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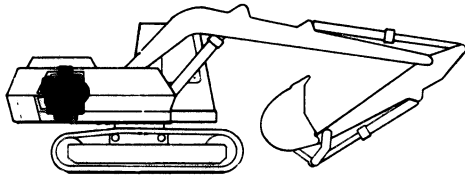
*Case 504BDT Engine

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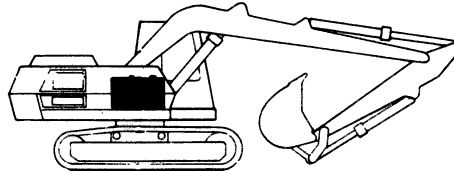
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The arrangement of the sections of this manual is according to the machine location code established in the CARES system.



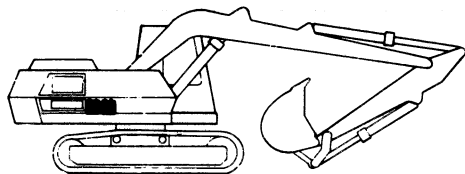
GENERAL

1



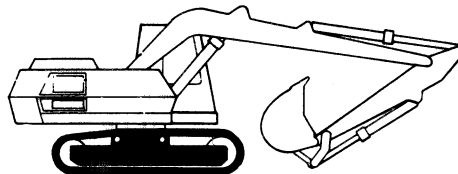
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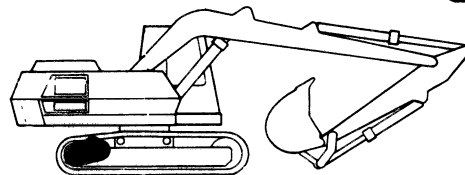
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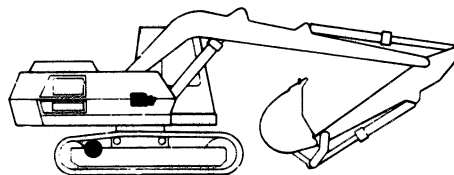
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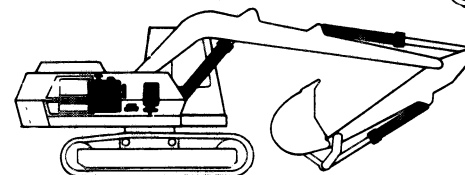
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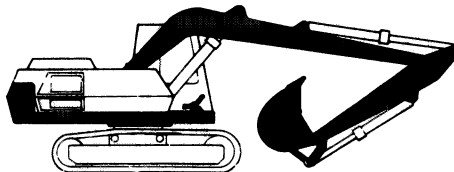
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GENERAL INFORMATION

INTRODUCTION

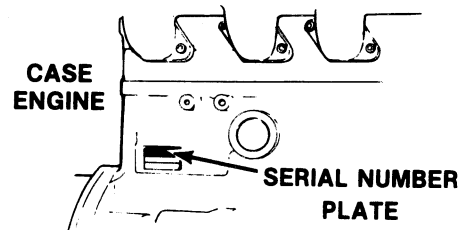
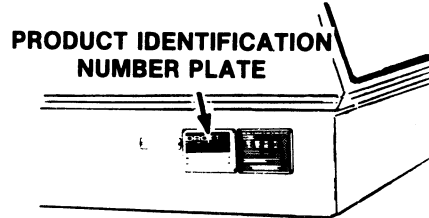
This manual provides instructions for maintenance and service of the 40 Crawler series "E". The information is arranged according to machine locations as established by the CARES system.

If further service information is required, contact your nearest J I Case dealer or Service Representative for assistance.

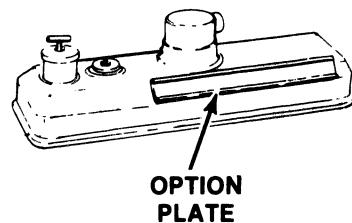
PARTS AND SERVICE

When writing to the dealer or manufacturer about your machine, always give reference to the model and PIN (Product Identification Number) in addition to the part name and location. The PIN plate is on the lower right corner of the cab.

All main components of the machine have an identification plate or number on the component housing. The location of the engine serial plate is shown.

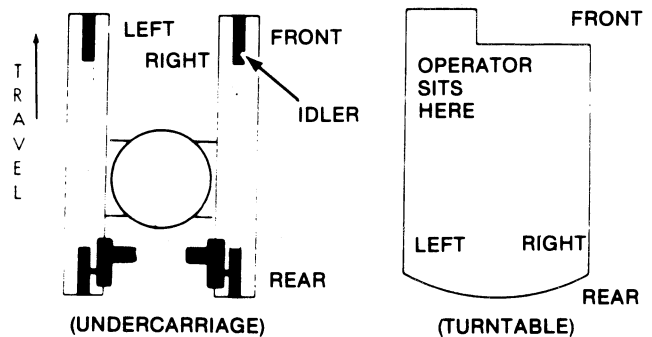


DETROIT DIESEL ENGINE



DIRECTIONAL REFERENCE

The turntable on this machine rotates through a full 360 degrees. The normal driving position is with the Boom over the front of the undercarriage (track drive transmission to the rear), as shown. In this position, directional callouts for both the turntable and the undercarriage are the same. All reference to Front, Rear and Left will be made with respect to this position. RIGHT is the Operator's right; LEFT is the Operator's left.



Section 1010

GENERAL SPECIFICATIONS

40 Crawler, Series E

CASE 504 BDT DIESEL ENGINE**General**

Type	6 Cylinder, 4 Stroke Cycle, Valve-in-Head Turbo-Charged
Firing Order	1-5-3-6-2-4
Bore	4-5/8 Inches (117.5 mm)
Stroke	5 Inches (127 mm)
Piston Displacement	504 Cubic Inches (8.2 litre)
Compression Ratio	15.8 to 1
No Load Governed Speed	2230-2270 RPM
Rated Engine Speed	2100 RPM
Engine Idling Speed	725 to 775 RPM
Exhaust Valve Rotators	Positive-type
Valve Tappet Clearance (Exhaust)	Cold, 0.025 inch (0.635 mm)
(Intake)	Cold, 0.015 inch (0.381 mm)

Piston and Connecting Rods

Rings per Piston	3
Number of Compression Rings	2
Number of Oil Rings	1
Type Pins	Full Floating Type
Type Bearing	Replaceable Precision, Steel Back, Copper-Lead or Aluminum Alloy Liners

Main Bearings

Number of Bearings	7
Type Bearings	Replaceable Precision Steel Back, Copper-Lead or Aluminum Alloy Liners

Engine Lubricating System

Crankcase Capacity	19 Quarts (18.1 litres)
with Filter Change	23 Quarts (21.8 litres)
Oil Pressure	45 to 60 PSI (310 to 413 kPa) with Engine Warm and Operating at Rated Engine Speed
Type System	Pressure and Spray Circulation
Oil Pump	High Capacity, Gear Type
Oil Filter (2)	Full flow Spin on Type

Fuel System

Fuel Injection Pump	Robert Bosch, Type PES Multiple Plunger
Pump Timing	30 Degrees Before Top Dead Center (Port Closing)
Fuel Injectors	Pencil Type, Opening Pressure 3200 PSI (22.064 kPa)
Fuel Transfer Pump	Plunger Type, Integral Part of Injection Pump
Governor	Variable Speed, Fly-Weight Centrifugal Type, Integral Part of Injection Pump
1st Stage Fuel Filter	Full Flow Spin on Type
2nd Stage Fuel Filter	Full Flow Spin on Type

