normal steels, e.g. for a steel of 75-tons per square inch tensile strength torque can be increased by 50%.

TESTING A BOLT FOR TORQUE LOADING

A useful method of testing safe torque for a bolt is shown in Fig. 5.

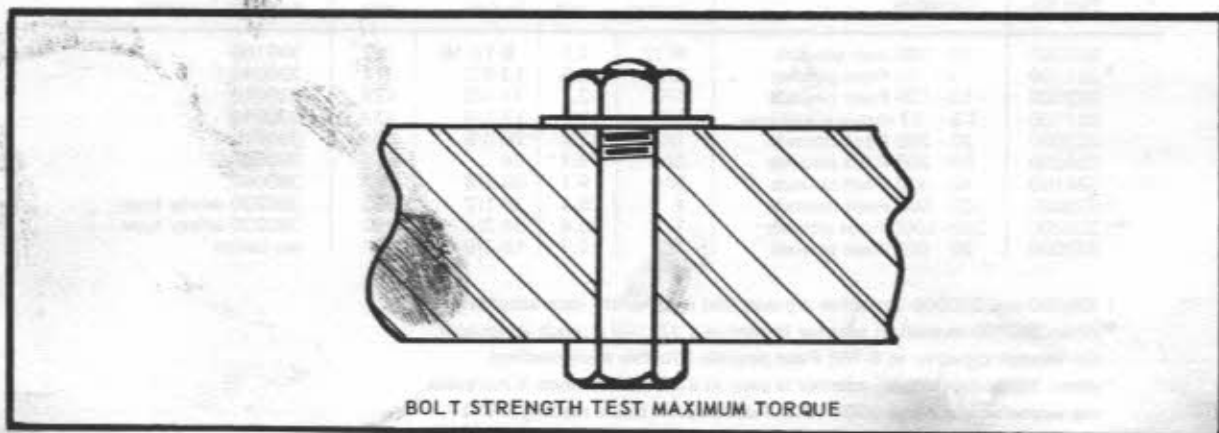


FIG. 5

Drill a hole in a piece of steel or cast iron. Select one or more bolts from the batch to be tested and assemble to the test block using the same washers, spring washers or keepers as will be used in the assembly.

Lubricate the bolt with the correct lubricant.

Tighten it until failure occurs, observing the highest torque achieved. A good working figure is 75% of this.

GENERAL HINTS

1. Keep your tension wrenches in a safe place and keep them clean, they are precision instruments.
2. Do not use the wrench to undo a nut. If a nut has to be "cracked back" use a spanner or socket wrench, particularly if the bolt has been tightened for some time. It often takes a much higher torque to undo a bolt than to tighten it.
3. Do not overload a wrench. An exclusive feature of the Dual Signal range of W & B wrenches is the soft face of the wedge angle. Any denting of this face by the trip point is DEFINITE EVIDENCE OF OVER LOADING. Aircraft and production shops use this feature as an insurance against faulty workmanship on critical parts.
4. Check cylinder heads and blocks for flatness. As a general rule reface a head with more than .005 of bow. Pay particular attention to the narrow bands between combustion chambers, a common place for gasket failure.
5. Recheck tappet clearances after retightening an overhead valve engine cylinder head.
6. Use a tension wrench for tightening main bearing caps and big ends if line boring or resizing is to be done, and tighten to the same torque when finally assembling it.

SPARK PLUGS

Spark plug tightening is important. Gaps can be changed, threads stripped or porcelain cracked by overtightening. Undertightening can cause leakage of compression and overheating of the plug. The recommendations are general ones. Where makers specify otherwise their figures should be followed:

THREAD SIZE	CAST IRON HEADS	ALUMINIUM HEADS
10 MM	12-14 foot pounds	9-11 foot pounds
14 MM	25-28 " "	22-25 " "
18 MM	30-35 " "	25-30 " "
7/8-18	32-37 " "	30-35 " "



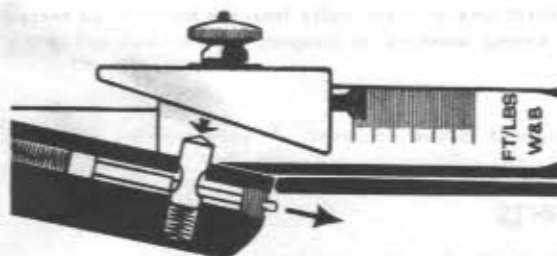
DUAL SIGNAL TENSION WRENCHES

Part No.	Capacity	Socket Square		Length Overall		Adaptor Supplied
		inches	mm.	inches	mm.	
320300	10 - 180 inch pounds	9/32	7.1	6-15/16	192	390150
*321100	4 - 80 Foot pounds	3/8	9.5	13-3/8	317	390040
322000	10 - 120 Foot pounds	1/2	12.7	17-1/8	427	390010
322100	1.5 - 17 metre kilograms	1/2	12.7	17-1/8	427	390010
323000	20 - 200 Foot pounds	1/2	12.7	20-5/8	524	390010
324000	50 - 300 Foot pounds	3/4	19.1	24	610	390060
324100	40 - 400 Foot pounds	3/4	19.1	38-7/8	987	390060
† 325000	100 - 500 Foot pounds	1	25.4	35-1/2	902	390230 safety type
*† 326000	200 - 1000 Foot pounds	1	25.4	54-3/4	1390	390230 safety type
332000	20 - 160 Foot pounds	1/2	12.7	19-3/8	492	see below

† 325000 and 326000 wrenches are supplied with safety lock adaptors

* When 392000 extension adaptor is used in a 321100 wrench it doubles the wrench capacity to 8-160 Foot pounds (Double scale reading)

* When 392960 extension adaptor is used in a 326000 wrench it increases the wrench capacity to 300 - 1500 Foot pounds (scale reading x 1½)



Dual Signal Tension Wrenches, Signal Mechanism

These wrenches have an exclusive signal mechanism which is audible and visible when correct torque is reached. The mechanism has, in addition, built in overload indication. If the operator continues to apply load after the indicator has tripped, a small indent appears on the wedge face, giving clear evidence that overload has occurred. A small overrun is incorporated so that in normal operation, no danger of indenting is present.

ADAPTORS FOR TENSION WRENCHES (square male)

Part No.	Dimensions inches		Dimensions mm.	Load Rating	
				Foot lbs.	Metre Kilograms
390010	1/2 x 1/2 x 1-7/16	long	12.7 x 12.7 x 36.5	200	27.6
390020	1/2 x 1/2 x 4	long	12.7 x 12.7 x 102	200	27.6
390030	3/8 x 1/2 x 1-3/8	long	9.5 x 12.7 x 35	80	11.1
390040	3/8 x 3/8 x 1-1/8	long	9.5 x 9.5 x 29	80	11.1
390050	3/8 x 3/8 x 3-3/8	long	9.5 x 9.5 x 86	80	11.1
390060	3/4 x 3/4 x 2-1/8	long	19 x 19 x 54	300	41.5
390070	3/4 x 3/4 x 6	long	19 x 19 x 152	300	41.5
390080	9/32 x 9/32 x 7/8	long	7.1 x 7.1 x 22	15	2.1
390090	9/32 x 1/4 x 7/8	long	7.1 x 6.4 x 22	15	2.1
390100	9/32 x 9/32 x 2-3/4	long	7.1 x 7.1 x 70	15	2.1
390130	1/2 x 3/4 x 1-15/16	long	12.7 x 19 x 49.2	200	27.6
390150	9/32 x 3/8 x 1	long	7.1 x 9.5 x 25.4	15	2.1
390160	9/32 x 1/2 x 1 1/4	long	7.1 x 12.7 x 32	15	2.1
† 390230	1 x 1 x 3	spigoted	25.4 x 25.4 x 76	1000	138.2
† 390240	3/4 x 1 x 3	spigoted	19 x 25.4 x 76	500	69.1
† 390250	1 x 1 x 8	spigoted	25.4 x 25.4 x 203	1000	138.2

† Safety type

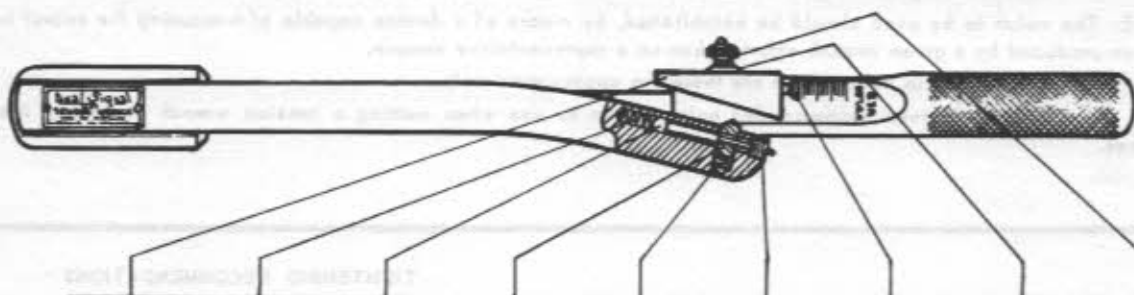
FOR SPARE PARTS LISTING. REFER NEXT PAGE.



DUAL SIGNAL TENSION WRENCHES

SPARE PARTS

WHEN ORDERING PARTS, PLEASE QUOTE, PART NUMBERS, PART NAMES, AND MODEL

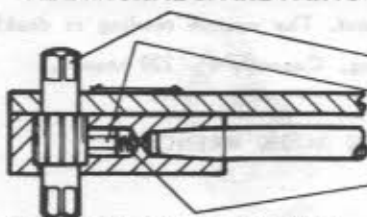


WEDGE	INDICATOR PIN SPRING	INDICATOR PIN	TRIP	TRIP SPRING	HOLLOW SCREW	ZERO SCREW	WEDGE WASHER	WEDGE LOCKNUT

MODEL	PART NUMBER								
320300	320305	320307	320309	320308	320306	320312	320313	320011	320319
321100	321105	321007	321009	321008	321006	321012	321013	321018	321019
322000	322005	322007	322009	322008	322006	322012	322013	321018	321019
323000	323005	322007	322009	322008	322006	322012	322013	321018	321019
324000	324005	322007	322009	322008	322006	322012	322013	324018	324019
324100	323005	322007	322009	322008	322006	322012	322013	321018	321019
325000	325005	325007	325009	325008	325006	325012	325113	325018	325019
326000	326005	325007	325009	325008	325006	325012	326013	326020	326021
332000	332005	322007	322009	322008	322006	322012	322013	321018	321019

NOTE:- IF ANY OF THESE PARTS ARE FITTED, THE
WRENCH MUST BE CHECKED FOR CALIBRATION

ADDITIONAL SPARE PARTS FOR MODEL 332000 (RATCHET TYPE).



