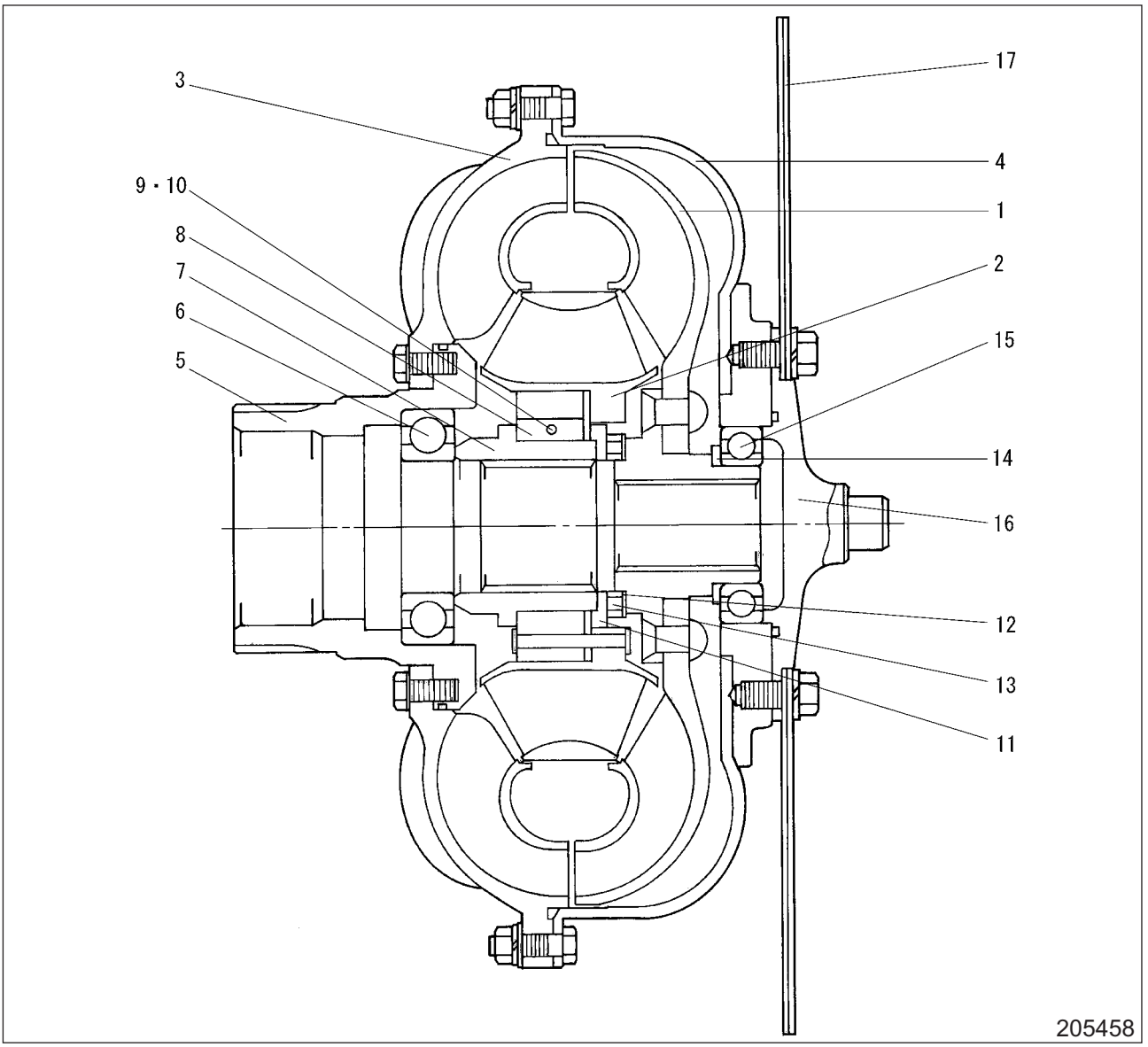
POWERSHIFT TRANSMISSION

1. Specifications

Truck model			DP60	DP70
Torque converter	Type		3-element, 1-stage, 2-phase	
	Maker model		ML15	
	Stall torque ratio		2.9	
Transmission	Operation method	Forward/ Reverse	Forward/reverse switching electrical column shift	
		Reverse	H/L automatic drive	
	Reduction ratio	Forward	1st: 2.138 2nd: 0.685	
		Reverse	1st: 2.138 2nd: 0.685	