DETROIT DIESEL 4-71N ENGINE

General

Type	Diesel, 4 Cylinder, 2 Stroke Cycle
Firing Order	1-3-4-2
Bore	4 25 inches (108 mm)
Stroke	5 inches (127 mm)
Piston Displacement	284 cubic inches (4 6 litres)
Compression Ratio	18 7 to 1
No Load Governed Speed	2470 RPM
Rated Engine Speed (Load)	2300 RPM
Engine Idling Speed	600 RPM
Crankcase Oil Capacity	14 quarts (13 3 litres)
with filter change	16 quarts (15 1 litres)

CRAWLER UNDERCARRIAGE

Track System Classification	D4
Track Gauge	7 ft 5 in (2 26 m)
Track Rollers	Sealed, 8 per side
Top Carrier Rollers	Sealed, 2 per side
Track Drives	Hydraulic Gear Motors with Drott Final Drive Transmissions
Track Brakes (Digging)	Self-adjust, spring-apply, hydraulic-release
Track Idler	Spring cushion, hydraulic-adjust
Track Pads	3 Bar Grouser or Cast Slope Bottom, 24 inch (609 mm) or 30 inch (762 mm) width

UPPERSTRUCTURE

Turntable Swing	Hydraulic Gear Motor and Spur Gear Reduction
Turntable Bearing	Single Race Bearing with Integral Gear Central Lubrication in Cab
House Brake	Mechanical, Double Disc
Rotation	Continuous at 5 6 RPM
Counterweight	8200 lb (3 720 kg) Integral with Turntable
Leveler (opt)	8½ degree pivot

BOOM AND ATTACHMENTS

"E" Main Boom with 9 ft (2 7 m) or 10 ft 5 in (3 2 m) dipper
 "Y" Main Boom with Tool Boom and Tool Boom Extension

BUCKETS

Type	Capacity	Width	Weight	No of Teeth
Standard	5/8 yd ³ (46 m ³)	30 in (760 mm)	1480 lb (671 kg)	4
	3/4 yd ³ (58 m ³)	36 in (910 mm)	1600 lb (726 kg)	5
	1 yd ³ (.70 m ³)	42 in (1 070 mm)	1720 lb (780 kg)	6
Severe Duty	1/2 yd ³ (37 m ³)	24 in (610 mm)	1200 lb (544 kg)	3
	3/4 yd ³ (.58 m ³)	36 in (910 mm)	1485 lb (673 kg)	5
High Capacity	7/8 yd ³ (67 m ³)	36 in (910 mm)	1720 lb (780 kg)	5

ELECTRICAL SYSTEM

Type	24 volt d-c, negative ground
Batteries (2)	12 volt, 625 C C A , 17 plates per cell
Alternator	24 volt, 42 amp

HYDRAULIC SYSTEM

Type	Two main pump circuits, with pressure summation by Power Sensing Valve
Pump	Gear pump with two sections
Control Valves	Two 4-spool valves, one single spool valve
Relief Pressures	See Section 8202
Filters	Two 10 micron filters in return lines Two 100 mesh strainer/diffusers in tank

Section 1020

SPECIFICATION DETAILS

504BDT Engine

Written In <i>Clear And Simple English</i>
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FRACTION to DECIMAL to MILLIMETER CONVERSION TABLE

Fraction	Decimal	MM	Fraction	Decimal	MM	Fraction	Decimal	MM
1/64	.0156	0.397	23/64	.3593	9.128	45/64	.7031	17.859
1/32	.0312	0.794	3/8	.3750	9.525	23/32	.7187	18.256
3/64	.0468	1.191	25/64	.3906	9.922	47/64	.7343	18.653
1/16	.0625	1.587	13/32	.4062	10.319	3/4	.7500	19.050
5/64	.0781	1.984	27/64	.4218	10.716	49/64	.7656	19.447
3/32	.0937	2.381	7/16	.4375	11.113	25/32	.7812	19.844
7/64	.1093	2.778	29/64	.4531	11.509	51/64	.7968	20.240
1/8	.1250	3.175	15/32	.4687	11.906	13/16	.8125	20.637
9/64	.1406	3.572	31/64	.4843	12.303	53/64	.8281	21.034
5/32	.1562	3.969	1/2	.5000	12.700	27/32	.8437	21.431
11/64	.1718	4.366	33/64	.5156	13.097	55/64	.8593	21.828
3/16	.1875	4.762	17/32	.5312	13.494	7/8	.8750	22.225
13/64	.2031	5.159	35/64	.5468	13.890	57/64	.8906	22.622
7/32	.2187	5.556	9/16	.5625	14.287	29/32	.9062	23.019
15/64	.2343	5.953	37/64	.5781	14.684	59/64	.9218	23.415
1/4	.2500	6.350	19/32	.5937	15.081	15/16	.9375	23.812
17/64	.2656	6.747	39/64	.6093	15.478	61/64	.9531	24.209
9/32	.2812	7.144	5/8	.6250	15.875	31/32	.9687	24.606
19/64	.2968	7.541	41/64	.6406	16.272	63/64	.9843	25.003
5/16	.3125	7.937	21/32	.6562	16.669	1	1.0000	25.400
21/64	.3281	8.334	43/64	.6718	17.065			
11/32	.3437	8.731	11/16	.6875	17.462			

INCH to MILLIMETER CONVERSION TABLE

Inch	MM	Inch	MM	Inch	MM	Inch	MM
1	25.400	6	152.000	10	254.000	60	1,524.000
2	50.800	7	177.800	20	508.000	70	1,778.000
3	76.200	8	203.200	30	762.000	80	2,032.000
4	101.600	9	228.600	40	1,016.000	90	2,286.000
5	127.000	10	254.000	50	1,270.000	100	2,540.000

RUN-IN INSTRUCTIONS

Engine Lubrication

Fill the engine crankcase with CASE HDM oil and install new engine oil filters, after an engine has been rebuilt.

NOTE: Use a *SERIES 3 DS or CD SERVICE CLASSIFICATION* oil that has the correct viscosity rating for ambient air temperature, if CASE HDM oil is not used.

Change the engine oil while the engine is hot and replace the engine oil filters, after the first 20 hours of operation.

Change the engine oil and filters at the given intervals, after the 20 hours, as found in the Operator's Manual.

Run-In Procedure For Rebuilt Engines (With A Dynamometer)

The following procedure must be followed when using a PTO dynamometer to run-in the engine. The dynamometer will make sure of the control of the engine load at each speed and will remove stress on new parts during run-in.

During the run-in, continue to check the oil pressure, coolant level and coolant temperature.

STEP	TIME	ENGINE SPEED	DYNAMOMETER SCALE LOAD*
1	**10 Minutes	1000 RPM	Not Any
2	**10 Minutes	1800 RPM	Not Any
3	20 Minutes	1800 RPM	1/3
4	20 Minutes	1800 RPM	1/2
5	***30 Minutes	100 RPM below rated speed	3/4
6	Tighten the cylinder head bolts to the torque that is found in Section 2015 of the service manual.		

* According to normal dynamometer scale load at rated speed for the specific vehicle model. Decrease this scale load as shown.

** For the best run-in procedure you will constantly change the throttle between 750 to 1000 RPM, for the first 10 minutes and from 1000 to 1800 RPM, for the next 10 minutes. The purpose of this changing RPM is to change the lubrication and coolant flow.

*** 30 minutes at 3/4 load is a minimum amount of time the engine can be run. It is best that when possible, the engine (especially a turbocharged diesel) must be run for four (4) hours or more, at the above speed and load before checking the full engine horsepower or before using the engine for heavy field work.

Run-In Procedure For Rebuilt Engines (Without A Dynamometer)

STEP	TIME	ENGINE SPEED	LOAD
1	*10 Minutes	1000 RPM	Not Any
2	*10 Minutes	1800 RPM	Not Any
3	30 Minutes	2/3 Rated RPM	Light Load
4	1 Hour	Full RPM (not over 2000 RPM)	80 to 90%
5	Tighten the cylinder head bolts to the torque that is found in Section 2215 of the service manual.		

