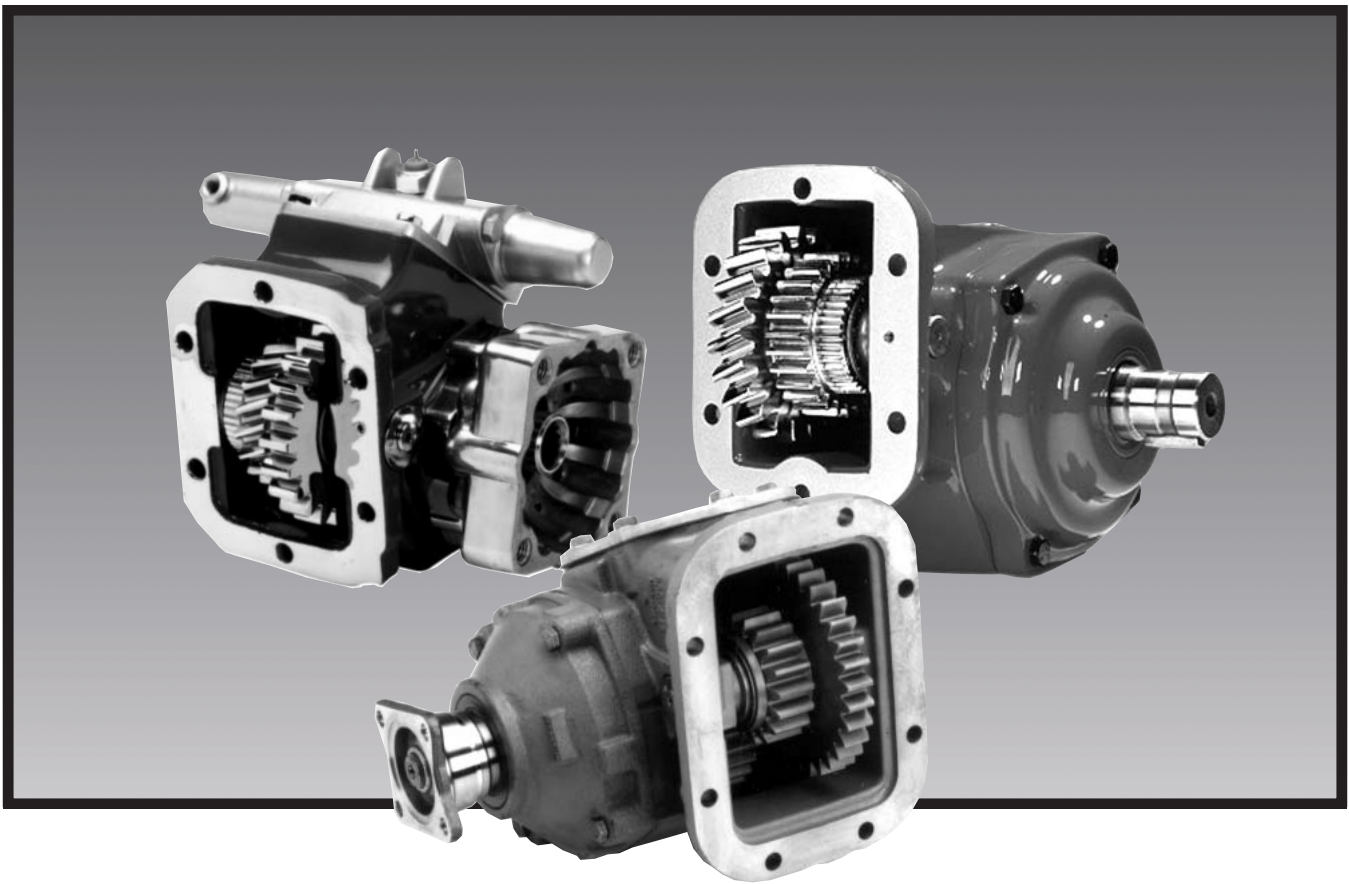


Chelsea

Bulletin HY25-1240-M1/US

Owner's Manual Power Take-Offs

Effective: March 2004
Supersedes: HY25-1240-M1/US April 2003



230 Series
231 Series
236 Series

250 Series
270 Series
271 Series

800 Series
852 Series
885 Series



 **WARNING**

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS 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 and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application and review the information concerning the product or system in the current product catalog. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the application are met.

The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

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
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 worn-out 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 and 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:

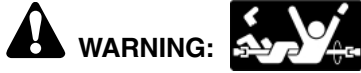
- Driven equipment must have separate controls.
- The driven equipment must be left in the disengaged position when not in operation.
- Do not operate the driven equipment until the vehicle is allowed to warm up.



This symbol warns of possible personal injury.

Safety Information (Continued)

Rotating Auxiliary Driveshafts



- 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

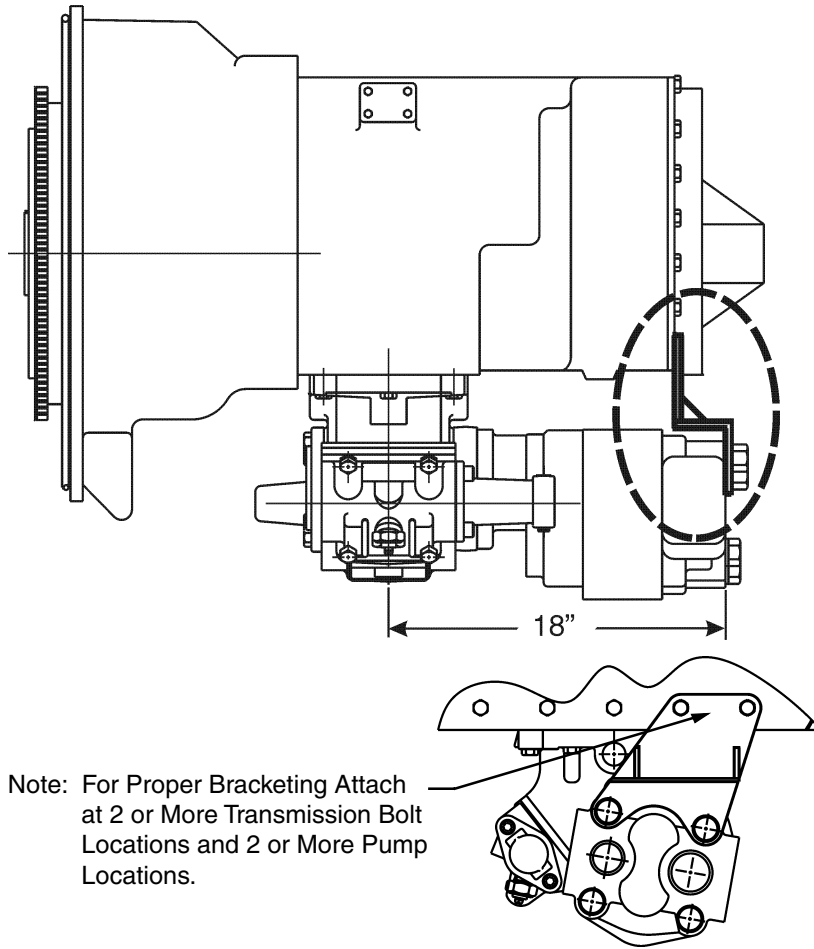
Use a bracket to support the pump to the transmission if:

- The pump weighs **40 pounds [18.14 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



⚠ 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

This booklet will provide you with information on correct installation of Chelsea® Power Take-Offs (P.T.O.'s). Proper installation and set up procedures will help you get additional and more profitable miles from your truck equipment and components.

It is important that you be sure that you are getting the right transmission/P.T.O. combination when you order a new truck. An inadequate transmission will overwork any P.T.O. in a short period of time. In addition, a mismatched transmission and P.T.O. combination can result in unsatisfactory performance of your auxiliary power system from the start.

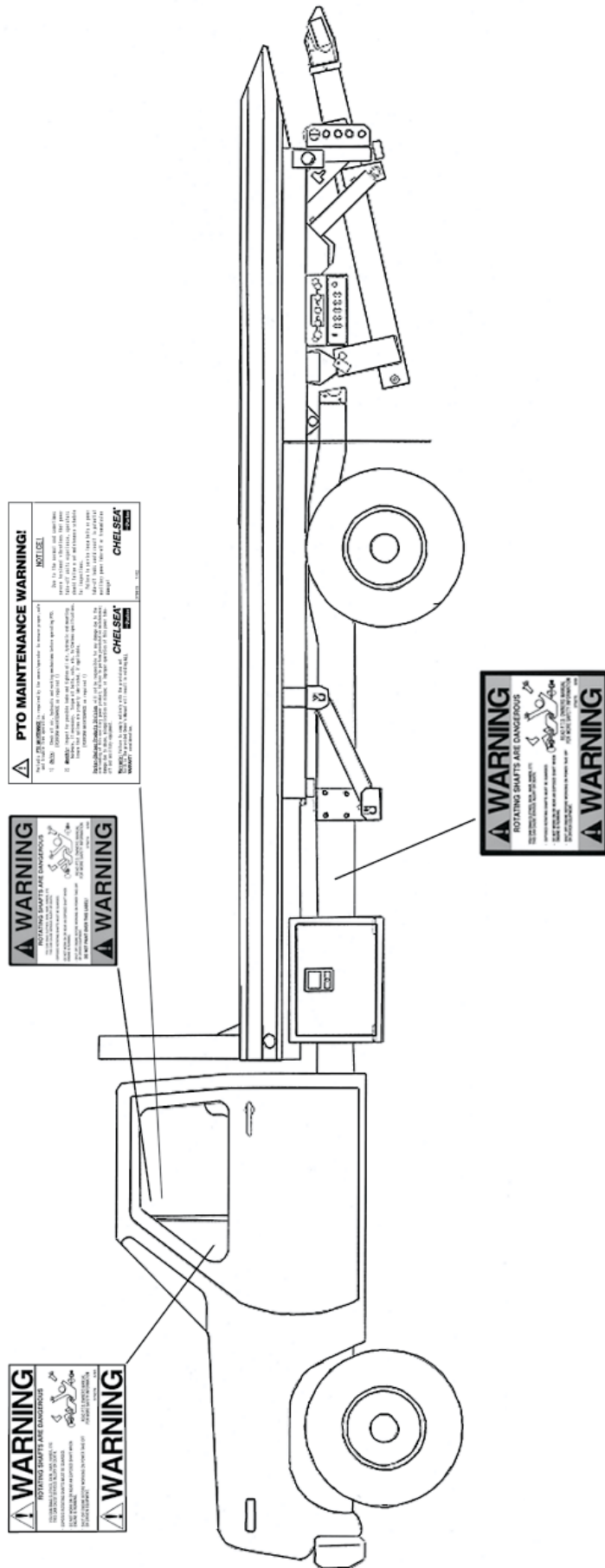
If you have questions regarding correct P.T.O. and transmission combination, please contact your local Chelsea® Auxiliary Power Specialist. They can help you select the properly matched components to insure correct and efficient applications.

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" 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 P.T.O. to Transmission for 230, 236, 250, 270, 800, 852 and 885 Series

1. Remove the P.T.O. aperture cover plate (Fig 1).
2. Discard the cover plate and cover plate gasket, then clean the aperture pad using a putty knife or wire brush (Fig 2).

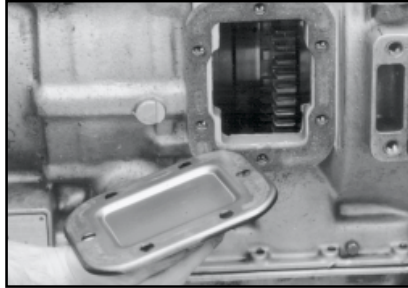


Figure 1

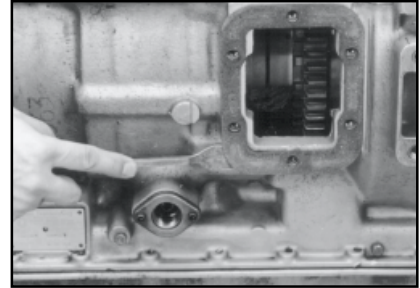


Figure 2

3. Install the proper studs in the P.T.O. aperture pad using a stud driver or wrench (Fig 3).

NOTE: Avoid contact of Permatex with automatic transmission fluid in automatics. Always check to be sure that the studs do not interfere with transmission gears.

4. Tighten the studs to 17 - 19 ft. lbs. (2.38 - 2.66 kg. meters) and then torque the capscrews to 32 - 37 ft. lbs. (4.43 - 5.12 kg. meters) for the 6 or 8 bolts (Fig 4).
5. For the 230, 236, 800, and 852 series, place one thick gasket .020" (.50 mm) and one thin gasket .010" (.25 mm) over the studs. For the 270 series with the AJ gear pitch designation (i.e.: 270XBAJP-B3XD) use the special 35-P-41 gasket that comes with the P.T.O. When the 35-P-41 gasket is installed with the 270 series, the need for backlash adjustment is greatly reduced.

The 250 Series requires (1) 35-P-41 gasket for installation and no backlash to check (Fig 5).

- When mounting a P.T.O. use gaskets between all mounting surfaces.
- Do not stack more than 3 gaskets together.
- Usually, one thick gasket .020" (.50 mm) will be required.
- Remember the lubricant in the transmission also lubricates the P.T.O. therefore, a gasket must always be used.