RATCHET PART No. 332020
RATCHET PAWL " " 332021
RATCHET SPRING " " 332023

SECTION THRU RATCHET HEAD.

STRUCTURAL BOLTS

Tension Wrenches are being used increasingly for bolted structures where high strength bolts replace rivets.

The following tables give recommended maintenance loadings for such bolts.

NOTE: The value to be used should be established, by means of a device capable of measuring the actual bolt tension produced by a given wrench effort, taken on a representative sample.

The figures in column five are therefore approximate only.

Column 4 gives recommended bolt tension to use when setting a tension wrench on one of these devices.

Bolt Diam. Inches	Minimum proof Load of bolts (AS No. B157) Lbs.	Minimum Bolt Tension Lbs.	TIGHTENING RECOMMENDATIONS	
			Recommended Bolt tension for setting Torque Wrenches Lbs.	Approximate Torque to produce minimum bolt tension Lbs. feet
1/2	12,050	12,050	13,250	100
5/8	19,200	19,200	21,100	200
3/4	28,400	28,400	31,200	350
7/8	36,050	36,050	39,700	520
1	47,250	47,250	52,000	780
1-1/8	56,450	56,450	62,200	1050 **
1-1/4	71,700	71,700	78,700	1480 **

** Use No. 392960 extension in conjunction with No. 326000 Tension Wrench.

The chart is reproduced by courtesy of McPhersons Pty. Ltd., manufacturers of Ajax Structural bolts and is based on ASTM A325 specifications. Bolts nuts and washers are to ASA standard B18.2 and B27.2 (Australian standard B157).

Where work is subject to inspection, reference should be made to local regulations for bolted structures.



VALVE & CLUTCH SPRINGS

In order to get the best out of modern engines with their high compressions, high engine speeds and larger valves, valve springs must be tested for correct loading.

Clutches, too, depend on correct springs for satisfactory operation.

The 370000 Spring Tester utilises the 324000 Tension Master Wrench to measure spring loading. An indicator spring clicks out when the spring is compressed to the length set on the micrometer nut. The wrench reading is doubled to obtain the spring loading. Capacity 0 - 220 pounds.

370000 WITH 342000 WRENCH

YEAR MODEL CYLINDER HEAD CON ROD MAINS

ALFA ROMEO

Sprint, Veloce	44-47	27-29	22-23
Spider, Veloce			
Ti Saloon			
2000 Spider,	51-54	53-60	51-54
2000 Saloon			
Giulia 1300, 1600	45	35-40	35-40
Giulia GTA Sprint	45	35-40	35-40
GTV Veloce	45	35-40	35-40

ALBION TRUCKS

114 to 125	79	66	
AZ, BY	84	33	
FT	66	33	
EN242, 243, 253	125	67	150
EN286	100	3/8-34	150
		7/16-54	
EN900	5/8-200	150	200
	1/2-100		

ALLARD CARS

53-56	Palm Beach, 21C	See Ford Consul engine.	
	Palm Beach, 21Z	See Ford Zephyr engine.	
36-55	K3, P2 chassis & Monte Carlo Saloon, Safari Estate Car	See Ford V8 30AP engine.	
	Mercury	C.I.50-55 AL.40	45 75-80

ALLIS CHALMERS

B, C, RC	60	40	80
G	35-40	20-25	80-90
WC, WD, WF	1/2-70, 3/8-25	70	85
HD5, HD7, HD10	180-190	65-75	Bolts 180-190 Nuts 155-185
U, UC, UM	85	120	120
HD6, HD11, 45 Motor Grader	1/2-95-105 5/8-180-185	120-130	5/8-160-170 3/4-210-230 Centre only 5/8-170-180 5/8-160-170 7/8-245-275 Centre only 5/8-150-160
DD	95-105	30-40	9/16-125-135
D	3/8-25 1/2-90	40	85 Piston Pin Clamp 20

ALLIS CHALMERS FORMERLY BUDA

4B-153, 182	95-105	50-60	125-135
6B-230, 273			
4BD-153, 182			
6BD-230, 273			
HP-217, 234, 298, 326, 351	95-105	75-85	150-160
K393, 428, L525, L.O-525	150-160	75-85	150-160

MODEL CYLINDER HEAD CON ROD MAINS

ALLIS CHALMERS FORMERLY BUDA - cont.

DT-317	95-105	75-85	150-160
DT-415, 496, 468, DTS-468, DTS-496	150-160	75-85	150-160
4MO-645, 6MO-672, 6MO-779, 893	1/2-95-105	135	5/8-150-160
6MO-892			
6MO-970, 8MO-1290	5/8-190-200	135	7/8-245-275
4DC-645, 6DC-844, 6DC-970, 8DC-1125, 6DCS-884, 8DCS-1125	1/2-100-110	135	5/8-150-160
6DA-779, 6DA-844, 6DA-970, 8DA-1125, 6DAS-844, 8DAS-1125	5/8-190-200	135	7/8-245-275
8DA-1290, 8DAS-1290			
6PC-1879, 8PC-2505, 8PCS-2505, 6DC-1611, 6DCB-1742, 6DC-1879, 8DC-2505, 6DCS-1879, 8DCS-2505	385-395	180	325-350
B-153, 182, 230, 273, G-153, 262			
BD, D, DA-77, 153, 175, 182, 230, 262, 273			
344-516	1/2-95-105	120-130	5/8-160-170
6000, 7000, 10000, 11000, 16000-21000	5/8-180-190		3/4-210-230
	CA gaskets 1/2-95-105 5/8-200 Metal to Metal gaskets 1/2-80-85 5/8-160-170	150-160	5/8-160-170 7/8-280-290
PC-1879-2505 DC, DCS-1879-2505	450	160-170	540-570

ALVIS CARS

TA14, TB14	26	43	F & C 43
			R 65
TA21	31	44	44
TB21	31	44	44
TC21, TD21	32	44	44

ARMSTRONG SIDDELEY

16 & 18 H.P.	55	30	30-40
Sapphire, Star	65-70	30-35	60-65
Sapphire, 346, 236, 234			

YEAR	MODEL	CYLINDER HEAD	CON ROD	MAINS
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AUSTIN See also B.M.C., Morris & Wolseley

7 H.P.	17	29	54
7 & 8 H.P., BY	46	29	62
A30	40	33	65
10 H.P., 12 H.P., 46		40-45	75
A40			
A50, Lancer 1 & 2	40-45	35	70
A55	30-45	35	70
Seven,	40	32	45
A40 Farina			
A55 Farina			
Omnivan 152	40	35	70
A60	40	35	70
Freeway Mk 1 & 2	40	35	70
Sprite, Mk 2, 2A & 3	40	35	60
A70, A90 &	65-70	60	80
16 H.P.			
A125, A135	65-70	60	80-92
A90 Six, A95	75	50	75
Six, A105 &			
Healey 6			
Healey 4 & 301	55-60	60	80
Commercial			
A99, A110	75	50	75
1800cc	45-50	40-45	70
Princess "R"	44-47	32-34	44-47

AUSTIN HEALEY

Mk 1	} 40	35	60
Mk 2 & 3			
Mk 4			

AUSTIN TRUCKS

Petrol Gipsy	55	50	80
2.2 Diesel Gipsy	75	50	80
Petrol 101,			
10/12 cwt. 152	40-45	35	70
Petrol LD,			
1A & 2A	65	35	70
2.2 Diesel LDO,			
1A, 2A, 4A, 5A	75	50	80
2.2 Petrol LD-	} 65	50	80
4A, 5A			
Petrol 25 cwt.-			
3 way van & 301			
FJ Series 5 Ton	110	60	50
FJ Series 7 Ton	110	60	50
3.4 Diesel 301,	} 100	58-59	83-84
301FC, 2 ton,			
(T200)			
3 ton (303) &			
(303A), 3 ton (304)			
4 ton (403) &			
(404), 5.1 Diesel			
5 ton (503) &			
(504), 7 ton-			
(701) & (702)			
Petrol 2 ton	} 67	50	80
(T200), 3 ton			
(303)			
3 ton (304).			
4 ton (403) &			
(404)			
5 ton (503)			

YEAR	MODEL	CYLINDER HEAD	CON ROD	MAINS	REMARKS
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AUSTIN TRUCKS - continued

Petrol 1½ ton				
(S200)	55	50	80	
2.2 Diesel				
1½ ton (S200)	75	50	80	
Petrol				
3 ton (303A)	62-65	50	80	
Petrol				
5 ton (series II)	65-70			
Perkins P6	} 64-68	70	120-150	
Diesel 5 ton				
(Series II)				
Petrol				
5 ton (504)	62-65	50	80	
2.2 Diesel FX	} 75	55	80	
4D, Hire Car				
FL 2D				

AUTO UNION

Audi 80	} 65	25-31	36-38
Audi 80 Variant			
Audi Super 90			

B.M.C. VEHICLES & MARINES

Navigator	40	35	60
Commander	75	50	80
Commodore 8	100	58	83
Sealord			
Blue Streak &	40	35	70
6 & Silver Four			
2.2 litre diesel	75	50	80
3.4 litre diesel	} 100	58	83
5.1 litre diesel			

B.M.W.

