

Chapter 11

POWER TAKE OFF (P.T.O.)

1. TRANSMISSION P.T.O.
2. TRANSMISSION MODELS TO BE INSTALLED HINO'S VEHICLES
3. OTHER NOTICES
4. MOUNTING POSITION OF TRANSMISSION P.T.O. ASSY
5. ENGINE REV. CONTROL FOR MOUNTING OF BODY OR EQUIPMENT

1. TRANSMISSION P.T.O.

When P.T.O. is necessary for body or equipment mounting to Hino vehicles, contact directly in the nearby transmission manufacturer as following or HMC or Hino authorized dealer.

2. TRANSMISSION MODELS TO BE INSTALLED HINO'S VEHICLES

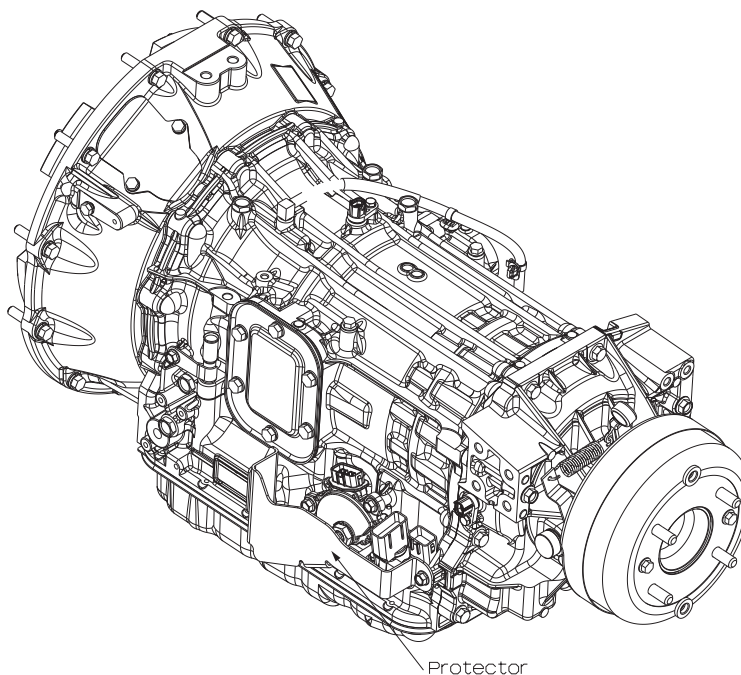
MODEL		ALL MODELS
TRANSMISSION	AUTO	ALISON A465HD (Diesel Model) A465 (Hybrid Model)

3. OTHER NOTICES

If a P.T.O. is installed make sure it works properly and meets the respective manufacturers guidelines for application, installation, and operation.

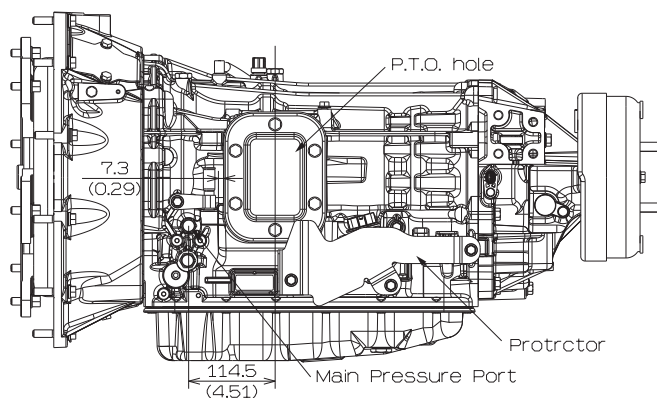
Please remove the protector when installing P.T.O..

In the case of hybrid model, the electrical oil pump is installed with the transmission.
Install P.T.O. not to interfere with it.

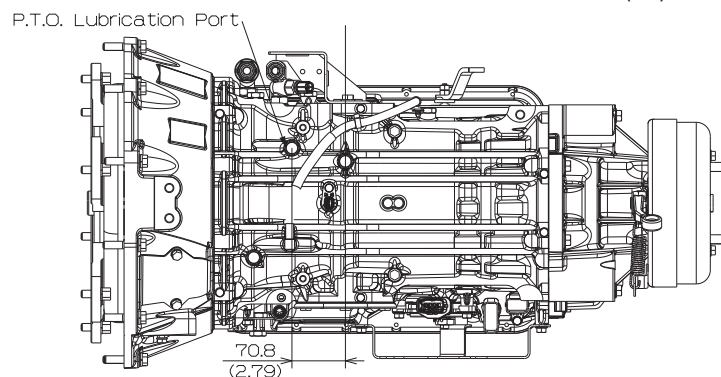


STATE OF INSTALLED PROTECTOR

Unit : mm (in.)

