Massey Ferguson®

Model 1428V / 1431 Hydro Tractor

WORKSHOP SERVICE MANUAL

4283008M1

CONTENTS

TRANSMISSION

GENERAL DESCRIPTION

Wheel Drive System

The wheel drive system composed of the following major components:

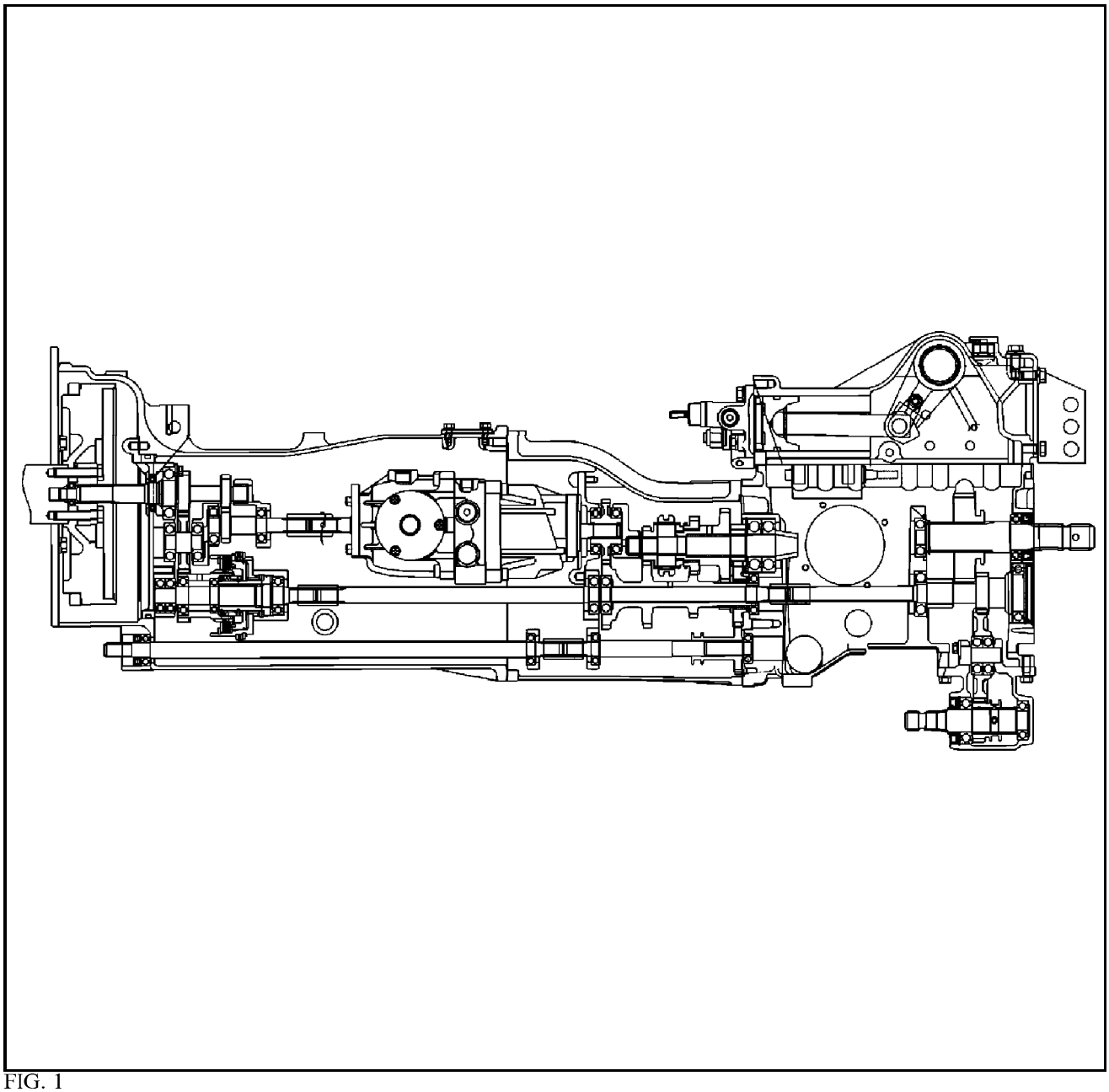

FIG. 1
FIG. 1: Transmission Assembly

INPUT GEAR

Construction

The input gears consist of a PTO clutch assembly, reverse idler and input gear.

PTO Clutch

The PTO on hydrostat tractors is driven thru a wet multi-disced, hydraulically operated clutch pack. For the PTO to work, the mechanical PTO lever located at the operator's station, must be engaged and the on/off switch on the console must be in the "ON" position. When the switch is in the "ON" position, the PTO valve is energized allowing oil pressure to clamp the discs in the PTO clutch pack together and turn the PTO shaft.

Oil Supply to Clutch Packs

FIG. 2: Oil is transferred from the auxiliary (steering) hydraulic pump to a reducing valve (1). The reducing valve acts as a flow divider, dividing the flow of oil to a primary and secondary circuit. Oil for the PTO clutch pack is supplied by the secondary circuit of the reducing valve. In addition, the reducing valve maintains line pressure to the primary circuit to operate the steering and hydro charge circuit.

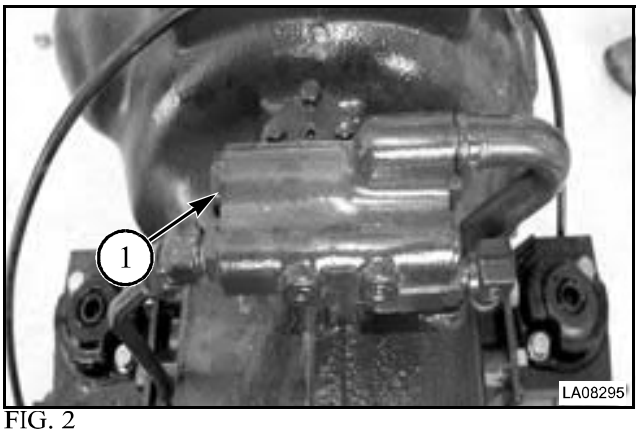

FIG. 2

FIG. 3: Oil pressure to the PTO can be checked using an adaptor fitting from tool kit ATP3031 and a pressure gauge. Test ports for the PTO clutch (1) are located under the tractor below the PTO solenoid valve.

