STANDARD TORQUE DATA FOR NUTS AND BOLTS— FOOT POUNDS

Recommended torque for all Standard Application Nuts and Bolts, provided:

A. All thread surfaces are clean and lubricated with SAE-30 engine oil. (See NOTE.)

B. Joints are rigid, that is, no gaskets or compressible materials are used.

C. When reusing nuts or bolts use minimum torque values.

NOTE: Multiply the standard torque by:

.65 when finished jam nuts are used.
.70 when Molykote, white lead or similar mixtures are used as lubricants.
.75 when parkerized bolts or nuts are used.
.85 when cadmium plated bolts or nuts and zinc bolts w/waxed zinc nuts are used.
.90 when hardened surfaces are used under the nut or bolt head.

1 FOOT POUND = 1.355 NEWTON METERS

Bolt or Stud Diameter		Type 1 Studs Only		Type 1 Bolts 6" length or less		Type 1 Bolts longer than 6"		Type 5 (all lengths)		Type 8 (all lengths)			
										Only when used† in cast (gray) iron		All other applications	
Inches	MM	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
1/4	6.4	5	6	5	6	3	3	9	10	11	13	12	14
5/16	8.0	12	13	12	13	6	7	19	21	24	27	27	30
3/8	9.5	21	24	21	24	11	13	33	37	43	47	45	50
7/16	11.1	35	38	35	38	19	21	53	60	69	76	75	85
1/2	12.7	52	58	52	58	29	32	80	90	104	117	115	130
9/16	14.3	70	80	70	80	41	46	115	130	150	170	165	185
5/8	15.9	98	110	98	110	57	63	160	180	210	230	220	250
3/4	19.0	174	195	174	195	100	112	290	320	350	390	400	450
7/8	22.2	300	330	162	181	162	181	420	470	570	630	650	730
1	25.4	420	470	250	270	250	270	630	710	850	950	970	1090
1-1/8	28.6	600	660	350	380	350	380	850	950	1200	1350	1380	1550
1-1/4	31.8	840	940	490	540	490	540	1200	1350	1700	1900	1940	2180
1-3/8	34.9	1100	1230	640	710	640	710	1570	1760	2300	2500	2600	2800
1-1/2	38.1	1470	1640	850	940	850	940	2000	2300	3000	3300	3300	3700
1-3/4	44.5	2350	2450	1330	1490	1330	1490	3300	3700	4700	5200	5300	6000
2	50.8	3500	3900	2000	2200	2000	2200	5000	5500	7000	7800	8000	9000

†When bolt penetration is 1-1/2 times the diameter of the bolt.

BOLT TYPE IDENTIFICATION CHART

IH TYPE	S.A.E. GRADE	DESCRIPTION	BOLT HEAD MARKING *
1	Equivalent 1 or 2	WILL HAVE A IH STANDARD MONOGRAM IN THE CENTER OF THE HEAD Low or Medium Carbon Steel Not Heat Treated	
5	5	WILL HAVE A IH AND 3 RADIAL LINES Quenched and Tempered Medium Carbon Steel	
8	8	WILL HAVE A IH AND 6 RADIAL LINES Quenched and Tempered Special Carbon or Alloy Steel	

*The center marking identifies the bolt manufacturer. The IH monogram is currently used. Some bolts may still have an IH or a raised dot which previously identified IH bolts.

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Specifications

Engine Model	D-358
Static Timing	10° BTDC
Charge Pressure @ High Idle	88 - 98 psi
Low Idle	900 ± 50 rpm
High Idle	2700 ± 30 rpm
Rated Speed	2500 rpm
Minimum Overload	1800 rpm
Fuel Pressure (Tank to Transfer Pump)	7 psi
Air Cleaner Restriction (at the cleaner)	25" Maximum

Engine

Removal

1. Disconnect the battery.

2. Remove the muffler shield, muffler, top hood and top rear angle.

3. Drain the radiator.

4. Disconnect the radiator hoses at the radiator.

5. Disconnect the air cleaner hose at the air cleaner. Disconnect the air cleaner extension pipe hose at the intake manifold and remove the pipe from the engine.

6. Remove the breather hose.

7. Remove the electrical leads from the air conditioner compressor safety switch. Loosen the belt adjusting bolts and remove the belt.

8. Remove the compressor mounting bracket and the compressor as an assembly. Lay the compressor aside on top of the separator drive jackshaft assembly and tie it in place.



CAUTION! Avoid disconnecting the refrigerant lines. Refrigerant vapor is not poisonous, however it does displace oxygen in the air. Oxygen starvation can cause you to lose consciousness. Avoid physical contact and breathing the vapors. If the lines are disconnected, the system will have to be evacuated and recharged.

