

SERIES/SECTION	SECTION NO.	FORM NO.
<b>10 SERIES - GENERAL</b>		
Specifications for Case A267 Diesel Engine, Series B Prior to SN 9103967 .....	C	9-78741
General Engine Specifications, Series B Loaders, SN 9103967 and After .....	11	9-79501
General Engine Specifications, Series C Loaders .....	11	9-79921
Lubrication, Maintenance, and Torque Charts, Series B .....	CC	9-71981
Maintenance and Lubrication, Series C .....	13	9-71982
<b>20 SERIES - ENGINE</b>		
Prior to SN 9103967		
Throttle Controls and Linkage .....	I	9-71981
Stall Checks .....	None	9-71981
Air Intake and Exhaust System .....	G	9-71981
Cylinder Heads, Valve Systems, Rocker Arms, Decompressor .....	K	9-76972
Engine Block .....	M	9-75222
Engine Counter Balancer .....	MM	9-76731
Water Pump .....	3M	9-77461
SN 9103967 Thru 9111008		
Throttle Controls and Linkage .....	1, Sup. 1	9-71982
Stall Checks, Engine Removal and Installation .....	21	9-71982
Cylinder Head and Valves .....	22	9-79392
Engine Block Assemblies .....	23	9-79403
Air Cleaner .....	24	9-71982
Cooling System and Engine Oil Filters .....	25	9-79421
<b>30 SERIES - FUEL SYSTEM</b>		
Prior to SN 9103967		
Fuel Injectors, Case Powercel Fuel Injection Pump .....	I	9-75421
SN 9103967 Thru 9111008		
Electric Fuel Pump .....	34	9-71982
Fuel System and Filters .....	3010	9-75297
Fuel Injection Pump .....	3012	9-74937
Fuel Injectors .....	3013	9-74959
<b>40 SERIES - HYDRAULICS</b>		
Hydraulic Testing .....	None	9-71981
Hydraulic Testing .....	Sup. 1	9-71982
Equipment Pump .....	None	9-71981
Equipment Pump .....	Sup. 1	9-71982
Control Valves .....	None	9-71981
Control Valves .....	Sup. 1	9-71982
Hydraulic Cylinders .....	None	9-71981
Hydraulic Cylinders .....	Sup. 1	9-71982

SERIES/SECTION	SECTION NO.	FORM NO.
<b>50 SERIES - STEERING</b>		
Hydrostatic Steering System, Series B Prior to SN 9103967 . . . . .	None	9-71981
Steering System, Series B with SN 9103967 and After and Series C . . . . .	51	9-71982
<b>60 SERIES - POWER TRAIN</b>		
4-Speed Synchromesh Transmission Series C . . . . .	64	9-71982
Differential and Planetaries, Series C . . . . .	67	9-71982
4-Speed Mechanical Transmission and Differential Brakes, Series C . . . . .	S	9-77341
Supplement to Section S . . . . .	None	9-77342
Forward-Reverse Transmission and Torque Converter . . . . .	SS	9-71981
Forward-Reverse Transmission . . . . .	SS, Sup. 1	9-71982
Trouble Shooting the Forward-Reverse Transmission . . . . .	SS, Sup. 2	9-71982
Forward-Reverse Transmission and Torque Converter . . . . .	SS, Sup. 3	9-71982
<b>70 SERIES - BRAKES</b>		
Brakes, Series C . . . . .	71	9-71982
Hydraulic Brake System, Series B . . . . .	3S	9-71981
<b>NOTE:</b> For units equipped with Differential Brakes, refer to Section S in 60 Series.		
<b>80 SERIES - ELECTRICAL</b>		
Electrical System, Series B . . . . .	F	9-71981
Electrical, Series C . . . . .	82	9-71982
<b>90 SERIES - MOUNTED EQUIPMENT</b>		
Loader . . . . .	None	9-71981
Loader Supplement, Series C . . . . .	92	9-71982
Model 36 Backhoe . . . . .	None	9-71981
Model 36 Backhoe . . . . .	Sup. 1	9-71982

**NOTE:** Powrcel Engines were on units with SN 9102281 to 9103966. "Open Chamber" engines on all units thereafter. First Series C unit was SN 9106000.

**SECTION**

**C**

**SPECIFICATIONS FOR  
CASE A267 DIESEL  
ENGINE**

**A267 ENGINE SPECIFICATIONS**

**NOTE ALL DIMENSIONS GIVEN IN INCHES**

Type ----- CASE Full Diesel, 4 Cylinder 4 Stroke Cycle  
Valve-in-Head Engine.  
Cylinder Heads ----- Multiple Cylinder Heads can be removed indi-  
vidually for Servicing (2 cylinders per head).  
Firing Order ----- 1-3-4-2  
Bore ----- 4-1/8 Inches  
Stroke ----- 5 Inches  
Piston Displacement ----- 267 Cubic Inches  
Compression Ratio ----- 15 to 1  
Full Load Rated Engine Speed ----- 2000 RPM  
No Load Governed Engine Speed ----- 2150 RPM  
Engine Idle Speed ----- 750 RPM  
Oil Filter, Crankcase ----- Replaceable Full Flow Element  
Method of Starting Diesel Engine ----- Engine Starts on Diesel Fuel  
(Electric Starting Motor).

**MAXIMUM COMPRESSION PRESSURES**

(At Cranking Speed of 200 RPM -- Injectors Removed from Engine)

Altitude	Sea Level	1000 ft.	2000 ft.	3000 ft.	4000 ft.	5000 ft.
Compression Pressure	480 to 510 PSI	455 to 485 PSI	435 to 465 PSI	415 to 445 PSI	395 to 425 PSI	375 to 405 PSI

Allowable Variance Between Cylinders ----- 25 Pounds Pressure

**CYLINDER SLEEVES**

Type ----- Replaceable Wet Type: Two Rubber O-ring  
Seals carried on each sleeve.  
Inside Diameter of Sleeve Bore ----- 4.125 to 4.126 Inches. Replace  
Sleeve when inside Diameter below  
Top Ring Ridge Exceeds 4.133 Inches.  
Piston Clearance in Sleeve (At Skirt) ----- .0045 to .0055 Inch  
Cylinder Sleeve Out-of-Round ----- Max. .002 Inch

