SERVICE MANUAL

Tractor

1470

Traction King

9-85831

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

TYPE 1-4

SERVICE MANUAL

Tractor

1470

Traction King

9-85831

1. Trim along dashed line.
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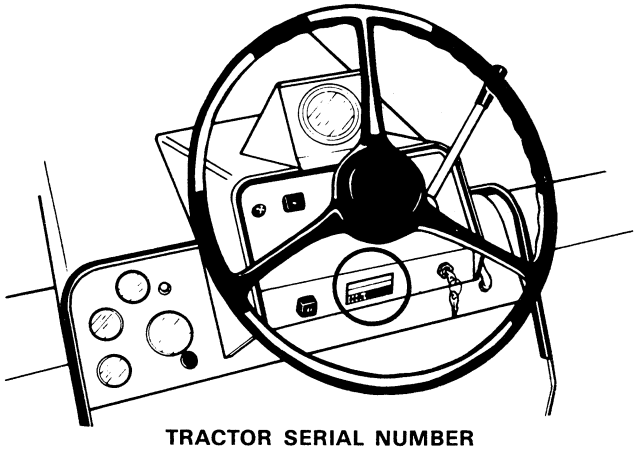
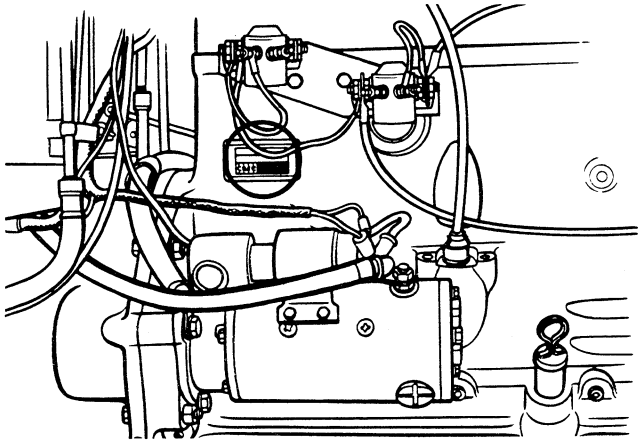
Section 11

GENERAL SPECIFICATIONS 1470 TRACTORS

SERIAL NUMBERS



TRACTOR SERIAL NUMBER



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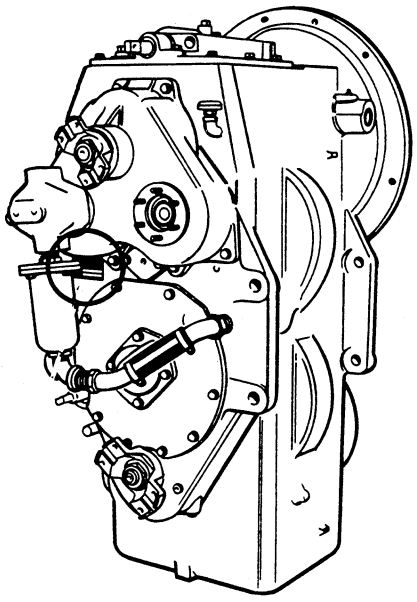
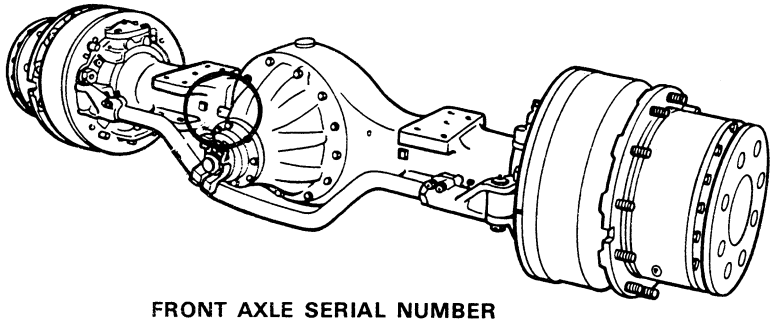
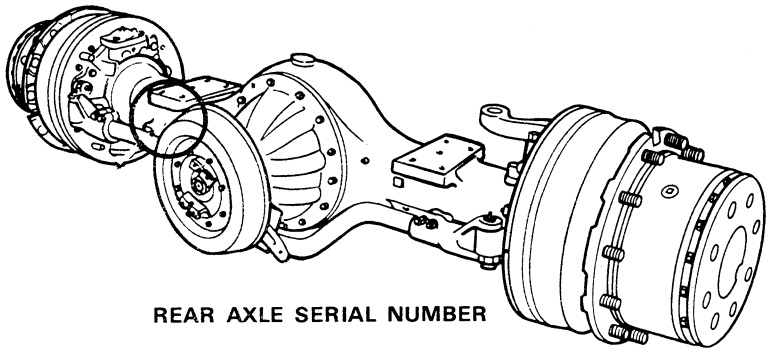


TRANSMISSION SERIAL NUMBER



FRONT AXLE SERIAL NUMBER



REAR AXLE SERIAL NUMBER

RAC. FORM 9-80141

PRINTED IN U.S.A.

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
Stroke ..... 5 Inches
Piston Displacement ..... 504 Cubic Inches
Compression Ratio ..... 16.5 to 1
Cylinder Sleeves ..... Removable Wet Type
No Load Governed Speed ..... 2160 RPM
Rated Engine Speed ..... 2000 RPM

Engine Idling Speed ..... 750 RPM
*Valve Tappet Clearance (Exhaust) ..... (Hot) .020 Inch
(Cold) .015 Inch
(Intake) ..... (Hot and Cold) .015 Inch

*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 Alloy Liners.

Main Bearings

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

Engine Lubricating System

Oil Pressure ..... 45 to 55 Pounds with Engine Warm and Operating at Rated Engine Speed.
Type System ..... Pressure and Spray Circulation
Oil Pump ..... Gear Type
Oil Filter ..... Full Flow Spin on Type

Fuel System

Fuel Injection Pump ..... Robert Bosch, Type PES(Multiple Plunger).
Pump Timing ..... 29 Degrees Before Top Dead Center (Port Closing).
Fuel Injectors ..... Pencil Type (Opening Pressure 2800 PSI).

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

Fuel Tank Water Trap and Drain ..... Located in Base of Fuel Tank

Fuel Tank Capacity ..... 100 U.S. Gallons

Fuel Level Gauge ..... Float, Located on Top of Fuel Tank.

GENERAL SPECIFICATIONS

Cooling System

Capacity ..... 40 U.S. Quarts

Type of System ..... Pressurized Thermostat Controlled By-Pass Type; Forced Circulation (Impeller Type Pump).

Thermostat ..... Starts to Open at Approximately 179^{0}F. Fully Open at 202^{0}F.

Pressure Cap ..... 7 PSI

Radiator Shutter ..... Available

When using a properly operating pressure cap, the engine temperature can safely rise to 230^{0}F.