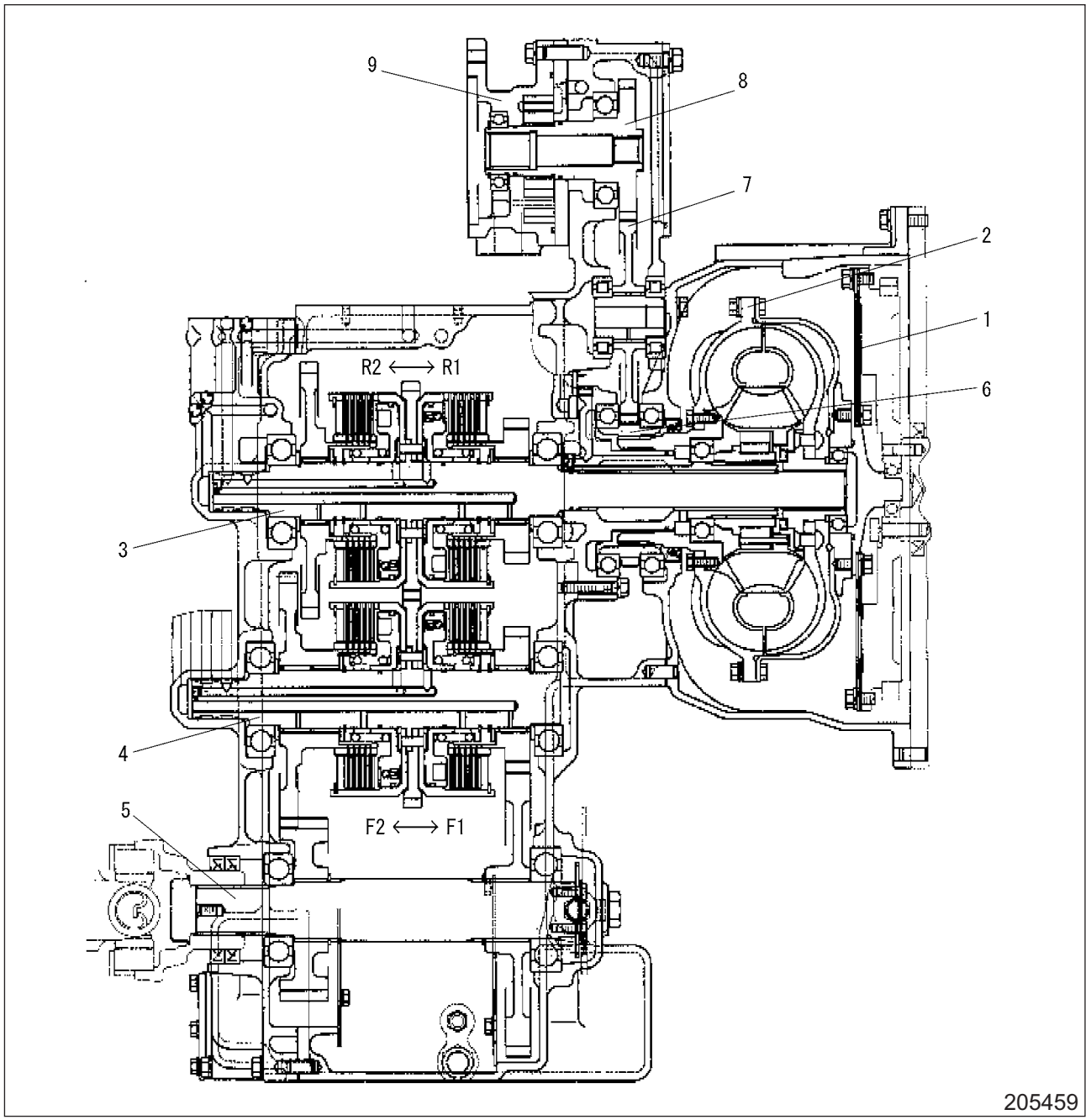
2. Structure

2.1 Torque converter



1 Turbine runner	7 Hub	13 Thrust bearing
2 Stator assembly	8 Roller	14 Spacer
3 Pump impeller	9 Spring	15 Ball bearing
4 Drive cover	10 Spring cap	16 Pilot boss
5 Pump boss	11 Thrust washer	17 Flexible plate
6 Ball bearing	12 Thrust washer	