**PISTON AND PISTON PINS**

Piston Material ----- Aluminum  
Piston Weight (Less Pin) ----- 54.4 oz. Pounds  
Diameter of Piston at Top of Skirt  
(Below Oil Ring) ----- 4.1144 to 4.1154 Inches  
Diameter of Piston at Bottom of Skirt ----- 4.1195 to 4.1205 Inches  
Piston Pins ----- Full Floating Type: Held in Position  
with Snap Rings in Piston. Replaceable Bronze  
Bushing in Connecting Rod.  
Piston Pin Length ----- 3.485 to 3.490 Inches  
Piston Pin Diameter ----- 1.4994 to 1.4995 Inches  
Piston Pin Fit in Piston ----- .0003 to .0008 Inch  
Piston Pin bore in piston ----- 1.4997 to 1.4999 Inches  
Piston Pin Fit in Connecting Rod Bushing ----- .0004 to .0011 Inch

**PISTON RINGS**

Rings Per Piston ----- 4-(3 Compression and 1 oil).  
Compression Rings  
Width of Ring (All 3) ----- .0930 to .0935 Inch  
Ring End Gap (All 3) when Compressed in  
4.125 Inch Cylinder ----- .013 to .023 Inch  
Side Clearance in Groove of 1st (Top) Ring ----- .0035 to .0050 Inch  
Side Clearance in Groove of 2nd and 3rd Ring ----- .0025 to .0040 Inch

Oil Ring----- To install Replacement Ring, Follow  
Instructions Packed with Rings.  
Width of Rings ----- .2485 to .2490 Inch  
Side Clearance in Groove ----- .0025 to .0040 Inch  
Ring End Gap ----- .013 to .028 Inch

#### CONNECTING RODS

Connecting Rod Bushing----- Replaceable Bronze Bushing  
Replacement Bushing Must Be Reamed.  
Piston Pin Hole Diameter in Rod(Without Bushing)--1.686-1.688 Inches  
Inside Diameter of Piston  
Pin Bushing in Rod ----- 1.5004 - 1.5008 Inches: Install New Bushing  
if inside Diameter Exceeds 1.504 Inches.  
Connecting Rod Bearing ----- Replaceable, Precision, Steel Backed  
Copper Lead Alloy Liners.  
Connecting Rod Capscrews ----- Self Locking Type, No Lock Wires  
Required - May Be used More Than Once.  
Connecting Rod Length (Center to Center  
Between Pin Hole and Bearing Journal Hole) --- 10.499 to 10.501 Inches  
Bearing Liner Width ----- 1.625 Inches  
Diameter of Crankshaft Journal Hole  
in Rod (Without Liner) ----- 2.9005 to 2.9010 Inches  
Inside Diameter of Bearing Liner (Standard  
Liner in Place in Rod and Capscrews Tight) -- 2.7503 to 2.7518 Inches  
Diameter of Crankshaft Rod Journal ----- 2.748 to 2.749 Inches  
Clearance Between Rod Bearing and  
Crankshaft Journal----- .0013 to .0038 Inch; Install  
New Bearing Liners When Clearance Exceeds  
.006 Inch  
Undersize Bearing Liners Available  
for Service ----- .002,.010,.020,.030 Inch  
Allowable Connecting Rod Bearing End Play ----- .005 to .012 Inch

#### CRANKSHAFT AND MAIN BEARINGS

Crankshaft ----- Balanced; Drilled to Provide Pressure  
Lubrication to Main and Connecting Rod Bearings.  
Type Main Bearings ----- Replaceable, Precision Steel  
Backed Copper - Lead Alloy Liners.  
Bearing Capscrews ----- Self Locking Type, No Lock  
Wires Required May Be Used More Than Once.  
Bearing Taking End Thrust ----- Center (Two Replaceable Bronze  
Thrust Bearings.)  
Crankshaft End Play (Measured  
at Center Main Bearing)----- .004 to .012 Inch; Install New  
Thrust Bearings If End Play Exceeds .020 Inch.  
Thrust Bearing Thickness Std. ----- .155 to .157  
Oversize Thrust Bearings  
Available for Service  
Thrust Bearing Thickness Oversize----- .161 to .163  
Connecting Rod Bearing Journal Diameter ----- 2.748 to 2.749 Inches  
Main Bearing Journal Diameter ----- 2.998 to 2.999 Inches  
Crankshaft Main and Connecting  
Rod Journal Bearings out of Round ----- Maximum .001 Inch  
Maximum Allowable Taper on  
Crankshaft Rod Journal ----- .002 Inch  
Inside Diameter of Main Bearing Liners  
(In Place and Capscrews Tight)----- 3.0006 to 3.0026 Inches  
Clearance Between Main  
Bearing Liner and Journal ----- .0016 to .0046 Inch; Install  
New Bearing Liner When Clearance Exceeds  
.0065 Inches.

Width of 1st, 3rd, 5th

Main Bearing Liners ----- 2.2135 to 2.2235 Inches

Width of 2nd, 4th

Bearing Liners ----- 1.51 to 1.61 Inches

Width Between Crankshaft Main Bearing Cheeks

2nd and 4th ----- 1.5575 to 1.5675 Inches

3rd (Center) ----- 2.624 to 2.626 Inches

5th ----- 2.620 to 2.630 Inches

Width Between Crankshaft Rod

Bearing Journal Cheeks ----- 1.9975 to 2.0025 Inches

Undersize Main Bearing Liners

Available for Service ----- .002,.010,.020,.030 Inch

Crankshaft Main Bearing Journals Should

Be Ground to ----- 2.988-2.989 Inches for .010 Inch Undersize Bearing

2.978-2.979 Inches for .020 Inch Undersize Bearing

2.968-2.969 Inches for .030 Inch Undersize Bearing

Undersize Connecting Rod Bearing

Shells Available for Service ----- .002,.010,.020,.030 Inch

Connecting Rod Crankshaft Journals Should

Be Ground to ----- 2.738-2.739 Inches for .010 Inch Undersize Bearing

2.728-2.729 Inches for .020 Inch Undersize Bearing

2.718-2.719 Inches for .030 Inch Undersize Bearing

**CAMSHAFT AND BUSHINGS**

Number of Bearing Surfaces on Camshaft ----- 4

Type Bushing ----- Replaceable, Precision, Steel Backed Babbitt

Bushings Lubrication ----- Pressure Lubricated from Oil Pump; Cam-

shaft Drilled to Provide Pressure Lubrication to

Valve Rocker Arm Assembly, and to Timing Gear

Train.