Electrical System

Type of System - Diesel ..... 24 Volt Negative Ground

Batteries ..... (2) 12 Volt Batteries Connected in Series Group Size 30H, Rated at 1.255 to 1.265 Specific Gravity. Discharge Rate 300 Amps at 0^{0}F. Voltage drops to 9.2 after 10 seconds. Voltage drops 1.0 Volt per cell after 5 minutes.

Alternator ..... 24 Volt 35 Amp Output

Voltage Regulator ..... 24 Volt, Transistor

Starter Motor ..... 24 Volt with Solenoid Switch

Lights (4) Front Driving and Flood ..... 24 Volt 50 Watt, Sealed Beam

Lights (2) Rear Flood ..... 24 Volt 50 Watt, Sealed Beam

Amber Warning Lights (2) ..... 24 Volt, Double Face, Flasher Type

Rear Warning Lights (2) ..... 24 Volt, Combination Stop and Tail Light

Parking Brake

Type ..... Cable Actuated by Orchlin Type Handle - Adjustable from Operator's Seat.

Hydraulic Brakes

Type ..... Hydraulic, Self-Adjusting Caliper Disc Type

Transmission

Type ..... Constant Mesh, Mechanical

Gear Selection ..... 8 Speeds Forward 4 Speeds Reverse

Shifting ..... Mechanical With Shifter Forks and Shifter Hubs

Power Steering

Front Steering ..... Hydrostatic

Rear ..... Single Double Acting Cylinder
With Dual Cylinders Available

Pump Capacity at 2000 RPM ..... 12.5 GPM

Relief Valve Pressure ..... 1350 to 1450 PSI

Remote Hydraulic System

Pump ..... Positive Gear Type, Continuous Running.

Type Valve ..... Dual Valve-Individual Hand Lever Control.

Portable Cylinder Coupling ..... Case Quick Detachable Break-Away Type

Pump Capacity at 2000 Engine RPM ..... 15.5 GPM

Relief Valve Pressure ..... 2050 to 2250 PSI

Portable Cylinders ..... Available

Power Take-Off

Type ..... Hydraulically Operated

Rotation ..... Clockwise

Spline Size..... 21 Splines ..... 1-3/8" Dia.

Engine Speed 2000 RPM ..... 1000 RPM Shaft Speed

Drawbar

Standard or Yoke Type ..... Full Swinging Roller Mounted.
Will Accommodate a 1-1/2 Inch Dia. Pin.

Draft-O-Matic System

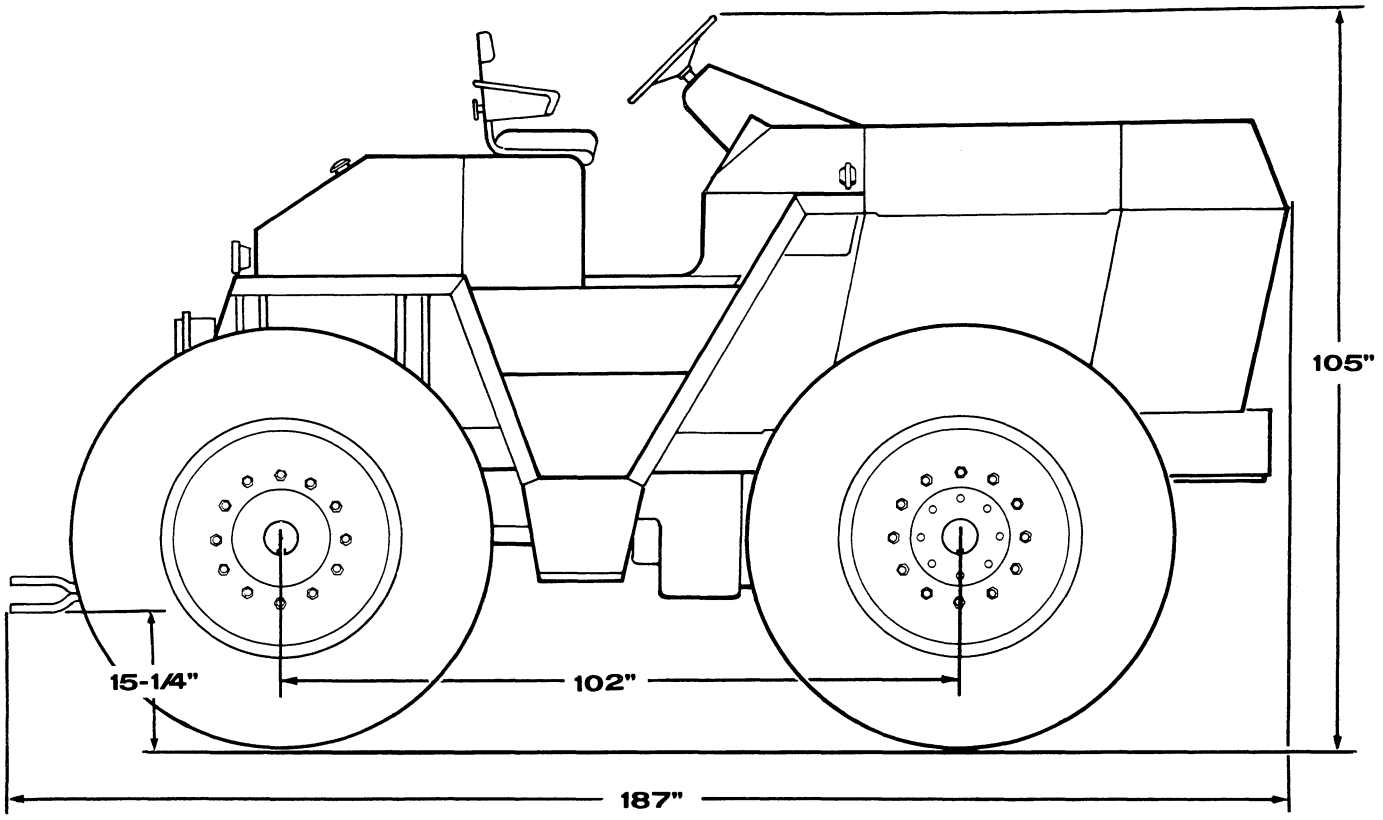
Type Control ..... Hand Lever with Adjustable Stops

Type Valve ..... 3 Positions - Raise - Hold - Lower

Type Draft Arms ..... Swinging, with Manual Float Adjustment

Type Hitch ..... 3 Point Category III

APPROXIMATE OVERALL MEASUREMENTS



Height over Steering Wheel	105"
Width over Tires (18.4 x 34)	96"
Overall Length	187"
Wheel Base	102"
Ground Clearance	15-1/4"
Approximate Weight	14,500 Lbs.
Tread - Front & Rear	77"

Turning Radious

Minimum Turning Radious	16'8"

Wheels, Tires and Pressures

Both Front & Rear 6 Ply	18.4 x 30 - 18 PSI
Both Front & Rear 6 Ply	18.4 x 34 - 18 PSI
Both Front & Rear 8 Ply	23.1 x 26 - 18 PSI
Both Front & Rear 10 Ply	28.1 x 26 - 16 PSI
Wheel Lug Nut Torque	250 Ft. Lbs.