6. Secure P.T.O. to the transmission.
 - Use self locking nuts provided with P.T.O. (Fig 6).

NOTE: Self locking nuts do not require lock washers (Fig 7).

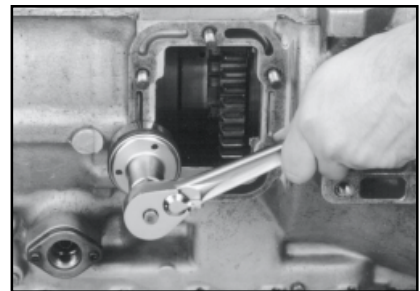


Figure 3

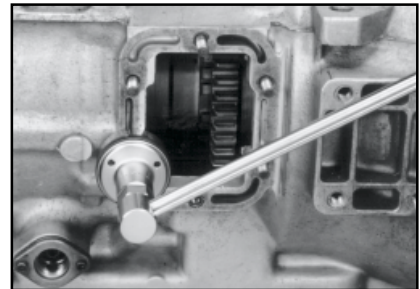


Figure 4

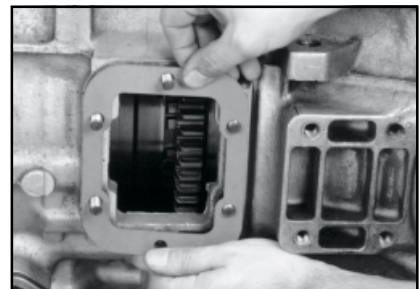


Figure 5

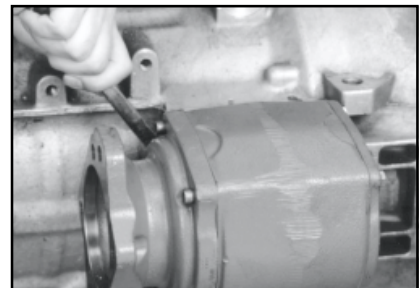


Figure 6

7. Fasten the P.T.O. to the transmission. Torque the self locking nuts to their proper specifications (Fig 8).
- 379744: 3/8"-24 for six bolt applications 35-40 ft. lbs. (4.83-5.52 kg.m)
 - 379745: 7/16"-20 for eight bolt applications 55-60 ft. lbs. (7.59-5.52 kg.m)
- Torque capscrews to their proper specifications.

- 7a. The 236 Series has an inspection plate that can be removed to check for proper backlash. Refer to page 12 for checking backlash procedure.
8. There are two (2) large drilled and tapped holes on the 230, 270 and 800 Series P.T.O. housing (See Fig 9). These two holes come with plugs installed. (Fig 9) The 852 Series has one (1) drilled and tapped hole in the inspection plate.
9. One of the plugs will be used for the dump line from the solenoid to the housing of the 270, 800 and 852 series. The 230 and 885 Series are air shifted and does not require the dump line. The one hole in the 852 will be used for the dump line from the solenoid valve.
- The second plug, which is positioned over the input gear, must be removed and replaced with a transducer if you are using the Chelsea Electronic Overspeed Control. If you are not using an Electronic Overspeed Control, the plug will remain in the housing (Fig 10). After checking backlash, continue with the plumbing and wiring of the controls.
10. There is a hole drilled and tapped on the 250 Series on the P.T.O. housing. This hole comes with a plug installed and is used for the high pressure line from the transmission (Fig 10-A).

See Page 27 for complete installation drawing.

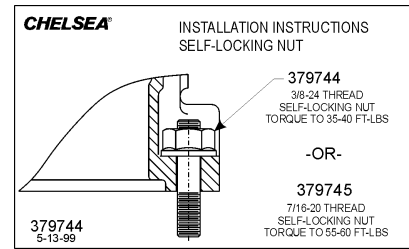


Figure 7

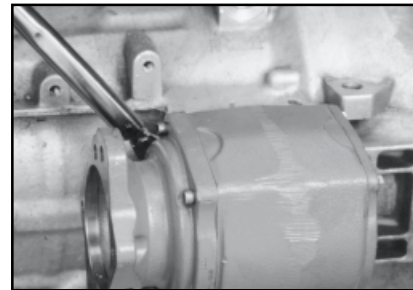


Figure 8

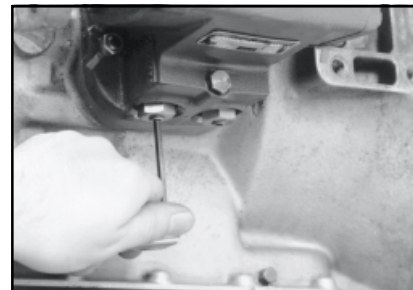


Figure 9

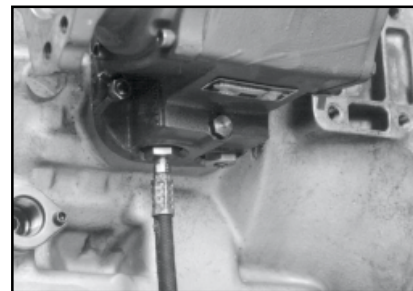


Figure 10

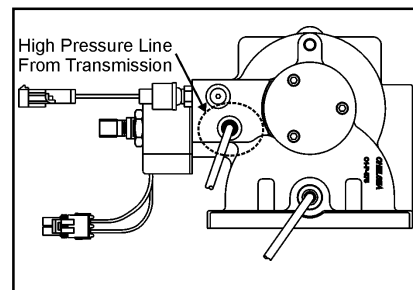


Figure 10-A

Mounting P.T.O. to Transmission for 231 and 271 Series

1. Remove the 6 bolt cover and gasket from the 6 bolt aperture. Clean the 6 bolt aperture as in step 2 on page 8 (Fig 1).
2. Place the 6 bolt rubber coated gasket on the transmission. The beaded (raised) surface should be facing the special mounting plate. (Fig 2).
3. Next, fasten the special mounting plate onto the opening with the three (3) socket head bolts. The three socket head bolts always go in the three holes closest to the two (2) welded-on nuts. Figure 3 shows the plate position for a P.T.O. with a "5" assembly arrangement. Torque the three socket head bolts to 300 in. lbs. (3.5 kg. meters) using an inch pound torque wrench.
4. Place the special gasket on the plate (Fig 4). Again, the gasket and plate can be mounted in two (2) positions depending on your assembly arrangement. See step 3.
5. Place the 231 or 271 on the plate (Fig 5). There are 5 (five) capscrews that hold the 271 to the transmission and plate. Make sure all 5 capscrews that go through the plate and into the transmission have copper gasket washers under them.
6. All 5 capscrews can be tightened and torqued with a 3/8" drive socket wrench (Fig 5). Torque all capscrews to 32 - 37 ft. lbs. (4.43 - 5.12 kg. meters).

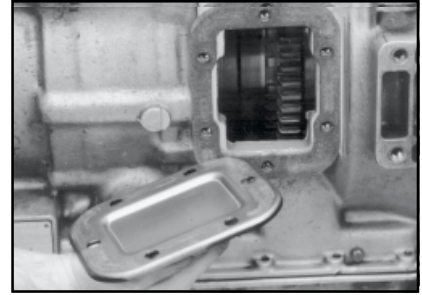


Figure 1

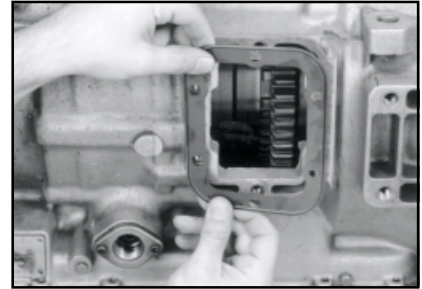


Figure 2

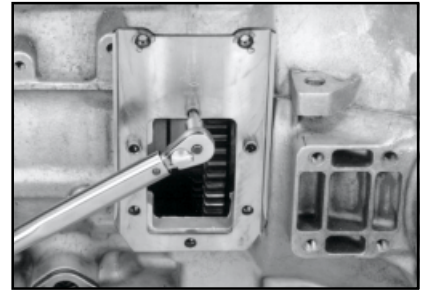


Figure 3

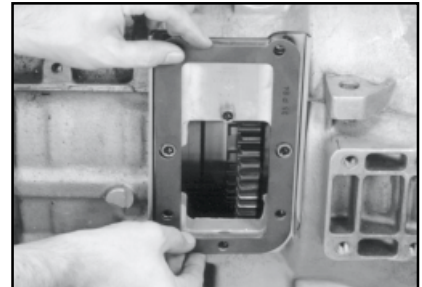


Figure 4

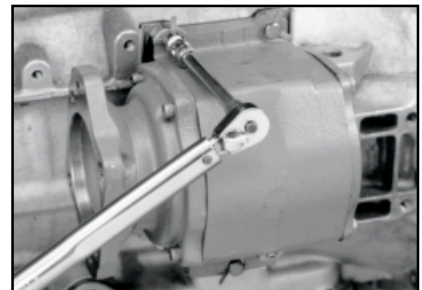


Figure 5

7. Bend the tabs to lock the nuts (Fig 6).
8. There are two (2) large drilled and tapped holes on the 231 and 271 series P.T.O. housing (Fig 7). These two holes come with plugs installed.
9. One of the plugs will be used for the dump line from the solenoid to the housing of the 231 and 271 series. The 231 series does not require the dump line.

The second plug, which is positioned over the input gear, must be removed and replaced with a transducer when using the Chelsea Electronic Overspeed Control. If you are not using an Electronic Overspeed Control, the plug will remain in the housing (Fig 8). After checking backlash, continue with the plumbing and wiring of the controls.

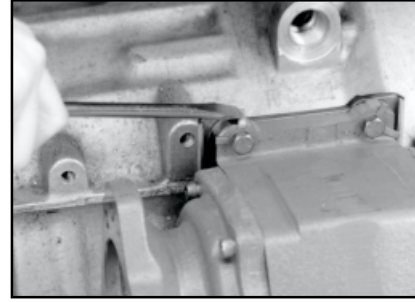


Figure 6

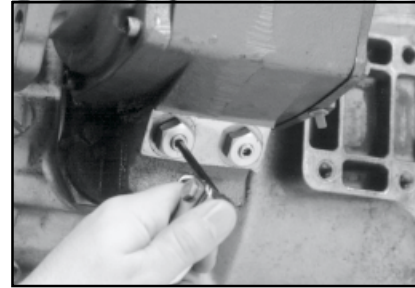


Figure 7

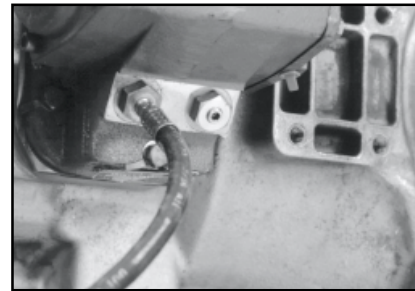


Figure 8

Checking Backlash

To check for proper backlash on P.T.O.s with shift cover

1. Remove the P.T.O. shift housing and/or inspection plate or removal inspection plate.
2. Mount the dial indicator so that it registers movement of the input gear (driven gear) of the P.T.O. (Fig. 9).

NOTE: See Figure 10 for proper location of dial indicator contact point. (Two common type dial indicators shown).

3. Hold the P.T.O. driver gear in transmission with a screwdriver or bar and rock the P.T.O. input gear (driven gear) back and forth with your hand. Note the total movement on the dial indicator.
4. Establish backlash at .006" - .012" [.15mm - .30mm] by adding or subtracting gaskets.

General rule: A Chelsea .010" gasket will change backlash approx. .006". A .020" gasket changes backlash approx. .012".

5. Replace the shift housing and/or inspection plate and retorque (4) four capscrews to 16-20 ft. lbs. (2.21-2.76 kg meters).

NOTE: Apply a drop of Loctite 290 on each capscrew before reinstalling. Capscrews that are furnished with a conversion kit and are being installed for the first time do not require the drop of Loctite.