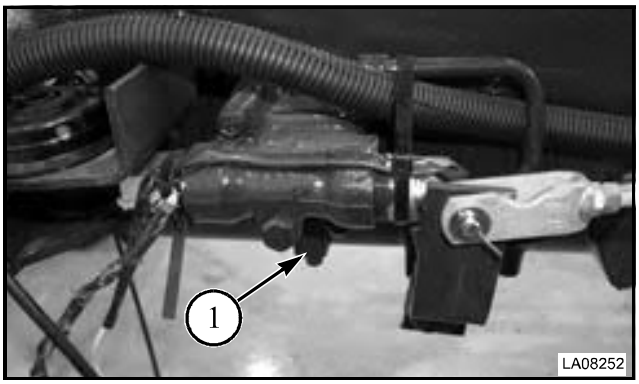

FIG. 3

Reducing Valve Operation

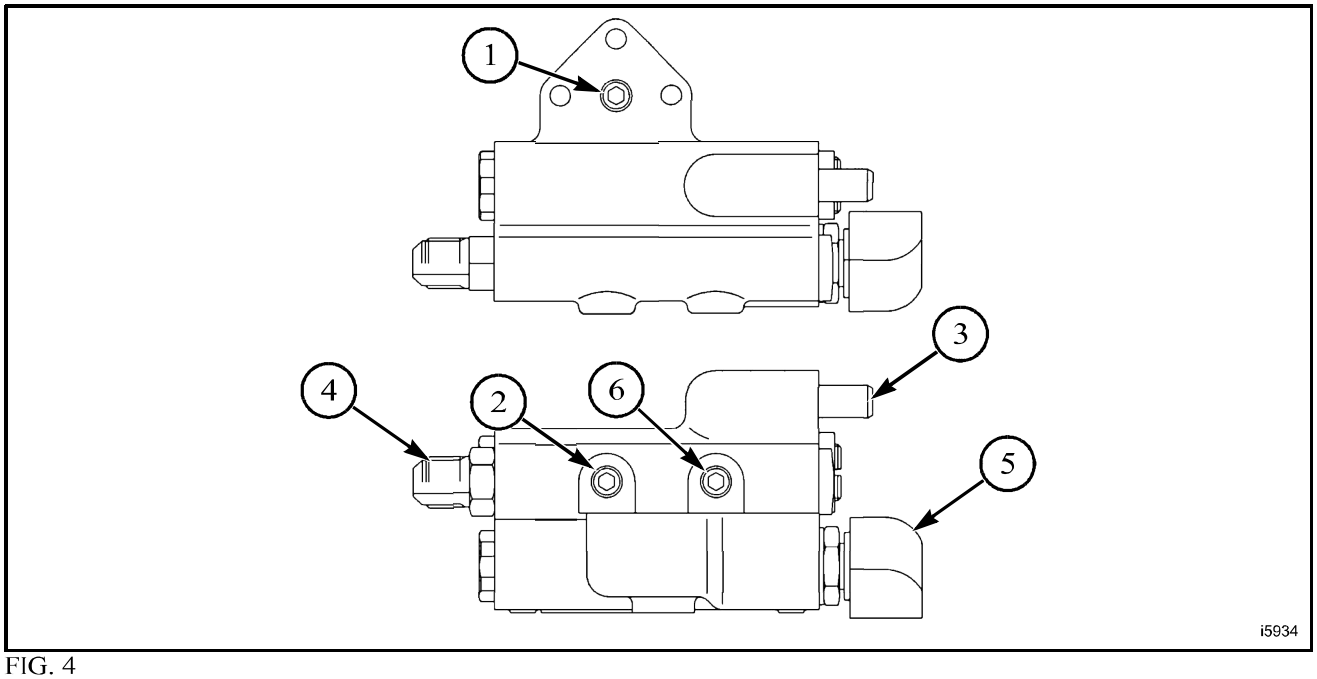

FIG. 4

FIG. 4: The reducing valve assembly controls the pressure and flow of oil in the control circuits for the PTO clutch as well as the steering orbitrol and hydrostat transmission.

Maintaining the preset pressure in spite of fluctuated primary circuit pressure and relieving excessive pressure applied to the PTO clutch controlling circuits to drain port, it protects the clutch from break-down.

Port P is connected to the auxilliary (steering) gear pump, the primary side to the steering orbit roll and the secondary side to the PTO clutch control circuit.

While the control valve connected to the secondary side is not working (in neutral), no fluid flows to the secondary side.

1. Primary pressure checking Port: 25-28 kg/cm (235-398 psi).
2. Secondary pressure checking Port: 19.5 kg/cm (277 psi).
3. Port DR (drain).
4. Secondary pressure (Port A).
5. Primary pressure (Port B).
6. Port relief chacking port: 30kg/cm (426 psi).

Reducing Valve Circuits

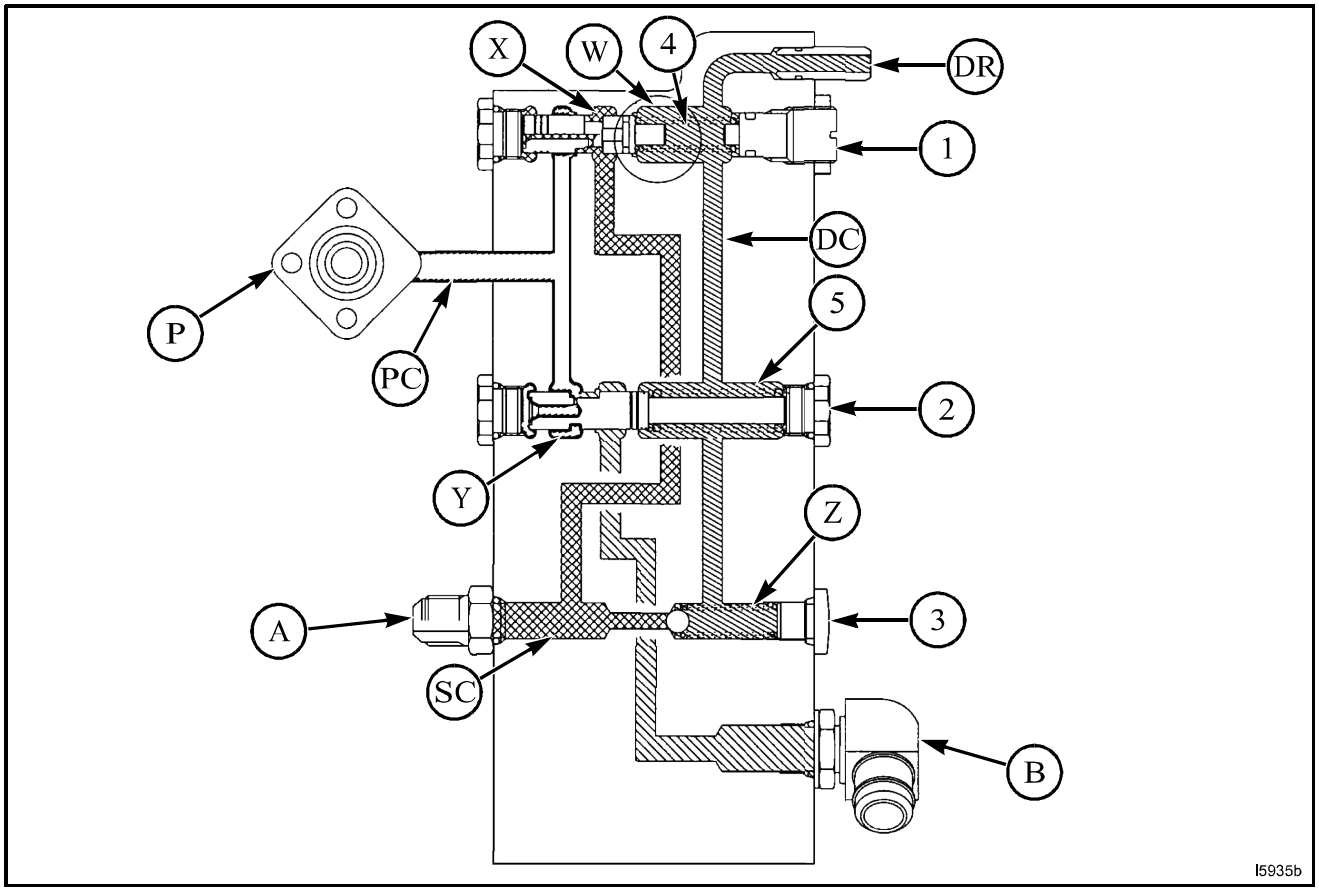

FIG. 5

FIG. 5: Reducing valve curcuits shown.

A	Port A to PTO clutch circuit (secondary circuit)
B	Port B to steering orbit roll
DR	Drain Port
1	Reducing valve
2	Sequence valve
3	Relief valve
4	Spring
5	Spring
C	Drain circuit
PC	Primary circuit
SC	Secondary circuit
W	When surge pressure affects primary pressure, pressurized fluid is relieved to port DR.
X	Pressure reduced to 19.5 kg/cm (277 psi) by balancing fluid pressure and spring force (4).
Y	Pressure reduced to 25-28 kg/cm (355-398 psi) by balancing fluid pressure and spring force (5).
Z	When surge pressure affects primary pressure, pressurized fluid is relieved to port DR, preset pressure: 30 kg/cm (426 psi).

LOCATION OF REDUCING VALVE AND PIPING

FIGS. 6–7: The reducing valve (1) is installed on the center of the transmission housing. It is located under the steering orbitrol unit.