APPROXIMATE TRAVEL SPEEDS IN MPH

FORWARD

First	2.46
Second	3.14
Third	4.10
Fourth	5.22
Fifth	6.54
Sixth	8.36
Seventh	10.88
Eighth	13.93

REVERSE

First	3.82
Second	4.87
Third	10.16
Fourth	12.95

NOTE: MPH RATINGS ARE TAKEN WITH 18.4 X 34 TIRE AND AT RATED ENGINE SPEED. NORMAL TRANSPORT SPEEDS ARE 10% HIGHER.

FUEL SPECIFICATIONS

Case diesel engines are designed to operate most efficiently when using a Number 2 Diesel Fuel. Most well known refiners and distributors market a good grade of Diesel Fuel and there should be no difficulty in obtaining it.

Do not confuse number 2 Diesel Fuel with Number 2 Furnace Oil, as this does not always meet the fuel specifications for diesel engines.

Specifications for Suitable Number 2 Diesel Fuel

A.P.I. Gravity (Minimum)	30
Pour Point (Maximum)	10^0Fahrenheit below ambient operating temperature.
Distillation (90% Point)	540^0 - 625^0 Fahrenheit
Distillation (End Point)	675^0 Fahrenheit
Flash Point (Minimum)	125^0Fahrenheit or legal
Kinematic Viscosity, centistokes @ 100^0 Fahrenheit	2.0 - 4.3 Seconds*
Cetane No. (Minimum)	40 (45 - 55 For Winter or high altitude use)
Water and Sediment Vol. (Maximum)	.05%
Ash, Wt. (Maximum)	.01%
Sulphur, Wt. (Maximum)	.5%

Carbon Residue on 10% (Maximum) 2%

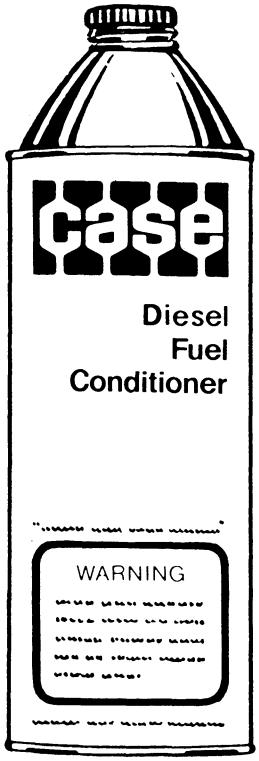
Corrosion, Copper Strip, 3 hrs. @ 212^0 Fahrenheit ..... No. 3

(*32-40 Saybolt Universal Seconds)

NOTE: The use of Number 1 Diesel Fuel, which is lighter fuel, may result in a loss of engine power and also increased fuel consumption because it has less heat content and a lower viscosity than Number 2 Diesel Fuel.

FUEL CONDITIONER

Case Diesel Fuel Conditioner is recommended for use in all Case Diesel engine fuel system. The fuel conditioner should be used as directed on the container.



Case Diesel Fuel Conditioner

Prevents gummy deposits from forming in the fuel system.
Improved lubrication to the upper internal parts of the engine.
Eliminates fouling of injector nozzles, valves and manifolds.
Helps keep condensation suspended in the fuel, allowing it to be burned with the fuel.
Maintains a higher degree of fuel combustion and engine performance from fuel the engine burns.

Section 12

DETAILED SPECIFICATIONS

1470 TRACTOR

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RAC. FORM 9-85652

PRINTED IN U.S.A.

504BDT Engine

Type ..... CASE full diesel, 6 cylinder 4 stroke cycle Valve-in-head engine.

Cylinder Heads ..... Multiple cylinder heads can be removed individually for Servicing (2 cylinders per head).

Firing Order 1-5-3-6-2-4

Bore ..... 4-5/8 Inches

Stroke ..... 5 Inches

Piston Displacement ..... 504 Cubic inches

Compression ratio ..... 16.5 to 1

Oil filter, crankcase ..... Replaceable full flow spin-on type

Method of starting diesel engine ..... Engine starts on diesel fuel (Electric starting motor).

Exhaust valve rotators ..... Positive type

COMPRESSION PRESSURES

	Engine Speed RPM	Normal Compression Pressure	Variation Between Cylinders
Cranking*	Approx.200	400 PSI	25 PSI
Running⁰	800	480 PSI	20 PSI

4% Reduction in PSI for every 1000 ft. above sea level
⁰operating temperatures
*operating temperature, all nozzles removed

ENGINE SPEED

Engine	Low Idle	Rated	No Load Governed
Turbo Charged	725 to 775 RPM	2000 RPM	2185 to 2215 RPM

Cylinder Head and Valves

NOTE: All dimensions are given in inches.

Maximum Limit Including Wear

Cylinder Head

Warpage ..... .005″

Exhaust Valve

Tappet clearance (Cold) ..... .025″

(Hot) ..... .020″

Face angle 45⁰

Face run-out ..... .002″

O.D. of head ..... 1.755″ to 1.745″

O.D. of stem end ..... .402″ to .403″ ..... .002″

Exhaust Valve (continued)		Maximum Limit Including Wear
O.D. of taper 4.2675″ from stem end	.401″ to .402″	.002″
Length	6.4405″ to 6.4195″	
Insert seat angle	44⁰	
Seat contact width	.0800″ to .1000″	
Seat run-out		.002″
Insert height	316″ to .313″	
O.D. of insert	1.9465″ to 1.9455″	
I.D. of insert	1.571″ to 1.577″	

Intake Valve		
Tappet clearance (Cold and Hot)	.015″	
Face angle	45⁰	
Face run-out		002″
Length	6.4405″ to 6.4195″	
O.D. of stem	.402″ to .403″	.002″
O.D. of head	2.005″ to 1.995″	
Seat angle	44⁰	
Seat contact width	.0775″ to .0975″	
Seat run-out		.002″
Insert height	.2775″ to .2825″	
O.D. of insert	2.0990″ to 2.1000″	
I.D. of insert	1.805″ to 1.815″	

Intake and Exhaust Valve Guides		
Length	3.219″	
O.D.	.7515″ to .7510″	
I.D. (Installed and reamed)	.4045″ to .4055″	.001″
Protrusion above cylinder head	.953″	

Valve Spring	
Free length	2.28″
Total Coils	7.75
Wire diameter	.171″
Compressed to 1-31/64″ (Valve open)	135 to 145 lbs.
Compressed to 1-15/16″ (Valve closed)	40 to 50 lbs.

