415 and 455 Lawn and Garden Tractors

TECHNICAL MANUAL

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John Deere
Worldwide Commercial and
Consumer Equipment Division

TM1836 (Apr2000)

Litho in U.S.A

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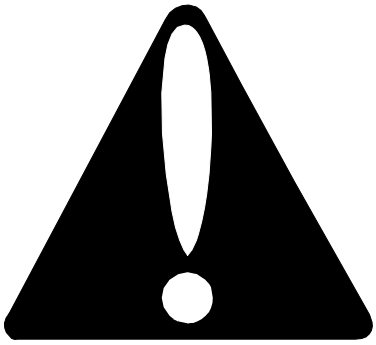
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RECOGNIZE SAFETY INFORMATION



This is the safety-alert symbol. When you see this symbol on your machine or in this manual, be alert to the potential for personal injury.

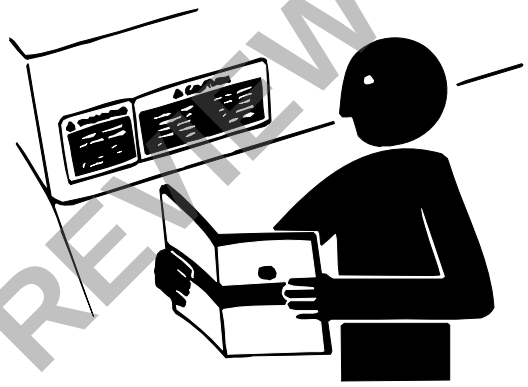
Follow recommended precautions and safe servicing practices.

Understand Signal Words

A signal word—DANGER, WARNING, or CAUTION—is used with the safety-alert symbol. DANGER identifies the most serious hazards.

DANGER or WARNING safety signs are located near specific hazards. General precautions are listed on CAUTION safety signs. CAUTION also calls attention to safety messages in this manual.

REPLACE SAFETY SIGNS

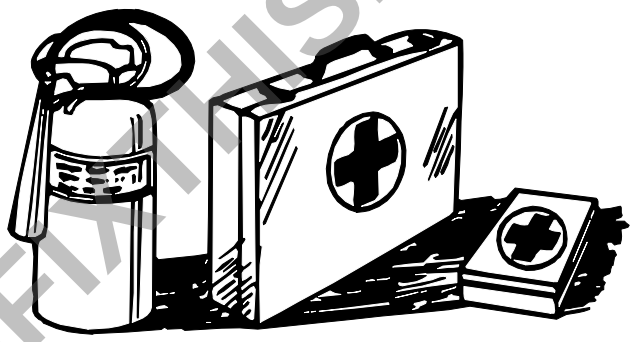


Replace missing or damaged safety signs. See the machine operator's manual for correct safety sign placement.

HANDLE FLUIDS SAFELY—AVOID FIRES

Be Prepared for Emergencies





When you work around fuel, do not smoke or work near heaters or other fire hazards.

Store flammable fluids away from fire hazards. Do not incinerate or puncture pressurized containers.

Make sure machine is clean of trash, grease, and debris.

Do not store oily rags; they can ignite and burn spontaneously.

Be prepared if a fire starts.

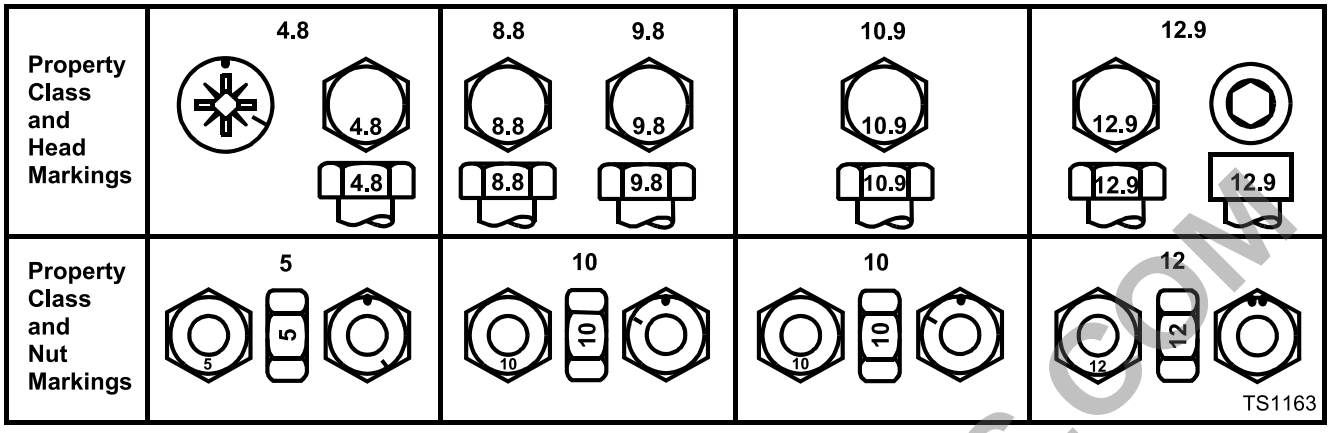
Keep a first aid kit and fire extinguisher handy.

Keep emergency numbers for doctors, ambulance service, hospital, and fire department near your telephone.

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METRIC FASTENER TORQUE VALUES



	Class 4.8				Class 8.8 or 9.8				Class 10.9				Class 12.9			
	Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]	
SIZE	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft
M6	48	3.5	6	4.5	9	6.5	11	8.5	13	9.5	17	12	15	11.5	19	14.5
M8	12	8.5	15	11	22	16	28	20	32	24	40	30	37	28	47	35
M10	23	17	29	21	43	32	55	40	63	47	80	60	75	55	95	70
M12	40	29	50	37	75	55	95	70	110	80	140	105	130	95	165	120
M14	63	47	80	60	120	88	150	110	175	130	225	165	205	150	260	109
M16	100	73	125	92	190	140	240	175	275	200	350	225	320	240	400	300
M18	135	100	175	125	260	195	330	250	375	275	475	350	440	325	560	410
M20	190	140	240	180	375	275	475	350	530	400	675	500	625	460	800	580
M22	260	190	330	250	510	375	650	475	725	540	925	675	850	625	1075	800
M24	330	250	425	310	650	475	825	600	925	675	1150	850	1075	800	1350	1000
M27	490	360	625	450	950	700	1200	875	1350	1000	1700	1250	1600	1150	2000	1500
M30	675	490	850	625	1300	950	1650	1200	1850	1350	2300	1700	2150	1600	2700	2000
M33	900	675	1150	850	1750	1300	2200	1650	2500	1850	3150	2350	2900	2150	3700	2750
M36	1150	850	1450	1075	2250	1650	2850	2100	3200	2350	4050	3000	3750	2750	4750	3500

DO NOT use these hand torque values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only and include a ±10% variance factor. Check tightness of fasteners periodically. DO NOT use air powered wrenches.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical grade.

Fasteners should be replaced with the same grade. Make sure fastener threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.

When bolt and nut combination fasteners are used, torque values should be applied to the **NUT** instead of the bolt head.

Tighten toothed or serrated-type lock nuts to the full torque value.