9. Disconnect the electrical harness at the engine.

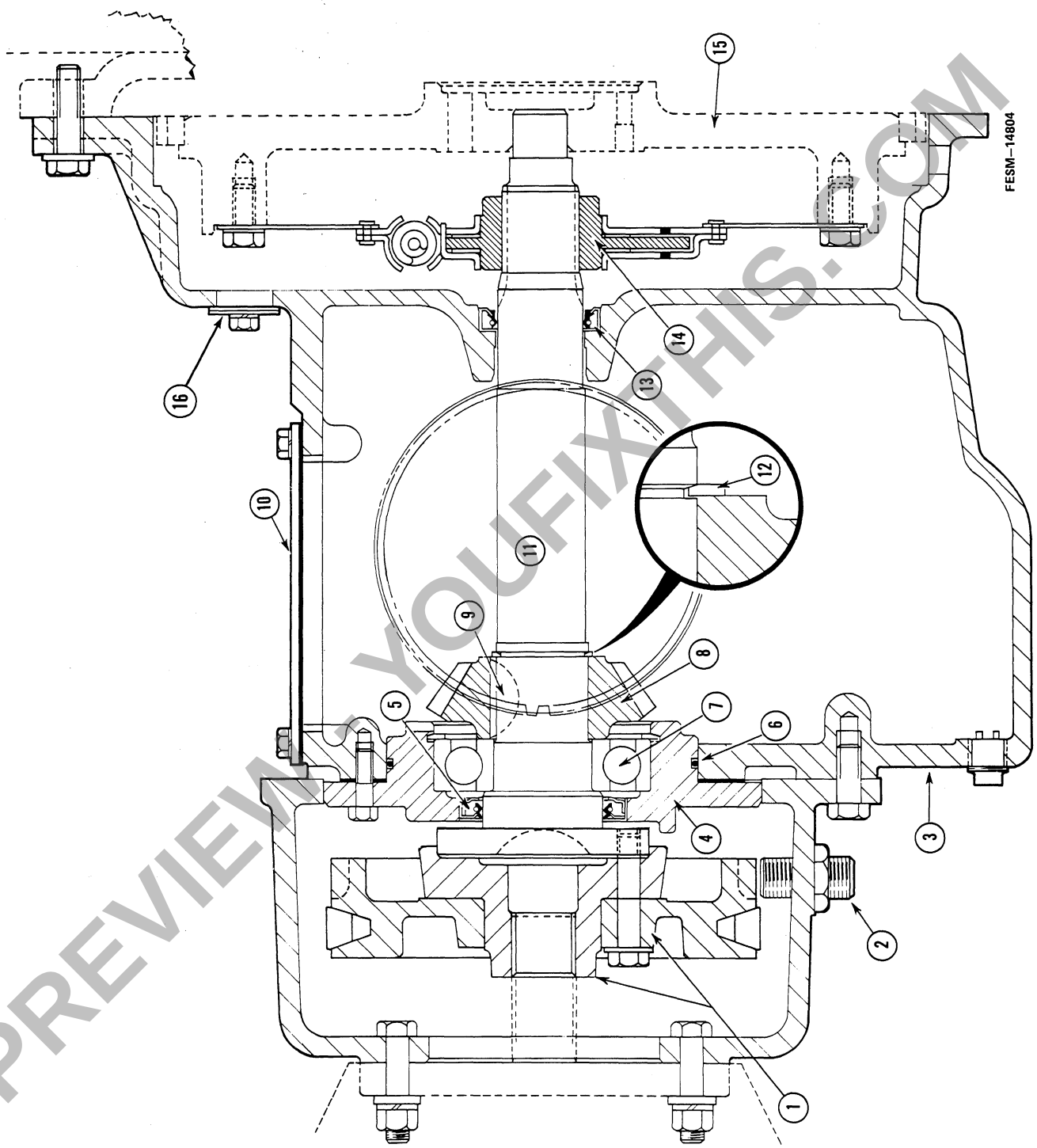
10. Disconnect the electrical harness at the starter. Remove the starter.

11. Disconnect the fuel supply and return lines.

12. Disconnect the heater hoses. Plug the openings.

13. Remove the fan shroud.

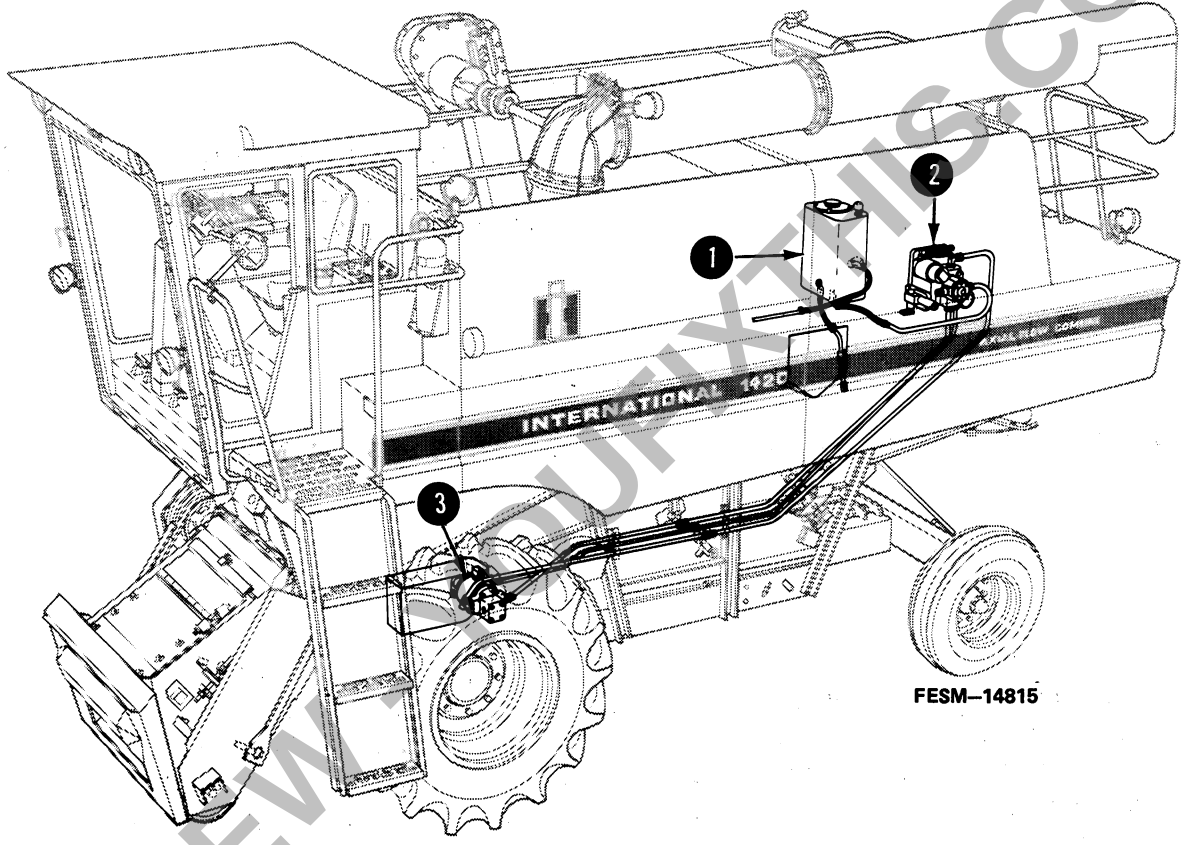
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Hydrostatic Drive Schematic