Diameter of Camshaft at Each Bearing Surface -- 2.246 to 2.247 Inches

Inside Diameter of Each Bushing

(Measured when in Place in Block) ----- 2.2484 to 2.2514 Inches

No. 1 (Front) Bushing Length ----- 1.646 to 1.666 Inches

No. 2 and 3 Bushing Lengths ----- 1.4275 to 1.4475 Inches

No. 4 Bushing Length ----- 1.146 to 1.166 Inches

Camshaft End Play ----- Automatically Taken Up by Spring

Loaded Thrust Button in Front end of

Camshaft. Washer Provided Between Drive

Gear and Front Bearing.

Camshaft Thrust Washer Thickness ----- .1225 to .1275

Maximum Backlash at tightest

Point (All timing gears) ----- .002 to .005

Maximum Backlash at

Loosest Point (All timing gears) ----- .006

**VALVE PUSH ROD LIFTERS**

Type ----- Mushroom

Outside Diameter of End that Projects into Block-- .8097 to .8102 Inches

Diameter of Bore in Block for Lifter ----- .8115 to .8130 Inch

Oversize Lifter Available for Service ----- .010 In. Oversize Lifter

Bore in Block Must Be Reamed to ---- .8215 to .8225 Inch for .010 Inch

Oversize Lifter.

**VALVE TAPPET CLEARANCE**

Intake and Exhaust ----- .025 Inch, Engine Cold

Intake and Exhaust ----- .025 Inch, Engine Hot

Hot Settings Are Made At Low Idle After The Engine Has Operated At

Thermostat Control Temperature For At Least Fifteen Minutes

**EXHAUST VALVES**

Angle of Valve Face ----- 44 Degrees  
 Valve Length ----- 6.116 Inches  
 Maximum Valve Face Runout ----- .002 Inch as Determined  
 with a Dial Indicator.

Diameter of Valve Stem ----- .401 to .402 Inch Install New Valve if there  
 is More than .002 Inch Difference in Diameter at any Point on Stem.

Diameter of Valve Head ----- 1.479 to 1.489 Inches  
 Valve Stem Clearance in Guide ----- .0035 to .0055 Inch

**INTAKE VALVES**

Angle of Valve Face ----- 44 Degrees  
 Valve Length ----- 7.243 Inches  
 Maximum Valve Face Runout ----- .002 Inch as Determined  
 with a Dial Indicator.

Diameter of Valve Stem ----- .402 to .403 Inch Install New Valve  
 if there is More than .002 Inch Difference in  
 Diameter at any Point on Stem.

Diameter of Valve Head ----- 1.731 Inches  
 Stem Clearance in Guide ----- .0015 to .0035 Inch

**EXHAUST VALVE SEAT INSERT**

Seat Angle ----- 45 Degrees  
 Seat Contact Width ----- .073 to .084 Inch  
 Outside Diameter of Insert ----- 1.640 to 1.641 Inches  
 Inside Diameter of Insert ----- 1.323 to 1.333 Inches  
 Maximum Allowable Seat Runout ----- .002 Inch as Determined  
 with a Dial Indicator.

**INTAKE VALVE SEAT**

Seat Angle ----- 45 Degrees  
 Seat Contact Width ----- .086 to .096 Inch  
 Maximum Allowable Seat Runout ----- .002 Inch as Determined  
 with a Dial Indicator.

**EXHAUST VALVE GUIDES**

Length ----- 3.218 Inches  
 Outside Diameter ----- .7510 to .7515 Inch  
 Inside Diameter ----- .4045 to .4055 Inch (After Assembly)  
 Valve Stem Clearance in Guide ----- .0035 to .0055 Inch  
 Distance Above Head Guide Must Protrude ----- 1.062 Inches, Press Fit

**INTAKE VALVE GUIDES**

Length ----- 4.375 Inches  
 Outside Diameter ----- .7510 to .7515 Inch  
 Inside Diameter ----- .4045 to .4055 Inch (After Assembly)  
 Valve Stem Clearance in Guide ----- .0015 to .0035 Inch  
 Distance Above Head  
 Guide Must Protrude ----- 1.062 Inches, Press Fit

**VALVE SPRINGS**

Free Length ----- Approximately 2.438 Inches  
 Spring Pressure at Compressed Height of  
 1.484 Inches (Valve Open) ----- 97 to 107 Pounds; Install New Spring if  
 Pressure is Less than 92 Pounds.  
 Spring Pressure at Compressed Height of  
 1.937 Inches (Valve Closed) ----- 43.5 to 46.5 Pounds; Install New Spring if  
 Pressure is Less than 41 Pounds.

**ROCKER ARM ASSEMBLY**

Lubrication ----- Pressure Lubricated; Crankcase Oil to  
 Rocker Arms Metered by Camshaft.

Oil Holes in Rocker Arm Shaft ----- Oil Holes must Face Push Rod  
Side of Engine Only. Shaft Cannot Be Rotated.

**Positioning of Exhaust**

Valve Rocker Arms ----- Spacer Washers Position Exhaust Valve  
Rocker Arm and Eliminate End Play without Binding.

**Outside Diameter of**

Rocker Arm Shaft ----- .872 to .873 Inch  
Inside Diameter of Rocker

Arm ----- .8745 to .8760 Inch  
Rocker Arm Shaft Spring

Spring Pressure at Compressed Height of  
1.562 Inches ----- 8.5 to 11.5 Pounds; Install  
New Spring If Pressure is Less than 8.5 Pounds

**OIL PUMP**

Type --- Positive Displacement, Gear Type Pump Driven off balancer.  
Pressure Relief Valve ----- Maintains 40 to 45 Pounds Full Pressure  
(Oil Warm, Engine Operating at Full Governed Speed)  
Relief Valve is Adjustable.

**WATER PUMP AND THERMOSTAT**

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

Type Pump ----- Impeller Vane Type  
Radiator ----- Heavy Duty Fin and Tube Type  
Temperature Control ----- By Pass Type Thermostat  
temp. range 185° to 200° F

**FUEL SYSTEM**

Injection Pump ----- Robert Bosch, Type PES Multiple Plunger Pump  
Direction of Pump Rotation ----- Counter-Clockwise  
Pump Mounting ----- Right Hand Side of Engine  
Pump Drive ----- Gear Driven from Camshaft Gear at Camshaft Speed  
Injection Pump Drive Lubrication ----- Pressure Lubricated From  
Front Camshaft Bearing.

Injection Pump Drive Shaft Diameter ----- 1.3700 to 1.3705 Inches  
Drive Shaft to Bushing Clearance ----- .001 to .002 Inch  
Number of Drive

Shaft Bushings ----- (2) These Bushings are Not Replaceable.  
A Replacement Drive Housing with Bushings  
in Place Aligned and Fine Bored is Provided.

