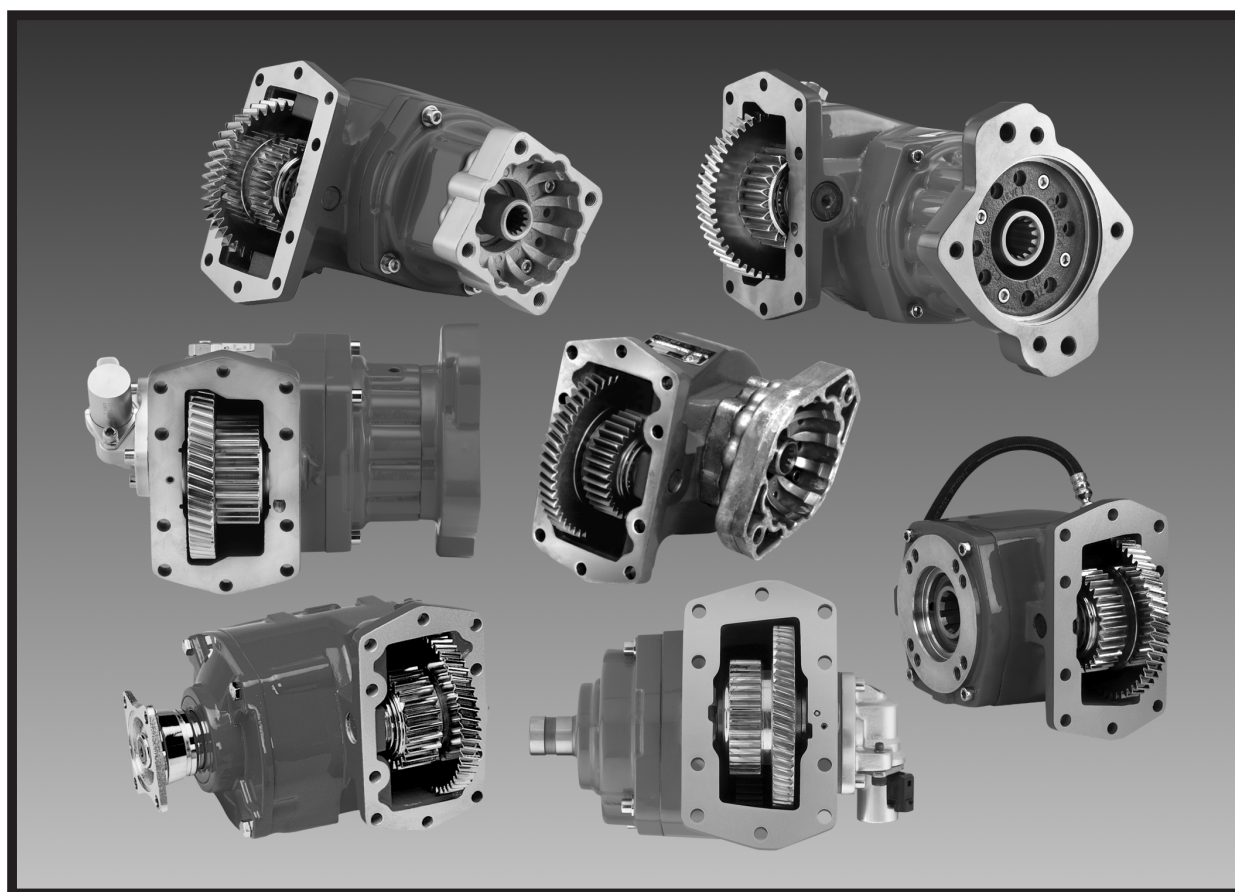


Owner's Manual Power Take-Offs

Effective: September 2012
Supersedes: HY25-1380-M1/US May 2012



267 Series
269 Series
277 Series

278 Series
859 Series
867 Series

870 Series
877 Series



WARNING — User Responsibility

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker-Hannifin Corporation, its subsidiaries and authorized distributors provide product or system options for further investigation by users having technical expertise.

The user, through its own analysis and testing, is solely responsible for making the final selection of the system and components and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application, follow applicable industry standards, and follow the information concerning the product in the current product catalog and in any other materials provided from Parker or its subsidiaries or authorized distributors.

To the extent that Parker or its subsidiaries or authorized distributors provide component or system options based upon data or specifications provided by the user, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the components or systems.

Offer of Sale

The items described in this document are hereby offered for sale by Parker Hannifin Corporation, its subsidiaries or its authorized distributors. This offer and its acceptance are governed by the provisions stated in the "Offer of Sale".

Patent Information

The Chelsea® Power Take-Off or its components shipped with this owner's manual may be manufactured under one or more of the following U.S. patents:

4610175 5228355 4597301 5645363 6151975 6142274 6260682 7159701 B2 7,510,064
Other patents pending.

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Safety Information

These instructions are for your safety and the safety of the end user. Read them carefully until you understand them.

General Safety Information

To prevent injury to yourself and/or damage to the equipment:

- Read carefully all owner's manuals, service manuals, and/or other instructions.
- Always follow proper procedures, and use proper tools and safety equipment.
- Be sure to receive proper training.
- Never work alone while under a vehicle or while repairing or maintaining equipment.
- Always use proper components in applications for which they are approved.
- Be sure to assemble components properly.
- Never use wornout or damaged components.
- Always block any raised or moving device that may injure a person working on or under a vehicle.
- Never operate the controls of the Power Take-Off or other driven equipment from any position that could result in getting caught in the moving machinery.

Proper Matching of P.T.O.



WARNING: A Power Take-Off must be properly matched to the vehicle transmission and to the auxiliary equipment being powered. An improperly matched Power Take-Off could cause severe damage to the vehicle transmission, the auxiliary driveshaft, and/or to the auxiliary equipment being powered. **Damaged components or equipment could malfunction causing serious personal injury to the vehicle operator or to others nearby.**

To avoid personal injury and/or equipment damage:

- Always refer to Chelsea catalogs, literature, and owner's manuals. Follow Chelsea recommendations when selecting, installing, repairing, or operating a Power Take-Off.
- Never attempt to use a Power Take-Off not specifically recommended by Chelsea for the vehicle transmission.
- Always match the Power Take-Off's specified output capabilities to the requirements of the equipment to be powered.
- Never use a Power Take-Off whose range of speed could exceed the maximum.

Cold Weather Operation of Powershift P.T.O.



WARNING: During extreme cold weather operation [32°F (0°C) and lower], a disengaged Powershift Power Take-Off can momentarily transmit high torque that will cause unexpected output shaft rotation. This is caused by the high viscosity of the transmission oil when it is extremely cold. As slippage occurs between the Power Take-Off clutch plates, the oil will rapidly heat up and the viscous drag will quickly decrease.

The Power Take-Off output shaft rotation could cause unexpected movement of the driven equipment resulting in serious personal injury, death, or equipment damage.

To avoid personal injury or equipment damage:

- Driven equipment must have separate controls.
- The driven equipment must be left in the disengaged position when not in operation.
- Do not operate the driven equipment until the vehicle is allowed to warm up.



This symbol warns of possible personal injury.

Safety Information (Continued)

Rotating Auxiliary Driveshafts



WARNING:



- Rotating auxiliary driveshafts are dangerous. You can snag clothes, skin, hair, hands, etc. This can cause serious injury or death.
- Do not go under the vehicle when the engine is running.
- Do not work on or near an exposed shaft when the engine is running.
- Shut off the engine before working on the Power Take-Off or driven equipment.
- Exposed rotating driveshafts must be guarded.

Guarding Auxiliary Driveshafts



WARNING: We strongly recommend that a Power Take-Off and a directly mounted pump be used to eliminate the auxiliary driveshaft whenever possible. If an auxiliary driveshaft is used and remains exposed after installation, it is the responsibility of the vehicle designer and P.T.O. installer to install a guard.

Using Set Screws



WARNING: Auxiliary driveshafts may be installed with either recessed or protruding set screws. If you choose a square head set screw, you should be aware that it will protrude above the hub of the yoke and may be a point where clothes, skin, hair, hands, etc. could be snagged. A socket head set screw, which may not protrude above the hub of the yoke, does not permit the same amount of torquing as does a square head set screw. Also, a square head set screw, if used with a lock wire, will prevent loosening of the screw caused by vibration. Regardless of the choice made with respect to a set screw, an exposed rotating auxiliary driveshaft must be guarded.

Important: Safety Information and Owner's Manual

Chelsea Power Take-Offs are packaged with safety information decals, instructions, and an owner's manual. These items are located in the envelope with the P.T.O. mounting gaskets. Also, safety information and installation instructions are packaged with some individual parts and kits. **Be sure to read the owner's manual before installing or operating the P.T.O.** Always install the safety information decals according to the instructions provided. Place the owner's manual in the vehicle glove compartment.



WARNING: Operating the P.T.O. with the Vehicle in Motion

Some Power Take-Offs may be operated when the vehicle is in motion. To do so, the P.T.O. must have been properly selected to operate at highway speeds and correctly matched to the vehicle transmission and the requirements of the driven equipment.

If in doubt about the P.T.O. specifications and capabilities, avoid operating the P.T.O. when the vehicle is in motion. Improper application and/or operation can cause serious personal injury or premature failure of the vehicle, the driven equipment, and/or the P.T.O.

Always remember to disengage the P.T.O. when the driven equipment is not in operation.

Pump Installation Precautions

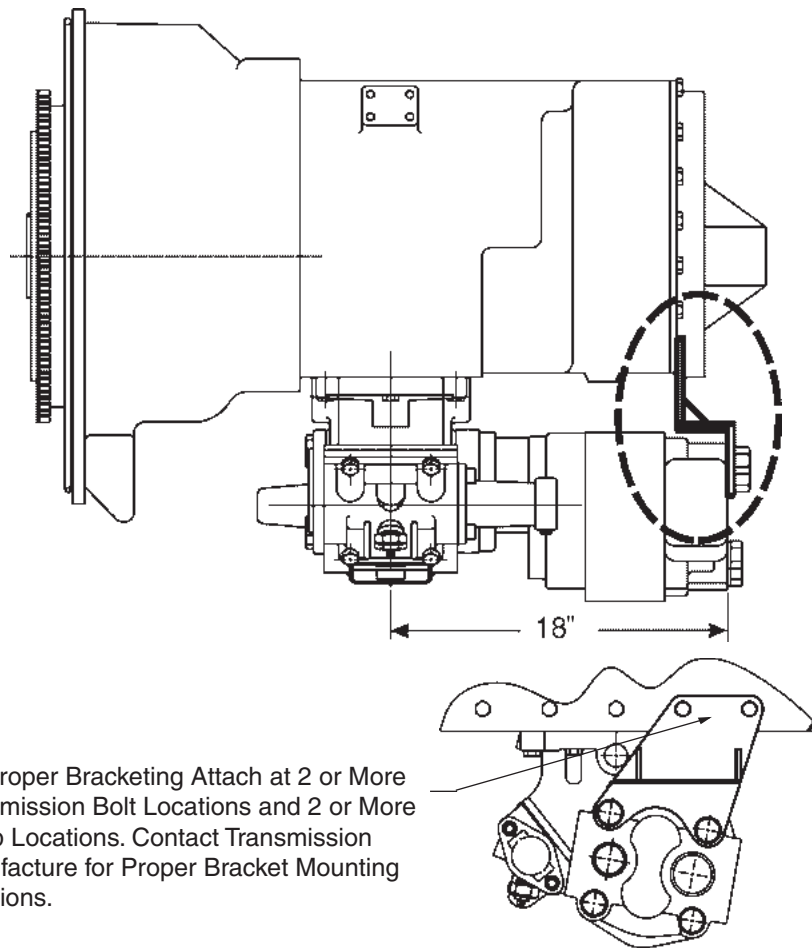
Use a bracket to support the pump to the transmission if:

- The pump weighs **40 pounds [18.4 kg]** or more.
- The combined length of the P.T.O. and pump is **18 inches [45.72 cm]** or more from the P.T.O. centerline to the end of the pump.



This symbol warns of possible personal injury.

Direct Mount Pump Support Recommendations



NOTE: For Proper Bracketing Attach at 2 or More Transmission Bolt Locations and 2 or More Pump Locations. Contact Transmission Manufacture for Proper Bracket Mounting Locations.



Use caution to ensure that bracket does not pre-load pump/P.T.O. mounting

Chelsea strongly recommends the use of pump supports (Support Brackets) in all applications. P.T.O. warranty will be void if a pump bracket is not used when:

- 1) The combined weight of pump, fittings and hose exceed **40 pounds [18.14 kg]**.
- 2) The combined length of the P.T.O. and pump is **18 inches [45.72 cm]** or more from the P.T.O. centerline to the end of the pump.

ALSO: Remember to pack the female pilot of the P.T.O. pump shaft with grease before installing the pump on the P.T.O. (reference Chelsea grease pack 379688)



This symbol warns of possible personal injury.

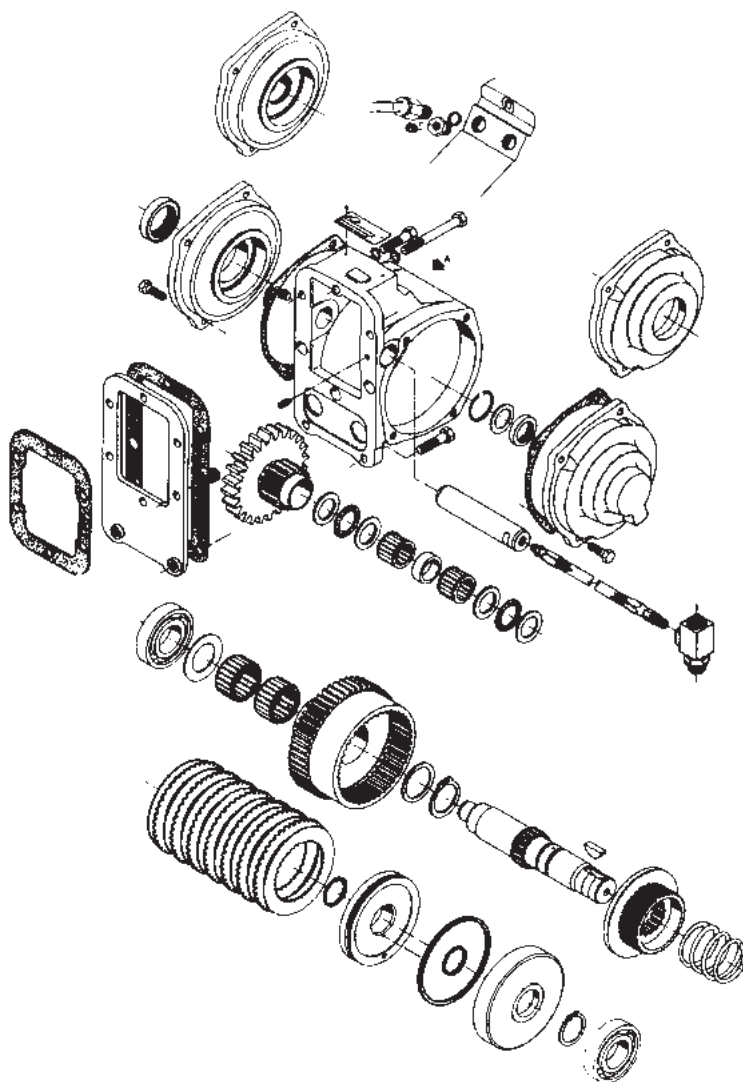
Foreword

Since our major objective is to show you how to get additional and more profitable miles from truck, tractor and trailer components, we want to provide you with information on the installation of Chelsea Power Take-Offs.

We all realize that an inadequate transmission will overwork any Power Take-Off in a very short period of time. In addition, a mismatched transmission/P.T.O. combination can result in unsatisfactory performance of the equipment right from the start.

Before you order new trucks, be sure you're getting the right transmission/P.T.O. combination. It is of vital importance for efficient performance to have adequate power. To help you select the proper type, size and design of P.T.O. it is advisable to discuss your specific requirements with Chelsea P.T.O. specialists. They know their products and have easy access to manufacturers of equipment, transmissions and Power Take-Offs. They can inform you about everything you need to know about power, at the right time, before you specify components.

Exploded View of a Typical Powershift P.T.O.

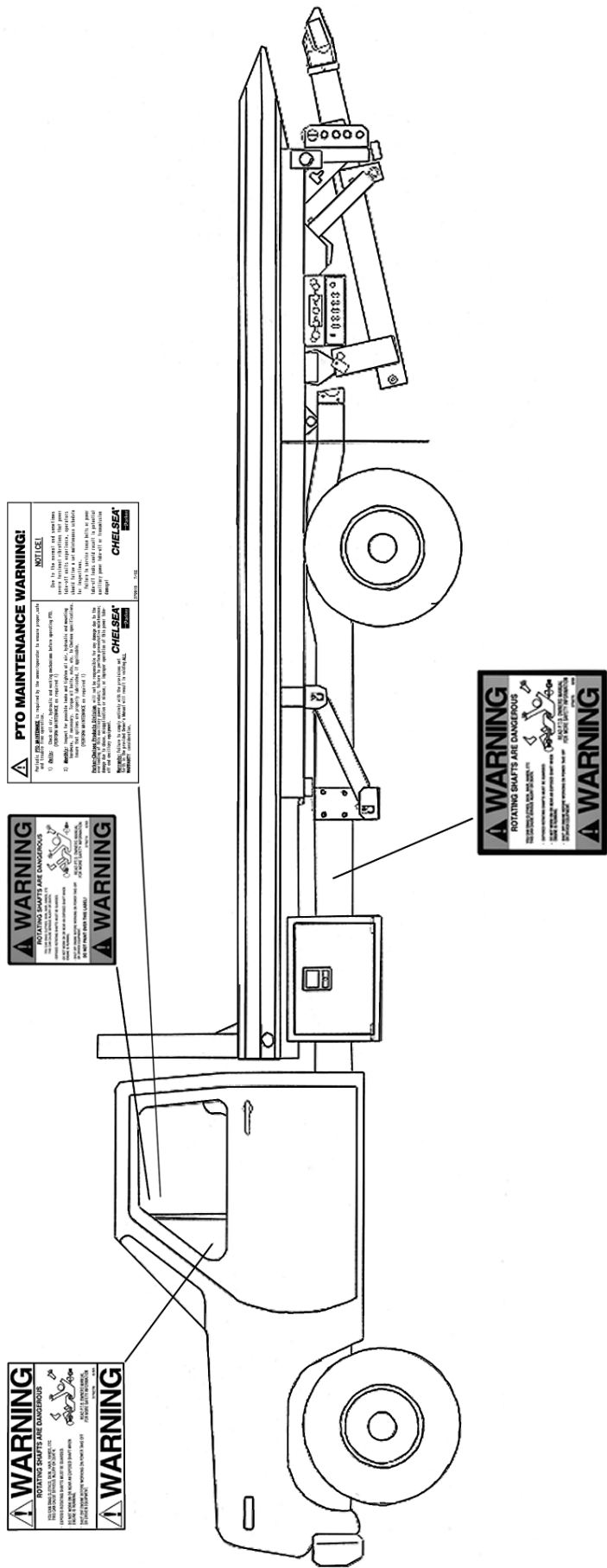


Chelsea P.T.O. Safety Label Instructions

1. The two black and orange on white 5" x 7" pressure sensitive vinyl labels, part number 379274; must be placed on the vehicle frame rails (one (1) on each side), in a position that would be **HIGHLY** visible to anyone that would go under the truck near the P.T.O. rotating shaft. If the vehicle is to be painted after these labels are installed, cover them with two (2) blank masking covers. Remove the masking covers after painting.
2. Place the one (1) black and orange on white 3.5" x 5" pressure sensitive vinyl label, part number 379275, on the visor nearest the operator of the vehicle, this must be placed near the P.T.O. visor label.
3. Place the one (1) red and white with black lettering 3.5" x 7.5" pressure sensitive vinyl label, part number 379915, on the opposite side of the visor from the above label # 379275.
4. Place the one (1) white and black heavy duty card, part number 379276, in the vehicle glove box. Again in a position highly visible to the operator, for example: try to place this card on top of whatever may be in the glove box.

