1450B AND 1455B CRAWLER TABLE OF CONTENTS AND SERVICE MANUAL INTRODUCTION

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Printed in U.S.A.
Issued September 1980
Revised September 1984
Revised September 1986
Revised March 1990

CASE CORPORATION

Section

1010

GENERAL ENGINE SPECIFICATIONS
1450B CRAWLER LOADER AND DOZER

504 BDT DIESEL ENGINES

Written In *Clear And Simple English*

CASE CORPORATION

Rac 8-22710

Printed in U.S.A.
Issued April, 1980

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 (117.48 mm)
Stroke	5 Inches (127.0 mm)
Piston Displacement	504 Cubic Inches (8 259 cm^3)
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 Liners

Main Bearings

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

Engine Lubricating System

Crankcase (without filter change)	14 Quarts 13.25 litres)
(with filter change)	17 Quarts (16.09 litres)
Oil pressure	45 to 60 PSI (310 to 414 kPa)(3.10 to 4.14 bar) with Engine Warm and Operating at Rated Engine Speed
Type System	Pressure and Spray Circulation
Oil Pump	Gear Type
Oil Filter	Full Flow Turn-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
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

NOTE: The CASE CORPORATION reserves the right to make improvements in design or changes in specifications at any time without incurring any obligation to install them on units previously sold.

1012

DECALS AND PAINTING

TABLE OF CONTENTS

Written In *Clear And Simple English*

9-67891

Printed in U.S.A.
Issued Sept 1980
Rev/Reprinted Sept 1984

CASE CORPORATION

GENERAL INFORMATION

The following pages show decals that are installed on the machine and machine attachments. Part numbers for the decals are also shown. When decals are needed, check the parts catalog to be sure the part number is correct. Decals are available separately or in a kit for this machine.