**Injection Pump Drive**

Shaft End Play ----- Automatically Taken Up By a Spring  
Loaded Thrust Button on Front End Of Drive Shaft.  
Thrust Washers Provided Between Front Drive Gear  
and Drive Shaft Housing.

**Thrust Washer**

Outside Diameter ----- 2.085 to 2.105 Inches  
Inside Diameter ----- 1.3725 to 1.3825 Inches  
Thickness ----- .1225 to .1275 Inch  
Timing Marks on Engine ----- Timing Marks Located on Crankshaft  
Pulley Flange. Pointer Located on  
Timing Gear Cover.

Fuel Injectors ----- Robert Bosch Pintle Type: Opening  
Governor ----- Mechanical Variable Speed Fly-Weight  
Centrifugal Type; Integral Part of Injection Pump,

**Fuel Filters**

1st Stage Fuel Filter ----- Full Flow Spin on Type  
2nd Stage Fuel Filter ----- Full Flow Spin on Type



## 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						

## TIMING CHART

ENGINE	FULL LOAD GOVERNED ENGINE SPEED	NUMBER OF DEGREES
A267D	2000	33°

## VALVE TIMING

With valve clearance set correctly, dial indicator mounted above the No. 1 intake valve stem and the reading taken with valve .040" off its seat.

A267D Inlet Opening (No. 1 Cyl.)----- 3° BTDC

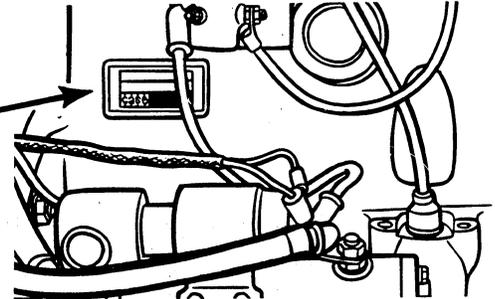
**NOTE** "Inlet Opening" is the only position on these engines that can be checked by the crankshaft pulley marks. If this position is correct, it can be assumed that the timing gears are correctly marked and properly assembled.

**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.

# Section 11

## GENERAL ENGINE SPECIFICATIONS W7E Loaders

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 .....	4 Cylinder, 4 Stroke Cycle, Valve-in-Head
Firing Order .....	1-3-4-2
Bore .....	4-3/8 Inches
Stroke .....	5 Inches
Piston Displacement .....	301 Cubic Inches
Compression Ratio .....	16.5 to 1
No Load Governed .....	Speed 2100 to 2150 RPM
Rated Engine Speed .....	2000 RPM
Engine Idling Speed .....	725 to 775 RPM
*Valve Tappet Clearance (Exhaust .....	(Hot) .020 Inch
(Intake) .....	(Cold) .025 Inch
	(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 .....	5
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 .....	30 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







**SECTION**

**CC**

**LUBRICATION,  
MAINTENANCE, AND  
TORQUE CHARTS**

## RUN-IN PERIOD

Items listed in this section are supplementary to the normal maintenance and lubrication during the run-in period only.

Component	Type of Service	Capacity or Measurement	Type of Lubricant
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### Check Every 2 Hours Until Torque Remains Stable

Wheel Bolt Torque	Front 170 ft. lbs. Rear 250 ft. lbs.	_____ _____	_____ _____
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### After First 20 Hours Of Operation

Engine Oil	Drain and Refill	9 Quarts With Filter Change	See Page 3
Engine Oil Filter	Replace Element	_____	A21475 Element
Hydraulic Suction Screen	Clean	_____	_____
Hydraulic Return Line Filter	Replace Element	_____	D35995 Element

## MAINTENANCE AND LUBRICATION

### Every 10 Hours Or Daily

1. Front Axle Pivot and King Pins	Grease	5 Fittings	Lithium "Soap Base" Grease
2. Steering Cylinders	Grease	2 Fittings	Lithium "Soap Base" Grease
3. Air Cleaner	Clean Dust Cup	_____	_____
4. Engine Oil	Check Level	_____	See Page 3
5. Power Shuttle Transmission Oil	Check Level	_____	Case Hi-Lo TCH Oil
6. 4 Speed Transmission and Final Drive Oil	Check Level	_____	See Page 3
7. Hydraulic Reservoir Oil	Check Level	_____	Case Hi-Lo TCH Oil
8. Air Intake Weather Cap	Clean	_____	_____
9. Fuel Water Trap.	Drain Water	_____	_____
10. Radiator	Check Level	_____	_____
11. Loader Pivot Points	Grease	18 Fittings	Lithium "Soap Base" Grease
12. Loader Pivot Points - With Drott Bucket	Grease	22 Fittings	Lithium "Soap Base" Grease
13. Backhoe Pivot Points	Grease	19 Fittings	Lithium "Soap Base" Grease

### Every 60 Hours Or Weekly

14. Power Shuttle Transmission Shift Lever	Oil	Few Drops	Engine Oil (SAE 30)
15. Brake Pedals	Grease	2 Fittings	Lithium "Soap Base" Grease
16. Brake Bellcrank (Right Side)	Grease	1 Fitting	Lithium "Soap Base" Grease
17. Brake Cross Shaft	Grease	2 Fittings	Lithium "Soap Base" Grease
18.			
19. Throttle Linkage Shaft Pivot	Grease	1 Fitting	Lithium "Soap Base" Grease
20. Power Steering Reservoir Oil	Check Level	_____	_____
21. Batteries	Check Liquid Level	_____	_____
22. Fan Belts	Check Tension	_____	_____
23. Steering Pump Drive Belt	Check Tension	_____	_____

### Every 120 Hours Of Operation

24. Starting Motor	Oil	Few Drops	Engine Oil (SAE 30)
25. Engine Oil	Drain and Refill	8 Quarts without Filter Change	See Page 3
26. Water Pump	Grease	1 Fitting	Lithium "Soap Base" Grease

Component	Type of Service	Capacity or Measurement	Type of Lubricant
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**Every 240 Hours Of Operation**

27. Engine Oil Filter	Replace Element	Add one Quart Oil	A21475 Element
28. Transmission and Final Drive Breather	Clean	_____	_____

