SERVICE MANUAL

Loader

W36

9-66874

1. Trim along dashed line.
2. Slide into pocket on Binder Spine.

TYPE 1-4

SERVICE MANUAL

Loader

W36

9-66874

1. Trim along dashed line.
2. Slide into pocket on Binder Spine.

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SERVICE MANUAL

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SERVICE MANUAL

Loader

W36

9-66874

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2. Slide into pocket on Binder Spine.

TYPE 1-4

W36 LOADER TABLE OF CONTENTS AND SERVICE MANUAL INTRODUCTION

Table of Contents

Reprinted

Printed in U.S.A.
Issued October 1977
Revised June 1978
Revised December 1980
Revised September 1983
Reprinted April 1984

CASE CORPORATION

9-66874

Service Manual Introduction

Safety Rules

This Safety Alert Symbol Indicates Important Safety Messages In This Manual. When You See This Symbol, Carefully Read The Message That Follows and Be Alert To the Possibility Of Personal Injury Or Death. 1-1

It is our recommendation that the warning tag illustrated in Figure 1 be put on the key for the key switch whenever someone is working on the machine. Make the tag from a light, durable material. The message on the tag in Figure 1 can be copied on any office copying machine and attached to your tag.

770523

Figure 1

WARNING: *Read operator's manual to familiarize yourself with control lever functions.* 46-27

WARNING: *Operate controls from the operator's seat only.* 35-7

WARNING: *When working in the area of the fan belt with the engine running, avoid loose clothing if possible, and use extreme caution.* 35-4

WARNING: *When performing checks and tests on the equipment hydraulic system or steering system, DO NOT deviate from the written procedure.* 40-13

WARNING: *When cycling the loader lift cylinders or the bucket cylinders to check operation or to remove air from a circuit, be sure fellow workers are out of the way.* 47-13

WARNING: *After installing tire on rim (wheel), place wheel in a safety cage before inflating tires. If proper equipment is not available, have a tire repair shop do the work.* 40-5

WARNING: *This is a one man machine, no riders allowed.* 35-8

CAUTION: *When removing hardened pins such as a pivot pin, or a hardened shaft, use a soft head (brass or bronze) hammer or use a driver made from brass or bronze and a steel head hammer.* 46-17

CAUTION: *When using a hammer to remove and install pivot pins or separate parts, using compressed air or using a grinder, wear eye protection that completely encloses the eyes (approved goggles or other approved eye protectors).* 46-13

CAUTION: *When servicing or repairing the machine, keep the shop floor and operator's compartment and steps free of oil, water, grease, tools, etc. Use an oil absorbing material and/or shop cloths as required. Use safe practices at all times.* 40-8

CAUTION: *Use suitable floor (service) jacks or chain hoists to raise wheels off the floor. Always block machine in place with suitable safety stands.* 40-7

CAUTION: *Pin sized and smaller streams of hydraulic oil under pressure can penetrate the skin and result in serious infection. If hydraulic oil under pressure does penetrate the skin, seek medical treatment immediately. Maintain all hoses and tubes in good condition. Make sure all connections are tight. Make a replacement of any tube or hose that is damaged or thought to be damaged. DO NOT use your hand to check for leaks; use a piece of cardboard or wood.* 40-6-A

CAUTION: *Some components of this machine are very heavy. Use suitable lifting equipment or additional help as instructed in this service manual.* 40-10

General Information

This service manual has been prepared with the latest service information available. Trouble shooting, removal, disassembly, inspection and installation procedures coupled with complete specifications and tightening references can be found in most sections. Some sections will have exploded views without accompanying text due to the simplicity of the procedure. This service manual is one of the most important tools available to the service technician. It is an invaluable aid in properly performing any phase of service.

The terms right-hand and left-hand and front and rear as used in this manual indicate the right and left sides, and front and rear of the machine as viewed from the operator's seat for proper operation of the machine or attachment.

The information contained in this manual is current at the time of printing.

Text

If this manual covers more than one machine, or different models of component parts (planetary axles, gear boxes, control valves, etc.) the procedures will apply to all unless otherwise noted.

Table of Contents

The preceeding pages contain a Table of Contents which list the Series number and title, and the sections contained in each series. The individual sections, where required, will have a Table of Contents on the second page of that section.

Page Numbers

All page numbers consist of two sets of digits separated by a dash, such as 4002-9. The digits preceeding the dash identify the section. The digits following the dash represent the consecutive page number within that section. Page numbers will be found at the upper right or left of each page.

Illustrations

Where possible, illustrations are placed as close as possible to the accompanying text and should be used as part of the text.

Torque References

Essentially two grades of fasteners (bolts, nuts and screws) are used on Case machinery. They are grade 5 and grade 8. Refer to Section 1051 for torque specifications and means of identification.

The specifications in Section 1051 are standard torque values and should be used on all fasteners during assembly and installation unless special torque values are noted in a particualr section.

Serial and Model Numbers

When ordering repair or replacement parts it can be necessary to furnish the parts department with one or both numbers. Serial and model numbers will be found in the following locations.

Machine - serial number plate attached to right-hand instrument panel.

Engine - serial number plate attached to left-hand side of engine above the starter.

Component parts - plate attached to part or number stamped in part.

Classification of Lubricants

Oil, lubricants and grease are classified and graded according to standards recommended by the Society of Automotive Engineers (SAE), the American Petroleum Institute (API), and the National Lubricating Grease Institute (NLGI).

Engine Oil

The SAE number indicates the viscosity of engine oils, for example, SAE 30, a single grade oil. Engine oils are also identified by dual numbers, SAE 10W30, a multigrade oil.

The API classification (SD, CD, etc.) defines oil performance in terms of engine usage. Only oils specified in Section 1050 should be used. These oils contain sufficient chemical additives to provide maximum engine protection. Both the SAE grade and API designation must be found on the container.

Gear Lubricant and Grease

Gear lubricant and grease must be that specified in Section 1050,

Special Tools

There are some special tools that are needed to remove and install, disassemble and assemble, check and adjust the component parts of this machine. Some special tools are easily made locally and the necessary information to make the tool is contained in this service manual. Others are more difficult and costly to make locally and must be purchased. Use these tools as recommended in this service manual for your personal safety and to do the job correctly.

Special tools that were formerly ordered from Case Service Parts Supply are now available from Service Tools in the U.S. and from Jobborn Manufacturing Co. in Canada.