If you require labels, please order part number 328946X at no charge from your local Chelsea Warehouse or send request direct to:

**Parker Hannifin Corporation
Chelsea Products Division
8225 Hacks Cross Road
Olive Branch, MS 38654
Customer Service: (662) 895-1011**



Function of Auxiliary Power Shafts

An auxiliary power shaft transmits torque from the power source to the driven accessory. The shaft must be capable of transmitting the maximum torque and R.P.M. required of the accessory, plus any shock loads that develop.

An auxiliary power shaft operates through constantly relative angles between the power source and the driven accessory, therefore, the length of the auxiliary power shaft must be capable of changing while transmitting torque. This length change, commonly called "slip movement", is caused by movement of the power train due to torque reactions and chassis deflections.

Joint operating angles are very important in an auxiliary power joint application. In many cases, the longevity of a joint is dependent on the operating angles. (See chart below)

This information is limited to 1000 through 1310 series applications. For applications requiring a series larger than 1310, contact your local Chelsea distributor.

Determining Shaft Type

1) Solid or tubular?

- a) In applications requiring more than 1000 R.P.M. or where the application necessitates a highly balanced auxiliary power shaft, a tubular shaft should be used.
- b) Spicer's solid shafting auxiliary power joints are designed for 1000 or less R.P.M. intermittent service such as:
 - Driving small hydraulic pumps
 - Driving winches
 - Driving low speed product pumps

2) Joint Series should be determined using the chart on the following page.

Spicer® Universal Joint Operating Angles			
Prop. Shaft R.P.M.	Max. Normal Operating Angle	Prop. Shaft R.P.M.	Max. Normal Operating Angle
3000	5° 50'	1500	11° 30'
2500	7° 00'	1000	11° 30'
2000	8° 40'	500	11° 30'

Above based on angular acceleration of 100 RAD/SEC²

Spicer® Universal Joint Engineering Data

Joint Series	1000	1100	1280	1310
Torque Rating Automotive (Gas or Diesel Engine) Lbs. ft. Continuous	50	54	95	130
Tubing Diameter Wall Thickness W = Welded S = Seamless	1.750 .065 W	1.250 .095 S	2.500 .083 W	3.00 .083 W
Flange Diameter (Swing Diameter) Rectangular Type	3.500	3.500	3.875	3.875
Bolt Holes - Flange Yoke Circle Diameter Number Male Pilot Dia.	2.750 .312 4 2.250	2.750 .312 4 2.250	3.125 .375 4 2.375	3.125 .375 4 2.375
Distance Across Lugs Snap Ring Construction	2.188	2.656	3.469	3.469
Bearing Diameter	.938	.938	1.062	1.062

* Maximum Operating Speed By Tube Size, Solid Shaft Size, and Length *(For speed below 500 R.P.M. or over 2500 R.P.M., contact your Chelsea Distributor)					
Tubing Dia. & Wall Thickness Joint & Shaft (W=Welded S=Seamless)	Max. Installed Length in Inches for Given R.P.M. Centerline to Centerline of Joints for a Two Joint Assembly or Centerline of Joint to Centerline of Center Bearing for a Joint & Shaft R.P.M. - Revolutions per Minute				
	500	1000	1500	2000	2500
1.750" x .065" W	117"	82"	67"	58"	52"
1.250" x .095" S	91"	64"	52"	45"	40"
2.500" x .083" W	122"	87"	70"	62"	55"
3.000" x .083" W	-	-	-	85"	76"
Solid Shaft Diameter					
.750"	60"	42"	35"	30"	27"
.812"	62"	44"	36"	31"	28"
.875"	65"	46"	37"	32"	29"
1.000"	69"	49"	40"	35"	31"
1.250"	77"	55"	45"	39"	35"

Mounting the P.T.O. on the Transmission

When installing a P.T.O., always wear protective clothing and safety glasses.

1. Begin by draining the oil from the transmission. Use caution, since the oil may be hot (**Fig. 1**).

NOTE: Installation shown is for Right Side (Street Side) of Transmission.



Fig. 1

2. Remove the P.T.O. aperture plate with a 15mm socket (**Fig. 2**).



Fig. 2

3. Remove the gasket and clean the aperture surface (**Fig. 3**).

NOTE: Do not reuse the gasket that comes with the transmission.

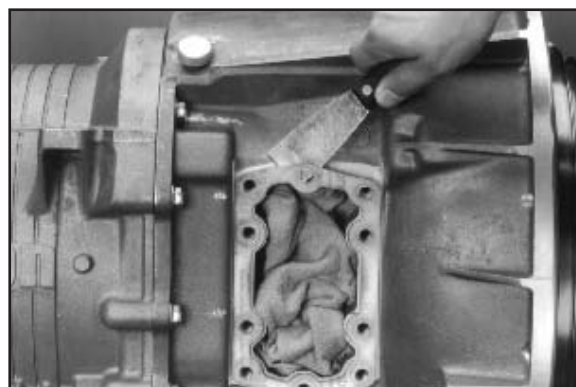


Fig. 3

4. Using a screwdriver, install the guide pins until they bottom out (**Fig. 4**) (Refer to [Page 39](#) for correct location and use).

NOTE: Do not use sealing compounds because they are generally incompatible with automatic transmission fluid.

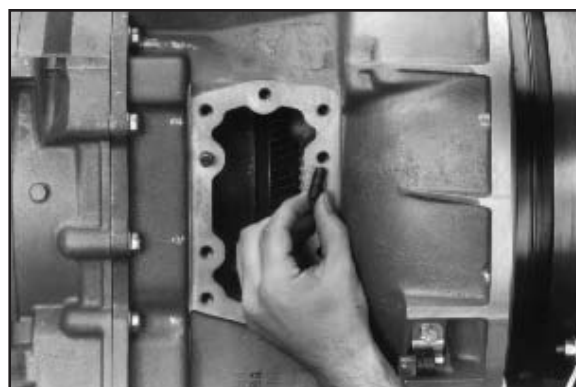


Fig. 4

Mounting the P.T.O. on the Transmission (Continued)

5. Install the special gasket over the guide pins. The ribbed surface should face outward, toward the installer (**Fig. 5**).

NOTE: To ensure proper backlash and sealing of P.T.O. to transmission only use gasket furnished with the P.T.O.

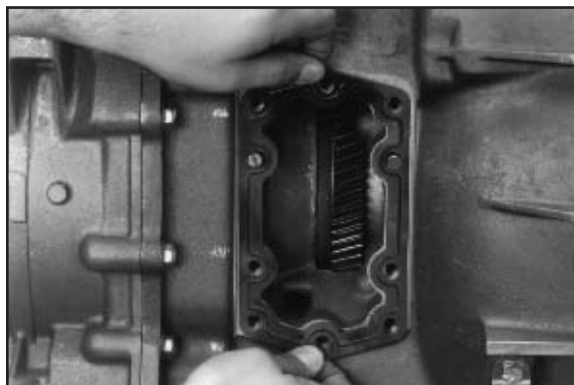


Fig. 5

6. Position the P.T.O. and secure it with the top capscrew (**Fig. 6**).



Fig. 6

7. Install the remaining capscrews. Torque all to 40 - 50 Lbs. ft. (54 - 68 N.m. or 5.5 - 6.9 Kg.m) (**Fig. 7**).

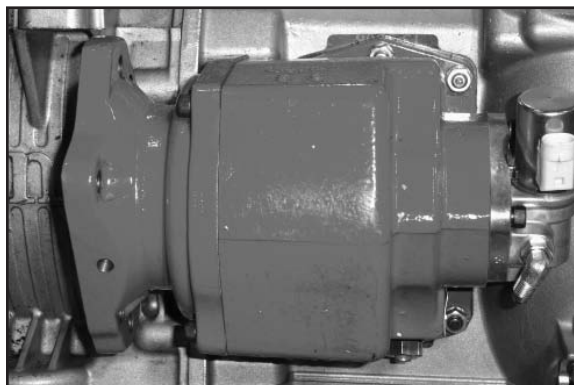


Fig. 7

8. Install P.T.O. pressure switch, part # 379502, into port on Hydraulic Valve Cap. Torque to 120-140 In-lbs (**Fig. 8**).



Fig. 8

Mounting the P.T.O. on the Transmission (Continued)

9. If using a rotatable flange see [Page 39](#) for bolt torque specifications. (**Fig. 9**).

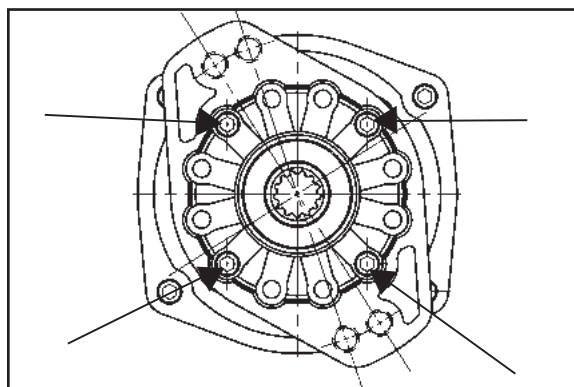


Fig. 9

10. Securely attach the high pressure line to the P.T.O. valve (**Fig. 10**).



Fig. 10

11. Use the special fitting to securely attach the high pressure line to the transmission. This fitting is included with the P.T.O. (**Fig. 11**). See the chart on [page 12](#) for the correct hose specifications. With the hose and P.T.O. securely connected, refill the transmission to the manufacturer's suggested specifications.

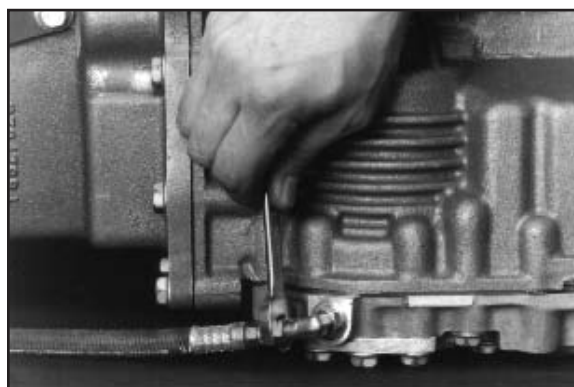


Fig. 11 (Right side shown)

12. Complete the assembly by installing the electrical connection to the valve assembly (**Fig. 12**) and the pressure switch (**Fig. 13**).

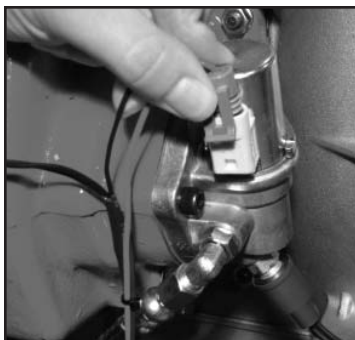


Fig. 12

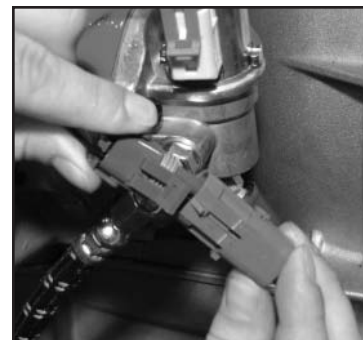
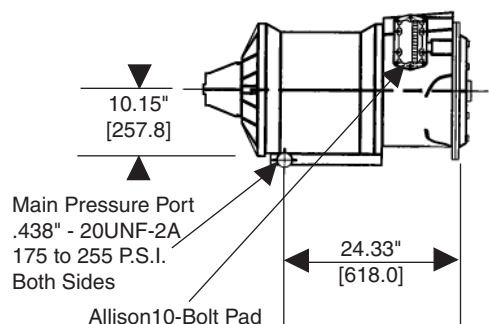


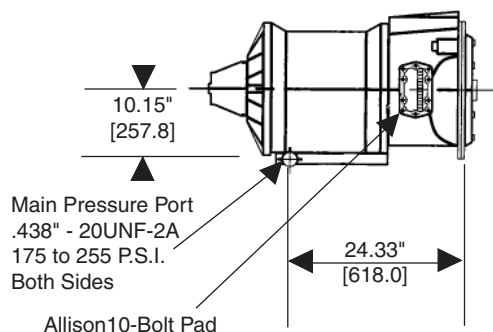
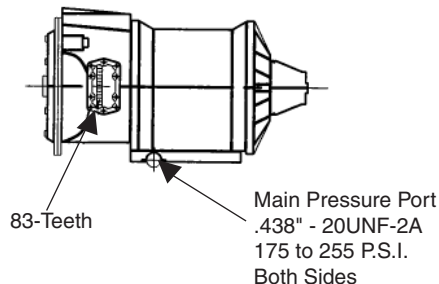
Fig. 13

Pressure Port and Aperture Opening Identification

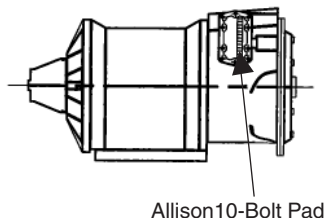
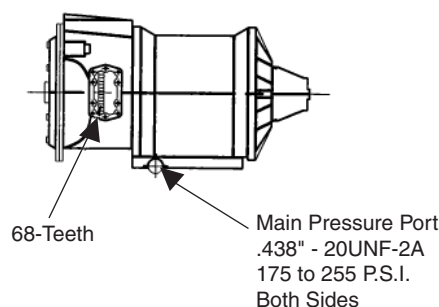
These drawings represent left and right views of the MD and HD pressure ports on the transmission.



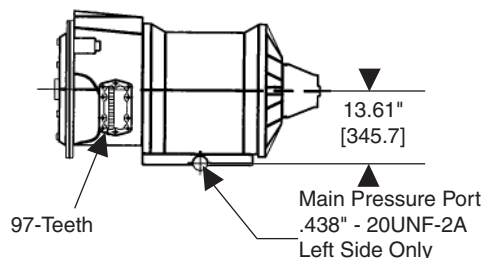
MD
Top/Left



MD
Right/Left



HD
Top/Left



Standard Hose Specifications by Transmission

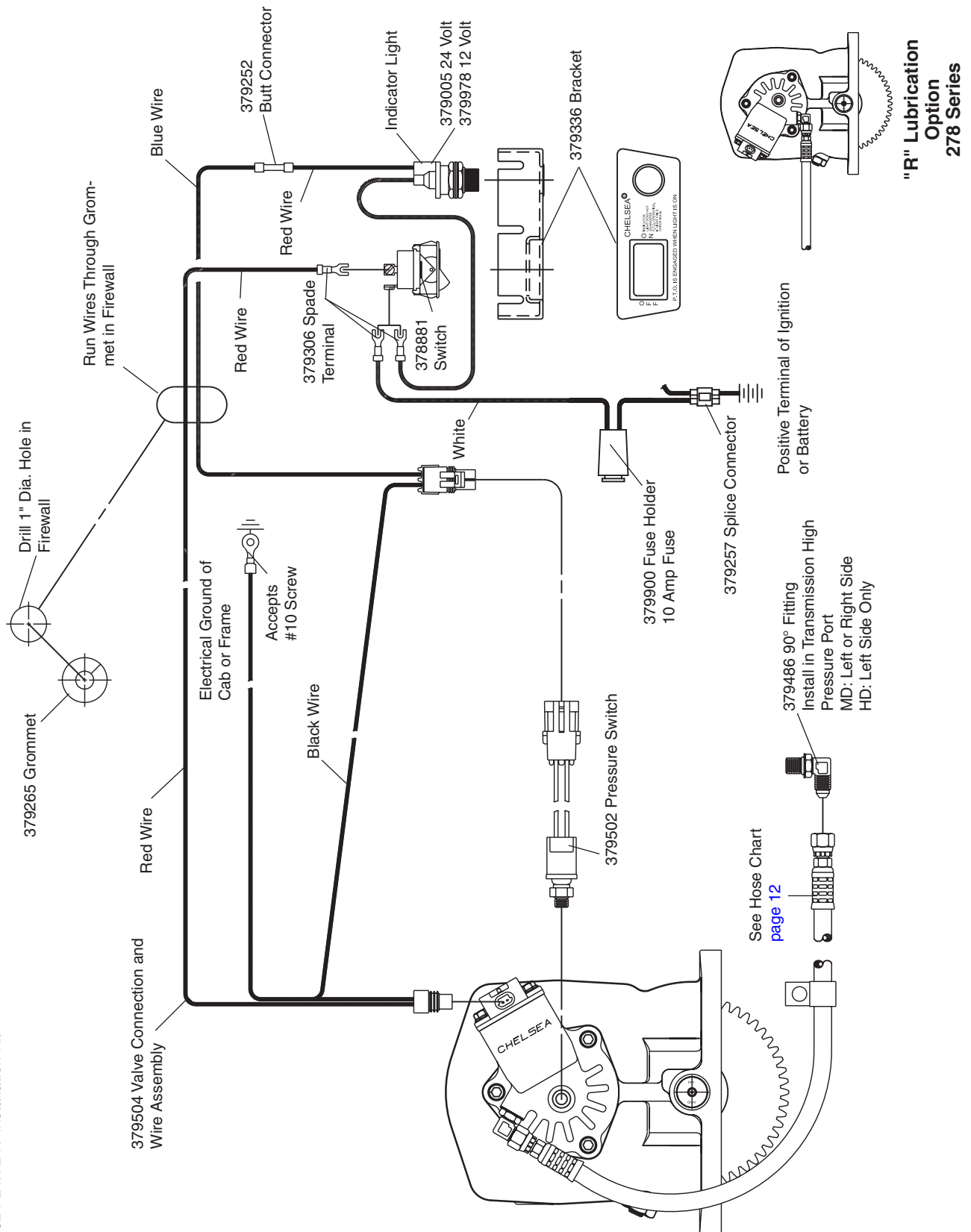
TRANS.	LOCATION	267 Series	277 Series	278 Series	859/867 870/877 Series
MD	Top Right (Right Press. Port)	329130-6X	329075-2X	329075-2X	329075-2X
MD	L.H. Side (Left Press. Port)	329130-1X	329130-5X	329130-5X	329130-5X
MD	R.H. Side (Right Press. Port)	329130-4X	329075-1X	329075-1X	329075-1X
HD	Top Right (Left Press. Port)	329130-6X	329075-2X	329075-2X	329075-2X
HD	L.H. Side (Left Press. Port)	329130-1X	329130-4X	329075-4X	329130-4X
HD ^{1,2}	L.H. Side (Left Press. Port)	—	329130-5X	329130-5X	329130-5X
HD ^{1,2}	Top Right (Left Press. Port)	—	329130-4X	329075-4X	329130-4X
MD ^{1,2}	L.H. Side (Left Press. Port)	—	329130-5X	329130-5X	329130-5X
MD ^{1,2}	R.H. Side (Right Press. Port)	—	329075-1X	329075-1X	329075-1X

An HD with 2 P.T.O.'s requires a 379556 "T" fitting and a 379703 swivel nut 90 degree elbow to attach 2 hoses to the single port on the left side.

