



**Muncie<sup>®</sup>  
Power  
Products**

**KEEP IN VEHICLE**  
READ OPERATING INSTRUCTIONS  
INSIDE BEFORE OPERATING PTO

# **FR66 or FR3C**

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INSTALLATION INSTRUCTIONS  
AND OPERATOR'S MANUAL

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# **WARNING!**

## **ALWAYS READ AND UNDERSTAND THE ENTIRE MANUAL COMPLETELY BEFORE INSTALLATION OR OPERATION OF PTO AND DRIVEN EQUIPMENT INCLUDING THESE WARNINGS AND OPERATOR'S INSTRUCTIONS IN SECTION 4!**

- ALWAYS DISENGAGE THE PTO WHEN THE DRIVEN EQUIPMENT IS NOT IN OPERATION
- DO NOT ATTEMPT TO INSTALL OR SERVICE ANY POWER TAKE-OFF WITH THE TRUCK ENGINE RUNNING. PUT IGNITION KEYS IN YOUR POCKET BEFORE GETTING UNDER TRUCK.
- DO NOT ALLOW TRUCK ENGINE TO BE STARTED WHILE WORKERS ARE UNDER TRUCK.
- BEFORE WORKING ON A VEHICLE PLACE TRANSMISSION IN NEUTRAL OR PARK, SET BRAKES, AND IMMOBILIZE TRUCK WHEELS WITH SUITABLE CHOCKS.
- BE SURE TO BLOCK ANY RAISED BODY OR MECHANISM BEFORE WORKING ON OR UNDER EQUIPMENT.
- INSTALLED POWER TAKE-OFFS MUST NEVER BE SHIFTED IN OR OUT OF GEAR BY ANY MEANS EXCEPT BY THE CONTROLS IN THE CAB OF THE TRUCK.
- STAY CLEAR OF SPINNING DRIVESHAFTS TO AVOID BECOMING ENTANGLED AND INJURED.
- APPLICATIONS WITH A ROTATING DRIVESHAFT ARE A POTENTIAL SAFETY HAZARD AND IT IS THE REQUIREMENT OF MUNCIE POWER PRODUCTS THAT EXPOSED DRIVESHAFTS BE GUARDED.
- OBTAIN PROPER TRAINING BEFORE OPERATING THIS MACHINERY
- DO NOT INSTALL OR OPERATE EQUIPMENT WHICH HAS NOT BEEN PROPERLY SPECIFIED FOR YOUR VEHICLE
- INSTALLERS ARE TO INSURE THAT PTO COMPONENTS DO NOT INTERFERE WITH ANY CHASSIS COMPONENTS, INCLUDING BUT NOT LIMITED TO VEHICLE CROSSMEMBERS, FRAME RAILS, DRIVESHAFTS, EXHAUSTS, CONVERTERS, FUEL LINES, ETC. WHILE VEHICLE IS STATIONARY OR MOBILE.
- ALLOW THE VEHICLE, PTO AND DRIVEN EQUIPMENT TO WARM UP WHEN OPERATING IN WEATHER WHERE TEMPERATURES ARE NEAR OR BELOW FREEZING 32° F (0° C)
- INSTALL SEPARATE CONTROLS FOR PTO AND DRIVEN EQUIPMENT.
- ALWAYS INSTALL THE SAFETY LABELS PROVIDED AND PLACE THE OPERATOR'S MANUAL IN THE VEHICLE GLOVE COMPARTMENT.

The PTO is supplied with a packet containing warning labels. If you did not receive any, or if you need extra, you may order them, no charge, by phone, email or mail. They are available through your nearest Muncie® distributor or at the number and address below:

1-800-FOR-PTOS (1-800-367-7867)  
Muncie Power Products, Inc.  
P.O. Box 548  
Muncie, IN 47308-0548  
info@munciepower.com

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** This symbol indicates a hazardous situation which, if not avoided, could result in death or serious injury.**

**Note: Muncie is not liable for damages, and consequential damages, related to lack of compliance with previous suggestions and guidelines.**

**IMPORTANT SAFETY INFORMATION**



# FR66/FR3C

## INSTALLATION INSTRUCTIONS AND OPERATOR'S MANUAL

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#### WIRE HARNESS INSTALLATION INSTRUCTION DOCUMENTS (LOCATED WITH WIRE HARNESS)

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FR66 Wiring Installation F-250 - F-550 Diesel (Stationary **OR** Mobile Mode)..... Document# IN 13-09  
FR66 Wiring Installation F-250 - F-550 Diesel (Stationary **AND** Mobile Mode) ..... Document# IN 13-08  
FR66/FR3C Wiring Installation F-250 – F-550, F-650 Gas (Stationary **Only**)..... Document# IN 13-10

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# **SECTION - 1**

## **PTO INSTALLATION**

### **ALL INSTALLERS MUST READ THE FOLLOWING**

#### **PTO AND ACTIVATION KIT INSTALLATION INSTRUCTIONS**

*Always wear safety glasses. Read entire manual before starting installation.*

**IMPORTANT:** Disconnect vehicle battery prior to installing electrical and electric/hydraulic activation kits.

- A. Vehicle manufacturers may have specific locations for accessing electrical power and activating hydraulics. The body builder manual or company representative for the vehicle chassis should be consulted prior to installing electrical or hydraulic systems.
- B. Route wires and activation lines away from rotating and high temperature components. Use appropriate looms and bulk head pass-thru's wherever possible to avoid rubbing through insulation or tubing and causing an electrical short or oil leak.
- C. Follow all Federal Motor Vehicle Safety Standards (FMVSS) for your vehicle.
- D. Where electrical grounds are indicated, be sure that they are good ground connections, with straight paths to the vehicle battery ground. (Many vehicle cabs are insulated from the vehicle frame and a weak ground is a very common cause for malfunctions).
- E. When installing hydraulic components, be certain to follow common installation and testing procedures. If you are not familiar with acceptable installation procedures request instructions and guidance from the hydraulic equipment supplier.
- F. Caution should be taken by installer with any PTO installation to insure components do not interfere with any chassis component during installation or when vehicle is operated.
- G. Cold weather start conditions require that the transmission be started and warmed prior to engaging PTO and using equipment. Hydraulic pumps should be run at idle and under no load conditions to allow oil to warm before activating hydraulic system.

#### **IMPORTANT INFORMATION:**

There is valuable information contained in the Ford "Super Duty F-Series Body Builders Layout Book". You can obtain a copy of this book by faxing your request to "Body Builder Coordinator" at 1-734-414-2971. Include your street address and desired vehicle and model year. It can also be found on the Ford website at <http://www.fleet.ford.com/truckbbas/>

# INSTALLATION INSTRUCTIONS

**⚠ Danger! Read entire manual before starting installation. Always wear safety glasses.**

1. The Standard Installation Kits contain four (4) warning labels. The selectable Mobile & Stationary Installation Kit contains five (5) warning labels. Install them as directed below. Before adhering the labels, make sure the surfaces are free of dirt and grease. Place labels supplied with the FR66/FR3C as follows:

## TRUCK FRAME LABELS

The two (2) Truck Frame Labels, which measure approximately 4" x 8", are to be placed on the outside of the vehicle frame rail. These labels are to be easily seen by anyone who might go under the truck near the FR66/FR3C PTO. One label is to be placed on each side of the vehicle. See Figure 1.

**Note:** Should the vehicle body installed on the chassis cover the frame rail, placed the label on the body in a position easily visible by anyone who might go under the vehicle or near the FR66/FR3C PTO.

### DO NOT PAINT OVER THE LABELS.

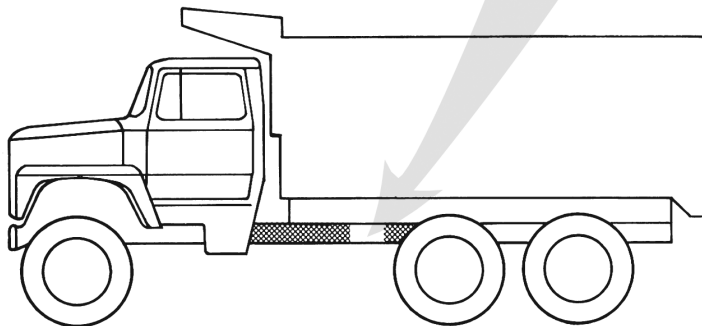
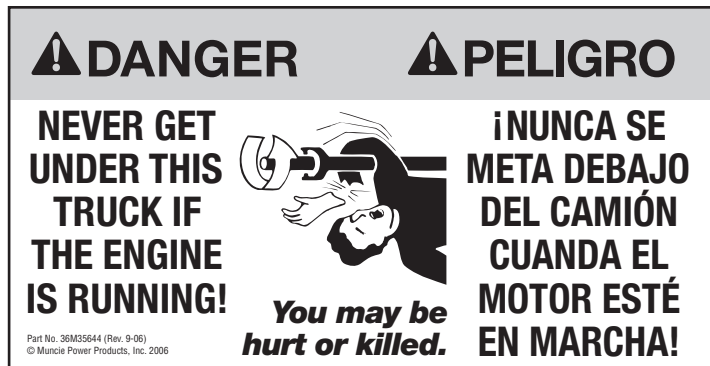
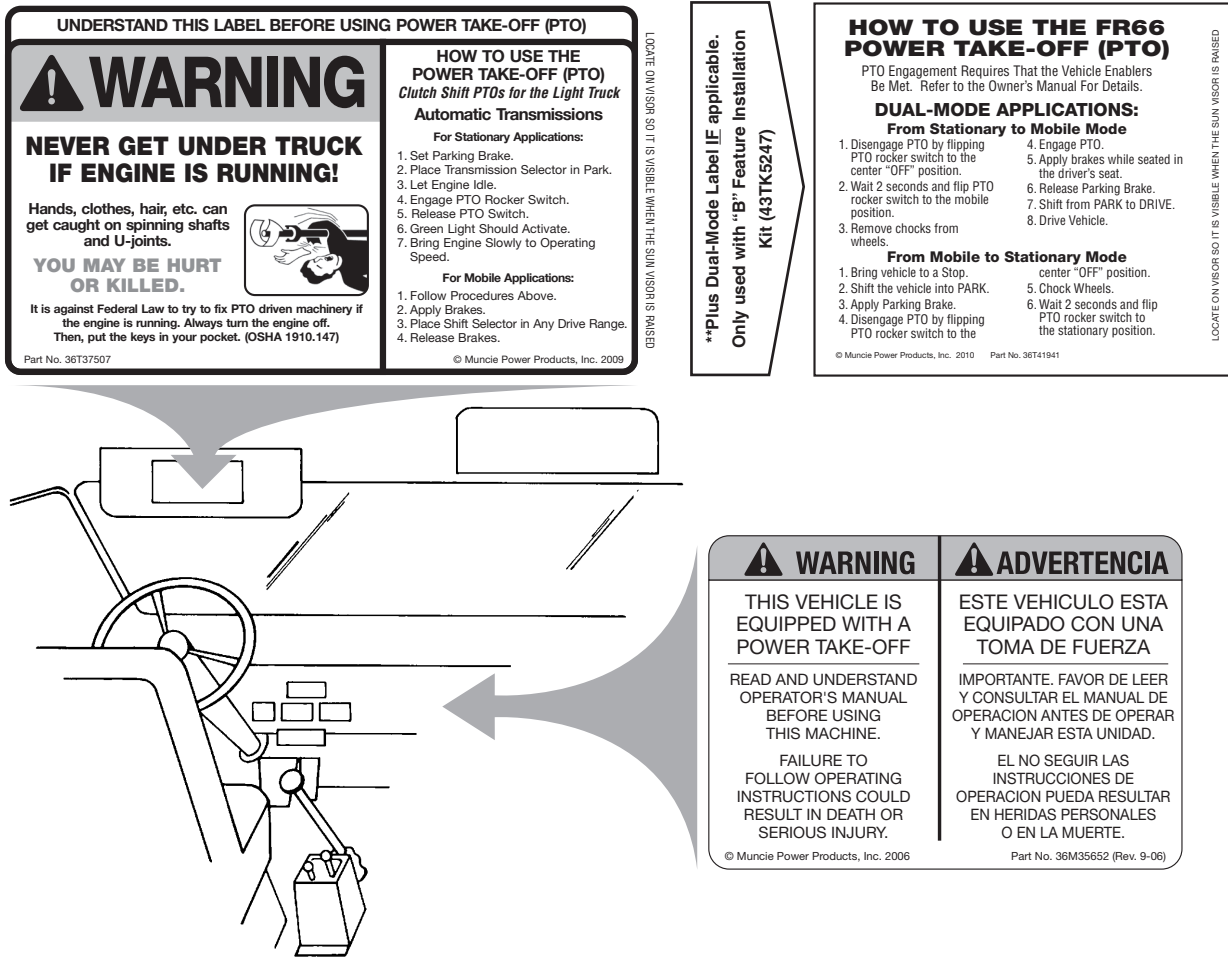