**Every 500 Hours Of Operation**

29. Power Shuttle Transmission Torque Converter	Drain and Refill	11 Quarts	Case Hi-Lo TCH Oil
30. Front Wheel Bearings	Repack with Grease	_____	Wheel Bearing Grease
31. Hydraulic Suction Screen	Clean	_____	_____
32. Hydraulic Return Line Filter	Replace Element	_____	D35995 Element
33. Hydraulic System Oil	Drain and Refill	9 Gallons	Case Hi-Lo TCH Oil
34. Cooling System	Drain, Flush and Refill	18 Quarts	_____

**Every 1000 Hours Of Operation**

35. Transmission and Final Drive Oil	Drain and Refill	28 Quarts	_____
36. Power Steering Reservoir Filter	Change Element	_____	A18061 Element

**LUBRICANTS AND CAPACITIES**

ALL CAPACITIES GIVEN IN U.S. MEASURE

LUBRICATION POINTS	APPROXIMATE CAPACITIES	AIR TEMPERATURE RANGES			
		Above 80° F.	80° F. to 32° F.	32° F. to -20° F.	-20° F. or Lower
Engine Crankcase	8 Quarts	SAE 30 Engine Oil Service DS Series 3	SAE 20W Engine Oil Service DS Series 3	SAE 10W Engine Oil Service DS Series 3	SAE 5W-20 Engine Oil Service DS Series 3
Engine Crankcase (Including Oil Filter)	9 Quarts				
Forward-Reverse Transmission Shift Lever Bearing	Few Drops				
Four-speed Transmission and Final Drive	28 Quarts (Refill)	Multi-Purpose Gear Lubricant API-GL-4, SAE 90			
Forward-Reverse Transmission and Torque Converter	11 Quarts (Refill)	Case Hi-Lo TCH Oil			
Hydraulic System Reservoir	36 Quarts (Refill)				
Hydraulic Power Steering Reservoir	1 Quart				
Water Pump	2 Strokes	*Lithium Soap-Base Grease Below 32° F. . . . . No. 1 32° F. to 90° F. . . . . No. 2 Above 90° F. . . . . No. 3			
Wheel Bearings	Use As Required (No. 2 Grade)				
All Pressure Fittings	As Many Strokes As Required				

## STANDARD TORQUES

Torque values listed are to be used under normal conditions.

quire tightening to a special torque for proper installation. These torques are shown in the servicing instructions and illustrations for each component.

Many capscrews, bolts, nuts etc. re-

### Grade 5 Capscrews, Nuts, Studs

S.A.E. Grade 5 Bolts (A.S.T.M. A325 and A.S.T.M. A449) are made from quenched and tempered medium carbon steel - Grade 5 bolts are identified by three (3) equally spaced radial lines embossed on the head of the bolt.



Coarse Thread (N.C.)

Fine Thread (N.F.)

	Torque (ft. lbs.)		Torque (ft. lbs.)
1/4" - 20 N.C.	5-10	9/16" - 12 N.C.	100-120
1/4" - 28 N.F.	10-15	9/16" - 18 N.F.	110-130
5/16" - 18 N.C.	15-20	5/8" - 11 N.C.	135-165
5/16" - 24 N.F.	15-20	5/8" - 18 N.F.	160-200
3/8" - 16 N.C.	25-35	3/4" - 10 N.C.	235-285
3/8" - 24 N.F.	30-40	3/4" - 16 N.F.	270-330
7/16" - 14 N.C.	45-55	7/8" - 9 N.C.	360-440
7/16" - 20 N.F.	50-60	7/8" - 14 N.F.	395-490
1/2" - 13 N.C.	65-85	1" - 8 N.C.	520-640
1/2" - 20 N.F.	80-100	1" - 12 N.F.	575-705

### Grade 8 Capscrews, Nuts, Studs

S.A.E. Grade 8 Bolts (A.S.T.M. A354, Grade BD), are made from quenched and tempered medium carbon alloy steel. Grade 8 Bolts are identified by six (6) equally spaced radial lines embossed on the head of the bolt.



Coarse Thread (N.C.)

Fine Thread (N.F.)

	Torque (ft. lbs.)		Torque (ft. lbs.)
1/4" - 20 N.C.	10-15	9/16" - 12 N.C.	135-165
1/4" - 28 N.F.	15-20	9/16" - 18 N.F.	155-190
5/16" - 18 N.C.	20-30	5/8" - 11 N.C.	200-240
5/16" - 24 N.F.	25-30	5/8" - 18 N.F.	215-265
3/8" - 16 N.C.	40-50	3/4" - 10 N.C.	340-420
3/8" - 24 N.F.	45-55	3/4" - 16 N.F.	380-460
7/16" - 14 N.C.	60-80	7/8" - 9 N.C.	540-660
7/16" - 20 N.F.	70-90	7/8" - 14 N.F.	595-725
1/2" - 13 N.C.	100-120	1" - 8 N.C.	810-990
1/2" - 20 N.F.	110-130	1" - 12 N.F.	900-1100

## TORQUES FOR HYDRAULIC FITTINGS

The following are torque specifications for installation of 37° flare female swivel fittings, straight thread "O"ring boss fittings,

and the locking nut on adjustable style "O"ring fittings. These torque values apply to steel fittings only.

Dash Size	Tube O.D. (Ref.)	Thread Size	37° Flare Female Swivel Ft. Lbs. Torque	Straight Thd. "O"Ring Ft. Lbs. Torque
4	1/4	7/16-20	6-12	12-19
5	5/16	1/2-20	8-16	16-25
6	3/8	9/16-18	10-25	25-40
8	1/2	3/4-16	15-42	42-67
10	5/8	7/8-14	25-58	58-92
12	3/4	1-1/16-12	40-80	80-128
14	7/8	1-3/16-12	60-100	100-160
16	1	1-5/16-12	75-117	117-187

**SECTION**  
**13**  
**MAINTENANCE**  
**AND**  
**LUBRICATION**

## MAINTENANCE CHART

INTERVAL	TYPE OF SERVICE	FLUIDS AND LUBRICANTS
Run-in Every 2 hours	Check wheel bolt torque until stabilized. Front 170 ft. lbs. Rear 220-240 ft. lbs.	
Run-in After first 20 hours	Change engine oil.  Replace engine oil filter.  Check drive belts for pro- per tension.	See chart, page 4.
Every 10 hours or daily	Grease loader pivot points.  Grease backhoe pivot points.  Check engine oil level.  Check radiator coolant level.  Empty air cleaner dust cup.	See chart, page 4.  See chart, page 4.
Every 60 hours or weekly	Grease front axle pivot and king pins.  Grease steering cylinders.  Grease anti-rollback link  Grease parking brake pivots  Check battery electrolyte level.  Clean Hydrovac breather  Check hydraulic oil level.	See chart, page 4.  See chart, page 4.  See chart, page 4.  See chart, page 4.  Distilled water
Every 150 hours	Grease drive line.  Change engine oil.	See chart, page 4.  See chart, page 4.
Every 300 hours	Grease brake pedal pivots.  Grease backhoe control levers.  Check tire pressures.  Lubricate power shuttle control lever.  Replace engine oil filter.	See chart, page 4.  See chart, page 4.    Few drops engine oil