1600-2, 1800	} 44	38-41	44
2000, 2000C Auto			
2000TI, 2000 CS			

B.M.W. Gias

T250, TS250			
Limousine	18-20	-	-
T400, TS400			
Coupe	25	-	-
1004, 1004S,			
1004 CL	25-29	25-33	47
1304, 1304CL	25-29	33	47
1304TS, 1300GT			
1700, 1700 Auto	25-29	40	47
1700 GT, 1700 TS			
2600 V8	28-29	40	47
3000 V8	29	40	47

BEDFORD TRUCKS & COMMERCIALS

10, 12 H.P., JC,	53-57	38-43*	46-50*
HC, PC			
W, KMO, OW	88-93	44-47*	Early 3/4 A/F Hex. 90-100 Late Models 1 & F 120-130 R 70-75
S Series	62-66	50-55	70
CA	57-61	20-23	50-60
CA	63-73†	20-23*	55-60*

Locking
Nuts
Finger
tight +
1/4 - 1/3
turn
with
spanner

YEAR MODEL CYLINDER HEAD CON ROD MAINS

BEDFORD TRUCKS & COMMERCIALS

- continued

TA Series	78-83	40-43	F & C 110-120 R 65-70
A Series & D Series			
TJ 214 cubic in.	88-98*	40-43*	F 110-120 I 110-120 R 65-70
TK Petrol			

TJ, TK 300 cu. in.	9/16-	55-60*	65*
SB, R, Petrol	71-76*		
	5/8-		
	95-105*		
	Studs		
	9/16-75-85*		
	5/8-75-85*		

SB, TJ, TK Diesel, 220, 300, 330 Motor	9/16-	55-60*	65*
	115-120*		
	5/8-		
	145-160*		
	Studs 9/16-		
	75-85†		
	5/8-75-85†		

VAS coach with 214 cc petrol motor	88-98†	40-43*	I & F 110-120* R 65-70
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VAS coach with SB, TJ, TK Diesel, see listing 300 cc Diesel motor

TK with Leyland See Leyland listing 0350, 0370, 0400 motor

*Washers greased with Molybdenum disulphide based chassis grease.

†Dry threads.

*Oiled threads.

BORGWARD CARS

Isabella,	70	35	70
Isabella TS & Combi			

BRIGGS & STRATTON ENGINES

A9	185-210	130-150
B14	185-210	175-200
2" Bore engines	150-175	90-110
8	185-210	90-110
ZZ & 23	185-210	175-200
6BH-6BHS	185-210	

BUICK CARS

In line, 8.40/50	50-70	40-45	90-100
In line, 60/70, 80/90	50-70	60-65	90-100
V8	63-73	40-45	100-110
Special	65-70	40-45	90-100
Super	65-70	60-65	90-100
Roadmaster	65-70	40-45	100-110
44, 46, 47, 4800	65-75		

V8 Special, 4000, 4100	50-55	30-35	F50-55 R65-70
V8 4400, 4600, 4800	65-75	40-45	100-110
V8, 4000, 4100, 4300	65-70	30-35	All except Rear 50-55 Rear 65-70 F.C. 100-125 R 100-110
V8 Special	65-70	30-35	

YEAR MODEL CYLINDER HEAD CON ROD MAINS

BUICK CARS - continued

V6, 225			
V8, 500, 540	65-80	30-40	95-120
V8, 400, 401, 425	65-80	40-50	80-110

CADILLAC CARS

36-42	All	70-75	50-60	130-140
43-48	All	70-75	60-65	130-140
49-60	All	65-70	40-45	90-100
61	All	75	40-50	80-105
62	All	75	45	95
63	All	75	40	95
64-67	All	60	40	95

CASE TRACTORS

L, LA	125	150	150
C, D, DEX	75	70	150
300, Spark Ignition	60-65	45-50	90-100
SEX	60	65	100
VA	3/8-45 1/2-75	60	90
R	70	60	90
A-125 Air cooled	35-40	45-50	90-100
S-15	60	65	100
400 & 500 Diesel	100	95-105	145-155
& 400 Spark Ignition			
188 Diesel	95-100	100	90-100
A267 Diesel & A251 Spark Ignition	120-125	95-105	145-155

MODEL CYLINDER HEAD CON ROD MAINS REMARKS
First Pull Second Pull Precam Injectors Chambers

CATERPILLAR TRACTORS

D9 66A, D9 18A	180	300	190	445	225	110
19A*						
D8, 14A, 15A, 16A, 46A, 35A	5/8 - 60	120	190	5/8-58	200	110
36A, 22A, 52A, 68A, D7 17A, 47A, 48A	7/8 - 150	300		7/8-350		
D6 56A, 57A, No. 12 21F, No. 14 35F, D333, 58B, 59B, 966, 33A, 977 53A	85	125	185	155	150	110
D6 31A, 32A, 8U, 9U, No. 12 94C, 38E, 977 20A	5/16- 42	58	58	120	200	110
D4 54A, 55A, 955 60A, 944 43A, D330 56B, 57B	7/16- 90	130				
D4, 6U, 7U, 29A, 30A	5/16- 42	58	58	120	200	100
955 26A, 12A	7/16- 90	130				
D2 4U, 5U, 933 11A	5/16- 45	60	58	96	150	110
933 42A, 25A, 922 59A	3/8 - 70	95	58	118	150	110
619 89E 90E	65	90				
619 61F, 62F	200	330	120	170	250	110
	200	330	17-23	350	160	110
			Plus 1/2 turn			

CATERPILLAR TRACTORS STARTING ENGINES

For D9 66A	50-60	36	60-70
For D9 18A, 19A & D8	57	36	60-70
D7	50-60	36	60-70
D6, 56A etc.	31-39	15-19	28-30
D4, 54A etc.			
D2	35	14	
933 42A etc.	31-39	13-15	28-30
619 89E	50-60		
619 61F, 62F	31-39	15-18	28-30

CHEVROLET CARS & COMMERCIALS

35-48	All Cars & American Trucks	75-80	45-50	100-110
	216 cubic inch	70-80	45-50	100-110
	235 cubic inch	90-100	45-50	100-110
55-58	6 cyl.	90-95	35-45	100-110
55-57	V8	60-70	30-35	60-70
	V8-283	60-70	35-45	95-100
	V8-348	60-70	35-45	95-100
	Corvair 500, 700, 900	27-33	20-26	
	Corvair 95			
	Greenbriar 1200			
	V8, 327, 283	60-70	30-35	80 (2 bolts) 105 (4 bolts)
	V8, 409 eng.	60-70	35-45	95-105
	Six (153, 194, 230)	90-95	35-45	60-70
	V8, 396, 427	80	50	95 (2 bolts) 105 (4 bolts)

CHRYSLER CARS

36-50	All 6 cyl.	Screws 65-70 Nuts 52-57	45-50	80-85
49-54	6 cyl.	70	45-50	80-85
51-58	American V8	85	45-50	80-85
57-58	Australian	65-70	45-50	80-85
	Royal			
59-65	All (U.S.A.)	70	45	85
	Valiant 170-225 engine	65	45	85 C.I. eng. 50 A.I. eng.
	Valiant V8-273	85	45	85
	318			
	V8, 361, 383, 440	70	45	85
	V8, 426	70	50	85
	Valiant			
	S R Series	65	45	85
	Valiant			
	AP5, AP6, V8	65	45	85
	Valiant			
	VE, VC, V8	85	45	85

CLIMAX ENGINES

R-100, R165	165-175	75-88	167-175
K67, K75, V80, V85, V122, V125	165-175	233-243	267-275
CE46, CE66	165-175	75-83	Rollers
CE96	233-243	165-175	Rollers
H2000, L3000	200	90	260
L3460, L4000	260	260	350
	Studs 260		
	Cap screws 300		
H288	175	260	350
L3230	165-175	233-243	267-275

CONTINENTAL ENGINES PETROL

F162, 226, 244, M330, 363	35-40	20-25	20-25
B427, T427, U501, R602, S820	7/16-70-75	3/8-35-40	3/8-35-40
	1/2	7/16	7/16
	90-100	70-75	70-75
	9/16	1/2	1/2
	130-140	85-96	85-96
	5/8	9/16	9/16
	145-155	100-110	100-110
F6186, F6209	1/2-90-100	30-35	75-85
	9/16		
	130-140		
	5/8-145-155	85-95	100-110

CONTINENTAL ENGINES DIESEL

ZD 129, GD 157, ED201	3/8-35-40	5/16-20-25	5/16-20-25
HD226, JD382	7/16-70-75	3/8-35-40	3/8-35-40
TD427, RD572	1/2-90-100	7/16-70-75	7/16-70-75
SD802	9/16-130-140	1/2-85-96	1/2-85-96
	5/8	9/16	9/16
	145-155	100-110	100-110
TD6427	130-140	85-95	100-110
RD6572	145-155	85-95	100-110
VD8603	100-110		

CONVAIR

60-63 All 27-33 20-26 *
 * NO CAPS. TORQUE CRANKCASE HALVES
 To 42-48 ft/lbs with 7/16" bolt, for 5/16" bolts 7-13 ft/lbs.

COMMER TRUCKS & COMMERCIALS

8 & 10 H.P. SV	38-42	15-20	45-65
OHV 41-43	17	50-60	
S 15/11, S 25/23	54	40	1 & F 45-65 R 65
S type all 6 cyl.	42	30-45	45-65
T type, B 2-5 ton	58	60-65	80
R type 5 & 7 ton			
Avenger R7, 7 ton, C, CXE	60-65	60-65	65-80
25 cwt. Superpoise	60-65	42	F42, R54
25 cwt. Forward Control	60-65	46	F42, R54
Q2, Q3, Q4			
Phase 1 & 2	42	3/8-46	54
Commando & QS Phase 1		7/16-54	
Superpoise 15-25 cwt.	54	60-65	1 & F 55-65 R 30-40
Diesel TS3,			
C	Cap Nuts 33-36	Pinch Bolts 12-14	Injector Sleeve 60-65
CA	Nylon 45		
CB Diesel	7/8-60	After Eng No. 8001, 17	
3/4 ton Forward Control Series 1 & 2, 1500	41-43	17	50-60
25 cwt. Series 2A			

COMMER TRUCKS & COMMERCIALS - continued

6 cyl. petrol					
C-B-HX	60		65	65	
4 cyl. Diesel					
BFD & FD	80		70		
6 cyl. walk three	65-70		35-37	70-75	
6 cyl. Perkins					
P6, C305	60		75	120	
six 354	60		90	150	
4 cyl. VAN & COB	45		20	50	
Perkins four					
van 1 ton	43		35	85	

CITROEN

LT. 15 (11BL)	36	25-29	50-55
Six	36-40	25-29	80-85
DS19 (4 cyl.)	44	35	60
2CV	25		

DAIHATSU

800 cc	32-40	14-18	29-36
1000 cc	32-40	14-18	29-36
1500 cc	68-76	25-29	68-76
1900 cc	68-76	25-29	70-87
Diesel	68-76	25-29	70-87

DAIMLER CARS

2½ litre sports (Alum. Head)	35-45	26-41	65-80
DB 18			
Consort	26-41	26-41	65-80
Conquest & Century	40-45	30-35	50-57
Majestic 3-8 litre	40-45	30-35	50-57
Majestic Major	55-60	25-30	50-57
DQ450			
SP250 Sports	40-45	25-30	25-30
2½ litre V8	50-55	25-30	30-35
Saloon			

D.A.F.