[a] *"Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings. "Dry" means plain or zinc plated (yellow dichromate - Specification JDS117) without any lubrication.*

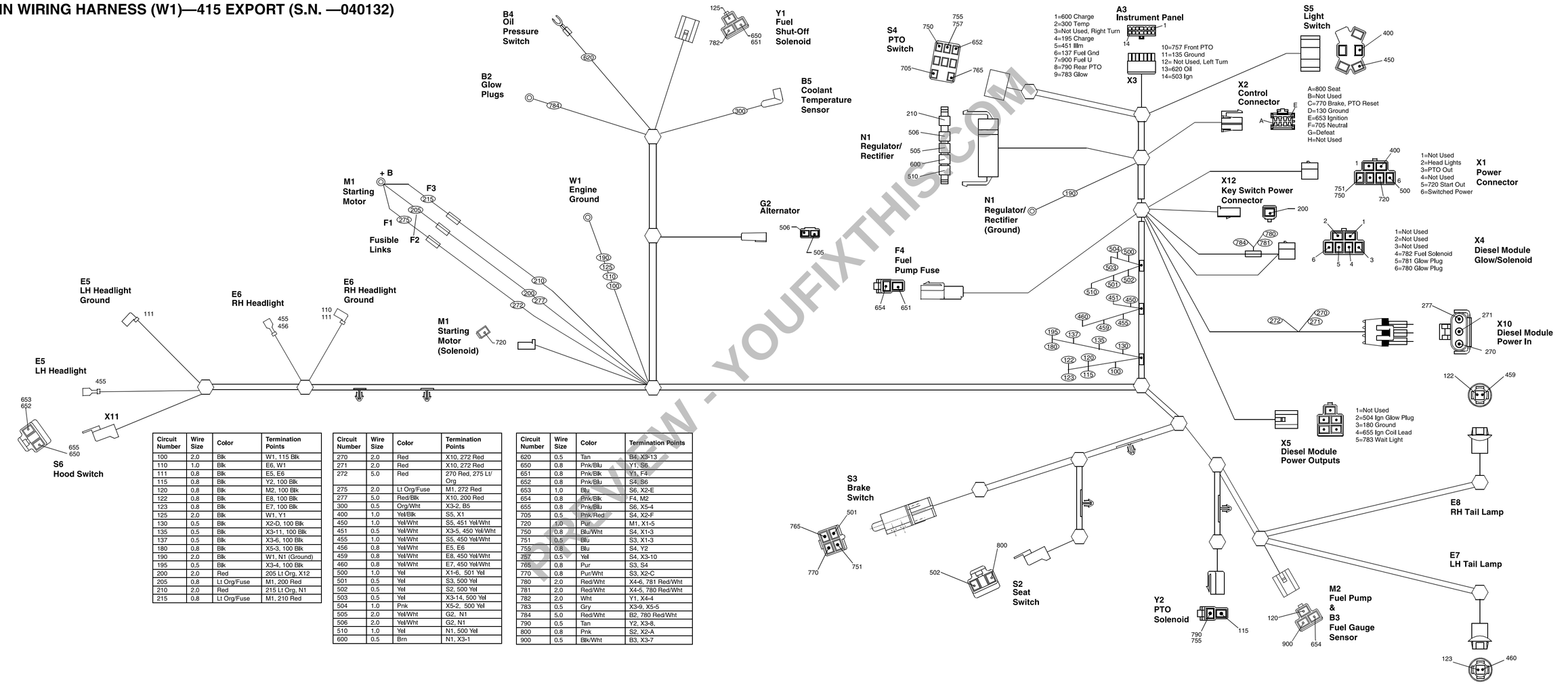
Reference: JDS—G200.

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ELECTRICAL WIRING HARNESSES—415/455 EXPORT

MAIN WIRING HARNESS (W1)—415 EXPORT (S.N. —040132)



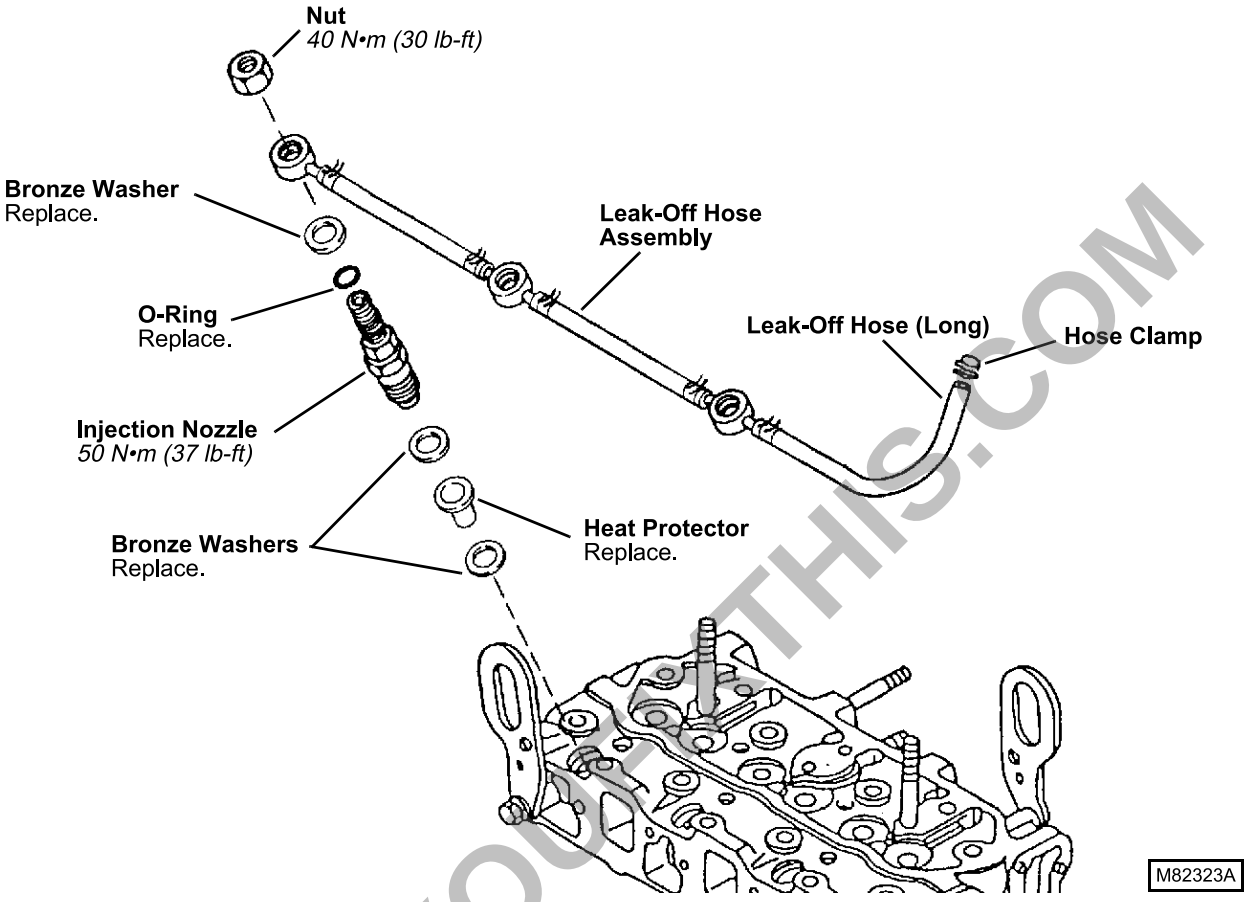
Circuit Number	Wire Size	Color	Termination Points
100	2.0	Blk	W1, 115 Blk
110	1.0	Blk	E6, W1
111	0.8	Blk	E5, E6
115	0.8	Blk	Y2, 100 Blk
120	0.8	Blk	M2, 100 Blk
122	0.8	Blk	E8, 100 Blk
123	0.8	Blk	E7, 100 Blk
125	2.0	Blk	W1, Y1
130	0.5	Blk	X2-D, 100 Blk
135	0.5	Blk	X3-11, 100 Blk
137	0.5	Blk	X3-6, 100 Blk
180	0.8	Blk	X5-3, 100 Blk
190	2.0	Blk	W1, N1 (Ground)
195	0.5	Blk	X3-4, 100 Blk
200	2.0	Red	205 Lt Org, X12
205	0.8	Lt Org/Fuse	M1, 200 Red
210	2.0	Red	215 Lt Org, N1
215	0.8	Lt Org/Fuse	M1, 210 Red