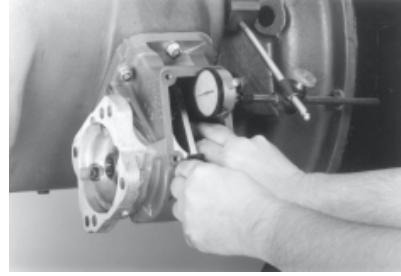


Fig. 9

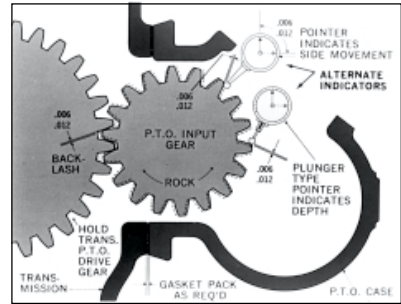


Fig. 10

**Automatic Transmissions
 Pressure Lube Hose Connection**

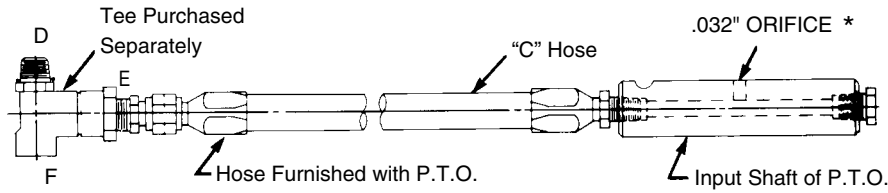


Chart I

Dimensional Information						
Tee Fitting	378840	378880	378970	378897		
D	.750-16 U.N.F. 2A	.875-14 U.N.F. 2A	1.062-12 U.N.F. 2A	1.312-12 U.N. 2A		
E	.250-18 N.P.T.F.	.250-18 N.P.T.F.	.250-18 N.P.T.F.	.250-18 N.P.T.F.		
F	.750-16 N.P.T.F.	.875-14 U.N.F. 2NB	1.062-12 U.N.F. 2B	1.312-12 U.N. 2B		

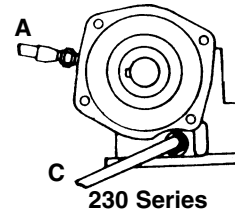
Allison 1000, 2000/2400 Series Converter Housing Options						
Converter Housing Group Number	SAE Number	Description	1000	2000	2400	Chelsea Fitting
34-561	#3	Integral Cooler Ports	STD.	---	---	378840
34-562	#2	Manifold Pad	OPT.	STD.	STD.	378970
34-563	#3	Manifold Pad	OPT.	STD.	STD.	378970
34-565	#3	Integral Cooler Ports	STD.	---	---	378840
34-566	#2	Manifold Pad	OPT.	STD.	STD.	378970
34-567	#2	Manifold Pad	OPT.	STD.	STD.	378970
34-572	#3	Integral Cooler Ports	STD.	---	---	378840
34-573	#3	Integral Cooler Ports	STD.	---	---	378840

The specific "T" fitting for each Automatic Transmission is called out at the bottom of each transmission's application sheet. If a "T" fitting is not called out, then a standard pipe tee will adapt.

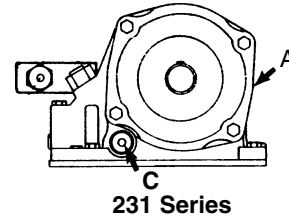
* **NOTE:** The .032" [0.81 mm] orifice is built into all pressure lubed idler shafts. No additional orifices are required when using these pressure lubed shafts.

Powershifts
P.T.O. Hose Connection Illustrations

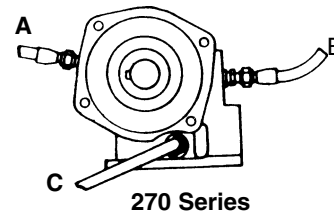
- A. Air Pressure Line From Valve.
- C. Lubrication Line From Transmission. Attach to Either End of IDLER Shaft.



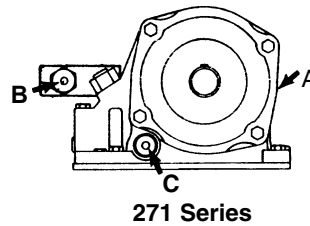
- A. Air Pressure Line From Valve.
- C. Lubrication Line From Transmission. Attach to Either End of IDLER Shaft.



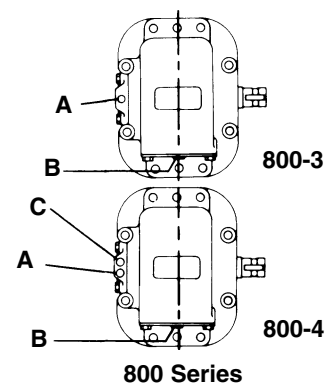
- A. High Pressure Line From Valve.
- B. Dump Line to P.T.O. From 3 Way Valve.
- C. Lubrication Line From Transmission. Attach to Either End of IDLER Shaft.



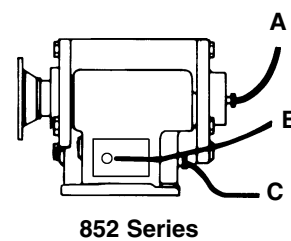
- A. High Pressure Line From Valve.
- B. Dump Line to P.T.O. From 3 Way Valve.
- C. Lubrication Line From Transmission. Attach to Either End of IDLER Shaft.



- A. High Pressure Line From Valve.
- B. Dump Line to P.T.O. From 3 Way Valve.
- C. Lubrication Line From Transmission.

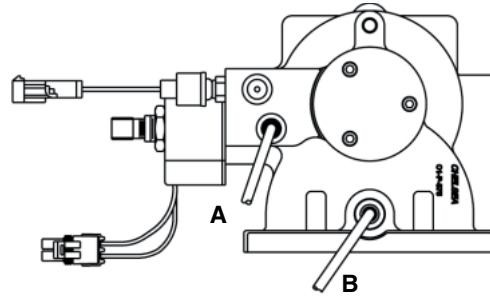


- A. High Pressure Line From Valve.
- B. Dump Line to P.T.O. From 3 Way Valve.
- C. Lubrication Line From Transmission. Attach to Either End of IDLER Shaft.



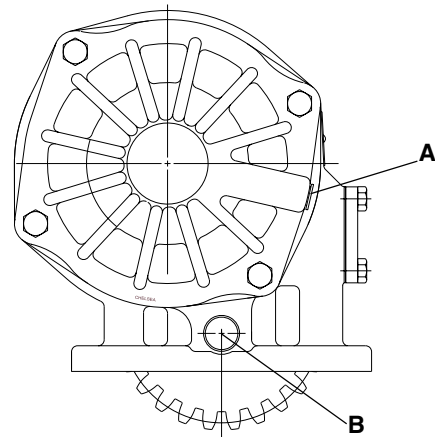
Powershifts
P.T.O. Hose Connection Illustrations (Continued)

- A. High Pressure Line From Transmission.
- B. Lubrication Line From Transmission.



250 Series

- A. High Pressure Line From Transmission.
- B. Lubrication Line From Transmission. Attach To Either End Of Idler Shaft.



236 Series

GMT C Series P.T.O. Wiring Harness

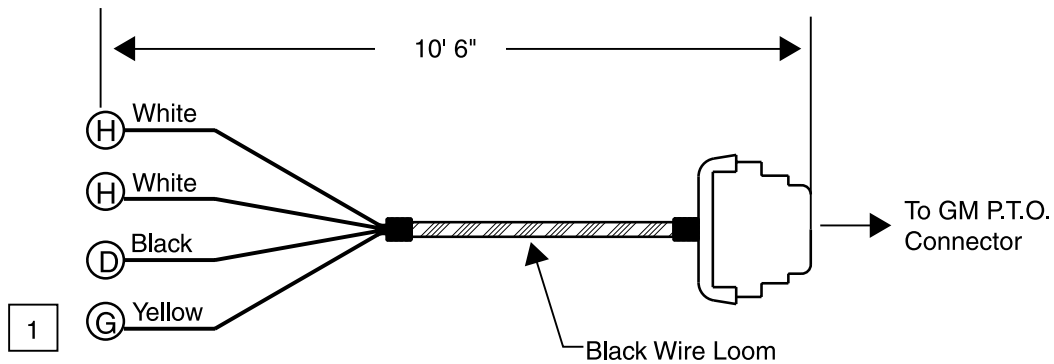
For model year 2003 GM C Series 4500, 5500, 6500, 7500 and 8500 trucks may be equipped with the Allison 1000, 2000/2400 transmissions. In these vehicles GM Truck has integrated a P.T.O. connector, located in the right hand engine compartment area. A Power Take-Off switch has also been incorporated into 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 designed 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.

The main purpose of the wiring harness on the Allison 1000, 2000/2400 transmissions will be to engage the torque converter lock-up clutch. The harness will also allow the end-user to utilize the stalk-mounted cruise control to control Power Take-Off RPM.

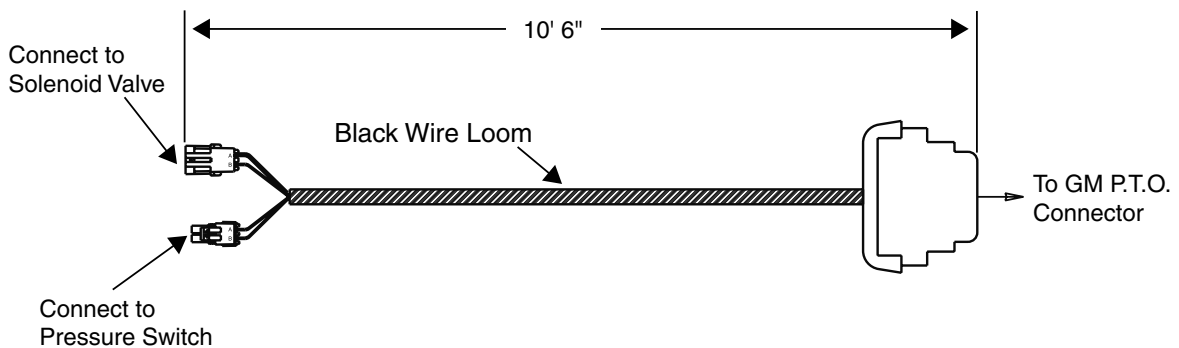
See wiring harness part number 379924 for the 270/230 Series and part number 379925 for the 250 Series Power Take-Offs.

2003 GM "C" Series Wiring Harness for 270 Series Part Number 379924

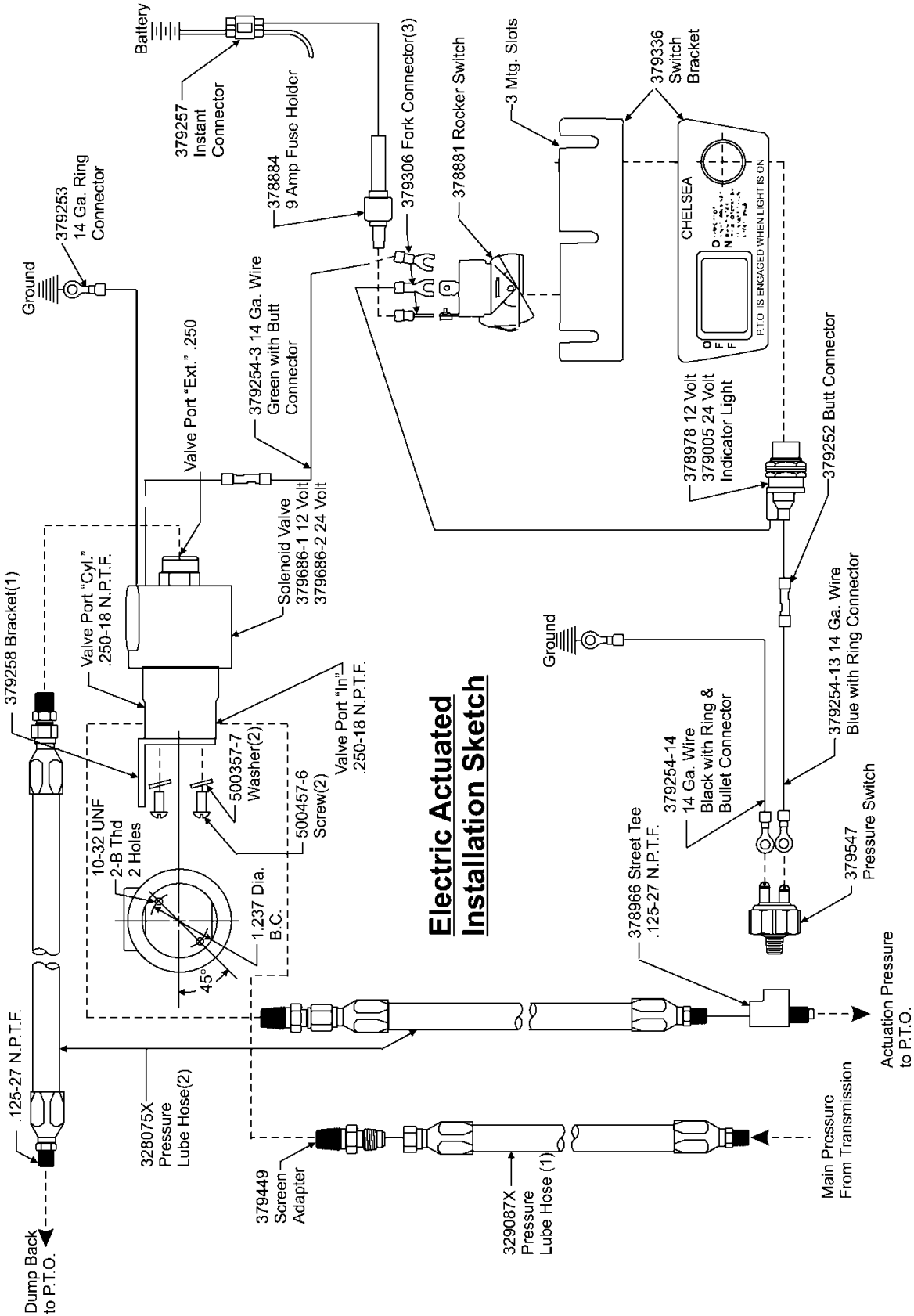


- 1 Connect the YELLOW wire and a WHITE wire to the Pressure switch.
Connect the BLACK wire and a WHITE wire to the solenoid valve.
There are no polarity issues for either of the connectors.