INTERVAL	TYPE OF SERVICE	FLUIDS AND LUBRICANTS
Every 300 hours (Con'td)	<p>Check brake master cylinder fluid level (two).</p> <p>Check power shuttle/torque converter oil level.</p> <p>Check mechanical transmission oil level.</p> <p>Drain water from fuel tank water trap, 1st stage filter and sediment bowl.</p> <p>Check rear axle oil level.</p> <p>Check drive belts for proper tension.</p>	SAE J1703 fluid
Every 500 hours	<p>Grease drive line spline.</p> <p>Replace hydraulic oil filter.</p> <p>Replace 1st and 2nd stage fuel filters.</p> <p>Clean or replace electric fuel pump filter.</p> <p>Repack front wheel bearings with grease.</p> <p>Clean Hydrovac filter.</p>	<p>See chart, page 4.</p> <p>See chart, page 4.</p>
Every 1000 hours	<p>Lubricate Hydrovac cylinders.</p> <p>Change power shuttle/torque converter oil.</p> <p>Change mechanical transmission oil.</p> <p>Change hydraulic oil.</p> <p>Clean hydraulic suction screen.</p> <p>Change Hydrovac filter.</p> <p>Change Hydrovac breather.</p> <p>Change rear axle oil.</p> <p>Lubricate starter motor.</p>	<p>See chart, page 4.</p> <p>Case TCH fluid</p> <p>See chart, page 4.</p> <p>Case TCH fluid</p> <p>See chart, page 4.</p> <p>Few drops engine oil</p>
As required	Service air cleaner element when indicator red band is showing	

COMPONENT	CAPACITY		SPECIFICATIONS
	U.S.	METRIC	
Engine crankcase	10 qts.	9,5 liters	CD- Commercial class D
Engine crankcase, with filter change	11 qts.	10,4 liters	(Service DS, Series 3) Mil-L 45199B Above 32° F. (0° C.) SAE 30 10° F. to 50° F. SAE 20W -12° C. to 10° C. Below 32° F. (0° C.) SAE 10W
Power shuttle and torque converter	12 qts	11,4 liters	Case TCH Fluid
Mechanical transmission	6.4 qts.	6,1 liters	Multipurpose gear lubricant SAE 90 (API-GL-4, Mil-L-2105)
Rear axle - total Center bowl Planetary (ea)	25 pts. 15 pts. 5 pts.	11,8 liters 7,1 liters 2,4 liters	Multipurpose gear lubricant SAE 90 SCL (API-GL-4, Mil-L-2105)
Hydraulic reservoir System total	9 gal. 35 gal.	34,1 liters 132,5 liters	Case TCH Fluid Alternate Oil: motor oil, SD-Service Class D or CA-Commercial Class A (Service MS or DG) Above 32° F. (0° C. ) SAE 10W Below 32° F. (0° C.) SAE 5 W
Hydrovac cylinder	1 fl. oz.	29,6 cm <sup>3</sup>	Case TCH Fluid
Brake system	2 pts.	0,9 liters	SAE J1703 brake fluid
Engine Coolant	30 qts.	28,4 liters	
Pressure fittings	As required		Above 32° F. (0° C.) Multipurpose or No. 2 lithium-soap base grease  Below 32° F. (0° C.) Multipurpose or No. 1 lithium-soap base grease
Wheel bearings	As required		No. 2 wheel bearing grease

**SECTION**

**I**

**THROTTLE CONTROLS  
AND LINKAGE**

# TABLE OF CONTENTS

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# ADJUSTMENT/INSTALLATION OF THROTTLE LINKAGE

## Specifications

Low idle speed, no load	750 RPM
High idle speed, no load	2125 to 2175 RPM

## Checking the Adjustment

### HIGH IDLE TOO HIGH (ABOVE 2175 RPM)

Service the injection pump. Refer to Section I of the Fuel System.

### HIGH IDLE TOO LOW (BELOW 2125 RPM)

Make the following check to determine if the fault is in the throttle linkage or injection pump:

1. Refer to Figure 1, Inset B. Disconnect the throttle link rod at the injection pump governor control lever.
2. Start the engine and move the control lever against the high speed adjusting screw.
3. If high idle speed is still below 2125 RPM, service the injection pump. See Section I, Fuel System. If high idle speed is now 2125-2175 RPM, adjust the throttle linkage. See "Idle Speed Adjustments" below.

## Idle Speed Adjustment

### LOW IDLE SPEED ADJUSTMENT

1. Check and adjust (if required) the accelerator linkage as described under "Accelerator Linkage Installation" below.
2. Adjustment of low idling speed can be made at the throttle link adapter block. See Figure 1, Inset A.
  - a. If low idle speed is too LOW, adjust the throttle link adapter block FORWARD on the throttle rod.
  - b. If low idle speed is too HIGH, adjust the throttle link adapter block REARWARD on the throttle rod.

NOTE: If problem is a "hunting" condition (Low idle speed drops to a very low RPM, then speeds up), refer to Section I, Fuel System for adjustments of injection pump.

### HIGH IDLE SPEED ADJUSTMENT

3. With the low idle speed properly adjusted, start the engine and adjust the pedal stop bolt to contract the bottom of the pedal when engine speed is at 2125-2175 RPM. Tighten the jam nut.