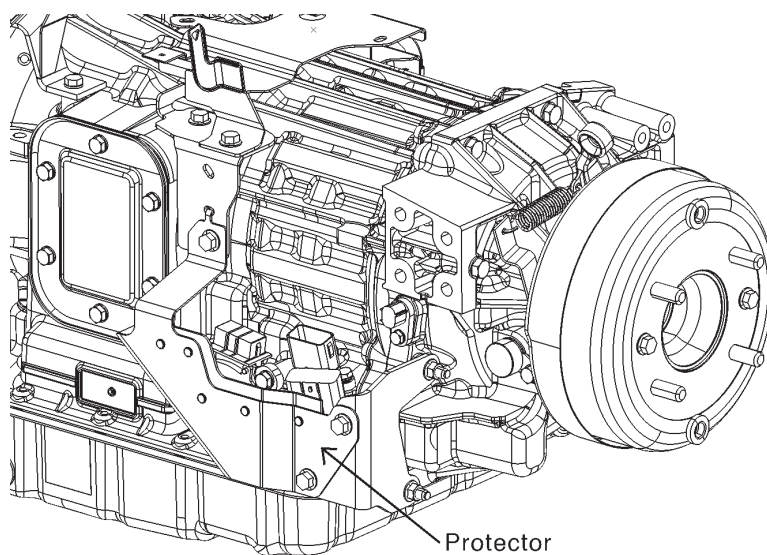


LEFT SIDE VIEW

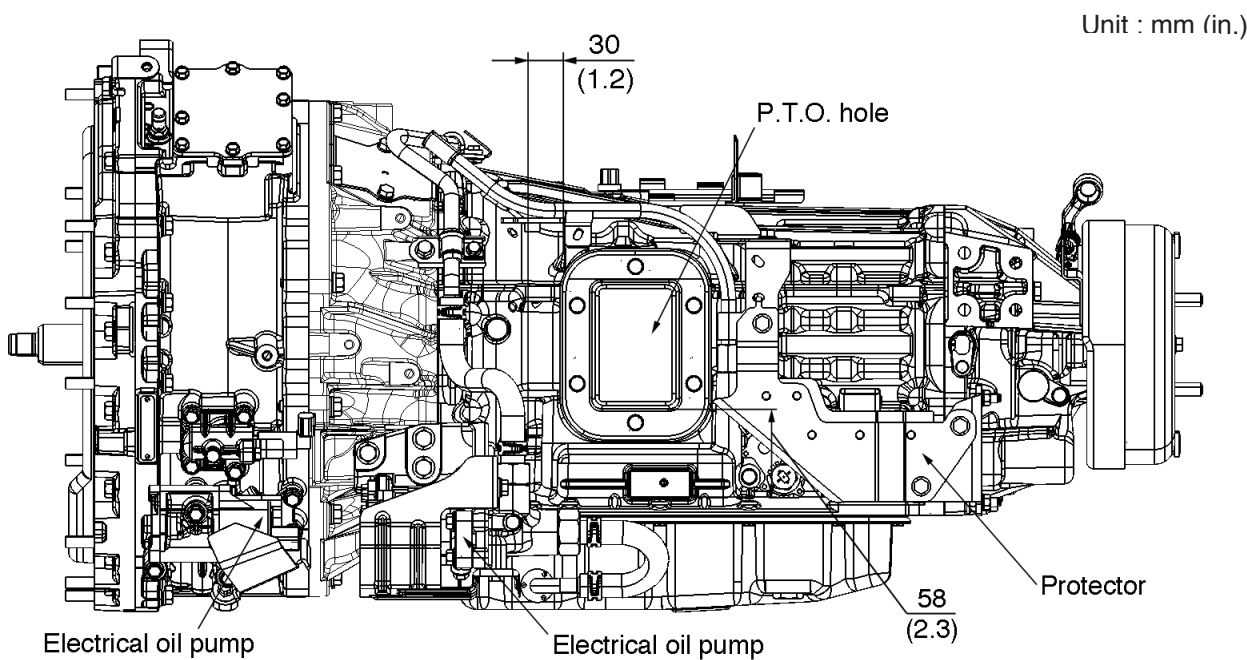


UPPER VIEW

TRANSMISSION OF DIESEL MODEL



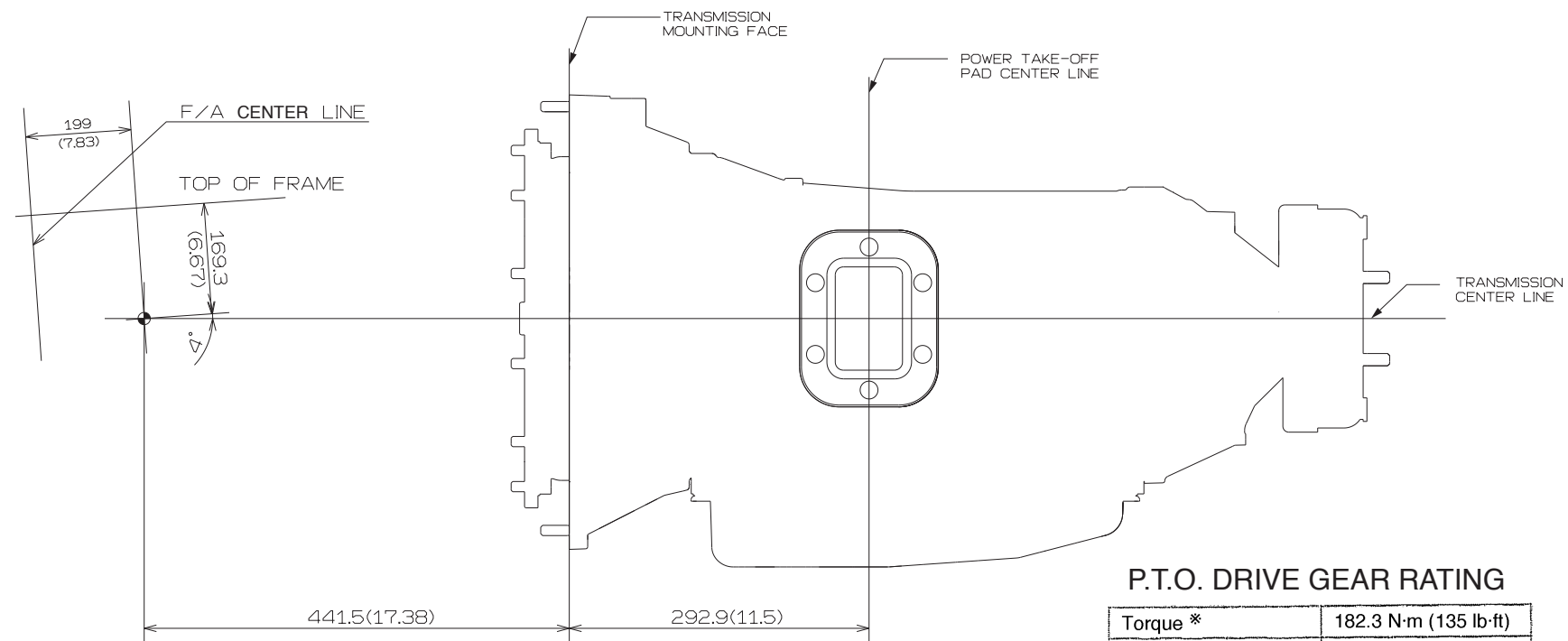
STATE OF INSTALLED PROTECTOR



TRANSMISSION OF HYBRID MODEL

4. MOUNTING POSITION OF TRANSMISSION P.T.O. ASSY

- TRANSMISSION MODEL : AISIN A465HD SERIES
- POWER TAKE OFF DRIVE GEAR RATING : 182 N·m (135 lb·ft)



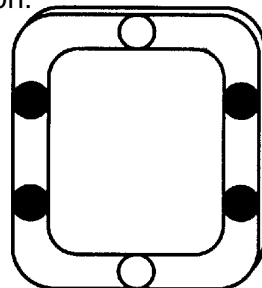
P.T.O. DRIVE GEAR RATING	
Torque *	182.3 N-m (135 lb-ft)
Rev. speed	1700 rpm
Continuous duty cycle	100h

※ On P.T.O. drive gear at LOCK-UP condition.