* If engine must then run at or near full load to operate the machine, remove the load for the first hour and run at high idle for several minutes at 15 minute intervals.

Run-In Procedure

Run the engine at full throttle for the first 8 hours. Keep a normal load on the engine. Prevent too much converter or hydraulic stall. DO NOT lug the engine below its Rated Engine RPM. A stall must not last more than 10 seconds.

ENGINE SPECIFICATION DETAILS

Cylinder Sleeves

	U.S. Value	Metric Value
Type	Wet, Can Be Replaced	
Material	Cast Iron	
I.D. of Sleeve	4.6250 to 4.6263"	117.475 to 117.508 mm
Maximum Service Limit	4.6283"	117.559 mm
Sleeve Out of Round (Installed in Block)	0.002"	0.0508 mm
Maximum Service Limit	0.002"	0.0508 mm
Taper (Installed in Block)	0.001"	0.0254 mm
Maximum Service Limit	0.002"	0.0508 mm
Clearance at Bottom of Piston,		
90 Degrees to Piston Pin	0.0052 to 0.0075"	0.1321 to 0.1905 mm
Maximum Service Limit	0.0100"	0.2540 mm

Piston

Type	Cam Ground	
Material	Aluminum Alloy	
OD At Bottom, 90 Degrees to Piston Pin	4.6188 to 4.6198"	117.3175 to 117.3429 mm
Minimum Service Limit	4.6178"	117.2921 mm
ID of Piston Pin Bore	1.8001 to 1.8005"	41.723 to 45.733 mm
Maximum Service Limit	1.8010"	45.745 mm
Width of 1st Ring Groove	Can Not Be Measured	
Width of 2nd Ring Groove	Can Not Be Measured	
Width of 3rd Ring Groove	0.188 to 0.189"	4.775 to 4.801 mm
Maximum Service Limit	0.1895"	4.813 mm

Piston Rings

Number One Compression (Top)	Keystone Type With Chrome Face	
End Gap in 4.625" (117.475 mm) ID Sleeve	0.015 to 0.025"	0.381 to 0.635 mm
Maximum Service Limit	0.030"	0.762 mm
Number Two Compression		
(Intermediate)	Keystone Type With Tapered Face	
End Gap in 4.625" (117.475 mm) ID Sleeve	0.015 to 0.025"	0.381 to 0.635 mm
Maximum Service Limit	0.0350"	0.762 mm
Number Three Oil Control Ring (Bottom)	Two Piece	
Width	0.1860 to 0.1865"	4.7244 to 4.7371 mm
End Gap in 4.625" (117.475 mm) ID Sleeve	0.016 to 0.026"	0.406 to 0.660 mm
Maximum Service Limit	0.031"	0.787 mm
Side Clearance	0.0015 to 0.003"	0.038 to 0.076 mm
Maximum Service Limit	0.0035"	0.089 mm

Piston Pin

U.S. Value

Metric Value

Type	Floats	
OD of Pin	1.7994 to 1.7996"	45.705 to 45.710 mm

Connecting Rod

Bushing	Replaceable	
Bushing ID , Installed (Ream to Size)	1.8004 to 1.8008"	45.730 to 45.740 mm
Maximum Service Limit	1.8018"	45.766 mm
Bearing Liners	Replaceable	
Bearing Liner Width	1.586 to 1.596"	40.284 to 40.538 mm
Bore ID Without Bearing Liners	3.1503 to 3.1513"	80.018 to 80.043 mm
Bearing Oil Clearance	0.0011 to 0.0041"	0.028 to 0.104 mm
Maximum Service Limit	0.0046"	0.117 mm
Undersize Bearings for Service	0.002, 0.010, 0.020, 0.030"	0.051, 0.254, 0.508, 0.762 mm
Side Clearance	0.007 to 0.016"	0.178 to 0.406 mm

Crankshaft

Type	Forged, Heat Treated and Balanced	
Main Bearing Liners	Replaceable	
Crankshaft End Play	0.003 to 0.015"	0.076 to 0.381 mm
Thrust Bearing, Standard Thickness	0.155 to 0.157"	3.937 to 3.988 mm
Thrust Bearing, Oversize Thickness for Service	0.161 to 0.163"	4.089 to 4.140 mm
Connecting Rod Journal, Standard OD	2.998 to 2.999"	76.149 to 76.175 mm
0.010" (0.254 mm) OD Undersize, Grind to	2.988 to 2.989"	75.895 to 75.921 mm
0.020" (0.508 mm) OD Undersize, Grind to	2.978 to 2.979"	75.641 to 75.667 mm
0.030" (0.762 mm) OD Undersize, Grind to	2.968 to 2.969"	75.387 to 75.413 mm
Connecting Rod Journal Maximum Taper	0.0005"	0.013 mm
Journals Out of Round	0.0005"	0.013 mm
Main Bearing Liner Width, 1st, 3rd, 5th and 7th	2.1515 to 2.1615"	54.648 to 54.902 mm
Main Bearing Liner Width, 2nd, 4th and 6th	1.214 to 1.224"	30.836 to 31.090 mm
Undersize Main Bearing Liners for Service	0.002, 0.010, 0.020, 0.030"	0.051, 0.254, 0.508, 0.762 mm
Main Bearing Oil Clearance	0.0016 to 0.0046"	0.041 to 0.117 mm
Maximum Service Limit	0.005"	0.127 mm
Main Bearing Journal, Standard OD	3.498 to 3.499"	88.849 to 88.875 mm
0.010" (0.254 mm) OD Undersize, Grind to	3.488 to 3.489"	88.595 to 88.621 mm
0.020" (0.508 mm) OD Undersize, Grind to	3.478 to 3.479"	88.341 to 88.367 mm
0.030" (0.762 mm) OD Undersize, Grind to	3.468 to 3.469"	88.087 to 88.113 mm
Main Bearing Journal Bore ID Without Liners	3.691 to 3.692"	93.751 to 93.777 mm
Main Journal Width		
2nd, 4th and 6th	1.618 to 1.633"	41.097 to 41.478 mm
3rd	2.555 to 2.570"	64.897 to 65.278 mm
5th	2.561 to 2.565"	65.049 to 65.151 mm
7th	2.5855 to 2.6005"	65.672 to 66.053 mm
Connecting Rod Journal Width	1.9975 to 2.0025"	50.737 to 50.864 mm

Camshaft

	U.S. Value	Metric Value
Type	Parabolic	
Bushing	Five, Replaceable	
Bushing Lubrication	Under Pressure	
ID of Bushing	2.2484 to 2.2514"	57.109 to 57.186 mm
Maximum Service Limit	2.2524"	57.211 mm
Bushing Width		
1st (Front)	1.6460 to 1.6660"	41.808 to 42.316 mm
2nd, 3rd and 4th	1.4275 to 1.4475"	36.259 to 36.767 mm
5th	1.1462 to 1.1662"	29.113 to 29.622 mm
OD of Each Bearing Surface	2.2460 to 2.2470"	57.048 to 57.074 mm
Minimum Service Limit	2.2455"	57.036 mm
Thrust Washer Thickness	0.1225 to 0.1275"	3.1115 to 3.2385 mm
Minimum Service Limit	0.1215"	3.086 mm
Thrust Plunger Spring		
Free Length	3.6250"	92.075 mm
OD of Spring	0.406"	10.312 mm
Compress to 2.750" (69.85 mm)	45 to 55 lbs.	200 to 245 N