Address your orders for special tools to:

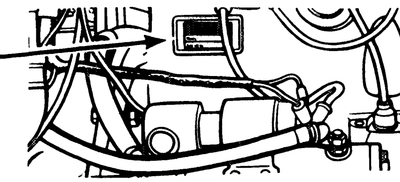
Service Tools
P.O. Box 314
Owatonna, Minnesota 55060

Jobborn Manufacturing Co.
97 Frid Street
Hamilton, Ontario L8P 4M3
Canada

Section 1010

GENERAL ENGINE SPECIFICATIONS
W36 LOADER

THE MODEL AND ENGINE SERIAL NUMBER IS STAMPED ON A PLATE LOCATED ON THE SIDE OF THE ENGINE ABOVE THE CRANKING MOTOR.



DIESEL ENGINES

General

Type	6 Cylinder, 4 Stroke Cycle, Valve-in-Head Intercooled-Turbo-Charged
Firing Order	1-5-3-6-2-4
Bore	4-5/8 Inches (117.5mm)
Stroke	5 Inches (127mm)
Piston Displacement	504 Cubic Inches (8 257cm^3)
Compression Ratio	15.8 to 1
Cylinder Sleeves	Removable Wet Type
No Load Governed Speed	2436 to 2465 RPM
Rated Engine Speed	2200 RPM
Engine Idling Speed	700 to 750 RPM
Exhaust Valve Rotators	Positive Type
*Valve Tappet Clearance (Exhaust)	(Hot) .020 Inch(0.508mm) (Cold) .025 Inch (0.635mm)
(Intake)	(Hot and Cold) .015 Inch (0.381mm)

*Hot Settings Are Made After the Engine Has Operated At Thermostat Controlled Temperature For At Least Fifteen Minutes.

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 (W/O Filter Change)	26 U.S. Qts. (24.6 litres)
With Filter Change	30 U.S. Qts. (28.4 litres)
Oil Pressure	45 to 60 PSI (310 to 414 kPa) with Engine Warm and Operating at Rated Engine Speed
Type System	Pressure and Spray Circulation
Oil Pump	Gear Type
Oil Filter (2)	Full Flow Spin on Type
Piston Oil Cooling	(From Main Bearings)Nozzle Pressure Spray

Fuel System

Fuel Injection Pump	Robert Bosch, Type PES Multiple Plunger
Pump Timing	25° Before Top Dead Center (Port Closing) IMPORTANT: Do not Advance Beyond 25° BTDC
Fuel Injectors	American Bosch 17mm Nozzles, Opening Pressure 4000 PSI (27 579 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
Hand Primer Pump	Located Top of Fuel Transfer Pump
Preliminary Fuel Filter	Located Bottom of Fuel Transfer Pump

Section
1012

DECALS AND REPAINTING

CASE CORPORATION

C.E. Div. 9-66871
October 1977

PRINTED IN U.S.A.

GENERAL INFORMATION

1. All decals relating to operation of the machine and mounted equipment must be in such condition that they can be read without difficulty. Any decal that is damaged or cannot be read must be replaced.

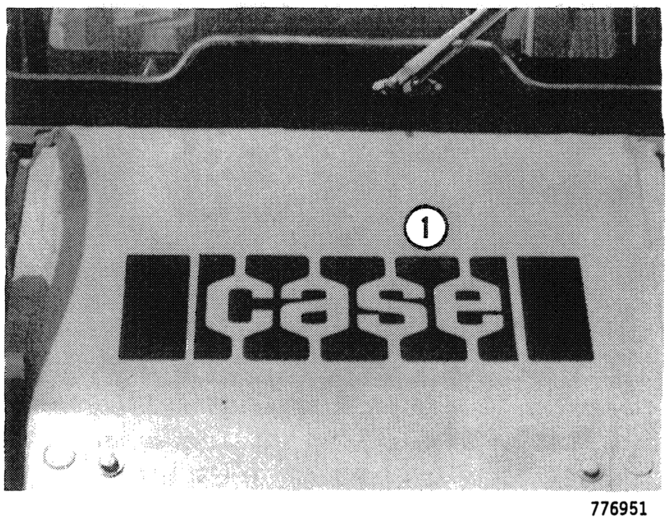
2. All decals that contain a safety message as indicated by WARNING or CAUTION must be in such condition that they can be read without difficulty. Any decal that is damaged or cannot be read must be replaced.

3. Whenever a machine or attachment is being repainted, cover good decals and remove damaged decals and decals that cannot be read. Use enamel thinner to aid in decal removal.

4. Whenever a decal is being replaced, remove the existing decal first. Use enamel thinner to aid in decal removal.

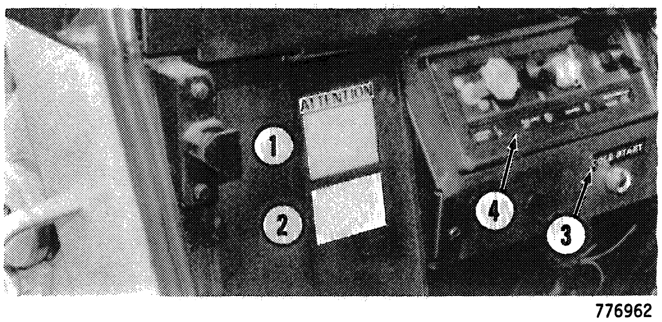
5. When repainting a machine or attachment use standard procedure; degrease, wash, sand, wiper down, mask as required and paint.

6. The following pages show decals as they are installed and their part number. Verify part number in parts catalog before ordering a decal.