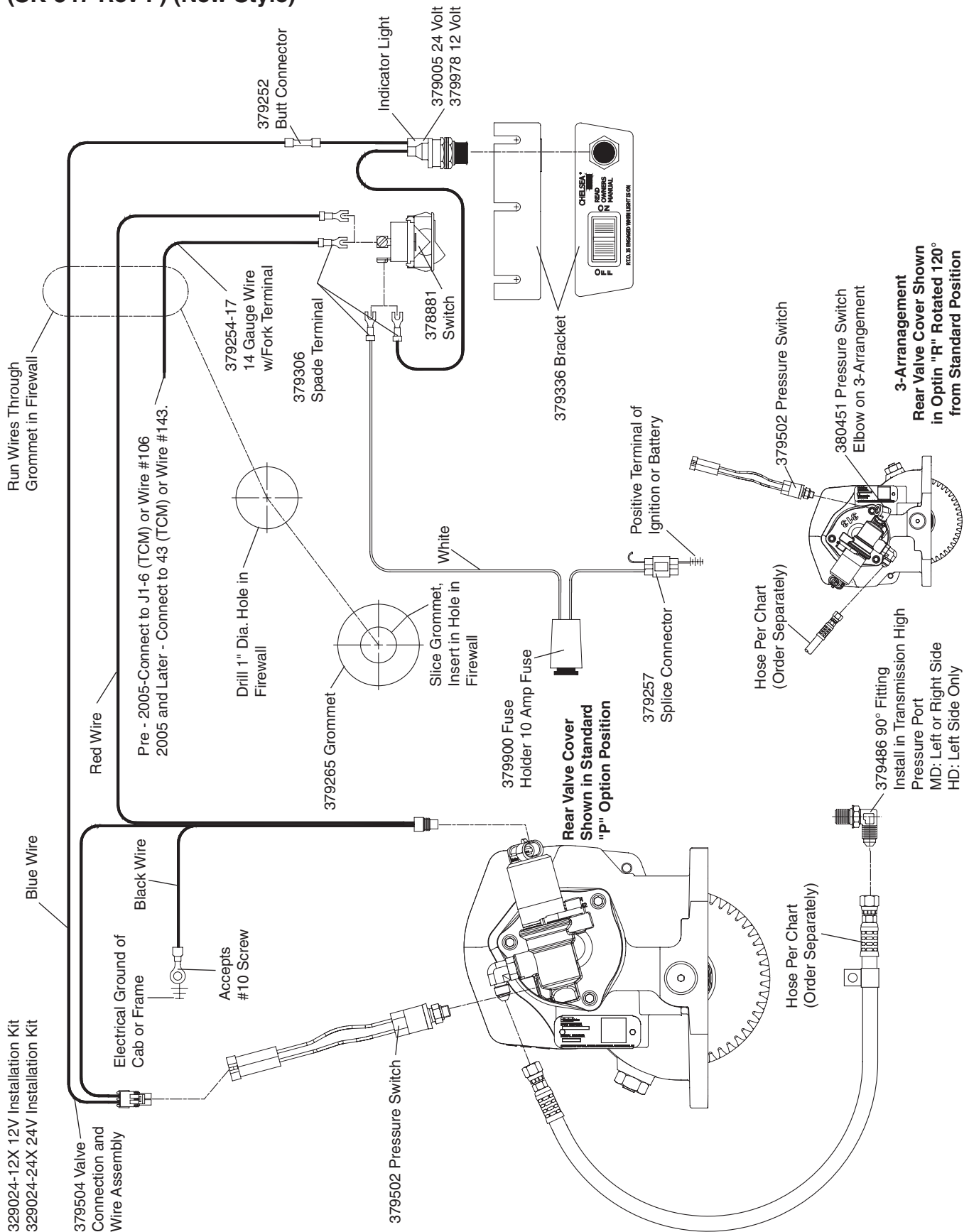
1 Lubrication Option "R", shifter Options "G" and "H" for 277 and 859 Series

2 Lubrication Option "R" for 278 Series

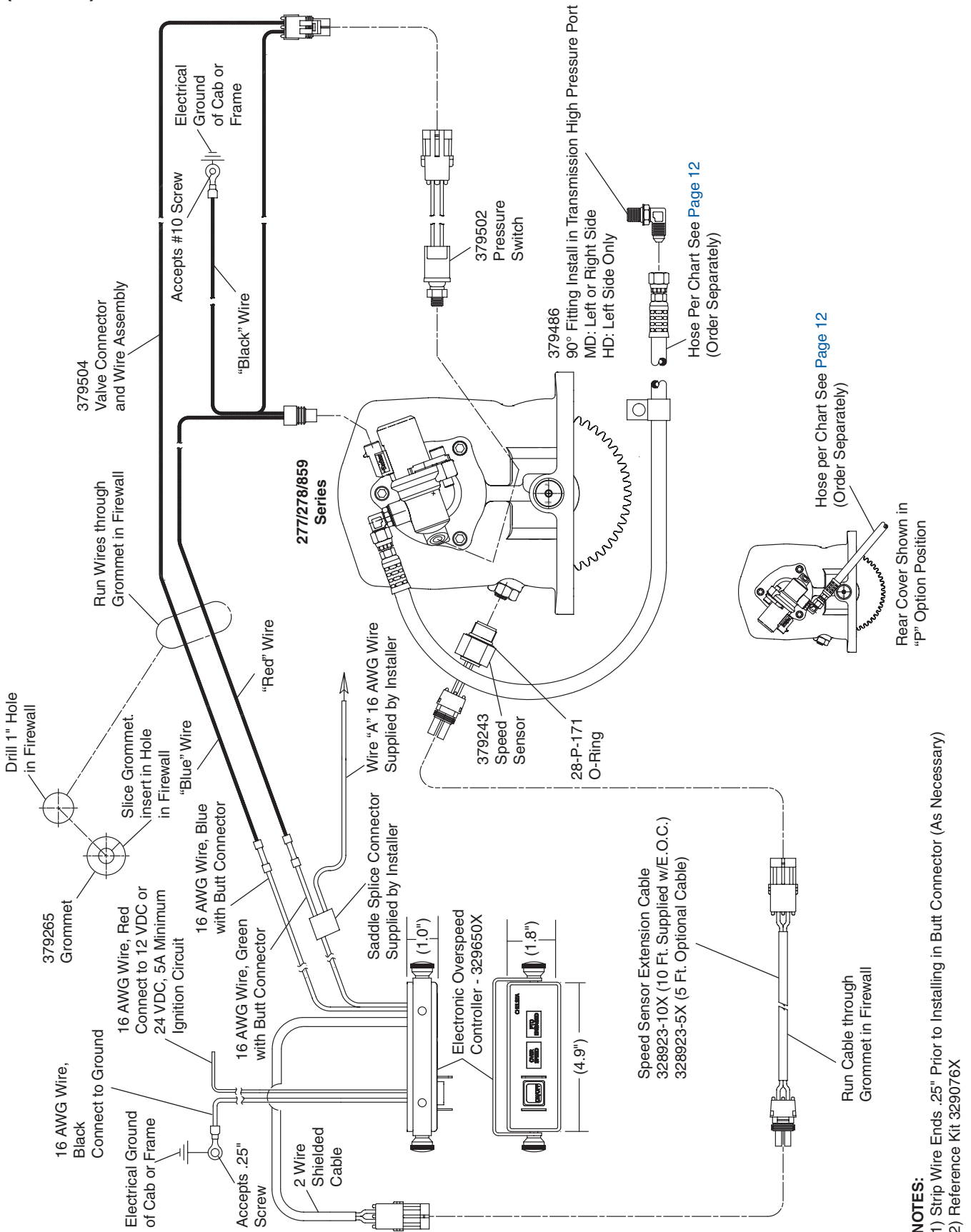
329024-12X 12V Installation Kit
329024-24X 24V Installation Kit



**Shift Installation Kit 277, 278, 859 & 870 Series without Electronic Overspeed Control
 (SK-347 Rev F) (New Style)**



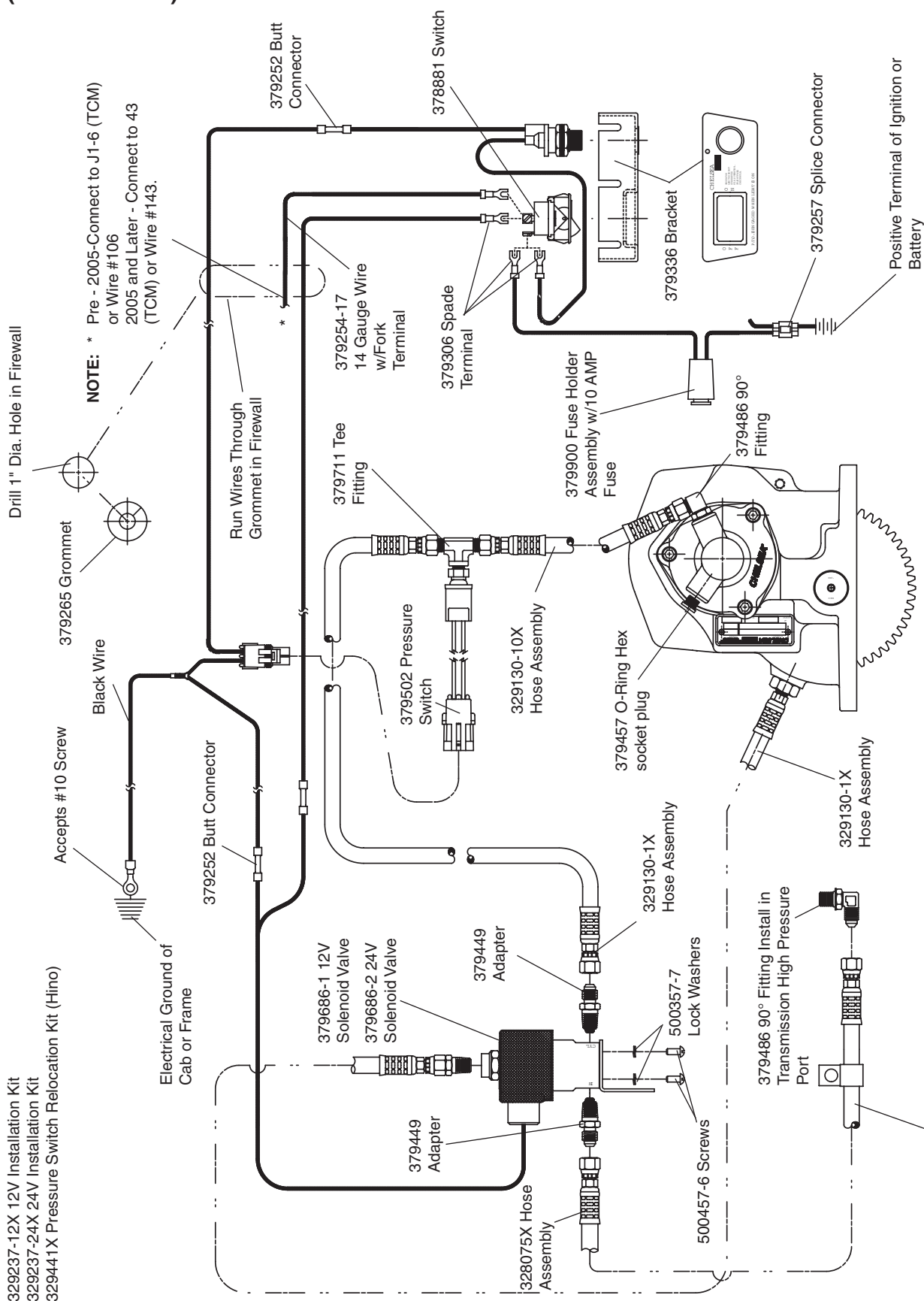
Shift Installation Kit 277, 278, 859 & 870 Series with Electronic Overspeed Control (SK-472)



NOTES:

- 1) Strip Wire Ends .25" Prior to Installing in Butt Connector (As Necessary)
- 2) Reference Kit 329076X

**Shift Installation Kit 277 Series with Remote Mount Solenoid for Hino Model 338
 (SK-410 Rev C)**



GMT C Series Trucks

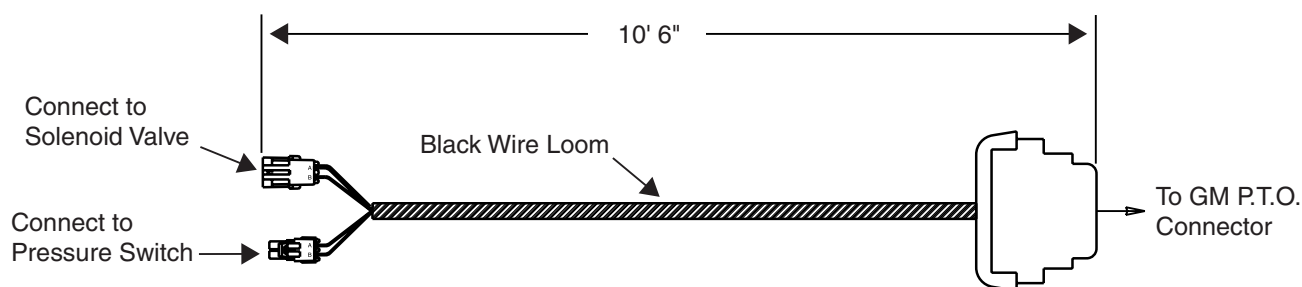
For model year 2003 GM C Series 4500, 5500, 6500, 7500 and 8500 trucks may be equipped with the Allison World (MD) transmission. In these vehicles GM Truck has integrated a P.T.O. connector, located in the right hand engine compartment area. A Power Take-Off switch has also been incorporated into the GM dash panel to control P.T.O. operation. With the P.T.O. option ordered on the truck, the P.T.O. connector and in-dash switch simplify the interface for the body builder.

In order for the customer to utilize the full capability of the P.T.O./transmission, Chelsea has design a wiring harness that must be used between the GM P.T.O. connector and the Chelsea Power Take-Off. These are for P.T.O. Non E.O.C. applications only.

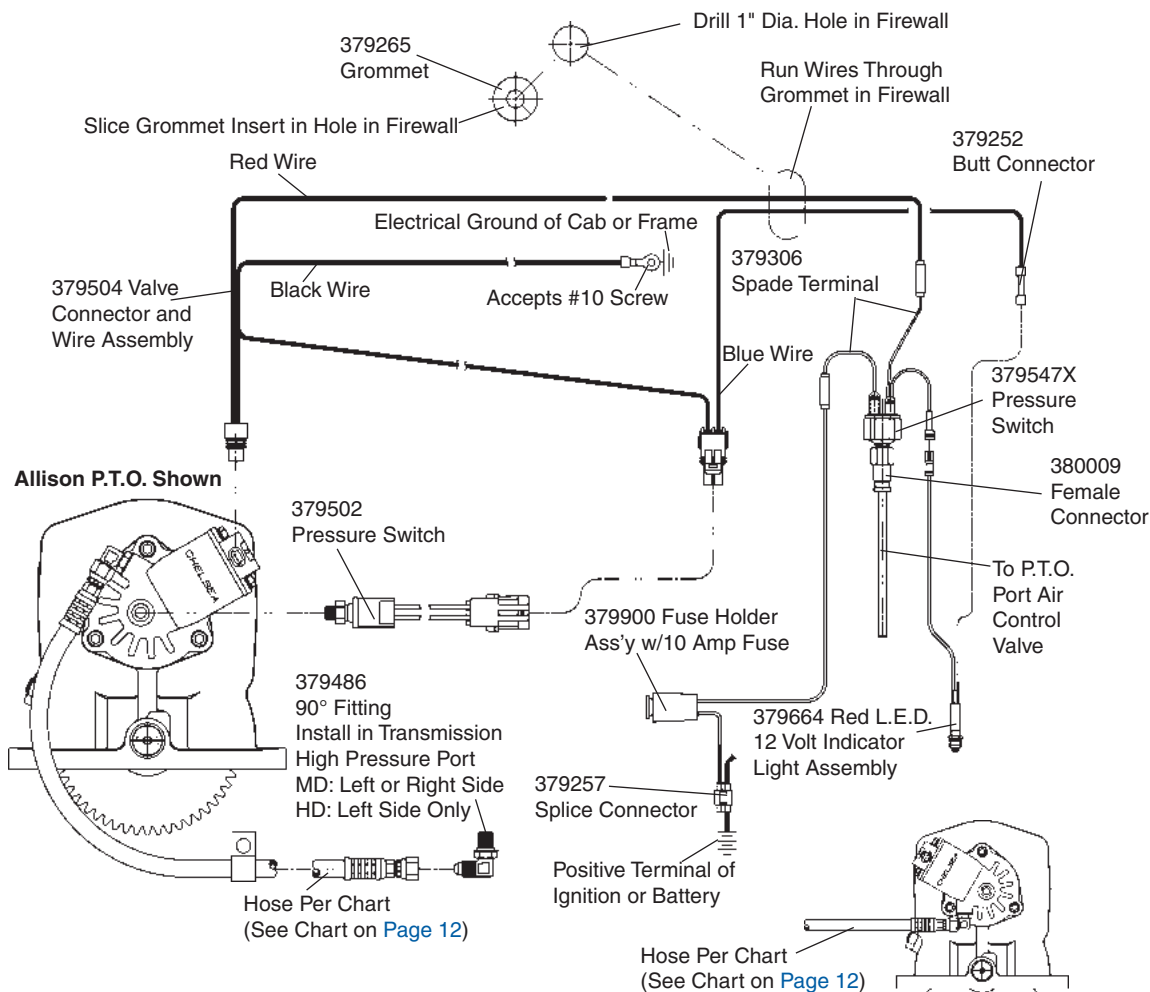
On the Allison World (MD) transmission the P.T.O. drive gear is engine driven. The wiring harness is not "required" for the Power Take-Offs listed on the chart, but must be used if the GM supplied in-dash P.T.O. switch is to be utilized.