1. The condition of all decals about the operation of the machine and/or attachments must be easy to read.

2. The condition of all decals that start with the words WARNING, CAUTION, or DANGER must be easy to read.

3. Replace any decal that is damaged or is not easy to read.

4. Remove the old decal before installing a new decal. Use enamel thinner to help remove the old decal.

5. Remove all dirt, grease, and oil before installing a new decal.

6. Use standard procedure to prepare the machine or attachment for painting.

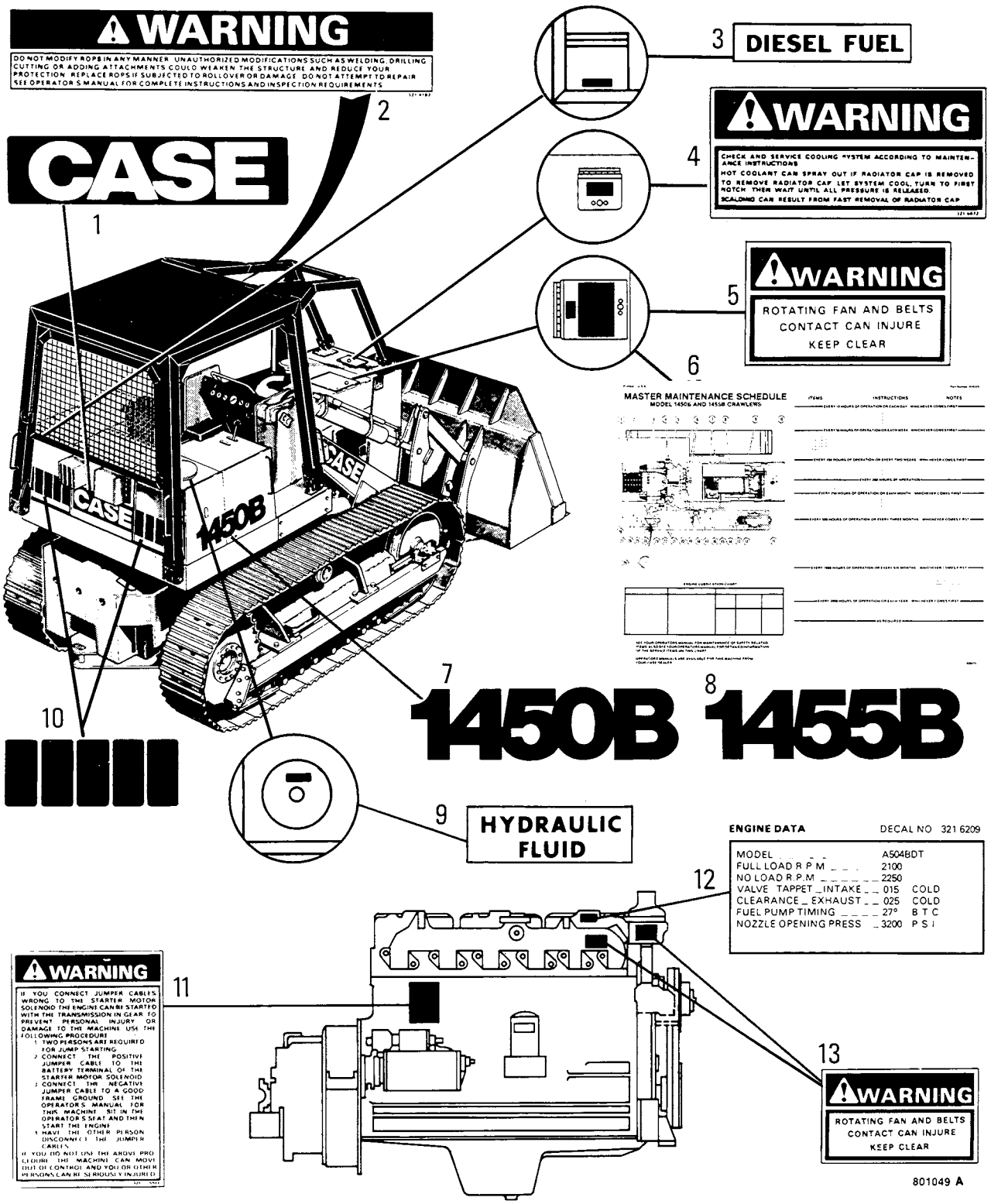
   a. Remove all dirt, grease, and oil from the surface to painted.

   b. Wash the area to be painted.

   c. Use sandpaper to prepare the surface that is to be painted.