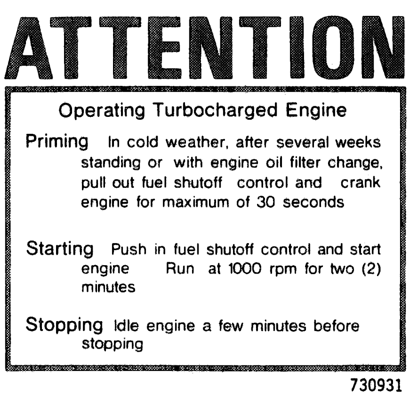
1. 321-3126

Figure 1



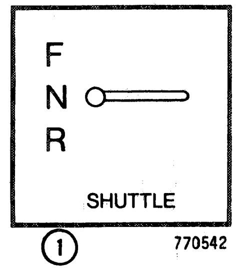
1. 321-2605 See Figure 3
2. 321-4454 See Figure 4
3. 321-2653
4. 321-3889 See Figure 5

Figure 2



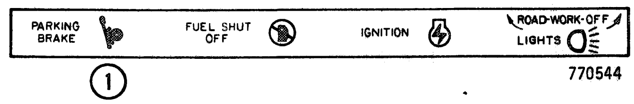
1. 321-2605 See Figure 2 For Location

Figure 3



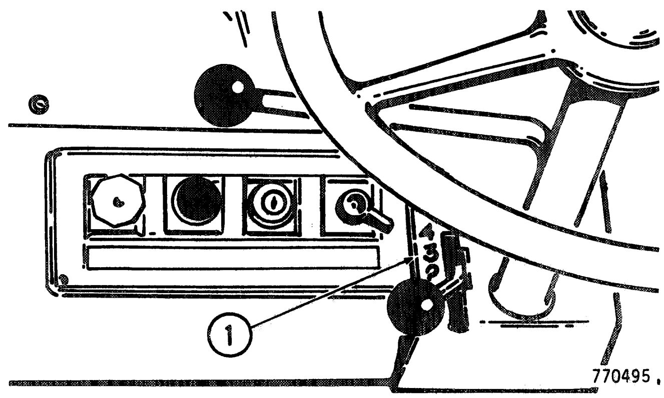
1. 321-4454 See Figure 2 For Location

Figure 4



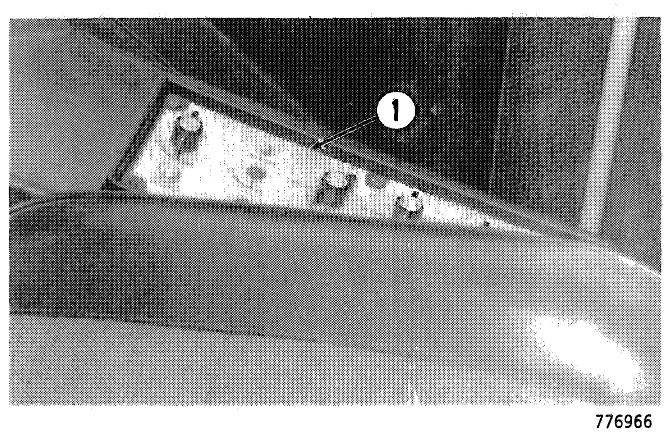
1. 321-3889 See Figure 2 For Location

Figure 5



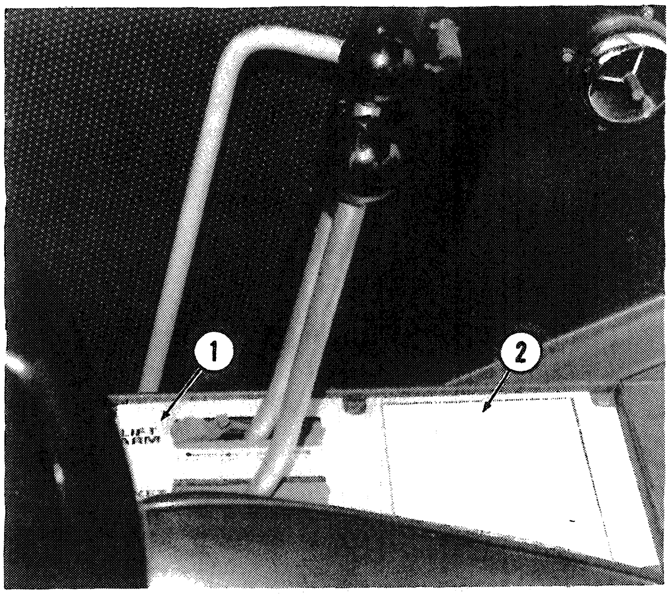
1. 321-4455

Figure 6



1. 321-4137

Figure 7



776967

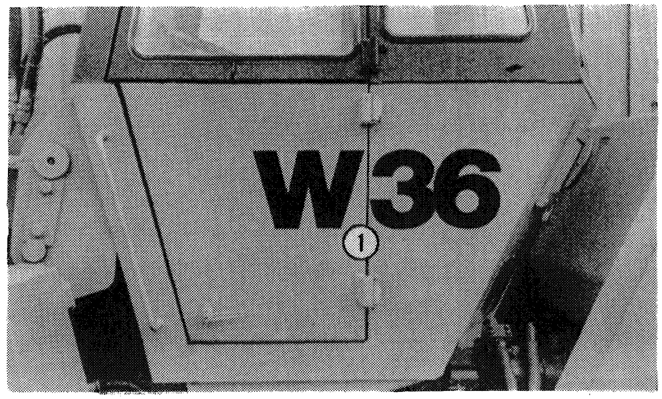
1. 321-4448 2 Spool Loader Control Valve
1. 321-4449 3 Spool Loader Control Valve
2. 321-3705 See Figure 9