See wiring harness part number 379926 for the 277, 278 and 859 Series Power Take-Offs.

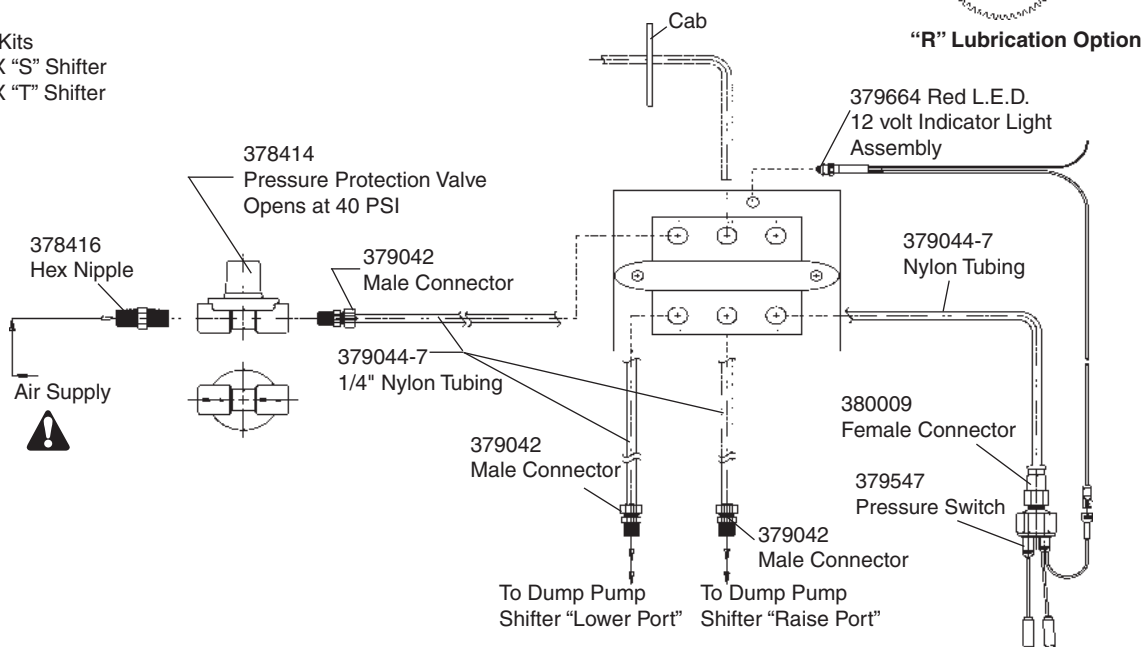
2003 GM "C" Series Wiring Harness for 277, 278 and 859 Series
Part Number 379926



P.T.O. Combo Valve Installation Sketch, 277 and 278 Series (SK-427 Rev B) (Old Style)



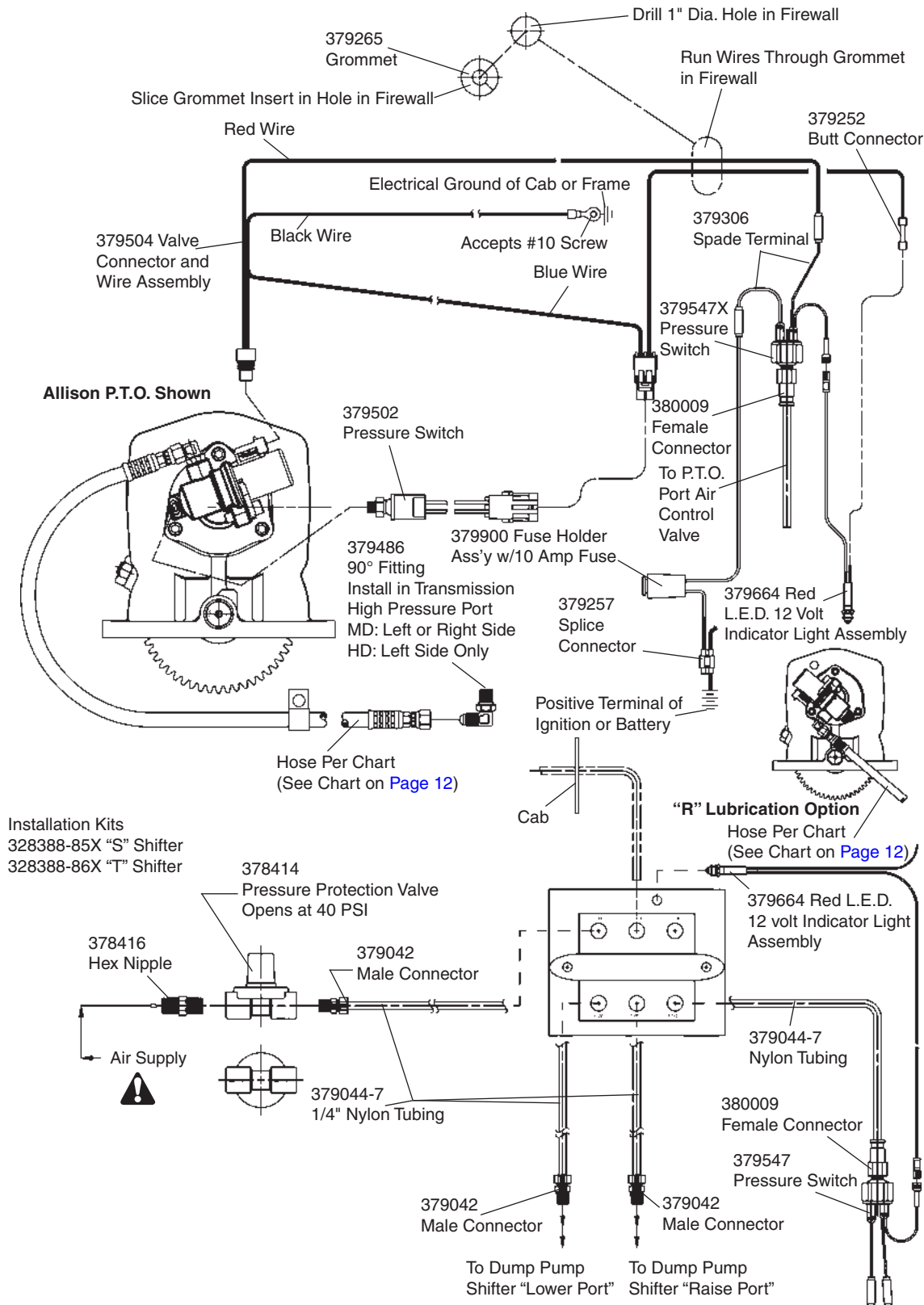
Installation Kits
 328388-85X "S" Shifter
 328388-86X "T" Shifter



Warning: Connect directly to air supply. Do not use tubing between air supply and pressure protection valve.

Caution: When installing nylon tubing avoid sharp angles, exhaust and manifold systems.

P.T.O. Combo Valve Installation Sketch, 277 and 278 Series (SK-427 Rev C) (New Style)



Warning: Connect directly to air supply. Do not use tubing between air supply and pressure protection valve.
Caution: When installing nylon tubing avoid sharp angles, exhaust and manifold systems.

Mounting the P.T.O. on the Transmission

When installing a P.T.O., always wear protective clothing and safety glasses.

1. Remove the P.T.O. aperture plate with a 16mm socket (**Fig. 1**).

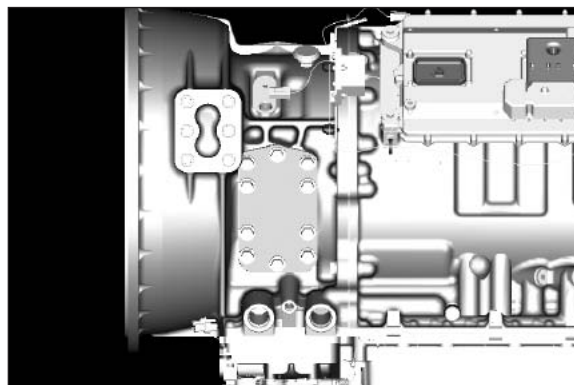


Fig. 1

2. Remove the gasket and clean the aperture surface (**Fig. 2**).

NOTE: Do not reuse the gasket that comes with the transmission.



Fig. 2

3. Using a screwdriver, install the guide pins until they bottom out (**Fig. 3**) (see [Page 39](#)).

NOTE: Do not use sealing compounds because they are generally incompatible with automatic transmission fluid.

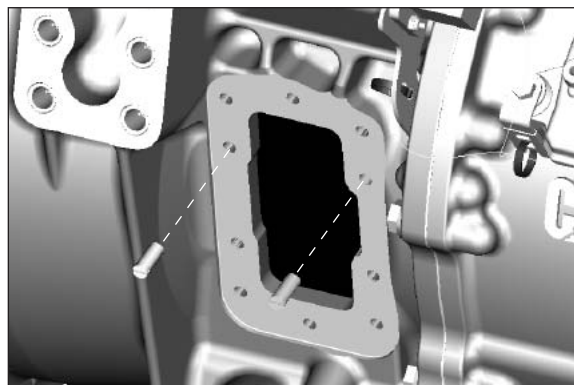


Fig. 3

4. Install the special gasket over the guide pins. The ribbed surface should face outward, toward the installer (**Fig. 4**).

NOTE: To ensure proper backlash and sealing of the P.T.O. to the transmission, only use Gasket furnished with the P.T.O.

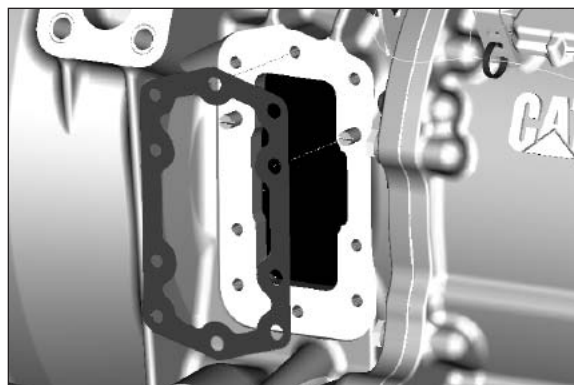


Fig. 4

Mounting the P.T.O. on the Transmission (Continued)

5. Position the P.T.O. and secure it with the top capscrew provided. (**Fig. 5**)

NOTE: Refer to [Page 39](#) for proper capscrew installation for the 269 & 278 Series

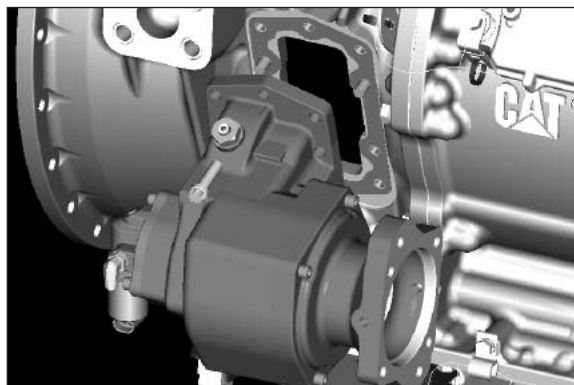


Fig. 5

6. Install the remaining capscrews. Torque them to 37-44 Lbs. ft. [50-60 N.m.] (**Fig. 6**).



Fig. 6

NOTE: There are two (2) high pressure ports available. Use the port located on the driver's side of the transmission unless there is an interference issue with a pump or driven object (**Fig. 7**).

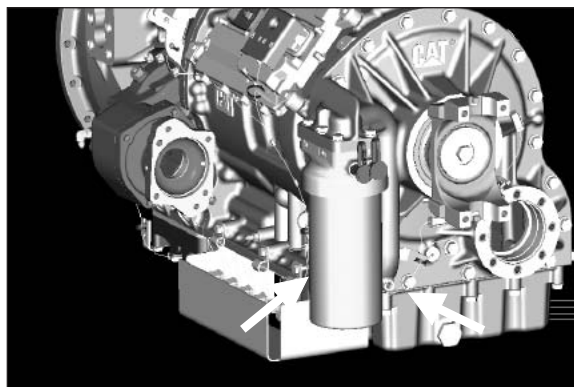


Fig. 7

7. Using the special fitting (379812) to securely attach the high pressure line to the transmission. This fitting is included with the P.T.O. Tighten to 8-10 Lbs. ft. [11.0 - 13.5 N.m.] (**Fig. 8**).

See the hose chart on [page 27](#) for the correct hose specifications. Tighten hose end fitting 2 flats from finger tight

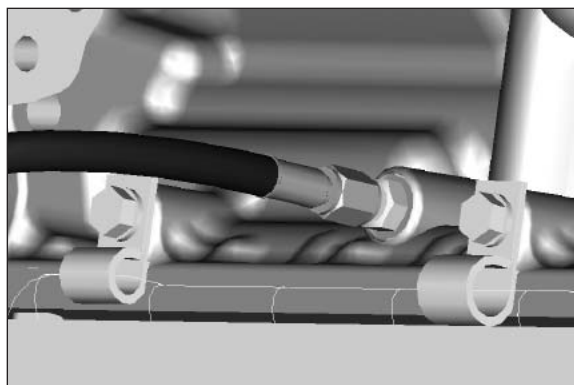


Fig. 8

Mounting the P.T.O. on the Transmission (Continued)

8. Securely attach the high pressure line to the valve. Tighten hose end fitting 2 flats from finger tight (**Fig. 9**).

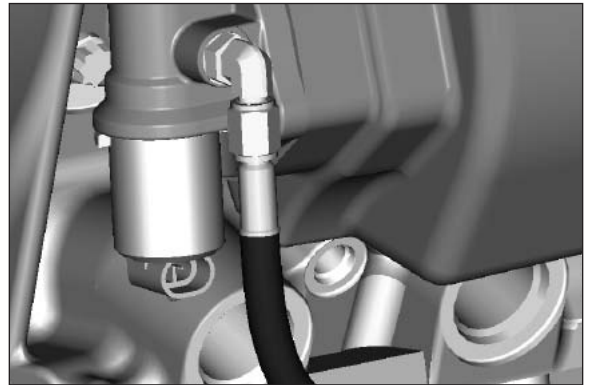


Fig. 9

9. Complete the assembly by installing the electrical connection (**Fig. 10**).

NOTE: See [page 24-26](#) for electrical connection drawings.

NOTE: If using a rotatable flange, see [page 39](#) for bolt torque.

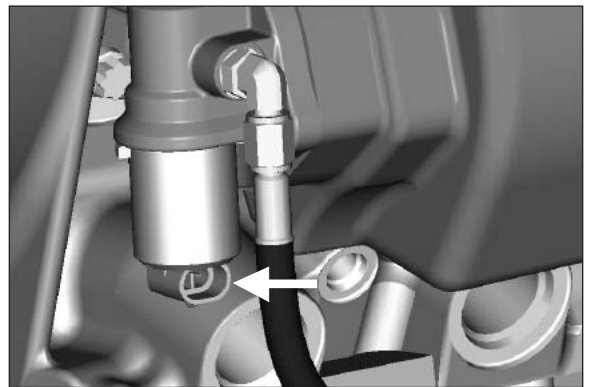
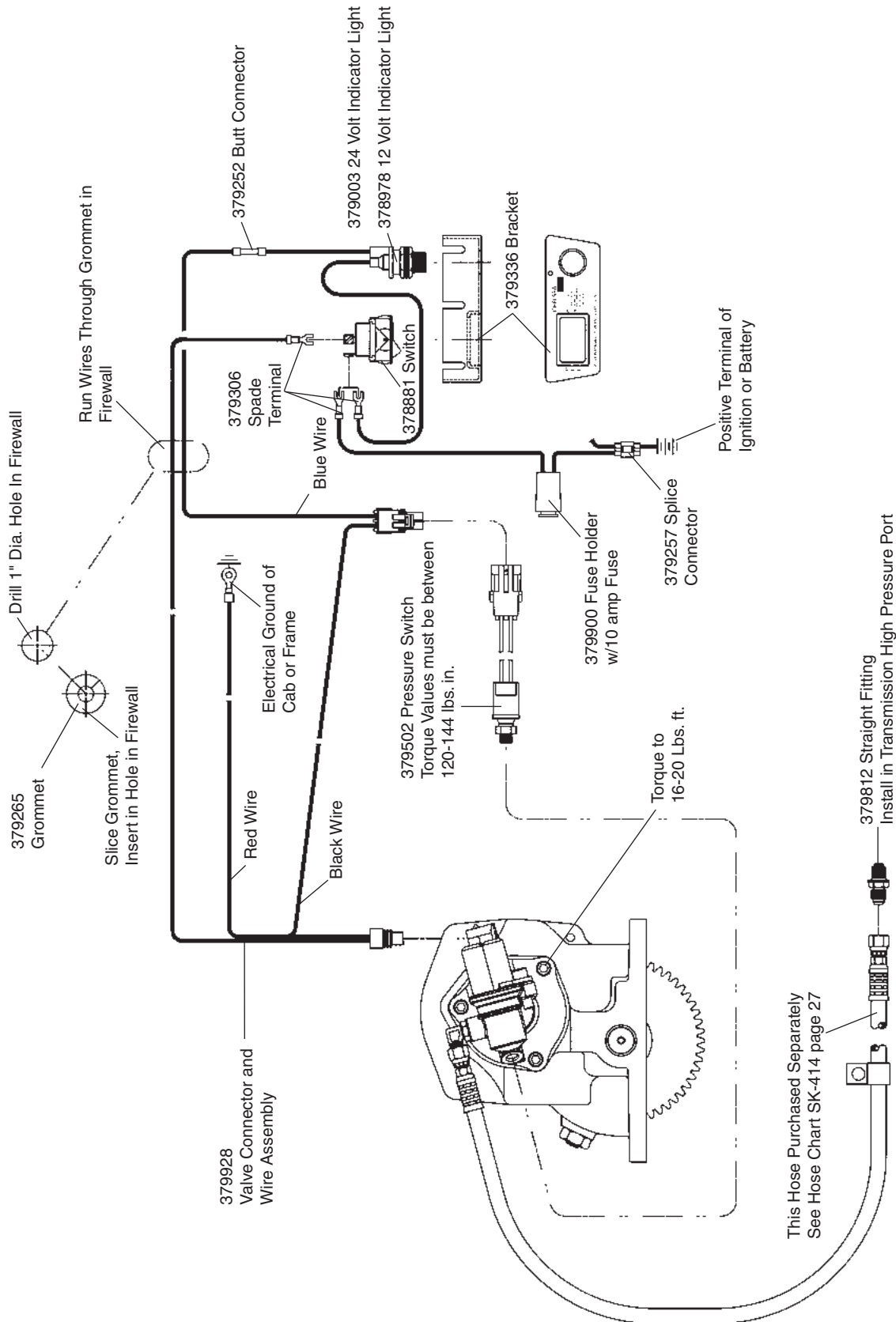