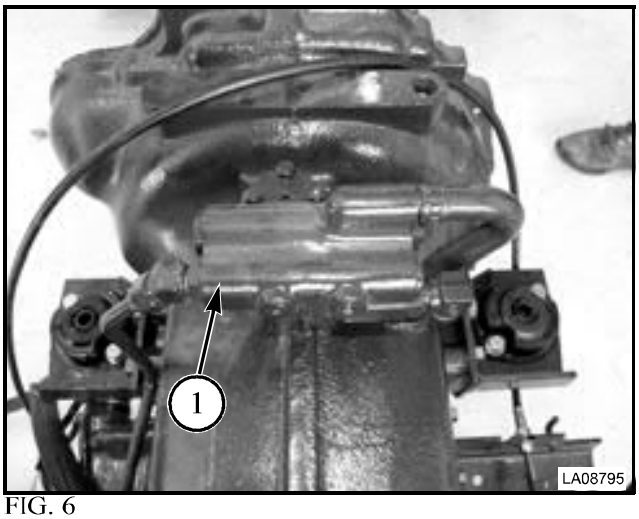

FIG. 6

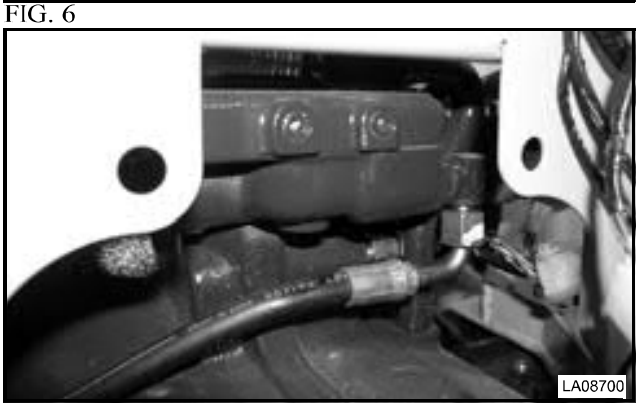

FIG. 7

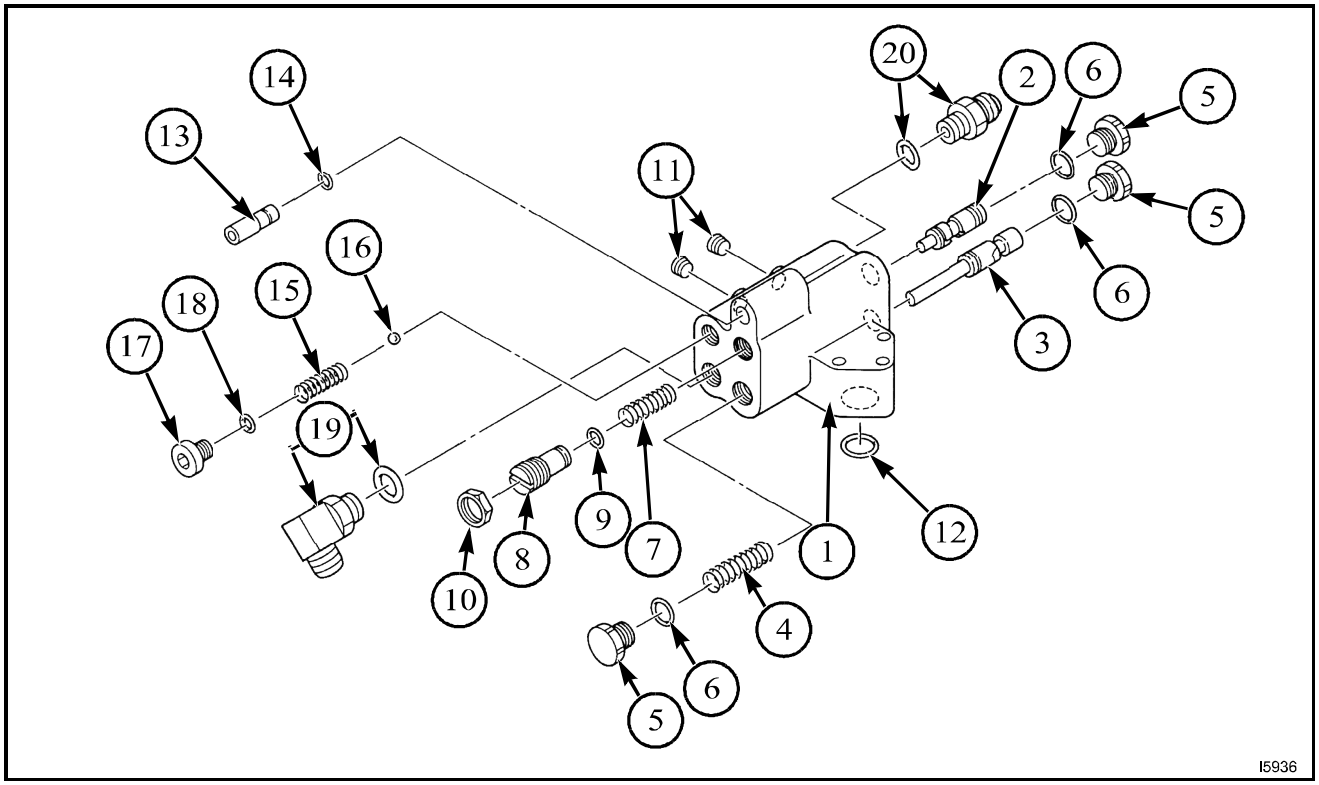

FIG. 8

FIG. 8: Exploded view of reducing valve.

Item	Qty.	Description
1	1	Body (PVG2)
2	1	Spool (PVG2/1)
3	1	Spool (PVG2/2)
4	1	Spring (HG054)
5	3	Plug (M16)
6	3	O-Ring
7	1	Spring (HC042)
8	1	Adjusting Screw (F)
9	1	O-Ring
10	1	Lock Nut

Item	Qty.	Description
11	2	Sunk plug with seal
12	1	O-Ring
13	1	Pipe (30)
14	1	O-Ring
15	1	Spring (HC040)
16	1	Steel Ball
17	1	Plug (PF1/4)
18	1	O-Ring
19	1	Adapter (L/PF3/8) Assembly
20	1	Adapter (PF1/4) Assembly