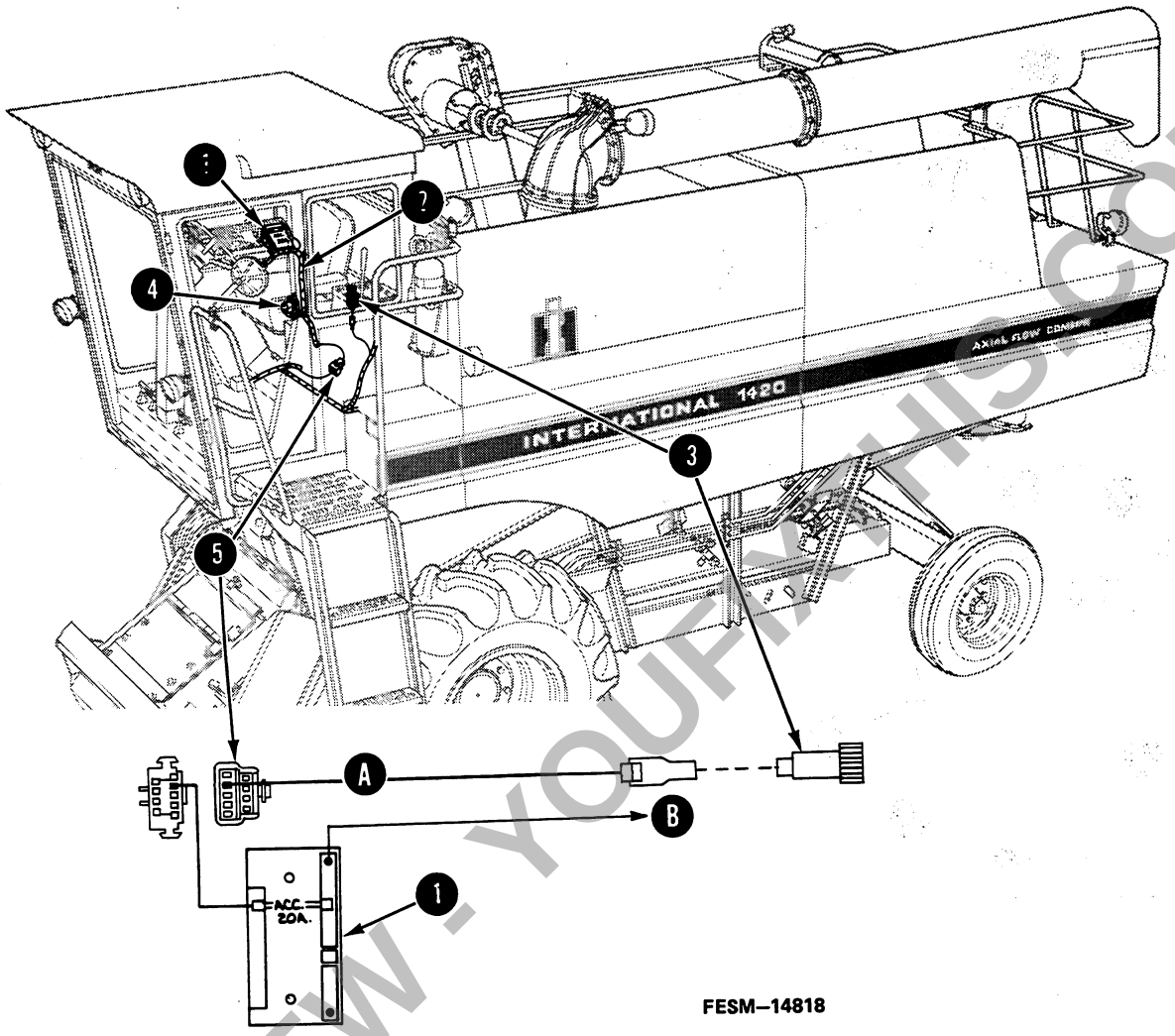


FESM—14815

1. Reservoir
2. Hydrostatic pump
3. Hydrostatic motor

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FESM–14818

1. Fuse panel
2. Console harness
3. Cigarette lighter
4. Solenoid switch
5. Front harness connection

A - Red with green
B - Light green with red - To "cold" side of front solenoid switch