Figure 8

770543

1. 321-3705 See Figure 8 For Location

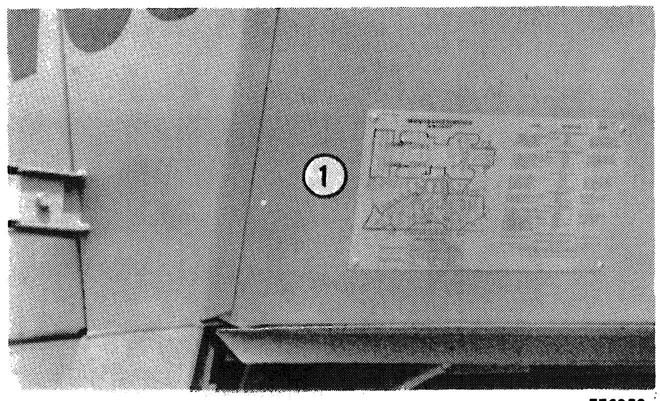
Figure 9



776958

1. 321-3584

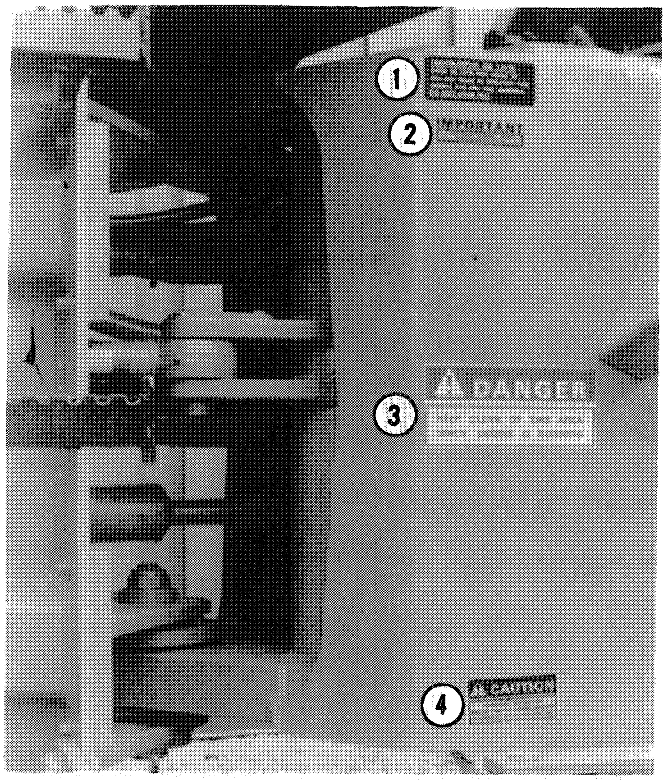
Figure 10



776952

1. 321-4308

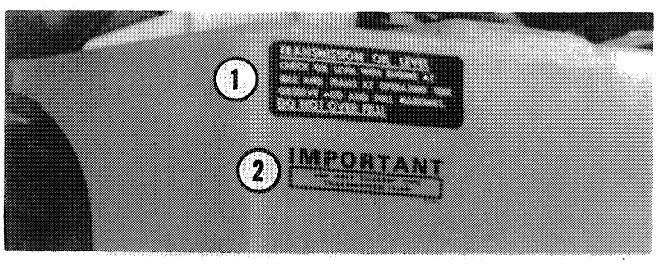
Figure 11



776959

1. 321-1980 See Figure 13
2. 321-4307 See Figure 13
3. 321-3205
4. 321-3206 See Figure 14