Valve Push Rod Lifters

OD of Lifter Stem, Standard	0.8097 to 0.8102"	20.566 to 20.579 mm
OD of Lifter Stem, Oversize for Service	0.8190 to 0.8195"	20.803 to 20.815 mm
ID of Block Bore, Standard	0.8118 to 0.8130"	20.620 to 20.650 mm
Maximum Service Limit	0.8135"	20.663 mm
ID of Block Bore, Oversize for Service	0.8215 to 0.8225"	20.866 to 20.892 mm

Gear Train

Backlash		
Crankshaft Gear to Camshaft Gear	0.004 to 0.011"	0.1016 to 0.2794 mm
Crankshaft Idler Drive Gear to Idler Gear	0.003 to 0.010"	0.0762 to 0.2540 mm
Idler Gear to Fuel Pump Gear	0.004 to 0.012"	0.1016 to 0.3048 mm
Crankshaft Gear to Oil Pump Gear	0.006 to 0.011"	0.1524 to 0.2794 mm
Crankshaft Gear to Fuel Pump Gear	0.027" Max.	0.6858 mm Max.
OD of Fuel Pump Idler Gear Shaft	1.7325 to 1.7330"	44.0055 to 44.0182 mm
ID of Fuel Pump Idler Gear Bushing	1.7345 to 1.7355"	44.0563 to 44.0817 mm
Maximum Service Limit	1.7375"	44.133 mm
Idler Gear Thrust Washer Thickness	0.061 to 0.063"	1.5494 to 1.6002 mm
Idler Gear End Play	0.002 to 0.012"	0.051 to 0.305 mm

Oil Pump

	U.S. Value	Metric Value
Positive Displacement Pump	Gear Type	
Backlash		
Pump Gear To Crankshaft Gear	0.006 to 0.011"	0.1524 to 0.2794 mm
Pump Gears To Body Radial Clearance	0.009"	0.229 mm
Pump Gears To Pump Cover Clearance	0.008"	0.203 mm
Oil Pressure at High Idle, Hot Oil	48 to 55 PSI	331 to 379 kPa
Relief Valve Spring		
Number of Coils	11	11
Wire Diameter	0.080"	2.032 mm
Minimum ID	0.469"	11.913 mm
Free Length	2.00"	50.80 mm
Compress to 1.252" (31.801 mm)	23.8 to 25.6 lbs.	106 to 114 N

Cylinder Head

Warpage	0.005"	0.127 mm
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Exhaust Valve

Tappet Clearance	0.025"	0.635 mm
Face Angle	44 Degrees	44 Degrees
Face Run-Out	0.002"	0.051 mm
OD of Head	1.745 to 1.755"	44.323 to 44.577 mm
OD of Stem	0.402 to 0.403"	10.211 to 10.236 mm
Minimum Service Limit	0.4018"	10.206 mm
OD of Taper at 4.2675" (108.395 mm)	0.401 to 0.402"	10.185 to 10.211 mm
Minimum Service Limit	0.4008"	10.180 mm
Length	6.4195 to 6.4405"	163.055 to 163.589 mm
Insert Seat Angle	45 Degrees	45 Degrees
Seat Contact Width	0.0800 to 0.1000"	2.032 to 2.5400 mm
Seat Run-Out	0.002" max.	0.051 mm
Insert Height	0.313 to 0.316"	7.950 to 8.026 mm
OD of Insert	1.9455 to 1.9465"	49.4157 to 49.4411 mm
ID of Insert	1.571 to 1.577"	39.903 to 40.056 mm

Intake Valve

	U.S. Value	Metric Value
Tappet Clearance	0.015"	0.381 mm
Face Angle	44 Degrees	44 Degrees
Face Run-Out	0.002" max.	0.051 mm
OD of Stem	0.402 to 0.403"	10.211 to 10.236 mm
Minimum Service Limit	0.4018"	10.206 mm
OD of Head	1.995 to 2.005"	50.673 to 50.927 mm
Length	6.4195 to 6.4405"	163.055 to 163.589 mm
Seat Angle	45 Degrees	45 Degrees
Seat Contact Width	0.0775 to 0.0975"	1.969 to 2.477 mm
Seat Run-Out	0.002" max.	0.051 mm
Insert Height	0.2775 to 0.2825"	7.049 to 7.176 mm
OD of Insert	2.0990 to 2.1000"	53.315 to 53.340 mm
ID of Insert	1.805 to 1.815"	45.847 to 46.101 mm

Intake and Exhaust Valve Guides

Length	3.219"	81.763 mm
OD of Guide	0.7510 to 0.7515"	19.075 to 19.088 mm
ID of Guide (Installed and Reamed)	0.4045 to 0.4055"	10.274 to 10.300 mm
Maximum Service Limit	0.4065"	10.325 mm
Height Above Cylinder Head	0.953"	24.206 mm

Valve Spring

Free Length	2.18"	55.372 mm
Number of Coils	7-1/4	7-1/4
Wire Diameter	0.192"	4.877 mm
Compress Spring to 1.484" (37.694 mm), Valve Open	153 to 167 lbs.	681 to 743 N
Compress Spring to 1.937" (49.200 mm), Valve Closed	50.5 to 60.5 lbs.	225 to 269 N

Rocker Arm Assembly

OD of Shaft	0.872 to 0.873"	22.149 to 22.174 mm
ID of Arm Bore	0.8745 to 0.8755"	22.212 to 22.238 mm
Shaft Assembly Lateral Movement (Both Ends)	0.010" to 0.030"	0.254 to 0.762 mm
Shaft Spring		
Number of Working Coils	4	4
Wire Diameter	0.080"	2.032 mm
Compress Spring to 1.562" (39.675 mm)	8.5 to 11.5 lbs.	38 to 51 N
Lubrication	Engine Oil, Camshaft Metering	
Shaft Oil Holes	Toward Valve Side of Engine	
	Shaft Can Not Be Turned	

Intake Valve Timing








Valve Timing	With the Number One Intake Valve to Rocker Arm Clearance Set at 0.015" (0.381 mm) and the Dial Indicator on the Number One Valve Retainer, 0.053" (1.346 mm) Movement of the Valve From the Seat (Clockwise Pulley Rotation) Will Give 7 Degrees after TDC Timing Indication on the Crank Pulley.
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Special Torque

	U.S. Value	Metric Value
Camshaft Nut With Hardened Washer (Add Lubrication to Threads and Washer With 30W Oil)	195 to 205 Ft. Lbs.	264 to 278 Nm (26.4 to 27.8 kgm)
Connecting Rod Bolts (Add Lubrication to Threads and Under Bolt Heads With 30W Oil)	95 to 105 Ft. Lbs.	129 to 142 Nm (12.9 to 14.2 kgm)
Crankshaft Pulley Bolt	100 to 110 Ft. Lbs.	136 to 149 Nm (13.6 to 14.9 kgm)
Crankshaft Main Bearing Bolts With Hardened Washers (Add Lubrication to Threads and Washer With 30W Oil)	195 to 215 Ft. Lbs.	264 to 292 Nm (26.4 to 29.2 kgm)
Cylinder Block Oil Cooler Outlet Cover Screw	35 to 42 Ft. Lbs.	48 to 57 Nm (4.8 to 5.7 kgm)
Cylinder Head Bolts (Add Lubrication to Threads with 30W Oil)	195 to 215 Ft. Lbs.	264 to 292 Nm (26.4 to 29.2 kgm)
Cylinder Head Cover Stud Nut	8 to 10 Ft. Lbs.	11 to 14 Nm (1.1 to 1.4 kgm)
Flywheel to Crankshaft Bolts With Hardened Washers	230 to 250 Ft. Lbs.	312 to 339 Nm (31.2 to 33.9 kgm)
Intake and Exhaust Manifold Studs	25 to 30 Ft. Lbs.	34 to 41 Nm (3.4 to 4.1 kgm)
Intake Manifold Hex Nuts (Heavy)	35 to 42 Ft. Lbs.	48 to 57 Nm (4.8 to 5.7 kgm)
Exhaust Manifold Hex Nuts	25 to 30 Ft. Lbs.	34 to 41 Nm (3.4 to 4.1 kgm)
Oil Pan Capscrews	24 to 28 Ft. Lbs.	33 to 38 Nm (3.3 to 3.8 kgm)
Oil Pan Drain Plug	29 to 31 Ft. Lbs.	39 to 42 Nm (3.9 to 4.2 kgm)
Oil Pump Suction Tube Nut	105 to 115 Ft. Lbs.	142 to 156 Nm (14.2 to 15.6 kgm)