Petrol			
BA475 & BB475	138-145	75-85	145-155
Diesel			
DA475 & DD575	180-190	75-85	145-155
Diesel			
DS575 & O.350	210-220	75-85	145-155
0.680 - P680			
7/16	80-85	150	215-225
9/16	150-160		

DATSUN CARS & COMMERCIALS

Bluebird, 1 ton, ½ ton & 2 door	35-45	35	70-85
P(L) 311-U & 320, 410			
Fairlady 1500	45-50	35-45	75-80
Bluebird, 411	45	21-24	75-80
2000 P(L) 130U	45-50	25-30	75-80
510, 1600cc 1st Step (O.H.C.S.) 2nd Step	32	20-24	32-39
Datsun 1000	32-34	24-26	36-38
Datsun 555 & SS	35-40	20-24	32-39
Datsun 411 Series	32-39	20-24	50-57
2000, GTA, GTB			
SP (L) 3104	45-50	35-45	75-80

JOHN DEERE TRACTORS

520	104	80-90	100	
620	150	100-110	150	
720	275	80-90	150	All
70D, 720D	275	208	Centre 29	Models
			Others 75	Delivery
C720D S/E, C820D S/E, C70D S/E, C80	67	7	35	valve holders.
820	275	200-220	150	Bendix
R	208	210	150	Scintilla
R S/E	20	25		80
50	104	85	100	Bosch
60	150	105	150	34-36
70	208	85	150	
B	104	63		
A	150	100		
G	208	63		
3010 & 4010	115	120-130	150	
Diesel				
LP Gas & Petrol	115	100-110	150	

DE SOTO CARS

36-54	All 6 cyl.	65-70	45-50	80-85
53-56	V8	80-85	45-50	80-85
56-58	V8	80-85	45-50	100
58-63	V8	70	45	85

DETROIT DIESEL see G.M.C.

DIAMOND T TRUCKS

80, 301, 304, 2215, AS, BS, 401, 402, 404, 5, 6, 7, 507, 509, 2445, 313, 611, 320, 353, 607, 613, 360, 609, 612, 614	55	40	F & C 60
			I & R 70
412 DR, 512B, 512DR	55	105	F & C 70
522 (Continental)	85-95	100-110	I & R 105
XL 308, (530-531)	100-110	100-110	70-75
DT 252	65-70	52-56	60-70
K 6271, K 6330, K 6363	85-95	70-75	65-70
T 6427	130-140	100-110	100-110
R 6572, R 6602	100-110	100-110	1/2-85-95
			9/16-100-110
TDXB	100	115	1/2-85-95
			9/16-100-110
XL 372, 406, 450, 501	100-110	75-85	I & F 120
XL 264	85-95	45-55	C & R 105
XL 308	100-110	60-70	100-110
HSS90	5/8-140-160	100-120	130-140
	7/16-30-40		

YEAR	MODEL	CYLINDER HEAD	CON ROD	MAINS
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DODGE VEHICLES

36-50	6 cyl.	Screws 65-70 Nuts 52-57	45-50	80-85
50-58	6 cyl.	70	45-50	80-85
53-58	V8	85	45-50	80-85
	V8-361, 383	70	45-50	80-85
	V8-318 Phoenix	85	45-50	80-85
	Dart 6 cyl.	65	45	Al. Engine 50 C. Iron Eng 85
	V8-413, 426	70	45	85

DORMAN ENGINES*

DLD Series	9/16-120	7/16-48	11/16-200
	1"-160		
DL Series	11/16-180	1/2-66	3/4-200
	1"-160		
DS Series	9/16-100	3/8-30	9/16-100
6K Series	5/8-140	1/2-66	3/4-200
4BK11	1/2-100	9/16-75	11/16-200

* Figures based on threads being clean and free from oil & grease and nuts resting on plain or tab washers.

EDSEL

58	E400 eng.	75	45-50	95-105
58	E475 eng.	90	45-50	95-105
59-60	Six	65-75	45-50	95-105
59-60	V8-292	65-75	45-50	95-105
59-60	V8-332 361 & 352	80-90	45-50	95-105

FEDERAL TRUCKS

10	55	55	105
11, 11H	55	40	F & C 60 I & R 70
15, 15N, 75, 75H, 55		55	F & C 60 I & R 70
18, 18H, 20, 20H, 80, 80H, 25, 25H, 85, 85H, 29, 29H, 89, 89H			
1800, 2500, 2900, 3000	Manifold side 80 Centre & water jacket side 90	56	F & I 70 C & R 60
3400, 4400, 4500, 3500	130-140	100-110	1/2-100-110 9/16-130-140
6000	100-110	85-95	100-110
6500	100-110	100-110	130-140

FERGUSON TRACTORS

TEA20 80mm	60-65	40-42	90-100
TEA20 85mm,	60-65	50-55	80-85
TED20, FE35 Petrol			
FE35 Kero			
TEF20 Diesel	75-80	65-70	Socket Screw 25-30 Centre bearing 39-42 F & R 18-20 Bearing C 39-42
FE35 23C Diesel	100-105	65-70	Housings Upper to Lower 25-30

MASSEY FERGUSON TRACTORS

MF702	100-105	65-70	F & R 18-20 Bearing C 39-42
MF35 Petrol & Kero, MF135 Petrol	60-65	50-55	80-85
MF35 Diesel 3A 152, MF203, 205	55-60	70-80	110-120
MF65, Mk 1 & 2, 65R & S, MF165 3165, A4-192 & AD4-203	55-60	70-80	110-120
MF85, MF88	130-140	90-100	140-150
MF30	40-42	30-35	80-85
MF90 (with Perkins 4A300 eng.)	105-110	100-105	145-150
MF135, 4500	55-60	45-60	88-95
AD3-152			
MF135, A4-236	85	65-70	140-150
Diesel 2135	55	65	115
Diesel 135	55	65	115

FIAT CARS & COMMERCIALS

500B, C	25	18	
500 Series	24	24	15
1100 Series	58	24	45
1400, 1400A, B, Diesel, 1900 AR51, 615N	65	46	75
1900 A & B			
600 (633 cc range)	20-22	16	45
600 (767 cc range)	20-22	25	45
1500 Cabriolet	50	29	53
1800/2100 & 2300 Series	65	48	76
1300/1500 Series & 1100 T van.	65	48	76
1100D Riviera	58	24	45

FIAT TRUCKS & COMMERCIALS

615 N1	65	45	80
650 E	115	58	90
642 T2	86-122	105	105
682 N3T3	166-202	185	185

FORD CARS

36-47	V8 & 6 cyl.	Cast Iron 55-60 Aluminium 40-45	Castell- Castellated 35-40 75-80 Selflock- Selflocking ing 40-45 80-90
	Pilot V8 (Austn)	60-65	As above 120-130
48-54	V8 & Custom-line	55-60	35-40 95-105
55-58	Customline & Fordomatic range	75	45-50 95-105
	Fairlane 500, Custom 300 USA & Canadian 292 engines	80-90 (cold & oiled) 65-75	45-50 (oiled) 40-45 80-90
	Thunderbird 390	80-90	40-45 95-105
	Fairlane V8-221	65-70	19-24 60-70
	Meteor 6-170		
	260-V8	65-75	19-24 60-70

YEAR	MODEL	CYLINDER HEAD	CON ROD	MAINS
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FORD CARS - continued

Falcon 144 & 170	65-75	19-24	60-70
Falcon 144 & 170 (XP)	65-75 oiled	19-24	60-70 oiled
Falcon 200 (XP)	70-75	19-24	60-70

Note Where corrugated steel gaskets are used, special tightening procedures apply. Refer to the vehicle manual.

8 & 10H.P.	30-35	Self lock-	45-50
S.V. Anglia & Prefect		ing 20-25	Pinned 30
100E, 105E, 107E	65-70	20-25	55-60
Consul Mk I & II			
Zephyr Mk I & II			
Zodiac, Cortina			
Zephyr Mk III			
Cortina GT			
V8-352	80-90	40-45	95-105
V8-390.406	80-90	40-45	95-105
Mustang (V8-289)	65-70 Oil	19-24	60-70 Oil
Falcon G.T. 1st Step	50	19-24	60-70
(289 eng.) 2nd Step	60		
3rd Step	65-72		
Falcon XR 1st Step	55	19-25	60-70
(170 & 200 eng) 2nd Step	65		
3rd Step	70-75		
Cortina Mark II			
Conventional head	65-70	30-35	65-70
Cross flow head (C.F.H.)	65-70	25-30	55-60
Escort 1100 & 1300	65-70	30-35	65-70
Falcon XT (170 & 200 Eng.)			
1st Step	55	-	-
2nd Step	65	19-25	60-70
3rd Step	70-75	-	-

FORD TRUCKS & COMMERCIALS

215, 239, 254 engines	65-70	45-50	95-105
279, 317 engines	80-90	45-50	120-130
54-55 223, 239, 256 engines	75	45-50	95-105
279, 317 engines	110	45-50	120-130
272 engines	85	45-50	95-105
302, 332 engines	110	45-50	120-130
57-60 292 engines	65-75	45-50	95-105
332, 352 engines	80-90	45-50	95-105
61-64 292 engines	65-75	40-45	80-90
F100, F250	105-115	40-45	95-105
F500 (223 eng.)	Oiled		Oiled
Thames 15 cwt. with Perkins 4/99 engine	40-42	30-35	80-85
Thames 5 & 7 cwt. " 10, 12, 15 cwt.	65-70	20-25	55-60
Thames Trader 1½, 2, 3, 4, 5 ton & 4 & 5 ton 6 cyl. Petrol & Diesel	85-90	55-60	70-75
V4, 1.7 & 2 Litre	60-70	38-43	55-60
Perkins 4-108 diesel	55-60	31-35	78-85
D Series 1000	100-105	25	175-185 Cap bolts + 1/6th turn 100-110 Side bolts
Perkins 4/99 Diesel	38-42	31-35	79-85
Ford D Series	85-90	85-90	115-120
240, 330, 360 Cid, Ford Transit -			
1st Step	45-55	20-25	55-60
2nd Step	55-65	20-25	55-60
3rd Step	65-70	20-25	55-60

FORD TAUNUS

12M, 12M Kombi			
15M, 15M Kombi			
17M (1.5)	50-60	21-25	65-75
15M-TS, 15 M Coupe			
17M, 20M, 20M-TS			