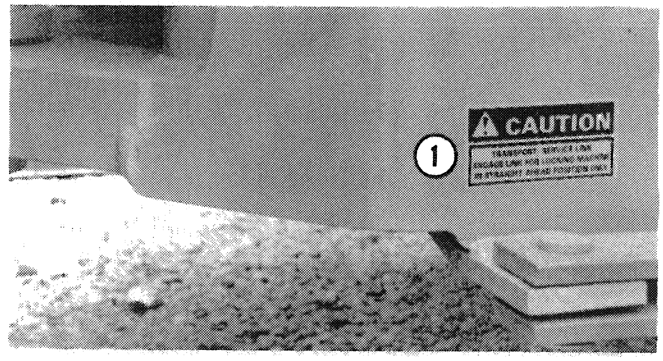
Figure 12



776960

1. 321-1980 See Figure 12 For Location
2. 321-4307 See Figure 12 For Location

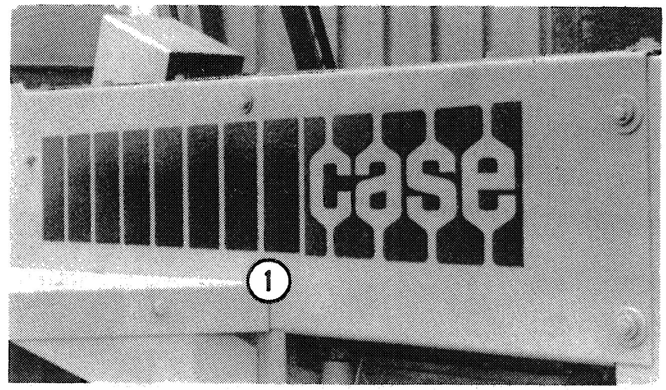
Figure 13



776961

1. 321-3206

Figure 14



776965

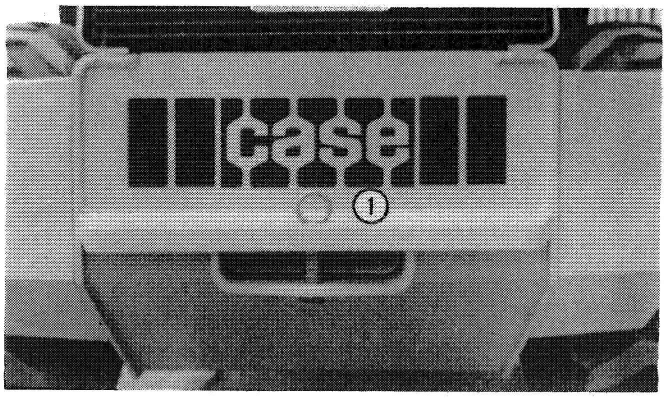
1. 321-3072

Figure 15

776964

1. 321-3569

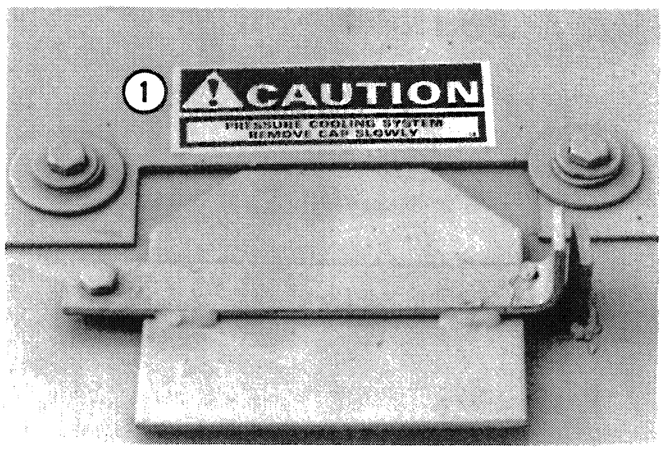
Figure 16 - Left Side of Fan Shroud



776963

1. 321-3098

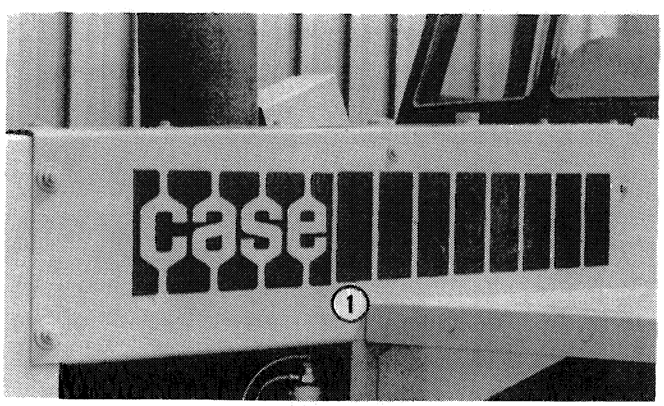
Figure 17



777103

1. 321-3061

Figure 18



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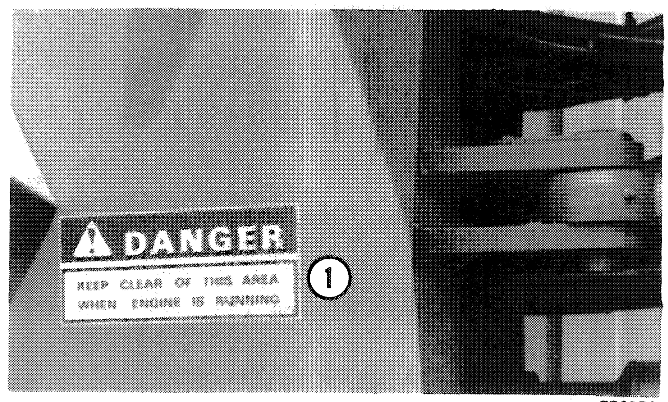
1. 321-3129

Figure 19

776955

1. 321-3569

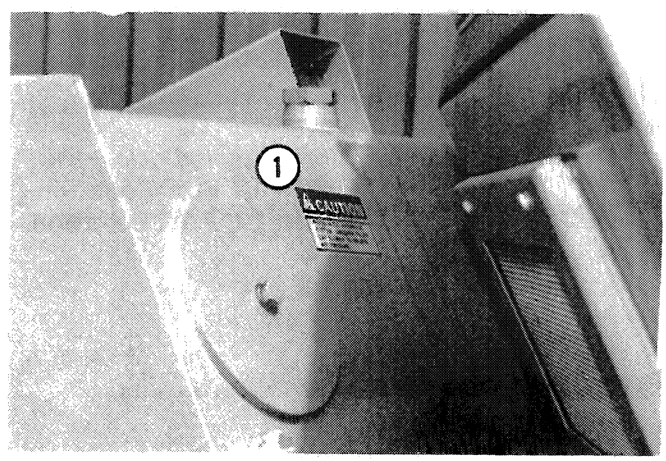
Figure 20 - Right Side of Fan Shroud



776954

1. 321-3205

Figure 21



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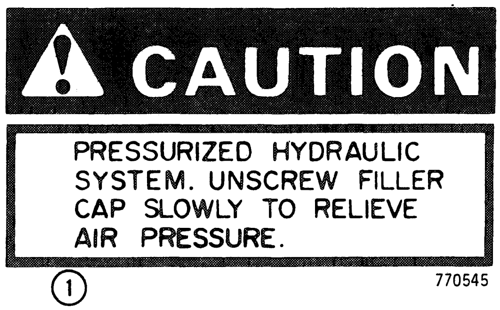
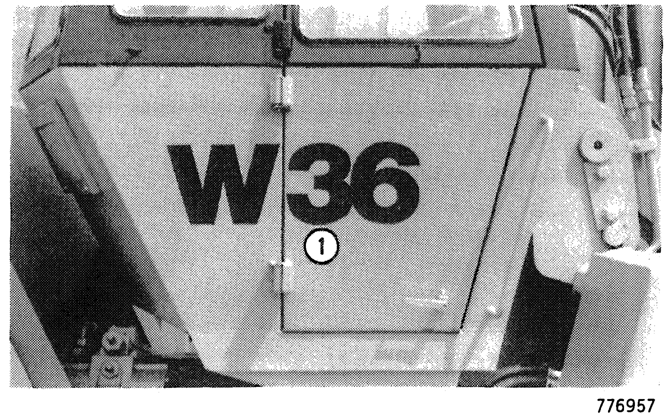
1. 321-3598 See Figure 23

Figure 22



1. 321-3598 See Figure 22 For Location

Figure 23



1. 321-3584

Figure 24

Section
1020

DETAILED SPECIFICATIONS

504BDT ENGINE

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

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RUN-IN-INSTRUCTIONS

Engine Lubrication

When the engine rebuild is complete, fill the engine crankcase with Case HDM oil and install new engine oil filters. **NOTE:** If Case HDM oil is not used, use only a Series 3 DS or CD Service Classification oil that has the proper viscosity rating for prevailing air temperature. Refer to vehicle Operators Manual.

After the first 20 hours of operation, change the engine oil while the engine is hot and replace the the engine oil filter/s. DO NOT DRAIN OIL UNTIL THE ENGINE HAS BEEN OPERATED 20 HOURS.

Change the engine oil and filter/s at the recommended intervals thereafter as outlined in the Operator's Manual.

Break-In Procedure for Rebuilt Engines (With a Dynamometer)

The following procedure must be implemented when using a PTO dynamometer to break-in the engine. The dynamometer will insure control of the engine load at each speed and will eliminate over stressing new parts during break-in.

During the break-in, continually check the oil pressure, coolant level, and coolant temperature.

STEP	TIME	ENGINE SPEED	DYNAMOMETER SCALE LOAD*
1	**10 Minutes	1000 RPM	None
2	**10 Minutes	1800 RPM	None
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	Retorque the cylinder head bolts using the procedure described in Section 2015 of this service manual.		

*Based upon normal dynamometer scale load at rated speed for the particular vehicle model. Reduce this scale load as indicated.

**The most ideal break-in procedure would be to constantly vary the throttle between 750 to 1000 RPM for the first 10 minutes and from 1000 RPM to 1800 RPM for the next 10 minutes. The purpose of this changing RPM is to vary the lubrication and coolant flow.

***30 minutes at 3/4 load is a minimum amount of time the engine should be run. It is recommended that whenever possible the engine (especially turbocharged diesels) should 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.

Break-In Procedure for Rebuilt Engines (Without a Dynamometer)

STEP	TIME	ENGINE SPEED	LOAD
1	*10 Minutes	1000 RPM	None
2	*10 Minutes	1800 RPM	None
3	30 Minutes	2/3 Rated RPM	Light Load
4	1 Hour	Full RPM (not over 2000 RPM)	80 to 90%
5	Retorque the cylinder head bolts using the procedure described in Section 2015 of this service manual.		