2003 GM "C" Series Wiring Harness for 250 Series Part Number 379925



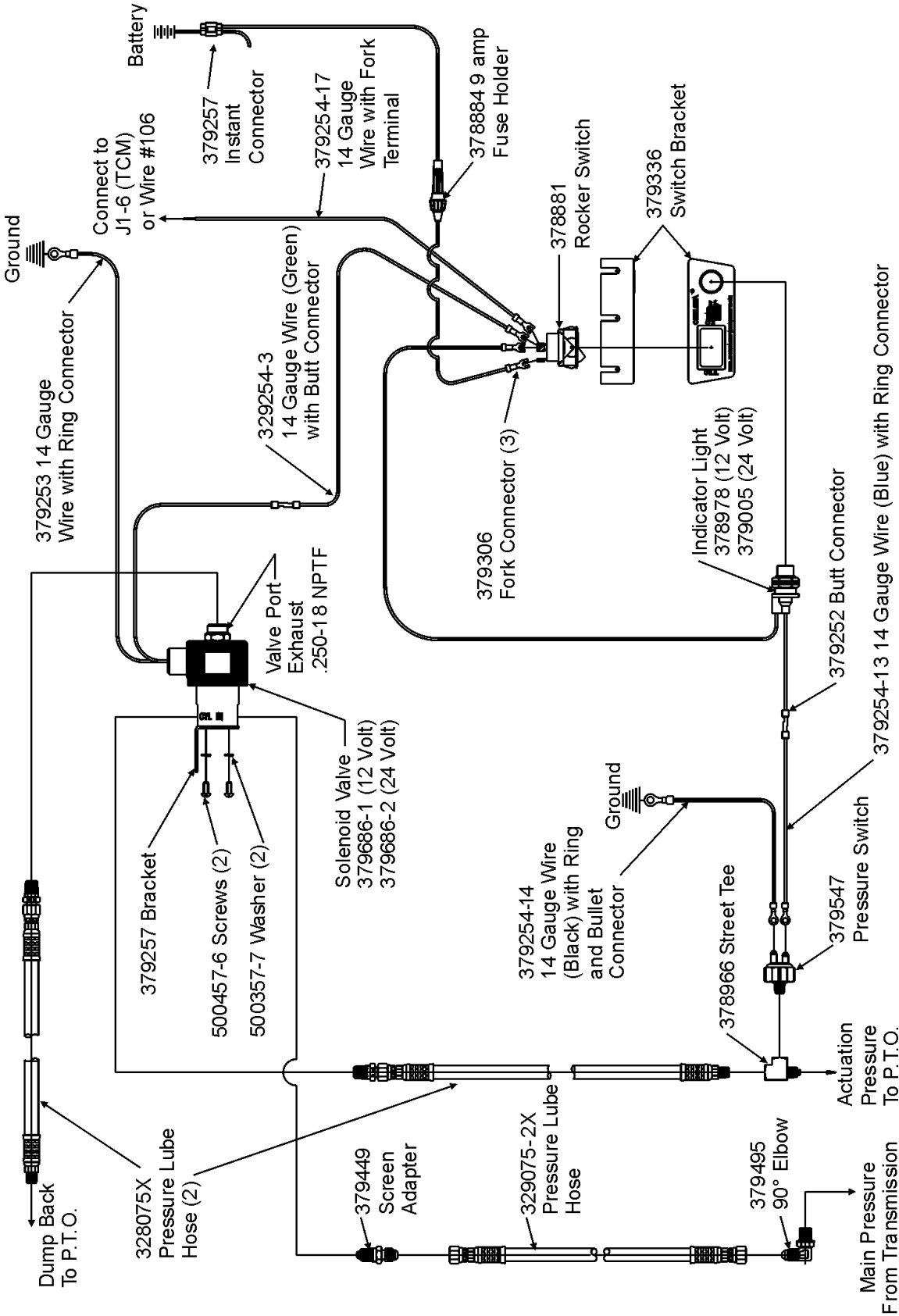
Shifter Component Installation Sketch for 270, 271, 800 and 852 Series (Allison) 12 and 24 Volt without E.O.C. (SK-225 Rev H)



**Electric Actuated
 Installation Sketch**

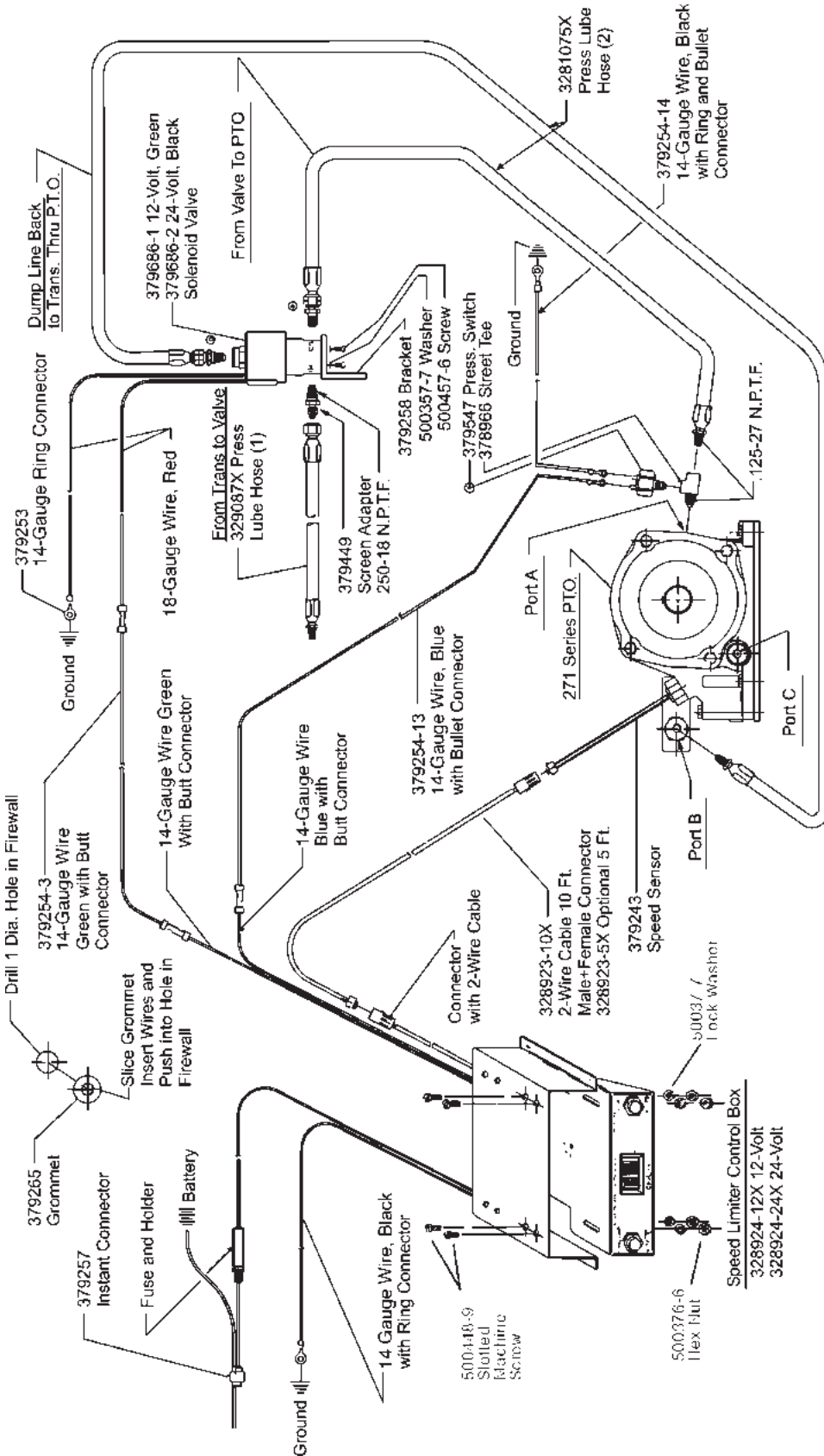
Transmission	Voltage	Solenoid Valve	Color Code
300 PSI	12 V	379686-1	Green
300 PSI	24 V	379686-2	Brown

Shifter Component Installation Sketch for 270 and 271 Series (Allison 1000, 2000/2400) 12 and 24 Volt without E.O.C. (SK-329 Rev D)

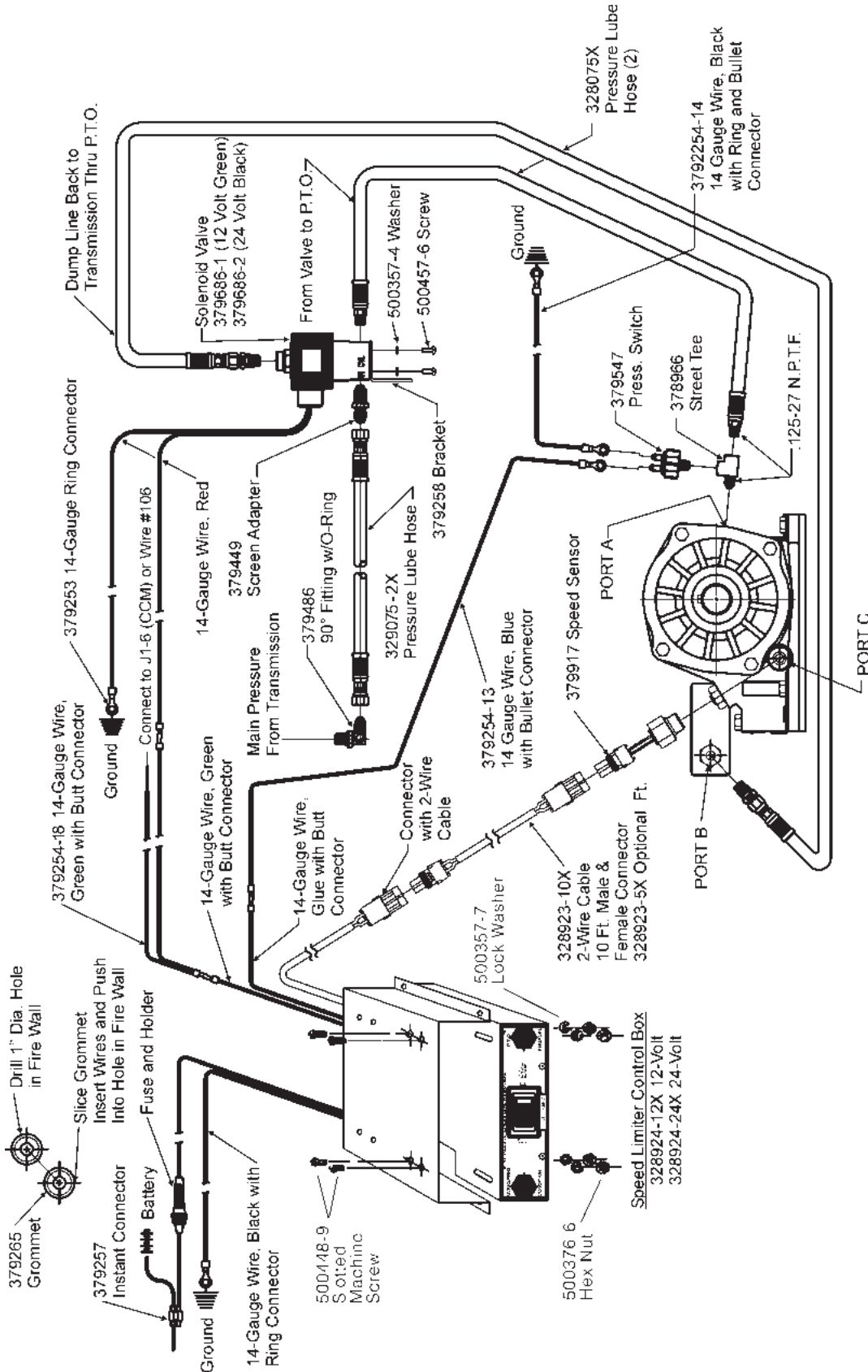


Hydraulic Shift Installation Kit 12V 328715X
 Hydraulic Shift Installation Kit 24V 328749X
 Allison 1000, 2000/2400 Fitting Kit 329297X
 Hose Kit #329365X