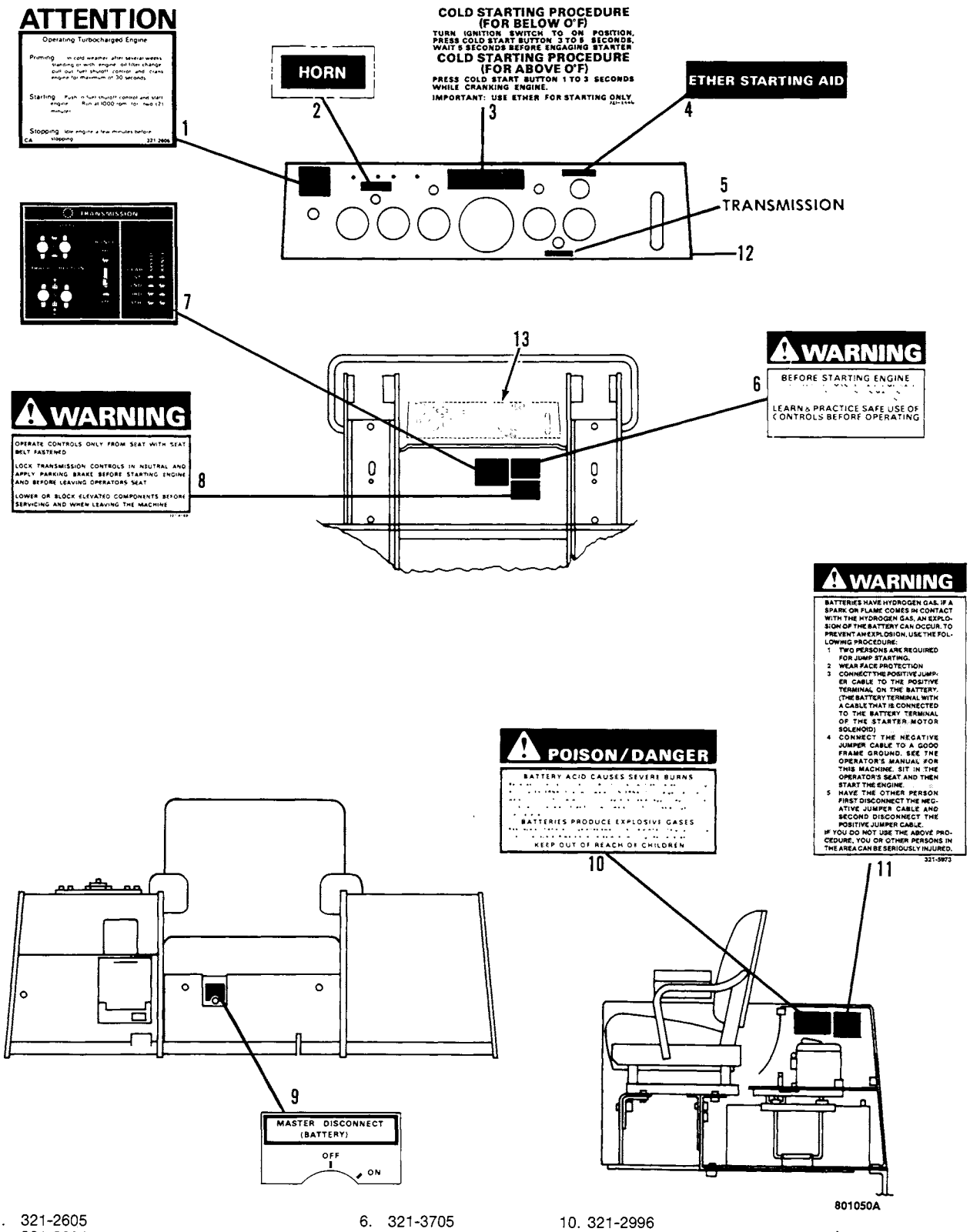
   d. Cover all surfaces that are not to be painted.

   e. Paint the machine or attachment.