Figure 1

# VISOR AND DASH LABELS

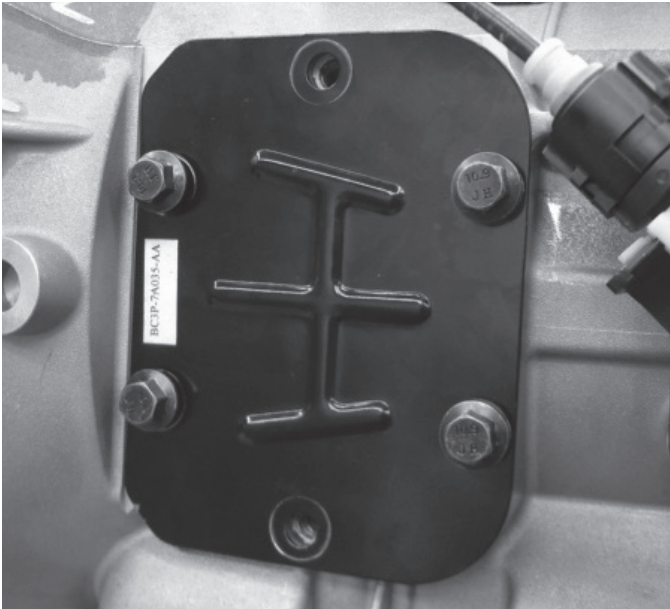
The PTO Equipped Caution Label, which measures approximately 2" x 3", is to be placed within the cab of the vehicle and in easy view of the vehicle operator. It should be located near the PTO control, when the control is installed in the vehicle dash (see figure 2). This label directs the operator to read the PTO operating instructions on the Visor Label. The Visor Label, which measures approximately 4" x 6½", is to be placed on the visor on the operator's side of the vehicle. See Figure 2 below.



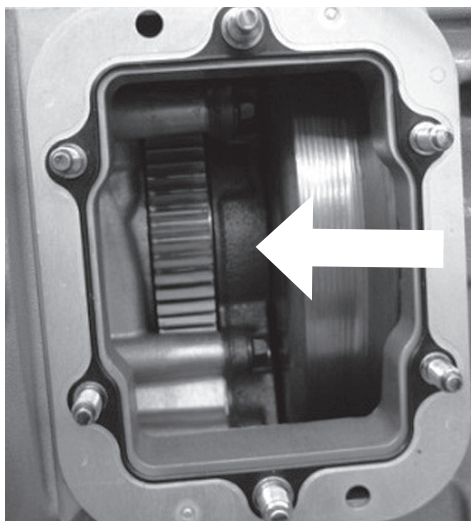
- While seated in the vehicle and with the transmission in "Park", start the engine and listen to the sounds of both the transmission and the engine before installing the FR66/FR3C PTO. A noise in the transmission gear may be more noticeable after the FR66/FR3C PTO is installed. Next, we will begin the installation of the FR66/FR3C PTO.

**▲3. DANGER! STOP ENGINE! Place the keys in your pocket.**

- Remove the cover plate and the cover gasket from the transmission (on the 4x4 chassis, the forward drive shaft may be removed in order to gain access to the PTO opening). Set the cover gasket aside for reuse when mounting the FR66/FR3C PTO (DO NOT discard the gasket; it MUST be used to install the FR66/FR3C PTO).



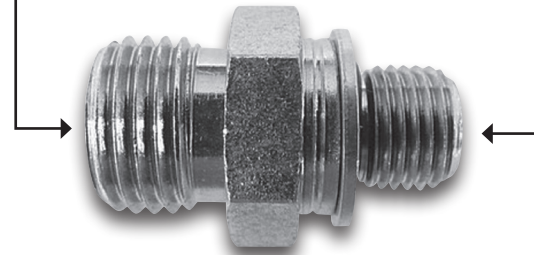
- Clean the mounting pad and inspect the bolt holes in aperture for thread sealant used on OEM bolts. Clean these internal threads with wire brush to clear out any material.
- Check the transmission to ensure that it has the PTO drive gear. It will be located in the forward part of the opening/ engine side of the opening. Also, check the FR66/FR3C PTO drive gear for condition. Any imperfections may cause excessive noise when the FR66/FR3C PTO is mounted.



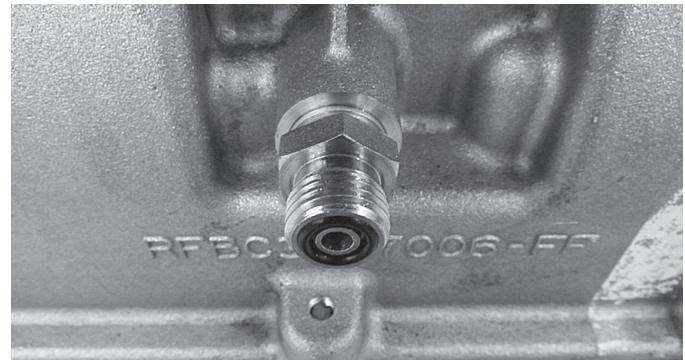
- Remove the components from the installation kit. Locate the Metric Straight x ORSF fitting (43T42793) for the main pressure port on the transmission.

- Install the Metric Straight x ORSF fitting into the transmission main pressure port located directly below the PTO opening. Install this fitting as far as it will go while being careful to not strip the fitting or opening threads.
- Tighten to no more than 5-lb.ft.

**Straight ORSF End**

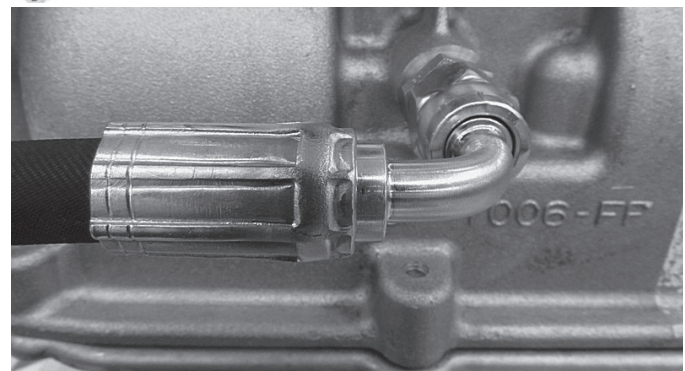


**Metric-M10x1 End**



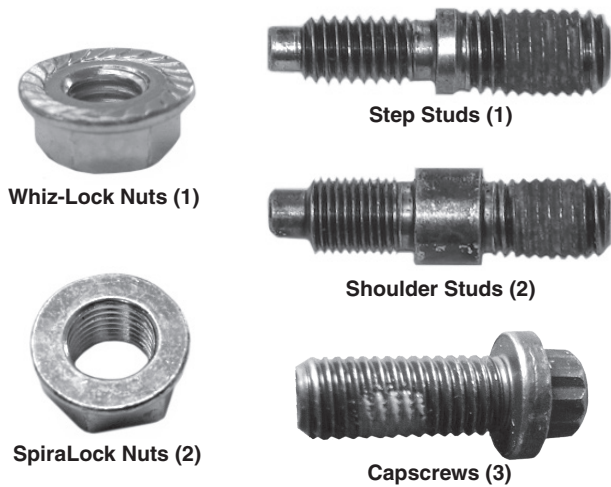
**Note: The ORSF on one end and Metric –M 10 x 1 on the other end. The M10 x 1 male end will be inserted into the transmission pressure port as shown.**

- Locate the hose Assembly (45T42791) attach the 90° ORSF end to the ORSF end of the fitting just installed in the previous step. Route this hose assembly to stay clear of any moving components that the transmission may possess.

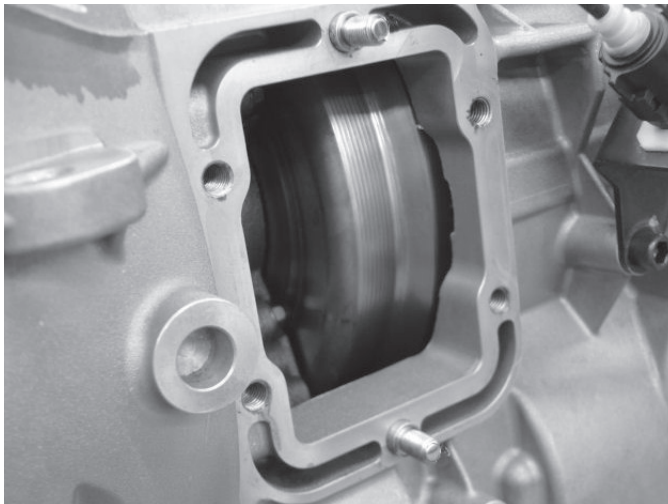




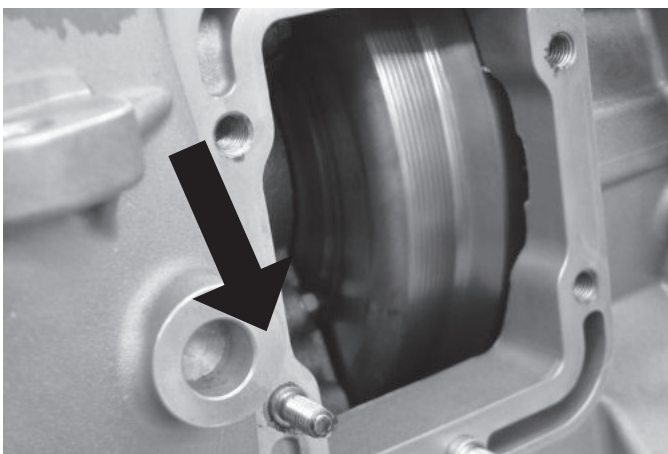
9. Locate the Whiz-Lock Nut (22T37605), SpiraLock Nuts (22T39282), Step Stud (20T37952), Shoulder Studs (20T37914), and Capscrews (19T42075). All of these are in the Installation Kit.



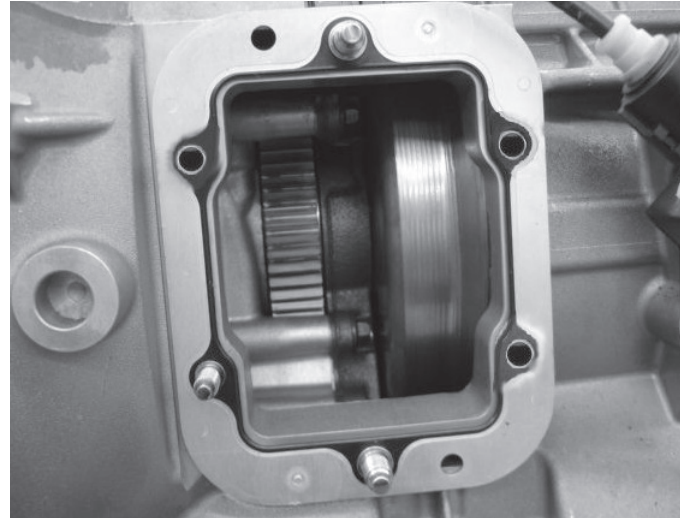
10. The (2) shoulder studs should be placed in the locations shown below. The (2) SpiraLock nuts are included and will be used in these locations once the PTO has been mounted.