Special Torque (Continued)

	U.S. Value	Metric Value
Rocker Arm Adjusting Screw Locknut	20 to 25 Ft. Lbs.	27 to 34 Nm (2.7 to 3.4 kgm)
Rocker Arm Bracket Stud Nut or Bolt	40 to 45 Ft. Lbs.	54 to 61 Nm (5.4 to 6.1 kgm)
Water Pump and Fan Shaft Nut	60 to 70 Ft. Lbs.	81 to 95 Nm (8.1 to 9.5 kgm)
Engine Oil Filter	Install Until Gasket Contacts Filter Head, Then Hand Tighten an Extra 1/2 Turn. Loosen Filter Approximately 1 Full Turn, Then Tighten Again Until Gasket Contact Is Made and Hand Tighten an Extra 1/2 to 3/4 Turn.	

GENERAL TORQUE SPECIFICATION TABLE (Revised 2-74) USE THE FOLLOWING TORQUES WHEN SPECIAL TORQUES ARE NOT GIVEN NOTE: These values apply to fasteners as received from supplier, dry, or when lubricated with normal engine oil. They do not apply if special graphited or moly-disulphide greases or other extreme pressure lubricants are used. This applies to both UNF and UNC threads.													
SAE Grade No.		2				5				8 *			
Bolt head identification marks as per grade NOTE: Manufacturing Marks Will Vary						  				  			
Torque		Torque				Torque				Torque			
Bolt Size		Foot Pounds		Newton-Meters		Foot Pounds		Newton-Meters		Foot Pounds		Newton-Meters	
Inches	Millimeters	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
1/4	6.35	5	6	6.8	8.13	9	11	12.2	14.9	12	15	16.3	20.3
5/16	7.94	10	12	13.6	16.3	17	20.5	23.1	27.8	24	29	32.5	39.3
3/8	9.63	20	23	27.1	31.2	35	42	47.5	57.0	45	54	61.0	73.2
7/16	11.11	30	35	40.7	47.4	54	64	73.2	86.8	70	84	94.9	113.9
1/2	12.70	45	52	61.0	70.5	80	96	108.5	130.2	110	132	149.2	179.0
9/16	14.29	65	75	88.1	101.6	110	132	149.2	179.0	160	192	217.0	260.4
5/8	15.88	95	105	128.7	142.3	150	180	203.4	244.1	220	264	298.3	358.0
3/4	19.05	150	185	203.3	250.7	270	324	366.1	439.3	380	456	515.3	618.3
7/8	22.23	160	200	216.8	271.0	400	480	542.4	650.9	600	720	813.6	976.3
1	25.40	250	300	338.8	406.5	580	696	786.5	943.8	900	1080	1220.4	1464.5
1-1/8	25.58					800	880	1084.8	1193.3	1280	1440	1735.7	1952.6
1-1/4	31.75					1120	1240	1518.7	1681.4	1820	2000	2467.9	2712.0
1-3/8	34.93					1460	1680	1979.8	2278.1	2380	2720	3227.3	3688.3
1-1/2	38.10					1940	2200	2630.6	2983.2	3160	3560	4285.0	4827.4
										* Thick nuts must be used with Grade 8 bolts			

Section 1050

MAINTENANCE AND LUBRICATION

Written In *Clear
And
Simple
English*

MAINTENANCE AND LUBRICATION

Introduction

Preventive maintenance and lubrication are the normal operations needed for safe and trouble free operation. Preventive maintenance is the easiest and best way to keep machine down time to a minimum.

Hour intervals are specified according to the number of hours the engine has run. The hourmeter, which operates only when the engine is running, indicates the total hours of operation.

Run-In Period

The items given in the run-in section are to be done during the run-in period only.

Preventive Maintenance

The items in this section are separated into maximum hour intervals. These intervals are for "average" operating conditions. When operating under "severe" conditions, for example, severe heat, cold, dust, mud or water, increase the interval (do the maintenance more frequently).

The following chart includes all components that need regular maintenance, the maintenance interval and the section where details of maintenance can be found.

NOTE: See page 1050-5 for list of fluids and lubricants.

NOTE: The following charts show maximum intervals. If the machine operates in severe conditions, do maintenance more frequently.

RUN-IN MAINTENANCE CHART

INTERVAL	MAINTENANCE	INSTRUCTIONS
Run-In Period After First 20 Hours	Change oil and filters on Case engine	See Operator's Manual
	Check fan belt tension	Section 4007
	Replace 10 micron hydraulic oil filters	Section 8201

PREVENTIVE MAINTENANCE CHART

INTERVAL	MAINTENANCE	INSTRUCTIONS
Every 10 Hours or daily, whichever comes first	Check engine oil	See Operator's Manual
	Check hydraulic oil	Section 8201
	Check restriction indicator for air cleaner	Section 2051
	Check coolant level in radiator	See Operator's Manual
	Clean dust cup on air cleaner	See Operator's Manual

INTERVAL	MAINTENANCE	INSTRUCTIONS
	<p>Check sediment bowl (Case engine only) on fuel transfer pump for water. If found, drain bowl, filter and fuel tank.</p> <p>Fill fuel tank</p> <p>Hydraulic controls — check operation</p> <p>Reset tooth wedges (buckets with Esco teeth)</p> <p>Check track rollers for leakage. Lifetime lubrication - no regular maintenance required.</p> <p>Lubricate turntable ring gear</p> <p>Clean the cab</p> <p>Lubricate boom and attachment</p> <p>Lubricate pillow blocks on crawler drive</p>	<p>See Operator's Manual</p> <p>See Operator's Manual</p> <p>Section 8220</p> <p>Section 9213</p> <p></p> <p>Section 9216</p> <p>Section 1052</p> <p>See List of Grease Fittings</p> <p>See List of Grease Fittings</p>
After first 50 hours or first week of operation	Check torques on all turntable bearing bolts	Section 9216
Every 50 hours or Weekly	<p>Lubricate leveler fittings</p> <p>Lubricate turntable bearing</p> <p>Check oil level in final drive transmissions</p> <p>Check oil level in swing gearbox</p> <p>Check tension in excavator tracks</p>	<p>See List of Grease Fittings,</p> <p>Section 9216</p> <p>Section 6317</p> <p>Section 9210</p> <p>Section 5503</p>
Every 100 hours	Change engine oil	See Operator's Manual
Every 200 hours	Change engine oil filter	See Operator's Manual

INTERVAL	MAINTENANCE	INSTRUCTIONS
Every 250 Hours or Monthly	Check V-belt deflection Check torque on all turntable bearing bolts Check/adjust house (swing) brake Check torque on mounting bolts for track rollers	Section 4007 Section 9216 Section 7011 Section 5506
Every 500 Hours or two months	Drain deposits from fuel tank and sediment bowl Clean or replace air cleaner element Add corrosion inhibitor to radiator Replace fuel filters, clean breather on fuel tank Replace hydraulic filters	See Operator's Manual Section 2051 See Operator's Manual See Operator's Manual Section 8201
Every 1500 Hours or 6 months	Drain and fill drive transmission Drain and fill swing gearbox Change oil in hydraulic system Clean battery and connecting posts Drain and flush radiator and cooling system. Install fresh coolants	Section 6317 Section 9210 Section 8201 See Operator's Manual See Operator's Manual
Every 3000 Hours or Yearly	Lubricate starter motor wicks Have authorized Case dealer check, clean and service turbocharger (Case 504BDT engine)	Section 4006