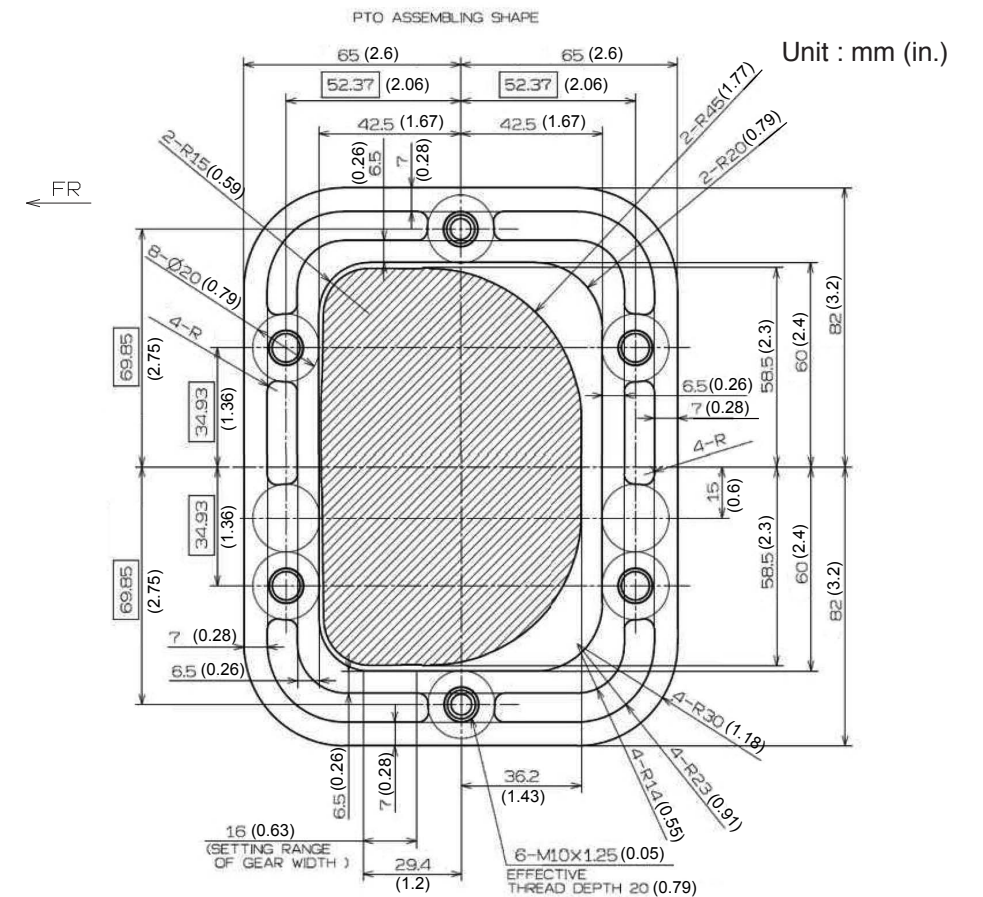
In P.T.O. operation, when engine rpm exceeds 1200 RPM, the torque converter will lock up.
The lock up engine rpm can not be modified.
The torque converter in lock up will be held until engine speed falls below 1000 RPM.

CAUTION!!

P.T.O. mounting stud bolts must have thread length less than **0.689inch (17.5mm)** to prevent contact with internal parts of Transmission.