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

Run-In Procedure (Agricultural Tractors)

For the first 8 hours of field operation stay one gear lower than normal. For the next 12 hours DO NOT "lug" the engine. Prevent "lugging" by shifting to a lower gear. The engine must not be "lugged" below its Rated Engine RPM during the early hours of life.

Run-In Procedure (Construction Equipment)

For the first 8 hours, operate the engine at full throttle maintaining a normal load. DO NOT baby the engine, but avoid prolonged converter or hydraulic stall. Engine must not be "lugged" below its Rated Engine RPM (Do not exceed 10 seconds of stall).

Run-In Procedure (Power Units)

For the first 1/2 hour, operate engine at 2/3 rated RPM with a light load or no load. For the next (1) hour, run engine at 80 to 90% load at rated RPM (but not over 2000 RPM). Then full load and rated RPM as required in application.

DETAILED ENGINE SPECIFICATIONS

Cylinder Sleeves

	U.S. Value	Metric Value
Type	Replaceable, Wet	
Material	Cast Iron	
I.D. of sleeve	4.6250 to 4.6263″	117.475 to 117.508mm
Maximum Serviceable Limit	4.6363″	117.762mm
Sleeve out of round (installed in block)	.001″ max.	.025mm max.
Maximum Serviceable Limit	.002″ max.	.051mm max.
Taper (installed in block)	.001″	.025mm
Maximum Serviceable Limit	.007″	.178mm
Clearance to bottom of piston skirt, 90° to piston pin	.0052 to .0075″	.132 to .19mm
Maximum Serviceable Limit	.0100″	.254mm

Piston

	U.S. Value	Metric Value
Type	Cam ground	
Materal	Aluminum Alloy	
O.D. at bottom of skirt, 90° to piston pin	4.6188 to 4.6198″	117.317 to 117.343mm
Minimum Serviceable Limit	4.6178″	117.292mm
I.D. of piston pin bore	1.8001 to 1.8005″	45.722 to 45.733mm
Maximum Serviceable Limit	1.8015″	45.758mm
Width of 1st ring groove	Not Measurable	
Width of 2nd ring groove	Not Measurable	
Width of 3rd ring groove	.188 to .189″	4.775 to 4.801mm
Maximum Serviceable Limit	.191″	4.851mm

Piston Rings

	U.S. Value	Metric Value
No. 1 Compression (chrome)	Keystone	
End gap in 4.625 I.D. (117.475mm) sleeve	.015 to .025″	.381 to .635mm
Maximum Serviceable Limit	.035″	.889mm
No. 2 Compression (chrome)	Keystone	
End gap in 4.625 I.D. (117.475mm) sleeve	.015 to .025″	.381 to .635mm
Maximum Serviceable Limit	.035″	.889mm
End Gap in 4.625 I.D. (117.475mm) sleeve (Intercooled Eng.)	.020 to .030″	.508 to .762mm
Maximum Serviceable Limit (Intercooled Eng.)	.040″	1.02mm
No. 3 Oil Control Ring	Two Piece	
Width	.1860 to .1865″	4.724 to 4.737mm
End gap in 4.625 I.D. (117.475mm) sleeve	.016 to .026″	.406 to .66mm
Maximum Serviceable Limit	.036″	.914mm
Side clearance	.0015 to .003″	.038 to .076mm
Maximum Serviceable Limit	.005″	.127mm

Piston Pin

	U.S. Value	Metric Value
Type	Full Floating	
O.D. of pin	1.7994 to 1.7996″	45.705 to 45.71mm
Fit in piston	.0005 to .0011″	.013 to .028mm
Fit in rod bushing	.0008 to .0014″	.020 to .035mm

Connecting Rod

Bushing	Replaceable	
Bushing I.D. installed (ream to size)	1.8004 to 1.8008″	45.73 to 45.74mm
Maximum Serviceable Limit	1.8018″	45.766mm
Bushing out of round	.0015″	.038mm
Bearing liners	Replaceable	
Bearing liner width	1.586 to 1.596″	40.284 to 40.538mm
Journal I.D. without bearing liners	3.1503 to 3.1513″	80.018 to 80.043mm
Bearing oil clearance	.0013 to .038″	.033 to .965mm
Maximum Serviceable Limit	.005″	.127mm
Undersize bearings for service	.002,.010,.020,.030″	.051, .254, .508, .762mm
Side clearance	.007 to .016″	.178 to .406mm

Crankshaft

Type	Balanced	
Main bearing liners	Replaceable	
End play, No. 5 main bearing cap	.003 to .012″	.076 to .305mm
Maximum Serviceable Limit	.020″	.508mm
Thrust bearing std. thickness	.155 to .157″	3.937 to 3.988mm
Minimum Serviceable Limit	.147″	3.734mm
Thrust bearing oversize thickness for service	.161 to .163″	4.089 to 4.14mm
Minimum Serviceable Limit	.153″	3.886mm
Connecting rod journal std. O.D.	2.998 to 2.999″	76.149 to 76.175mm
.010″ (.254mm) O.D. undersize, grind to	2.988 to 2.989″	75.895 to 75.921mm
.020″ (.508mm) O.D. undersize, grind to	2.978 to 2.979″	75.641 to 75.667mm
.030″ (.762mm) O.D. undersize, grind to	2.968 to 2.969″	75.387 to 75.413mm
Connecting rod journal maximum taper	.0015″	.038mm
Journals out of round	.0005″	.013mm
Main bearing liner width 1st, 3rd, 5th and 7th	2.1515 to 2.1615″	54.648 to 54.902mm
Main bearing liner width 2nd, 4th and 6th	1.214 to 1.224″	30.836 to 31.09mm
Undersize main bearing liners for service	.002,.010,.020,.030″	.051,.254,.508,.762mm

Crankshaft (Cont'd)

	U.S. Value	Metric Value
Main bearing oil clearance	.0016 to .0046″	.041 to .117mm
Maximum Serviceable Limit	.006″	.152mm
Main bearing journal std. O.D.	3.498 to 3.499″	88.849 to 88.875mm
.010″ (.254mm) O.D. undersize, grind to	3.488 to 3.489″	88.595 to 88.621mm
.020″ (.508mm) O.D. undersize, grind to	3.478 to 3.479″	88.341 to 88.367mm
.030″ (.762mm) O.D. undersize, grind to	3.468 to 3.469″	88.087 to 88.113mm
Main bearing journal bore I.D. without liners	3.691 to 3.692″	93.751 to 93.777mm
Main journal width between cheeks:		
2nd, 4th and 6th	1.618 to 1.633″	41.097 to 41.478mm
3rd	2.555 to 2.570″	64.897 to 65.278mm
5th	2.561 to 2.565″	65.049 to 65.151mm
7th	2.5855 to 2.6005″	65.671 to 66.053mm
Connecting rod journals, width between cheeks	1.9775 to 2.0025″	50.228 to 50.863mm