**Electronic Overspeed Control Installation Sketch for 270, 271, 800 and 852 Series
(Allison) (SK-224 Rev E)**

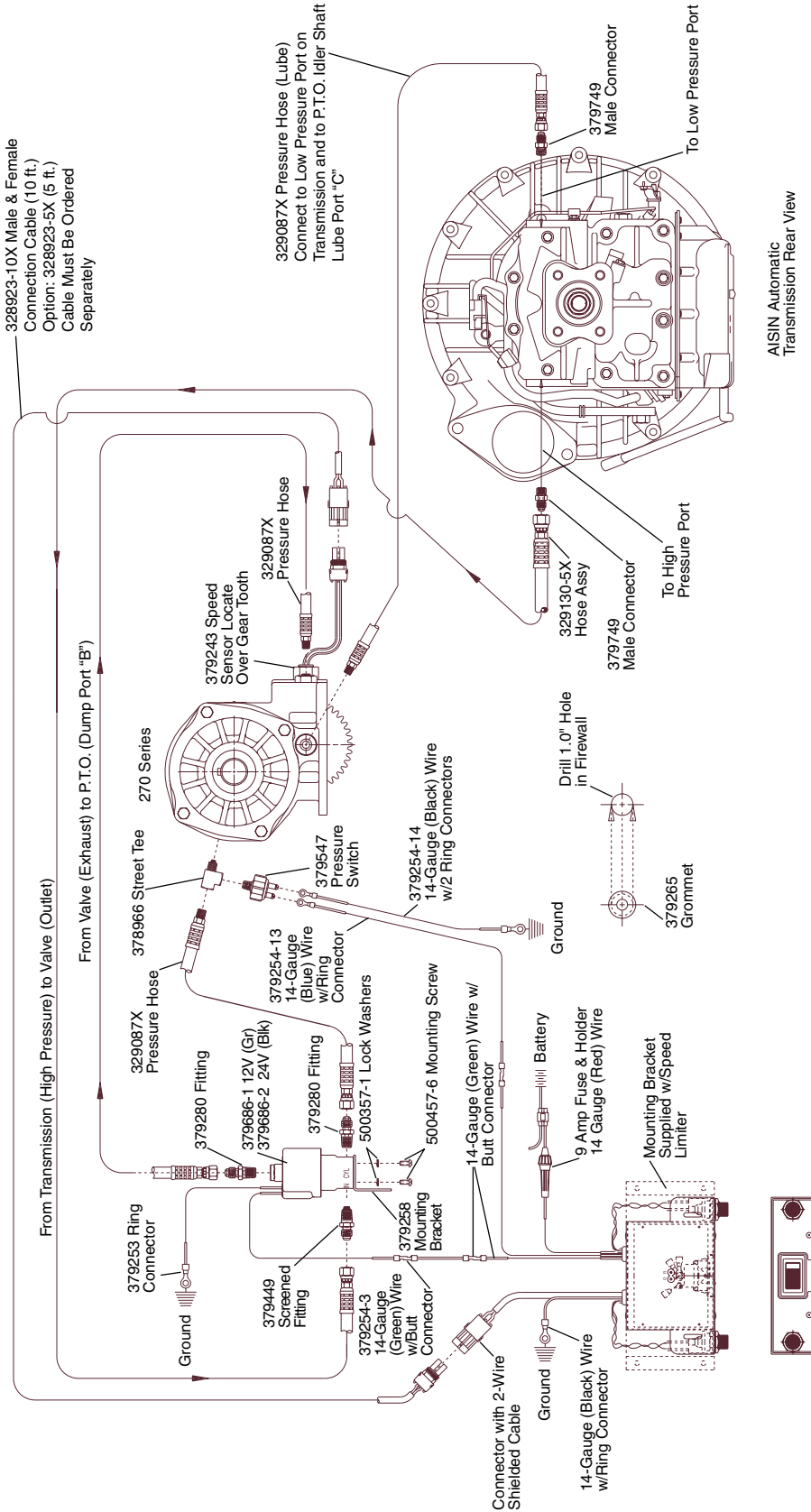


Electronic Overspeed Control Installation Sketch for 270 and 271 Series (Allison 1000, 2000/2400) (SK-328 Rev G)

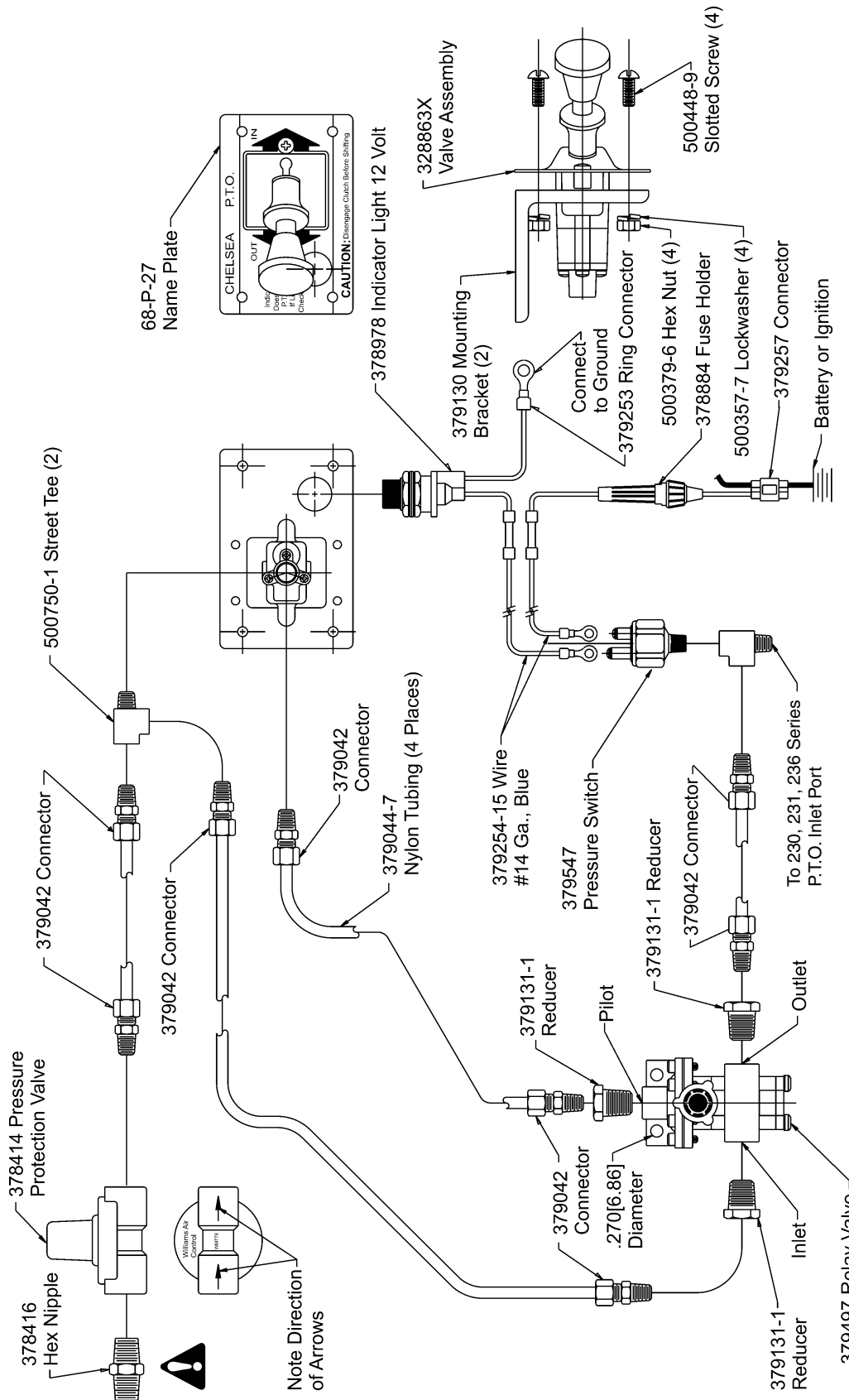


Hydraulic Shift Installation Kit 12V 328929-12X
 Hydraulic Shift Installation Kit 24V 328929-24X
 Allison 1000, 2000/2400 Fitting Kit 329297X
 Hose Kit #329365X
 J1-6 Feedback Kit (must be ordered separately) 329336-2X

Installation Sketch 12 and 24 Volt with Speed Limiter, 270 Series/AISIN Automatic Transmission (SK-321 Rev B)

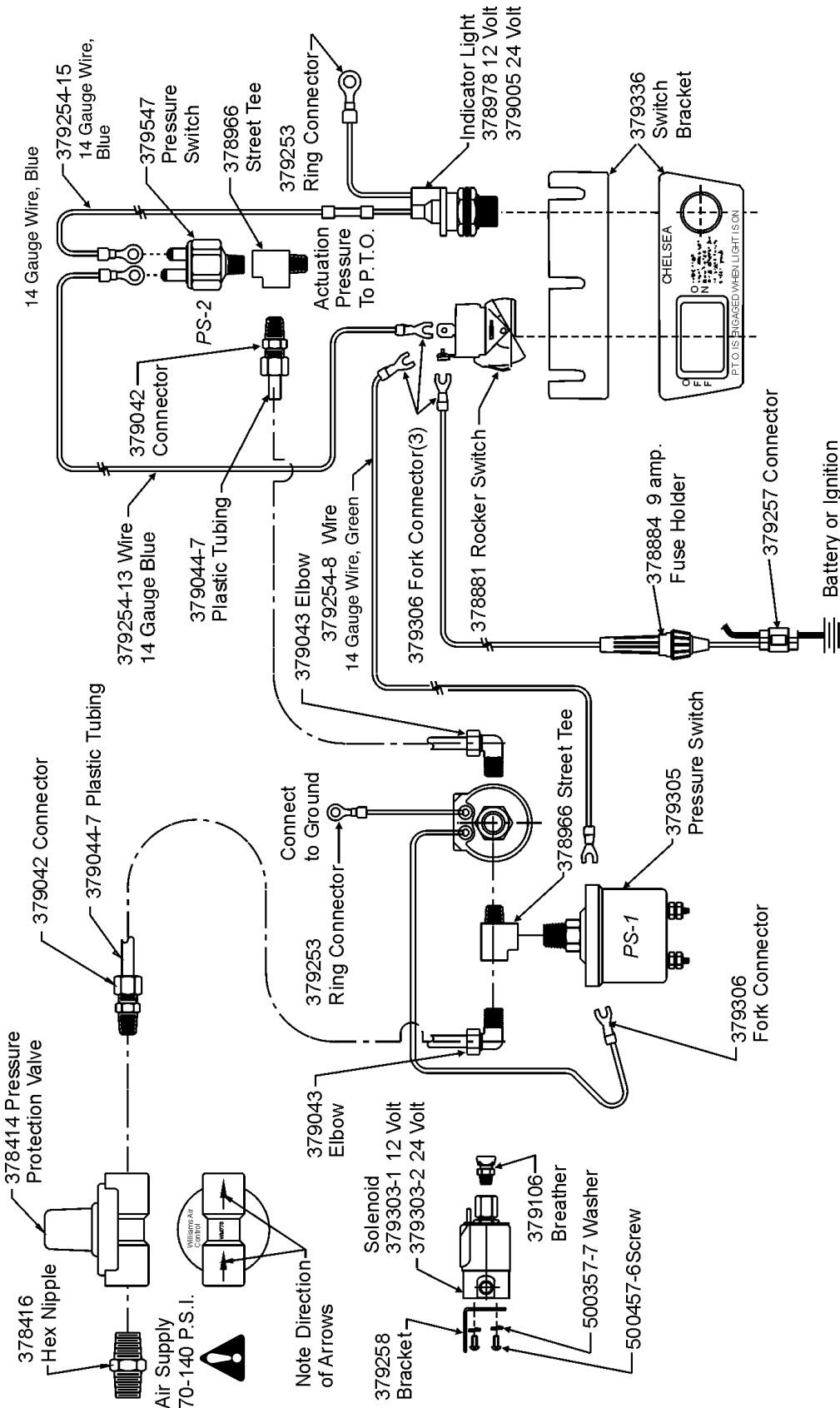


Manual Air Shift Component Installation Sketch for 230, 236 and 231 Series with Manual Air Valve (Sk-246 Rev C)



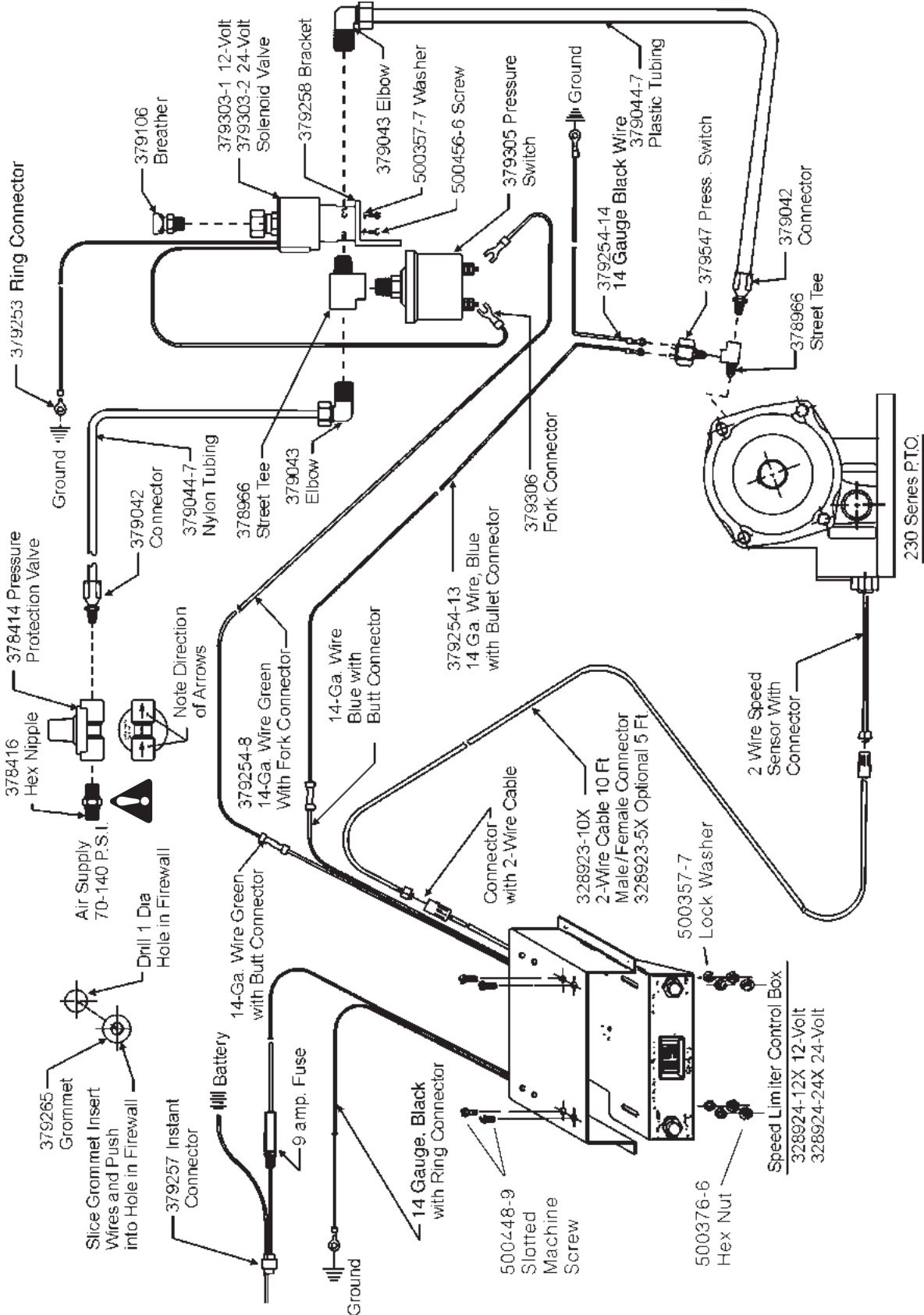
Warning: Connect directly to air supply. Do not use tubing between air supply and pressure protection valve.