		Maximum Limit Including Wear
Rocker Arm Assembly		
O.D. of shaft	.872″ to .873″	
I.D. of arm bore	.8745″ to .8755″	
Shaft assembly end play (both ends)	.010″ to .030″	
Shaft spring		
Total coils (working coils)	4	
Wire diameter	.080″	
Compressed to 1-9/16	8.5 to 10 lbs.	
Lubrication	Engine oil, camshaft metering	
Shaft oil holes	Toward valve side of engine. Shaft cannot be rotated	

Engine Block

Cylinder Sleeves		
I.D. of sleeve	4.6250″ to 4.6260″	.005″
Sleeve out of round		.006″
Clearance to bottom of piston skirt	.0045″ to .0055″	
Taper	.001″	
Piston		
Type	Cam ground	
Material	Aluminum Alloy	
O.D. at bottom of skirt, 90^0 to the piston pin	4.620″ to 4.621″	
I.D. of piston pin bore	1.7999″ to 1.8003″	.001″
Width of 2nd ring groove	.097″ to .098″	
Width of 3rd ring groove	.2505″ to .2515″	
Piston Rings		
No. 1 Compression (Chrome)	Keystone Type	
Width	.1140″ to .1145″	
End gap in 4.625″ I.D. sleeve	.015″ to .025″	
Side clearance	None	
No. 2 Compression	Tapered Face	
Width	.0925″ to .0935″	
End gap in 4.625″ I.D. sleeve	.013″ to .023″	
Side clearance	.0035″ to .0055″	

		Maximum Limit Including Wear
Oil Ring		
Width	.2485″ to .2490″	
End gap in 4.625″ I.D. sleeve	.013″ to .028″	
Side clearance	.0015″ to .0030″	
Piston Pin		
Type	Full Floating	
O.D. of pin	1.7994″ to 1.7996″	
Fit in piston	.0004″ to .0008″	
Fit in rod bushing	.0008″ to .0014″	
Connecting Rod		
Bushing	Replaceable bronze	
Bushing I.D. installed (ream to size)	1.8004″ to 1.8008″	.001″
Bushing out of round		.0015″
Bearing liners	Replaceable	
Bearing liner width	1.586″ to 1.596″	
Journal I.D. without bearing liners	3.1503″ to 3.1513″	
Bearing oil clearance	.0013″ to .0038″	.006″
Undersize bearing for service	.002″, .010″, .020″, .030″	
Side clearance	.007″ to .014″	
Cap bolts	Self locking type	
Crankshaft		
Type	Balanced	
Main bearing liners	Replaceable	
End play, No. 5 main bearing cap	.004″ to .012″	.020″
Thrust bearings std. thickness	.155″ to .157″	.008″
Thrust bearings oversize thickness for service	.161″ to .163″	.008″
Connecting rod journal std. O.D.	2.998″ to 2.999″	
.010″ O.D. undersize, grind to	2.988″ to 2.989″	
.020″ O.D. undersize, grind to	2.978″ to 2.979″	
.030″ O.D. undersize, grind to	2.968″ to 2.969″	
Connecting rod journal maximum taper		.002″
Journals out of round	.001″	
Main bearing liner width 1st, 3rd., 5th, and 7th	2.1515″ to 2.1615″	
Main bearing liner width 2nd, 4th and 6th	1.214″ to 1.224″	

Crankshaft (continued)		Maximum Limit Including Wear
Undersize main bearing liners for service	.002", .010", .020", .030"	
Main bearing oil clearance	.0016" to .0046"	
Main bearing journal std. O.D.	3.498" to 3.499"	
.010" O.D. undersize, grind to	3.488" to 3.489"	
.020" O.D. undersize, grind to	3.478" to 3.479"	
.030" O.D. undersize, grind to	3.468" to 3.469"	
Main journal bore I.D. without liners.	3.691" to 3.692"	
Main journal width between cheeks		
2nd, 4th and 6th	1.618" to 1.633"	
3rd	2.555" to 2.570"	
5th	2.561" to 2.565"	
7th	2.5855" to 2.6005"	
Connecting rod journal width between cheeks	1.9775" to 2.0025"	

Camshaft		
Type	Parabolic	
Bushings	5, Replaceable	
Bushing lubrication	Pressurized	
Oil clearance	.0014" to .0054"	.007"
I.D. of bushing installed	2.2484" to 2.2514"	
Bushing Width		
1st (front)	1.646" to 1.666"	
2nd, 3rd and 4th	1.4275" to 1.4475"	
5th	1.1462" to 1.1662"	
O.D. of each bearing surface	2.246" to 2.247"	.004"
Thrust washer thickness	.1225" to .1275"	.012"
Thrust plunger spring		
Free length	3.625"	
O.D. of spring	.391" to .406"	
Compressed to 2.750"	45 to 55 lbs.	

Valve Push Rod Lifters		
Type	Mushroom	
O.D. in block, std.	.8097" to .8102"	
O.D. in block, oversize for service	.8190" to .8195"	
I.D. of block bore, std.	.8115" to .8130"	.0015"
I.D. of block bore, oversize for service	.8215" to .8225"	

Gear Train		Maximum Limit Including Wear
Backlash		
Crankshaft gear to camshaft gear	.004″ to .011″	
Idler drive gear to idler gear	.003″ to .010″	
Idler gear to fuel pump gear	.004″ to .012″	
Crankshaft gear to oil pump gear	.007″ to .012″	
Crankshaft gear to fuel pump gear	Maximum .027″	
O.D. of idler gear shaft	1.7325″ to 1.7330″	.0005″
I.D. of idler gear with bushing	1.734″ to 1.735″	
Idler gear to shaft running clearance	.001″ to .0025″	.005″
Idler gear thrust washer thickness	.061″ to .063″	.057″
Idler gear end play		.010″

Oil Pump		
Positive displacement	Gear Type	
Backlash pump gear to crankshaft gear	.007″ to .012″	
Drive gear to pump body clearance	.0035″ to .0065″	
Drive and driven gear thickness	1.250″	
Gears to body radial clearance		.006″
Gears to pump cover clearance		.005″
Relief valve spring		
No. Coils	12	
Wire thickness	.071″	
Minimum I.D.	.469″	
Free length	2.06″	
Compressed to 1.252″	17.25 to 19.05 lbs.	
Oil pressure	45 to 55 PSI	

Cooling System

Type	Pressurized thermostat controlled by-pass forced circulation
Pump Type	Vane type impeller
Fan	Suction type
Fan belt adjustment	80 Pound tension w/tension gauge or 1/2″ deflection
Cooling system capacity	40 U.S. Quarts
Radiator Cap	7 PSI
Thermostat	Starts to open between 175^{0}F and 182^{0}F. Fully open at 202^{0}F.
Cold weather coolant	Reputable top brand "High Boiling Point" Anti-Freeze

Engine Oil Filter

Type	Full flow spin on type
Capacity	1 U.S. Quart
Filter replacement	Every 240 hours
Filter head relief valve spring	
Free length	2.81″
No. of coils	9
Wire diameter	.063″
Compressed to 1.400″	5.33 to 5.83 lbs.