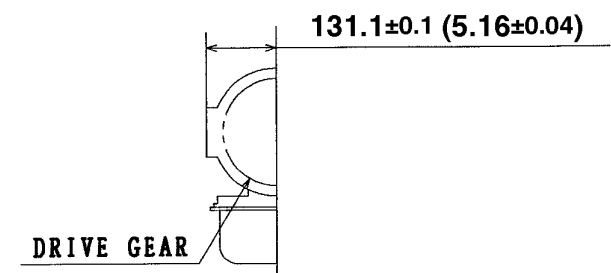


* Indicates drilled through holes



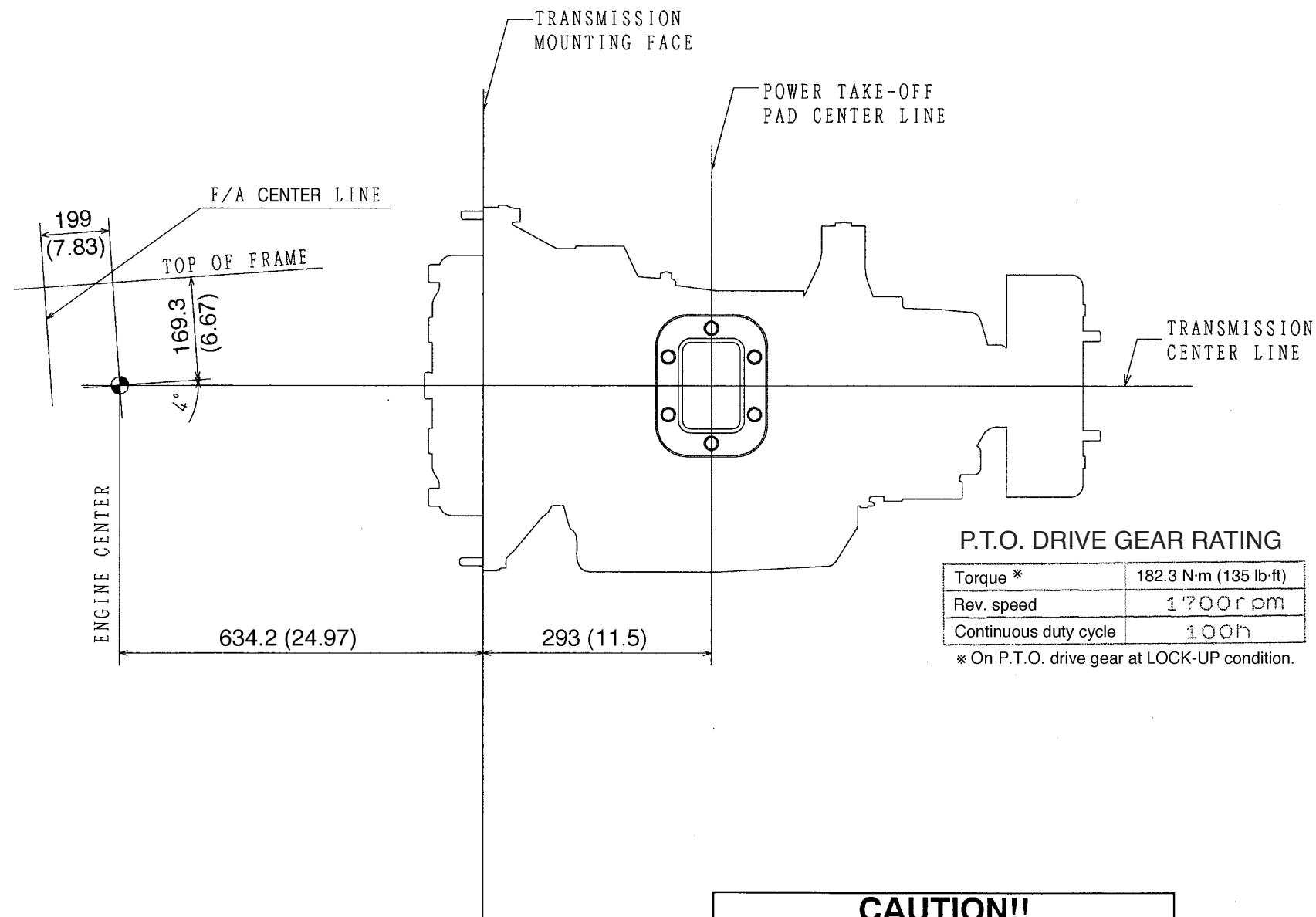
P. T. O. DRIVE GEAR SPECIFICATION

Number of teeth	69
Normal module	3 (0.12)
Normal pressure angle	20°
Helix angle (and direction)	0°
Standard pitch circle diameter	207.000 (8.150)
Base circle diameter	194.516 (7.658)
Whole depth	6.78 (0.27)
Over pin diameter {Used pin diameter}	216.902 $^{0}_{-0.238}$ (8.539 $^{0}_{-0.00937}$) (8.0 (0.24))
Rotation direction of P.T.O. drive gear	Same as engine



Power take-off opening	SAE 6-bolt, regular duty P.T.O
P.T.O driver gear	Converter driven gear
Drive gear ratio	Below 1200rpm: 1x turbine speed Above 1200rpm: Engine speed

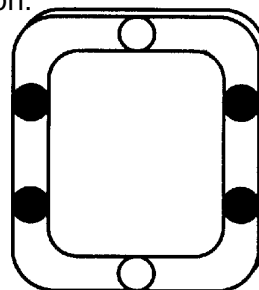
- **TRANSMISSION MODEL : AISIN A465 SERIES**
- **POWER TAKE OFF DRIVE GEAR RATING : 182 N·m (135 lb·ft)**