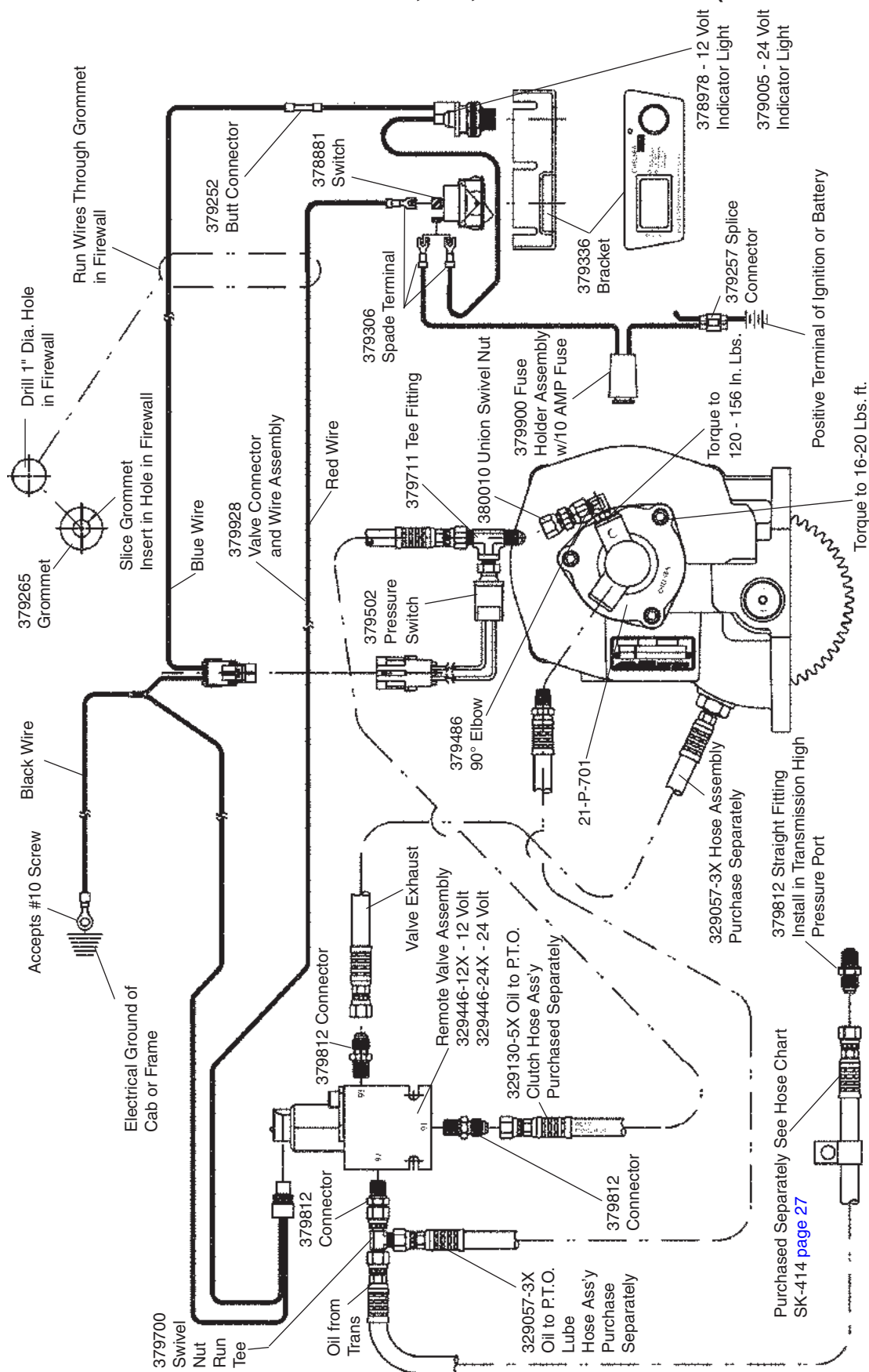
Fig. 10

**Shift Installation Kit 277, 278, 859 and 870 Series without Electronic Overspeed Control
 (SK-411 Rev A)**



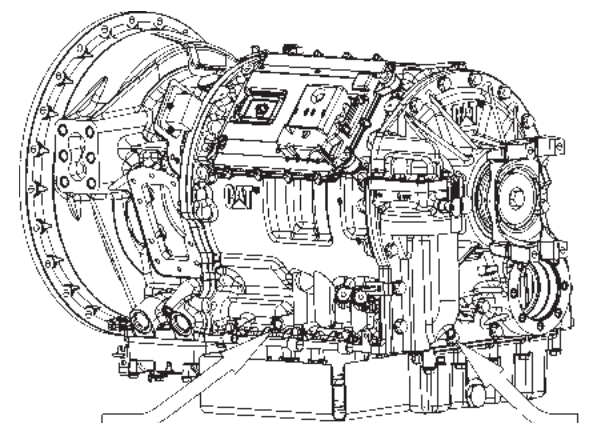
329443-12X - For 12V Installation Kit
 329443-24X - For 24V Installation Kit

3329445-12X 12V Installation Kit



NOTE: This option is not available with, nor can it be used on E.O.C. applications.

Pressure Port Locations & Hose Chart (SK-414 Rev B)

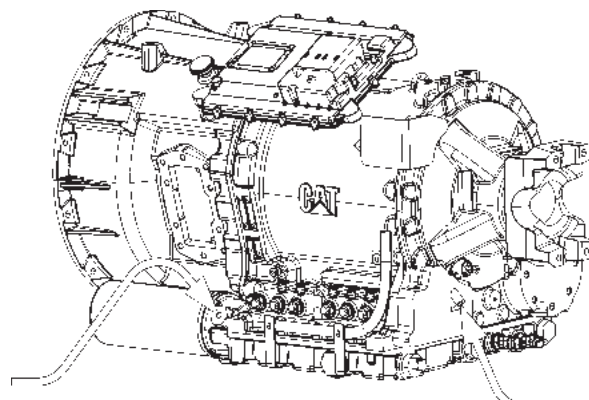


Left Side Port

Rear Port

CX31

(Filter Removed for Clarity)



Left Side Port

Rear Port

CX28

Both High Pressure Connections are -4 O-Ring Boss

HOSE CHART							
Trans.	P.T.O.	P.T.O. Location	High Oil Pressure Location	P.T.O. Valve Location	P.T.O. Fitting	Trans. Fitting	Trans.-P.T.O. Valve Hose #
CX31 CX28	277, 278, 859, 870	Driver (LHS)	LHS	Attached	379486	379812	329075-1X
		Driver (LHS)	Rear				329075-5X
		Pass. (RHS)	LHS				329075-2X
		Pass. (RHS)	Rear			379486	329075-5X
		Driver (LHS)	LHS	Remote	379486	379812	329130-6X
		Driver (LHS)	Rear				329130-6X
		Pass. (RHS)	LHS				329130-6X
		Pass. (RHS)	Rear				329130-6X
	267	Driver (LHS)	LHS	N/A	379486	379812	329130-3X
		Driver (LHS)	Rear			379486	329075-5X
		Pass. (RHS)	LHS			379812	329075-2X
		Pass. (RHS)	Rear			379812	329075-5X
	867, 877	Driver (LHS)	LHS	N/A	379486	379812	329130-3X
		Driver (LHS)	Rear				329075-5X
		Pass. (RHS)	LHS				329075-2X
		Pass. (RHS)	Rear			379486	329075-5X

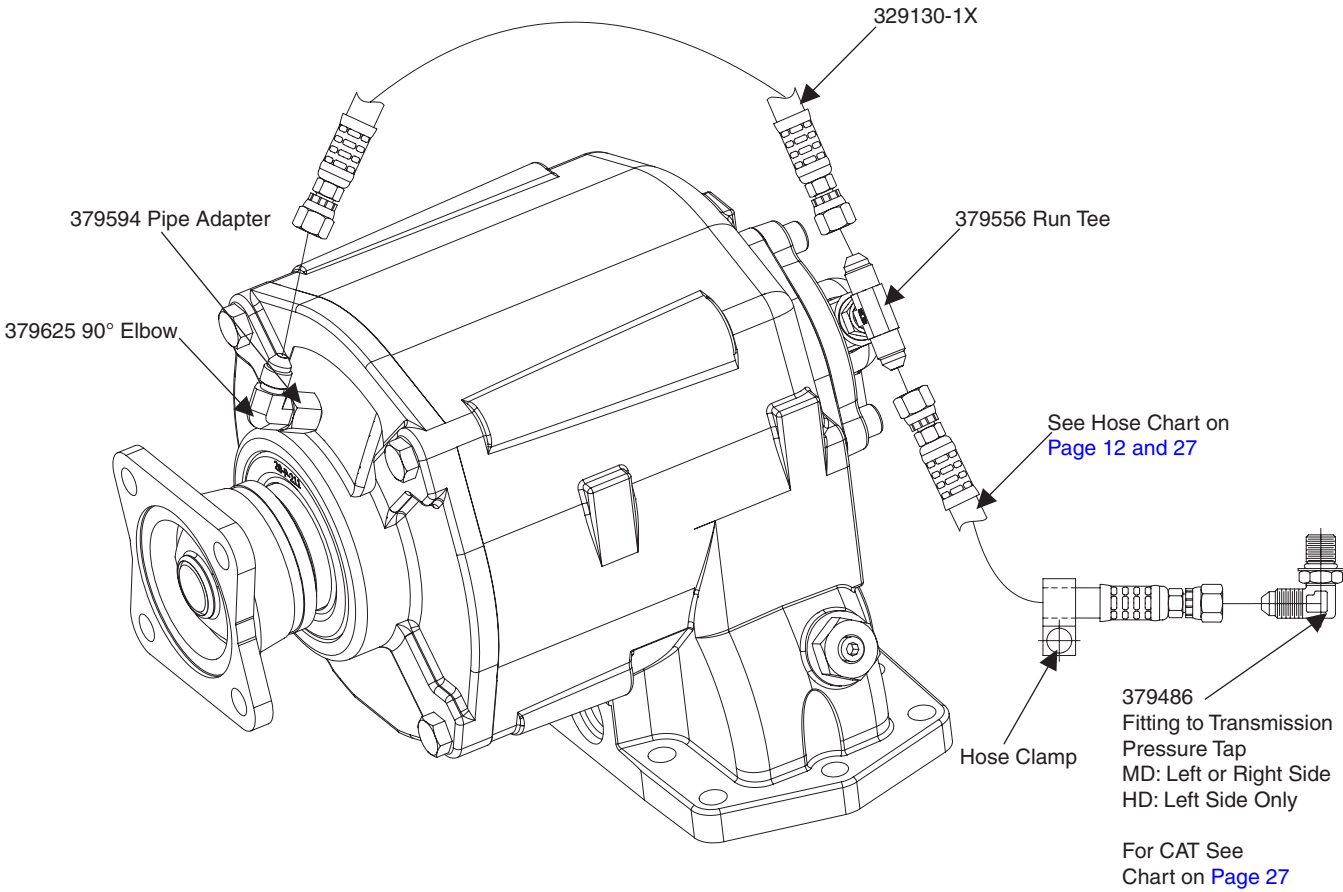
LHS = Left Side of Transmission, 8 o'clock position

RHS = Right Side of Transmission, 1 o'clock position

NOTES:

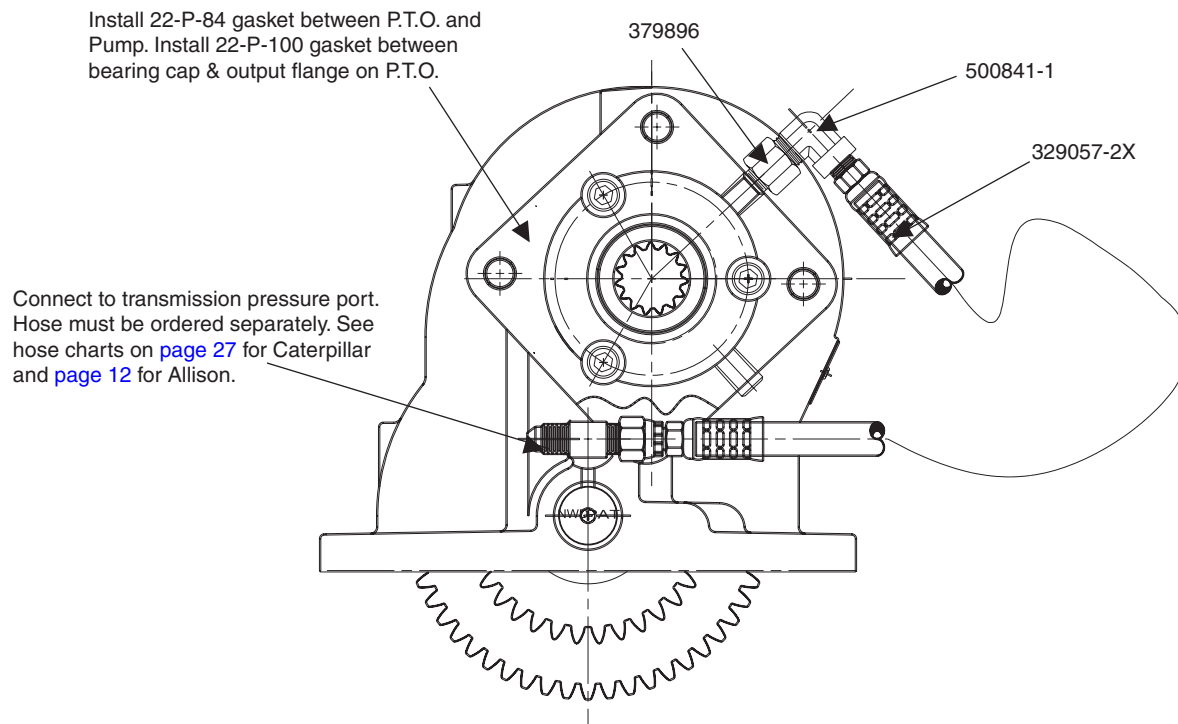
1. P.T.O. Fitting 379486 and Transmission Fitting 379812 included with the P.T.O. Unit. If Using 379486 in Transmission it Must be Purchased Separately
2. Hoses to be Purchased Separately
3. 379486 Elbow Will Not Install on Left Hand (Driver) Side Oil Port Due to Transmission Interference
4. If 379486 is Listed as Transmission Fitting for Rear Location, Route Hose Along Right Hand (passenger) Side of Transmission and Under Transmission Output Yoke

Hose Installation Sketch 867 Series (SK-553)

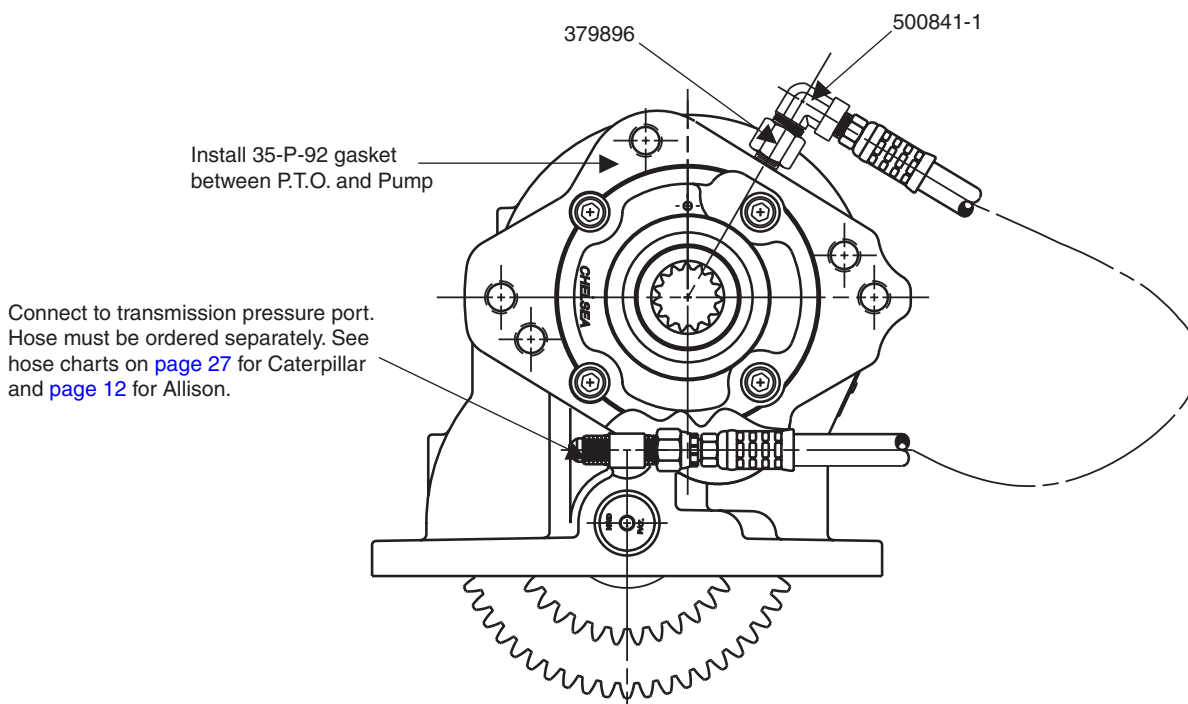


CAUTION: Wet Spline Options Must be used with a Pump that has a Contiguous Sealing surface to Ensure a proper seal between Pump and P.T.O.