Steering

Power Steering	
Front Steering	Hydrostatic
Rear Steering	Independent Hydraulic
Pump	Positive, Gear Type, Continuous Running
Steering Cylinders	
Front	Dual 2 Double Acting Cylinders
Rear	Single 1 Double Acting Cylinder With Dual Cylinders Available
Pump Capacity at 2000 RPM	12.5 GPM
Relief Valve Pressure	1350 to 1450 PSI

Air Cleaner

Type ..... Dry, Replaceable element

Element change interval ..... Every four washings or more often if required

Element service interval ..... When the red signal appears in the clear plastic window of the restriction indicator

Dust cup check ..... Daily or every 10 hours

Pre-Cleaner service interval ..... Whenever dust reaches the mark indicated on the plastic receptacle

Restriction indicator replacement ..... When the red signal does not disappear after several resets or does not meet the specifications given below

	CASE NO.	DONALDSON NO.	INCHES OF WATER	INCHES OF MERCURY
Diesel	A17652	RBX00-2220	18.1″ to 21.9″	1.32″ to 1.59″

Fuel System

FUEL FILTERS

First stage filter ..... Full flow spin on type

Second stage filter ..... Full flow spin on type

Fuel system operating pressure (w/o preliminary filter) ..... 14 to 21 PSI

Fuel system operating pressure (w/preliminary filter) ..... 20 to 30 PSI

Fuel filter head relief valve spring (if equipped)

No. of coils (active) 19

Free length ..... 1.268″

Wire diameter ..... .033″

O.D. of spring ..... .218″ to .238″

Compressed to 1.109″ ..... 28 to 30 oz.

FUEL TANK

Capacity ..... 100 U.S. Gallons

Water trap ..... Drain daily

TIMING

Timing marks ..... Located on crankshaft pulley (0^0 to 35^0 BTDC) and (0^0 to 15^0 ATDC) timimg pointer located on timing gear cover.

504BDT at 2000 RPM Rated Engine Speed ..... 29^0 BTDC

FUEL INJECTION PUMP

Type ..... Robert Bosch, PES multiple plunger
Rotation ..... Counter-clockwise
Mounting ..... Left hand side of engine
Drive ..... Gear driven at 1/2 engine speed
Lubrication ..... Pressurized engine oil
Governor ..... Centrifugal type, variable speed, flyweight, integral part of pump.

FUEL INJECTOR

Type ..... Roosa Master
Opening pressure (new) ..... 2950 to 3050 PSI
(serviced) ..... 2750 to 2850 PSI
Maximum opening pressure difference between cylinders ..... 100 PSI
Valve lift ..... 3/4 turn off valve seat or .0135"
Spray orifice size ..... .013"
Sac hole size ..... .042"
Number of orifices 4
Orifice length (through sac wall) ..... .031"
Orifice spray angle ..... 150^0
Leakoff rate ..... 3 to 10 drops in 30 seconds at 1500 PSI after first drop appears (serviced injector).

Opening pressure control spring:
Free length ..... .536"
No. of coils 7
Wire diameter ..... .056"
O.D. of spring ..... .276"
Compressed to .435" - .457" ..... 27 lbs. pressure

Brakes

Type fluid ..... 70 R1 Heavy Duty
Free pedal ..... 1"
Master cylinder ..... 1.25" Bore, 1.44" Stroke
Manually operated horizontal piston type with integral fluid reservoir
Calipers ..... Two pistons per caliper with 2.25" bore
Brake Disc ..... 19.0" Dia., .44" thick

	Free Length	Spring O.D.	No. of Coils	Extend to	Spring Rate (lbs.)
Brake pedal return spring	6.4"	.75"	30	8.8	48.56

Hydraulics

PUMP-DUAL ELEMENT

Type oil ..... Case TCH

Pump type ..... Flange mounted, gear type, fixed displacement

Pump capacity ..... Main element 15.5 GPM at 2000 RPM at 2000 PSI
Steering element 12 GPM at 2000 RPM at 1400 PSI

Pump gears ..... Drive gear and driven gear

Shaft Bearings ..... Precision needle bearings

STEERING

Type of Oil ..... Case TCH

Pump

Positive, fixed displacement gear type with needle bearings and pressure loaded wear plates. The steering pump is the second element of a dual element hydraulic pump.
..... 12.5 G.P.M. @ 1350 P.S.I.

Front Steering Cylinders

Dual-double acting cylinders.
..... 2 inch bore, 1 inch dia. rod, 8 inch effective stroke

Rear Steering Cylinder

Single - double acting cylinder with dual cylinders available as optional equipment.
..... 3 inch bore, 1 inch dia. rod, 6 inch effective stroke

Flow divider Valve

Priority type with integral adjustable relief valve for front steering. Excess flow to rear steering.
..... Priority flow to front steering 6 G.P.M.
..... Front steering relief 1400 P.S.I.

Front Steering Valve

Four-way open center rotary type valve with positive displacement gerotor.
..... Valve displacement 14.8 cu. in. per rev.

Rear Steering Valve

Four-way open center valve, spring centered spool, nylon lock poppets at cylinder ports and integral relief valve.
..... Rear steering relief 1400 P.S.I.

CONTROL VALVE

	FREE LENGTH	WIRE DIA.	NO. OF COILS	COMPRESS TO	SPRING RATE (lbs.)
Lowering poppet spring	2.187″	.080″	20	1.875″	30 to 50
Load check springs	1.250″	.0475″	7	.750″	7.7 to 9.3
Trigger valve spring	1.625″	.0475″	6	.437″	46 to 56 ozs.
Flow divider spring	1.390″	.055″	8	.875″	8 to 8.8

REMOTE CONTROL VALVE

	FREE LENGTH	WIRE DIA.	NO. OF COILS	COMPRESS TO	SPRING RATE (lbs.)
Outlet spring	1-1/8″	1/32″	8	23/32″	52
Return ball check springs	2-1/4″	5/64″	10	1-5/8″	30
Relief valve spring (w/inserts)	1.11″	1/16″	12	31/32″	14
Pilot relief valve spring	1″	1/16″	8	7/8″	55
Pilot piston spring	.717″	.135″	4	39/64″	115
Spool plunger spring	1-7/8″	.072″	12	31/32″	23

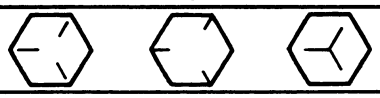
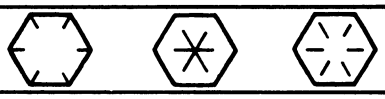
PORTABLE HYDRAULIC CYLINDERS W/HYD. LIMIT STOP

	FREE LENGTH	NO. OF COILS	SPRING RATE	COMPRESSED TO
Valve Plunger Spring	1.750″	18-20	1 to 1.2 lbs.	.796″ to .828″
Push Rod Spring	2.312″	14	3.5 to 4.5 lbs.	1.75″

Transmission

	FREE LENGTH	WIRE DIA	NO. OF COILS	COMPRESS TO	SPRING RATE (lbs.)
Mesh lock springs	1.5″	.063″	10.75	15/16″	34 to 40
Main shaft detent spring	1.5″	.063″	10.75	15/16″	35 to 40
Clutch pressure springs	3-5/8″	.170″	11	2-1/16″	170 to 185

General Torque Specification Table

GENERAL TORQUE SPECIFICATION TABLE (Revised 6-67) 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 Foot Pounds		Torque Foot Pounds	
Bolt Size	Min.	Max.	Min.	Max.
1/4"	9	11	12	15
5/16	17	20.5	24	29
3/8	35	42	45	54
7/16	54	64	70	84
1/2	80	96	110	132
9/16	110	132	160	192
5/8	150	180	220	264
3/4	270	324	380	456
7/8	400	480	600	720
1"	580	696	900	1080
1-1/8	800	880	1280	1440
1-1/4	1120	1240	1820	2000
1-3/8	1460	1680	2380	2720
1-1/2	1940	2200	3160	3560
* Thick nuts must be used with Grade 8 bolts				

Special Torques

ENGINE

Cylinder head bolts ..... 200 to 210 ft. lbs.