Shifter Component Installation Sketch for 230, 236 and 231 Series 12 and 24 Volt without E.O.C. (SK-226 Rev D)



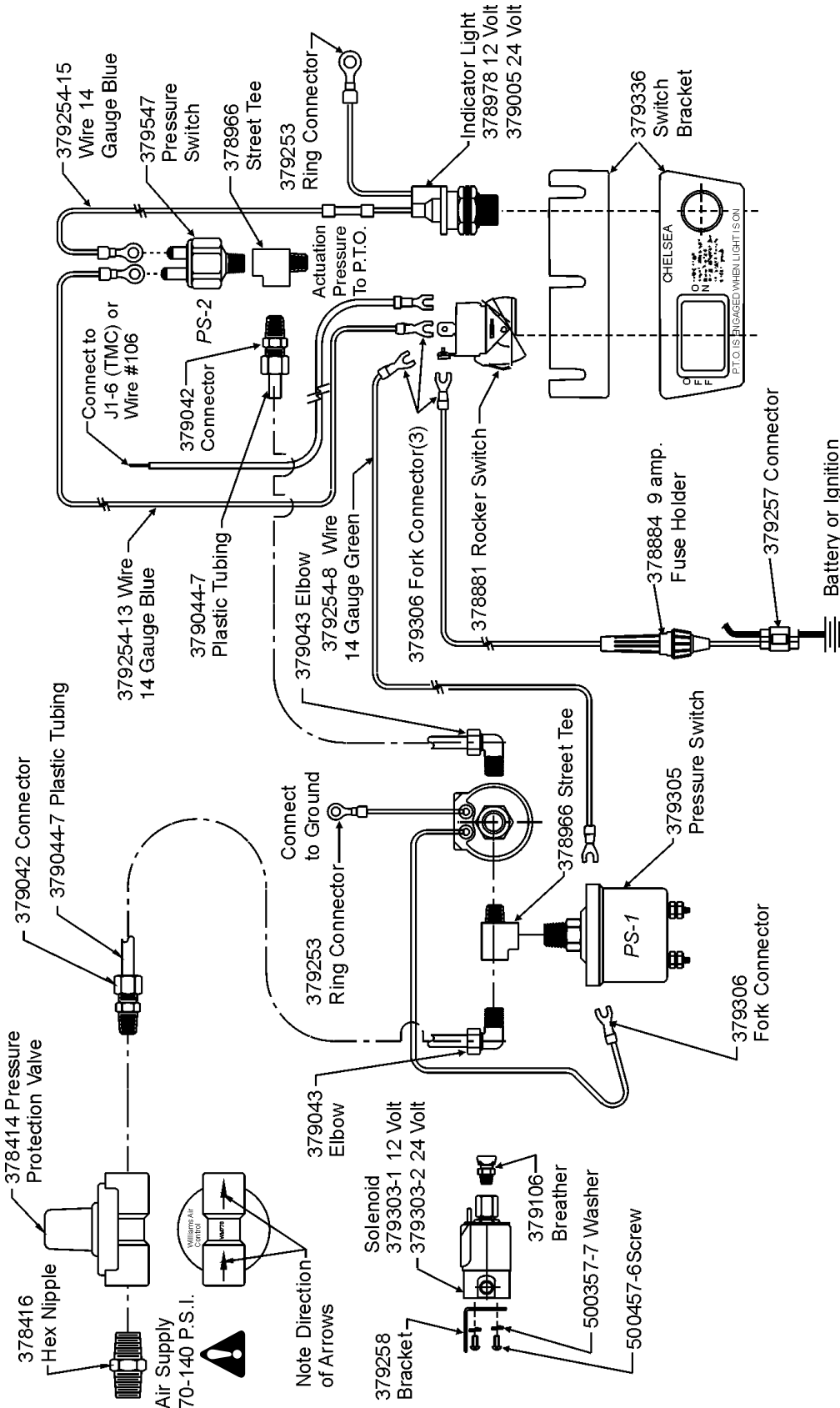
Warning: Connect directly to air supply. Do not use tubing between air supply and pressure protection valve.

Shifter Component Installation Sketch for 230, 236 and 231 12 and 24 Volt w/E.O.C. (SK-227 Rev C)



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

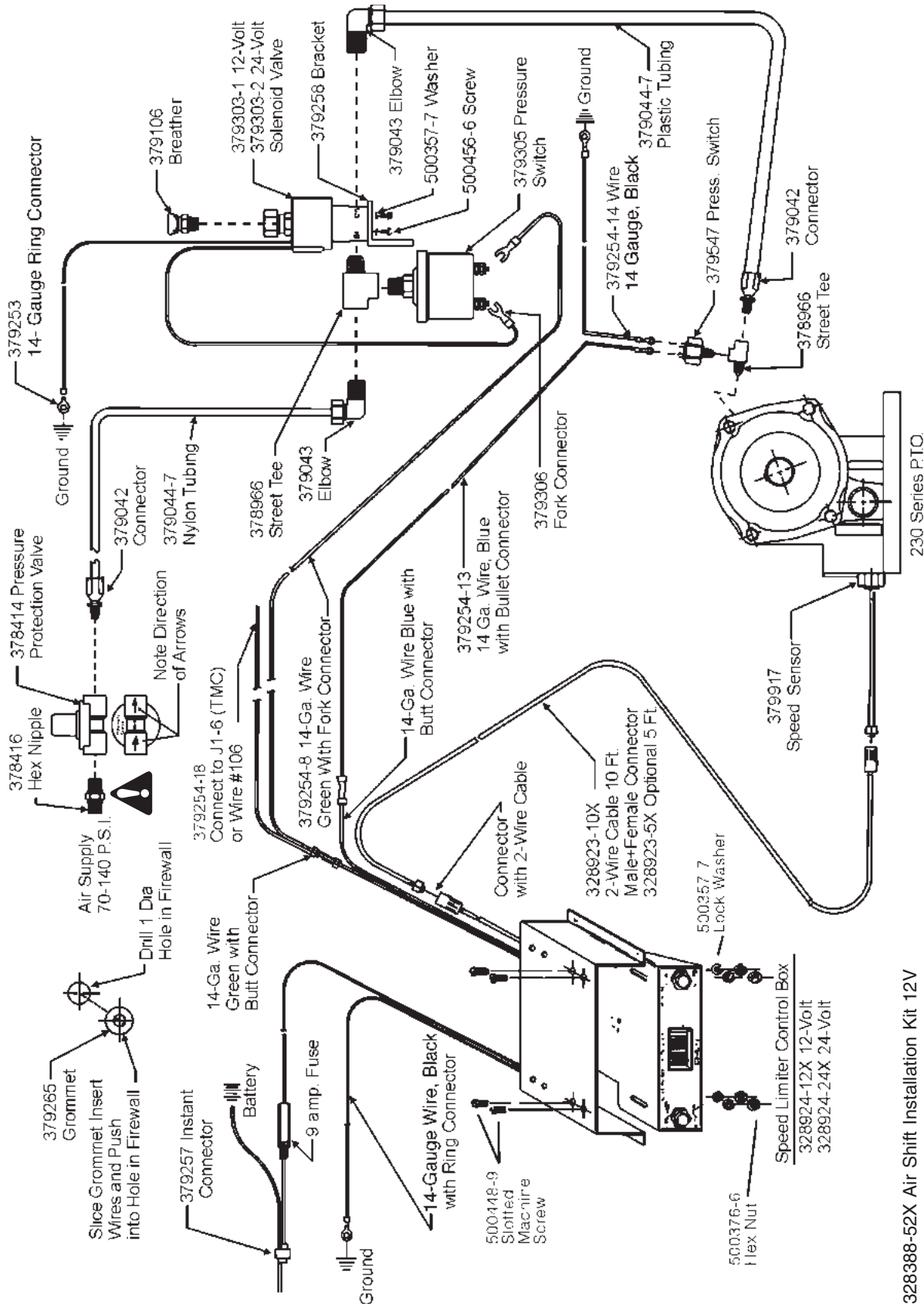
**Shifter Component Installation Sketch for 230 and 231 12 and 24 Volt without E.O.C.
 (Allison 1000, 2000/2400) (SK-337 Rev B)**



- 328388-50X Air Shift Installation Kit 12V
- 328388-51X Air Shift Installation Kit 24V
- 329336-1X J1-6 Wire Kit

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

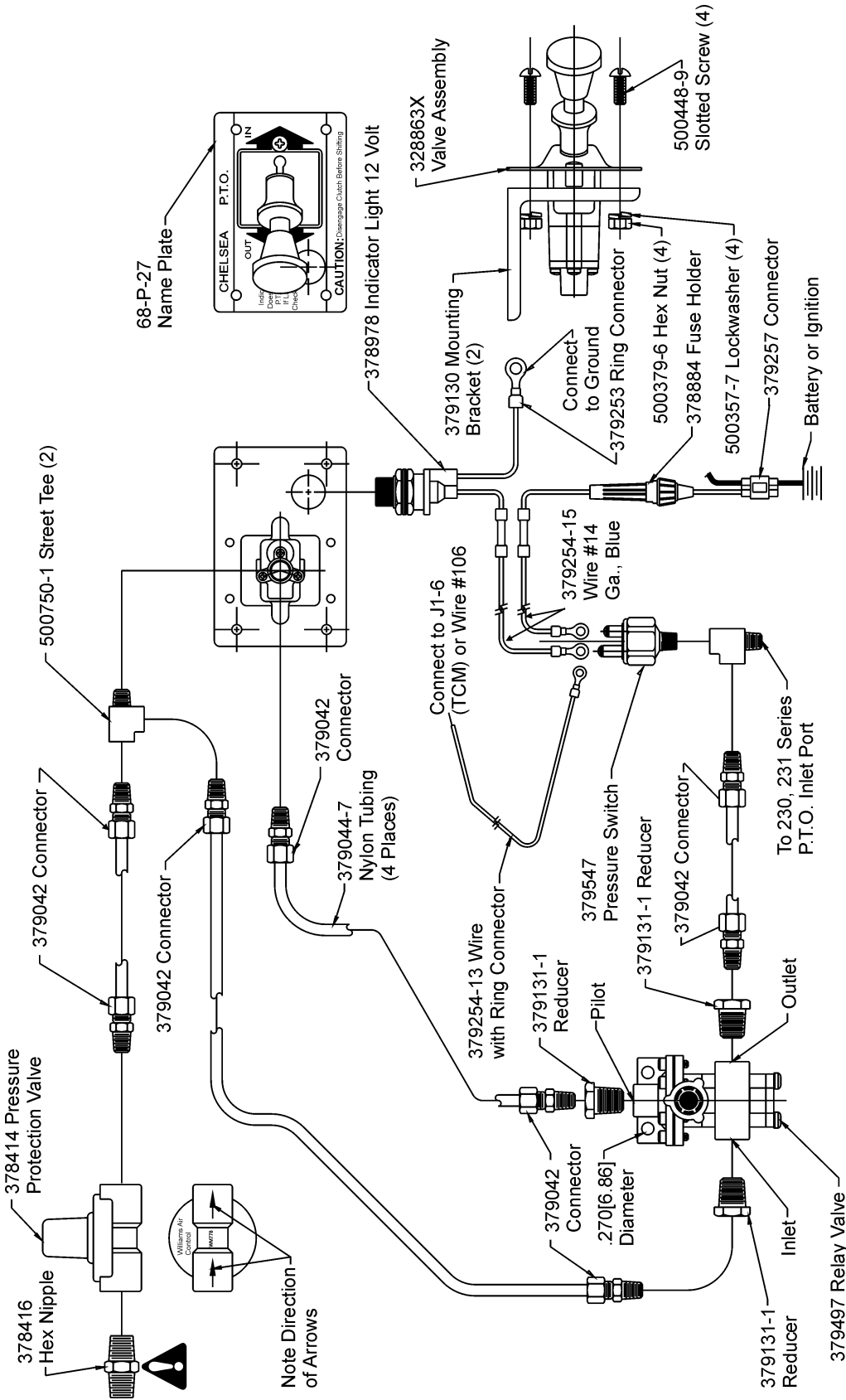
Shifter Component Installation Sketch for 230 and 231 12 and 24 Volt with E.O.C. (Allison 1000, 2000/2400) (SK-338 Rev D)