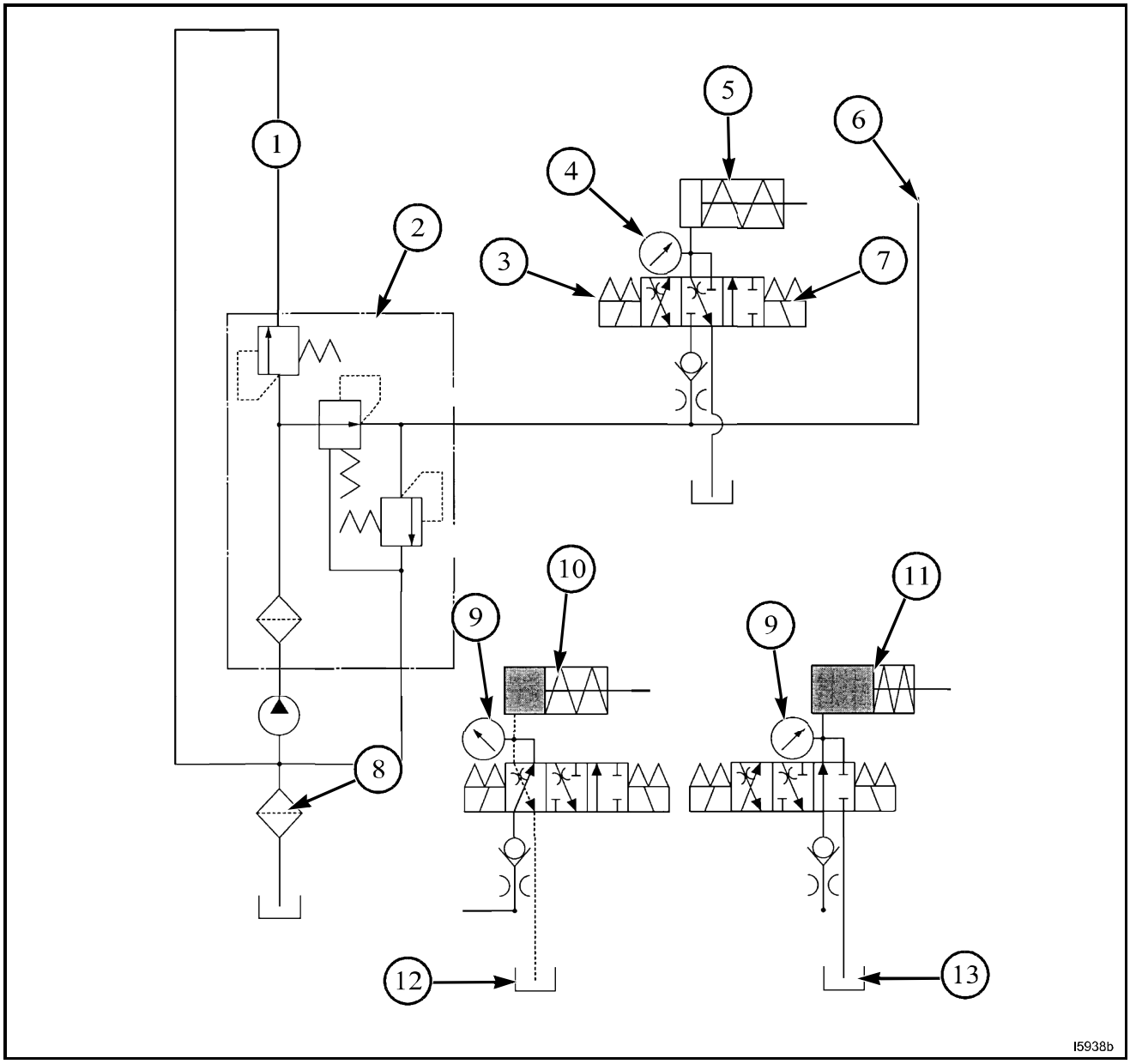

FIG. 9

FIG. 9: Hydraulic circuit for PTO clutch.

NOTE: Kgf/cm2 x 14.223=psi.

(1) To Steering Circuit
(2) Reducing Valve
(3) Half Pressure Solenoid Valve
(4) Pressure Checking
(5) PTO Clutch
(6) Reverse Valve
(7) Full Pressure Solenoid Valve
(8) Suction Filter
(9) Pressure Checking
(10) Half Pressurised PTO Clutch
(11) Fully Pressurised PTO Clutch
(12) Half Pressure: 0.735-0.883 MPa (7.5-9 kgf/cm2)
(13) Full Pressure: 1.57-1.77 MPa (16-18 kgf/cm2)

OPERATION OF PTO SOLENOID

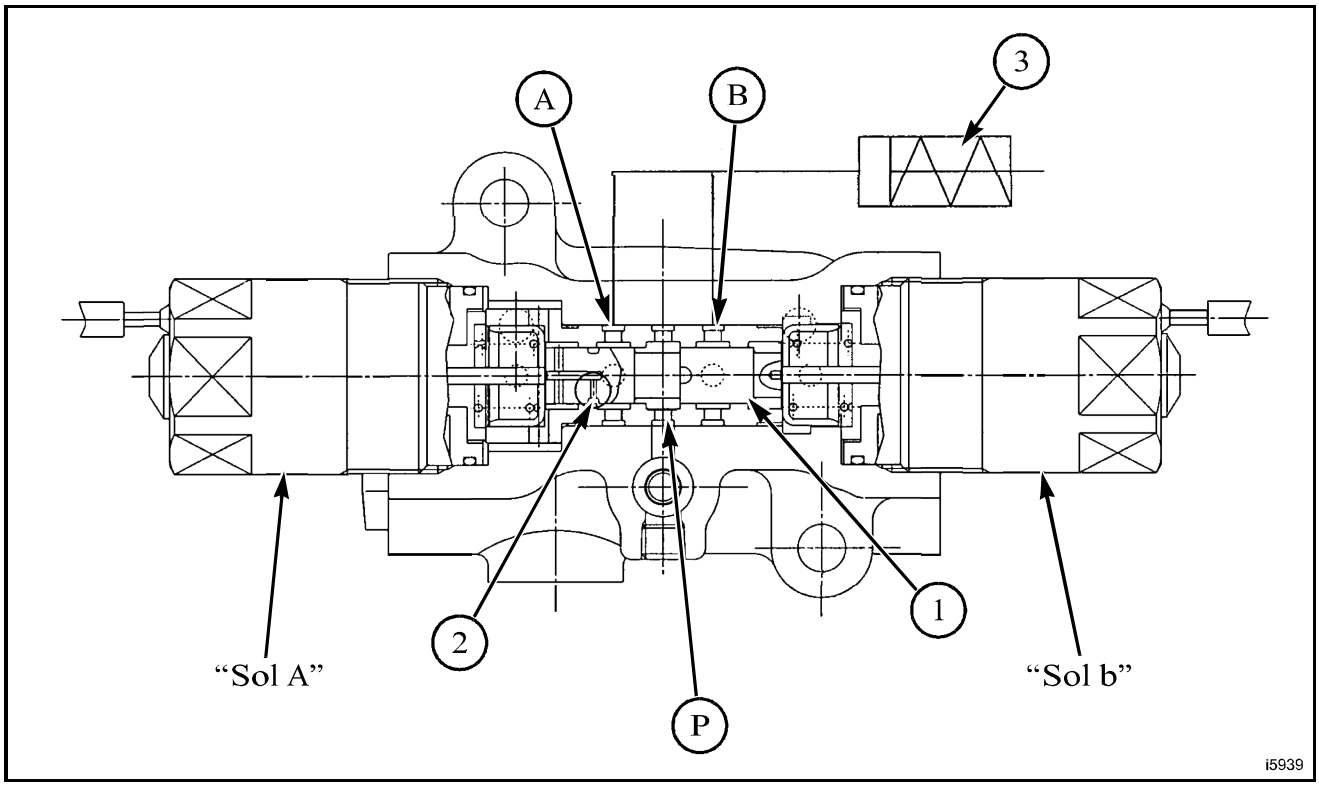

FIG. 10

FIG. 10: This solenoid valve turns on and off the PTO output by engaging the clutch smoothly without shock by controlling the flow and pressure of the fluid whose pressure is regulated at a constant level by the reducing valve to the PTO clutch (3).

The fluid regulated by the reducing valve flows to port P of the solenoid valve. While the solenoid valve is in neutral, no fluid flows to the clutch.

When the solenoid on "SOL a" side is energized by the signal from the timer unit, spool (1) shifts to the right and fluid flows to port (B) which is connected to port (A). The flow from port (B) interconnected with port (A) brings about half clutch engagement because part of the fluid escapes to the drain port through orifice (2) in spool (1) relevant to port (A) when clutch discs are met to each other by means of the clutch piston.

NOTE: Kgf/cm2 x 14.223 = psi.

Half pressure: 7.5-9 kg/cm² (106-128 psi)

Full pressure: 16-18 kg/cm² (227-256 psi)

FIG. 11: The PTO solenoid is located on the LH side of the transmission housing.