Intake and exhaust manifold stud nuts ..... 25 to 30 ft. lbs.

Cylinder head valve cover stud nuts ..... 60 to 70 in. lbs.

Rocker arm bracket stud nuts ..... 40 to 45 ft. lbs.

Camshaft nut ..... 95 to 105 ft. lbs.

Connecting rod bolts ..... 95 to 105 ft. lbs.

Crankshaft pulley bolt ..... 100 to 110 ft. lbs.

Flywheel to crankshaft bolts ..... 180 to 190 ft. lbs.

Main bearing cap bolts ..... 145 to 155 ft. lbs.

Oil pump suction tube nut ..... 95 to 105 ft. lbs.

Oil pan capscrews ..... 13 to 17 ft. lbs.

ENGINE (continued)

Fan pulley nut	60 to 70 ft. lbs.
Spark plugs	32 to 35 ft. lbs.

FUEL SYSTEM

Fuel pump drive hub nuts	43 to 50 ft. lbs.
Fuel pump timing pointer screws	60 to 72 in. lbs.
Fuel injector pressure adjusting screw locknut	70 to 75 in. lbs.
Fuel injector clamp capscrews	20 ft. lbs.

HYDRAULICS

Remote control valve mounting bolts	80 to 96 ft. lbs.
Hydraulic block to reservoir bolts	80 to 96 ft. lbs.
Remote control valve head bolts	35 to 40 ft. lbs.
Hydraulic pump body bolts	32 to 37 ft. lbs.
Reservoir inlet filter retainer nuts (flex-loc)	30 to 35 in. lbs.
Inlet filter flange bolts	35 to 42 ft. lbs.
Hitch control valve mounting bolts	17 to 20 ft. lbs.
Hitch cylinder piston rod nut	200 to 225 ft. lbs.
Hitch cylinder head capscrews	15 ft. lbs.
Remote cylinder piston rod nut	250 to 270 ft. lbs.

BRAKES

Caliper to transmission mounting bolts	75 to 100 ft. lbs.
Caliper casting to spacer bolts	70 to 80 ft. lbs.
Parking brake pinion shaft nut	800 to 1100 ft. lbs.

DIFFERENTIAL

Axle housing stud nuts	185 to 235 ft. lbs.
Spindle hub nuts	160 to 180 ft. lbs.
Ring gear replacement bolts (lockwire in place)	186 to 205 ft. lbs.
Pinion shaft bearing cover bolts	130 to 140 ft. lbs.
Front axle yoke to pinion shaft nut	300 to 400 ft. lbs.
Case half bolts	93 to 103 ft. lbs.
Differential bearing cap bolts	160 to 180 ft. lbs.

STEERING

Front steering valve check seat	150 in. lbs.
Front steering valve end cap bolts	250 in. lbs.
Front steering valve meter cap bolts	150 in. lbs.

TRANSMISSION

Lubrication pump cover bolts	23 to 25 ft. lbs.
Brake disc to front yoke bolts	30 ft. lbs.
Universal joints to transmission yoke bolts	35 to 40 ft. lbs.
PTO shaft to attaching flange nut	200 to 250 ft. lbs.
PTO and pump housing mounting bolts	37 to 41 ft. lbs.
Input seal retainer mounting bolts (lockwire in place)	37 to 41 ft. lbs.
Clutch release yoke lockscrew (lockwire in place)	25 to 30 ft. lbs.
Shifter fork retainer lockscrew (lockwire in place)	25 to 30 ft. lbs.
Speed control cover bolts	37 to 41 ft. lbs.
Reverse fork lockscrews (lockwire in place)	25 to 30 ft. lbs.
Forward range fork lockscrews (lockwire in place)	25 to 30 ft. lbs.
Range control cover bolts	37 to 41 ft. lbs.
Quill shaft locknuts	100 to 150 ft. lbs.
Input shaft bearing carrier bolts	37 to 41 ft. lbs.
Idler shaft retaining bolts	37 to 41 ft. lbs.
Main shaft spanner nut	100 to 150 ft. lbs.
Main shaft shifter fork lockscrew (lockwire in place)	25 to 30 ft. lbs.
Output shaft flange nuts	200 to 250 ft. lbs.
Transmission lube suction tube nut	75 to 100 ft. lbs.

Section 2010

CYLINDER HEAD AND VALVES

SPECIFICATIONS

	Decimal System	Metric System
CYLINDER HEAD		
Warpage ..... (Max. Limit Incl. wear)	.005″	0.127mm
EXHAUST VALVE		
Tappet clearance (COLD)	.025″	.635mm
Tappet clearance (HOT)	.020″	.508mm
Face angle	44⁰	44⁰
Fan run-out ..... (Max. Limit Incl. wear)	.002″	.051mm
O.D. of head	1.745″ to 1.755″	44.323 to 44.577mm
O.D. of stem end	.402″ to .403″	10.211 to 10.236mm
(max. limit Incl. wear)	.002″	.051mm
O.D. of taper 4.2675″ (108.3947mm)	.401″ to .402″	10.185 to 10.211mm
(max. limit Incl. wear)	.002″	.051mm
Length	6.4195″ to 6.4405″	163.0557 to 163.5887mm
Insert seat angle	45⁰	45⁰
Seat contact width	.0800″ to .1000″	2.032 to 2.540mm
Seat run-out (max. limit Incl. wear)	.002″	.051mm
Insert height	.313″ to .316″	7.95 to 8.026mm
O.D. of insert	1.9455″ to 1.9465″	49.4157 to 49.4407mm
I.D. of insert	1.571″ to 1.577″	39.903 to 40.056mm

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SPECIFICATIONS (Continued)

	Decimal System	Metric System
INTAKE VALVE		
Tappet clearance (COLD and HOT)	.015″	3.81mm
Face angle	44^0	44^0
Face run-out (max. limit Incl. wear)	.002″	.051mm
Length	6.4195″ to 6.4405″	163.0557 to 163.5887mm
O.D. of stem	.402″ to .403″	10.211 to 10.236mm
(max. limit Incl. wear)	.002″	.051mm
O.D. of head	1.995″ to 2.005″	50.673 to 50.927mm
Seat angle	45^0	45^0
Seat contact width	.0775″ to .0975″	1.9687 to 2.4767mm
Seat run-out (max. limit Incl. wear)	.002″	.051mm
Insert height	.2775″ to .2825″	7.0487 to 7.1757mm
O.D. of insert	2.0990″ to 2.1000″	53.315 to 53.34mm
I.D. of insert	1.805″ to 1.815″	45.847 to 46.101mm
INTAKE AND EXHAUST VALVE GUIDES		
Length	3.219″	81.763mm
O.D.	.7510″ to .7515″	19.075 to 19.202mm
I.D. (installed and reamed)	.4045″ to .4055″	10.2747 to 10.2997mm
(max. limit Incl. wear)	.001″	.025mm
Protrusion above cylinder head	.953″	24.206mm
VALVE SPRING		
Free length	2.28″	57.912mm
Total coils	7.75	
Wire diameter	.171″	4.343mm
Compressed to 1.48″ (30.480mm) (valve open)	135 to 145 lbs.	61.24 to 65.78 kg.
Compressed to 1.94″ (49.276mm) (valve closed)	40 to 50 lbs.	18.14 to 22.68 kg.