11. The (1) Step Stud should be placed in the location indicated below. The (1) Whiz-Lock nut is included and will be used in this location once the PTO has been mounted.



12. Place the cover gasket (that was removed in step 3) back onto the transmission as shown below. (Replacement gasket available PIN 13T41973)

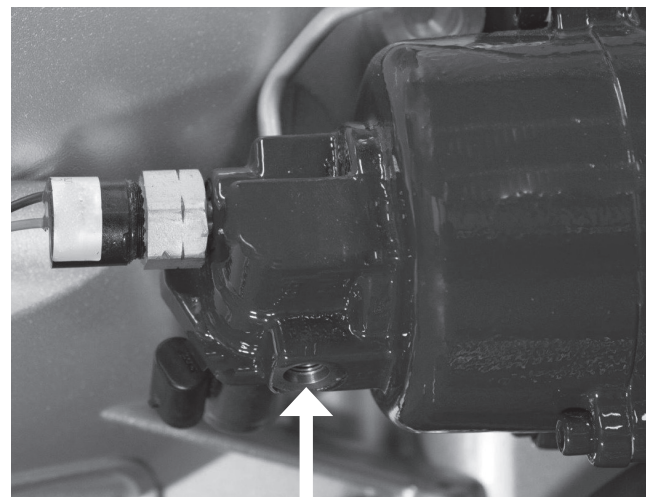


13. Hold the PTO in position and install the (3) 12-point Capscrews into the remaining holes. Use the (1) Whiz-Lock nut and thread it onto the (1) Step Stud. Next, position and install the (2) SpiraLock nuts onto the (2) Shoulder Studs. Tighten the (1) Whiz-Lock nut for the Step Stud to 17 ft.lb. and the (2) SpiraLock nuts for the Shoulder Studs and the (3) Capscrews to 40 ft.lb.

**Notes:**

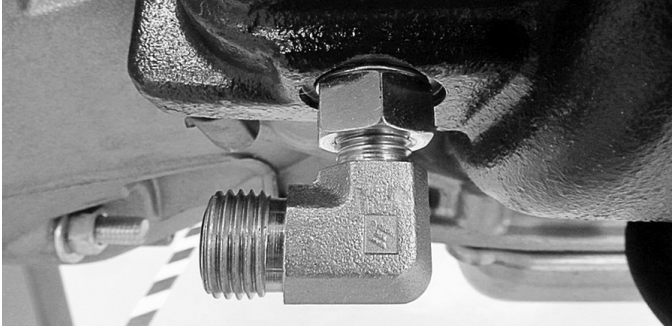
1. If the Straight Metric x ORSF fitting has not been installed as described in step 8, then do so now.
2. It is important to check the gaps between the PTO and the transmission and make sure the gear teeth are properly meshed before tightening the nuts.
3. Checking the backlash is not required when using the approved Ford furnished gasket. Never use silicone type sealant on PTO/transmission mounting surfaces, as proper backlash cannot be attained.

14. On the FR66/FR3C locate the bottom oil port; it may have a 90° fitting currently in it. If the PTO already has a 90° fitting, remove and discard the fitting.



FR66 Bottom Oil Port

- 15 Install the ORFS elbow into the PTO activation port. Align the elbow to allow installing the other end of the activation hose from step 8. Tighten the jam nut when in position.



• Tighten not to exceed 5-lb.ft.

Image 5

- 16.0 The location of the pressure switch on the current FR66/FR3C PTO is now in the end of the cover, refer to “Images 6 & 7” of this document for proper pressure switch port location. Additionally the pressure switch will need remote mounted on the GAS engine chassis (See Step 16.1).

**Note the Following changes from the previous version of the FR66 PTO and the “Rev-A” version of the FR66 PTO**

**Current FR66/FR3C PTO Version:** The pressure switch is now to be installed in the end of the cover as shown in the following image. (If installing on GAS engine refer to “16.1 - 16.4” for remote mount of pressure switch)

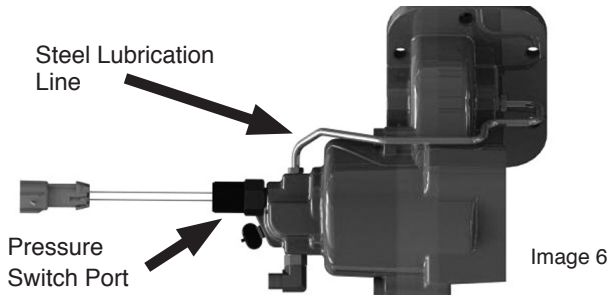


Image 6

**Previous FR66 PTO Version:** PTO did not have a steel lubrication line and the pressure switch will be located as shown below.

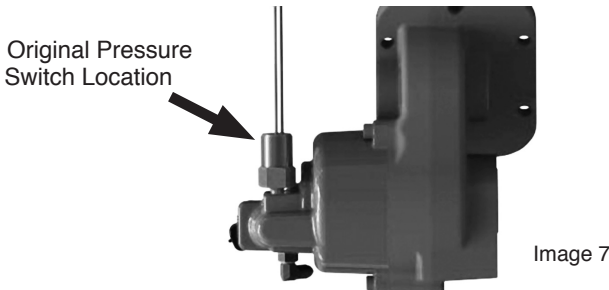


Image 7

The current “Rev-A” FR66 PTO end cover seen above with the steel lubrication line has an O-Ring Thread port for the pressure switch. The pressure switch is installed into the end port shown above in “Image 6”. There is a steel lubrication line installed in the PTO when you receive it. The steel tubing should be installed from the factory and is not required to be removed during installation.

**If not installing FR66 PTO on GAS engine chassis, skip to “STEP 17”.**

**Caution must be taken when using the correct port for the pressure activation line and the pressure switch.**

**If installing FR66 on GAS engine follow instructions below regarding pressure switch installation.**

On the GAS engine, the PTO is shipped with a heat shield and a hose kit (43TK5527). These additional components are supplied to help provide additional heat protection for the pressure switch. This is only done for the GAS engine as the exhaust line is located much closer to the PTO.

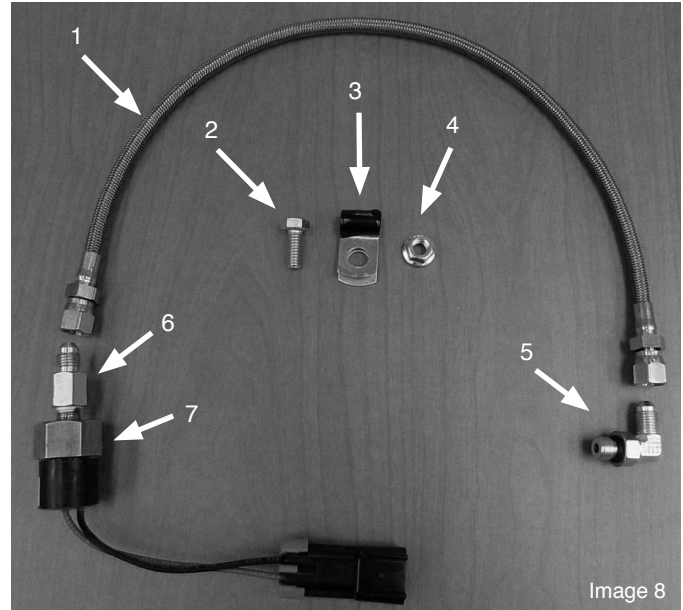
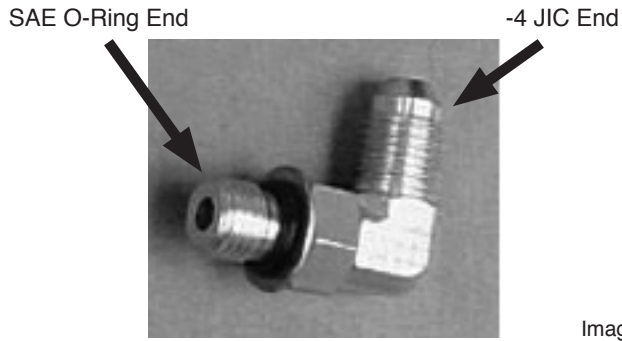


Image 8

43TK5527 kit components:

- 1) Stainless Steel Braided Hose 18" (45T43308)
- 2) 5-16x18 $\frac{3}{4}$ " Hex Bolt (19M10001)
- 3) Loop Clamp (49T43356)
- 4) 5-16x18 Hex Nut (22T37605)
- 5) SAE O-Ring 90 x -4 JIC (43M68014)
- 6) Straight -4 Male JIC x  $\frac{1}{8}$ " Female NPT fitting (43T43215)
- 7) Pressure Switch w/  $\frac{1}{8}$ " NPT fitting (30T60228)

**16.1** Install the SAE O-Ring 90 x -4 JIC fitting (43M68014) in the port for the pressure switch shown in "Image 6". Install the SAE O-Ring end of the fitting into the port. Position as shown in "Image 9".



• Tighten not to exceed 5-lb.ft.

Image 9

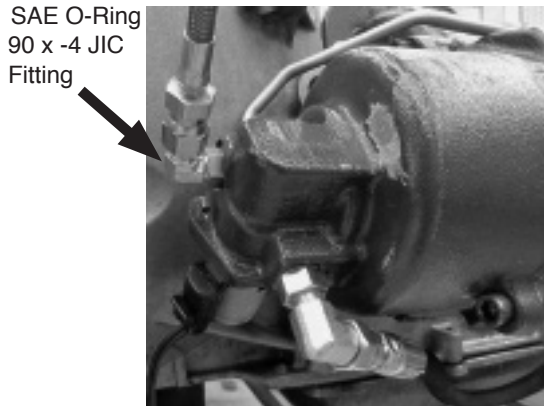


Image 10

**16.2** Attach the stainless steel braided hose (45T43308) to the -4 JIC end of the 90 degree fitting that was just installed.

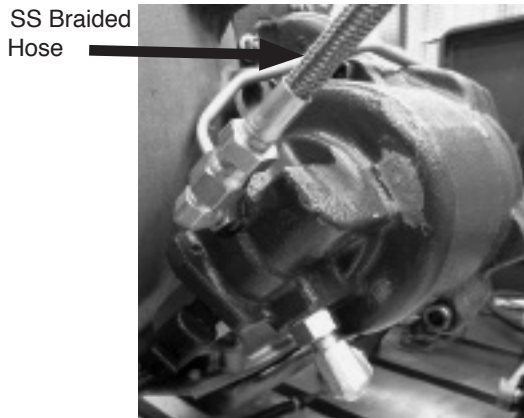


Image 11

**16.3** Attach the other end of the stainless steel braided hose to the straight -4 Male JIC x 1/8" Female NPT fitting (43T43215). Then attach the pressure switch (30T60228) to the 1/8" Female NPT fitting.

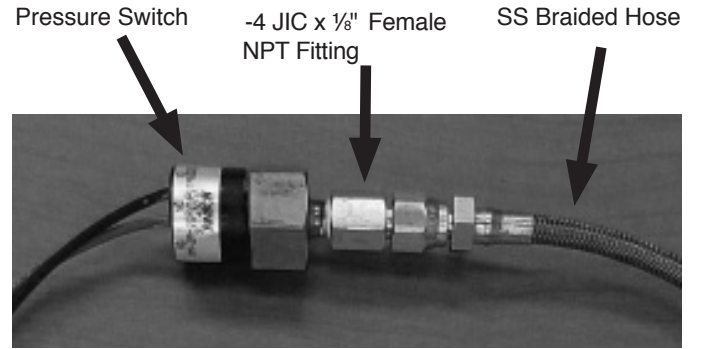


Image 12

**16.4** Using the Loop Clamp (49T43356), Hex Bolt (19M10001) and Hex Nut (22T37605) attach the SS Braided Hose to an appropriate location on the truck frame. Be sure to allow slack in the hose.