FORD TRACTORS

Ford Ferguson 9N-2N	50-55	35-40	75-80
8N	65-70	35-40	75-85
NAA, NAB, NCA	65-75	45-50	95-105
NCB, NDA, NDB (with EAE EAF engines)			
EAE (134 cu.in.)			
501, 600, 601, 700, 701, 800, 801, 900, 901, 1801, 2000, 4000	65-75	45-50	95-105
1801D, 2000D, 4000D	100-105	45-50	110-115
6000, 6000D	95-105	45-50	95-105

FORDSON TRACTORS

Major Mk I & II	Bolts marked 55-60	Marked 100	Delivery valve
Diesel, Petrol & Vap. oil	100 85-90	70-75	Holder 30
	Bolts marked BEES or RIBE 75-80		Injector Bolts 12-15
Power Major, Super Major	85-90	55-60	9/16-95-100 1/2-70-75
			Injector & delivery valve Bolts as above
			Flywheel Bolts 80-90
			Injector Bolts 30-35
Dexta, Super Dexta	55-60	cad. plated 50-60 Unplated 65-70	90-95
Petrol Dexta	60-65	50-55	85-90 As above

FORD EUROPE

GBAL-55, GBKO	54	20-25	46-50
G4BAL, G4BAC, G4BK	Cold 42 Warm 49	20-25	76
P2T, P2TL, P2F, P2FL, P2KO, P2KOL	Cold 48 Warm 54	20-25	76
G4BT, TO, TK, TP, TH	Cold 42 Warm 49	20-25	76
G43T, TO, TK, TP, TH	54	20-25	46-50
G7BT, TK, TH, TP	Cold 42 Warm 49	20-25	76
LAAB, LBAC, LDAC, LEAC, LDACA, LCCC, LFBC	Cold 78 Warm 87	33	58-70

GARDNER ENGINES

LW Series	62	104	175
LK Series	62	82	125

YEAR	MODEL	CYLINDER HEAD	CON ROD	MAINS	
GENERAL MOTORS TRUCKS & ENGINES					
39-50	228, 248	60-65	40-50	70-80	
40-56	71 Series	125-135	65-70	175-180	
57 on	71 Series, inline engines (cast iron)	Bolt 180-190 Nut 165-175	65-75	Bolt 180-190 Nut 155-185	Injector Clamp Bolt 20-25
	71 Series, inline engines (aluminium)	Nut 140-160	65-75	Nut 120-140	
	V-71 Series engines	Bolt 180-190 Nut 165-175	65-75	Bolt 180-190	
	Series 51 engines*				
	Low Block..	(9/16-12) 120-130	(3/8-24) 54-59	(9/16-12) 120-130	
	High & Low block	(5/8-11)	"	"	
	Bolt with clamp	160-170			
	High block	(5/8-11)	"	"	
	Bolt without clamp	120-130			
	Series 53 engines	(5/8-11) 170-180	(5/16-24) Vee eng. 120-130 25-30 (3/8-24) In line engines 40-45	(9/16-12) 120-130	Injector clamp Bolt (3/8-16) 25-30

* Lubricate these threads and washer face with International compound No. 2 or equivalent. Torque to full torque by hand, back off approximately 60° and re-torque to full listed torque.

110 Series	(5/8-18) 150-160	(7/16-20) 65-75	Bolt(3/4-10) 215-235 Nut(3/4-16) 180-215 (7/16-20) 30-35	Injector Clamp Bolt (7/16-20) 30-35
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GOLIATH CARS & COMMERCIALS

GM700, 600, GP700, GM900	43		50	Crank- case Flange Studs (8mm) 23 Max
1100 & Combi	36	24	36	Sump Flanges Studs (8mm) 23 Max.
Commercial Hansa	36	24	36	

HANOMAG TRACTORS

D611S/R12,	50	36	50
D14/R6, R19,	100	65	105
D21/R22, R27,			
D28S/R28, R35,			
D28L, L.A./1.5,			
2, 2.5			
D57/R45, K55	130	97	250
D93/K90	130	97	290

HERCULES

IX, NX Series	40-45	40-45	80
ZX Series	40-45	25	80
OO Series	55	55	105
QX Series	60-100	40	60-70
JX Series			
DOOB, C, D ser.	160	140	
DJX, DRX ser.	5/8-175 1" - 280	160	175
DFX Series	160		

HILLMAN CARS

Minx Mk 3, 4, 5,	42	14-20	45-65
6, 7, 8, 8A			
Series 2			
Series 3			
Series 3A, 3B	45	17,	50-60
Series 3C & Aust			
Deluxe & Mk 5			
Super Hillman	45-48	23-25	50-60
Mk 1 & 2			
Imp.	36 Cold	18	41 Spark Plug 14
HB Series	48	29	55

HOLDEN CARS & COMMERCIALS

48-63	All models	60-65	30-35	55-60 oiled
	EH (149 & 179)	60-70	20-26 Oiled	60-70 Oiled
	HD (149 & 179)			
	HR (161 & 186)			
	HK (161 & 186)			
	Torana	39-43	24-26	55-60
	V8, 5 litre	65	35-11/32 bolt 45-3/8 bolt	80
	Monaro 186	60-70	20-26	75
	Monaro V8 327	65	35	80

HOWARD ROTOVATORS

M Series	15	9		Flywheel 65
L & LH	20	15		
5 H.P., 8 H.P. & Junior	35			
12 H.P.	42			
DH22 Tractor	55	60	70	Flywheel 60
A Series	1/2-75 3/8-40	60	150	Flywheel 90

HONDA

S, 600, S, 800	28	-	-
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HUDSON CARS

To 40	6 & 8	Cast 50 Alum 45	52	92
40-42	6 & 8	Cast 50 Alum 45	40-45	55-75
42-47	6 & 8	45	40-45	70-80
48-49	6	45-50	40-45	70-80
	8	70-75	40-45	70-80
	500 Model	70-75	40-45	70-80
51-52	Model	60-65	40-45	70-80
	Hornet	Alum 75-80	40-45	70-80
	Wasp	Cast 1.60-65	40-45	70-80
	Special V8 & 56	60-65	52-56	80-85
	Jet	60-65	27-30	66-70

HUMBER CARS

Snipe Mk 2 & 3	42	30-45	45-65
Mk 4	58	60-65	80
Hawk MK 3, 4, 5,	54	Steel 30-40 Alloy 25-29	F & C 45-65 R 30-40
Hawk Mk 6,	58	25-29	F & C 45-65 R 30-40
Series 1			
Super Snipe	60-75	35-37	70-75
Series 1			
Super Snipe			
Series 2			
Super Snipe	65-70	35-37	70-75
Series 3 & 4			
Super			
Hawk Series 1A	58	castellated	F & C 45-65
Hawk Series 2		24-34	R 30-40
Hawk Series 3	58	Nylok	F & C 45-65
Hawk Series 4		27-30	R 30-40
Vogue Mk 1 & 2	45-48	23-25	50-60
Vogue Sport (All)	48 cold	23-25	50-60

YEAR	MODEL	CYLINDER HEAD	CON ROD	MAINS	REMARKS
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INTERNATIONAL HARVESTER TRUCKS

K1, 2, 3, 4, KB1, 65	80	105	
2, 3, 4 (Engine GRD 214)			
K5, K55, KB5, KB55 (Engine GRD 233)			
K6, K56, K6F, KB6, KB56, (Engine FAC or BLD 250)	80	80	105
KB7, KB57 (FAC 259 or BLD 269)			
KR8 (Engine Red 361)	105	80	105
KR11 (Engine Red 450)			
AL & AR Series 110, 130, 112 (Engine ASD 220, Australian) 160, 161, 162 (Engine ASD 240 Austn.)	85-95	45-55	75-85
L & R Series 182 (Engine BD 269)	75-85	60-70	100-110
R182 (Engine BD 282)			
L & R 190, 192, LF195, (Engine RD 406)	100-110	75-85	100-110
BD282	100-110	60-70	100-110
AS110, 120, 130, 148, 160, 182 (Engine ABD 220, 240, 264)	85-95	45-55	75-85
AS110, 120, 130, 148, (Engine ABD 240 Tilt Valve)			
ASC160, 182, (Engine ABD 264 Tilt Valve)			
AA 110, 120, 130, 148, 160, ACF 174, 182 Engines ABD 240, 244, 282			
AGD 240-282	85-95	45-55	75-85
V345	90-100	45-55	75-85
BD308	100-110	60-70	100-110

INTERNATIONAL HARVESTER TRACTORS & POWER UNITS

Farmall A & V	65	40	75
Farmall H & 4	70	40	75
Farmall M & 6	110	55	65
9 Series	160	65	125
9A Diesel	130	55-60	5/8-150 175
M, TD6, UD6, ID6, WD6	110-135	110-120	3/4-250-275
AW6, ADS6, AW7K, AM7K Super Farmall AM (Engine AC 264)	110-130	56-60	100-105
AW6, Farmall AM (Engine AC 248)			
AWD6, AW7D, AM7D, AMD (Engine AD 264)			
TD9, WD9, UD9, 130		70-75	5/8-150-175

YEAR	MODEL	CYLINDER HEAD	CON ROD	MAINS
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ID9, IWD9				3/4-250-275
TD14, UD14, TD18, UD18	190	70-75		150-155
14A & Series 142 18A & Series 182	190	70-75		250-275
TD24	260	70-75		250-275
TD20	180-200 SAE 30 oil	70-75		150-155
		White lead & oil		225-245 SAE 30 oil
				Stud Nuts early engine Stud Nuts or Bolts (all other engines)

B250	70-75	40-45	70-75
B275	70-75	40-45	80-85

62-63 B414 75-80 40-45 80-85
 NOTE B250, B275 & B414, Main Bearing Cap Bolts. Effective from engine serial numbers: BC-144/1052, BD-144/41078 (except serials BD-144/41261-A to BD-144/41279-A inclusive) and BD-154/8204 the crankshaft bearing caps and bolts have been changed to enable a higher torque loading to be used. New caps are painted white for identification. THE FOLLOWING IMPORTANT POINTS SHOULD BE NOTED:

1. New bearing caps must be fitted with new bearing cap bolts and torqued to 95-100 ft. lbs.
2. If old bearing caps are fitted with old bolts, torque must not exceed 80-85 ft. lbs.
3. If new bolts are used with old caps, torque must not exceed 80-85 ft. lbs.
4. New bolts may be identified by thread length which is 1.12 in. against the 1" of old bolts.