Circuit Number	Wire Size	Color	Termination Points
270	2.0	Red	X10, 272 Red
271	2.0	Red	X10, 272 Red
272	5.0	Red	270 Red, 275 Lt/ Org
275	2.0	Lt Org/Fuse	M1, 272 Red
277	5.0	Red/Blk	X10, 200 Red
300	0.5	Org/Wht	X3-2, B5
400	1.0	Yel/Blk	S5, X1
450	1.0	Yel/Wht	S5, 451 Yel/Wht
451	0.5	Yel/Wht	X3-5, 450 Yel/Wht
455	1.0	Yel/Wht	S5, 450 Yel/Wht
456	0.8	Yel/Wht	E5, E6
459	0.8	Yel/Wht	E8, 450 Yel/Wht
460	0.8	Yel/Wht	E7, 450 Yel/Wht
500	1.0	Yel	X1-6, 501 Yel
501	0.5	Yel	S3, 500 Yel
502	0.5	Yel	S2, 500 Yel
503	0.5	Yel	X3-14, 500 Yel
504	1.0	Pnk	X5-2, 500 Yel
505	2.0	Yel/Wht	G2, N1
506	2.0	Yel/Wht	G2, N1
510	1.0	Yel	N1, 500 Yel
600	0.5	Brn	N1, X3-1

Circuit Number	Wire Size	Color	Termination Points
620	0.5	Tan	B4, X3-13
650	0.8	Pnk/Blu	Y1, S6
651	0.8	Pnk/Blk	Y1, F4
652	0.8	Pnk/Blu	S4, S6
653	1.0	Blu	S6, X2-E
654	0.8	Pnk/Blk	F4, M2
655	0.8	Pnk/Blu	S6, X5-4
705	0.5	Pnk/Red	S4, X2-F
720	1.0	Pur	M1, X1-5
750	0.8	Blu/Wht	S4, X1-3
751	0.5	Blu	S3, X1-3
755	0.8	Blu	S4, Y2
757	0.5	Yel	S4, X3-10
765	0.8	Pur	S3, S4
770	0.8	Pur/Wht	S3, X2-C
780	2.0	Red/Wht	X4-6, 781 Red/Wht
781	2.0	Red/Wht	X4-5, 780 Red/Wht
782	2.0	Wht	Y1, X4-4
783	0.5	Gry	X3-9, X5-5
784	5.0	Red/Wht	B2, 780 Red/Wht
790	0.5	Tan	Y2, X3-8,
800	0.8	Pnk	S2, X2-A
900	0.5	Blk/Wht	B3, X3-7

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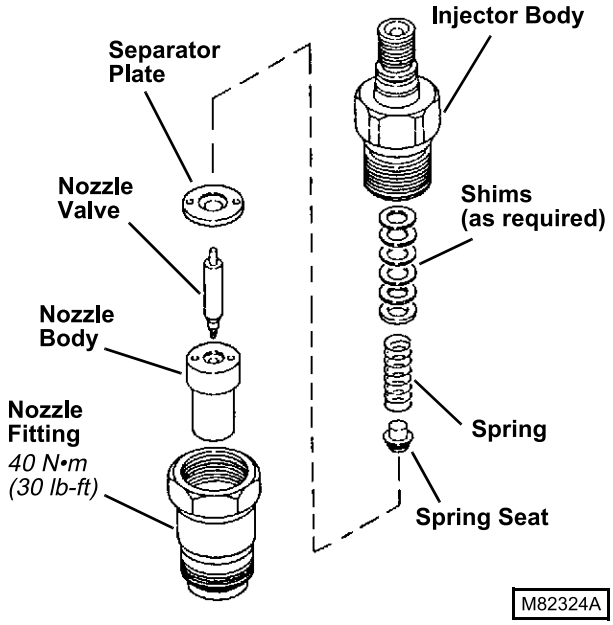


Disassembly/Assembly

NOTE: If servicing more than one nozzle, keep parts for each nozzle separate from one another.

IMPORTANT: If injection nozzles are disassembled to be cleaned, the same number and thickness of shims must be installed.

- Clean and inspect nozzle assembly.
- After assembly is complete, test injection nozzle. (See TESTS AND ADJUSTMENTS.)



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TESTS AND ADJUSTMENTS

AIR INTAKE SYSTEM LEAKAGE TEST

Reason:

Check for leaks in air intake system.

Equipment:

- Air Pressure Regulator

Procedure:

1. Remove air cleaner restriction indicator/switch, if equipped, and install test fitting.
2. Connect air pressure regulator to manifold using hose and fitting from air cleaner.
3. Remove air cleaner cover and main filter element.
4. Put large plastic bag into and over end of main filter element. Install main filter element and cover.
5. Pressurize air intake system between **34—69 kPa (5—10 psi)**. If air intake system cannot be pressurized, turn engine slightly to close valves.
6. Spray soap solution over all connections from air cleaner to intake manifold or turbocharger, if equipped, and check for leaks.

IMPORTANT: When reinstalling starting aid nozzle, position arrow on nozzle pointing against intake air flow.



Results:

- Find leaks and repair or replace parts as necessary.

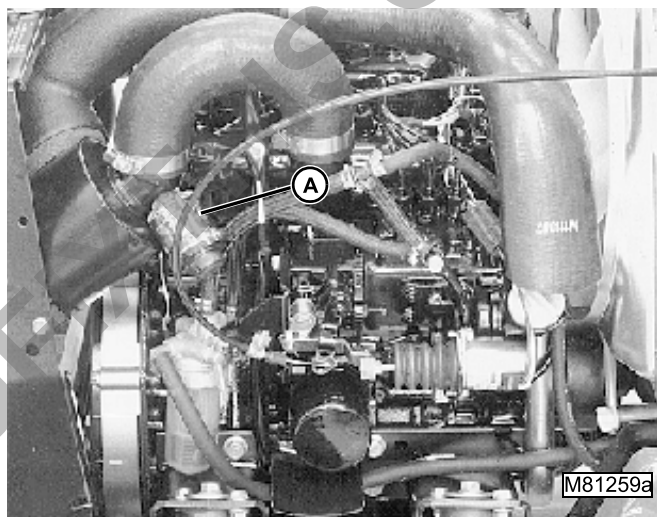
AIR FILTER RESTRICTION INDICATOR TEST

Reason:

Check operation of indicator and check intake system for leaks.