**17.** Install the activation hose and route it away from the exhaust or obstructions.

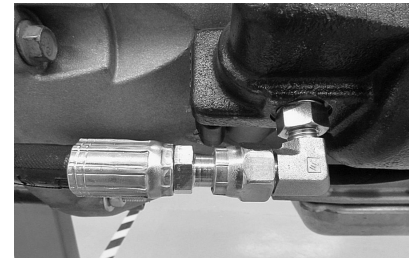


Image 13

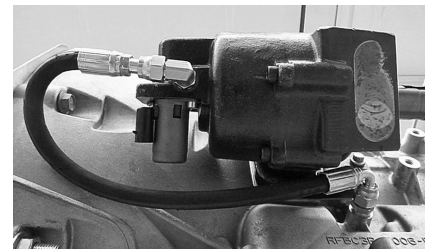


Image 14

Above:  
Orientation of activation hose on **DIESEL** engine chassis.

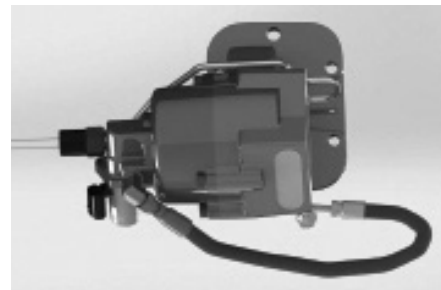
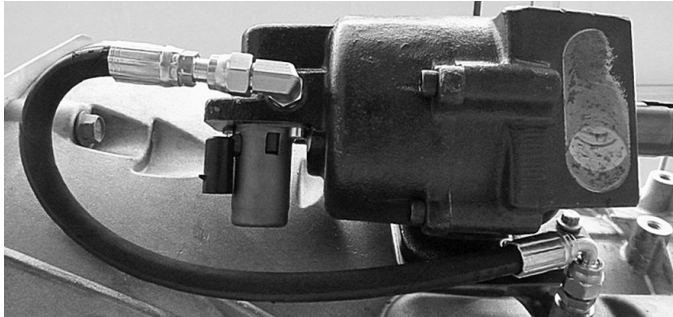


Image 15

Above:  
Orientation of activation hose on **GAS** engine chassis.

18. Use cable ties to route the hose away from the exhaust and away from any rotating components.

**Note: Save several wire ties for routing the wire harness later.**



**Instructions for installation of the wire harness and initial testing are located on the "Harness Instruction Sheet". Document #IN13-09 for Diesel Mobile OR Stationary Mode, IN13-10 for Gas Stationary Only Mode.**

19. Use cable ties to route the hose away from the exhaust and away from any rotating components. Route the wire harness from the vehicle front passenger compartment to the solenoid valve.

*Return to Step 16 of the IN10-01 (Rev 10-1) document or Step 19 of the IN10-01 (Rev 13-06) document to complete the installation.*

**20. 49TK5533 Heat Shield Installation Instructions:**

The 49TK5533 kit includes a heat shield (49T43320) and four band clamps (49T43365).

1. Install the PTO before installing the heat shield.
2. If replacing an existing aftermarket heat shield, remove the shield and clamps and discard.
3. Carefully unpack the heat shield and band clamps from the carton.

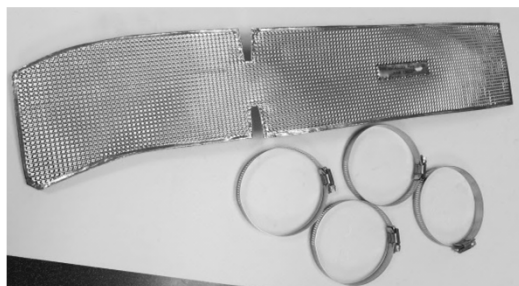


Figure 1

4. Open the band clamps and insert each one through two eyelets in the shield as shown, so that the clamps are on the bottom side of the shield "Figure 2". Use all four clamps.

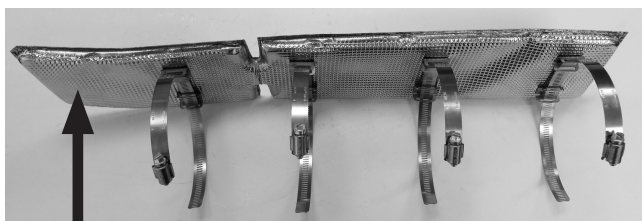


Figure 2

Short End Installs Towards The O2 Sensor.

5. Slide the shield on top of the exhaust with the top end of the shield up towards to the O2 sensor.
6. Gently bend the shield along the top of the exhaust so that it is between the exhaust and the PTO.  
Note the location of the notch shown on "Figure 3".
7. Connect the band clamps around the exhaust pipe and tighten (30-35 lb.in.) to hold the shield into position.

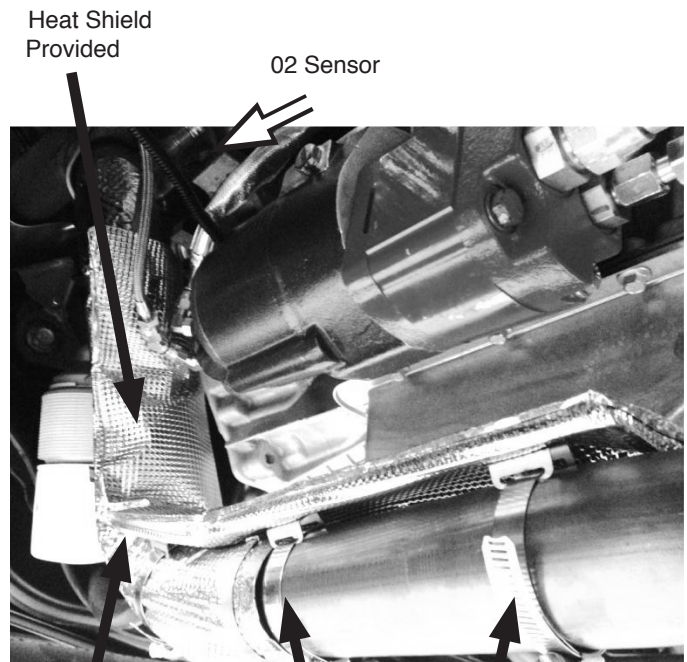


Figure 3

Position The Shield Notch At The Bend In The Pipe.

Tighten Band Clamps (4 places)

# PUMP OPTIONS WITH FR66 PTO (SKIP TO STEP 43 IF USING DRIVELINE)

## Muncie FR66 PTO Flange Options & Pumps for Ford Chassis

Ford Chassis	Muncie Pumps to use with FR66			
	PF4-***-16QSRL	PF4-***-16ASRL	PH1-**-02ASRL-M	PK1-**-02ASRL-M
4 x 4	“N” PTO Output	N/A	N/A	N/A
4 x 2	“N” PTO Output	“T” PTO Output	“Q” PTO Output	“Q” PTO Output

## Pumps Used with FR66 PTO in Ford 4x2 Applications

### Direct Mount Pump: PF4-\*\*\*-16\*SRL Pump Flow @ 1,200 ENG. (Theoretical) Ordered Separately.

PF4-870	13.3 GPM	PF4-606	9.2 GPM	PF4-368	5.6 GPM	PF4-212	3.2 GPM
PF4-818	12.5 GPM	PF4-502	7.7 GPM	PF4-290	4.4 GPM	PF4-160	2.4 GPM
PF4-714	10.9 GPM	PF4-424	6.5 GPM	PF4-264	4.0 GPM	PF4-107	1.24 GPM

Note: PF4 Pump may be used with “Q” or “A” Pump Mount options in 4x2 applications. Must use appropriate PTO mounting flange (See Chart Above).

### Direct Mount Pump: PH1-\*\*-02ASRL-M Pump Flow @ 1,200 ENG. (Theoretical) Ordered Separately.

PH1-11	12.9 GPM	PH1-08	9.7 GPM	PH1-05	6.4 GPM		
PH1-09	11.3 GPM	PH1-07	8.1 GPM	PH1-03	3.22 GPM		

### Direct Mount Pump: PK1-\*\*-02ACRL-M Pump Flow @ 1,200 ENG. (Theoretical) Ordered Separately.

PK1-17	20.5 GPM	PK1-13	15.4 GPM	PK1-06	7.6 GPM		
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## Pumps Used with FR66 PTO in Ford 4x4 Applications

### Direct Mount Pump: PF4-\*\*\*-16QSRL Pump Flow @ 1,200 ENG. (Theoretical) Ordered Separately.

PF4-424	6.5 GPM	PF4-290	4.4 GPM	PF4-212	3.2 GPM	PF4-107	1.24 GPM
PF4-368	5.6 GPM	PF4-264	4.0 GPM	PF4-160	2.4 GPM		

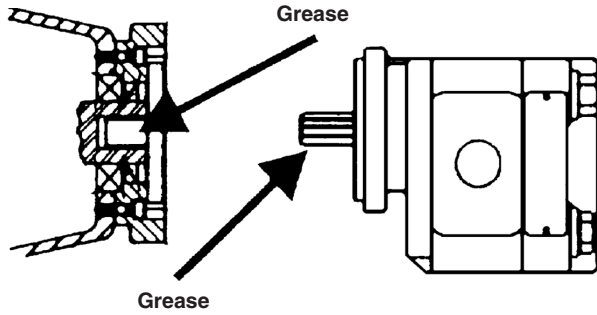
The Muncie PF series pumps with the “Q” pump mount are of special design. This design allows for interference problems to be minimized. The Muncie PF4-\*\*\*-16QSRL pump is the only pump to be used on the FR66 in applications with the 4x4 Ford chassis. This pump uses thru-bolts to mount to the FR66 PTO. (Note: The 1¼" round keyed shaft is available on the FR66 PTO for mounting to a 4x2 chassis.)

Muncie PF4 pumps offer the ¾ – 11T spline shaft with the

“Q” or “A” pump mount, the correct PTO Output flange can be found in the chart above.

If your application makes requires a Muncie “H” or “K” series pump you will need to use one of the above options to ensure that the pump will fit. “H” and “K” pumps should only be used in 4x2 applications. These Pumps will have the SAE “A” 2-bolt mounting flange and 7/8 – 13T splined shaft. This will require that your FR66 PTO has the “Q” output type. (Example: FR66-F1209-D3QX)

**MUNCIE PF4 SERIES PUMP INSTALLATION**  
(Skip to Step 43 if using a driveline)



- 38. Place a non-seizing compound or grease on the FR66 PTO shaft and pump shaft. All Muncie direct mount PTOs are supplied with the appropriate grease.
- 39. The PF4 series pump with the “Q” flange will be shipped with only 2 bolts. The other two capscrews and flat washers are shipped loose with the pump so that it can be mounted to the FR66 PTO. It is critical that the proper mounting capscrews be used. IF you did not receive capscrews, then contact Muncie Power Products, Inc. for the correct mounting hardware.

**Note: Be sure to follow the instructions included with the pump for correct selection of mounting capscrews.**

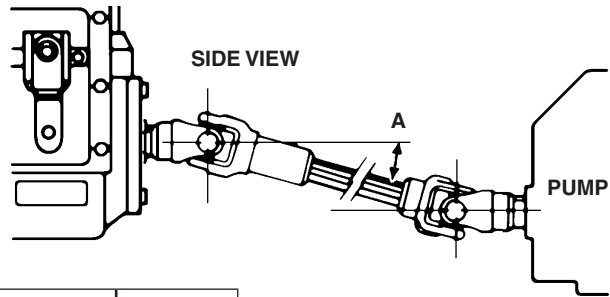


- 40. Before installation, place the flat washers over the shaft of the capscrews (there should be 1 or 2 washers used depending on the size of the pump being installed).
- 41. Place the pump into the PTO output mounting by aligning the splines as well as the pilot. Align the thru-bolt mounting holes and insert the capscrews with flat washers and torque both to 40-42 ft.lb. **Note: The pump orientation is with the pump body offset pointing down.**
- 42. If not completed already, finish installation by placing the warning labels in their correct locations as indicated by the instructions on the border of the decals. Placement examples located on pages 5-6.