CIGARETTE LIGHTER

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Troubleshooting

A thorough and orderly troubleshooting procedure will help define steering complaints and diagnose the troubles more surely. By following good, thorough procedure, many possibilities can be eliminated and the cause of trouble determined more quickly.

Complaints are likely to be hard steering or leakage. Some of the causes of these are common. These complaints are covered separately.

For a thorough, orderly procedure of checking the system, the following order is recommended:

1. First read information on Hard Steering, Steering Wheel Slip, Leakage, and Air in Fluid Circuit.

2. Make the manual pump performance tests.

3. Make the pressure test of hydraulic pump.

4. Test the steering cylinder.

Hard Steering

Hard Steering Definition: Abnormal high steering wheel effort with power steering (excluding manual steering with "dead" engine).

NOTE: Not to be confused with hard steering while the hydraulic pump is operating and caused only by the effect of the manual pump producing additional hydraulic pressure when operator applies more manual effort than necessary.

Steering Wheel Slip

General Information

Steering wheel slip is the term given to the additional movement of the steering wheel necessary to hold the steering position of the road wheels. It involves inability to hold the steering position without further steering movement of the steering wheel.

Slip is due to leakage anywhere in the system, internal and external, or to air in the system.

Some slip is normal and permissible. With hydraulic fluid at normal operating temperature, four revolutions of the steering wheel per minute with rear wheels against the stop is acceptable. Slip, under normal operating conditions, will be considerably less than this.

Steering wheel slip is checked by measuring steering wheel rotation, in turns, in a specified unit of time with a specified pull on input shaft of the manual pump while the rear wheels are against the stop. Procedure for checking steering wheel slip is described in the following paragraphs.

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General Contents

Safe Work Rules, Standard Torque Data for Nuts and Bolts, Metric Conversion Tables, Standard Torque Data for Hydraulic Tubes and Fittings, Flangette Bearing Installation, Special Service Tools Required ..... IV – XIII

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1 ENGINE AND FUEL TANK

2 SEPARATOR DRIVE UNITS

3 HYDROSTATIC DRIVE

4 BRAKES, TRANSMISSION, DIFFERENTIAL, FINAL DRIVES AND STEERING AXLE

5 HYDRAULIC SYSTEM

6 CUTTING AND FEEDING

7 THRESHING AND SEPARATING

8 CLEANING SYSTEM

9 ELEVATORS AND GRAIN TANK

10 OPERATOR'S CAB AND ELECTRICAL SYSTEM

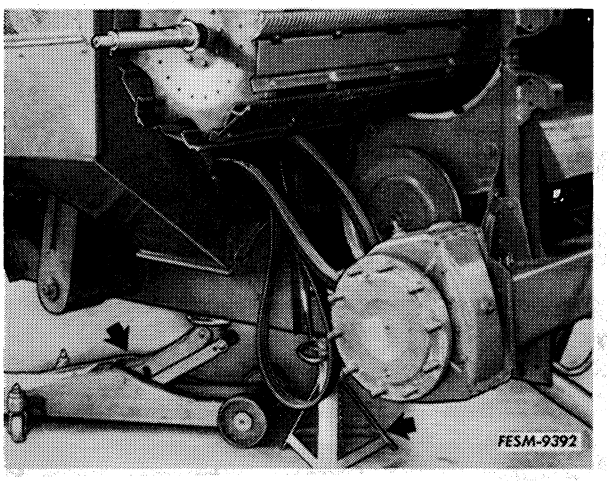
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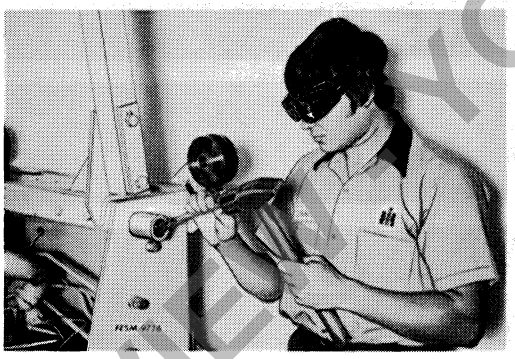
WORK SAFELY – FOLLOW THESE RULES

This symbol is used to call your attention to instructions concerning your personal safety. Be sure to observe and follow these instructions.

1. To prevent injury, do not allow children or by-standers around the machine while it is being adjusted and/or serviced.



2. Always use safety stands in conjunction with hydraulic jacks or hoists. Do not rely on the jack or hoist to carry the load, they could fail.