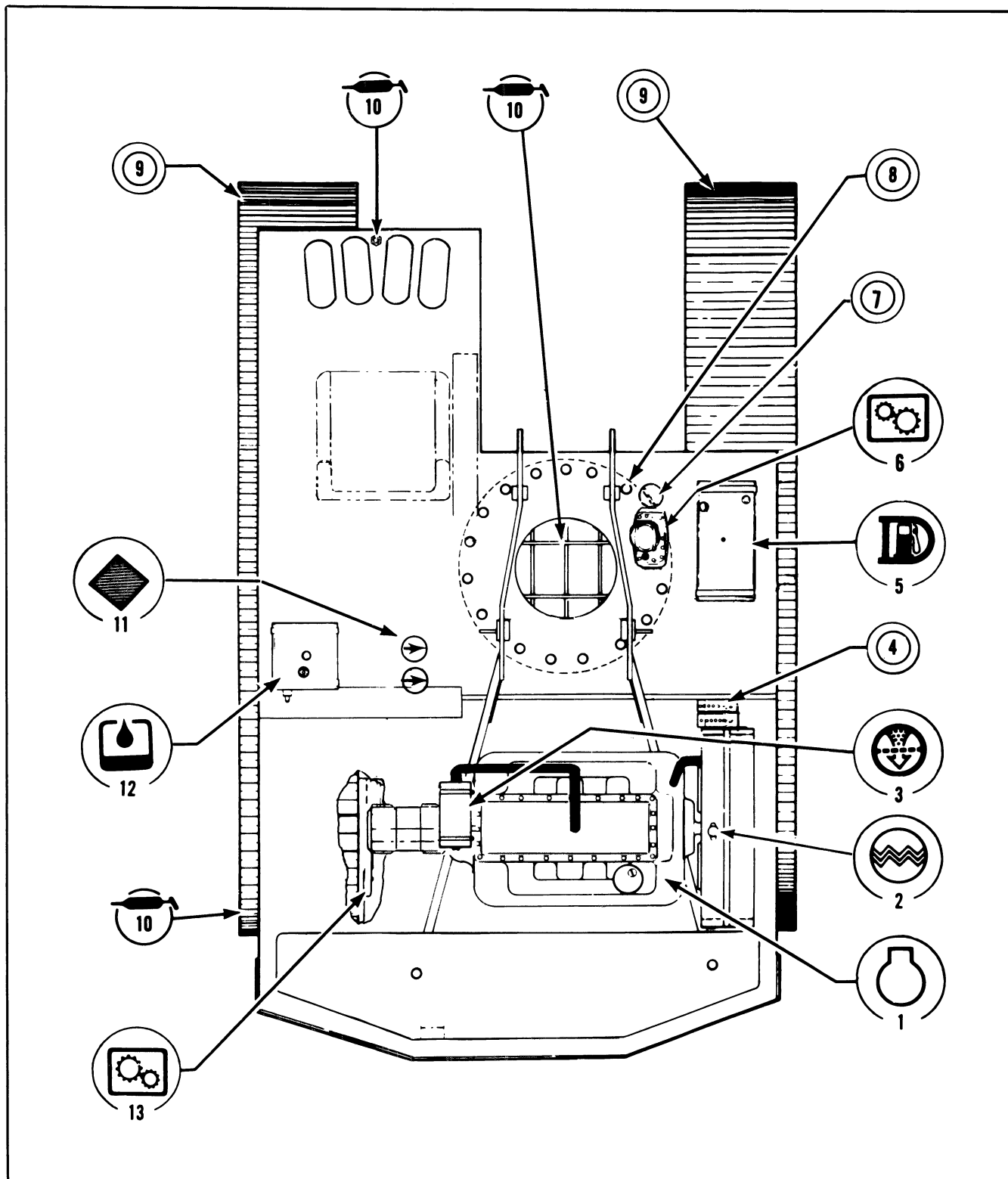
IMPORTANT: Always install new decals whenever the old decals are destroyed, lost, painted over, or illegible. When individual parts are replaced that have decals attached, be sure to install a new decal with the new part. Replacement decals are available from your J I Case Dealer.

FUEL, FLUIDS AND LUBRICANT CHART

COMPONENT	CAPACITY		SPECIFICATIONS
	U.S.	METRIC	
Fuel Tank	75 gal.	284 litres	No. 2 diesel fuel
Engine crankcase Case Engine— with filter change—	19 quarts 23 quarts	18.1 litres 21.8 litres	Case Engine* Engine oil: Case HDM Oil CD - Commercial class D Above 32° F (0° C) - SAE 30W 10° to 50° F (-12° to 10° C) -SAE 20W Below 32° F (0° C) -SAE 10W Detroit Diesel Engine See Engine Manual
Detroit Diesel 6V-53— with filter change—	17 quarts 19 quarts	16.1 litres 17.9 litres	
Detroit Diesel 4-71— with filter change—	14 quarts 16 quarts	13.3 litres 15.1 litres	
Hydraulic Tank	25 gals.	95 litres	Case TCH Fluid Alternate oils: Engine oil - SD Service class D CA - Commercial class A (Service MS or DG) Above 32° F (0° C) - SAE 10W Below 32° F (0° C) - SAE 5W Type C-2 transmission and hydraulic fluid, example: Tenneco Hytrans Fluid
Hydraulic System 50 Crawler 40 Crawler	65 gal. 55 gal.	246 litres 208 litres	
Final drives (each)	14 quarts	13.2 litres	Case FDL final drive fluid or SAE 90 API-GL-4 Gear Lubricant
Swing Gearbox	11 pints	5.2 litres	Case FDL final drive fluid or SAE 90, API-GL-4 Gear Lubricant
Cooling System	8.5 gal.	32 litres	Ethylene glycol and water mixed for prevailing temperatures. Follow specifications of antifreeze manufacturer.
Grease Fittings	As req'd.		No. 2 Moly-disulfide grease
Turntable Bearing Ring Gear	As req'd.		Open Gear Lubricant - (Mobil Mobitac E, Texaco Crater Compound, or equivalent)

***NOTE:** It is very important that a high quality engine oil be selected for use in the Case Diesel Engine. It is also very important that the correct weight (SAE Viscosity Rating) of oil be selected for the prevailing air temperature. This assures you that the oil will remain fluid or free flowing within the specified temperature ranges. If Case HDM engine oil is not available, select an oil which is specified as API CD, API SE, or Mil-L-2104C.