1	Spool
2	Orifice
3	PTO Clutch
A	Port A
B	Port B
P	Port P
SOL a	Solenoid a (half pressure)
SOL b	Solenoid b (full pressure)

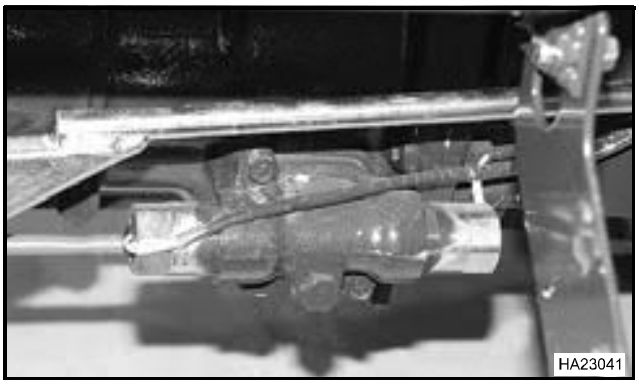

FIG. 11

PTO Valve

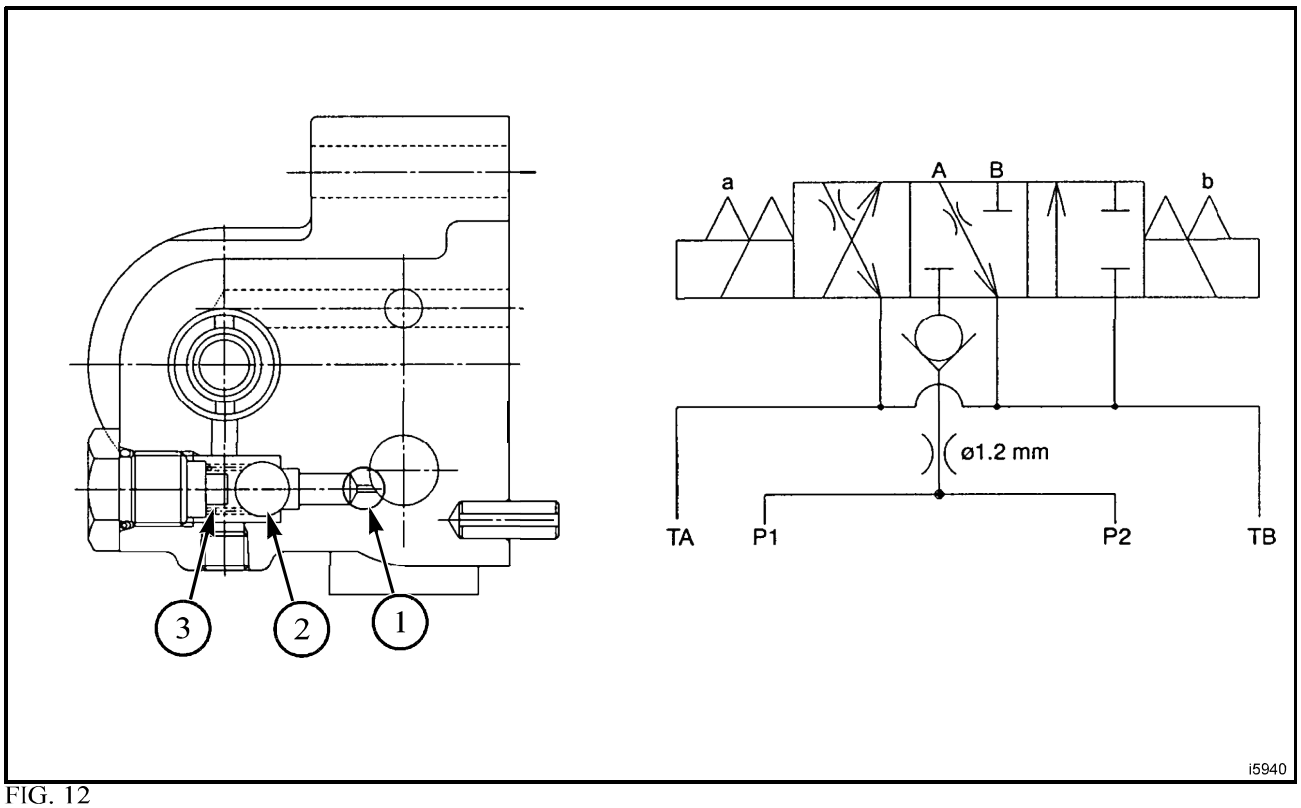

FIG. 12

FIG. 12: The half engagement (half pressure) condition is maintained for about 1.1 seconds. Then the solenoid on "SOL b" side is energized, the spool shifts to the left, port A becomes the supplying port and port (B) is blocked. Then the pressure rises to the preset level by the reducing valve and the clutch becomes fully engaged. Steel ball (2) prevents the contacting pressure of the clutch from falling due to the checking mechanism, even when line pressure drops momentarily.

(1) Orifice

(2) Steel ball

(3) Spring

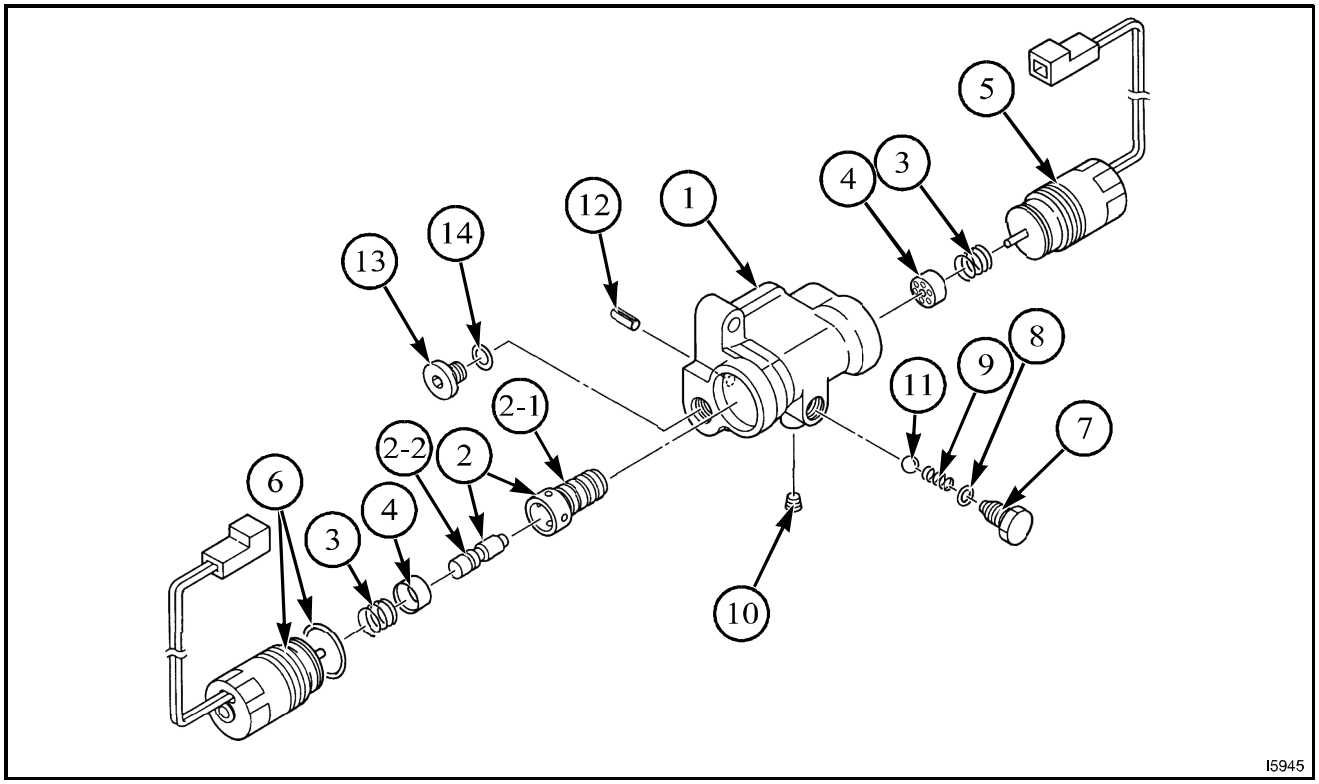

FIG. 13

FIG. 13: Exploded vie of PTO solenoid valve.