NOTE: If encountering performance problems (black smoke, etc.), check for plugged radiator cooling fins. Also check connecting hose is not damaged.

Procedure:



1. Release restriction indicator (A).
2. Start engine and run at wide-open throttle.

Results:

- If restriction indicator is at or above 635 mm (25 in.) vacuum, replace primary element.
- With new primary element installed, indicator at or above 500mm (20 in.) vacuum, replace secondary element.

NOTE: Normal restriction is approximately 380 mm (15 in.) vacuum.

Procedure:

1. Squeeze air supply hose to create a restriction.

Results:

- With engine at wide-open throttle and restriction applied, vacuum should increase and hold reading on indicator. If not, check for air leak in air intake hoses, or replace indicator.

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ENGINE OIL SPECIFICATIONS

DIESEL ENGINE OIL

IMPORTANT: DO NOT USE GALVANIZED CONTAINERS—diesel fuel stored in galvanized containers reacts with zinc coating in the container to form zinc flakes. If fuel contains water, a zinc gel will also form. The gel and flakes will quickly plug fuel filters and damage fuel injectors and fuel pumps.

It is recommended that diesel fuel be stored **ONLY** in a clean, approved **POLYETHYLENE PLASTIC** container **WITHOUT** any metal screen or filter. This will help prevent any accidental sparks from occurring. Store fuel in an area that is well ventilated to prevent possible igniting of fumes by an open flame or spark, this includes any appliance with a pilot light.

IMPORTANT: Keep all dirt, scale, water or other foreign material out of fuel.

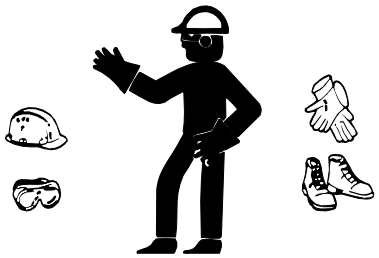
Keep fuel in a safe, protected area and in a clean, properly marked **("DIESEL FUEL")** container. **DO NOT** use deicers to attempt to remove water from fuel. **DO NOT** depend on fuel filters to remove water from fuel. It is recommended that a water separator be installed in the storage tank outlet. **BE SURE** to properly discard unstable or contaminated diesel fuel and/or their containers when necessary.

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USE SAFE SERVICE PROCEDURES

Wear Protective Clothing

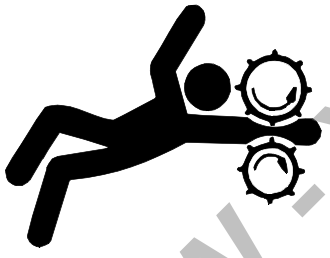


Wear close fitting clothing and safety equipment appropriate to the job.

Prolonged exposure to loud noise can cause impairment or loss of hearing. Wear a suitable hearing protective device such as earmuffs or earplugs to protect against objectionable or uncomfortable loud noises.

Operating equipment safely requires the full attention of the operator. Do not wear radio or music headphones while operating machine.

Service Machines Safely



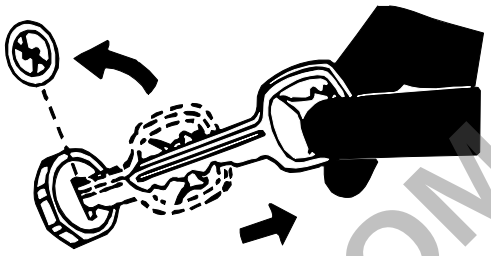
Tie long hair behind your head. Do not wear a necktie, scarf, loose clothing, or necklace when you work near machine tools or moving parts. If these items were to get caught, severe injury could result.

Remove rings and other jewelry to prevent electrical shorts and entanglement in moving parts.

Use Proper Tools

Use tools appropriate to the work. Makeshift tools and procedures can create safety hazards. Use power tools only to loosen threaded parts and fasteners. For loosening and tightening hardware, use the correct size tools. **DO NOT** use U.S. measurement tools on metric fasteners. Avoid bodily injury caused by slipping wrenches. Use only service parts meeting John Deere specifications.

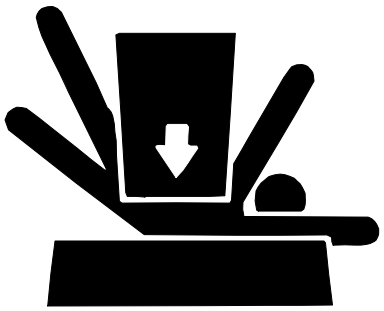
Park Machine Safely



Before working on the machine:

1. Lower all equipment to the ground.
2. Stop the engine and remove the key.
3. Disconnect the battery ground strap.
4. Hang a “DO NOT OPERATE” tag in operator station.

Support Machine Properly and Use Proper Lifting Equipment



If you must work on a lifted machine or attachment, securely support the machine or attachment.

Do not support the machine on cinder blocks, hollow tiles, or props that may crumble under continuous load. Do not work under a machine that is supported solely by a jack. Follow recommended procedures in this manual.

Lifting heavy components incorrectly can cause severe injury or machine damage. Follow recommended procedure for removal and installation of components in the manual.

Work in Clean Area

Before starting a job:

1. Clean work area and machine.
2. Make sure you have all necessary tools to do your job.
3. Have the right parts on hand.
4. Read all instructions thoroughly; do not attempt shortcuts.

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SLOW IDLE ADJUSTMENT

Reason:

To achieve proper slow idle rpm setting. Provides adequate rpm to keep engine running smoothly without stalling.

Equipment:

- Digital Tachometer

Procedure:

1. Place a small piece of reflective tape on crankshaft pulley.

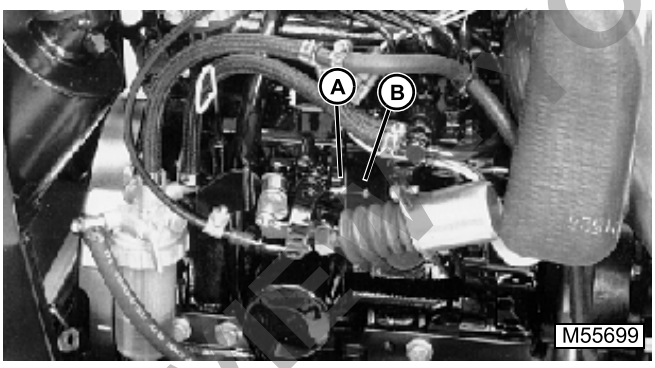
NOTE: Make sure air cleaner is clean and not restricted. Replace air cleaner element as necessary.

2. Start engine and run for 5 minutes.
3. Use a digital tachometer to check engine speed at flywheel.
4. Visually check that injection pump throttle lever is against slow idle stop screw. Check slow idle speed.
5. After slow idle speed adjustment, adjust throttle cable. (See THROTTLE CABLE ADJUSTMENT.)

Specifications:

Slow Idle Speed . . . . . 1650 ±150 rpm

Results:



- If slow idle rpm is not according to specifications, loosen jam nut (A) and turn screw (B). After adjustment, hold adjustment screw stationary and tighten jam nut.

FAST IDLE ADJUSTMENT

Reason:

To achieve proper fast idle speed setting. This provides proper speed for PTO operation and insures that engine is running at proper speed for peak performance.