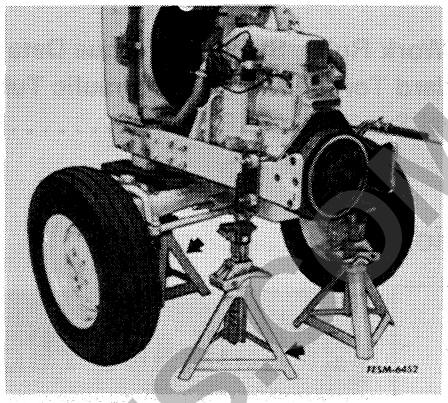


3. Always wear safety glasses when using a hammer, chisel or other tools that may cause chips to fly.

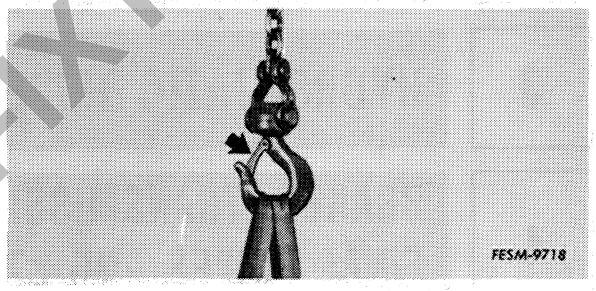
4. Keep work area organized and clean. Wipe up oil or spills of any kind. Keep tools and parts off of the floor. Eliminate the possibility of a fall which could result in a serious injury.

5. Be sure to reinstall safety devices, guards or shields after adjusting and/or servicing the machine.

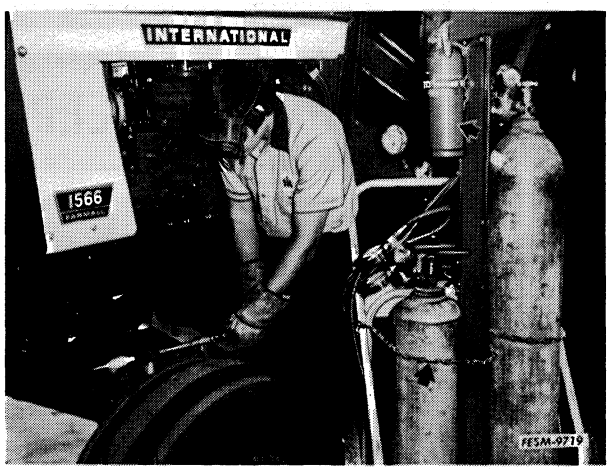
6. After servicing, be sure all tools, parts, or servicing equipment are removed from the machine.



7. When splitting tractors, or disassembling machines, be sure to use safety stands and adequate supports to prevent tipping or rollover.



8. Use a safety catch on all hoist hooks. Do not take a chance, the load could slip off of the hook.



9. When using an acetylene torch always wear welding goggles and gloves. Keep a "charged" fire extinguisher within reach. Be sure the acetylene and oxygen tanks are separated by a metal shield and are chained to the cart. Do not weld or heat areas near fuel tanks or fuel lines and utilize proper shielding around hydraulic lines.

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Due to a continuous program of research and development, some procedures, specifications and parts may be altered in a constant effort to improve our products.

When changes and improvements are made in our products, periodic revisions may be made to this manual to keep it up-to-date. It is suggested that customers contact their dealer for information on the latest revision.

LIBRARY FILING INFORMATION

1. File this Manual, GSS-1500, after Divider Tab GSS-1500.

2. Enter the following information in the Service Manual Index.

   A. Print or preferably type in the combine model and page 10 on the first open line of the combine section contents, page 3.

   B. Print or preferably type in the combine model and form number on page 10 in the combine section of the Service Manual Index.

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CHASSIS
1420 Axial Flow Combine

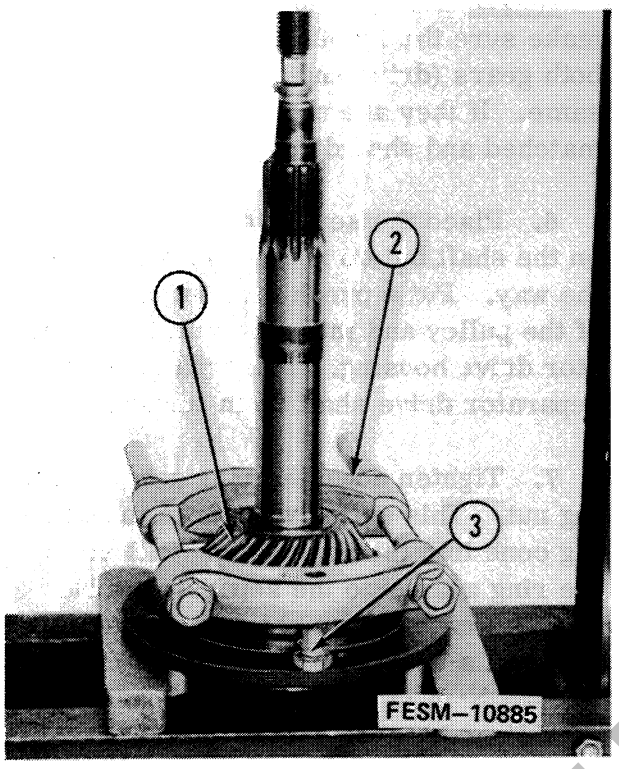
GSS-1500 w/Revision 1
September, 1982

NOTE: Refer to the following Service Manuals for service information not contained in this manual:

GSS-1052	Testing and Servicing Electrical Equipment
GSS-1407	Chassis – 815 – 915 Combines
GSS-1427	Diesel Engine and Fuel System
GSS-1455	Basic Air Conditioning
GSS-1479	Chassis – 1440, 1460 and 1480 Combines
GSS-1492	Recharging Hydraulic Accumulators

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PTO Bearing Housing



Disassembly

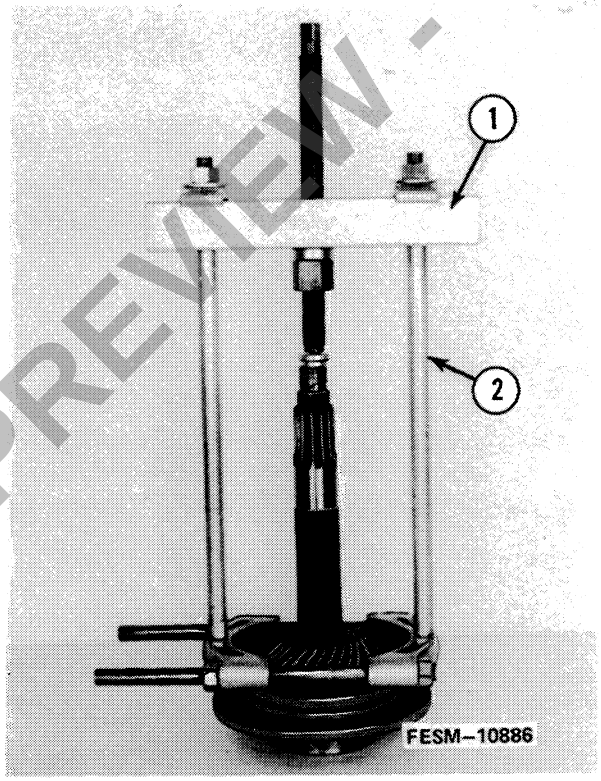
1. Thread two 5/8 inch National Fine bolts into an OTC 952 bearing puller attachment.

2. Remove the pinion gear retaining ring.

3. Place the puller attachment between the pinion gear and the bearing housing and screw the heads of the bolts against the bearing housing.

1. Drive gear (pinion gear)
2. OTC 952
3. 5/8 inch NF bolt

4. Press the PTO drive shaft from the pinion gear and bearing housing.



NOTE: When the shaft is pressed out, the Woodruff Key in the shaft will destroy the inner race of the bearing. If the bearing is to be saved, press the shaft just enough to break it loose from the pinion gear. Then finish the gear removal by pulling it off with an OTC 938 bridge and two OCT 930-B puller legs.

5. Remove the bearing retaining ring and press the bearing from the bearing housing.

6. Remove the oil seal.

1. OTC 938 Bridge
2. OTC 930-B Legs

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Section 4

BRAKES, TRANSMISSION, DIFFERENTIAL, FINAL DRIVES AND STEERING AXLE

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Servicing the Brake Disc

Disassembly

1. Disconnect the brake linkage and lines on the side being serviced. Remove the brake cylinder.

2. Remove the axle drive shaft. Remove the lock wires from the axle drive shaft sleeve and slide the sleeves toward each other on the axle drive shaft.



FESM-3579

3. Remove the bolts securing the brake housing to the brake housing adapter and pull the housing and discs away from the adapter. Note that the bolts which hold these assemblies together are spaced unevenly so that they cannot be incorrectly reassembled.

4. Lift out the outer friction disc assembly. Use a large cold chisel as a wedge between the brake operating rod yoke and the actuating disc assemblies. Place the chisel flat between these parts, and twist it to spread the discs, thus enabling them to clear the "stops." Lift the actuating disc assemblies out, then the inner friction disc assembly.

Inspection and Repair

Greatest braking efficiency can be obtained only when the maximum amount of friction area makes contact during the braking action. For this reason, braking surfaces that are rust pitted have lost some braking efficiency; the pitted area will not contact the friction material of the brake lining. The amount of efficiency lost will depend on the extent of the pitting.

Grooved brake lining caused by rough or rust encrusted brake surfaces also can result in a great reduction in the lining area that contacts the brake surface. Inspect thoroughly and take corrective action as necessary, using the following steps and procedures as your guide.

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General Description

Three electro-hydraulic control valves are used to control the operations of the combine. One valve controls the feeder clutch and another valve controls the separator clutch. The third valve is a stack valve which controls header lift, reel lift and the unloading auger swing.

All the hydraulic valves are electrically actuated by solenoids rather than mechanical linkage.

How It Works

Flow from the hydraulic pump is directed to all three valves. The flow entering the stack valve is exposed to the primary and secondary system relief valves. The primary system relief valve controls the maximum pressure to the feeder clutch valve, the separator clutch valve and the header lift section of the stack valve. The secondary system relief valve controls the maximum pressure to the reel lift and unloading auger swing sections of the stack valve and the steering hand pump.