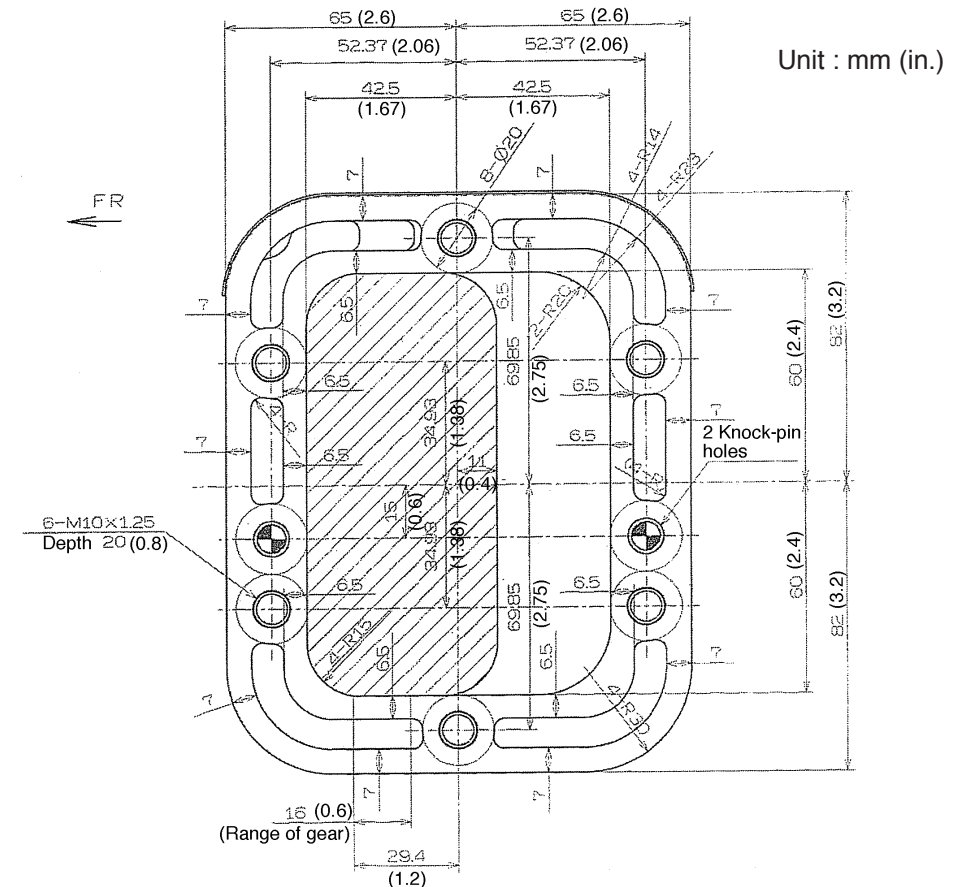
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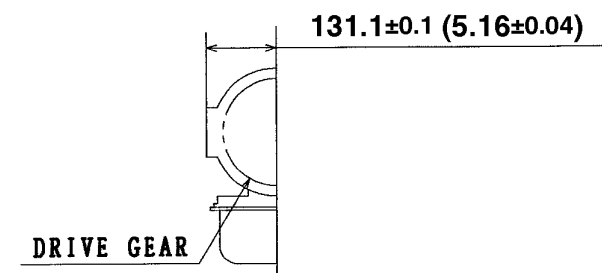


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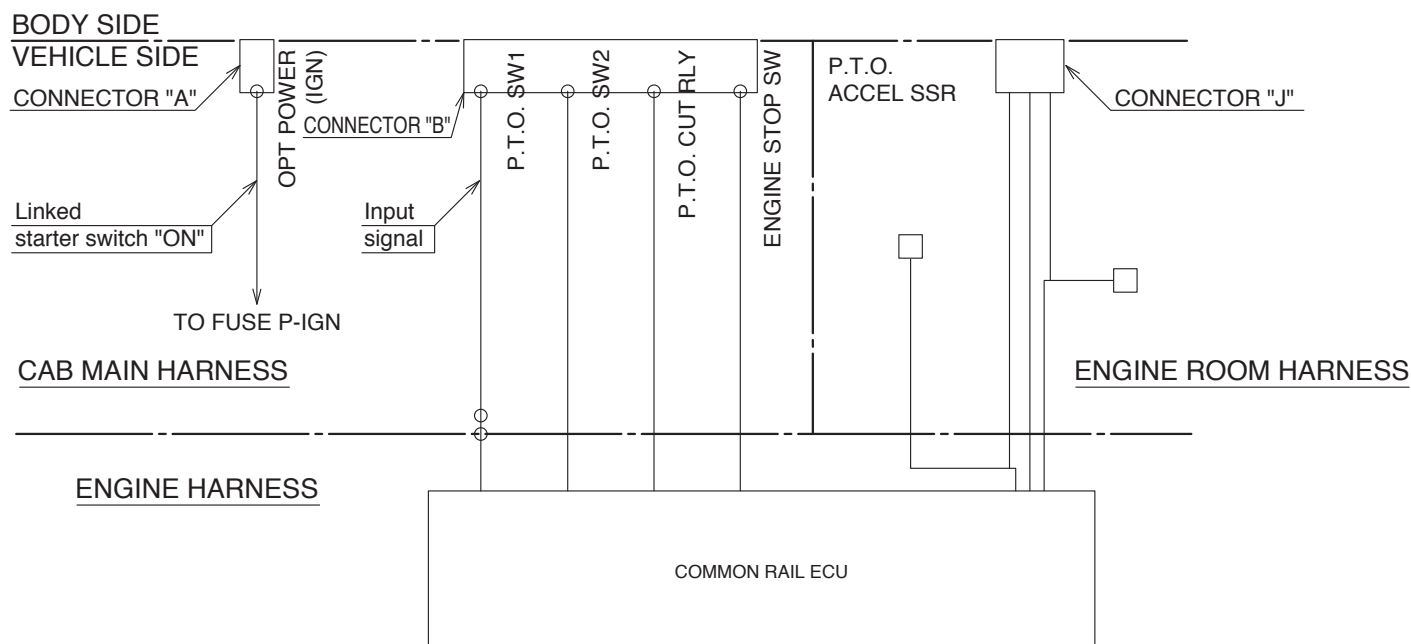
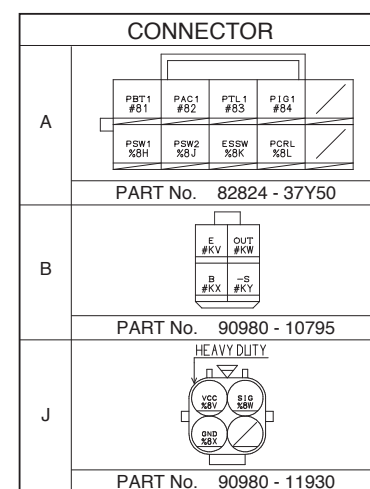
5. ENGINE REV. CONTROL FOR MOUNTING OF BODY OR EQUIPMENT