Equipment:

- Digital Tachometer

Procedure:

1. Place a small piece of reflective tape on crankshaft pulley.

NOTE: Make sure air cleaner is clean and not restricted. Replace air cleaner element as necessary.

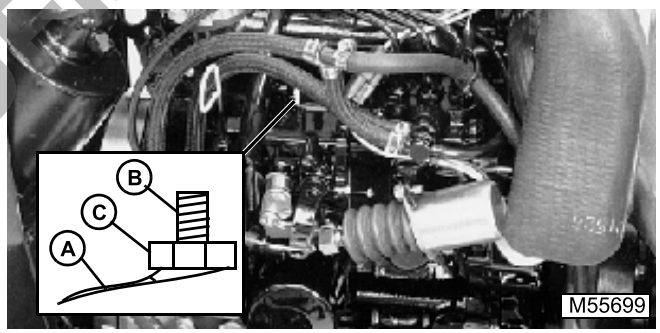
2. Start engine and run for 5 minutes.
3. Use a digital tachometer to check engine speed at flywheel.
4. Push against injection pump throttle lever to insure it is up against fast idle stop screw. Check fast idle speed.
5. After fast idle speed adjustment, adjust throttle cable. (See THROTTLE CABLE ADJUSTMENT.)

Specifications:

Fast Idle Speed . . . . . 3350 ±100 rpm

Results:

NOTE: Some adjustment can be made without removing sealed wire (A). Attempt to make the adjustment before removing wire.



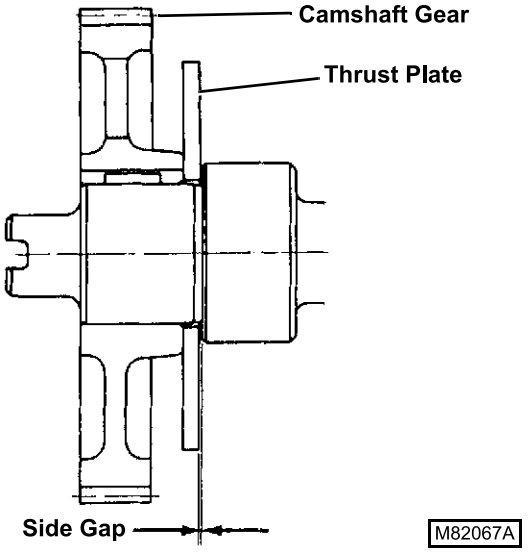
- If fast idle rpm is not according to specifications, remove fast idle acorn nut and loosen nut (C). Turn screw (B) until fast idle speed is correct. After adjustment, tighten nut (C) WITHOUT moving screw (B).
- Install acorn nut and new wire seal (A) and mark with a new paint stripe.
- If engine still does not meet fast idle specifications, have pump inspected by an Authorized Diesel Service (ADS) center.

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CAMSHAFT INSPECTION/ REPLACEMENT

1. Check camshaft side gap using a feeler gauge.



Camshaft Side Gap:

Standard . . . . . 0.05—0.15 mm (0.0020—0.0060 in.)

Wear Limit. . . . . 0.40 mm (0.016 in.)

If side gap is at wear limit, remove gear and replace thrust plate.

2. Inspect gear for chipped or broken teeth. Replace if necessary.

To remove/replace gear:

- Remove gear from camshaft using a knife-edge puller and a press.

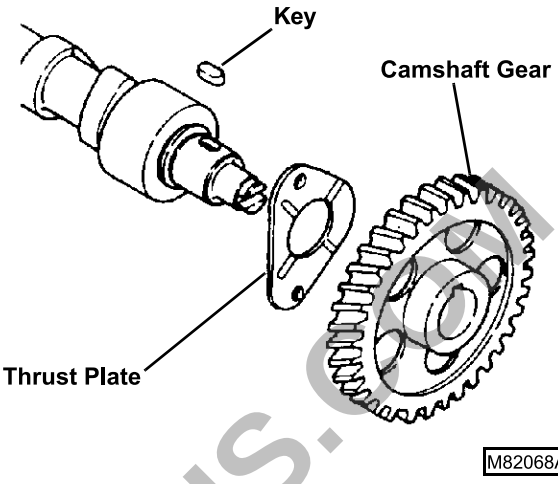
⚠ CAUTION

DO NOT heat oil over 182° C (360° F). Oil fumes or oil can ignite above 193° C (380° F). Use a thermometer. Do not allow a flame or heating element to come in direct contact with the oil. Heat the oil in a well-ventilated area. Plan a safe handling procedure to avoid burns.

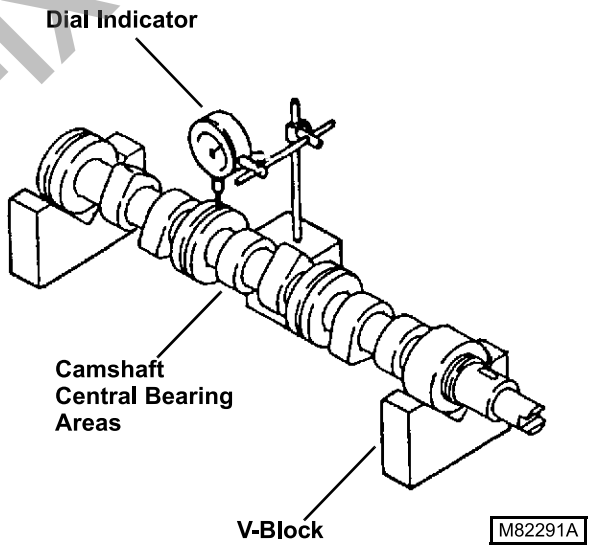
- Heat gear to approximately 150°C (300°F).

IMPORTANT: Be sure thrust plate is not between camshaft gear and camshaft shoulder while installing gear.

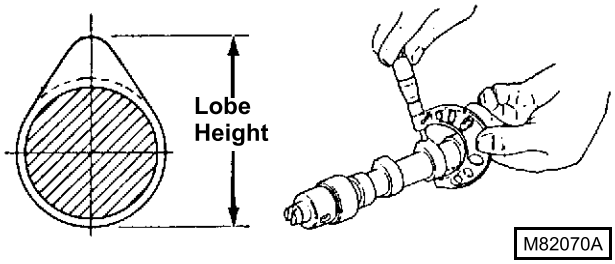
- Install thrust plate, if removed. Install gear with timing mark “C” side toward press table. Align slot in gear with key in shaft. Press camshaft into gear until gear is tight against camshaft shoulder.
- Thrust plate must spin freely on camshaft.



3. Inspect camshaft for bend using V-blocks and a dial indicator. Turn camshaft slowly and read variation on indicator. If variation is greater than **0.02 mm (0.001 in.)**, replace camshaft.