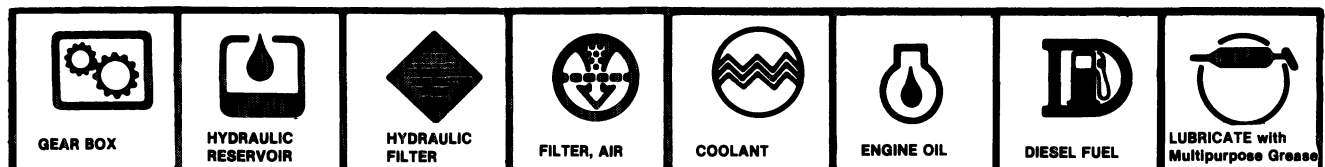
MAINTENANCE CHART



MAINTENANCE CHART

REF.	COMPONENT/SYSTEM	<div> Daily - 10 Hours Weekly - 50 Hours 2 Weeks - 100 Hours Monthly - 250 Hours 2 Months - 500 Hours 6 Months - 1500 Hours 12 Months - 3000 Hours </div>							SERVICE/CHECK
1	ENGINE	✓							Check oil, drain water and sediment from fuel filters
				✓					Change oil and filters
								✓	Service turbocharger, lubricate starter
2	RADIATOR, COOLING SYSTEM	✓							Check coolant level
			✓						Clean fins, remove obstruction, check fan belts
						✓			Add corrosion inhibitor
							✓		Drain and flush system
3	AIR CLEANER	✓							Check restriction indicator, empty dust cup
						✓			Clean or replace element, tighten hose clamps
4	BATTERIES		✓						Check electrolyte level (except "Maintenance Free" type)
							✓		Clean battery case, posts and connections
5	FUEL TANK	✓							Fill at end of shift, drain water from tank
						✓			Clean breather
6	SWING GEARBOX		✓						Check oil level
							✓		Change oil, clean breather
7	TURNABLE BEARING	✓							Lubricate the ring gear
			✓						Lubricate the bearing race (thru Central Lube)
8	TURTABLE BEARING BOLTS				✓				Check torque
9	TRACK	✓							Grease pillow blocks, clean tracks*
			✓						Check and adjust track tension
10	LUBRICATION FITTINGS	✓	✓						Apply grease per intervals in List of Grease Fittings
11	HYDRAULIC FILTERS					✓			Replace 10 micron elements
12	HYDRAULIC OIL TANK	✓							Check oil level
						✓			Replace breather
							✓		Change oil, clean strainer/diffusers
13	FINAL DRIVE TRANSMISSIONS		✓						Check oil level, look for damage or leaks
							✓		Change oil
14	CAB and CONTROLS	✓							Clean cab, check operation of controls
					✓				Check condition and adjustment of the controls
15	BOOM and ATTACHMENT	✓							Lubricate thoroughly* (See List of Grease Fittings)

*In severe application, every 4 hours



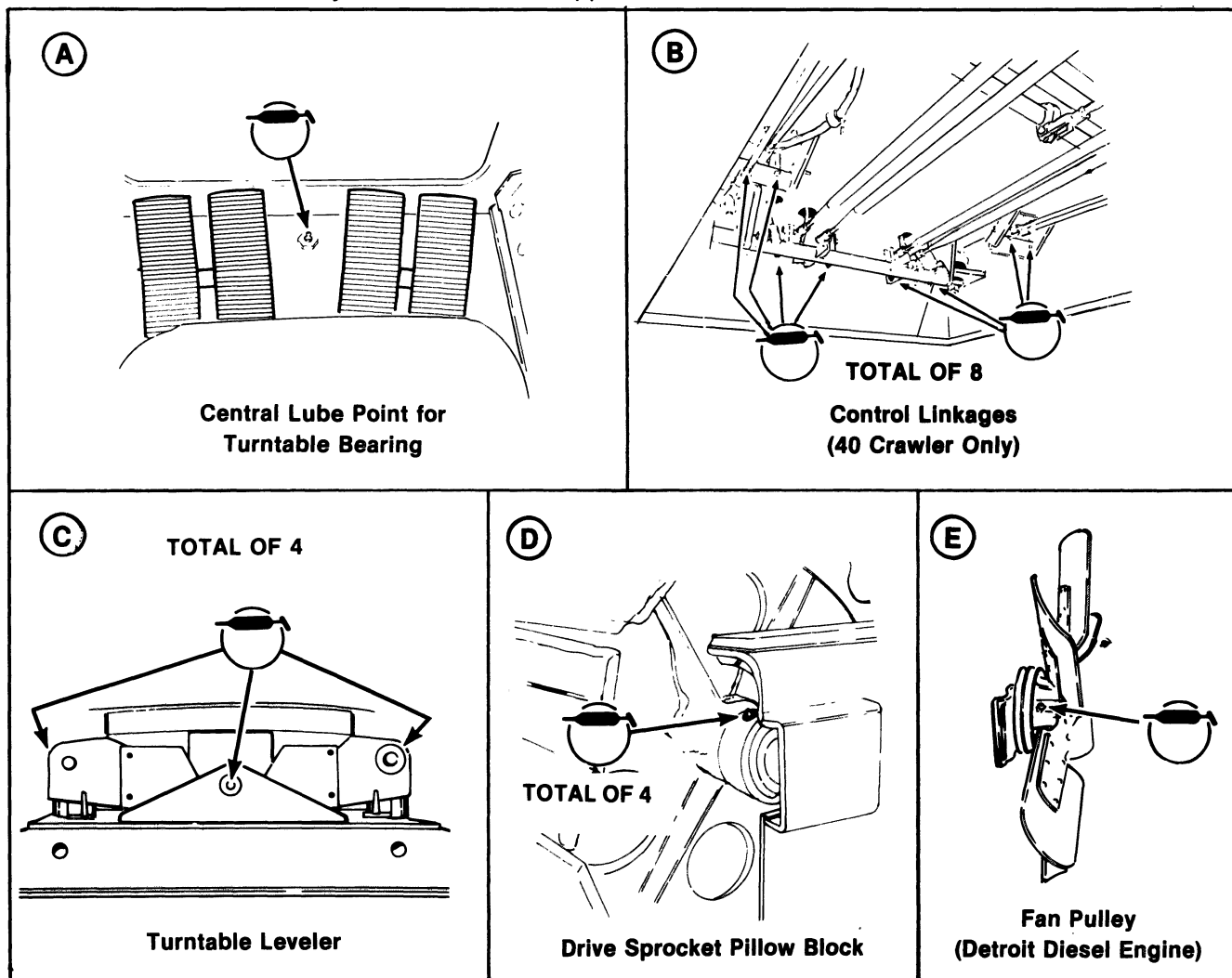
LIST OF GREASE FITTINGS

LUBRICATION FITTING CHART			
Ref.	Location/Title	Qty.	Interval
A	Turntable Bearing	1	Weekly/50 hours
B	Control Linkages (40 Crawler only)	8	Weekly/50 hours
C	Turntable Leveler	4	Weekly/50 hours
D	Drive Sprocket Pillow Blocks*	4	Daily/10 hours
E	Fan Pulley (Detroit Diesel Engine)	1	Weekly/50 hours
F	E-Boom (50 Crawler)*	21	Daily/10 hours
G	E-Boom (40 Crawler)*	21	Daily/10 hours
H	Y-Boom (40 Crawler)*	21	Daily/10 hours