TD15	155	55-60	110-135
TD25	400-425	145-155	225-245
TD30	SAE 50 oil	White lead & oil	
TD92	110-120	40-50	75-85
660D	SAE 50 oil	SAE 10 oil	
BTD6	110-135	55-60	150-170
	Grade 3 oil	Grade 3 oil	Grade 3 oil
BTD8	110-115	55-60	150-170
	Grade 3 oil	Grade 3 Oil	Grade 3 Oil
BTD20	Refer to Rolls Royce Manual		
Scout (4-152 engine)	75-80	40-45	75-80

ISUZU

Bellat 1500 1600 GT	43-50	65-72	33-46
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JAGUAR

38-48 1½ litre	92	29	83
36-50 2½ litre	waisted stud 62	Steel 37	
	solid stud 92	Alloy 29	83
36-47 3½ litre	1/2-92	Steel 36	80-85
	7/16-63	Alloy 29	
48-50 3½ litre	62	29	83
Z Series 3½ litre	62	37	83
XK 120, 140, 150	54	37	83
Mk 7 & Mk 7 type			
M, MK 8, Mk 9, 10			
2.4, 3.4 Mk 1			
2.4, 3.4 Mk 2			
3.8 Mk 2			
E Type			
240			
4.2 Mk 10	54	37	83

Cam-shaft Cap Nuts 15

YEAR	MODEL	CYLINDER HEAD	CON ROD	MAINS	YEAR	MODEL	CYLINDER HEAD	CON ROD	MAINS	REMARKS
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JOWETT CARS

Javelin & Jupiter 42 34 60

KARMAN GHIA

1200 & 1500 22-23 36 25

KARRIER VEHICLES

Bantam 2ton 54 Steel i & F 45-65
Side Valve 30-40 R 30-40
Alloy 25-29
Bantam OHV 54 40 I & F 55-65
R 30-40
Gamecock 3-4 60.65 60-65 65-80 Can Rod
ton OHV & diesel Pinch
Bolts 13-15
Piston
Rod
Pinch
Bolts

LANCIA

Aprilia 58 20 58
Aurelia 1991 25 45 40
(B/21)
Aurelia 2666 20 45 41
(B/12)
Aurelia 2500 GT 20 25 41
Appia 23 23 31
Beta 41 25 61
" 250 58 65 Inner 108
Outer 58
3RO & ESATAU 119 181 Inner 202
Outer 123
TL51 - CL51 36 238
Flaminia 38 26 38
Flavia 40 26

LEYLAND

0300 6 cyl. 190-200 See note 150-170
diesel
7.4 litre, 6 cyl. 105-110 150-160
E0600 6 cyl. 9/16-155-160 260-270
7/16-80-85
E0350 210-220 155-165
E0350 with Reinz 180-190 155-165
Repa gasket
E0680 9/16-150-160 260-270
7/16-80-85
8.6 litre 105-110 190-200
74L, 6 cyl. 83-88 155-160
06L, 6 cyl. 110-115 260-270
E0375 210-220 145-155
EN0370 105-110 155-165
Power Plus 150-160 215-225
E0680, EN0600
E0400 105-110 145-155

Note Connecting rod bolt tightening is checked by the elongation method. Refer to the engine operating manual.

LAUSON ENGINES

SLV, VA 12-14 7-9
RSH, 55A, 55AB,
R, V
TLH, TLU 12-14 14-16
P 12-14

LINCOLN CARS

49-51 Nuts 55 52-60 125
Cap Screws
70
52-54 80-90 45-50 125
55-57 80-90 45-50 125
58-60 95-105 45-50 95-105
61-63 95-105 40-45 95-105
64-65 125-135 40-45 95-105

LISTER ENGINES

LD/SL 40 12
HA/B2, HA/B3 100 45-55
FRI-6 65-68 40-45 90-95

LYCOMING ENGINES

O-235-C1, C1A 3/8-25 23-27
O-290-D, D2, 1/2-46 23-27
O-435-A 3/8-25
O-320, O-340-A 1/2-46 23-27
GO-435-C2, 3/8-25
C2B
GO-440-B

MACK TRUCKS

AB, AC, AP, BK, 114-119 91-95 137-140
BQ
BG, CU 86-91 74-77 137-140
CE, CF, CT 109-11 91-95 137-140
209 60-61 46-49 84-91
228, 268, 309 63-65 67-70 63-70
EJ, EN271, 63-65 67-70 63-70
EN290
EN330 70-75 30-35 100-110
EN354A 95-100 60-65 100-105
Long Stud
125-130
EN431A, 501A 95-100 100-105 100-105
Long Stud
125-130
EN707A, 135-140 145-150 100-105
END605
END457 135-140 100-105 100-105
END517, 135-140 137-150 100-105
ED Truck & Bus
engine
END672, NR 125-130 145-150 100-105
EN291, 331, 401 100 65 105
EN464, 431A 130 105 105
Short Stud
100
EN707B 130 150 105
END-510 130 105 105
Cap Screw
100
END-673 150 150 105

McKAY MASSEY HARRIS TRACTORS

See also Massey Ferguson & Ferguson

Model 203 70-75 70-75 100-110
Model 102, Jun. 7/16-70-75
3/8-40-45 40-45 100-110
82 7/16-70-75 40-45 100-110
Pacemaker 70-75 100-110 70-75
25 70-75 120-130 100-110
TE20, TO-20, 70-75 40-45 85-95
TO-30, TO-35,
A-40-60
Power Plant

YEAR	MODEL	CYLINDER HEAD	CON ROD	MAINS
MAZDA				
1500		55-60	32-33	60-65
1000		55-60	30-31	60-65
1200		50	28	45

MEADOW DIESELS

4D-330, 4D-420	9/16-8 5/8-110	1/2-55	5/8-90
	1/2-80	7/16-50	
6G-630, 6P-630	9/16-110	7/16-50	5/8-90
	1/2-80		
6D, 630	5/8-110	7/16-50	5/8-90
6D, 970	3/4-250	9/16-98	3/4-200

MERCEDES BENZ

60-63	180a, 180b, 180c, 190, 190c, 190sl	Cold Hot	58 65	27*	58
62-63	180D, 180Db, 180Dc, 190D, 190Db, 190Dc, 219, 220S				
59-60	220 SE	72 80	27*	58	
61-63	220b, 220Sb, 220 SEB				
58-62	300d	58-65	27	65	
54-63	300 SE, 300 SL				
	200	58-65	27	65	
	200D	65	27	65	
	230, 230S, 250S	58-65	44	58	
	250SE, 250SL	58-65	33-40	35-38	
	600				

* Tighten until bolt is elongated 0.1 m.m.

MERCURY CARS

54-57	All	Hot 75	45-50	95-105
			Pal Nut	
			3-3 1/2	
	ECU368	Hot 90	45-50	120-130
		High Tensile		
		Bolts 95-110		
	V8-383, 430	High Tensile	40-45	95-105
		Bolts 95-105		
	352, 390	80-90	40-45	95-105
	V8-292	65-75	40-45	80-90
	223	105-115	40-45	95-105
	V8-406	100-110	53-58	95-105

MORRIS CARS TRUCKS & COMMERCIALS

2.2 Diesel LDO,				
1M, 2M, 4M, 5M	75	50	80	
Petrol				
LC5, LC5T, LCF	65			
3.4 Diesel				
LCO.5, LCO.5T, LCFO, NVS 3 ton	100	58-59	83-84	
Petrol				
NV 3 ton,				
PP & FV 5 ton	100	55	100	
4.5 Diesel				
OP, FVO.5 ton	100	66-67	41-42	
FVSO.5 ton				
NVO 5 ton				
Petrol FVS 5 ton				
NVS 5 ton	91-92	50	83-84	
Petrol 7	37-38	33	75	
Petrol 7B, 7.4, 7.2	40-45	35	70	
Petrol LD				
1M, 2M, 4M, 5M	65			
8 H.P. E, S.V.	42-46	25-27	40-44	
Minor OHV,	40	35	60	

MORRIS CARS TRUCKS & COMMERCIALS continued.

Series 2,				
BMC 1000, 1100				
14 H.P. MO, MCV 45-50		30-35	75	
Oxford & Cowley				
Oxford OHV	40-45	35	70	
Series 2 & 3				
20 H.P.	42	33	75	
10 H.P., M, SM,	45	28	54	
10/4				
12 H.P. Series 3	50	35	60	
25 H.P. 6 cyl.	40-45	30-35	75	
LC,	66	50	104	
PV Commercial				
Series 3.4 litre	55	50	80	
petrol				
J Van, J2 Van,	40-45	35	75	
JB				
Oxford Series V	40	35	70	
Major Elite	40	35	70	
850, Cooper,	40	35	60	
Mini Cooper & Van				
1 1/2 ton Series	55	50	80	
5200				
1100	40	35	60	
Mini Cooper "S"	42 Nut	46	67	
	25 Bolt			

M.G. CARS

TB, TC, Y, TD	50	26	62
Magnette ZA	50	35	70
MGA, MGB	50	35	70
Midget	40	35	60
1600, Magnette	40	35	70
III & IV.			
GT	45-50	35-40	70

MINNEAPOLIS MOLINE TRACTORS

Unitractor	70-75	70-75	
V206B4			
335 Unitractor	65-70	70-75	F90-100
165A-4			R60-65
445 Unitractor	70-75	70-75	
206H-4, 206J-4,			
206K-4, 206H-4A			
206H-4B			
UB Tractor	A125-130	80-85	F110-120
283B-4	B105-110		R75-80
5 Star 283E-4	A125-130	80-85	100-105
	B105-110		
283-4A,	A125-130	80-85	F135-140
425A-6A	B105-110		R100-105
403-4B,	A115-120	80-85	F135-140
605A-6A	B95-100		R100-105
1210-12A	A115-120	80-85	F110-120
	B95-105		R95-100
800-6A,		60-65	F145-155
1600-12A			R110-120
D206-4	70-75	70-75	F90-100
			R60-65
5 Star Diesel	A125-130	80-85	100-105
D336-4	B105-110		
	C85-90		
UB Diesel	A125-130	80-85	F195-205
D283-4	B105-110		R100-105
GB Diesel	C85-90		
D425-6, 6A			
4 Star, 4 Star	70-75	60-65	90-100*
Super Jet Star			

Note A. Camshaft Side, B. Exhaust Manifold Side, C. 9/16 Studs (Diesel). * Bolts are self locking and require case hardened washers under the bolt head.