2.2 Transmission

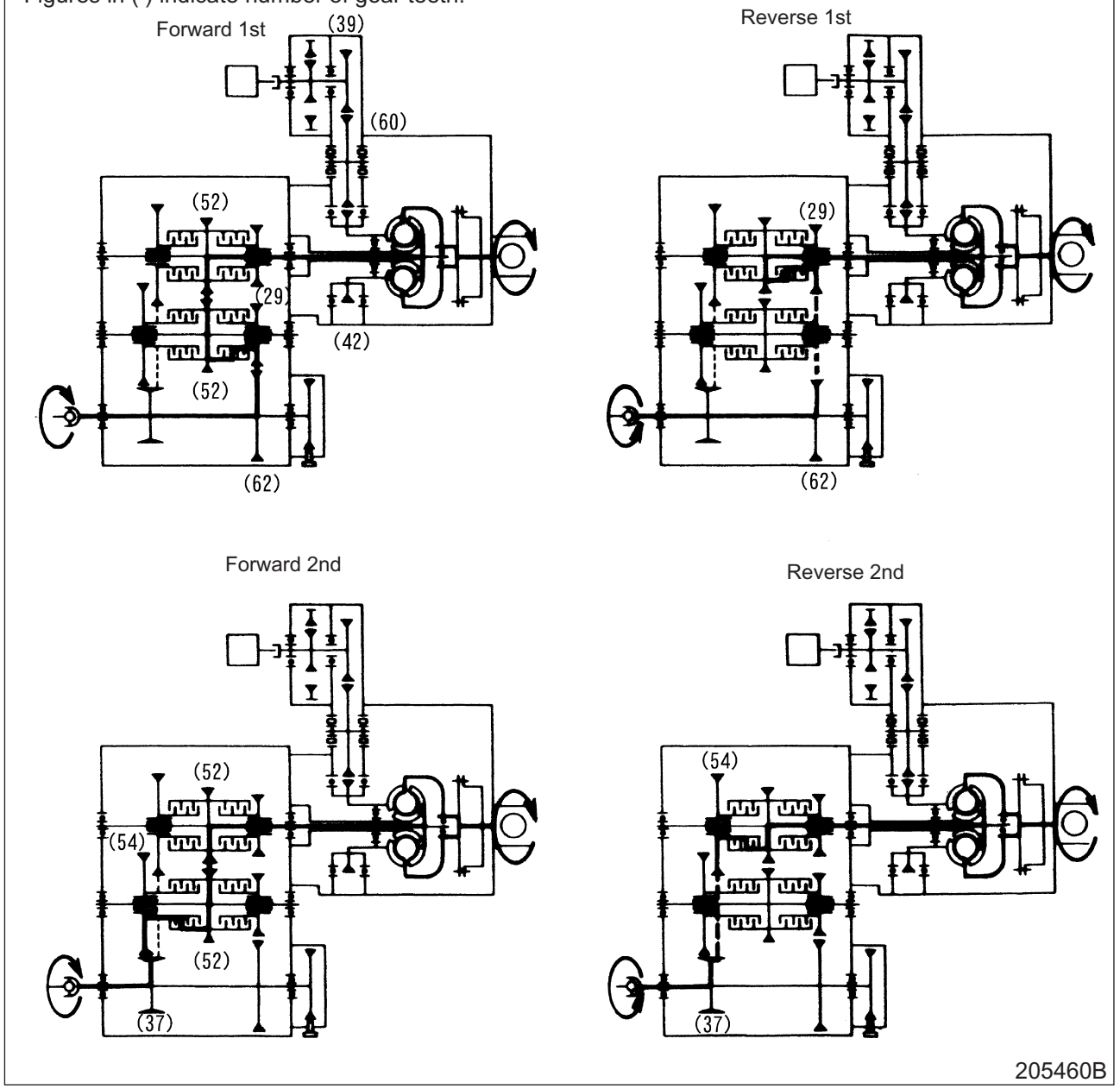


1 Flexible plates
2 Torque converter assembly
3 Input shaft
4 Countershaft
5 Output shaft
6 PTO drive gear
7 Pump idler gear
8 Pump drive gear
9 Pump case

The transmission is the powershift type and has two speeds forward and two speeds reverse. The gear shifting is a power-shift type implemented by the hydraulic multi-disc type clutch.