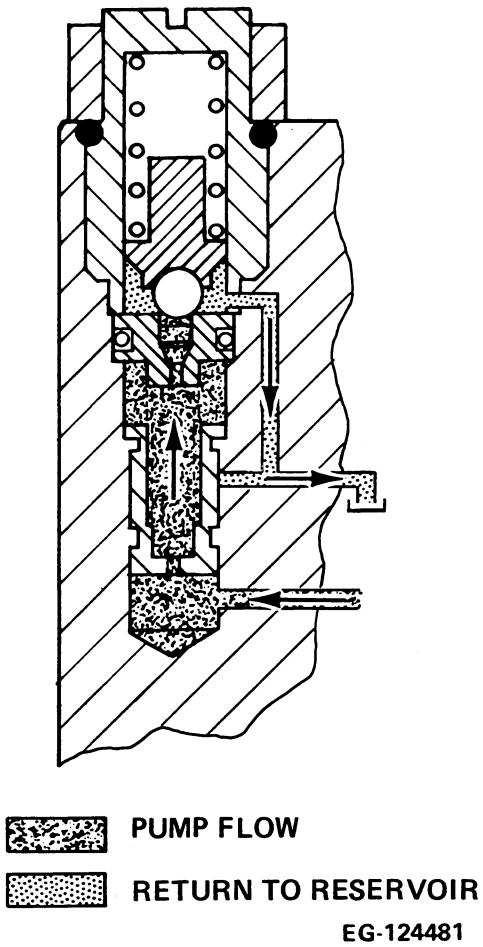
Primary and Secondary Relief Valves

There are two pilot-operated relief valves in the header lift section of the stack valve: the primary relief valve which is set at 15513.2 kPa (2250 psi) and the secondary relief valve which is set at 13789.5 kPa (2000 psi).

The primary system relief valve is located in the pump inlet cavity and is exposed to the pump flow at the inlet end of the primary flow divider. This relief valve controls the maximum pressure to the feeder clutch valve, the separator clutch valve and the header lift section of the stack valve.

The secondary system relief valve is located in the passageway between the two flow dividers and is exposed to flow at the inlet end of the secondary flow divider. This relief valve controls the maximum fluid pressure to the reel lift and unloader auger swing sections of the stack valve and to the steering hand pump.

Both relief valves function in the same manner. Fluid under pressure is exposed to the end of the relief valve and enters the main poppet through an orifice. The fluid fills the spring cavity and increases in pressure as the system pressure increases. At a pressure slightly less than the relief valve pressure, the pilot poppet ball will be forced off its seat and allow fluid to pass to the reservoir. This lowers the pressure on the spring side of the main poppet, allowing the poppet to move against its spring and open a passage to the reservoir. As soon as the pressure is reduced, the pilot poppet ball will seat and pressure will build behind the main poppet causing it to seat.



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PROBLEM	CAUSE AND REMEDY
UNLOADER AUGER SWING VALVE - Continued	
B. Auger won't extend or extends too slow - Continued	4. Check the unloader auger swing valve for internal leakage. Refer to "Flo-Rating the Unloader Auger Swing Circuit".
C. Auger won't retract or retracts too slow	1. See "All systems weak or slow".
	2. In order for the auger to retract, the raise "Normally Open Primary Poppet" solenoid on the reel lift valve and the retract solenoid on the auger swing valve must be energized. Check to see if current is reaching both solenoids by placing a wrench on top of the solenoid. If current is reaching the valve, the solenoid will be magnetized. If there is no magnetism, check the wiring for continuity. If the wiring is found to be satisfactory, replace the solenoid coil.
	3. Check for restriction due to bent line or hose between valve and cylinders.
	4. Check the unloader auger swing valve for internal leakage. Refer to "Flo-Rating the Unloader Auger Swing Circuit".
D. Auger continues to retract or extend with toggle switch off	1. Spool sticking. Remove the spool and check for binding.
	2. Orifice in the spool plugged. Remove and clean.
	3. Later production valves, check valves not sealing. Remove the check valves and check for binding or broken springs.
SEPARATOR AND FEEDER CLUTCH VALVES	
A. Valve fails to engage	1. See "All systems weak or slow".

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For the accumulator to function properly, the precharge pressure of the gas must be less than the normal unit hydraulic lift pressure. The accumulator is factory precharged to 6895 kPa (1000 psi) pressure.

NOTE: The precharge pressure is the pressure of the dry nitrogen gas when the accumulator is completely empty of hydraulic oil.

Setting Precharge Pressure With Nitrogen Accumulator Charging Kit 15-147 A

1. With the header on the ground, and all pressure in the hydraulic lines relieved, install a pressure gauge in the header lift line.

CAUTION! Do not separate hydraulic lines with the header raised unless the header is securely supported.

2. Raise the header approximately 152 mm (6 inches) from the ground and record the lift pressure.

Lower the header to the ground to completely empty the accumulator of hydraulic fluid before reading precharge pressure.

3. Remove the valve guard from the accumulator and attach the Nitrogen Accumulator Charging Kit 15-147A.

4. Refer to the chart for the recommended precharge pressure.

Accumulator Precharge Pressure (Measured with Charging Kit 15-147A)	
Normal Hydraulic Lift kPa (psi)	Recommended Accumulator Precharge Pressure kPa (psi)
6924 kPa (1200 psi and above)	6206 to 6895 kPa (900 to 1000 psi)
6895 kPa (1000 psi)	4827 to 6206 kPa (700 to 900 psi)
5506 kPa (800 psi)	4482 to 5171 kPa (650 to 750 psi)
4137 kPa (600 psi)	3103 to 3792 kPa (450 to 550 psi)

5. Bleed off or add nitrogen gas as needed to obtain the required precharge pressure.

NOTE: For additional information on "Recharging Hydraulic Accumulators", refer to GSS-1492.