SPECIFICATONS (Continued)

	Decimal System	Metric System
ROCKER ARM ASSEMBLY		
O.D. of shaft	.872" to .873"	22.149 to 22.174mm
I.D. of arm bore	.8745" to .8755"	22.2127 to 22.2377mm
Shaft assembly end play (both ends)	.010" to .030"	.254 to .762mm
Shaft spring:		
Total coils (working coils)	4	4
Wire diameter	.080"	2.033mm
Compressed to 1.562" (39.675mm)	8.5 to 11.5 lbs.	3.86 to 5.22 kg.
Lubrication	Engine oil, camshaft metering	
Shaft oil holes	Toward valve side of engine. shaft cannot be rotated.	

Special Torques

	Decimal System	Metric System
Cylinder head bolts	200 to 210 ft. lbs.	27.660 to 29.043 m-kg.
Intake and Exhaust manifold stud nut	25 to 30 ft. lbs.	3.456 to 4.148 m-kg.
Cylinder head valve cover stud nut	5 to 6 ft. lbs.	.691 to .830 m-kg.
Rocker arm bracket stud nut	40 to 45 ft. lbs.	5.530 to 6.221 m-kg.

CHECKING COMPRESSION PRESSURE

(Refer to Figure 1)

1. Clean the engine thoroughly, preferably by steam cleaning.

2. Before cranking the engine make sure all operating controls are in neutral, brakes are set and the wheels are securely blocked.

3. There are two methods of checking compression pressure - the cranking method and the engine running method. **NOTE:** The engine must be at operating temperature for either method used.

   CRANKING METHOD - Close the needle valve at the fuel tank. Disconnect all high pressure fuel lines and leak-off lines between injectors. Remove all of the injectors. Refer to the chart.

   RUNNING METHOD - Disconnect the high pressure fuel line and leak-off lines from the number one injector. Using an appropriate length of tubing or hose, route the ful from these lines back to the fuel tank or a clean container. Remove the number one injector. Refer to chart.

4. Clean the injector bores of loose carbon and residue. Replace the compression seal in the injector bore of the cylinder to be checked and install a Bacharach 70-314 (D-558) Compression Gauge Adapter. Secure with an original injector clamp assembly and spacer, Inset A. Tighten bolt to 20 ft. lbs. (2.765 m-kg). Connect Case No. CD-504 Compression Gauge to the adapter.

   IMPORTANT: It is very important that all cylinder pressures be approximately alike. For the allowable compression pressure variation, refer to the chart.

5. If the compression is greater than the figure mentioned, carbon deposits are indicated. If the reading is below these figures, leaking valves or excessive ring clearance is indicated. **NOTE:** To make a simple check when a compression leak is indicated, squirt a small amount (1 oz.)(28.4g) of oil into the cylinder and recheck the compression. If the pressure rises to near normal, compression loss is past the rings. Very little change in compression indicates leakage past the valves. A low pressure reading will cause difficulty in starting, particularly at low temperatures.

   NOTE: Take several compression readings on each cylinder. This is done by pressing the vent valve button to relieve gauge pressure. When the button is released, the gauge will again indicate compression pressure.

   IMPORTANT: Replace the compression seal and carbon seal on all injectors at the time of installation.

	ENGINE SPEED	NORMAL COMPRESSION PRESSURE	ALLOWABLE VARIATION BETWEEN CYLINDERS
CRANKING	Approximately 200 RPM	400 PSI (28.123 kg/cm²)	25 PSI (1.758 kg/cm²)
RUNNING	800 RPM	480 PSI (33.748 kg/cm²)	20 PSI (1.406 kg/cm²)

NOTE: *A 4% reduction in PSI (kg/cm²) must be allowed for every 1000 ft. (304.800mm) above sea level.

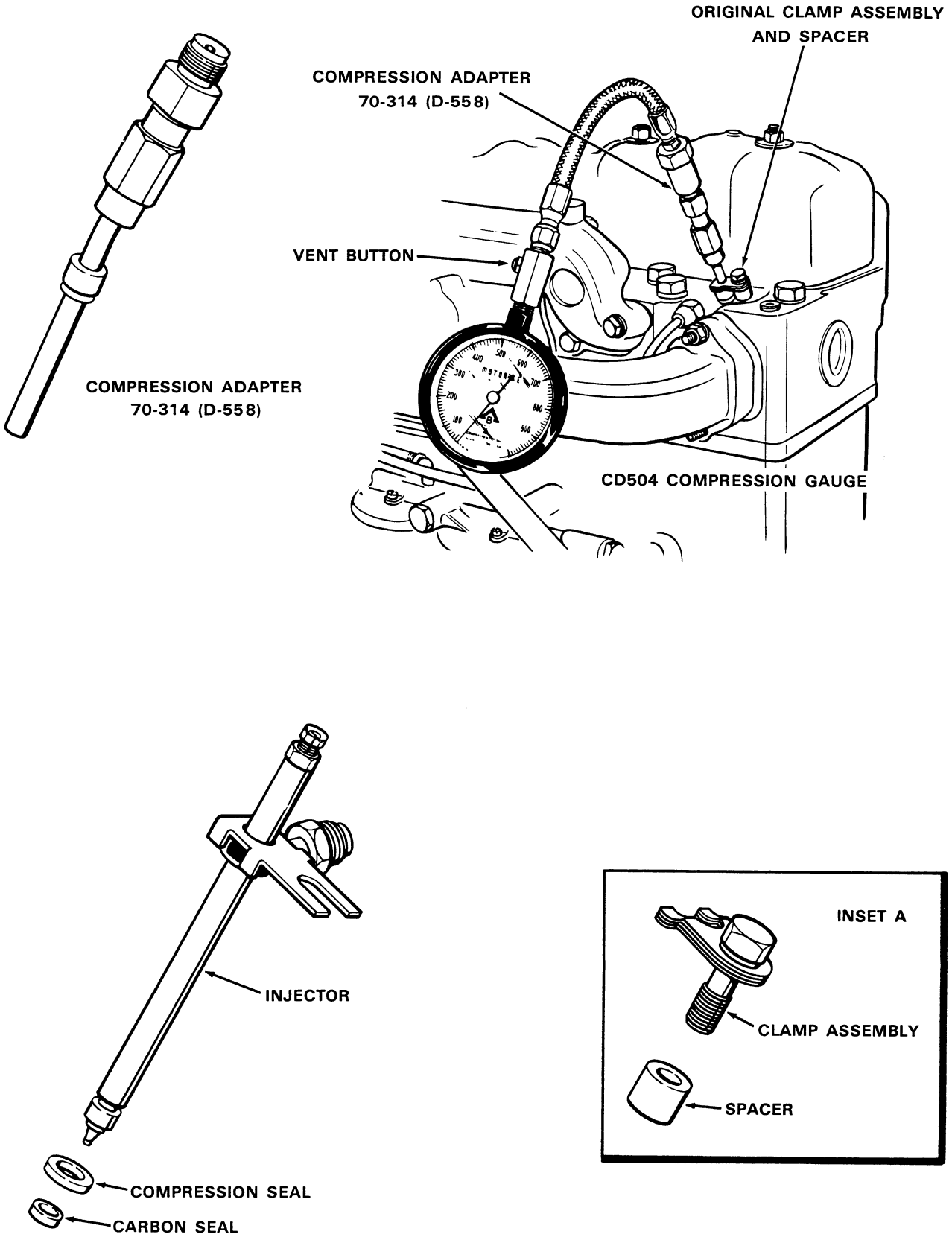
ORIGINAL CLAMP ASSEMBLY
AND SPACER
COMPRESSION ADAPTER
70-314 (D-558)
VENT BUTTON
COMPRESSION ADAPTER
70-314 (D-558)
CD504 COMPRESSION GAUGE
INJECTOR
COMPRESSION SEAL
CARBON SEAL
INSET A
CLAMP ASSEMBLY
SPACER