Item	Qty.	Description
1	1	Body (EDW3)
2	1	Spool Set
2-1	1	Sleeve
2-2	1	Spool (B1M1P)
3	2	Spring (HCO12)
4	2	Spring Set
5	1	Solenoid Set
6	1	Solenoid Set

Item	Qty.	Description
7	1	Plug (M12)
8	1	O-Ring
9	1	Ball Retaining Spring

Item	Qty.	Description
10	1	Sunk Plug with Seal
11	1	Steel Ball
12	1	Spring Pin
13	1	Plug (PF 1/4)
14	1	O-Ring

CONTROL OF TIMER UNIT

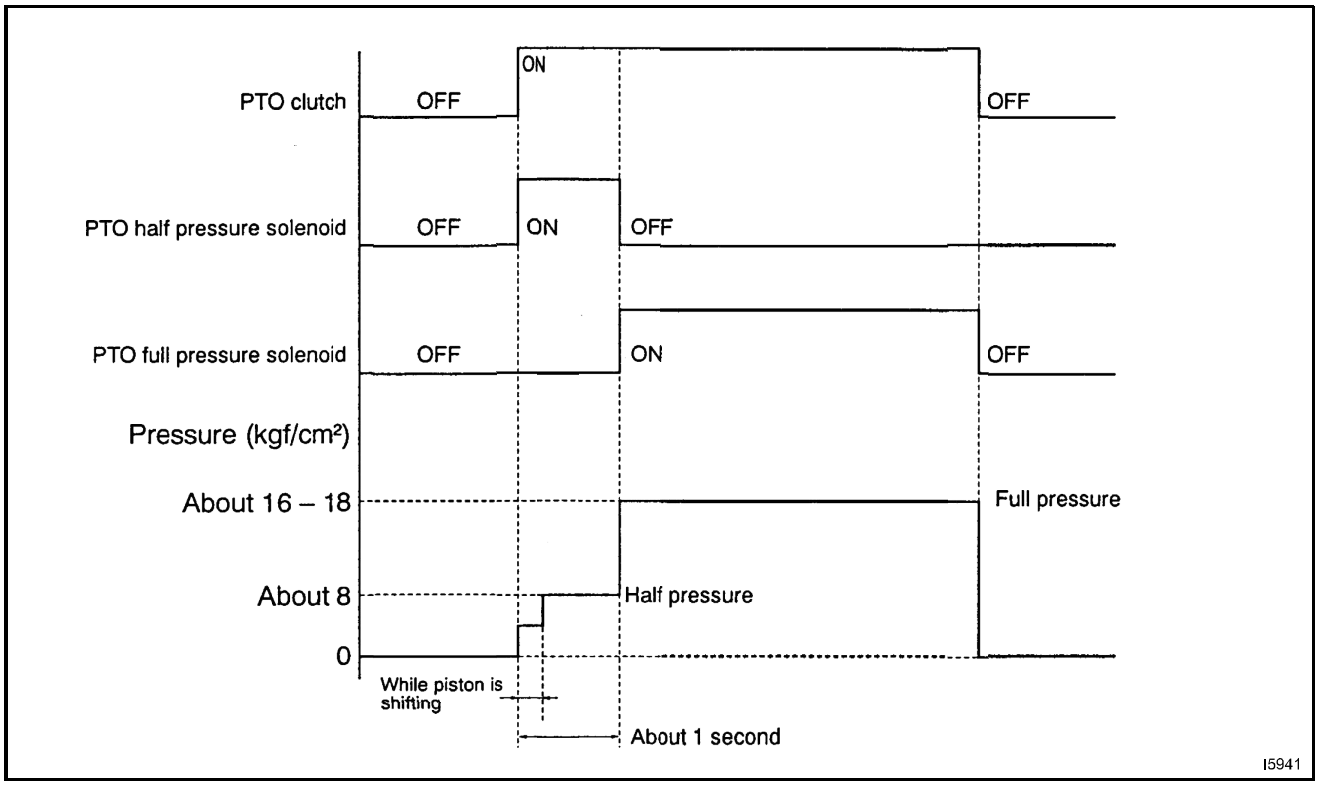

FIG. 14

FIG. 14: Time chart for half clutch operation.

The independent PTO is designed to maintain half engagement for about one second before engaging fully.

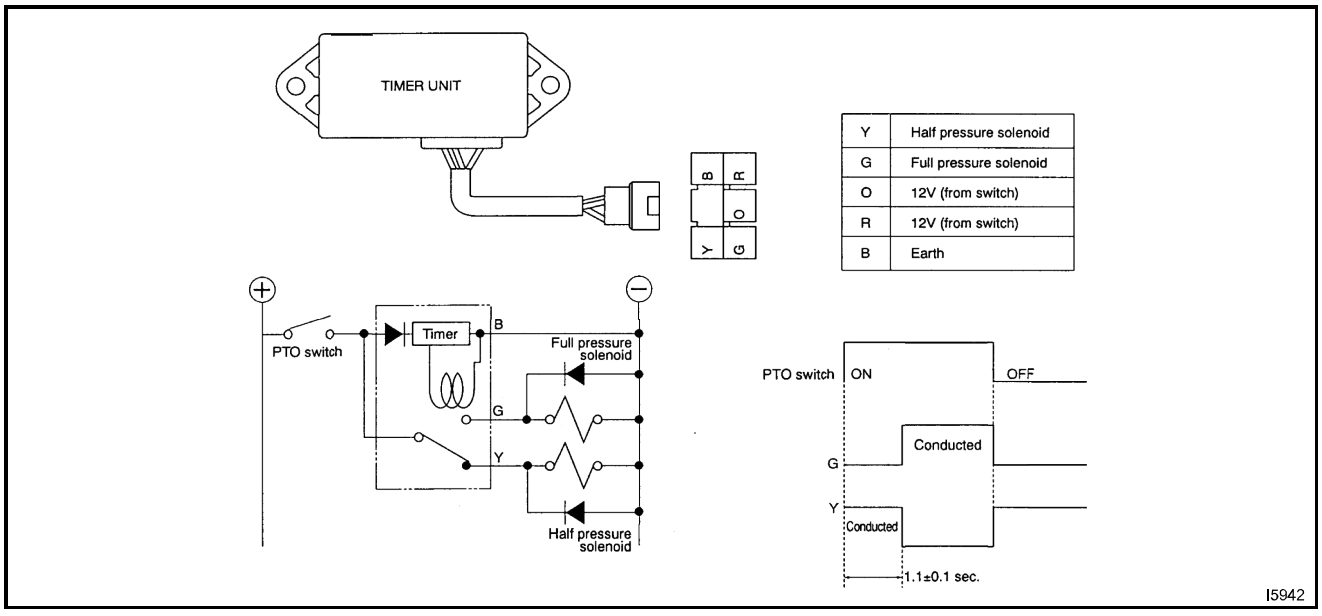

FIG. 15

FIG. 15: Timer unit.

LOCATION OF PTO TIMER RELAY

FIG. 16: The relay (1) controls the solenoid valve for the independent PTO. As it is installed under the dashboard, take care not to allow the leads for the relay to interfere with the brake pedals and clutch pedal.