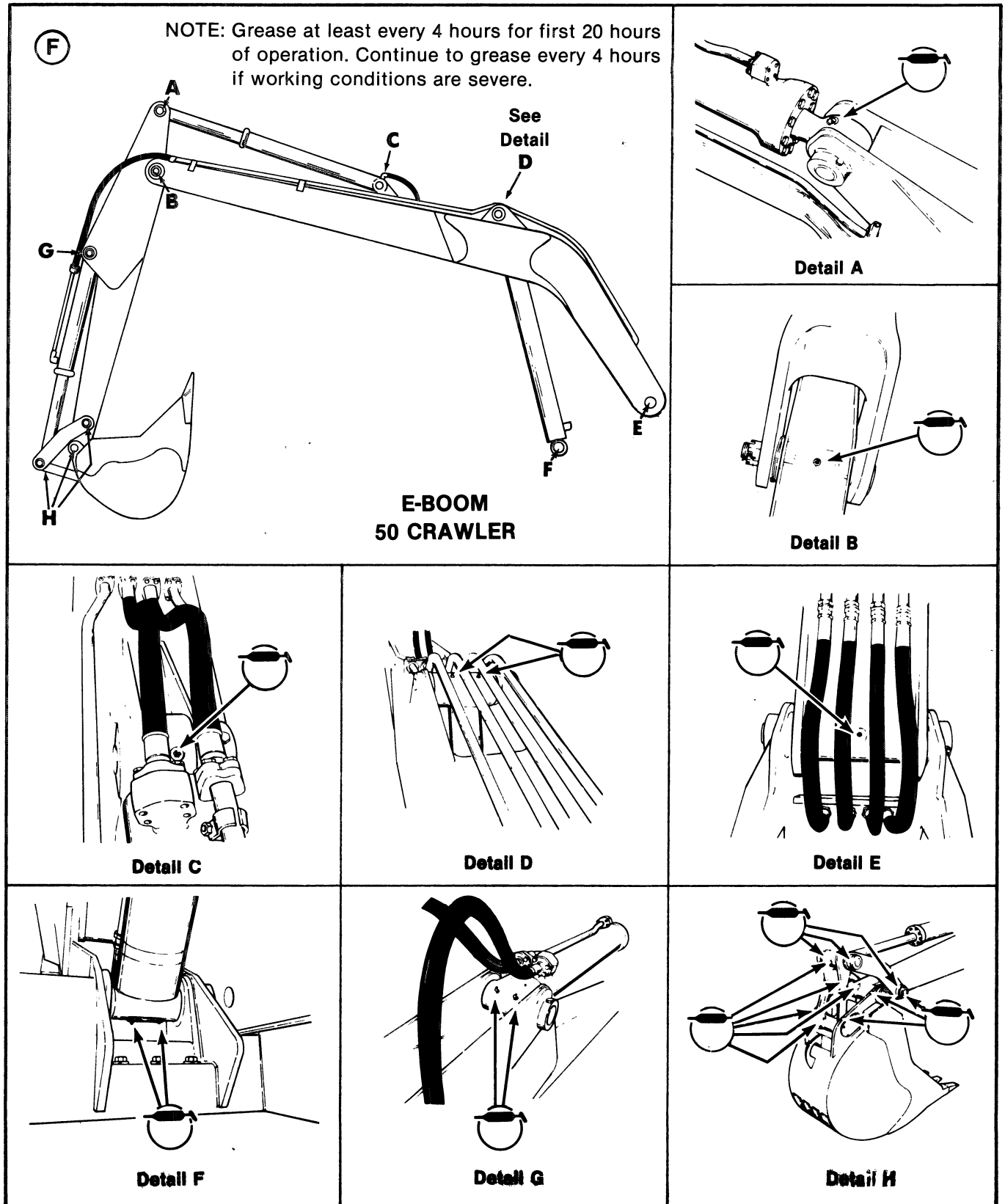
Lubrication Procedure

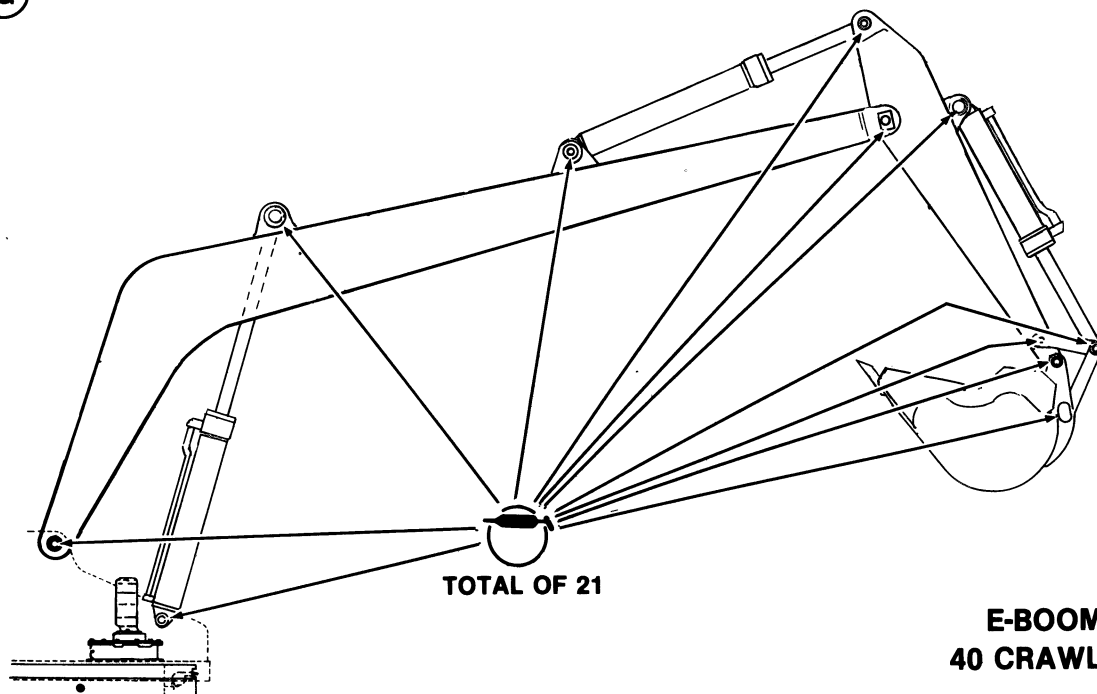
Wipe fitting before applying grease gun. Apply enough lubricant at each location to push out old grease. If any fitting will not take grease, remove the fitting and check for foreign material or damage. Replace the grease fitting if there is damage.

*Lubricate every 4 hours in severe applications.

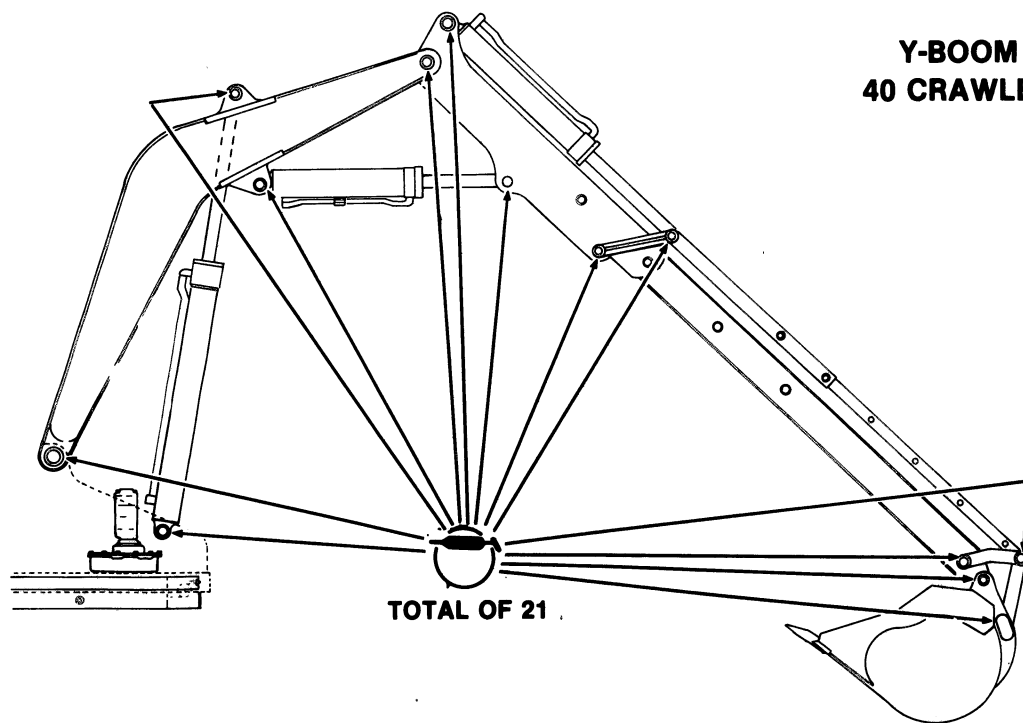


BOOM LUBRICATION



G

**E-BOOM
40 CRAWLER**

H

**Y-BOOM
40 CRAWLER**