4. Measure camshaft lobe height.



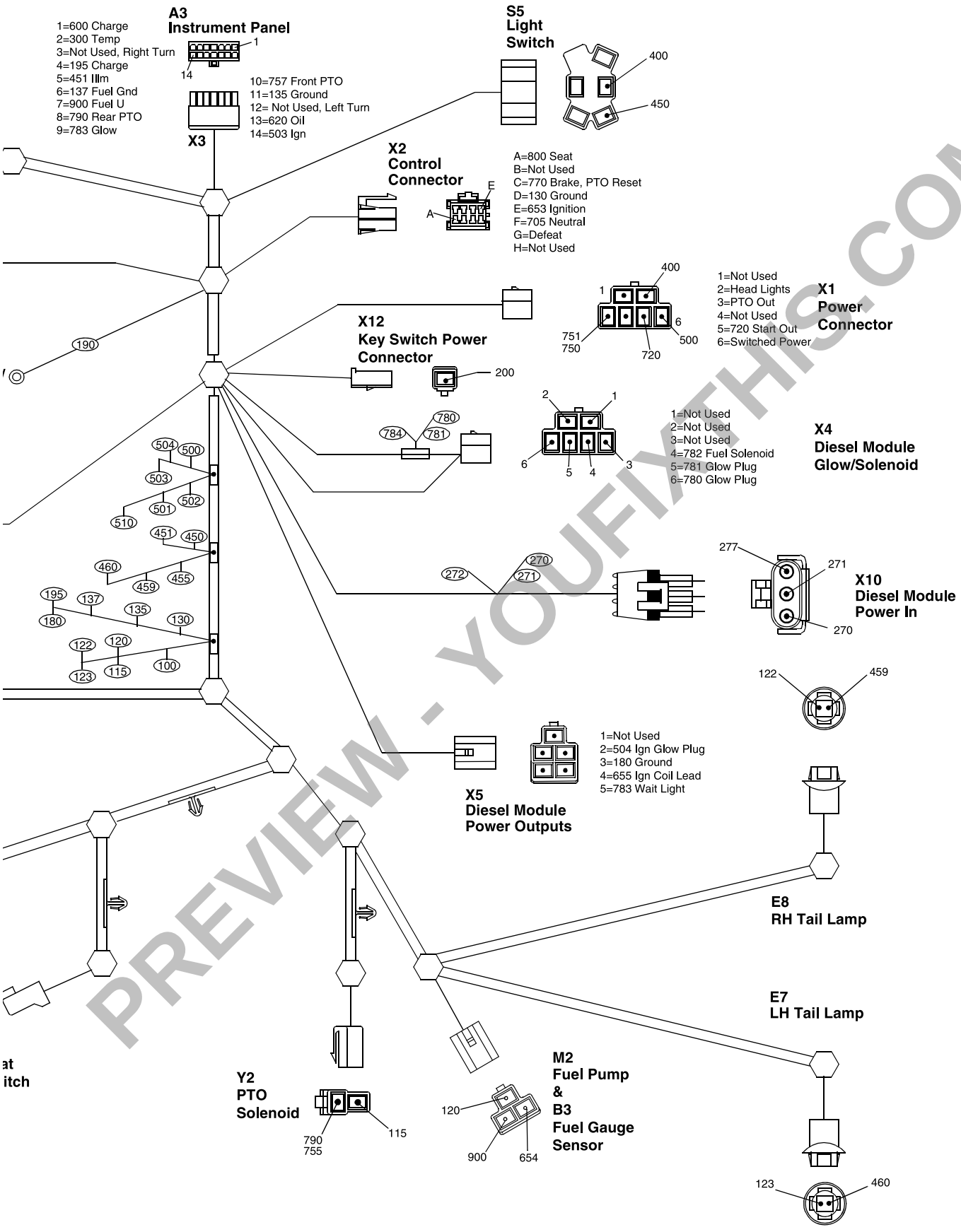
Lobe Height—3TN66:

Standard . . . . . 29.97—30.03 mm (1.180—1.182 in.)

Wear Limit. . . . . 29.75 mm (1.171 in.)

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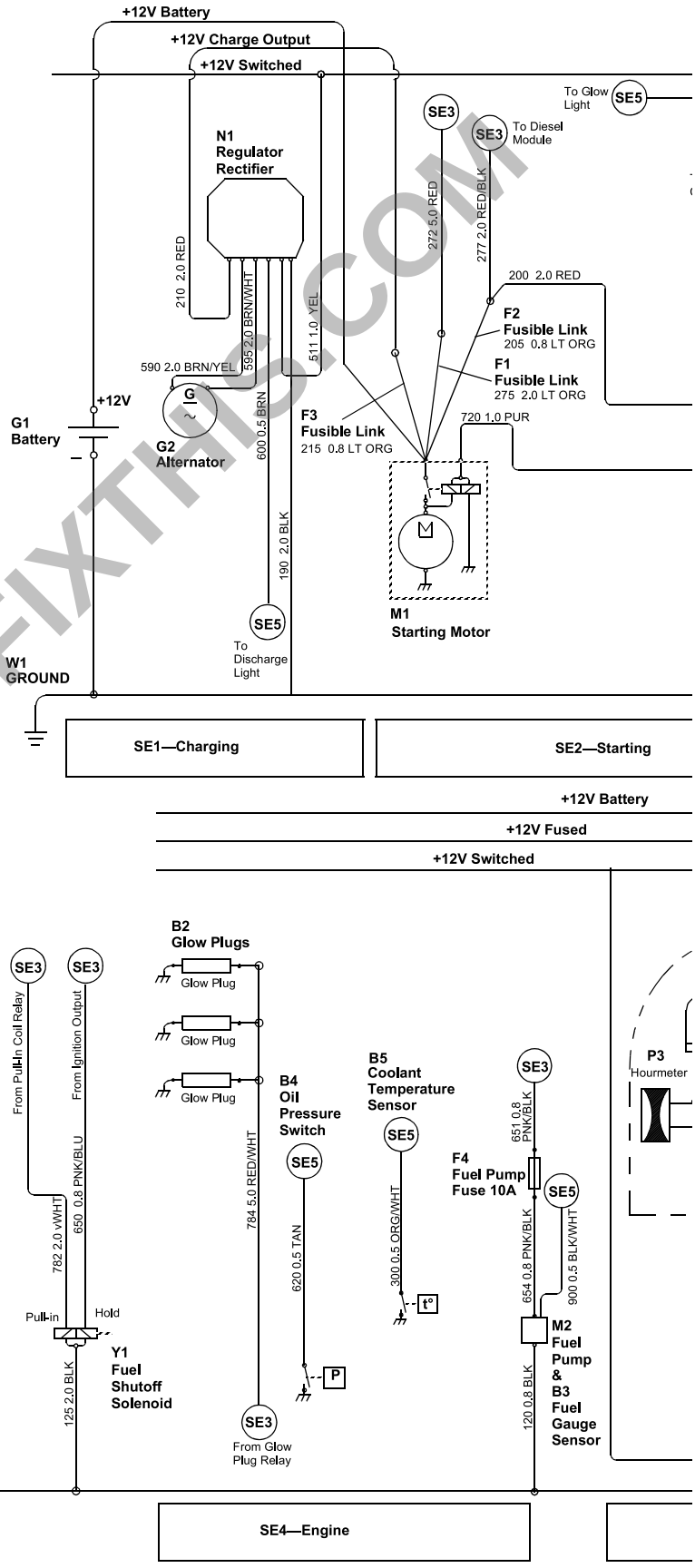
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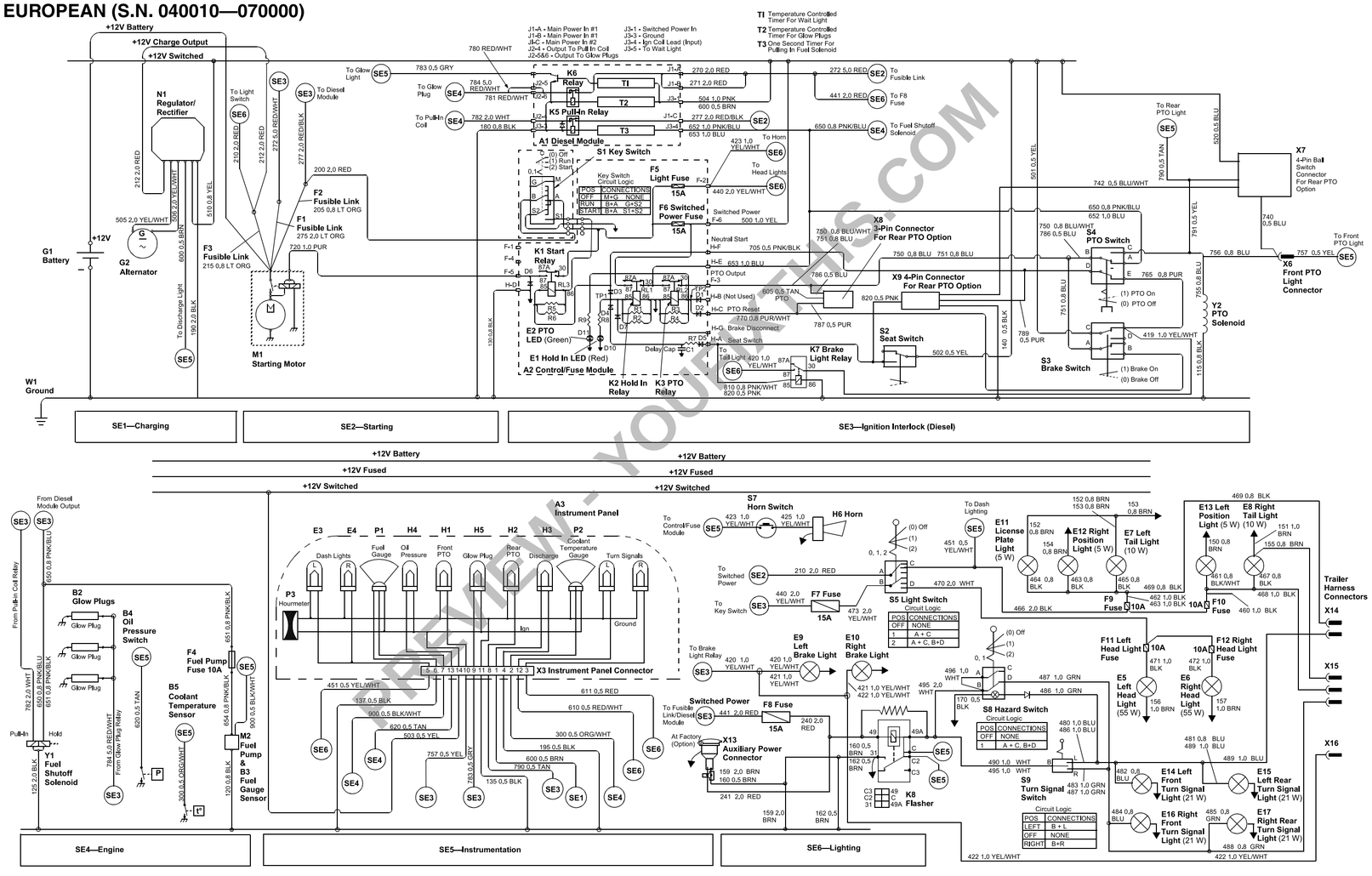