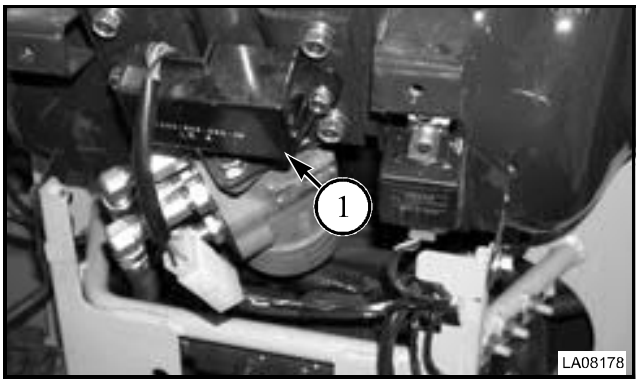

FIG. 16

PTO CLUTCH

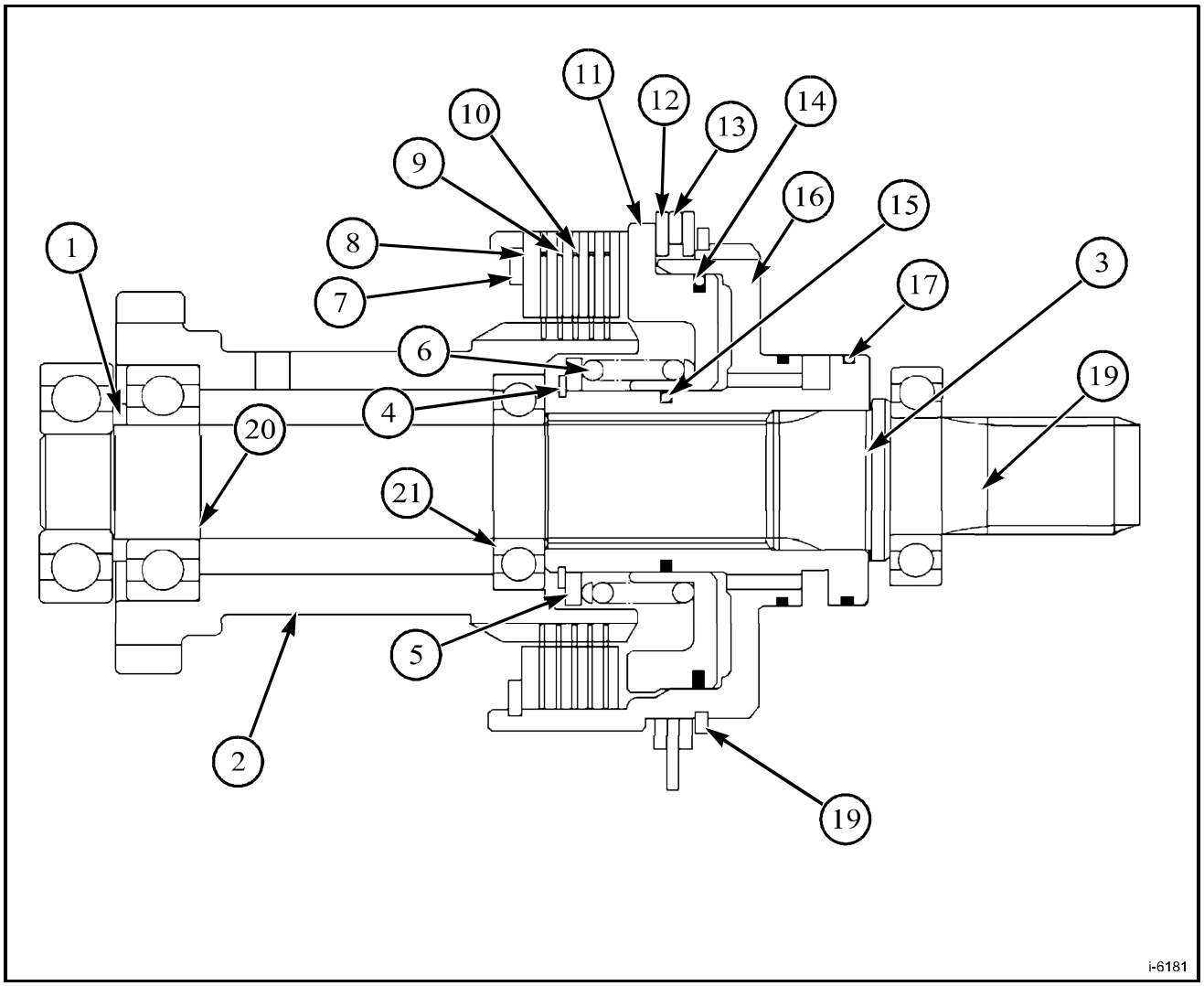

FIG. 17

FIG. 17: Component list.

(1) Collar (26x35x03)
(2) Helical Gear (24T)
(3) PTO Shaft
(4) Snap Ring
(5) Washer
(6) Spring
(7) Snap Ring
(8) Backup Plate
(9) Friction Plate
(10) Separator Plate
(11) Piston
(12) Pressure Plate
(13) Brake Disc
(14) Seal Ring
(15) Seal Ring
(16) Cover Assembly
(17) Seal Ring
(18) Snap Ring
(19) Bearing
(20) Bearing
(21) Bearing
(22) Washer

Overhaul

FIG. 18: Remove PTO clutch.

Disassembly of the PTO clutch assembly should be done in a clean, dust-free place. Exercise special attention to avoid damage of the seal rings, etc.

Pull out PTO drive shaft (3) to the rear.

Pull out PTO helical drive gear (2) to the front.

Remove snap ring (7) and take out back-up plate friction plate and seperator plates.

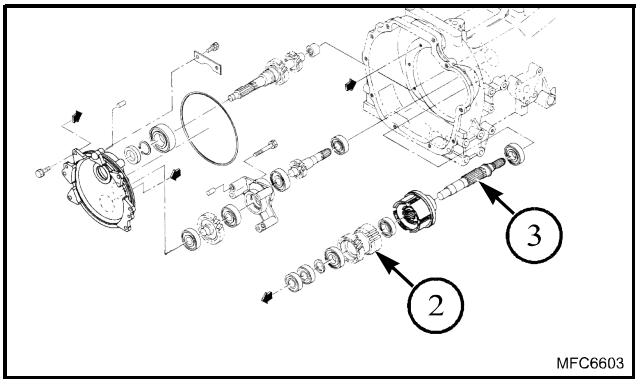

FIG. 18

FIGS. 19–20: While holding return spring (6) compressed with a special tool, remove snap ring (4).

Disassemble into separate parts: piston, return spring, brake disc, and cover assembly.

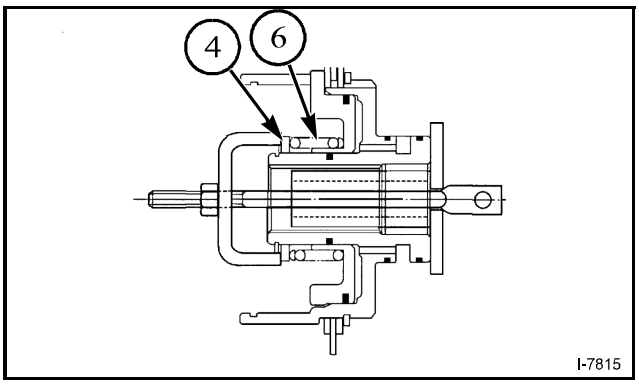

FIG. 19

INSPECTION

Cover Assmebly

Replace a cover assembly which has a damaged or worn sliding surface.

If there is any damage to the cover assembly and the piston seal ring, these parts should also be replaced.

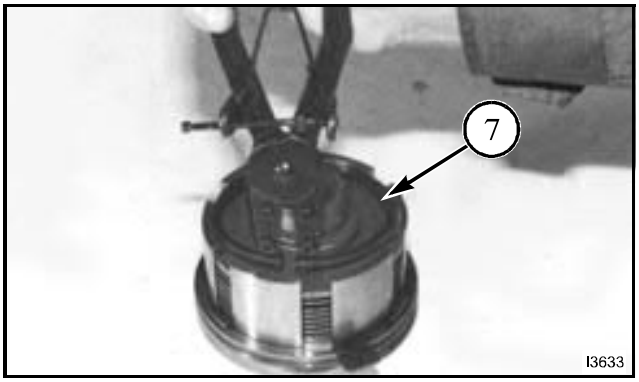

FIG. 20

Disc Assembly (Friction Plate)

FIG. 21: If the thickness of a disc assembly exceeds the usable limit mentioned below or combined width of the disc assembly and driven plate is less than 23.8 mm (0.937"), replace both the disc assembly and driven plate.

Inspection for disc thickness and serration wear.