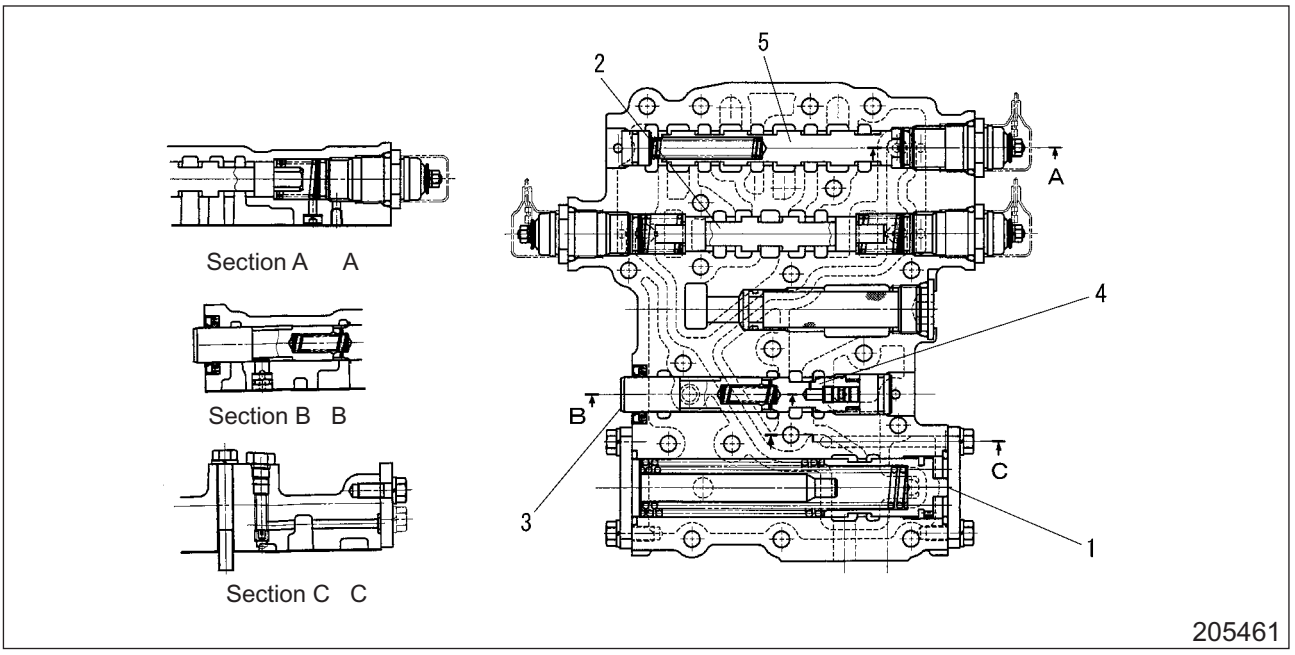
2.3 Power Train Line

Figures in ( ) indicate number of gear teeth.