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

328388-52X Air Shift Installation Kit 12V
 328388-53X Air Shift Installation Kit 24V
 329336-2X J1-6 Wire Kit (must be ordered separately)

Air Shift Component Installation Sketch for 230 and 231 Series with Manual Air Valve without E.O.C. (Allison 1000, 2000/2400) (SK-339 Rev B)



328388-57X Air Shift Installation Kit
 3293336-2X J1-6 Wire Kit

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

Installation Sketch, 250 Series 12 & 24 Volt without Speed Limiter (SK-330 Rev B)

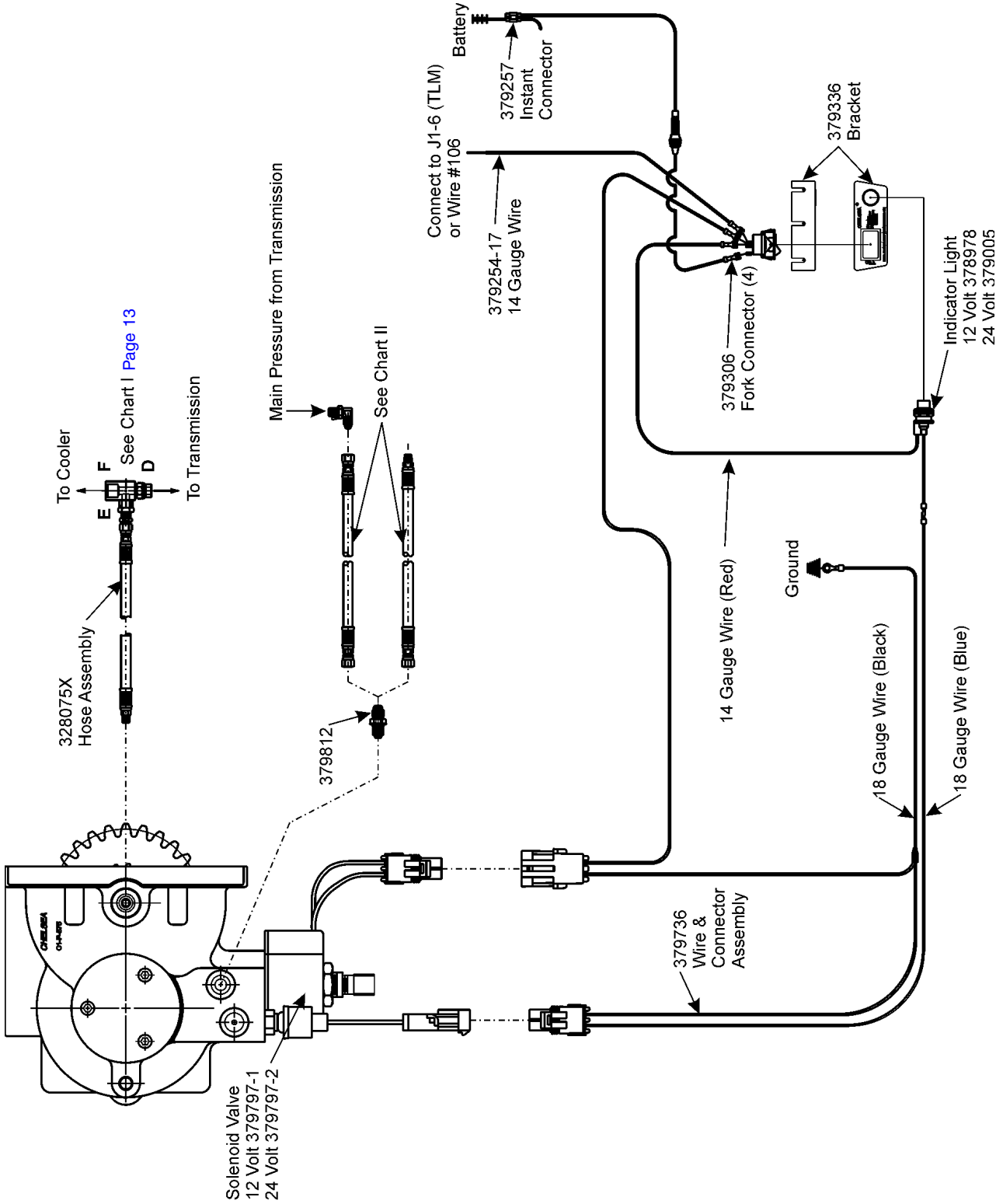
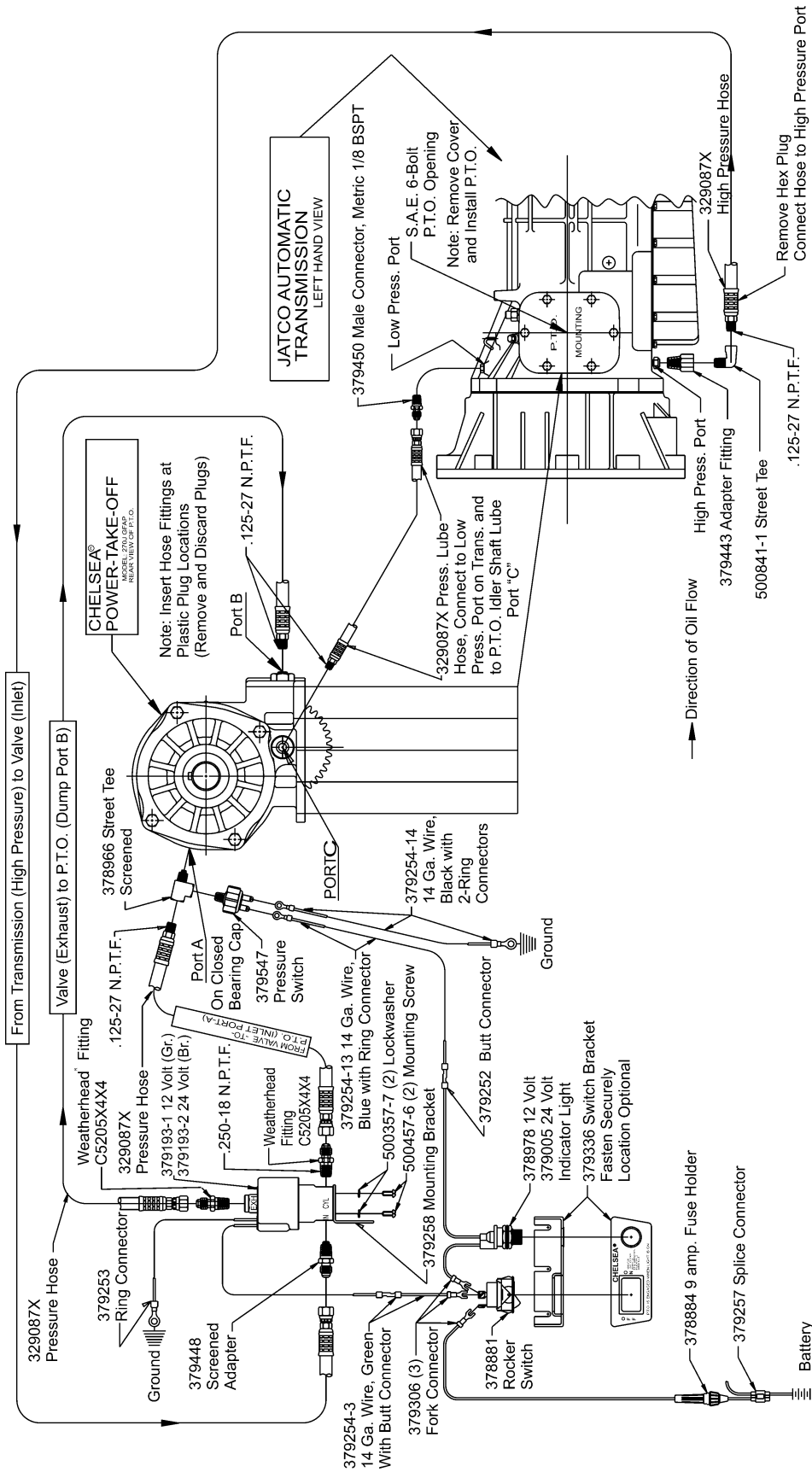