YEAR	MODEL	CYLINDER HEAD	CON ROD	MAINS
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METROPOLITAN

57-62		40	33	70
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MITSUBISHI

Colt 1000	40-43	21-30	29-40
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NASH CARS

36-40	All	60	50-55	70
40-56	10, 40	60	27-30	70
49-56	60	65	50-55	70
55-56	Ambassador V8	55-60	40-45	90-95
56-58	" Special V8	60-65	52-56	80-85
56	Statesman & Rambler	60-65	27-30	66-70
57	V8	60-65	52-56	80-85

NISSAN VEHICLES

Junior & caball	45-50	35-45	75-85
40, N40, C141, NC141			
Cedric 1900 cc	45-50	35-45	75-85
G31			
Patrol 60	55-65	40	72-80

N.S.U. VEHICLES

Prinz 4-Sport prinz	25	-	-
Prinz 1000, 1000L			
Prinz 1000TT type 110	23	23	23
Type 110S, 110SC			

OLIVER TRACTORS

42-51	6 & 8 cyl.	60-65	7/16-60-65-3/8-45-48	90-95
70	62	37	62	
80	54	62	62	
90, 99, 900	104	83	104	
Super 88		56-60	108-112	
Fleetline & Super 55, 66, 77, 88 petrol	92-100	46-50	87-92	
55, 66, 77, 88 Diesel	112-117	46-50	87-92	
Super 44, 440, 550, 660, 770, 880 Petrol	92-100	46-50	87-92	
550, 660, 770, 880 Diesel	112-117	46-50	87-92	

OLDSMOBILE CARS

36-54	60, 70, 80, 6 & 8 cyl.	63-70	50-55	1/2-100 9/16-140
49-59	8 cyl. V8	60-70	45-50	F & C 100 R 140
Super 88		60-80	38-48	90-120 Rear 130-160
F85		45-55	30-35	50-60 Rear 70
V6-225		65-70	30-35	65-70
V8-394		60-80	32-42	90-120 R130-160
V8-330		60-80	30-42	60-80 R90-120
66-67	6 cyl.	95	35	65

YEAR	MODEL	CYLINDER HEAD	CON ROD	MAINS
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OPEL

Rekord 1.5 & 1.7	65	36	72
Kadett, Kadett L			
Caravan Kadett Coupe	33	20	45
Railie			
Rekord 1.9	65	36	72
Rekord Coupe 2.2	72	36	72
Commodore	72	36	72
Kapitan Admiral	80	36	72
Diplomat 4.6	65	36	65
Diplomat 5.4	65	36	65

PACKARD CARS

48-54	6 & 8	63	60-65	90-95
54-56	V8	55-60	40-45	90-95
57-59		55-65	52-54	85-95

PERKINS DIESEL ENGINES

P3, P4, P6	55-60	60	110-115
L4	80	100	120
R6	60	100	100
6-354	55-60	85-90	145-150

PEUGEOT

203-403	Cold 60	36-40	65
404	50-58	31-34	50-58

PLYMOUTH CARS

49-58	Six	70	45-50	80-85
55-59	V8	85	45	80-85
60-65	Six	65	45	Alum. Eng. 50 Cast I. Eng. 85
60-65	V8-318-273	85	45	85
60-65	V8-361, 383 413	70	45	85

PONTIAC CARS

37-50	6 & 8	60	45	85
50-55	6 & 8	60	45	F & C95 R 120
55-64	V8	60-70	30-35	60-70 Rear 120
Tempest 4 Cyl. (195)	95	45	95	Rear 120
Tempest V8 (215)	50-55	30-35	65-70	
Tempest V8(326)95	95	45	95	
Tempest 6-215	85-100	30-35	60-70	
Tempest V8-326	85-100	40-46	90-110 R110-130	
66-67	6 cyl.	93	33	100
V8, 400, 425	90-100	40-46	90-110	Rear 110-130

YEAR	MODEL	CYLINDER HEAD	CON ROD	MAINS
PORSCHE				
356A				
1300, 1300S	22	25-29	Crankcase 22	
1600, 1600S				
356B				
1600 (Cast iron head)	25	33	Crankcase 18	
1600S (Aluminium head)				
Carrera				
1500 gs				
1600 aT				
2 Litre				
912	22	33	29	
911	22-24	36	25	
911S	22-24	36	25	

PRINCE TRUCKS

T631 Super Clipper			
431 Super Miller	72-79	33-36	72-79
T442 1 Ton			

RAMBLER

56		60-65	27-30	66-70
57-63	6 cyl. OHV.	60-65	27-30	66-70
57-62	8 cyl.	60-65	46-50	F & C 80-85
				R 50-55
	Alum. 6 cyl.	50-53	27-30	55-58
	L Head 6	57-60	27-30	66-70
	Classic V8	58-62	48-50	Rear 50-55
			Oil	Other 80-85
	3-1/8 6 cyl			
	OHV	58-62	27-30	66-70
	6 Cy. - 282	80-85	27-30	75-85
	V8, 290	72-77	27-30	95-105
	287, 327	58-62	46-50	50-55 rear
				75-85 others
67	V8, 290, 343	90-100	27-30	90-105
67	6 cyl. 232	80-85	27-30	75-80

RENAULT

748, 760	45 cold	20-25	45
Fregate	67 cold	32-35	75-77
Dauphine	45 cold	20-25	45
Gordini, Floride	45 cold	20-25	45
R4	45	20-25	45
R8 & Caravelle	45	20-25	45
750	45	20-25	45
R2130			
ESTAFETTE	40-45	21-25	40-45
R2132 & R2133			
ESTAFETTE	43	25	43
R2065			
VOLTIGEUR	65	35	80
R2086			
GOELETTE	65	35	80
GALION			
R2167 & R2168	65	35	80

REO TRUCKS & BUSES

S209, 140, 228,	58-60	49-53	88-98
268, Gold Comet			
OA255, OA292,	100-105	65-70	85-90
OA331, OH160,			
OV195, OV220			

RILEY CARS

1 1/2 litre	45	35-37	F & C 20-25
			R 65
2 1/2 litre	75	35-40	75
Pathfinder	75-100	50	75
1 1/2 litre, 4/68	40	35	70

ROLLS ROYCE

Silver Cloud,	40	32	45
Phantom V			

ROVER CARS & LANDROVERS

P3, P4, 60, 75,	3/8-30	30	60
90, 105	7/16-50		
86, 107, 109	3/8-42	37	85
	7/16-55		
3 litre, 100	3/8-30	30	65
	7/16-50		
80	5/16-12	35	85
	1/2-75		
Land Rover 2 1/2	5/16-12	35	85
Petrol	1/2-65		
Land Rover	5/16-12	35	85
2 litre Diesel	1/2-75		
Land Rover	5/16-12	25	100
2 1/2 litre Diesel	1/2-80		
100 & 110	3/8-30	30	65
	7/16-50		
3 Litre MK3	3/8-30	◇	65
	7/16-15		
2000 c.c.	55△	30	65
3500 V8	65-70	30-35	65-70 Rear
			50-55 Others

◇ Machined thread bolts 30 ft. lb., Rolled thread bolts 25 ft. lb.
△ At front of timing case 10 ft. lb.

SIMCA CARS

8-1200	43	18	32
Aronde	43	18	32
Vedette	30	22	52

SINGER CARS

SM1500, Hunter,	58-66	35	58-66
4AD			
9 & 10 H.P. to	45	30	45
4AB			
Gazelle	58-66	33-42	58-66
Gazelle late	44-46	23-25	50-60
3B & 3C			
Vague 1	45-48	23-25	50-60

SKODA CARS

1101, 1102, 1200 50		25-28	44-49
Octavia,	42-45	24-27	36-40
Super &ambi			

STANDARD CARS & COMMERCIALS

See also TRIUMPH

Vanguard 4	60-65	42-46	90-100
Spacemaster	60-65	50-55	85-90
Vanguard Diesel	75-80	65-70	Socket Screw
			25-30
			centre bearing
			housing to black
			39-42
Vanguard	100-105	55-60	89-90
Sportsman			
Vanguard 6 cyl.	42-46	42-46	55-60
8 H.P.	35-38	35-38	85-90
8 & 10 H.P.	38-42	42-46	55-60
10 H.P., 6 cwt.	42-46	42-46	55-60
van, Atlas van,			
6 cwt, pickup			

YEAR MODEL CYLINDER HEAD CON ROD MAINS

YEAR MODEL CYLINDER HEAD CON ROD MAINS

STUDEBAKER CARS

37-50	Champion	50-55	25-27	90-92
49-50	Commander	80-85	50-55	90-95
51-54	Commander	55-65	52-54	88-93
51-54	Champion	46-50	28-32	88-93
55-63	Six	46-50	28-50	85-95
55-62	V8 (Studebaker engine)	55-65	52-54	85-95
55-58	Commander (G Series)	46-50	28-32	85-95
56-58	Commander (B-H Series)	55-65	52-54	85-95
57	Commander	55-65	28-32	85-95
59	Commander	55-65	52-54	85-95
65	Cruiser	60-70	30-35	60-70
66	6 cyl.	90-100	30-35	60-70
66	V8,	60-70	30-35	60-70

TRIUMPH CARS

Mayflower	35-38	35-38	90-100
Renown	50-65	42-46	90-100
2000	60-65	42-46	90-100
TR2, TR3	Cold 100-105	55-60	85-90
1800	60-65	40-45	85-90
TR3A-TR4	100-105	45-50	85-90
Herald, Herald S	42-46	42-46	55-60
1200, Spitfire	42-46	42-46	55-60
2000cc	42-46	42-46	55-60
Spitfire 2000	45	45	65
Vitesse GT6	42-46	38-42	55-60
2 Litre	42-46	38-42	55-60
TR5	65-70	38-42	55-60

SUNBEAM & SUNBEAM TALBOT CARS

Rapier	41-43	17	50-60
Rapier IIIA,	44-46	23-25	50-60
Alpine II			
Rapier III			
Alpine Series 1	44-46	19-21	50-60
Alpine Series 2	44-46	23-25	50-60
Talbot 80	42	14-20	
Alpine 90	54	25-29	F & C 45-65 R 30-40