Installation “RY” Wet Spline 267 Series (SK-351 Rev C)



Installation “AF” Wet Spline 267 Series (SK-350 Rev C)

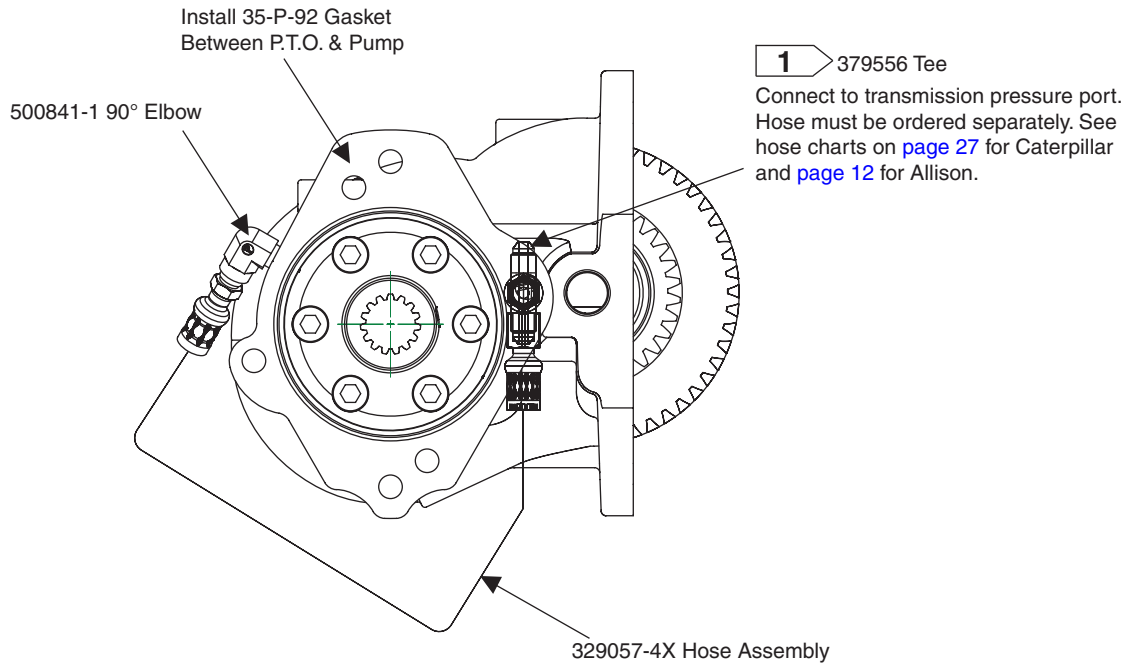


Installation "RJ" Wet Spline 267 Series (SK-465 Rev A)

NOTES:

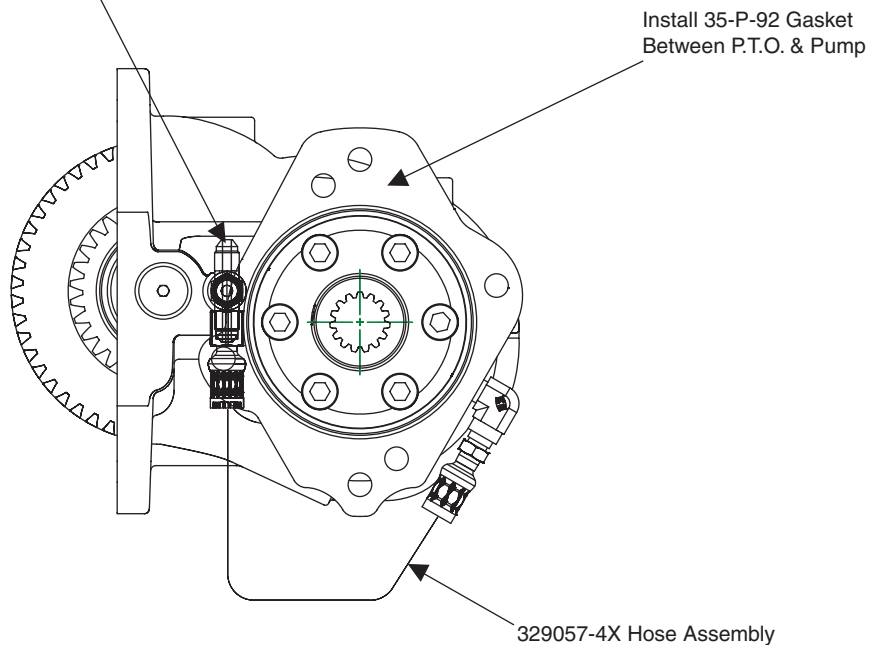
- 1** Connect to Transmission Pressure Port

5 Ass'y View



- 1** 379556 Tee
Connect to transmission pressure port. Hose must be ordered separately. See hose charts on [page 27](#) for Caterpillar and [page 12](#) for Allison.

3 Ass'y View



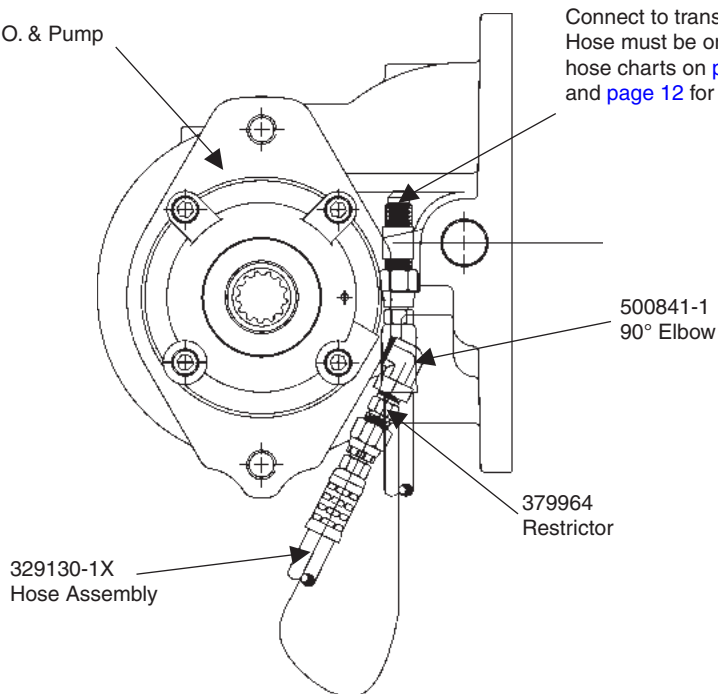
NOTES: Install Hose and Fittings Prior to Installing P.T.O. on Transmission

Installation "AK" Wet Spline 267 Series (SK-378 Rev A)

Kit #329406X for Wet Spline Installation Components

5 Ass'y View

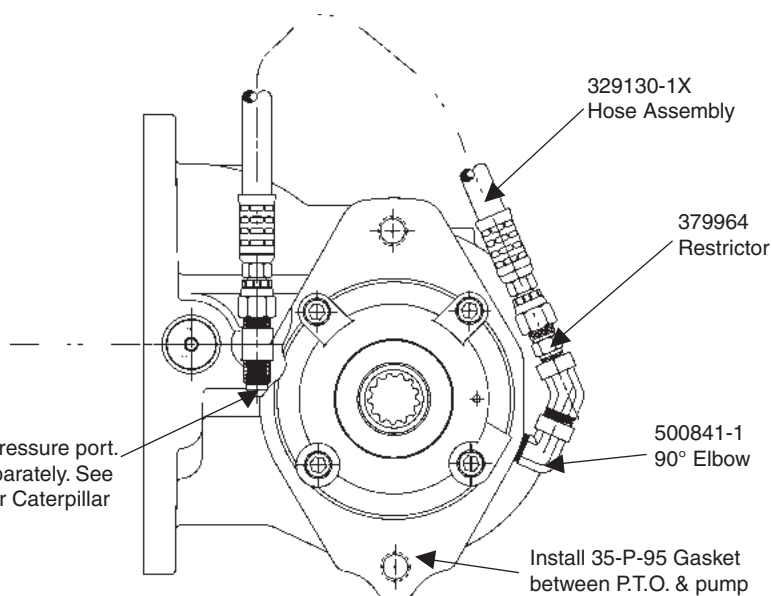
Install 35-P-95 Gasket between P.T.O. & Pump



Connect to transmission pressure port. Hose must be ordered separately. See hose charts on [page 27](#) for Caterpillar and [page 12](#) for Allison.

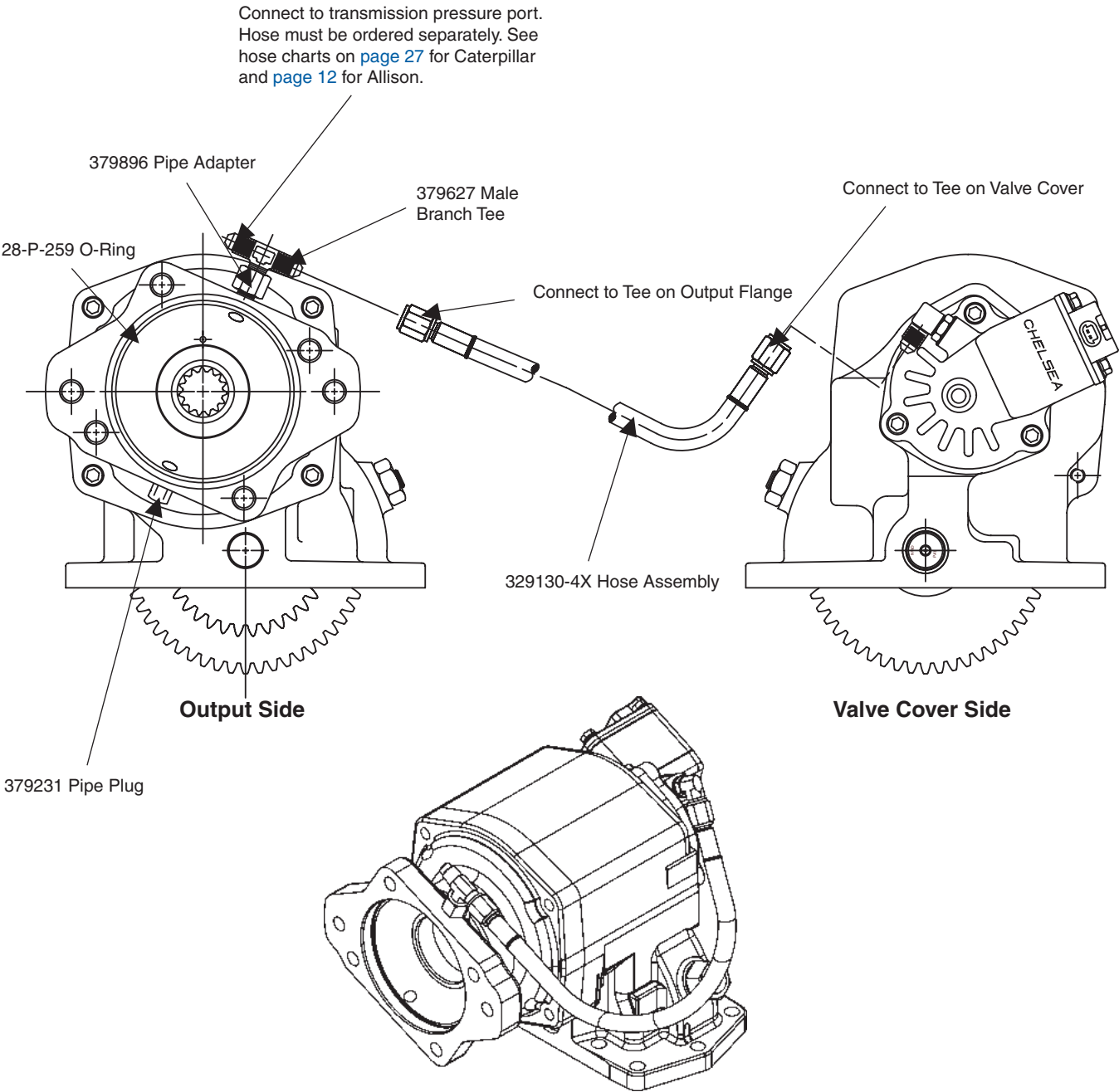
3 Ass'y View

Connect to transmission pressure port. Hose must be ordered separately. See hose charts on [page 27](#) for Caterpillar and [page 12](#) for Allison.

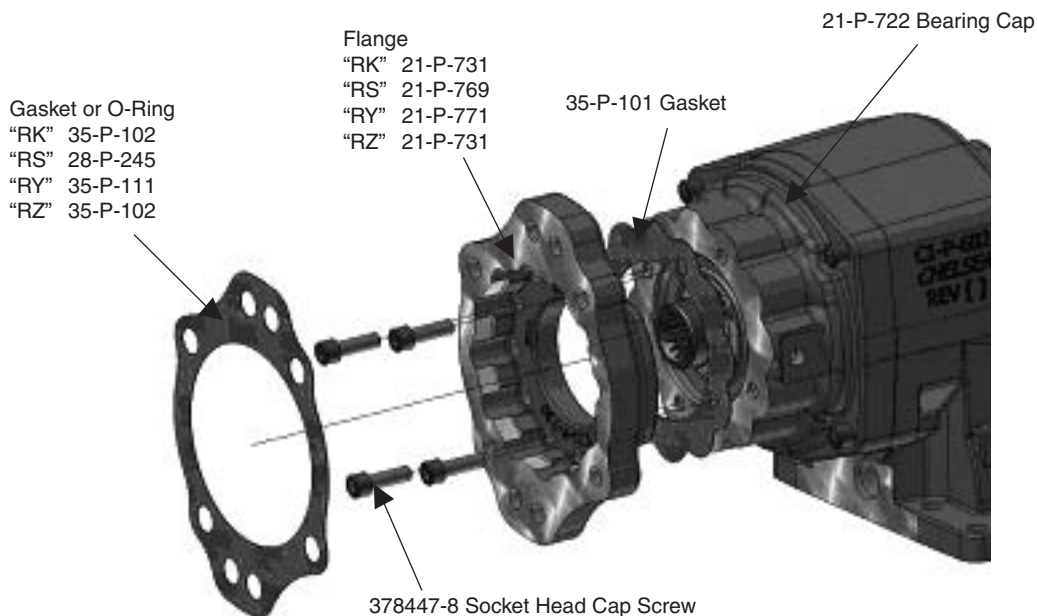
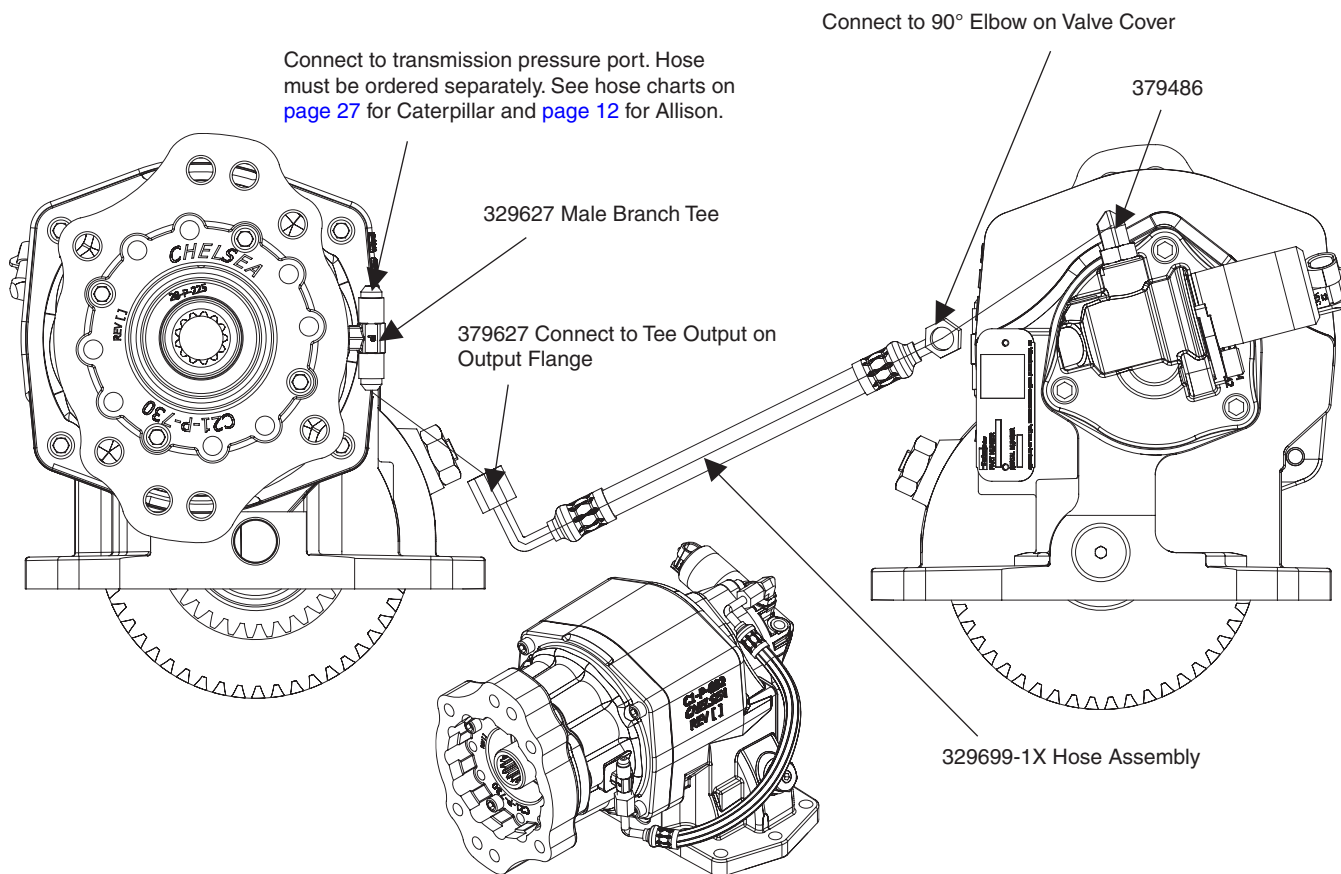


Installation “AF” Wet Spline 277 and 278 Series (SK-383 Rev B) (Old Style)