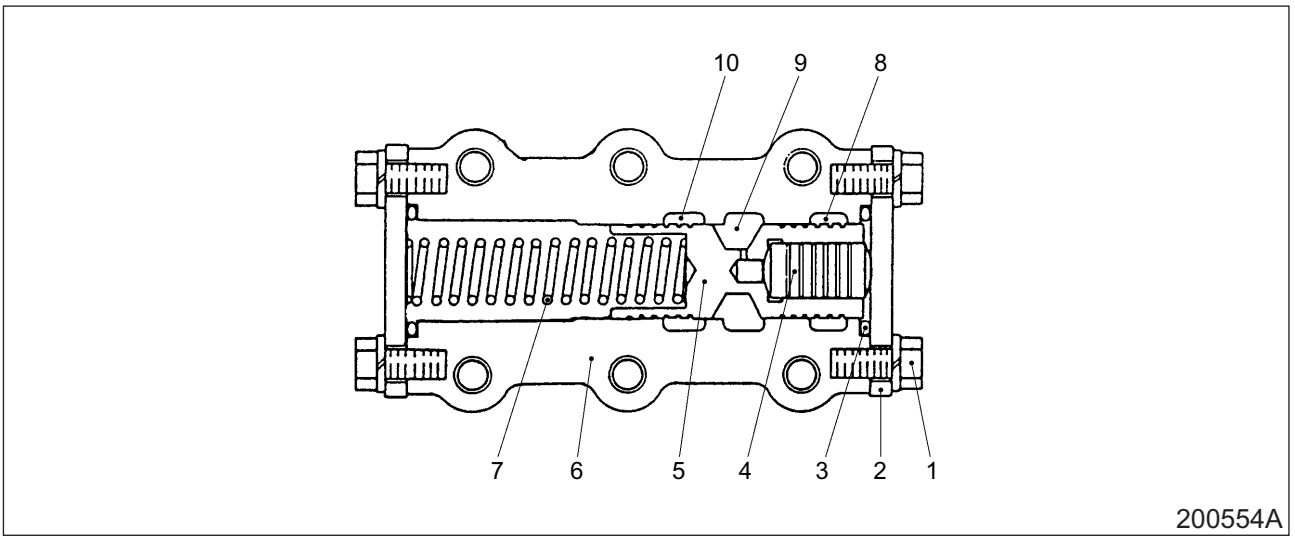
Speed		Gears engaged	Gear ratio
Forward	1st	52/52 × 62/29	2.138
	2nd	52/52 × 37/54	0.685
Reverse	1st	62/29	2.138
	2nd	37/54	0.685
PTO gear		60/42 × 39/60	0.929

2.4 Control Valve



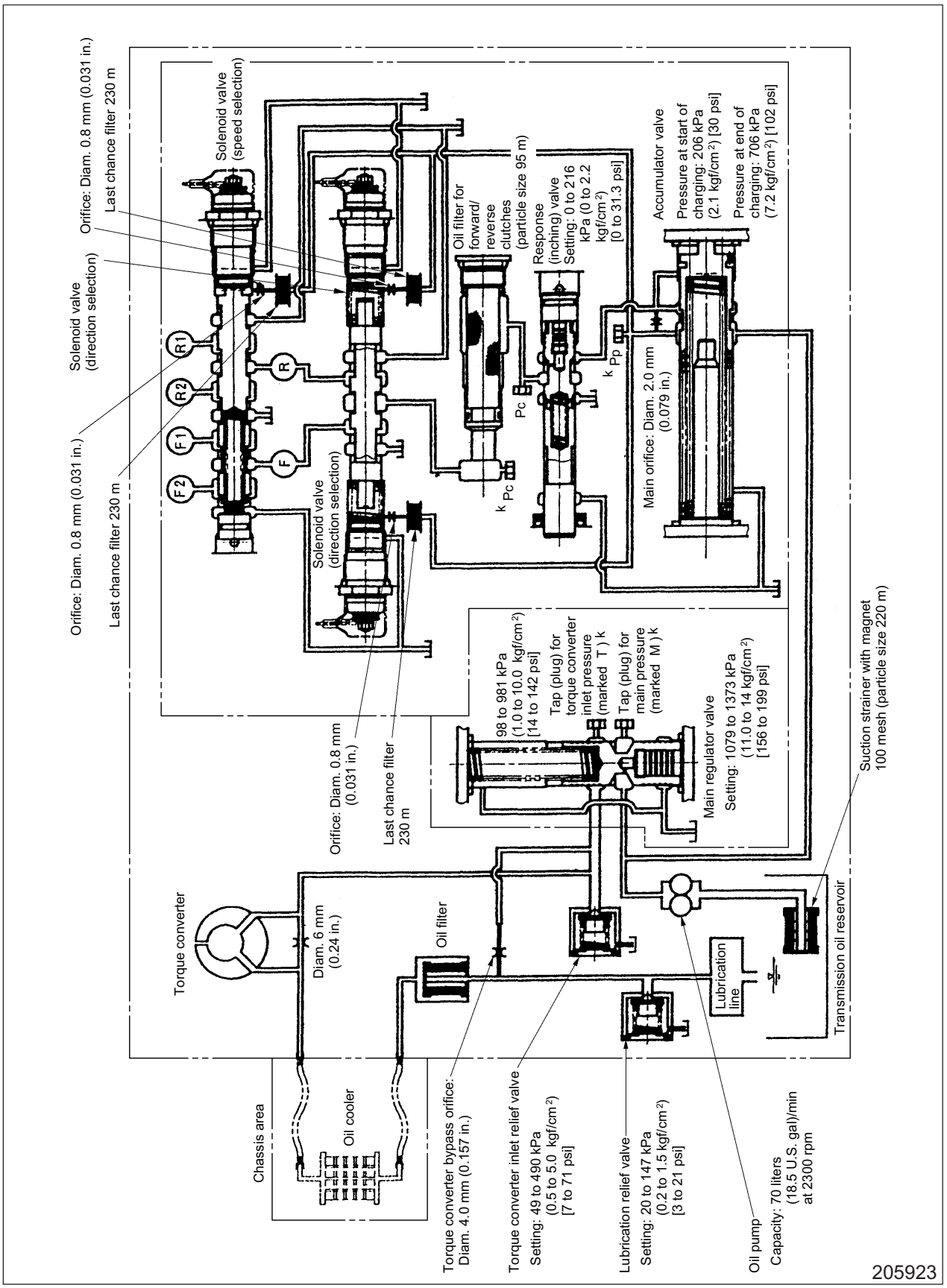
1 Accumulator valve
2 Directional valve
3 Clutch valve plunger
4 Clutch valve
5 Speed (H/L) valve