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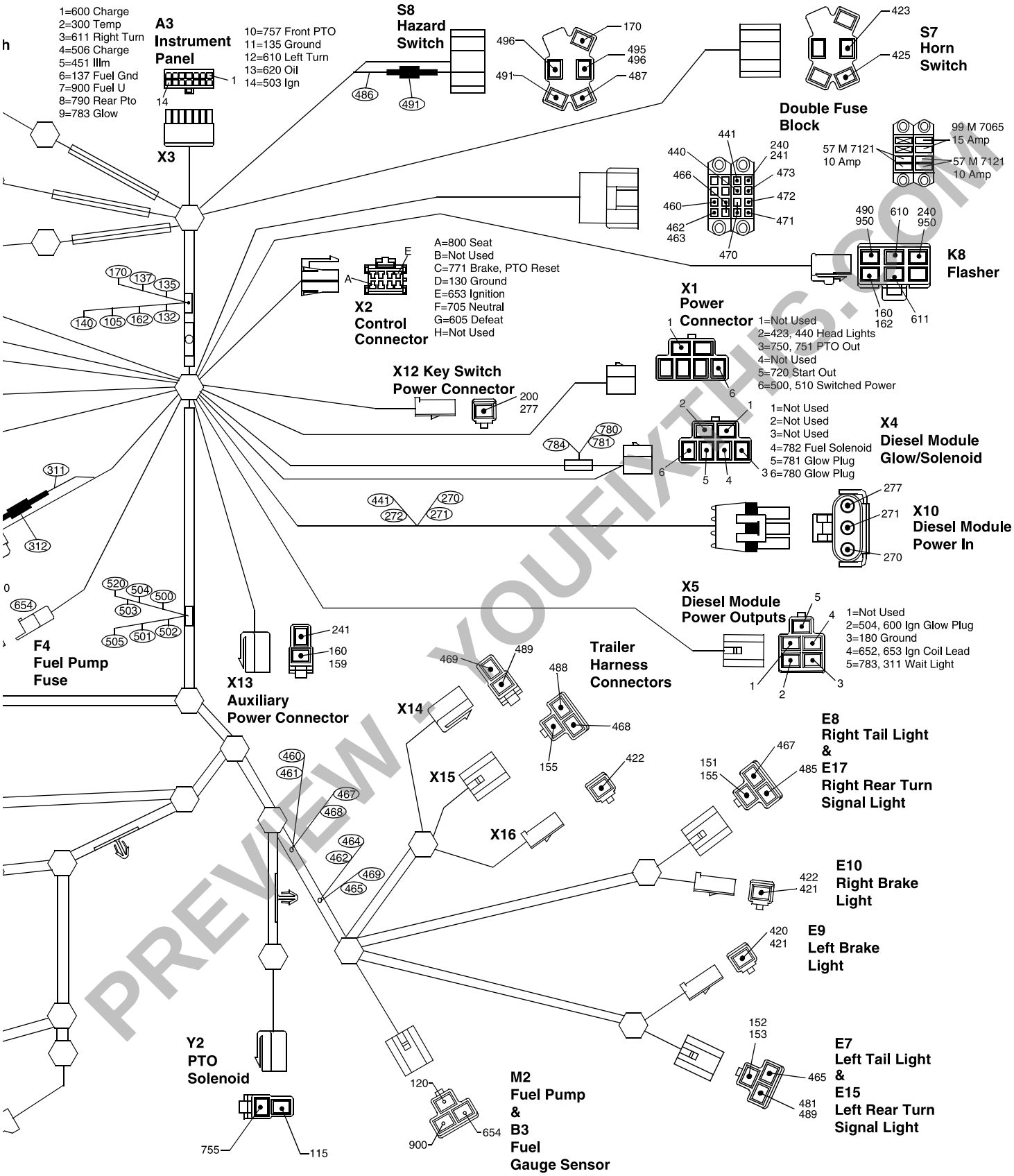
ELECTRICAL SCHEMATICS—415 EUROPEAN