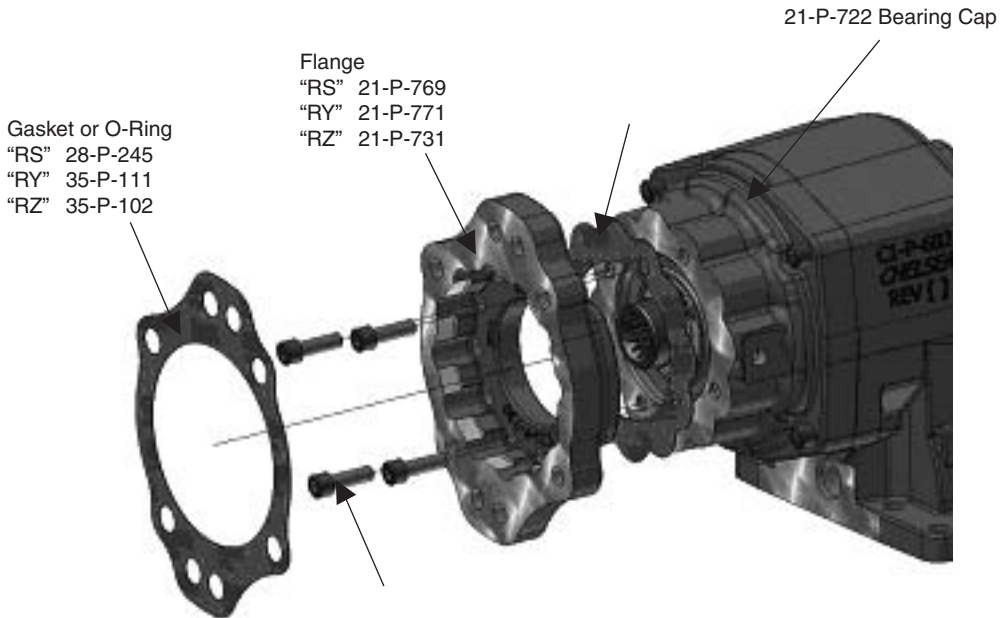
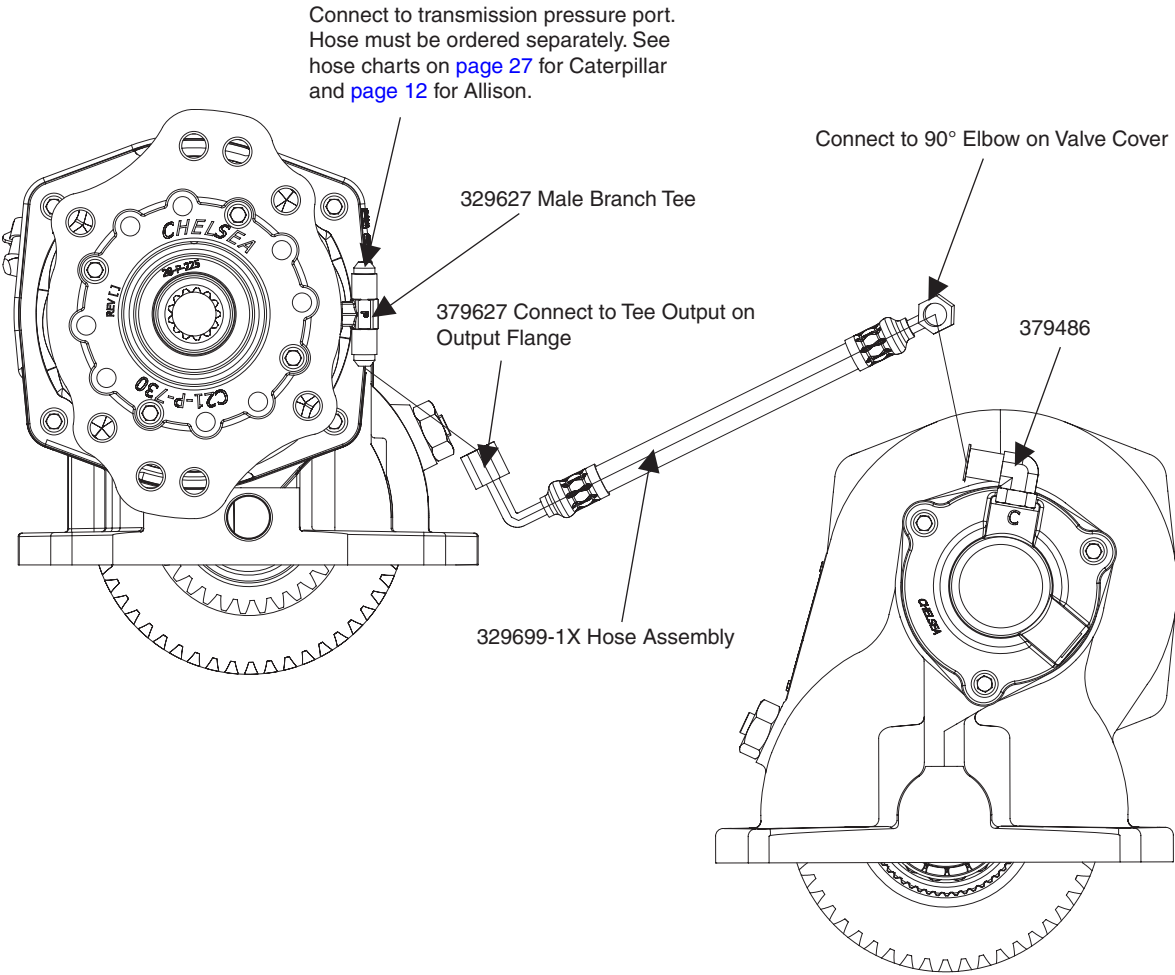
329337-6X - Wet Spline Installation Kit



Installation "RK", "RS", "RY" & "RZ" Wet Spline 277, 278, and 870 Series (SK-508)

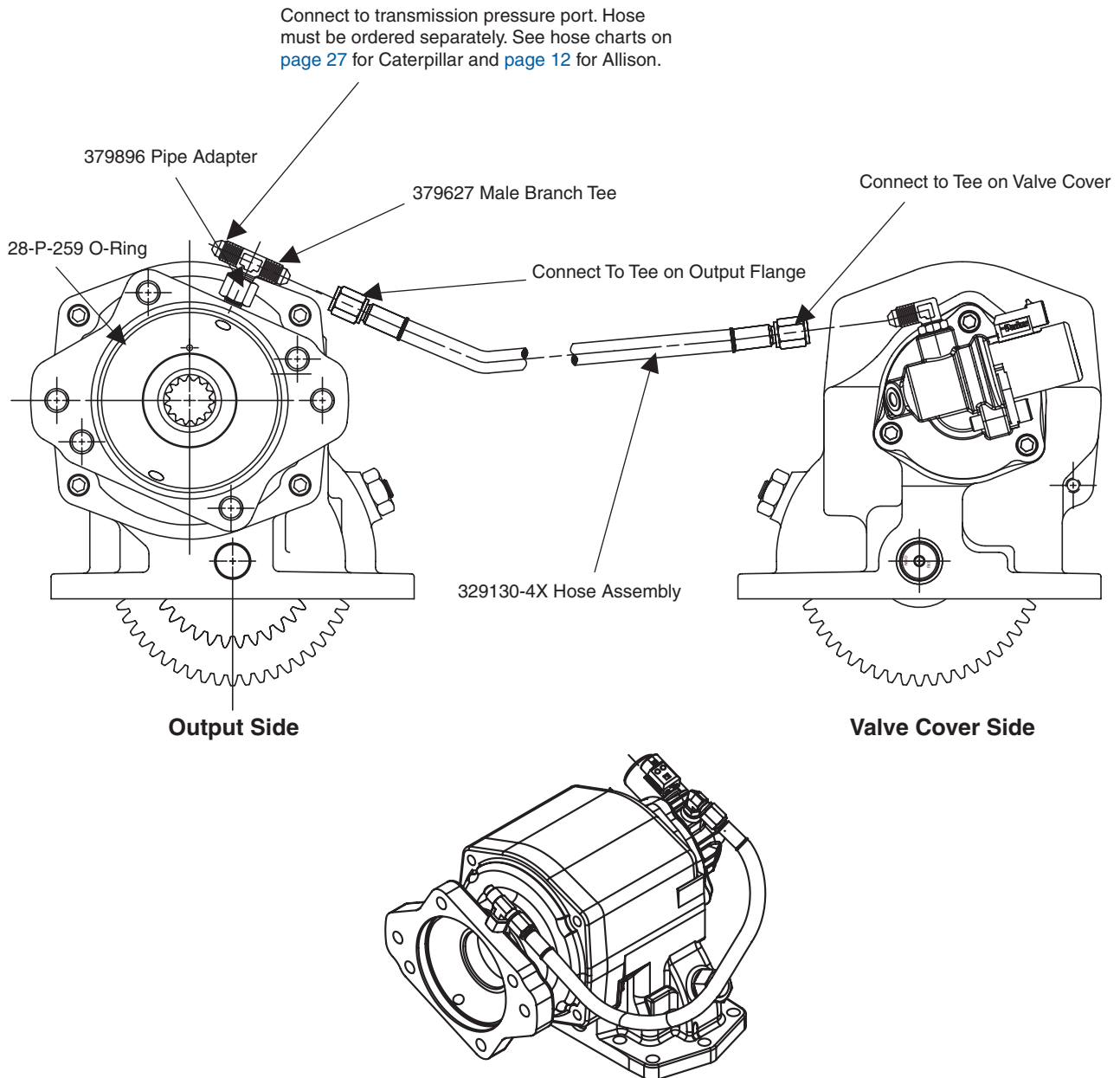


Installation “RS”, “RY” & “RZ” Wet Spline 877 Series



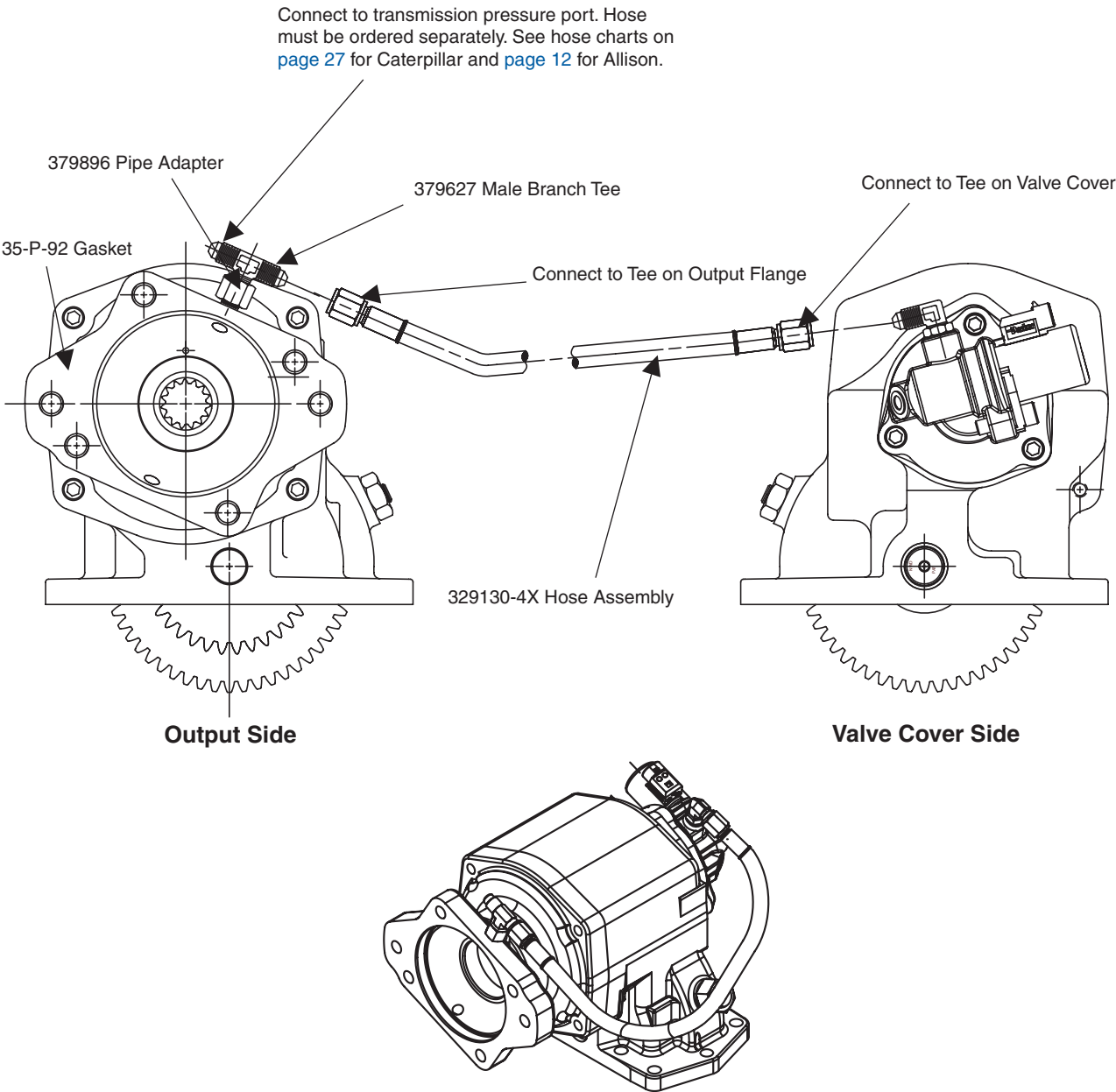
Installation “AF” Wet Spline 277 and 278 Series (SK-383 Rev D) (New Style)

329337-6X - Wet Spline Installation Kit

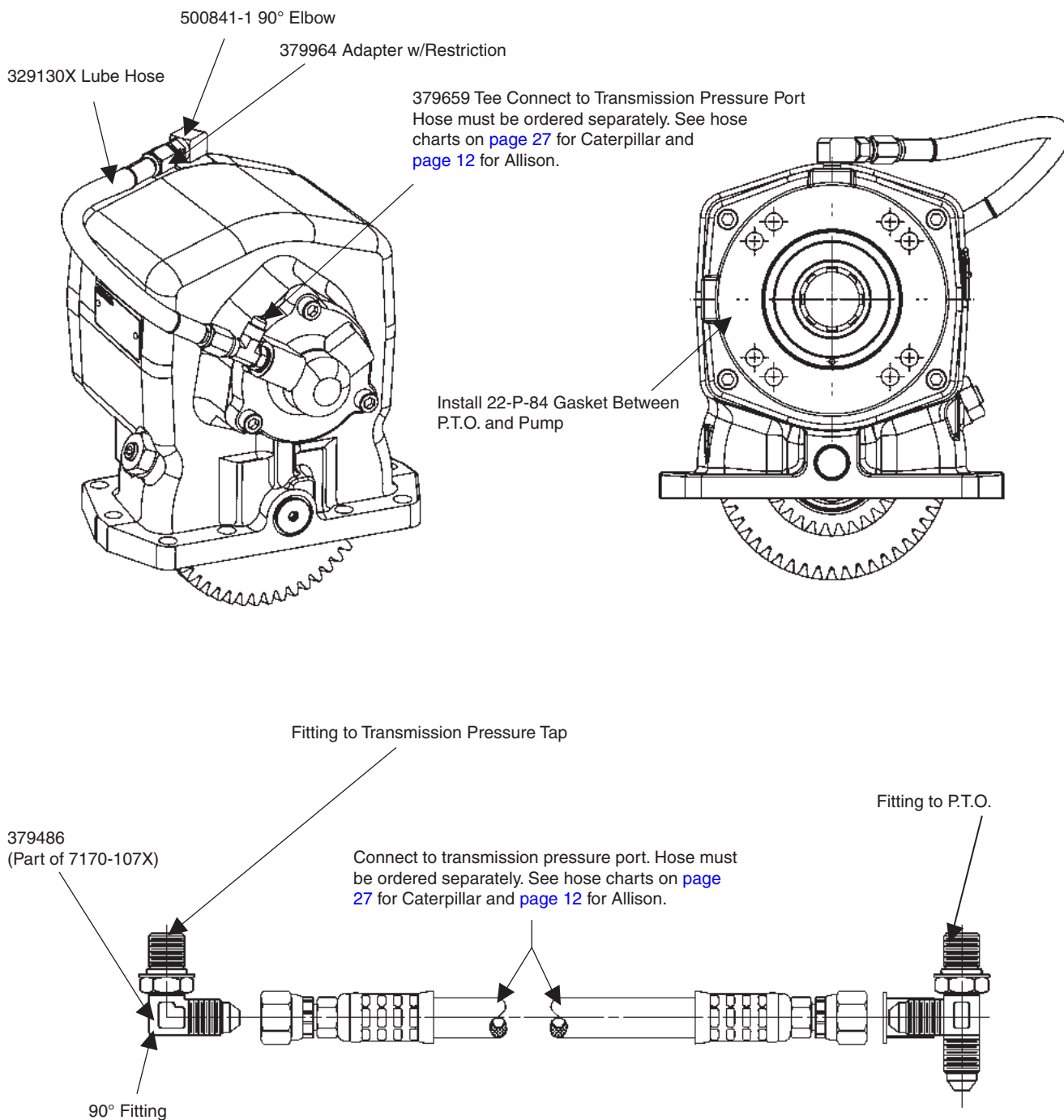


Installation “XK” Wet Spline 277 and 278 Series

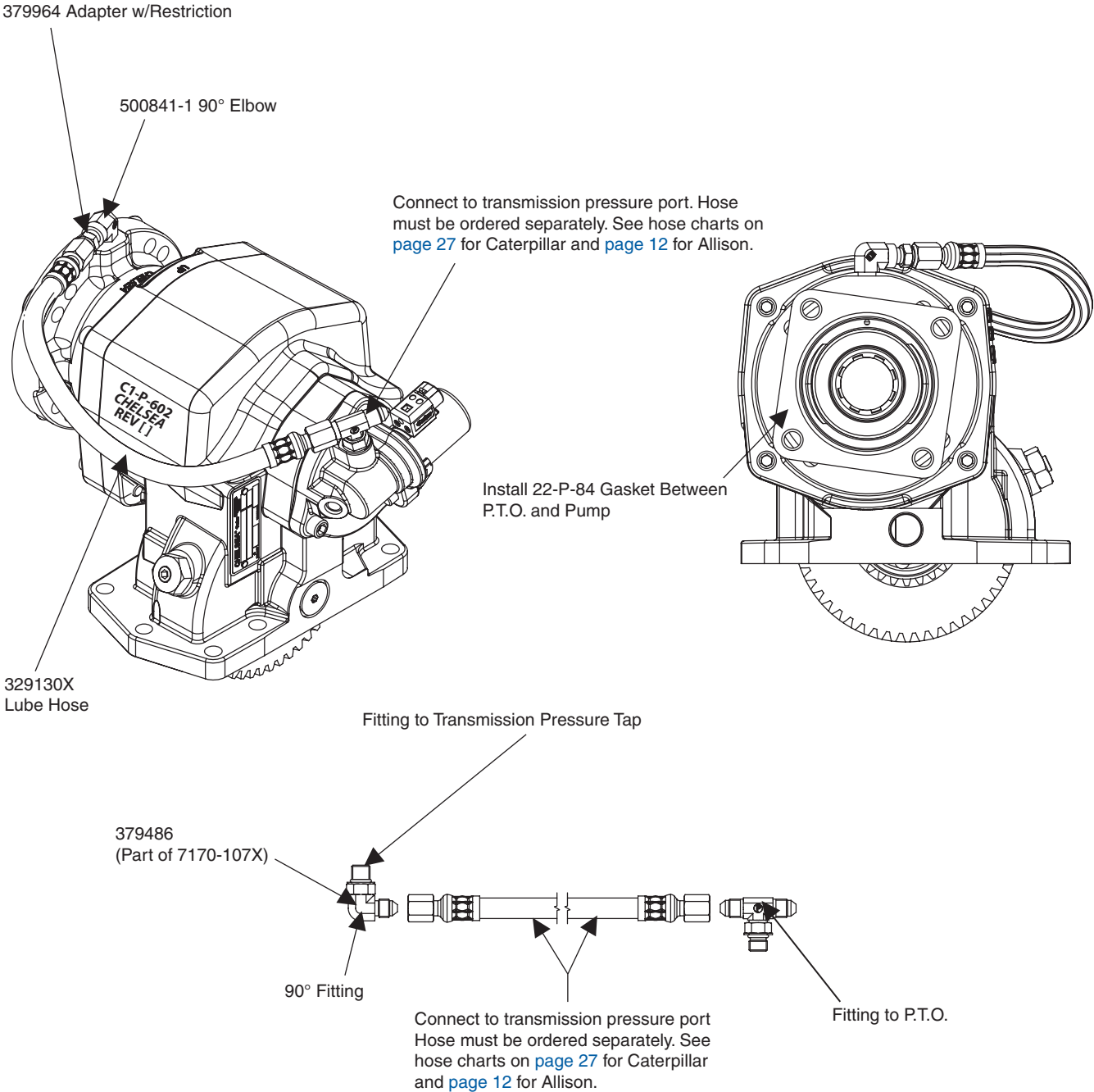
329337-6X - Wet Spline Installation Kit



Installation "XY" Wet Spline 269 Series (SK-416 Rev B)

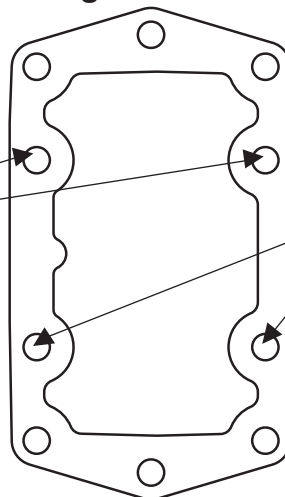


Installation “ZY” Wet Spline 277 and 278 Series (SK-454 Rev A)



269, 278, 870 and 877 Series Installation Mounting Kit Instructions (SK-355 Rev C)

Dowel Pin Location if installing P.T.O. on Right Side (Curb Side) of Transmission.