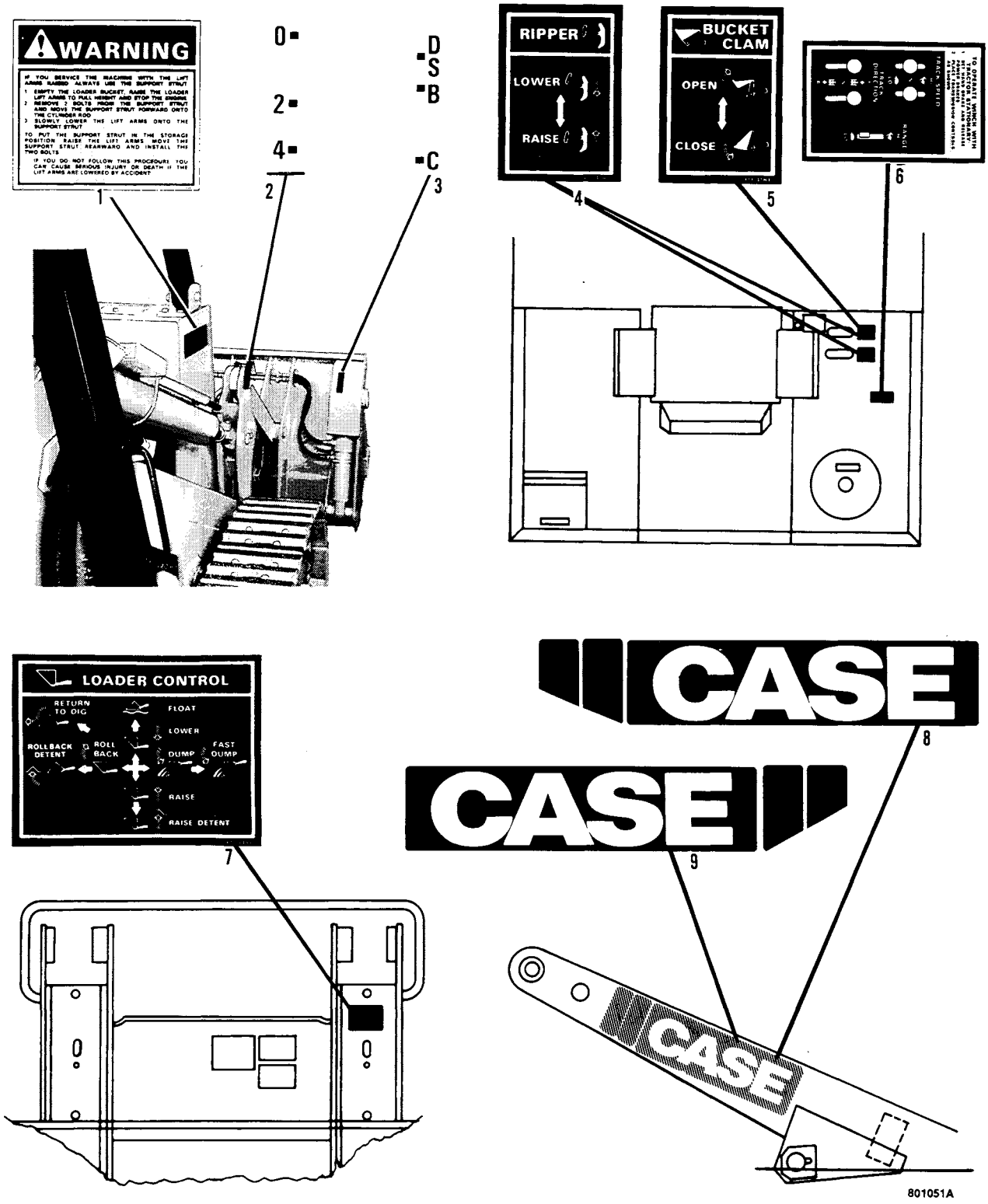
1. 321-5273
2. 321-4192
3. 321-6672
4. 321-3708 (UNDER COVER FOR RADIATOR CAP)
5. R52403 (UNDER COVER FOR AIR CLEANER)
6. 321-6240 (UNDER COVER FOR AIR CLEANER)
7. 321-5272 BLACK, R48491 BROWN
8. R49131 BROWN
9. 321-229
10. 321-3123 BLACK, R48488 BROWN
11. 321-5974
12. 321-6209
13. 321-3596 (BOTH SIDES OF ENGINE)