2.5 Main Regulator Valve

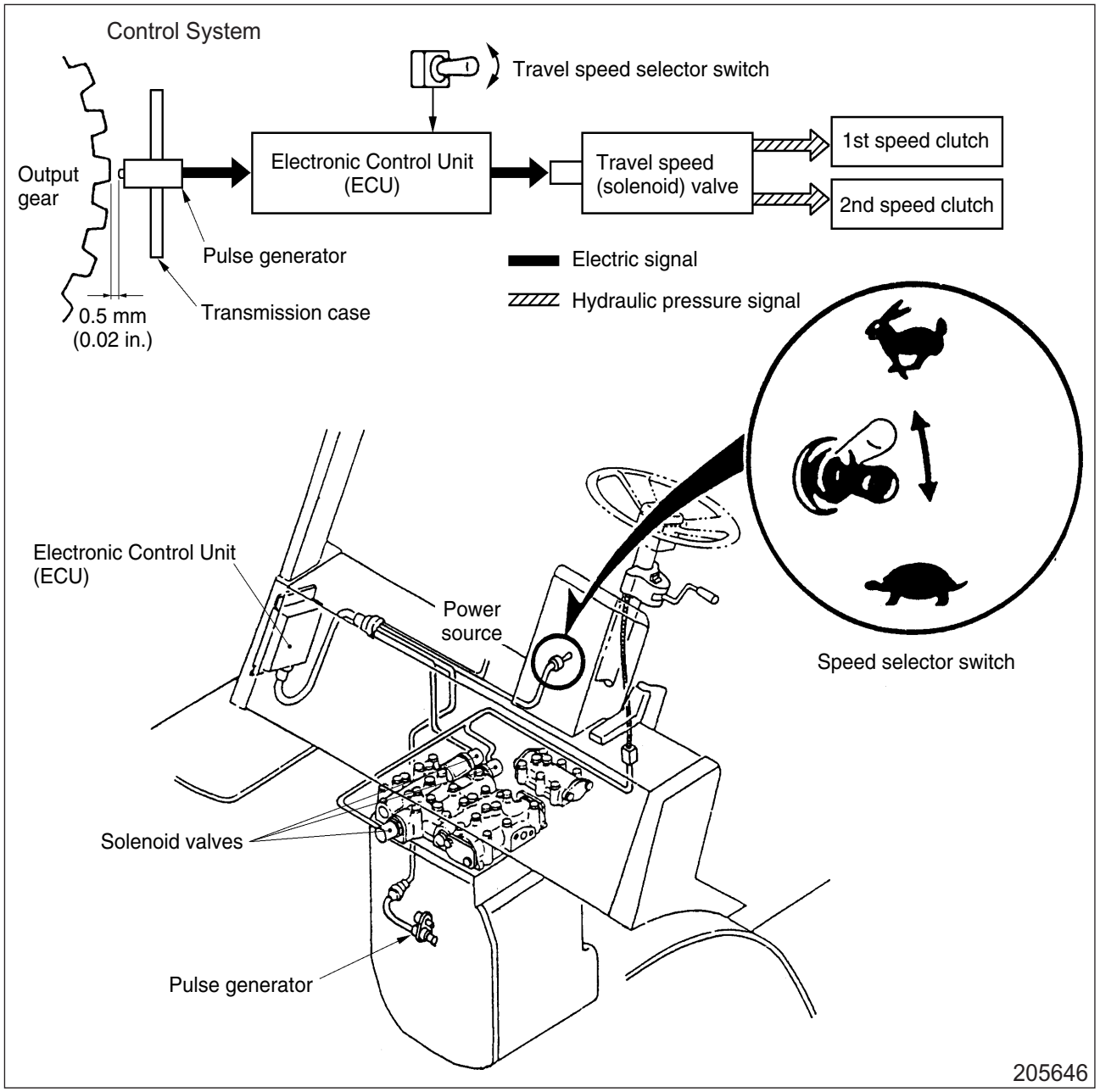


1 Bolt
2 Cover
3 O-ring
4 Slug
5 Spool
6 Body
7 Spring
8 Drain port
9 Main pressure port
10 Torque converter inlet pressure port

2.6 Torque Converter Drive Transmission Hydraulic System Schematic



2.7 Automatic 2-speed Shifting Mechanism



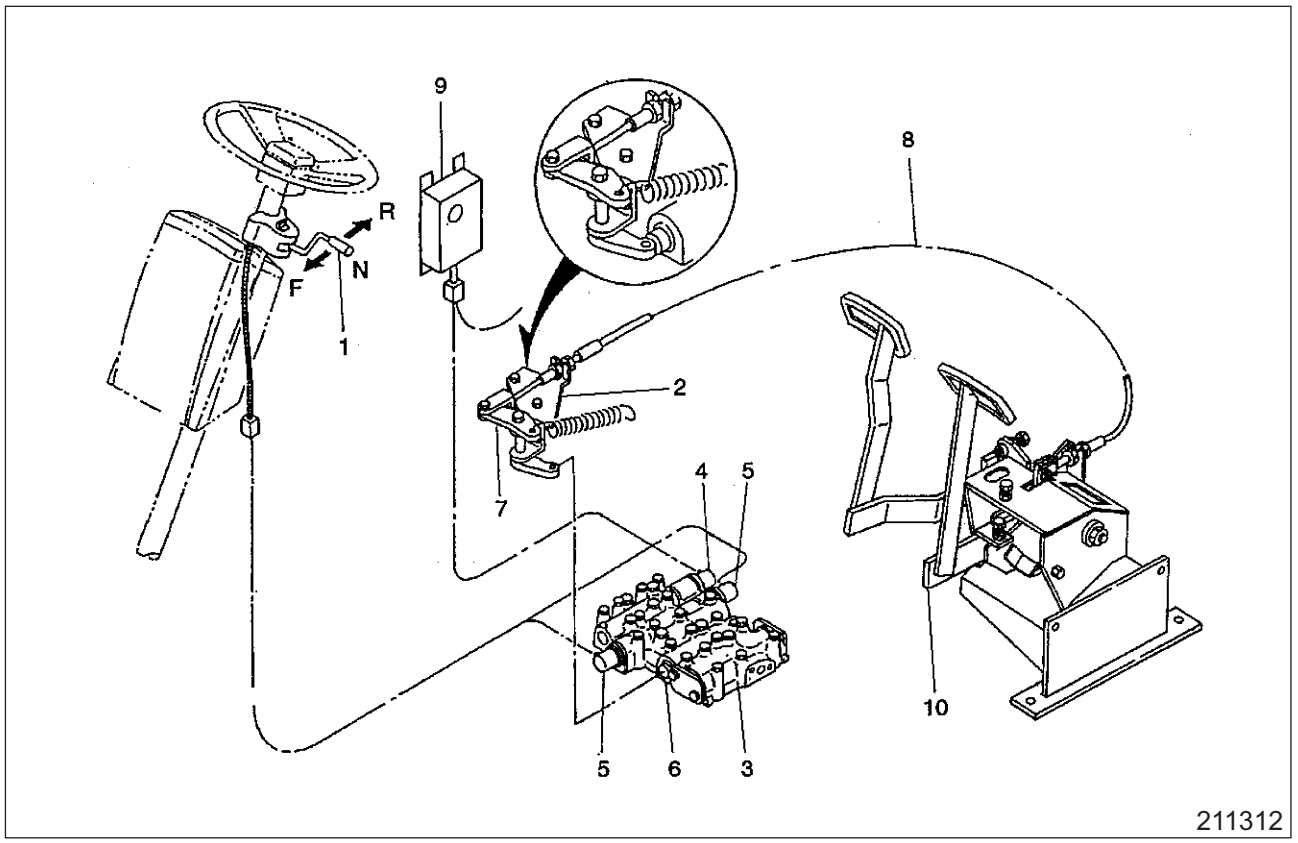
The automatic 2-speed transmission is made up of a combination of the torque converter drive transmission enabling 2 speeds for each of the forward and reverse directions with the dedicated control system, which consists of the pulse generator, ECU, and solenoid valves.
With the speed selection switch, it is possible to shift the travel speed manually between the “Automatic 2-speed” and “Fixed 1st speed” modes whichever is more suitable for the current operational situation.