Camshaft

	U.S. Value	Metric Value
Type	Parabolic	
Bushing	5, Replaceable	
Bushing Lubrication	Pressurized	
Oil Clearance	.0014 to .0054″	.035 to .137mm
Maximum Serviceable Limit	.0124″	.315mm
I.D. of bushing	2.2484 to 2.2514″	57.109 to 57.185mm
Maximum Serviceable Limit	2.2554″	57.287mm
Bushing width:		
1st (front)	1.646 to 1.666″	41.808 to 42.316mm
2nd, 3rd and 4th	1.4275 to 1.4475″	36.258 to 36.766mm
5th	1.1462 to 1.1662″	29.113 to 29.621mm
O.D. of each bearing surface	2.246 to 2.247″	57.048 to 57.074mm
Minimum Serviceable Limit	2.242″	56.947mm
Thrust washer thickness	.1225 to .1275″	3.111 to 3.238mm
Minimum Serviceable Limit	.1105″	2.807mm
Thrust plunger spring:		
Free length	3.625″	92.075mm
O.D. of spring	.3912 to .4062″	9.936 to 10.317mm
Compressed to 2.750″ (69.85mm)	45 to 55 lbs.	200 to 245 N

Valve Push Rod Lifters

	U.S. Value	Metric Value
Type	Mushroom	
O.D. of lifter stem, standard	.8097 to .8102″	20.566 to 20.579mm
O.D. of lifter stem, oversize for service	.8190 to .8195″	20.803 to 20.815mm
I.D. of block bore, standard	.8118 to .8130″	20.62 to 20.65mm
Maximum Serviceable Limit	.8145″	20.688mm
I.D. of block bore, oversize for service	.8215 to .8225″	20.866 to 20.891mm

Gear Train

Backlash:		
Crankshaft gear to camshaft gear	.004 to .011″	.102 to .279mm
Idler drive gear to idler gear	.003 to .010″	.076 to .254mm
Idler gear to fuel pump gear	.004 to .012″	.102 to .305mm
Crankshaft gear to oil pump idler gear	.006 to .011″	.152 to .279mm
Crankshaft gear to fuel pump gear	.027″ max.	.686mm max.
O.D. of idler gear shaft	1.7325 to 1.7330″	44.005 to 44.018mm
Minimum Serviceable Limit	1.732″	43.993mm
I.D. of idler gear bushing	1.7345 to 1.7355″	44.056 to 44.082mm
Maximum Serviceable Limit	1.740″	44.196mm
Idler gear thrust washer thickness	.057 to .063″	1.448 to 1.6mm
Idler gear end play	.010″ max.	.254mm max.

Oil Pump

Positive displacement pump	Gear Type	
Backlash:		
Pump gear to crankshaft gear	.006 to .011″	.152 to .279mm
Pump idler gear to pump drive gear	.003 to .008″	.076 to .203mm
Drive gear to pump body clearance	.005 to .010″	.127 to .254mm
Pump drive gear thickness	.700″	17.78mm
Pump idler gear thickness	.742 to .744″	18.847 to 18.898mm
Pump gears to body radial clearance	.009″ max.	.229mm max.
Pump gears to pump cover clearance	.008″ max.	.203mm max.
Oil pressure	45 to 60 PSI	310 to 414 kPa
Relief valve spring:		
No. of coils	11.2	
Wire dia.	.106″	2.692mm
Minimum I.D.	.625″	15.875mm
Free length	2.874″	72.3mm
Compress to 1.89″ (48mm)	44.96 to 49.7 lbs.	200 to 221 N

Oil Pump (Cont'd)

	U.S. Value	Metric Value
Safety valve inner spring:		
No. of coils	16.5	
Wire dia.	.086″	2.184mm
I.D.	.480″	12.192mm
Free length	3.106″	78.892mm
Compress to 1.86″ (47.2mm)	33.6 to 37.2 lbs.	149.5 to 165.5 N
Safety valve outer spring:		
No. of coils	9.25	
Wire dia.	.082″	2.083mm
Minimum I.D.	.686″	17.424mm
Free length	2.442″	62.027mm
Compress to 1.2″ (30.5mm)	23.5 to 25.9 lbs.	104.5 to 115.2 N

Cylinder Head

Warpage	.005″ max.	.127mm max.

Exhaust Valve

Tappet clearance (COLD)	.025″	.635mm
Tappet clearance (HOT)	.020″	.508mm
Face angle	44^0	44^0
Face run-out	.002″ max.	.051mm max.
O.D. of head	1.745 to 1.755″	44.323 to 44.577mm
O.D. of stem	.402 to .403″	10.211 to 10.236mm
Minimum Serviceable Limit	.400″	10.16mm
O.D. of taper at 4.2675″ (108.395mm)	.401 to .402″	10.185 to 10.211mm
Minimum Serviceable Limit	.399″	10.135mm
Length	6.4195 to 6.4405″	163.055 to 163.589mm
Length (A150225 Stamped on Valve)	6.4222 to 6.4378″	163.124 to 163.520mm
Insert seat angle	45^0	45^0
Seat contact width	.0800 to .1000″	2.032 to 2.54mm
Seat run-out	.002″ max.	.051mm max.
Insert height	.313 to .316″	7.95 to 8.026mm
O.D. of insert	1.9455 to 1.9465″	49.416 to 49.441mm
I.D. of insert	1.571 to 1.577″	39.903 to 40.056mm

Intake Valve

Tappet clearance (HOT and COLD)	.015″	.381mm
Face angle	29^0	29^0
Face run-out	.002″ max.	.051mm max.
O.D. of stem	.402 to .403″	10.211 to 10.236mm
Minimum Serviceable Limit	.400″	10.16mm

Intake Valve (Cont'd)