Common Decals



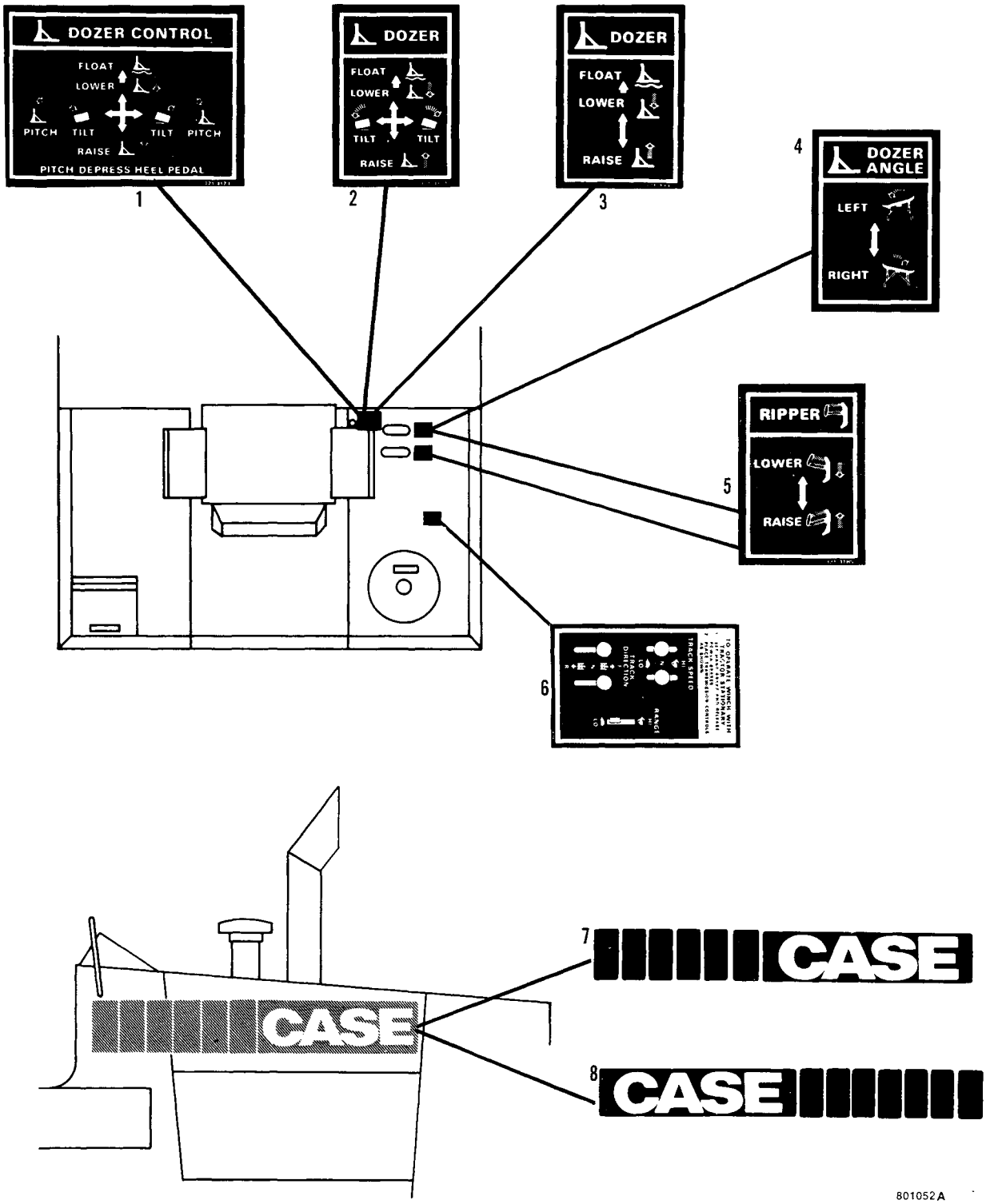
1. 321-2605
2. 321-3294
3. 321-2946 FACTORY INSTALLED
4. 321-2435
5. 321-5698
6. 321-3705
7. 321-4178
8. 321-4188
9. 321-2392
10. 321-2996
11. 321-4196
12. R48560
13. R47220 BLACK, R51640 BROWN

Common Decals



1. 321-6488
2. 321-1706
3. 321-2606
4. 321-4185
5. 321-4184
6. 321-6258
7. 321-4435
8. RIGHT SIDE 321-5274 BLACK, R48492 BROWN
9. LEFT SIDE 321-4275 BLACK, R48493 BROWN

Loader Decals



1. *321-4173*
2. *321-4181*
3. *321-4397*
4. *321-4182*
5. *321-4185*
6. *321-6258*
7. *Right Side 321-5276 Black, R48429 Brown*
8. *Left Side 321-5277 Black, R48430 Brown*

Dozer Decals

Section 1020

SPECIFICATION DETAILS

504BDT Engine

Written In *Clear And Simple English*

Rac 8-22760

Printed in U.S.A.
April, 1980

CASE CORPORATION

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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	
Cranksaft 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

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.

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													
Bolt Size		Torque Foot Pounds		Torque Newton-Meters		Torque Foot Pounds		Torque Newton-Meters		Torque Foot Pounds		Torque 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	9.53	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