Dowel Pin Locations if installing P.T.O. on Left Side (Street Side) of Transmission.

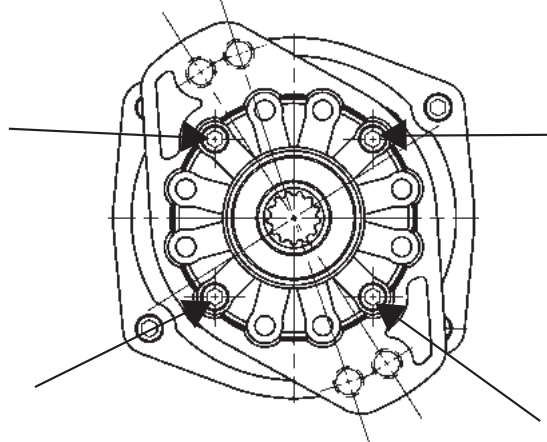
NOTE: P.T.O. Models 269, 278, 870/877 Guide pins 379451 may be removed after assembly and replaced with 379453-10 capscrews.

NOTE: Models 267, 277, 859 & 867 guide pins cannot be removed.

NOTE: Install Shorter 379453-8 capscrews Under Barrel of P.T.O. Housing in Either Hole Depending on Housing Orientation.

Installing Rotatable Flanges

The rotatable flange is shipped loose with the P.T.O. units for ease of installation. After determining the flange position, attach the flange to the P.T.O. bearing cap using the capscrews provided in the bag kit. After installing the capscrews make sure to torque the screws to the correct torque values stated in the Torque Chart. Consideration should be taken on the size and weight of the pump being installed. (see [pages 3 and 4](#))



RA Flange Shown

Outputs	P.T.O. Series	Output Flange to Bearing Cap Capscrew P/N	Qty.	Size Capscrew	Capscrew Bag Kit	Recommended Capscrew Torque
PA, PF, RA, RB, RF, RG	277/278	378447-6	4	0.312"-18 x 1.000"	328170-208X	16-20 Lbs. ft. [22-27 Nm]
RK, RM, RS, RY, RZ	277/278 870/877	378447-8	4	0.312"-18 x 1.500"	328170-216X	16-20 Lbs. ft. [22-27 Nm]
RJ	267	379740-6	6	M10-1.50" x 0.984"		35-40 Lbs. ft. [47-54 Nm]

NOTE: Reinstalling or tightening of a rotatable flange after it has become loose is not recommended. If a P.T.O. has run for a length of time after the flange has become loose, the flange and / or bearing cap may not be to manufacturing tolerance.

P.T.O. Shifting Procedure & Precautions

CAUTION: This vehicle is equipped with a Power Take-Off. Shut engine off before working on the Power Take-Off or getting below the vehicle. Consult the operating instructions before using the P.T.O. (See sun visor.)

POWER TAKE-OFF OPERATION — VEHICLE STATIONARY**Automatic Transmission with Powershift P.T.O.s**

Engage the P.T.O. with the engine at idle speed.

NOTE: Powershift P.T.O.s: The engine must be at idle or below 1000 R.P.M. when the P.T.O. is engaged. See the transmission manufacturer's instructions for special procedures.

IMPORTANT:

Failure to follow the proper shifting or operating sequences will result in premature P.T.O. failure with possible damage to other equipment.

**Warning: Cold Weather Operation of Powershift P.T.O.s**

During extreme cold weather operation [32° F (0° C) and lower], a disengaged Powershift Power Take-Off can momentarily transmit high torque that will cause unexpected output shaft rotation. This is caused by the high viscosity of the transmission oil when it is extremely cold. As slippage occurs between the Power Take-Off clutch plates, the oil will rapidly heat up and the viscous drag quickly decreases.

The Power Take-Off output shaft rotation could cause unexpected movement of the driven equipment, resulting in serious personal injury, death, or equipment damage.

To avoid personal injury or equipment damage:

- Driven equipment must have separate controls.
- Driven equipment must be left in the disengaged position when not in operation.
- Driven equipment must not be operated until the vehicle is allowed to warm up.



This symbol warns of possible personal injury.

Power Take-Off Maintenance

Due to the normal and sometime severe torsional vibrations that Power Take-Off units experience, operators should follow a set maintenance schedule for inspections. Failure to service loose bolts or Power Take-Off leaks could result in potential auxiliary Power Take-Off or transmission damage.

Periodic P.T.O. MAINTENANCE is required by the owner/operator to ensure proper, safe and trouble free operation.

Daily: Check all air, hydraulic and working mechanisms before operating P.T.O. Perform maintenance as required.

Monthly: Inspect for possible leaks and tighten all air, hydraulic and mounting hardware, if necessary. Torque all bolts, nuts, etc. to Chelsea specifications. Ensure that splines are properly lubricated, if applicable. Perform maintenance as required.

With regards to the direct mounted pump splines, the P.T.O. requires the application of a specially formulated anti-fretting, high pressure, high temperature grease. The addition of the grease has been proven to reduce the effects of the torsional vibrations, which result in fretting corrosion on the P.T.O. internal splines as well as the pump external splines. Fretting corrosion appears as a "rusting and wearing" of the pump shaft splines. Severe duty applications, which require long P.T.O. running times and high torque may require more frequent regreasing. Applications such as Utility Trucks that run continuously and are lightly loaded also require frequent regreasing due to the sheer hours of running time. It is important to note that service intervals will vary for each and every application and is the responsibility of the end user of the product. Chelsea also recommends that you consult your pump owners manuals and technical services for their maintenance guidelines. Fretting corrosion is caused by many factors and without proper maintenance; the anti-fretting grease can only reduce its effects on components.

Chelsea offers the grease to our customers in two packages. The first is a 5/8 fluid ounce tube (379688), which is included with every applicable P.T.O., and the second is a 14-ounce grease cartridge (379831). Chelsea also offers greaseable shafts for most all output designators.

Warranty: Failure to comply entirely with the provisions set forth in the appropriate Owner's Manual will result in voiding of ALL Warranty consideration.

[illegible]

Offer of Sale

The items described in this document and other documents and descriptions provided by Parker Hannifin Corporation, its subsidiaries and its authorized distributors ("Seller") are hereby offered for sale at prices to be established by Seller. This offer and its acceptance by any customer ("Buyer") shall be governed by all of the following Terms and Conditions. Buyer's order for any item described in its document, when communicated to Seller verbally, or in writing, shall constitute acceptance of this offer. All goods, services or work described will be referred to as "Products".

1. Terms and Conditions. Seller's willingness to offer Products, or accept an order for Products, to or from Buyer is subject to these Terms and Conditions or any newer version of the terms and conditions found on-line at www.parker.com/saleterms/. Seller objects to any contrary or additional terms or conditions of Buyer's order or any other document issued by Buyer.

2. Price Adjustments; Payments. Prices stated on Seller's quote or other documentation offered by Seller are valid for 30 days, and do not include any sales, use, or other taxes unless specifically stated. Unless otherwise specified by Seller, all prices are F.C.A. Seller's facility (INCOTERMS 2010). Payment is subject to credit approval and is due 30 days from the date of invoice or such other term as required by Seller's Credit Department, after which Buyer shall pay interest on any unpaid invoices at the rate of 1.5% per month or the maximum allowable rate under applicable law.

3. Delivery Dates; Title and Risk; Shipment. All delivery dates are approximate and Seller shall not be responsible for any damages resulting from any delay. Regardless of the manner of shipment, title to any products and risk of loss or damage shall pass to Buyer upon placement of the products with the shipment carrier at Seller's facility. Unless otherwise stated, Seller may exercise its judgment in choosing the carrier and means of delivery. No deferment of shipment at Buyer's request beyond the respective dates indicated will be made except on terms that will indemnify, defend and hold Seller harmless against all loss and additional expense. Buyer shall be responsible for any additional shipping charges incurred by Seller due to Buyer's acts or omissions.

4. Warranty. Parker Chelsea warrants that all products sold conform to the applicable Parker Chelsea standard specification for the lesser period of: 2 years (24 Months) from Date of service or 2-1/2 years (30 Months) from date of build (as marked on the product name plate). The prices charged for Seller's products are based upon the exclusive limited warranty stated above, and upon the following disclaimer: **DISCLAIMER OF WARRANTY: THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO PRODUCTS PROVIDED HEREUNDER. SELLER DISCLAIMS ALL OTHER WARRANTIES, EXPRESS AND IMPLIED, INCLUDING DESIGN, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.**

5. Claims; Commencement of Actions. Buyer shall promptly inspect all Products upon delivery. No claims for shortages will be allowed unless reported to the Seller within 10 days of delivery. No other claims against Seller will be allowed unless asserted in writing within 30 days after delivery. Buyer shall notify Seller of any alleged breach of warranty within 30 days after the date the defect is or should have been discovered by Buyer. Any action based upon breach of this agreement or upon any other claim arising out of this sale (other than an action by Seller for an amount due on any invoice) must be commenced within 12 months from the date of the breach without regard to the date breach is discovered.

6. LIMITATION OF LIABILITY. UPON NOTIFICATION, SELLER WILL, AT ITS OPTION, REPAIR OR REPLACE A DEFECTIVE PRODUCT, OR REFUND THE PURCHASE PRICE. IN NO EVENT SHALL SELLER BE LIABLE TO BUYER FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR AS THE RESULT OF, THE SALE, DELIVERY, NON-DELIVERY, SERVICING, USE OR LOSS OF USE OF THE PRODUCTS OR ANY PART THEREOF, OR FOR ANY CHARGES OR EXPENSES OF ANY NATURE INCURRED WITHOUT SELLER'S WRITTEN CONSENT, EVEN IF SELLER HAS BEEN NEGLIGENT, WHETHER IN CONTRACT, TORT OR OTHER LEGAL THEORY. IN NO EVENT SHALL SELLER'S LIABILITY UNDER ANY CLAIM MADE BY BUYER EXCEED THE PURCHASE PRICE OF THE PRODUCTS.

7. User Responsibility. The user, through its own analysis and testing, is solely responsible for making the final selection of the system and Product and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application and follow applicable industry standards and Product information. If Seller provides Product or system options, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the Products or systems.

8. Loss to Buyer's Property. Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, will be considered obsolete and may be destroyed by Seller after two consecutive years have elapsed without Buyer ordering the items manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

9. Special Tooling. A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture Products. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the Products, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

10. Buyer's Obligation; Rights of Seller. To secure payment of all sums due or otherwise, Seller shall retain a security interest in the goods delivered and this agreement shall be deemed a Security Agreement under the Uniform Commercial Code. Buyer authorizes Seller as its attorney to execute and file on Buyer's behalf all documents Seller deems necessary to perfect its security interest.

11. Improper use and Indemnity. Buyer shall indemnify, defend, and hold Seller harmless from any claim, liability, damages, lawsuits, and costs (including attorney fees), whether for personal injury, property damage, patent, trademark or copyright infringement or any other claim, brought by or incurred by Buyer, Buyer's employees, or any other person, arising out of: (a) improper selection, improper application or other misuse of Products purchased by Buyer from Seller; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller's use of patterns, plans, drawings, or specifications furnished by Buyer to manufacture Product; or (d) Buyer's failure to comply with these terms and conditions. Seller shall not indemnify Buyer under any circumstance except as otherwise provided.

12. Cancellations and Changes. Orders shall not be subject to cancellation or change by Buyer for any reason, except with Seller's written consent and upon terms that will indemnify, defend and hold Seller harmless against all direct, incidental and consequential loss or damage. Seller may change product features, specifications, designs and availability with notice to Buyer.

13. Limitation on Assignment. Buyer may not assign its rights or obligations under this agreement without the prior written consent of Seller.

14. Force Majeure. Seller does not assume the risk and shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter "Events of Force Majeure"). Events of Force Majeure shall include without limitation: accidents, strikes or labor disputes, acts of any government or government agency, acts of nature, delays or failures in delivery from carriers or suppliers, shortages of materials, or any other cause beyond Seller's reasonable control.

15. Waiver and Severability. Failure to enforce any provision of this agreement will not waive that provision nor will any such failure prejudice Seller's right to enforce that provision in the future. Invalidation of any provision of this agreement by legislation or other rule of law shall not invalidate any other provision herein. The remaining provisions of this agreement will remain in full force and effect.

16. Termination. Seller may terminate this agreement for any reason and at any time by giving Buyer thirty (30) days written notice of termination. Seller may immediately terminate this agreement, in writing, if Buyer: (a) commits a breach of any provision of this agreement (b) appoints a trustee, receiver or custodian for all or any part of Buyer's property (c) files a petition for relief in bankruptcy on its own behalf, or by a third party (d) makes an assignment for the benefit of creditors, or (e) dissolves or liquidates all or a majority of its assets.

17. Governing Law. This agreement and the sale and delivery of all Products hereunder shall be deemed to have taken place in and shall be governed and construed in accordance with the laws of the State of Ohio, as applicable to contracts executed and wholly performed therein and without regard to conflicts of laws principles. Buyer irrevocably agrees and consents to the exclusive jurisdiction and venue of the courts of Cuyahoga County, Ohio with respect to any dispute, controversy or claim arising out of or relating to this agreement.

18. Indemnity for Infringement of Intellectual Property Rights. Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Section. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets ("Intellectual Property Rights"). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that a Product sold pursuant to this Agreement infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If a Product is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using the Product, replace or modify the Product so as to make it noninfringing, or offer to accept return of the Product and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to Products delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any Product sold hereunder. The foregoing provisions of this Section shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

19. Entire Agreement. This agreement contains the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of sale. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter are herein merged.

20. Compliance with Law, U. K. Bribery Act and U.S. Foreign Corrupt Practices Act. Buyer agrees to comply with all applicable laws and regulations, including both those of the United Kingdom and the United States of America, and of the country or countries of the Territory in which Buyer may operate, including without limitation the U. K. Bribery Act, the U.S. Foreign Corrupt Practices Act ("FCPA") and the U.S. Anti-Kickback Act (the "Anti-Kickback Act"), and agrees to indemnify and hold harmless Seller from the consequences of any violation of such provisions by Buyer, its employees or agents. Buyer acknowledges that they are familiar with the provisions of the U. K. Bribery Act, the FCPA and the Anti-Kickback Act, and certifies that Buyer will adhere to the requirements thereof. In particular, Buyer represents and agrees that Buyer shall not make any payment or give anything of value, directly or indirectly to any governmental official, any foreign political party or official thereof, any candidate for foreign political office, or any commercial entity or person, for the purpose of influencing such person to purchase products or otherwise benefit the business of Seller.

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Sales Offices Worldwide

North America

Canada

Parker Hannifin Canada

160 Chisholm Drive
Milton, Ontario L9T 3G9
Tel: (905) 693-3000
Fax: (905) 867-0789

Mexico

Parker Hannifin Corporation

Via de Ferrocarril a
Matamoros 730
Apodaca, N.L Mexico
Tel: (011) 52 81 8156 6000
Fax: (011) 52 80 8156 6076

South Africa

Parker Hannifin Pty Ltd

Sales Company South Africa
10 Berne Avenue
Aeroporto
Kempton Park
SOUTH AFRICA
1620
Tel: +9610700
Fax: +3927213

South America

Brazil

Parker Hannifin Industria e Comercio Ltda.

Hydraulics Division
Av Frederico Ritter 1100
District Industrial
94930-000 Cachoeirinha
RS, Brazil
Tel: 55 51 3470 9131
Fax: 55 51 3470 6090

Latin America

Pan American Div

7400 N W 19th St Suite A
Miami, FL 33126
UNITED STATES
Tel: (305) 470-8800
Fax: (305) 470-8809

Europe

Great Britain

Parker Chelsea Products

Parker Hannifin Limited

93, Second Avenue
Pensnett Trading Estate,
Kingswinford,
UNITED KINGDOM
DY6-7FR
Tel: + 44 (0) 1384 282777
Fax: + 44 (0) 1384 401851

South Asia

Chelsea Products

Parker Hannifin India Pvt. Ltd.

TTC Industrial Area, Mahape
Navi Mumbai - 400 709, India
Tel: +91 22 6513 7081 - 85
ext 260
Fax: +91 22 2768 6841

Asia Pacific

Australia

305 Frankston-Dandenong Road
Dandenong South, Victoria 3175
Tel: 61 3 9768-5555
Fax: 61 3 9768-5556

Australia

Parker Hannifin (Australia) Pty. Ltd.

9 Carrington Road
Castle Hill
New South Wales, 2154
Tel: 61 2 9842-5812
Fax: 61 2 9842-5826

Parker Hannifin Singapore Pte

No 11 Fourth Chin Bee Rd
Jurong Town
SINGAPORE
619702
Tel: (+68) 87 -6300
Fax: (+62) 65 -5125

Parker Hannifin Hong Kong Ltd

8/f, Kin Yip Plaza
9 Cheung Yee Street
Cheung Sha Wan Kowloon
HONG KONG
Tel: (+02) 428-8008
Fax: (+02) 480-4256

Parker Hannifin Motion & Control (Shanghai) Co., Ltd.

280 Yunqiao Road, Jinqiao Export
Processing Zone
Shanghai 201206, P. R. China
Tel: (+86) 21 6455 2002
Fax: (+86) 21 5463 1250

Parker Hannifin Beijing

Suite B9-B11
21/F Hanwei Plaza
No. 7 Guanghua Road
Chaoyang District
Beijing 100004, China
Tel: (+86) 10 6561 0520 - 5
Fax: (+86) 10 6561 0526 - 7



Parker Hannifin Corporation

Chelsea Products Division
8225 Hacks Cross Road
Olive Branch, Mississippi 38654 USA
Tel: (662) 895-1011
Fax: (662) 895-1069
www.parker.com/chelsea