	U.S. Value	Metric Value
O.D. of head	1.995 to 2.005″	50.673 to 50.927mm
Length	6.4195 to 6.4405″	163.055 to 163.589mm
Seat angle	30°	30°
Seat contact width	.0750 to .1000″	1.905 to 2.54mm
Seat run-out	.002″ max.	.051mm max.
Insert height	.2650 to .2685″	6.731 to 6.82mm
O.D. of insert	2.0990 to 2.1000″	53.315 to 53.34mm
I.D. of insert	1.777 to 1.787″	45.136 to 45.39mm

Intake and Exhaust Valve Guides

Length	3.219″	81.763mm
O.D. of guide	.7510 to .7515″	19.075 to 19.088mm
I.D. of guide (installed and reamed)	.4045 to .4055″	10.274 to 10.3mm
Maximum Serviceable Limit	.4065″	10.325mm
Protrusion above cylinder head	.953	24.206mm

Valve Spring

Free length (With White Stripe)	2.18″	55.37mm
Free length (With Green Stripe)	2.28″	57.91mm
No. of coils (With White Stripe)	7.25	
No. of coils (With Green Stripe)	7.75	
Wire dia. (With White Stripe)	.192″	4.877mm
Wire dia. (With Green Stripe)	.171″	4.343mm
Compress to 1.48″ (30.48mm) Valve open (W/White Stripe)	153 to 167 lbs.	681 to 743 N
Compress to 1.48″ (30.48mm) valve open (W/Green Stripe)	135 to 145 lbs.	600 to 645 N
Compress to 1.94″ (49.28mm) valve closed (W/White Stripe)	50.5 to 60.5 lbs.	225 to 269 N
Compress to 1.94″ (49.28mm) valve closed (W/Green Stripe)	40 to 50 lbs.	178 to 222 N

Rocker Arm Assembly

O.D. of shaft	.872 to .873″	22.149 to 22.174mm
I.D. of arm bore	.8745 to .8755″	22.212 to 22.238mm
Shaft assembly end play (both ends)	.010 to .030″	.254 to .762mm
Shaft spring:		
No. of working coils	4	
Wire dia.	.080″	2.032mm
Compress to 1.562″ (39.67mm)	8.5 to 11.5 lbs.	37.8 to 51.2 N
Lubrication	Engine oil, camshaft metering.	
Shaft oil holes	Toward valve side of engine. Shaft cannot be rotated.	

Intake Valve Timing

Valve Timing .... With No. 1 intake valve lash set at .015″ (.381mm) and dial indicator on No. 1 valve retainer, .053″ (1.346mm) movement of valve from seat (CW pulley rotation) gives 7^0 ATDC timing indication on crank pulley.

SPECIAL TORQUES

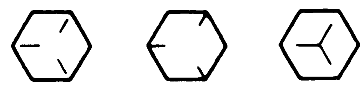
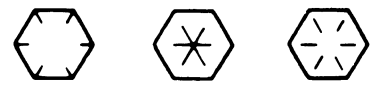
	U.S. Value	Metric Value
Camshaft nut w/clipped washer	95 to 105 ft. lbs.	129 to 142 Nm
Camshaft nut w/hardened washer	195 to 205 ft. lbs.	264 to 278 Nm
Connecting rod bolts (lube threads and underside of bolt head with 30W oil	105 ft. lbs.	142 Nm
Crankshaft pulley bolt	100 to 110 ft. lbs.	136 to 149 Nm
Crankshaft main bearing bolts w/o washers	145 to 155 ft. lbs.	197 to 210 Nm
Crankshaft main bearing bolts w/ hardened washers	200 to 210 ft. lbs.	271 to 285 Nm
Cylinder block oil cooler outlet cover screw	35 to 42 ft. lbs.	47 to 57 Nm
Cylinder head bolts	200 to 210 ft. lbs.	271 to 285 Nm
Cylinder head cover stud nut	8 to 10 ft. lbs.	11 to 14 Nm
Flywheel to crankshaft bolts	180 to 190 ft. lbs.	244 to 258 Nm
Intake and exhaust manifold studs	25 to 30 ft. lbs.	34 to 41 Nm
Intake manifold hex. nuts (std.)	25 to 30 ft. lbs.	34 to 41 Nm
Intake manifold hex. nuts (heavy)	35 to 42 ft. lbs.	47 to 57 Nm
Exhaust manifold hex. nuts	25 to 30 ft. lbs.	34 to 41 Nm
Oil pan capscrews	13 to 17 ft. lbs.	18 to 23 Nm
Oil pan drain plug (copper or nylon)	29 to 31 ft. lbs.	39 to 42 Nm
Oil pump idler gear shaft bolt	40 to 45 ft. lbs.	54 to 61 Nm
Oil pump suction tube nut	90 to 100 ft. lbs.	122 to 136 Nm
Rocker arm adjusting screw locknut	20 to 25 ft. lbs.	27 to 34 Nm
Rocker arm bracket stud nut or bolt	40 to 45 ft. lbs.	54 to 61 Nm
Water pump and fan shaft nut (std.)	60 to 70 ft. lbs.	81 to 95 Nm
Water pump and fan shaft crownlock nut	45 to 50 ft. lbs.	61 to 68 Nm

Engine oil filter .... Install until gasket contacts filter head, then hand tighten an additional 1/2 turn. Loosen filter approximately 1 full turn, then retighten until gasket contact is made and hand tighten an additional 1/2 to 3/4 turn.

GENERAL TORQUE SPECIFICATION TABLE (Revised 11-73)

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.		5				8 *			
Bolt head identification marks as per grade NOTE: Manufacturing Marks Will Vary									
		Torque				Torque			
Bolt Size		Foot Pounds		Newton-Meters		Foot Pounds		Newton-Meters	
Inches	Millimeters	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
1/4	6.35	9	11	12.2	14.9	12	15	16.3	20.3
5/16	7.94	17	20.5	23.1	27.8	24	29	32.5	39.3
3/8	9.53	35	42	47.5	57.0	45	54	61.0	73.2
7/16	11.11	54	64	73.2	86.8	70	84	94.9	113.9
1/2	12.70	80	96	108.5	130.2	110	132	149.2	179.0
9/16	14.29	110	132	149.2	179.0	160	192	217.0	260.4
5/8	15.88	150	180	203.4	244.1	220	264	298.3	358.0
3/4	19.05	270	324	366.1	439.3	380	456	515.3	618.3
7/8	22.23	400	480	542.4	650.9	600	720	813.6	976.3
1	25.40	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

NOTE: Case Company 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.

Section 1050

MAINTENANCE AND LUBRICATION

CASE CORPORATION

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