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Section 6

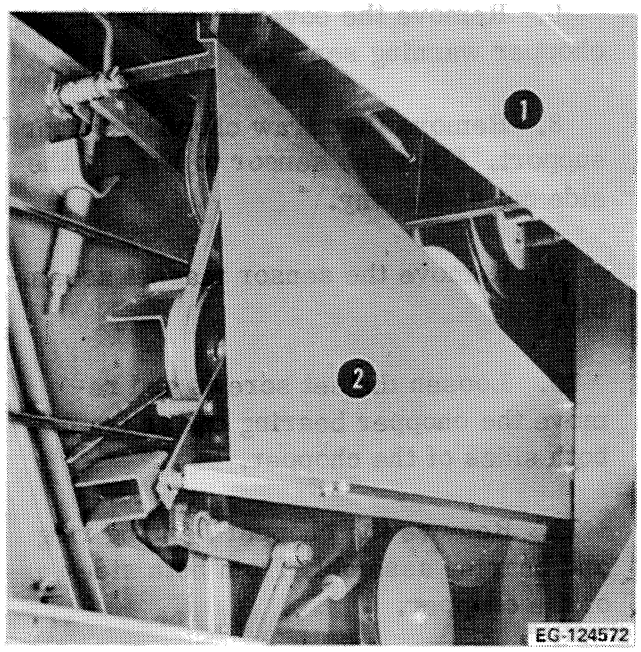
CUTTING AND FEEDING

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1. Left hand rear side sheet
2. Chopper drive shield

Straw Chopper

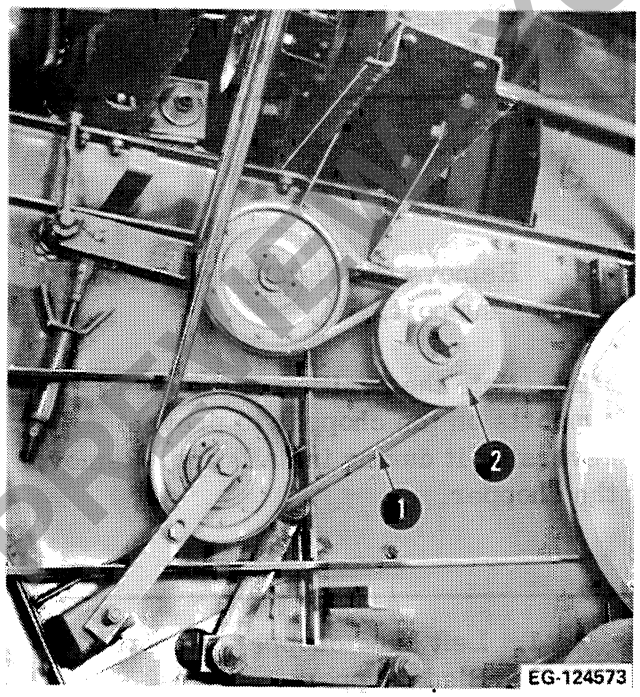
Removal

1. Remove the straw spreader blades and cone assembly by pulling the pin at the top and sliding it off the shaft.

2. Remove the chaffer and shoe sieves in order to provide room to work.

3. Remove the left rear side sheet from the combine.

4. Remove the protective shielding from over the chopper driven pulley.



1. Straw chopper drive belt
2. Straw chopper driven pulley

5. Remove the straw chopper drive belt.

6. Remove the square tapered key from the chopper driven pulley and remove the pulley.

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Installation

Install the air conditioner components in the reverse procedure of removal paying particular attention to the following:

Be sure the hoses are clean and free of excessive moisture. Make certain that the capillary is installed well into the core area.

Compressor Installation

Prior to installing a new or serviced compressor, place compressor on the bench in a position similar to final mounting on the unit. Remove oil filler plug and rotate compressor crankshaft, until a clean 1/8" steel rod can be inserted through the filler plug opening to the bottom of the compressor crankcase.

Insert a locally made dipstick (refer to GSS-1455). Remove the dipstick and compare wetted portion of dipstick with oil level requirement shown in "Specifications".

NOTE: Be certain that oil level height figure taken from "Specifications" is for same compressor mounting position. If necessary, add refrigerant oil to bring oil up to correct level (see "Specifications" for correct oil type). Replace the oil filler plug.

Place the compressor on the mounting pad and align the mounting holes. Install the mounting bolts but, do not completely tighten them.

Position the compressor to obtain correct belt alignment and tension. Torque the mounting bolts to 20 N·m (15 ft. lbs.).

Energize the clutch assembly and torque the clutch hub retaining bolt to 24 N·m (18 ft. lbs.). De-energize clutch assembly.

Lubricate new service valve gaskets with refrigerant oil and install service valves and gaskets on compressor. Torque the service valve nuts to 98 N·m (72 ft. lbs.).

NOTE: Do not over-tighten service valve nuts. The valves can be rotated slightly on their seat without breaking the high pressure seal. This is not an indication of a loose valve.

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