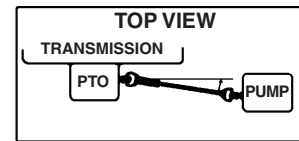
**INSTALLATION OF DRIVELINE ON FR66/FR3C PTO**

- 43. On a 4x2 chassis, if your system contains a driveline between the FR66 PTO and another product and you are experiencing noise in your system that was not heard before, the angularity or the phasing of your driveline may be the cause. Check the drive line angularity and reduce the total angularity recommended by the chart and be sure that the PTO shaft is parallel within 1.5° to the pump shaft

(or driven unit). **Note: For Installations with angles in the tom and side views, used this formula to compute the true joint angle (TJA):  $TJA = \sqrt{A^2 + B^2}$ .**



Max Speed (RPM)	Max TJA “A”
3,500	5°
3,000	5°
2,500	7°
2,000	8°
1,500	11°
1,000	12°



- 44. If not completed already, finish installation by placing the warning labels in their correct locations as indicated by the instructions on the border of the decals. Placement examples located on pages 5-6.

# SECTION 2

## Auxiliary Instructions, Wire Schematics

### 2012 Model Ford Early Build – Blue/Gray Wire

On Ford's initial production, the SEIC (Stationary Elevated Idle Control) bundle will not contain a Blue/Orange for the Ford PTORS2 wire, but will contain (2) Blue/Gray wires. To ensure proper installation, locate each of these wires and check the continuity ground. Turn the ignition key to "ON" (but Do Not start the engine), then shift the vehicle out of Park. The wire that changes continuity is for the "Park" indicator and the one that does not change is the wire for the PTO mobile mode. Connect the Muncie Yellow/Green wire to this Ford Blue/Gray wire, circuit PTORS1. Ford has made the change and current vehicles have the correct Blue/Orange wire.

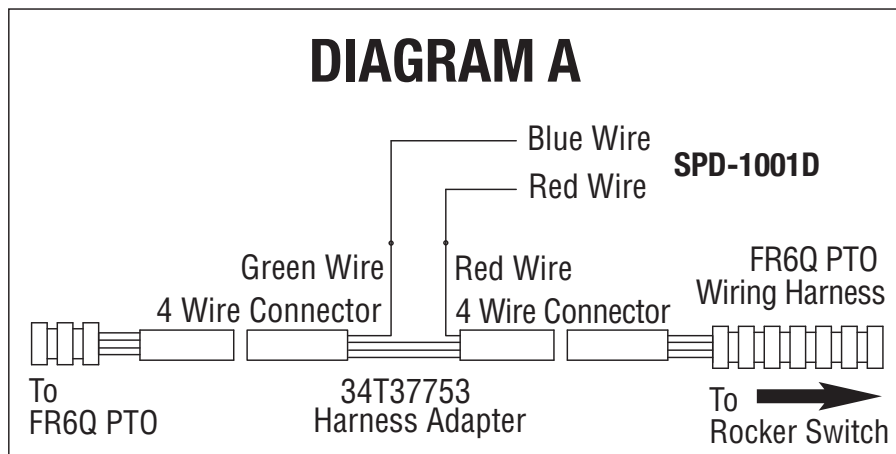
**NOTE: This applies to FR66-F1209-D3\*X and FR66-F1209-D3\*B PTO's with the supplied wire harnesses.**

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### FR66 PTO INSTALLATION WITH SPD-1001D SYSTEM PROTECTION DEVICE

*Requires purchase of 34T37753 and SPD-1001D (not included with the FR66 PTO)*

1. Make the FR66/FR3C PTO installation as described in Section 1.
2. Locate the 4-wire connector on the FR66/FR3C PTO Harness and plug in the wire harness adapter 34T37753 (sold separately). The adapter is designed to assemble in only one direction.
3. Find the **Red** wire on the wire harness adapter and connect this wire to the SPD-1001D wire harness **Red** wire as shown in Diagram "A".
4. Find the **Green** wire on the wire harness adapter and connect this wire to the SPD-1001D wire harness **Blue** wire as shown in Diagram "A".



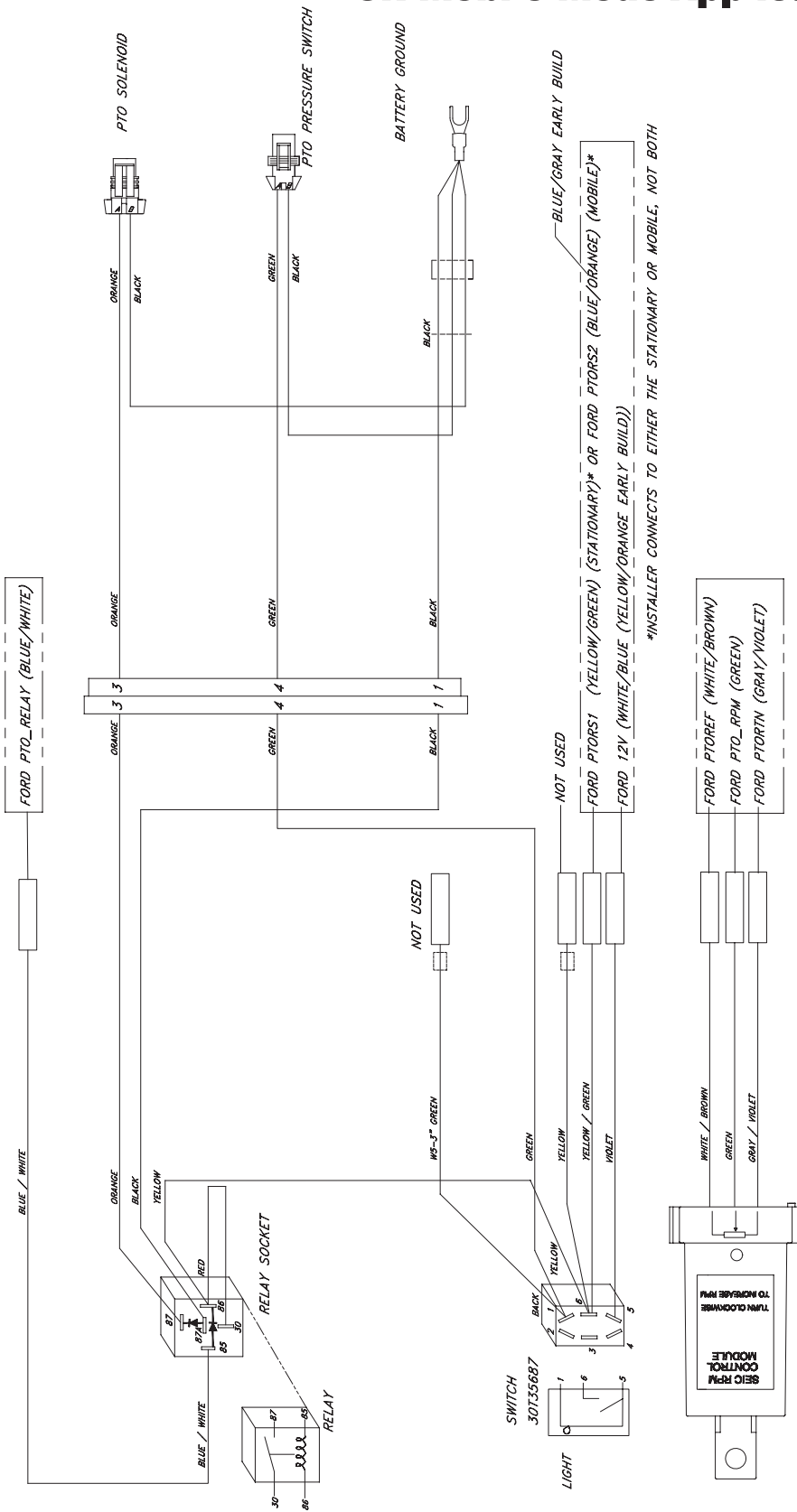
5. Locate Ford **Blue** wire (tag CTO PTOIC-1) and connect the **Orange** SPD-1001D wire.
6. Connect the **Black** SPD-1001D wire to a good/secure ground at the fuse panel or battery (not to the cab).
7. Connect the **White** wire to an overspeed light if required, (light sold separately). Ground the other terminal of the light.
8. Mount the SPD-1001D after making the calibration setting as described in the SPD-1001D installation manual. (Document IN07-04)

# FR66-F1209-D3\*X Wire Harness Schematic – (34T41671)

## F-250 – F-550 Super Duty Diesel Stationary

## F-650/750 (2012-2015 with SEIC controls)

## OR Mobile Mode Application



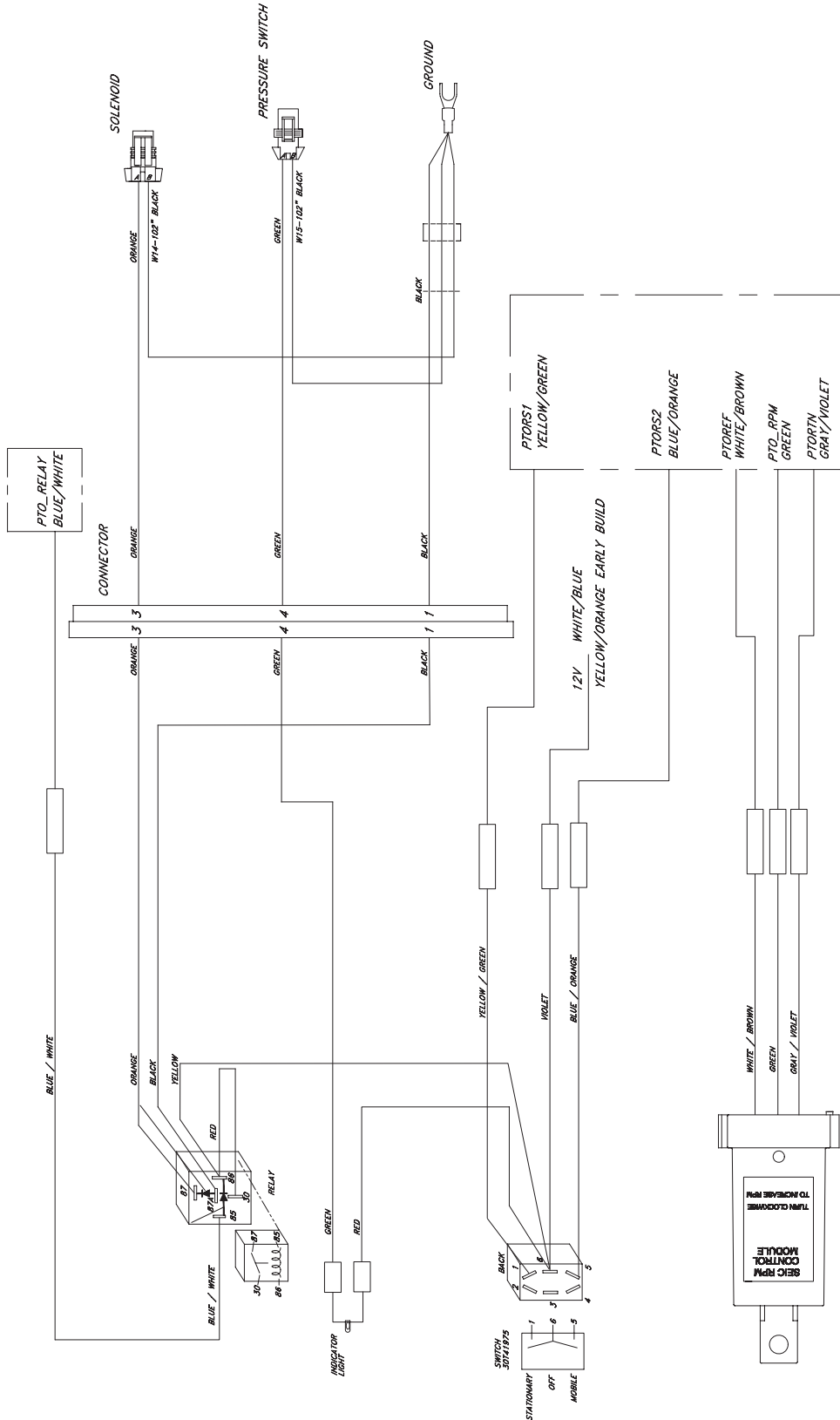
**FR661209D3\*X WIRE HARNESS #34T41671 Wire Color, Pin#, Circuit # Reference (Mobile OR Stationary Mode)**