Inspection Items	Specified Values	Usable Limit
Disc thickness	1.94mm (.075 in.)	1.64 (.065 in.)
Sufrace flatness	0.2 mm (0.008 in.)	

FIG. 21

Driven Plate

Inspection for deformation and burning.

A seriously damaged or worn disc should be replaced. Surface flatness must be within 0.2 mm (0.008 in).

Brake Disc

FIG. 22: Inspection for deformation and burning.

A seriously damaged or worn disc should be replaced.

Inspection Items	Specified Values	Usable Limit
Disc thickness	3.0 +/- 0.1 mm (0.114-0.122 in.)	2.6 mm (0.098 in.)
Sufrace flatness	-	0.2 mm (0.008 in.)

FIG. 22

FIG. 23: If the combined thickness of the return plate and the brake disc deviates from the specified value, replace both parts.

Also inspect other parts for wear and deformation and replace them if necessary.

NOTE: Seal rings (14) and (15) and the two seal rings (17) should be replaced as a pair.

FIG. 23

REASSEMBLY

Reassemble the parts in reverse order of disassembly, following these instructions.

NOTE: Each part should be washed clean before reassembly.

Apply multi-purpose, quality grease to needle bearings in advance.

Each bolt and nut should be tightened to the respective specified torque in accordance with the tightening torque table.

Every time a gear is installed, its smooth rotation should be checked.

Every snap ring should be seated securely in its groove.

When installing seal rings, apply fresh oil ahead of time and install them carefully so as not to damage them.

FIG. 24: Install the pressure plate (12) with the press-processed side (P) turned towards the brake disc (13).

When installing the return spring, use a special tool. The snap ring should be securely seated in the groove.

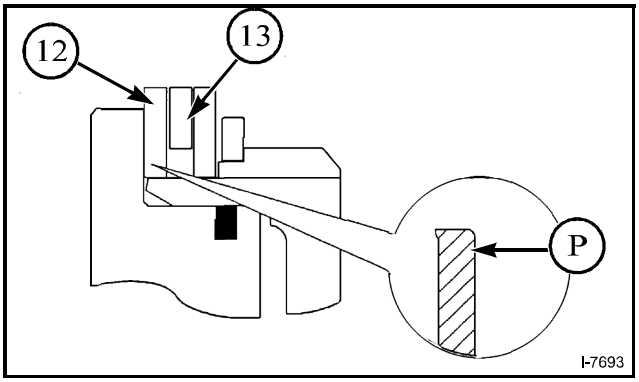

FIG. 24

FIG. 25: When pushing the bearings (20) and (21) into the gear (2) be careful only to push on the outer races.

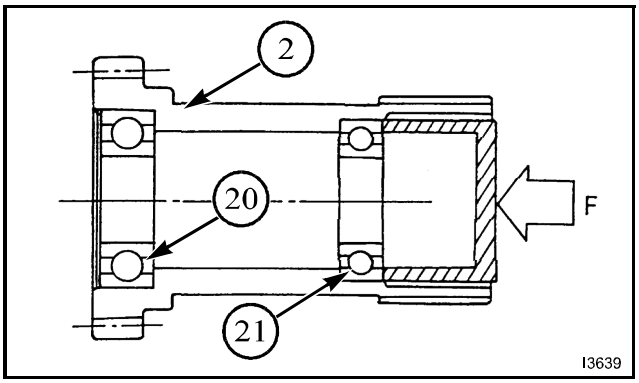

FIG. 25

FIG. 26: After reassembly, check to see that PTO drive gear turns smoothly by locking the PTO clutch.

When installing the PTO clutch, make sure the PTO brake tab (1) is inserted in the groove located in the support material.

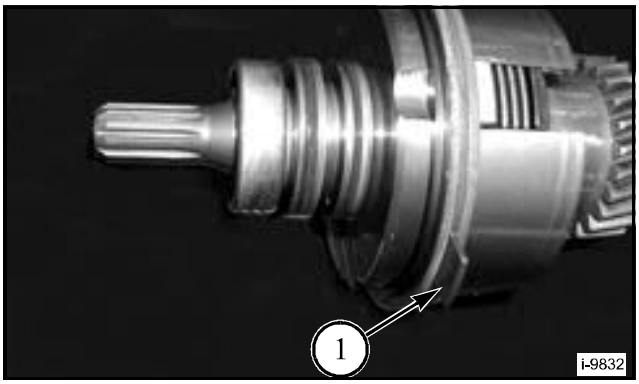

FIG. 26

PTO DRIVE SYSTEM

The PTO drive system is composed of the independent PTO clutch and the PTO change gears.

The PTO change gears are housed behind the ring gear.

Speed Shift Gear Train Diagrams

Input and HST

FIG. 27: Drive from the engine, E, is taken from the input shaft, through the counter shaft and the HST unit, and output to the range change section, R.

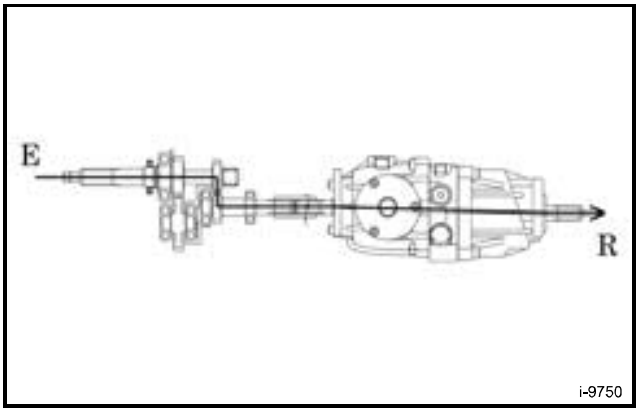

FIG. 27

Range Gear Shift Position “One” (Tortoise)

FIG. 28: When the range change is shifted position "one", the shift collar is moved rearward to lock the (38T) gear to pinion shaft. Drive from HST unit, R, travels downward to countershaft, then continue rearward and upward to pinion shaft.

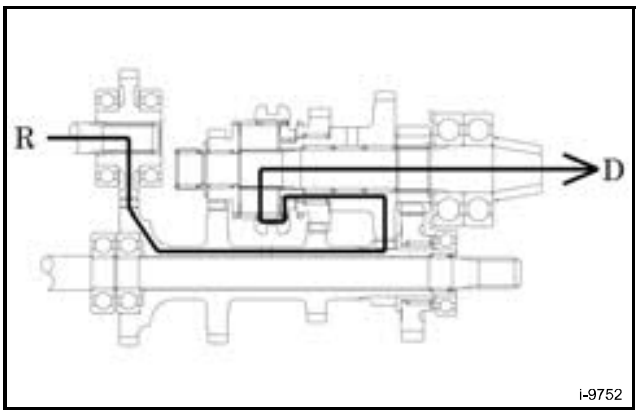

FIG. 28

Range Change Shift Position "Two" (Hare One)

FIG. 29: When the range change is shifted position "two", the shift collar is moved rearward to lock the (29t) gear to pinion shaft. Drive from HST unit, R, travels downward to countershaft, then continue rearward and upward to pinion shaft.

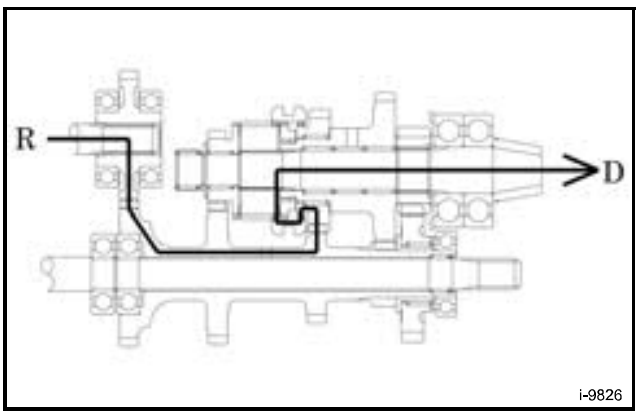

FIG. 29

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