## Installation

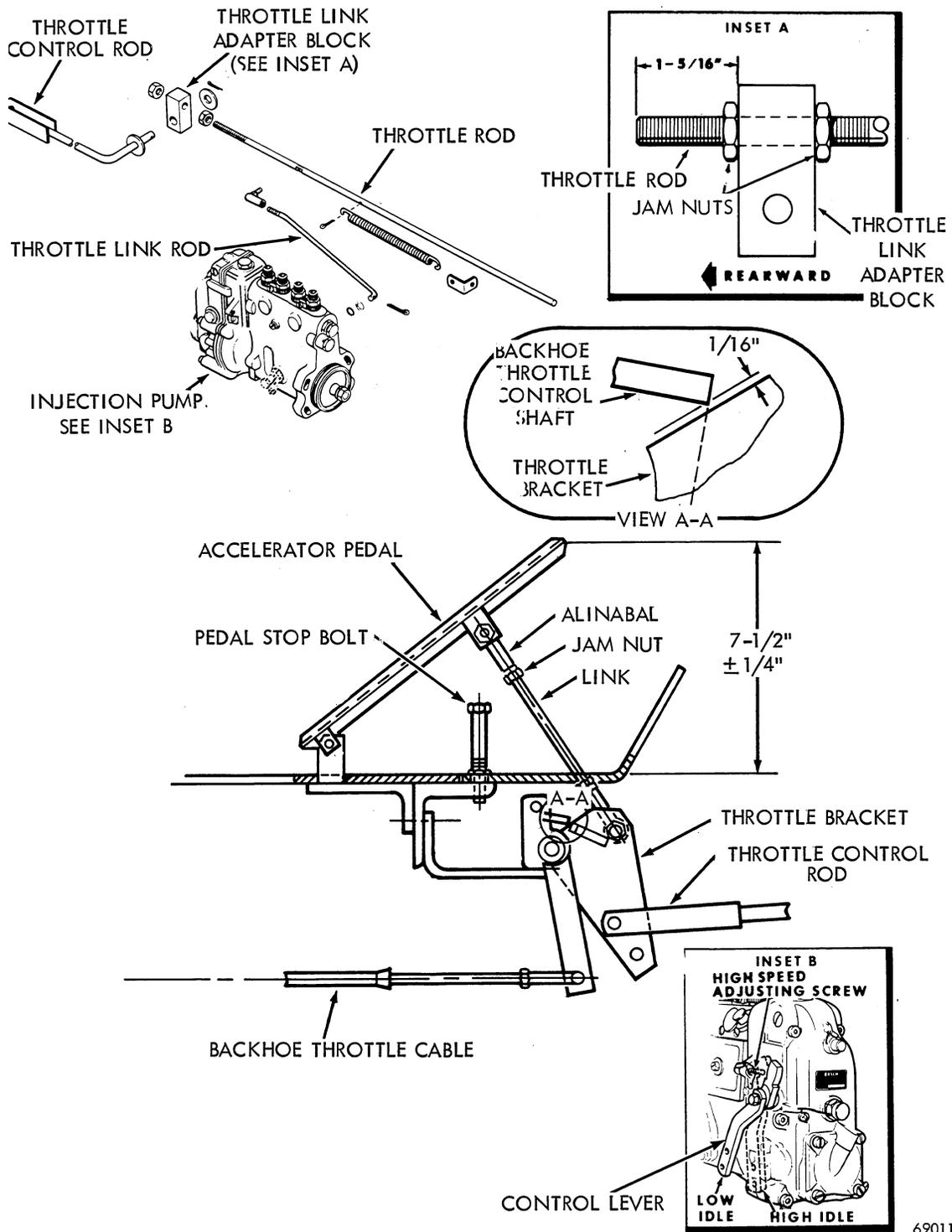
### ACCELERATOR LINKAGE INSTALLATION

1. Position linkage in fuel shutoff position by depressing fuel shutoff pedal.
2. Refer to Figure 1. Loosen jam nuts on accelerator link rod and adjust alinabals to the 7-1/2" dimension.
3. With backhoe throttle cable in fully closed position, adjust the cable at the yoke until the throttle shaft control plate is in contact with the throttle shaft bracket within 1/16" or less.

### THROTTLE ROD INSTALLATION

Refer to Figure 1, Inset A.

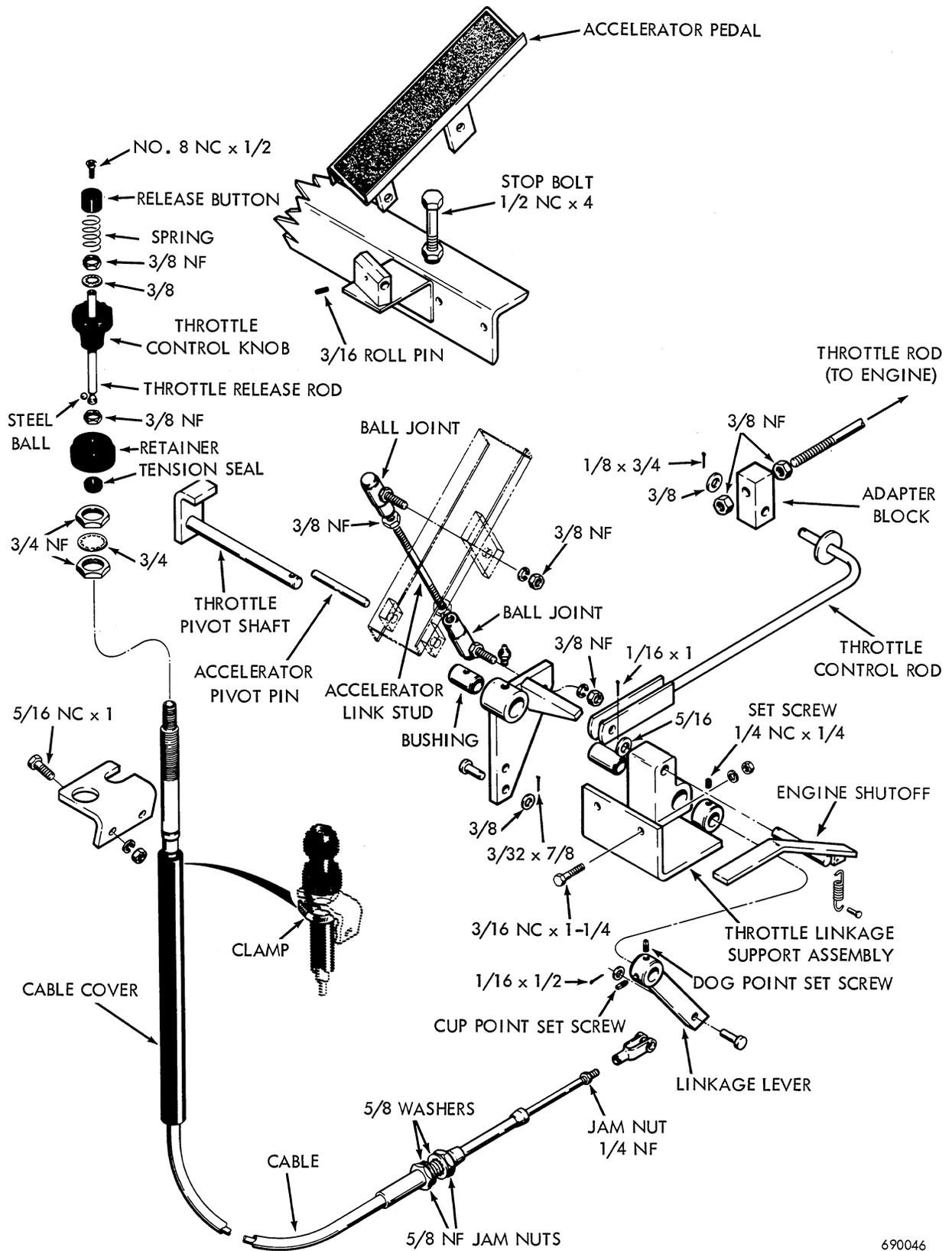
1. Install the throttle link adapter block on the throttle rod so it extends approximately 1-5/16" rearward. Tighten the jam nuts.
2. Start the engine and allow it to idle. Engine speed should be 750 RPM. If not, make the adjustment described under "Low Idle Speed Adjustment" above.