Harness Wire Color	Circuit Intent	Ford Wire Tag	PCM Pin	Circuit No.	Ford Wire Color	
					Stationary Mode	Mobile Mode
Blue/White	Output	PTO_RELAY	C-11	CE326	Blue/White	Blue/White
Yellow/Green	Input (VPWR)	PTORS1/ PTORS2	C-06	CE912	Yellow/Green	Blue/Orange (Blue/Gray- Early Build)
White/Brown	Reference Voltage	PTOREF	C-55	LE434	White/Brown	White/Brown
Green	Input (Resistor)	PTO_RPM	C-08	CE914	Green	Green
Gray/ Violet	PCM Ground	PTORTN	C-22	RE327	Gray/Violet	Gray/Violet
Violet	12Vdc Power				White/Blue (Yellow/Orange- Early Build)	White/Blue (Yellow/ Orange-Early Build)



# FR66-F1209-D3\*B Wire Harness Schematic – (34T41940)

## F-250 – F-550 Super Duty Diesel Both Stationary AND Mobile Mode Application



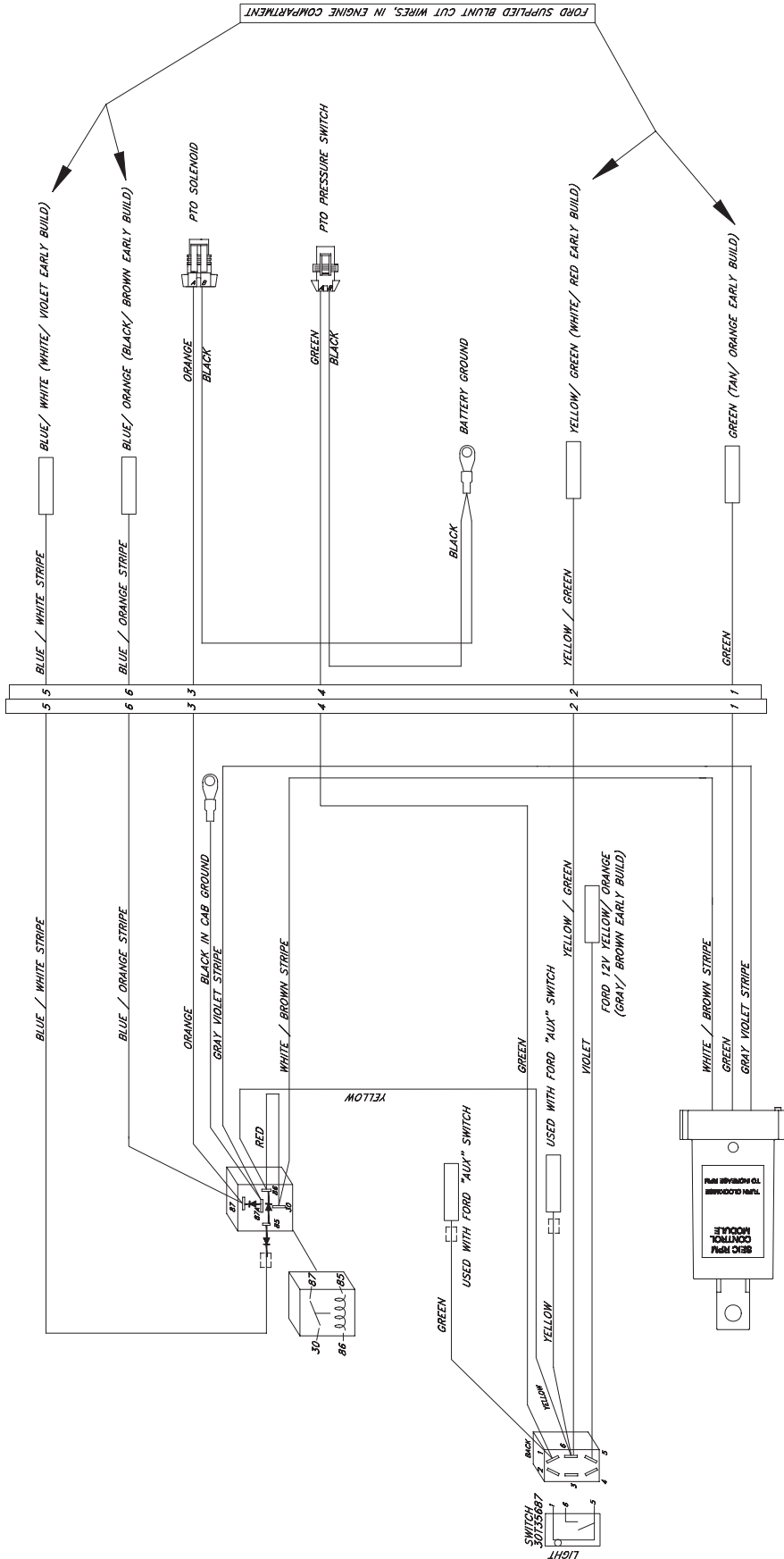
**FR661209D3\*B WIRE HARNESS #34T41940 Wire Color, Pin#, Circuit # Reference (Mobile AND Stationary Mode)**

Harness Wire Color	Circuit Intent	Ford Wire Tag	PCM Pin	Circuit No.	Ford Wire Color
Blue/White	Output	PTO_RELAY	C-11	CE326	Blue/White
Yellow/Green	Input (VPWR)	PTORS1	C-06	CE912	Yellow/Green
Blue/Orange	Input (VPWR)	PTORS2	C-06	CE933	Blue/Orange
White/Brown	Reference Voltage	PTOREF	C-55	LE434	White/Brown
Green	Input (Resistor)	PTO_RPM	C-08	CE914	Green
Gray/Violet	PCM Ground	PTORTN	C-22	RE327	Gray/Violet
Violet	12Vdc Power				White/Blue (Yellow/Orange-Early Build)

# FR66/FR3C-F1209-G3\*X Wire Harness Schematic – (34T43359)

## 2011-2015 Model Year F-650 Medium Duty 6.8L Gas Stationary Only

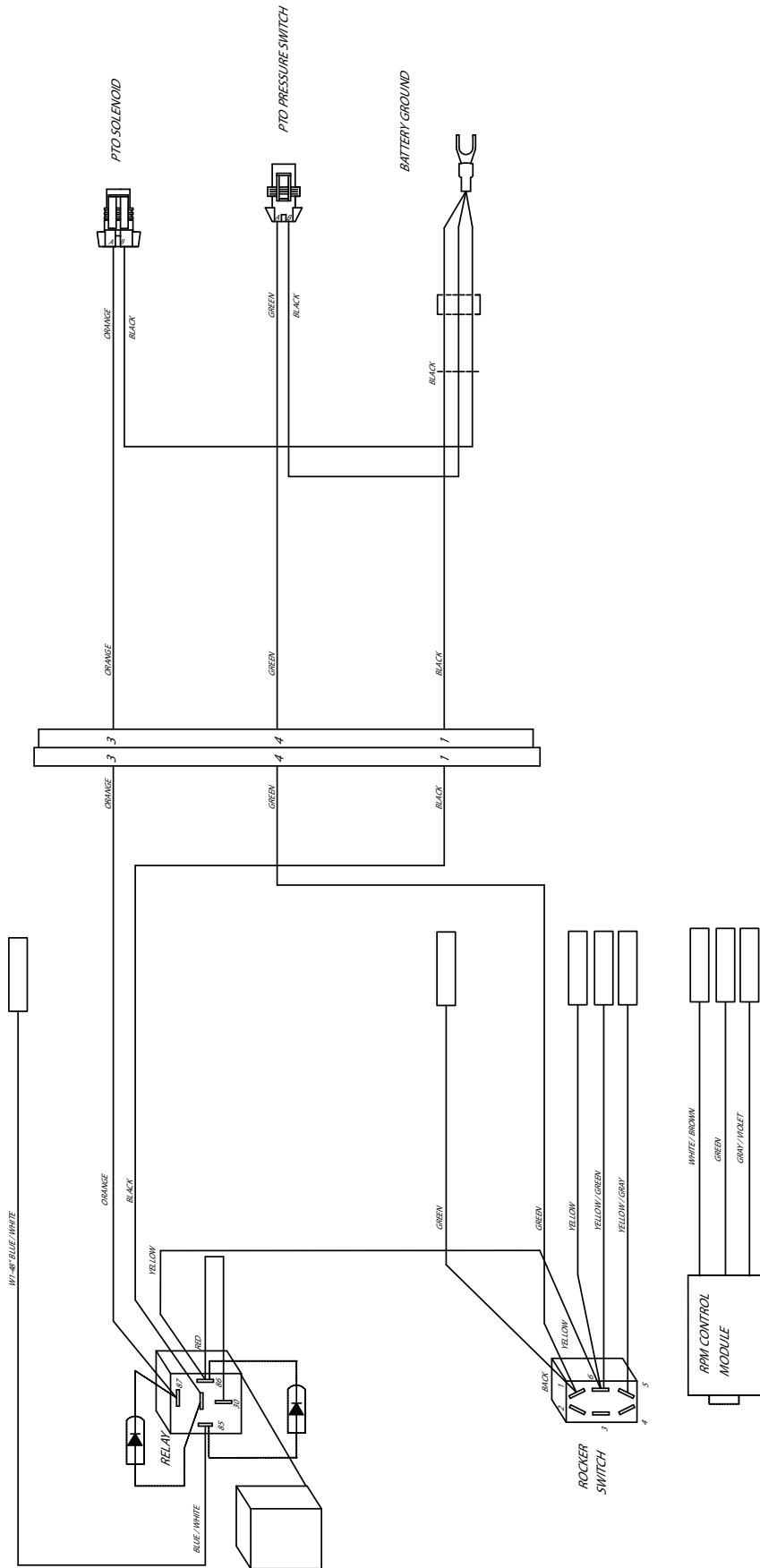
## 2016 and Later F-250 – F-550 6.8L Gas



**FR661209G3\*X WIRE HARNESS #34T42747 Wire Color, Pin#, Circuit # Reference (Stationary Only Mode)**

Harness Wire Color	Circuit Intent	Ford Wire Tag	PCM Pin	Circuit No.	Ford Wire Color
Blue/White	Output	PTO RELAY	C-11	CE326	Blue/White (White/Violet Early Build)
Blue/Orange	Input (VPWR)	PTO REQ 2	C-06	CE933	Blue/Orange (Black/Brown Early Build)
Yellow/Green	Input (VPWR)	PTO REQ 1	C-22	CE912	Yellow/Green (White/Red Early Build)
Green	Input (Resistor)	PTO RPM	C-08	CE914	Green (Tan/Orange Early Build)
Violet	12Vdc Power				Yellow/Orange (Gray/Brown Early Build)

# FR66/FR3C-F1209-63\*X Wire Harness Schematic – (34T43179) 2016 & Later Model Year F-650 – F-750 Super Duty Diesel Stationary OR Mobile Mode Application