Figure 1

Suggest:

If the above button click is invalid.

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first, and then click the above link

to download the complete manual.

Thank you so much for reading

CYLINDER HEAD AND COMPONENTS

(Refer to Figure 2 and 3)

Remove the muffler and hood from the vehicle. Steam clean the engine thoroughly before doing any service work or removing any components.

1. Drain the cooling system. Disconnect and remove the turbocharger oil supply tube (1). Disconnect the oil drain tube (2) from the turbocharger (3). Disconnect the air cleaner from the turbocharger. Loosen clamps (4) on hose (5) on the intake manifold elbow (6). Remove the turbocharger and connector (7). Remove the exhaust elbow (8) from the water manifold (9) and the intake elbow (6) from the intake manifold (10). Discard gaskets (11, 12 and 13).
2. Remove the intake manifold (10) and discard gaskets (14). Remove the exhaust manifolds (15) and discard gaskets (16). Disconnect the hoses from the thermostat housing and water manifold. Remove the water manifold (9) and discard gasket (17).
3. Disconnect the high pressure fuel lines to the injectors and the front leak-off tubes between each cylinder head. Cap them to prevent the entry of foreign material.
4. Disconnect and remove the breather tube (18) from the cylinder head covers and discard gasket (19). Remove the rocker arm covers (20) and discard gaskets (21 and 22).
5. Remove the rocker arm assemblies (23) push rods (24) and tag them for proper installation. See Page 2010-12, for servicing of the rocker arm assemblies.
6. Remove the cylinder head bolts (25) and cylinder heads (26). Discard the cylinder head gaskets (27).

NOTE: For turbocharger service see Section 2014.

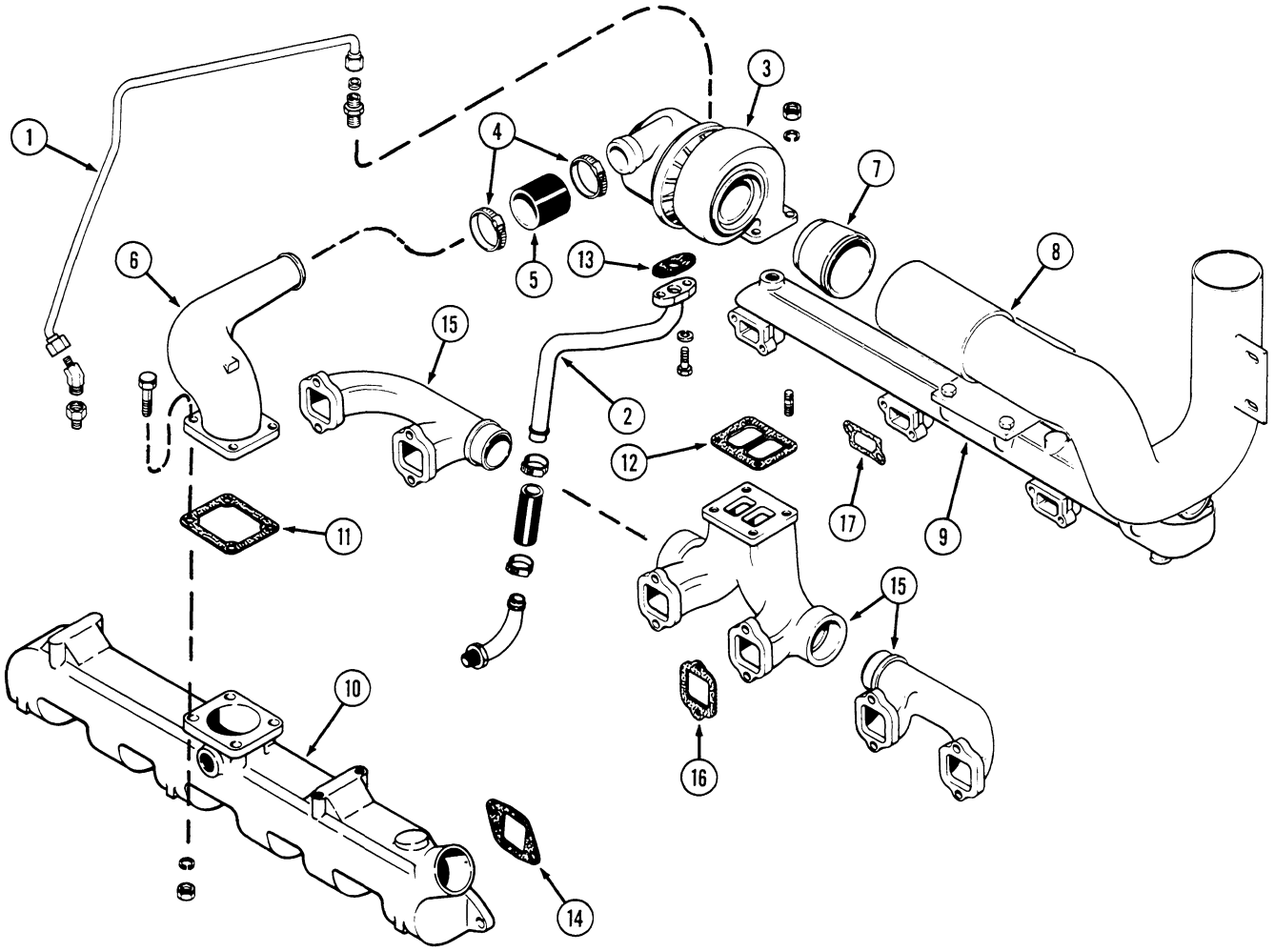

Figure 2