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Figure 1

# EXPLODED VIEW



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Figure 2 - Backhoe and Accelerator Throttle Linkage

## BACKHOE THROTTLE CONTROL

Refer to Figure 2.

This control permits the operator to adjust and maintain any desired engine speed for backhoe operation. To operate: Loosen the retainer, depress the release button, and pull out throttle control knob until desired engine speed is reached. For a finer adjustment, twist the knob in or out. Tighten the retainer to maintain the adjustment.

The backhoe throttle control is mounted on the right rear of the tractor. Its principal parts are the cable assembly attached to the engine throttle linkage, throttle release rod, retainer, throttle control knob, and re-

lease button. These parts are all shown in Figure 2.

One end of the sleeve is connected to the cable and the other end to the throttle control knob. The steel ball locks the sleeves in position until released by depressing the release button and the release rod to which the release button is attached.

The retainer contains the tension seal which prevents the sleeve from inching out of adjustment during backhoe operation. When the retainer is tightened down, the tension seal is squeezed against the sleeve and holds it in place.

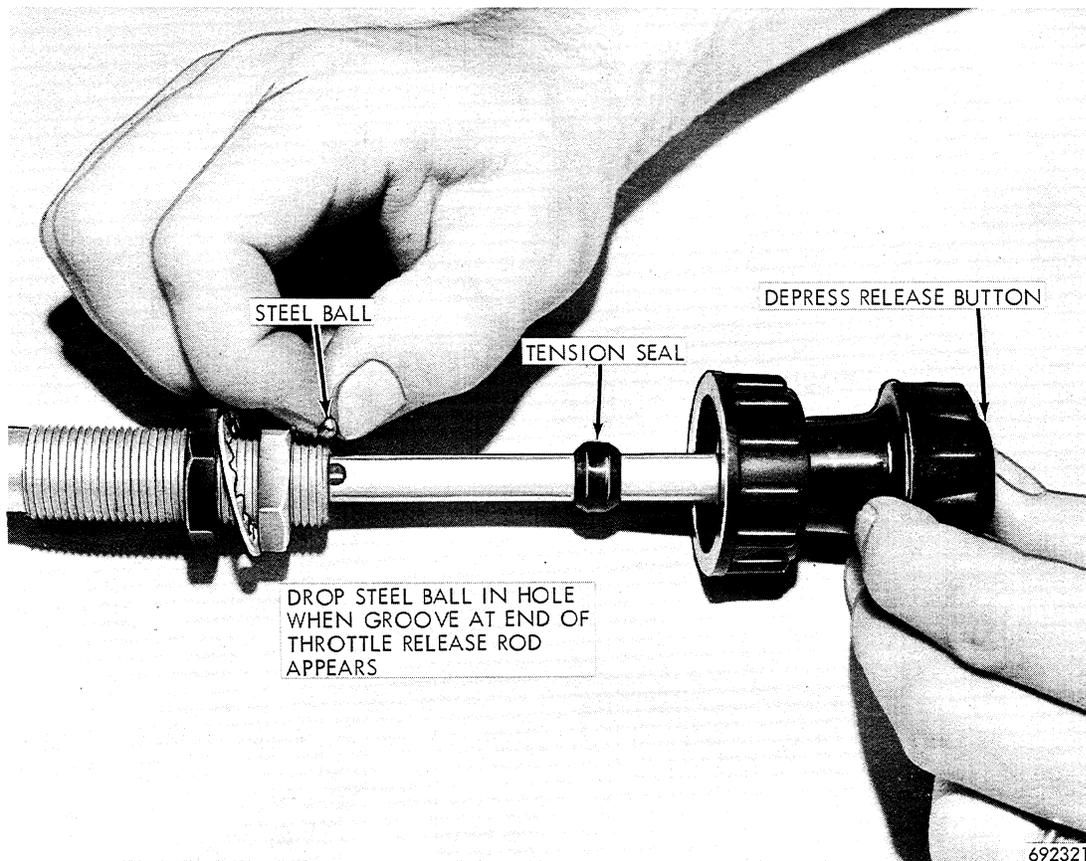


Figure 3 - Assembling Steel Ball

## Trouble Shooting Chart

Refer to Figure 2 for parts identification.

<u>Problem</u>	<u>Possible Cause</u>	<u>Remedy</u>
Engine Speed Cannot Be Maintained	<ol style="list-style-type: none"> <li>1. Worn tension seal.</li> <li>2. Tension seal not squeezed against inner sleeve.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace tension seal.</li> <li>2. Move jam nuts down on outer sleeve so retainer can be screwed down farther.</li> </ol>
No Detent	<ol style="list-style-type: none"> <li>1. Steel ball not replaced.</li> <li>2. Steel ball improperly assembled.</li> </ol>	<ol style="list-style-type: none"> <li>1. Disassemble control and replace steel ball.</li> <li>2. Disassemble control and assemble as shown in Figure 3.</li> </ol>
Release Button Not Working	Same as "No Detent" above.	
Control Pulled Out, Engine Speed Slow	<ol style="list-style-type: none"> <li>1. Throttle linkage improperly adjusted.</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust throttle linkage.</li> </ol>

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