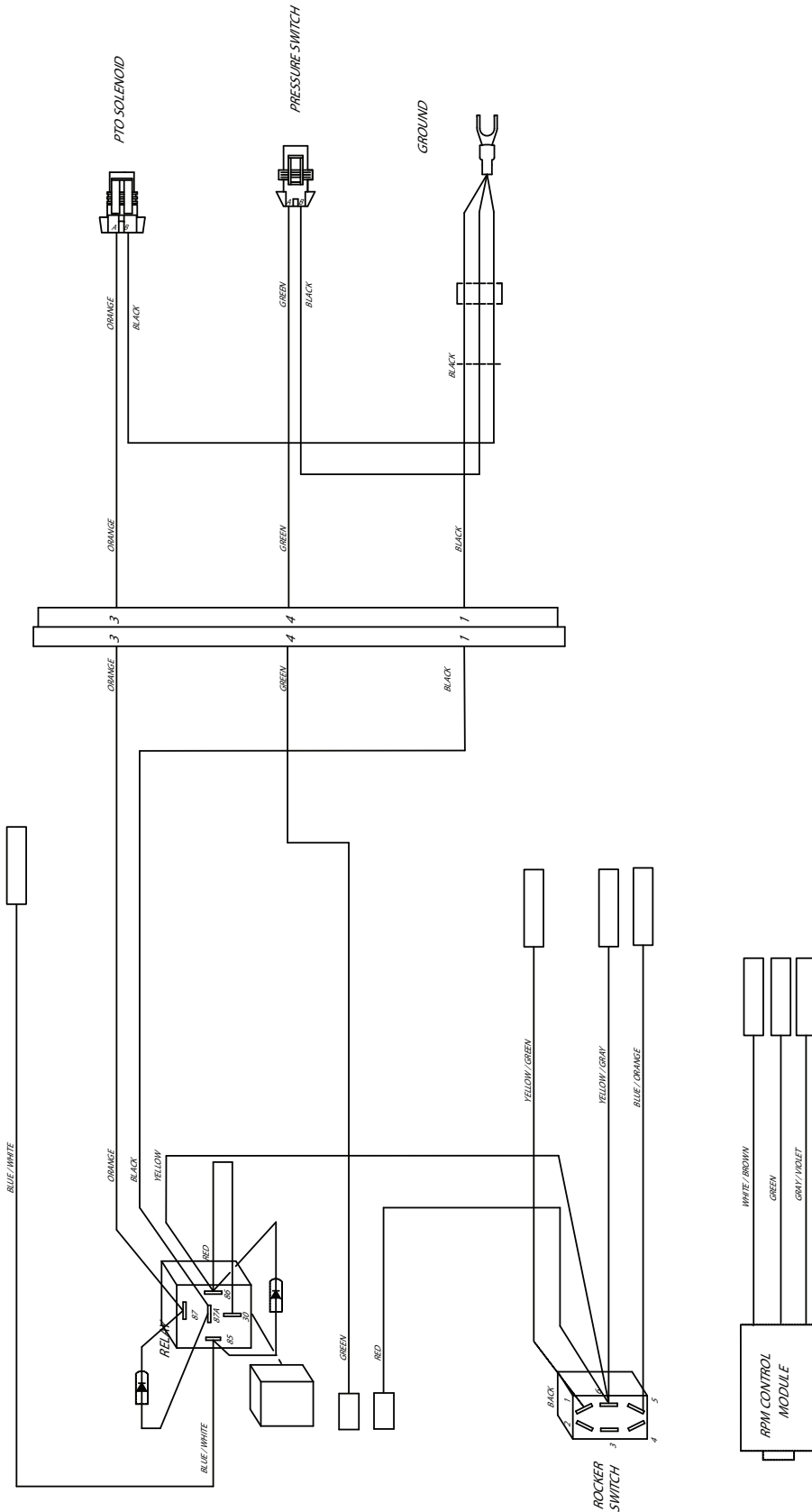


**FR66/FR3C-120963\*X WIRE HARNESS #34T43179 Wire Color, Pin#, Circuit # Reference (Mobile OR Stationary Mode)**

Harness Wire Color	Circuit Intent	Ford Wire Tag	PCM Pin	Circuit No.	Ford Wire Color	
					Stationary Mode	Mobile Mode
Blue/White	Output	PTO_RELAY	C-11	CE326	Blue/White	Blue/White
Yellow/Green	Input (VPWR)	PTORS1/ PTORS2	C-06	CE912	Yellow/Green	Blue/Orange (Early Build)
White/Brown	Reference Voltage	PTOREF	C-55	LE434	White/Brown	White/Brown
Green	Input (Resistor)	PTO_RPM	C-08	CE914	Green	Green
Gray/ Violet	PCM Ground	PTORTN	C-22	RE327	Gray/Violet	Gray/Violet
Yellow/Gray	12Vdc Power				Yellow/Gray	White/Blue (Yellow/ Orange-Early Build)

# FR66/FR3C-F1209-63\*B Wire Harness Schematic – (34T43661)

## F-650 – F-750 Super Duty Diesel Both Stationary AND Mobile Mode Application

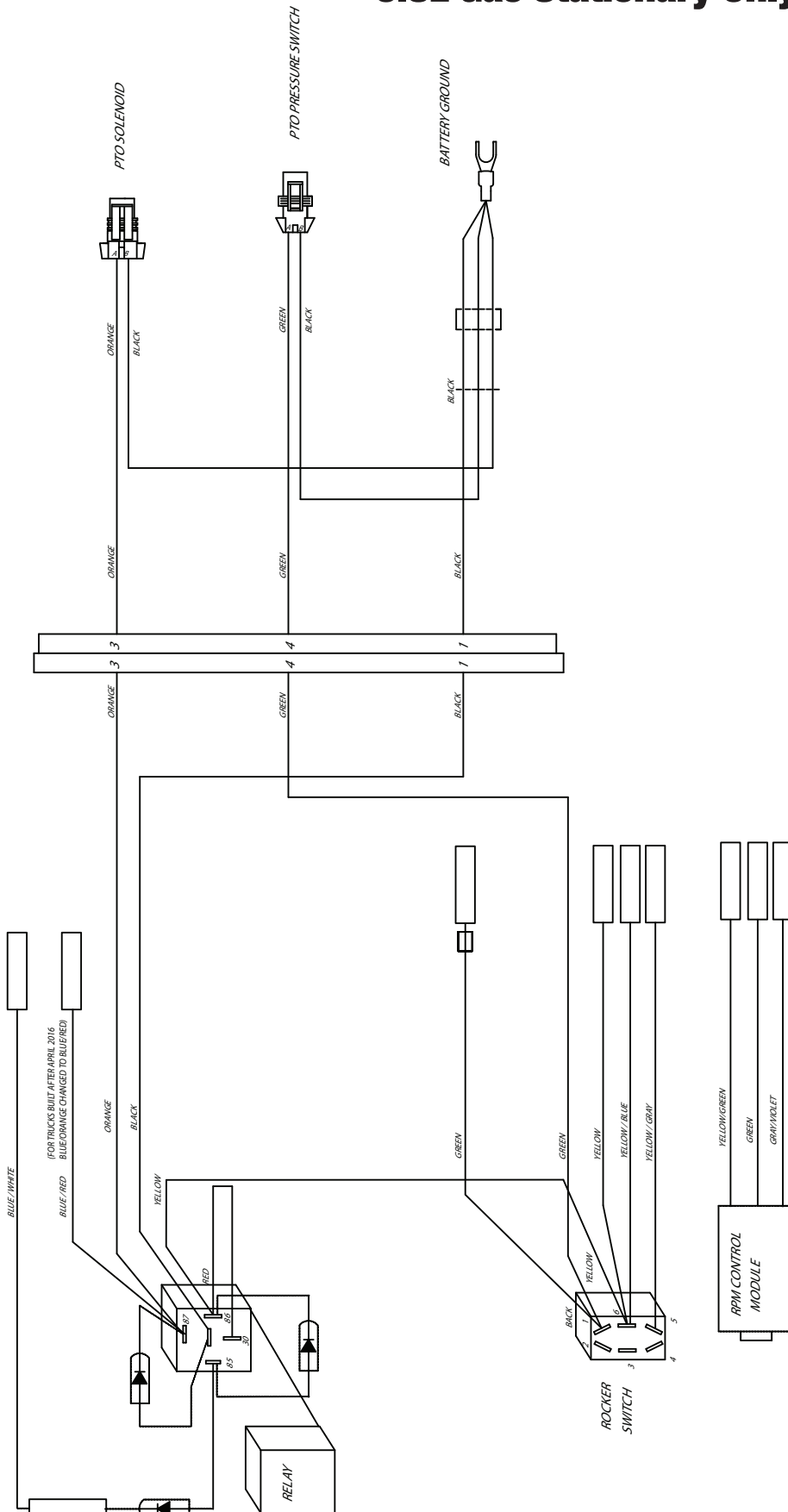


**FR66/FR3C-120963\*B WIRE HARNESS #34T43661 Wire Color, Pin#, Circuit # Reference (Mobile AND Stationary Mode)**

Harness Wire Color	Circuit Intent	Ford Wire Tag	PCM Pin	Circuit No.	Ford Wire Color
Blue/White	Output	PTO_RELAY	C-11	CE326	Blue/White
Yellow/Green	Input (VPWR)	PTORS1	C-06	CE912	Yellow/Green
Blue/Orange	Input (VPWR)	PTORS2	C-06	CE933	Blue/Orange
White/Brown	Reference Voltage	PTOREF	C-55	LE434	White/Brown
Green	Input (Resistor)	PTO_RPM	C-08	CE914	Green
Gray/Violet	PCM Ground	PTORTN	C-22	RE327	Gray/Violet
Yellow/Gray	12Vdc Power				Yellow/Gray

# FR66/FR3C-F1209-F3\*X Wire Harness Schematic – (34T43650)

## 2016 & Later Model Year & F-250 – F-550, F-650 – F-750 Medium Duty 6.8L Gas Stationary Only



**FR66/FR3C-1209F3\*X WIRE HARNESS #34T43650 Wire Color, Pin#, Circuit # Reference (Stationary Only Mode)**

Harness Wire Color	Circuit Intent	Ford Wire Tag	PCM Pin	Circuit No.	Ford Wire Color
Blue/White	Output	PTO RELAY		CE326	Blue/White
Blue/Orange	Input (VPWR)	PTO REQ 2		CE933	Blue/Orange Blue/Red*
Yellow/Blue	Input (VPWR)	PTO REQ 1		CE912	Yellow/Blue (Yellow/Green Early Build)
Green	Input (Resistor)	PTO RPM		CE914	Green
Yellow/Gray	12Vdc Power				Yellow/Gray
Yellow/Green	Output	PTO REF	52	LE424	Yellow/Green
*Gray/Violet	Input	PTO SIGRTN	54	RE407	*Gray/Violet

\*For 2016 trucks  
built after April 2016

# SECTION 3

## Test Procedures

(Test can only be done after completing installation instructions in Section 1.)

1. Start the engine and engage the FR66 PTO by turning the rocker switch to the “ON” position. Be sure that all Ford SEIC enablers are met. See Section 4. If the FR66 PTO fails to operate or will not develop enough torque to operate the equipment, check the pressure as follows.
2. Stop the engine and place the ignition keys in your pocket.
3. Install a 400 PSI pressure gauge at the piston port of the FR66 PTO as shown in figure 1 below.

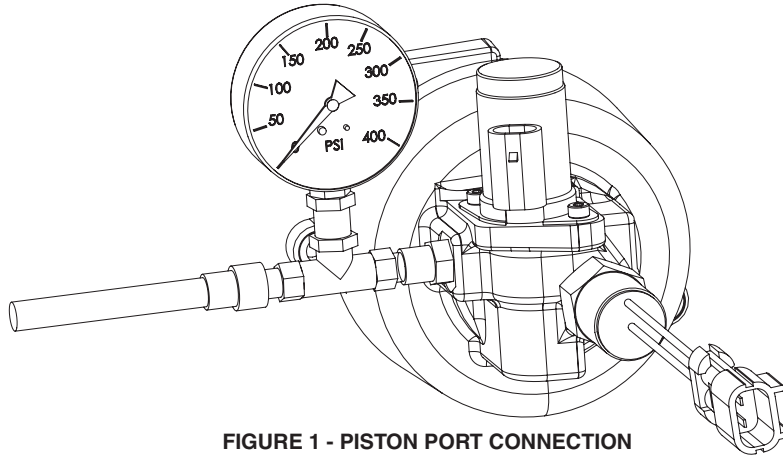


FIGURE 1 - PISTON PORT CONNECTION

4. Remove the pressure switch from the FR66 end cover and place a second 400 PSI pressure gauge in the pressure switch port as shown in figure 2 below.