Selector switch position (mode)	Travel speed	
Automatic 2-speed	1st	0 to 6 km/h (0 to 6.2 mph)
	2nd	6 to 27.5 km/h (6.2 to 17.1 mph)
Fixed 1st speed	0 to 10 km/h (0 to 6.2 mph)	

NOTE

ECU is an acronym of Electronic Control Unit.

2.8 Torque Converter Drive Control System



1 Direction lever
2 Inching bracket
3 Control Valve
4 Solenoid valve (for 1st and 2nd)
5 Solenoid valve (for forward/reverse)
6 Clutch valve plunger
7 Inching lever
8 Cable
9 ECU
10 Inching pedal

3. Suggestions for Removal and Installation

When installing and removing the transmission assembly to/from the truck, handle it as an unit of the engine. For the actual operation practices refer to “4. POWER TRAIN”.

3.1 Removal

3.1.1 Transmission Removal

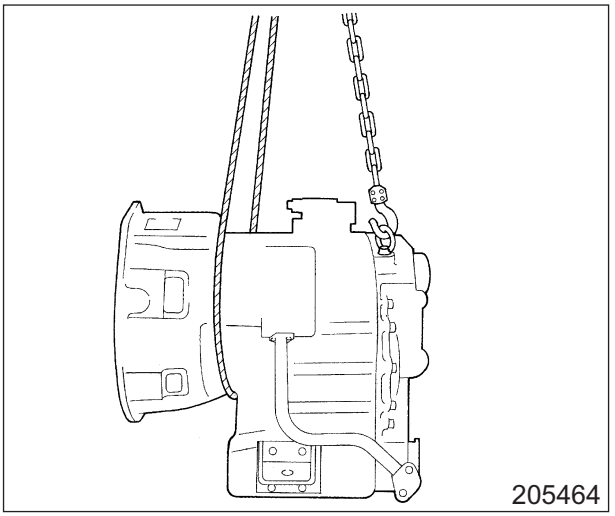
(1) Place the engine on a stable stand, since it will be left as an single unit after the transmission is separated from it. Make the whole unit stable by additionally supporting the transmission part with the placed wooden blocks.

(2) Remove the hydraulic gear pump from the transmission.

(3) Hoist the transmission with wire ropes and lift it just enough to take the weight of the transmission.
To lift the transmission, tie a wire rope around the torque converter case. To lift the transmission, screw a washer-based eye bolt into the transmission cover, and hitch a chain with the eye bolt. Use this 2-point lifting method with the leveling block inserted under the transmission to ensure its level.

(4) Remove the flexible plate fastening bolts through the access hole in the transmission case.

(5) Separate the transmission from the engine by lifting the transmission with the hoist.



3.1.2 Torque Converter Removal

(1) The torque converter can be removed easily, since it is merely inserted into the stator shift, PTO drive gear, and input shaft of the transmission, which is just removed as an assembly.

NOTE

Because the torque converter does boot have a drain plug, it is not possible to completely drain the remaining oil. The oil must be drained by facing the pump boss side down during removal.