MAIN ELECTRICAL SCHEMATIC—415 EUROPEAN (S.N. 040010—070000)



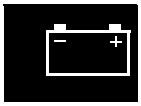
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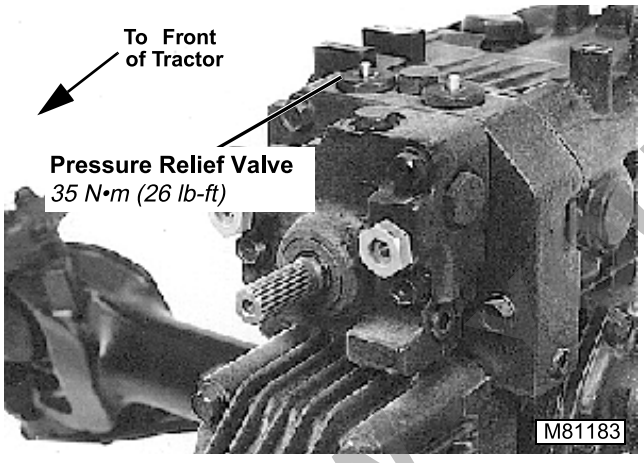
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HYDROSTATIC PRESSURE RELIEF VALVE (40 LOADER)— INSTALLATION

IMPORTANT: The 40 loader is shipped complete with a hydrostatic pressure relief valve which must be installed in place of the tractor transaxle forward control valve. The relief valve limits the peak hydrostatic pressures in the transaxle. This protects the transaxle from unnecessary stress for longer life. Operation of a front end loader on a tractor without the transaxle hydrostatic pressure relief valve will void the tractor warranty. If a 40 loader is taken off one tractor and used on another, or another brand of loader is used, it is important that the loader tractor be equipped with the transaxle relief valve.

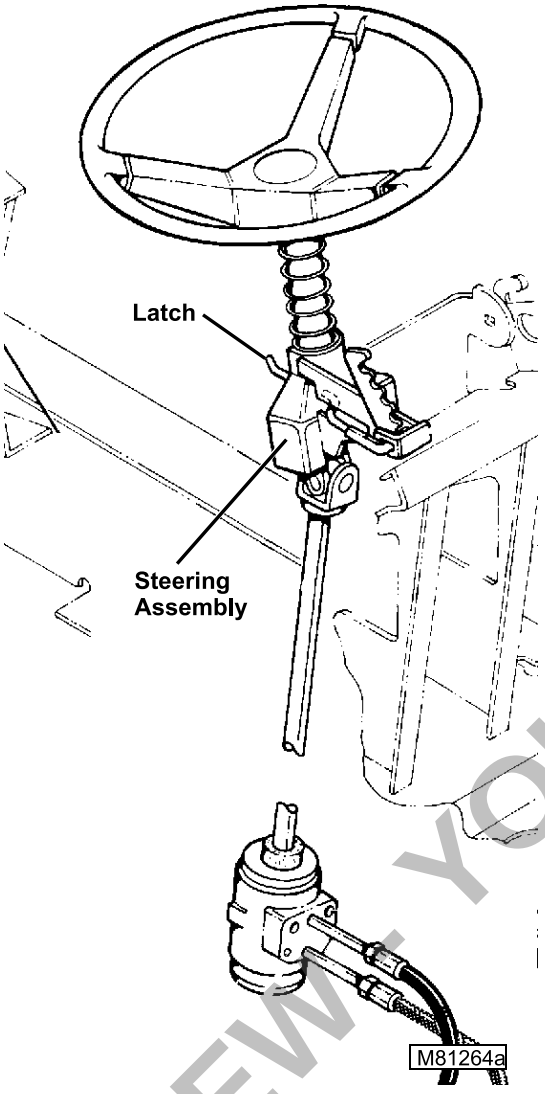


1. Remove forward control valve and replace with hydrostatic pressure relief valve.
2. Tighten valve to **35 N•m (26 lb-ft)**.

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TILT STEERING ROD—REMOVAL/ INSTALLATION



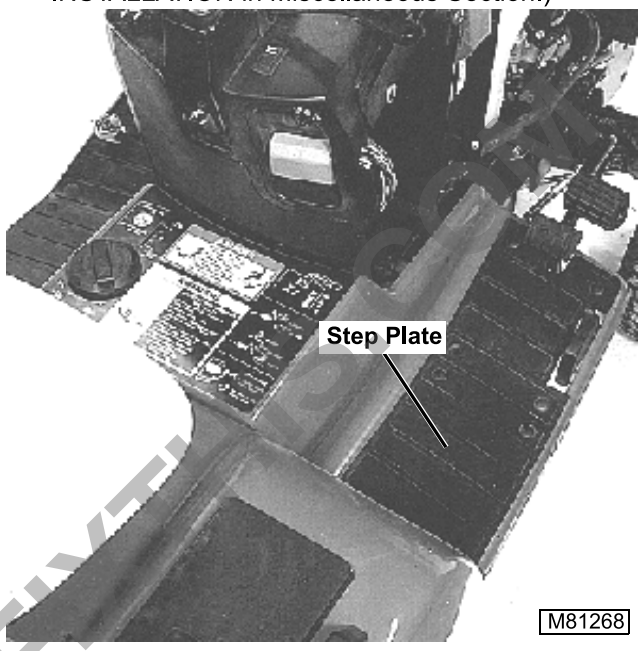
1. Remove steering wheel and pull console up over the steering post.

NOTE: It has been found that adding two washers at notch end will act as a guide and prevent twisting of rod.

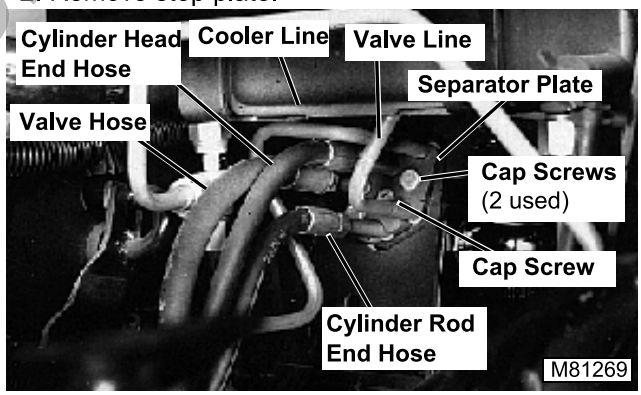
2. Remove tilt steering adjusting rod and put an additional 1 mm (0.04 in.) bend in end of rod opposite the spring attachment point. Without additional bend in rod, it may hang up in corner of tilt latch knob not allowing latches to seat into tilt notches.

STEERING VALVE—REMOVAL/ INSTALLATION

1. Remove radiator. (See RADIATOR—REMOVAL/ INSTALLATION in Miscellaneous Section.)



2. Remove step plate.



3. Remove cap screws.
4. Remove separator plate.
5. Remove steering valve to cooler line.
6. Remove steering valve to cylinder rod end hose, pump to steering valve hose, and steering valve to cylinder head end hose.
7. Remove steering valve to control valve line.
8. Remove cap screw and steering valve.
9. Make repairs to valve as necessary.

NOTE: When installing steering valve, install cap screw finger-tight.

IMPORTANT: Always use new O-rings. Damaged or used O-rings will leak.

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