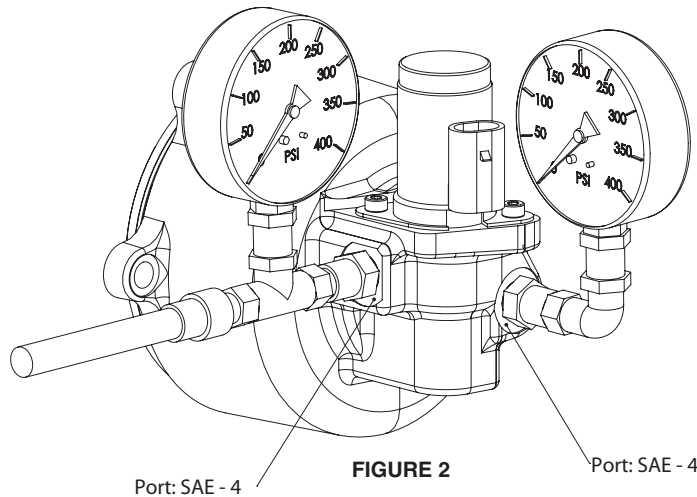


FIGURE 2

5. Start the engine (staying clear of any rotating components). Engage the FR66/FR3C PTO by turning the rocker switch to the “ON” position. Increase the engine speed to 1,300 RPM.
6. If either gauge registers less than 130 PSI or if there is more than 50 PSI difference between the 2 gauges at any engine speed, check for obstructions in the hose or remove the solenoid and check for contamination.
7. If the gauge on the piston port registers 50 PSI or less, you may be connected to the wrong port on the transmission. Recheck the transmission information for the main pressure port location.

# SECTION 4

## Operator's Manual

### PTO SHIFTING PROCEDURE & PRECAUTIONS

PTO's should not be engaged (turned "ON") under heavy load and/or at engine speeds over 1,000 RPM. If your operators are careless or negligent in this respect, you can safeguard your equipment with one or more Muncie protective systems. (See Section 2)

**CAUTION:** Do NOT operate hydraulic pumps or systems without the hydraulic system completely installed.

### **▲ WARNING! STATIONARY OPERATION REQUIREMENTS:**

- DO NOT GO UNDER THE VEHICLE WITH THE ENGINE RUNNING
- Parking brake must always be set
- Vehicle's wheels must always be chocked
- Transmission must always be in park

**Important:** An operator must always be in the driver's seat whenever the engine is running and the transmission is in gear, in order to prevent or stop any unexpected movement of the vehicle which may cause injuries to the operator or others in the vicinity.

### **FORD SEIC Enabler/ Disable Conditions**

Vehicle Conditions to Enable SEIC (All are required)	Vehicle Conditions to Disable SEIC (Any one required)	Diesel		Gas F-650
		Stationary	Mobile	Stationary
Parking brake applied	Parking Brake disengaged	Yes	No	Yes
Foot off of service brake	Depressing service brake	Yes	No	Yes <sup>3</sup>
Vehicle in PARK (automatic trans.)	Vehicle taken out of park	Yes <sup>3</sup>	No	Yes
Foot off of accelerator pedal	Accelerator pedal depressed	Yes	No	Yes
Vehicle speed is 0 MPH (stationary)	Vehicle speed is not 0 mph (stationary)	Yes	No	Yes
Engine at a stable base idle speed		Yes	No	Yes <sup>2</sup>
Transmission oil Temp. above 20° F	Transmission Oil Temperature (TOT) Limit exceeds 240° F.	Yes	No	Yes <sup>3</sup>
Engine Coolant Temp. (ECT) 120° F min. <sup>1</sup>	Engine Coolant Temperature Limit (ECT)	No	No	Yes <sup>3</sup>
	Catalyst Temperature Limit	No	No	Yes <sup>3</sup>

1. Engine coolant Temp (ECT) is changed to 20° F min. in Ford Job 2 programming.
2. (Applies to gas engine only) If a SEIC disabling condition occurs, the engine must be allowed to reach a stable base idle before the system can be re-initiated. This could take up to 15 seconds. If an attempt is made to re-initiate SEIC before the engine has reached a stable base idle SEIC will not engage. The operator will have to turn SEIC off and then back on once the vehicle has reached a stable base idle.
3. A "change-of-state" at both the "PTO\_REQUEST" and "PTO\_ENGAGE" circuits is required to re-invoke SEIC. When a disabler is seen by the PCM, the "PTO\_OK" circuit changes from "ground-source" to "open-circuit". After approximately 3 seconds SEIC drops out, returning the engine speed to base idle. For vehicle-stationary operation, the automatic transmission torque converter unlocks as engine speed drops below 900 RPM. To re-initiate SEIC the operator must turn off the aftermarket PTO switch (removing drops command voltage to both the "PTO\_REQUEST" and "PTO\_ENGAGE" circuits) and turn it back on again.

# PTO OPERATION VEHICLE STATIONARY

1. The PTO drive gear is engine driven and will rotate whenever the engine is running.
2. See warning above. Set parking brake and, with foot off of service brake, and with the vehicle engine operating at idle, engage PTO by pushing the rocker switch to the engage position.
3. Connection of the FR66/FR3C PTO is through the Ford SEIC control. The Muncie harness will allow the throttle settings to range from 900 RPM (default) to 3,000 RPM. The Maximum allowable operating engine speed is 2,500 RPM. Connection to Ford 6.7L diesel computer through the PTO activation circuit will automatically increase engine to a pre-set RPM.
4. The PTO activation system is wired through the vehicle ignition. If you leave the PTO engaged and turn off the vehicle, the PTO activation will not automatically turn on when the enablers are met and the engine is re-started. You will need to go through the activation process again once the engine is restarted.

**Note:** Consult your Muncie product literature or call your nearest Muncie Power Center for information on the SPD-1001D System Protection Device. The SPD-1001D is adjustable for maximum engine speed and can also prevent engagement of your PTO at unsafe engine speeds. The Ford instrument panel includes a temperature gauge, which monitors transmission temperature. A temperature rise occurring immediately after PTO installation should prompt to have the installation checked for the proper PTO gasket and correct transmission oil level. Allow the system to cool. Temperature increases can indicate possible system problems, application misuse, or potential failure. Have the vehicle cooling system checked by a qualified technician. The PTO may need to be inspected by an approved Muncie service center.

## PTO OPERATION:

### Mobile Vehicle

1. Vehicle must be wired for mobile operation.
2. With the vehicle engine operating at idle and the parking brake set, engage the PTO by pushing the rocker switch to the “engage” position.
3. Release the parking brake, shift the transmission into a drive or reverse selection.
4. The Torqshift® transmission is designed to allow PTO operation in all gears including over-drive.

### Switchable: Stationary/Mobile

1. When switching between modes, a 1-2 second pause in the center “OFF” position is required for the SEIC to recognize the change.

## PTO MAINTENANCE

The Power Take-off, being an integral part of the transmission, should be serviced at the same intervals as the transmission. Changing transmission fluid should follow the interval

recommended by the vehicle manufacturer for severe service. Transmission oil level is important. Checking for PTO leaks and checking the transmission oil level should be done on a regular basis.

The Power Take-off is also part of a system. The PTO system may include the activation control parts, a driveshaft, or hydraulic pump. This PTO system requires periodic checks and service. Typically the interval for maintenance checks of the PTO system depends on the application of the system. Every time the chassis is lubricated or a mechanic is under the vehicle the PTO system should be checked and/or serviced. For severe duty PTO system applications, it is recommended that the system be checked for service every 100 hours of use (this guideline can be adjusted based on past service history once you have it established). Service should include checking and lubricating direct mount pump shaft connections. PTO gears can be checked for wear by removing the PTO. If pitting, galling, cracking, or deformation of the gears or splines has occurred, then the PTO needs to be rebuilt or replaced. Within the first week of use, recheck installation of PTO. Check for leaks and loose mounting hardware. Re-torque mounting nuts/bolts.

At regular maintenance intervals; check adjustments and lubricate moving parts, tighten/repair connections and mounting hardware. Pumps that are mounted directly to the PTO output require the application of an anti-seize or a high temperature and/or high pressure grease (Muncie PTOs are initially supplied with required grease). The purpose of this grease is to help make PTO easier to service and to reduce the effects of fretting corrosion on the mating PTO and pump shafts. PTO applications under severe duty cycles and/or high torque requirements may require servicing this shaft connection by periodically re-greasing shafts. Fretting corrosion cannot be stopped by applying grease; the grease is only a deterrent.

## PTO TORQUE & HORSEPOWER RATINGS

Intermittent service refers to an On-Off operation under load. If maximum horsepower and/or torque is used for an extended period of time, (5 minutes or more), it is considered “Continuous Service” and the horsepower rating of the PTO should be reduced by multiplying the value below by 0.70.

	Stationary	Mobile
PTO Series	FR66	
Speed Ratio	09	
Intermittent HP @ 1,000 RPM*	38	22.8
Intermittent KW @ 1,000 RPM*	28	17
Torque Ft.Lbs.*	200	120
Torque N-M	271	163
Maximum PTO Speed	2,500	

\*Torque & HP limitations are mandated by Ford to limit transmission loading.



# FR66/FR3C - PTO TROUBLESHOOTING GUIDE

<b>PROBLEM</b>	<b>POSSIBLE CAUSE</b>	<b>REMEDY</b>	<b>PREVENTION</b>
<b>PTO DOES NOT ENGAGE</b>	FORD required wiring installation not followed.	Inspect and reconnect PTO activation wire connection on the PTO harness.	Refer to wiring diagram found in Section 2.
	Contaminated hydraulic activation lines.	Remove contaminants from piston area.	Change transmission oil filter.
	Transmission Hydraulic Pressure not high enough.	Hydraulic line connected to the wrong port.	Review installation diagrams found in Section 2.
	Burned or extremely worn clutch pack.	Replace worn components.	Follow proper shifting procedures.
	Rocker switch incorrectly connected.	Remove connection at rocker switch, check pins and re-install per instructions on Step 32 (IN 10-01.01 & IN 10-01.02) or Step 33 (IN 10-01.03).	Make sure green wire in connector is at top when installed.
<b>PTO DOES NOT DISENGAGE</b>	Faulty hydraulic solenoid valve.	Repair or replace.	Sometimes a result of contamination or a dirty valve.
	Burned or extremely worn clutch pack.	Repair or replace components.	Follow proper engagement procedures. See Section 3.
<b>PTO ENGAGES LOW/ NO OUTPUT SPEED OR PUMP FLOW</b>	FORD required wiring installation not followed.	Inspect and reconnect PTO activation wire connection on the PTO harness.	Refer to wiring diagram found in Section 2.

# **POWER TAKE-OFF WARRANTY**

The Muncie Power Take-off is warranted to be free of defects in material or workmanship and to meet Muncie's standard written specifications at the time of sale. Muncie's obligation and liability under this warranty is expressly limited to repairing or replacing, at Muncie's option, within one year after date of original installation any defective part or parts or any product not meeting the specifications.

**THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. MUNCIE MAKES NO WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR ANY PARTICULAR PURPOSE. MUNCIE'S OBLIGATION UNDER THIS WARRANTY SHALL NOT INCLUDE ANY TRANSPORTATION CHARGES OR COSTS OF INSTALLATION OR ANY LIABILITY FOR DIRECT, INDIRECT SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OR DELAY. THE REMEDIES SET FORTH HEREIN ARE EXCLUSIVE, AND MUNCIE'S LIABILITY WITH RESPECT TO ANY CONTRACT OR SALE OR ANYTHING DONE IN CONNECTION THEREWITH, WHETHER IN CONTRACT, IN TORT, UNDER ANY WARRANTY, OR OTHERWISE, SHALL NOT, EXCEPT AS EXPRESSLY PROVIDED HEREIN, EXCEED THE PRICE OF THE PRODUCT OR PART ON WHICH SUCH LIABILITY IS BASED.**

If requested by Muncie, products or parts for which a warranty claim is made are to be returned transportation prepaid to a Muncie Service Center. Any installation or use not in accordance with catalogue or package instructions, other improper use, operation beyond capacity, substitution of parts not approved by Muncie, use with equipment other than the equipment on which the Power Take-off is first installed, or alteration or repair made to the Power Take-off other than at a Muncie Service Center shall void this warranty. No employee or representative of Muncie is authorized to change this warranty in any way or to grant any other warranty.





**Muncie<sup>®</sup>  
Power  
Products**

*A Member of the Interpump Group*

IN10-01 (Rev. 02-18)

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