Engines which are mounted to the Hino truck models are controlled by a electric computer. Make sure following procedure how to control of engine revolution (speed) hereinafter collectively referred engine revolution when provide power take off device (ex. Transmission P.T.O.) in order to control mounted body or equipment.

ELECTRIC CIRCUIT DIAGRAM RELATED WITH ENGINE REVOLUTION CONTROL WHICH IS ORIGINALLY PROVIDED IS FOLLOWING FIGURE.

WARNING

- Whatever P.T.O. control system is mechanical or pneumatic or electric, the signal circuit of P.T.O. switched on is always connected with engine control computer.
- This alteration including provision of P.T.O. unit etc. must be provided own responsibility of Body or Equipment Manufacturer.
- Standard function of Engine Acceleration Control by accelerator pedal inside of cabin is cancelled during operation of body or equipment by this system.



[Note] • Refer to “COMMON RAIL CIRCUIT” and “CONNECTORS” in Chapter 12.

- Connector A and B are provided under the center cluster, instrument panel in cab.
- Connector J is provided in the left side rail.

(See Chapter 7 “ELECTRICAL POWER SOURCES” for detailed position.)

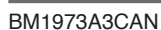
EXAMPLE A

Condition to be adapted this engine idle-up method as follows.

- Required torque of P.T.O. : MAX 147 N·m (108 lb·ft).
- Control range of engine revolution : Idle to MAX 2800 rpm.

Make sure to wire the electric circuit as following figure.

When set up engine revolution, please consult with HMC.
The detail of customization is described in HINO-DXII.



EXAMPLE B

(In the case, the P.T.O. received heavy torque load or required constant engine revolution.)

Condition to be adapted this engine idle-up method as follows.

- Required torque of P.T.O. : OVER 147 N·m (108 lb·ft) to MAX.
(to be limited by transmission and P.T.O. manufacture.)
- Control range of engine revolution : Idle to MAX.