VAUXHALL CARS & COMMERCIALS

DX	80	40	F & I 68-70 R 63-65
10 H.P. Wyvern	53-57	38-43	47-50
12 H.P. LIX			
15 H.P. Wyvern	43-47	Lock-plates 22-25	55-60
		Locknuts 20-23	
J, JB, 14 H.P.	63-66	38-43	F & I 66-71 R 61-66
L Series 18 H.P.	73-76	38-43	F & I 66-71 R 61-66
Velox			

Velox 23 H.P.	43-47	Lock-plates 22-25	After tightening con rod nuts, tighten Lock-nuts finger tight plus 1/4 to 1/3 turn
		Locknuts 20-22	

THORNYCROFT TRUCKS

Sturdy Star	1/2-65-74	7/16-	3/4-130-149
Petrol ER4		65-74	
Sturdy Star	1/2-65-74	7/16-	1/2-74-93
Diesel TR6, TR6 DI		65-74	9/16
Trident CR6 & CR6/1	9/16-112-121	1/2-74-84	9/16-93-102
Trusty NR6, NR6MV	9/16-121-139	9/16-112-130	9/16-112-130
GRN6 & KRN6	9/16-110-130	9/16-5/8-110-130	5/8-140-160
TC4	65-74	65-74	112-130
JR6	1/2-65-74	7/16-65-74	1/2-74-93
QR6	9/16-110-130	9/16-110-130	5/8-140-160

TOYOTA

Tiara & Scout	77-83	35-45	70-80
Crown 700	80-85	40-47	75-80
	25	31	
Corona	80	35	75
Crown 2M & M engines	8 m.m. bolts 11-15	30-34	71-78
	13 m.m. bolts 54-61		
Corolla	36-48	29-36	39-47
Land Cruiser	95 warm	50	Front 101 Second 101 Third 101 Fourth 87

Victor, Late 1957 & Cresta PA Series	57-61	20-23	55-60
PA Velox & Cresta	80-85†	40-43*	80-85*
FBS, FBD	67-73†	20-23*	55-60*
FBH VX4/90 engine with alum. head PB (162 cc. eng.)	67-73†	20-23*	55-60*
	80-85 †	40-43*	80-85*
Viva	38-40†	24-26*	55-60*
Brabham Viva SL 90	43	25	58

Refer to workshop manual when fitting a new cylinder head to FB series engines.

† Dry Threads * Oiled Threads.

YEAR	MODEL	CYLINDER HEAD	CON ROD	MAINS	REMARKS
VOLKSWAGEN					
54-60	1200 c.c.	36 H.P. 26-27	36	22	
60-65	1200 c.c.	40 H.P. 22-23	36	25	
63-65	1500 c.c.	53 H.P. 22-23	36	25	
66	1300 c.c.	50 H.P. } Δ	29-36	25	
	1600 c.c.	65 H.P. }			
				Δ 1st setting	
				7	
				2nd setting	
				23	
				Blade	
				Holder	
				Nut 45	
				Blade	
				Holder	
				Bolt 45	
VICTA MOTOR MOWERS					
54-63	All two strokes	15			
60-63	4 stroke Lawson & Kirby Lawson motors	12-14	6		
VILLIERS ENGINES					
	Mk 10	18	6		
	Mk 12, Mk 15	18-19	8		
	Mk 20, 25, 40	29	10		

VOLVO CARS

B16B, B4B, B16A	50-60	30-35	60-70
BB70	50-60	30-35	60-70
D-47A	100-116	100-116	100-116
D-67	100-116	100-116	140-160
D-96	14mm 130-145	140-160	140-160
	12mm 87-100		
122S/B18 & P1800 Coupe	61-69	38-42	87-94
D7 (with chassis series 55)	120		152
D10 & D510 (with chassis series 75)	170	80	210
A6	100-115	60-72	100-115
B36 AV	60-72	46	90
ED	50-57	39-43	61-72
D96 AL 14mm	101-115	140-160	140-160
12mm	61-72		
D96 AS & B 14mm	130-145	140-160	140-160
TD96 A3 & B 12mm	87-100		
144	61-69	38-42	87-94
123GT	50-60	30-35	60-70
P1800S	50-60	30-35	60-70

WAUKESHA ENGINES PETROL

FC, XAH, VIK,	7/16-45-50
62KA, 6ML,	
6MK, 6-110,	
6BK, 65RK,	
6-125, XBKH,	
VB2H	
6BKH, 6D-100	1/2-65-80
CHK, HL, WK,	5/8-90-100
6GAH, 6RB,	
HBKH, 6D-80,	
6D-140	
6FK, 6L5,	3/4-96-100
6LRO, WBFH,	
6EKH, 6NKH,	
6LRN	

All torque figures with oiled threads

WAUKESHA ENGINES

DIESEL

180DLB, DLC,	96-100	42-50	87-92
185DLB,			
185DLC			
190DLB	96-100	56-59	108-112
190DLC, DLCA	96-100	87-92	108-112
190DLCR			
190DMF	112-117	87-92	125-133
195DLB, DLC,	95-100	87-92	108-112
DLCA			
197DLC, DLCS	112-117	87-92	125-133
135DK, DBK,	166-175	108-112	125-133
DBKS			
148DK, DKB,	292-300	67-69	292-300
DKBS			
6WAKD, DB,	292-300	108-112	292-300
DBS			
6NKDB, DBS	395-400	166-175	292-300
6LRD, RDB,	395-400	166-175	292-300
RDBS, VLRD			

WHITE TRUCKS

WC20, 130A	85-90	48-52	70-75
WC20, 230A			
Mustang			
WC22, 150A,	105-110	50-65	80-90
250A Mustang			
260A, 280A,	105-110	80-120	80-90
290A, 370A,			
380A, 390A,			
470A, 490A			
6-110A, 6-130A,	100-105	65-75	80-90
6-145A, 6-160A,			
6-170A, 6-185A			
8-235A			

WILLYS CARS & COMMERCIALS

4, 6 cyl.	Nuts 65-75	50-55	65-75
	Cap Screws		
	60-65		
50-58 4 cyl.	60-70	50-55	65-75
6 cyl. F Head	60-70	11/32-33-38	65-75
		7/16-	
		50-55	
6 cyl. L Head	30-35	40-45	85-95
6-226	30-35	40-45	85-95
6-230	75-80	40-45	85-95

WOLSELEY CARS

4/50, 6/80	41-42	33-34	75
4/44	41-42	27	63
		Piston	
		Pin 33	
15/50	40-45	35	70
6/40 Series			
1, 2, and 3.	75	50	75
1500 OHV			
15/60	40	35	70
6/99, 6/110,			
6/110 Mk2	Stud 75	50	75
	Bolt 40		
62-65 24/80, 24/80			
Mk 1 and 2	40	35	70

MOTOR MOWERS

POPE

POPE ROTARY MOWER (4 stroke engine)

Torque Readings:—

Cylinder Head Bolts	15-17 ft. lbs.
Big End Bolts	91-96 inch lbs.
Crankcase Half Bolts	6-8 ft. lbs.
Cowl Securing Screws	5-6 ft. lbs.
Magneto Securing Screws	5-6 ft. lbs.
Nut Securing Starter Cup WICO Mag. Phelon Mag.	40-45 ft. lbs. 30-35 ft. lbs.
Bolt Securing Starter Handle	19-21 ft. lbs.
Nut Securing Starter & Cowl	5-6 ft. lbs.

POPE ROTARY MOWER (4 stroke)

Rear Throw Machine:—

Handle Pivot Screws	12-14 ft. lbs.
Nut & Bolt Securing Engine & Deck	10-14 ft. lbs.
Cutter Blade Bolt	10-13 ft. lbs.
Nut Securing Wheel Support	23-25 ft. lbs.

POPE ROTARY MOWER (2 stroke engine)

Cylinder Head Bolts	15-17 ft. lbs.
Cylinder Base Nut	15-17 ft. lbs.
Crankcase Half Bolts	15-17 ft. lbs.
Cowl Securing Screws	5-6 ft. lbs.
Magneto Securing Screws	5-6 ft. lbs.
Nut Securing Starter Cup WICO Mag. Phelon Mag.	40-45 ft. lbs. 30-35 ft. lbs.
Bolt Securing Starter Handle	19-21 ft. lbs.
Nut Securing Starter & Cowl	5-6 ft. lbs.

POPE ROTARY MOWER (2 stroke engine)

Side Throw Machine:—

Handle Pivot Screws	12-14 ft. lbs.
Nut & Bolt Securing Engine & Deck	10-14 ft. lbs.
Cutter Blade Bolt	10-13 ft. lbs.
Nut Securing Wheel Support	23-25 ft. lbs.

SIMPSON

SIMPSON ROTARY MOWER (4 stroke engine)

Torque Readings:—

Cylinder Head Bolts	15-17 ft. lbs.
Big End Bolts	91-96 inch lbs.
Crankcase Half Bolts	6-8 ft. lbs.
Cowl Securing Screws	5-6 ft. lbs.
Magneto Securing Screws	5-6 ft. lbs.
Nut Securing Starter Cup WICO Mag. Phelon Mag.	40-45 ft. lbs. 30-35 ft. lbs.
Bolt Securing Starter Handle	19-21 ft. lbs.
Nut Securing Starter & Cowl	5-6 ft. lbs.

SIMPSON ROTARY MOWER (4 stroke)

Rear Throw Machine:—

Handle Pivot Screws	12-14 ft. lbs.
Nut & Bolt Securing Engine & Deck	10-14 ft. lbs.
Cutter Blade Bolt	10-13 ft. lbs.
Nut Securing Wheel Support	23-25 ft. lbs.

SIMPSON ROTARY MOWER (2 stroke engine)

Cylinder Head Bolts	15-17 ft. lbs.
Cylinder Base Nut	15-17 ft. lbs.
Crankcase Half Bolts	15-17 ft. lbs.
Cowl Securing Screws	5-6 ft. lbs.
Magneto Securing Screws	5-6 ft. lbs.
Nut Securing Starter Cup WICO Mag. Phelon Mag.	40-45 ft. lbs. 30-35 ft. lbs.
Bolt Securing Starter Handle	19-21 ft. lbs.
Nut Securing Starter & Cowl	5-6 ft. lbs.

SIMPSON ROTARY MOWER (2 stroke engine)

Side Throw Machine:—

Handle Pivot Screws	12-14 ft. lbs.
Nut & Bolt Securing Engine & Deck	10-14 ft. lbs.
Cutter Blade Bolt	10-13 ft. lbs.
Nut Securing Wheel Support	23-25 ft. lbs.