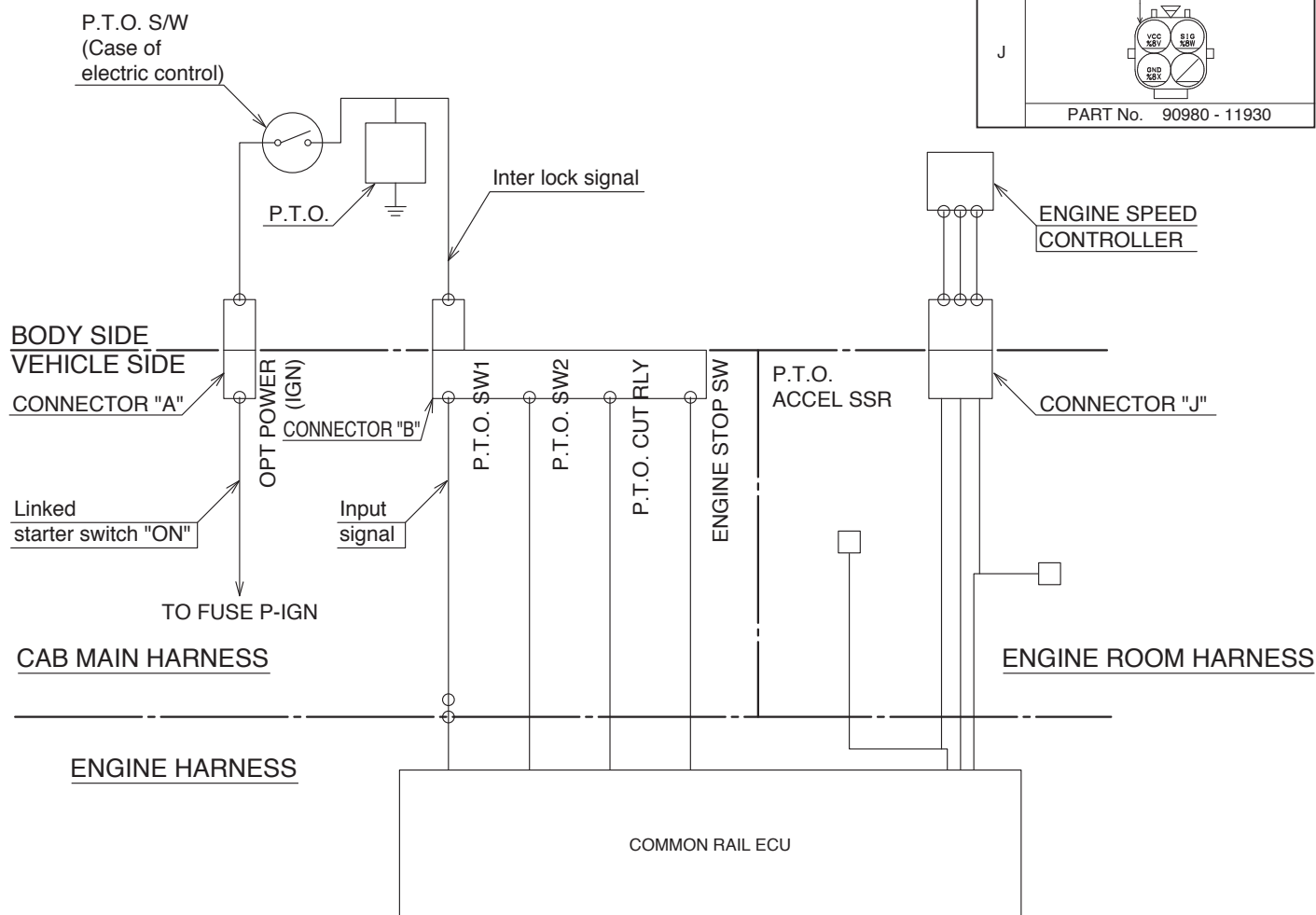
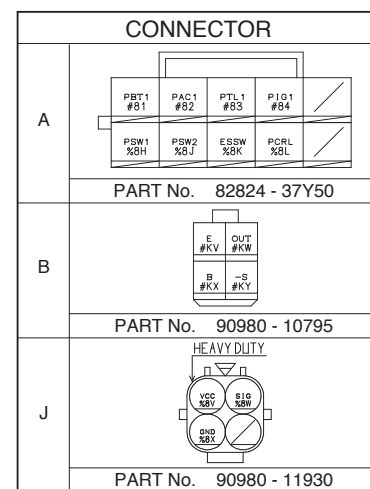
Engine revolution is controlled by the ENGINE SPEED CONTROLLER.

The electrical specification of the ENGINE SPEED CONTROLLER is described in next page.

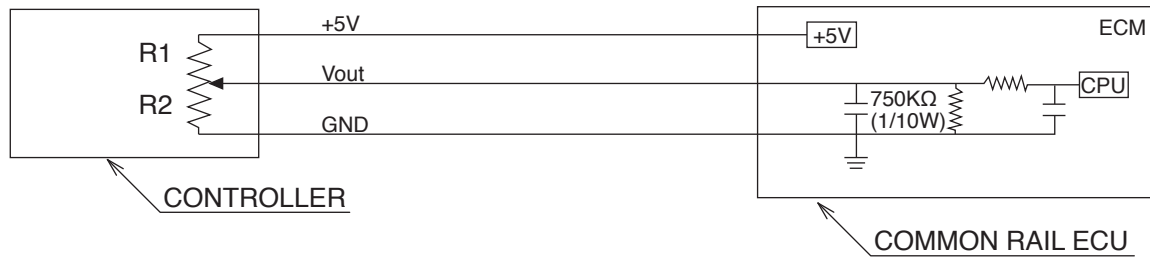
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SPECIFICATION OF THE ENGINE SPEED CONTROLLER



calculation ;

$$V_{out} = 5 \times R / (R1 + R)$$

$$1/R = (1/R2) + (1/750)$$

$$\text{Note ; } R1 + R2 = 2k\Omega$$

R1 (Ω)	R2 (Ω)	Vout (V)	ENGINE SPEED (rpm)
1500	500	1.25	The same voltage will not produce the same ENGINE SPEED by condition (ex. engine mode).
1450	550	1.37	
1400	600	1.5	
1350	650	1.62	
1300	700	1.75	
1250	750	1.87	
1200	800	2	
1150	850	2.12	
1100	900	2.25	
1050	950	2.37	
1000	1000	2.5	

• The graph in relation with ENGINE SPEED and Vout (for reference)