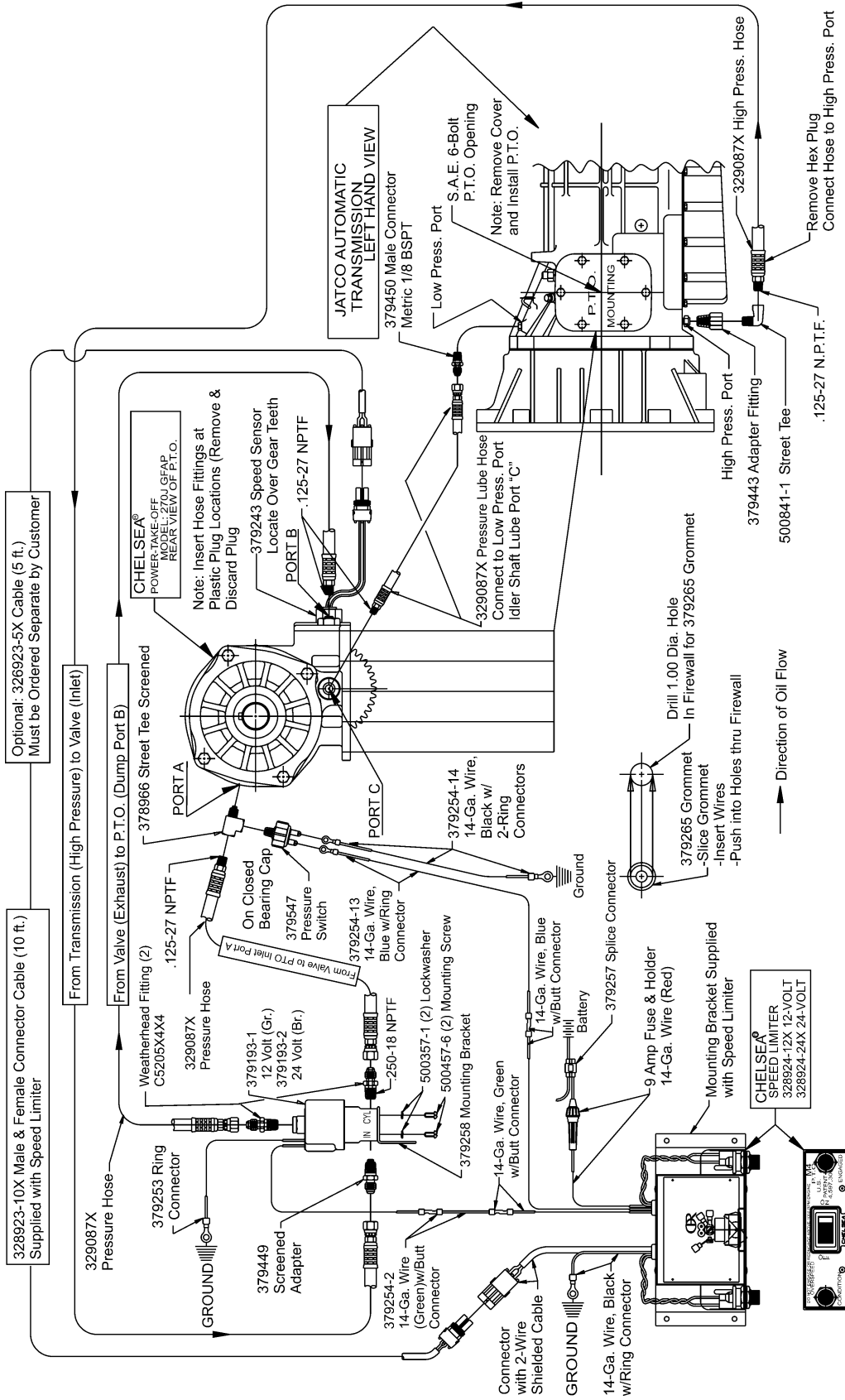
Chart II

Transmission	High Pressure Hose	Fitting
Allison 1000, 2000/2400	329141-1X	379486

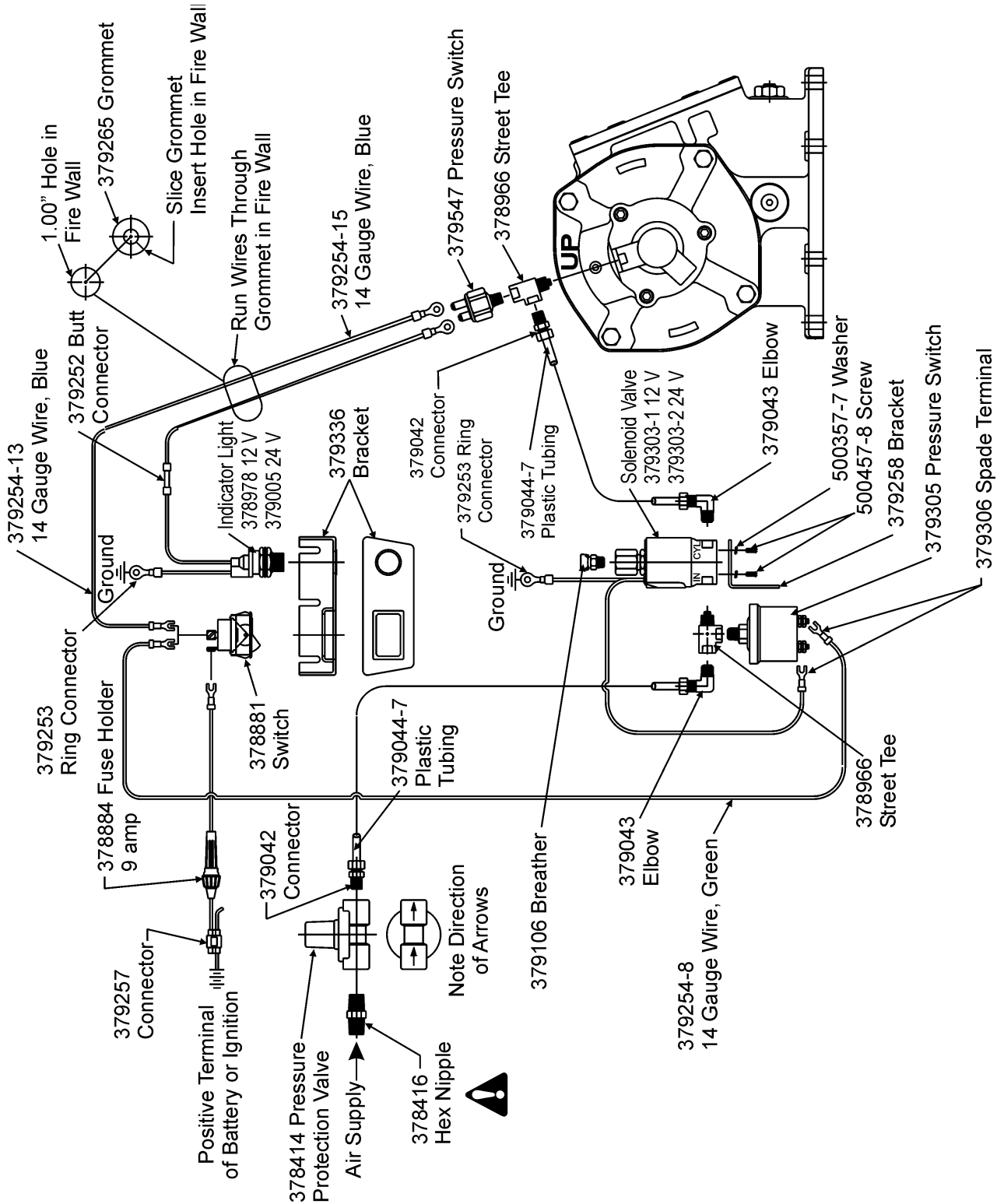
Shifter Component Installation Sketch for JATCO (SK-242 Rev B)



Installation Sketch, Electronic Overspeed Control for JATCO (SK-241 Rev B)



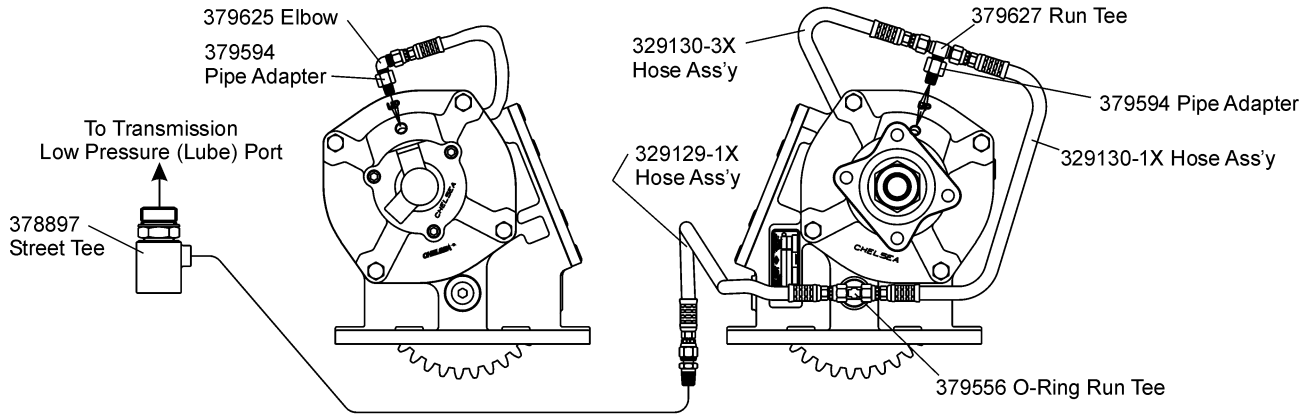
Shifter Component Installation Sketch for 885 Series 12 and 24 Volt without E.O.C. (SK-301 Rev A)



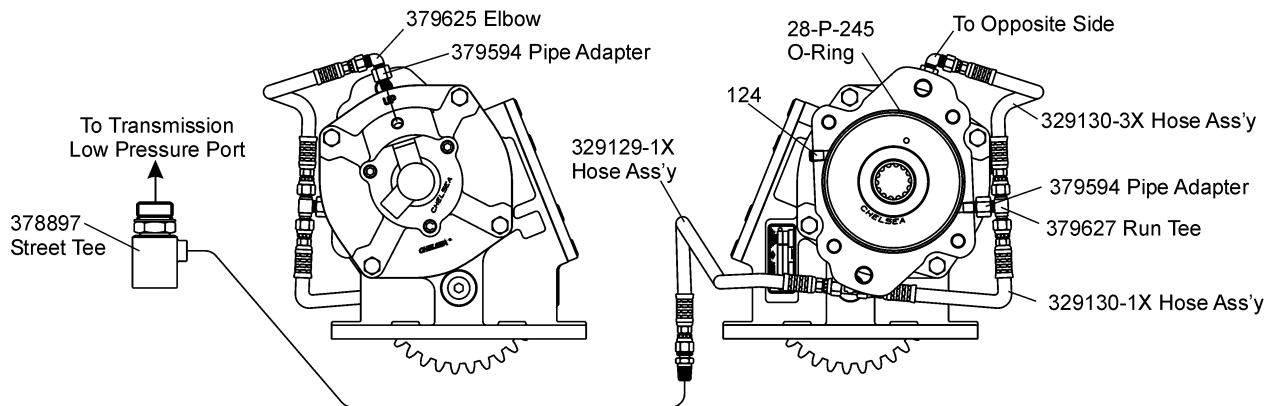
Warning: Connect directly to air supply. Do not use tubing between air supply and pressure protection valve.

Pressure Lube Installation Schematic for 885 Series (SK-336)

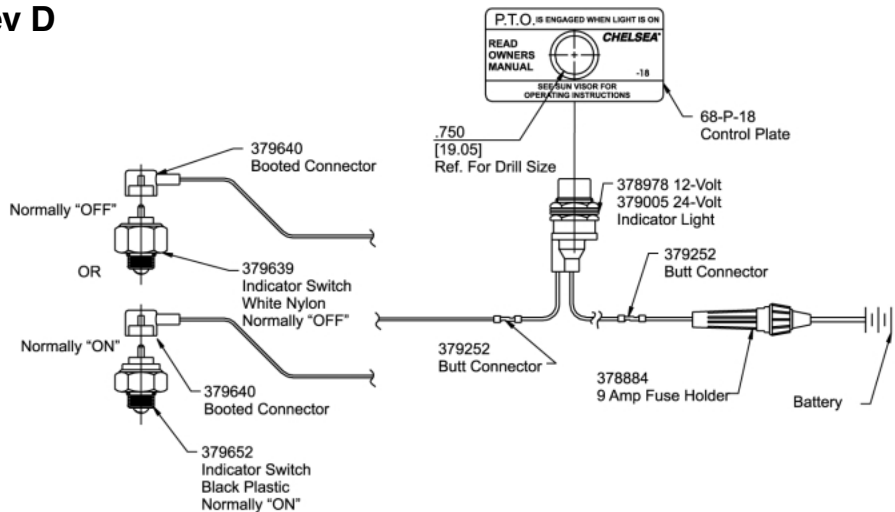
“XV” & “AB” Output



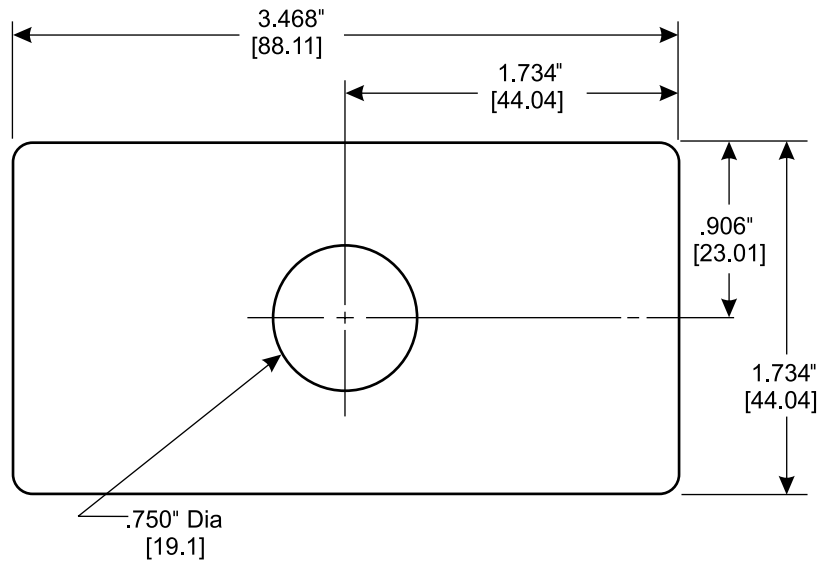
“XS” Output



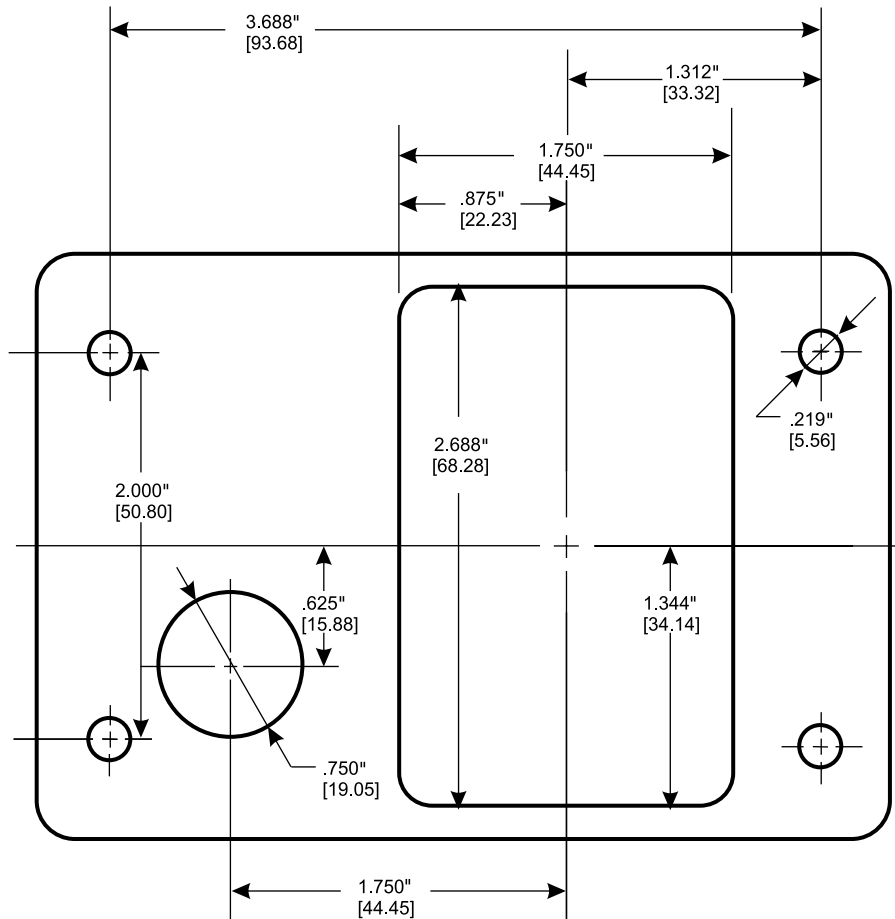
Indicator Light Installation
Sk-286 Rev D



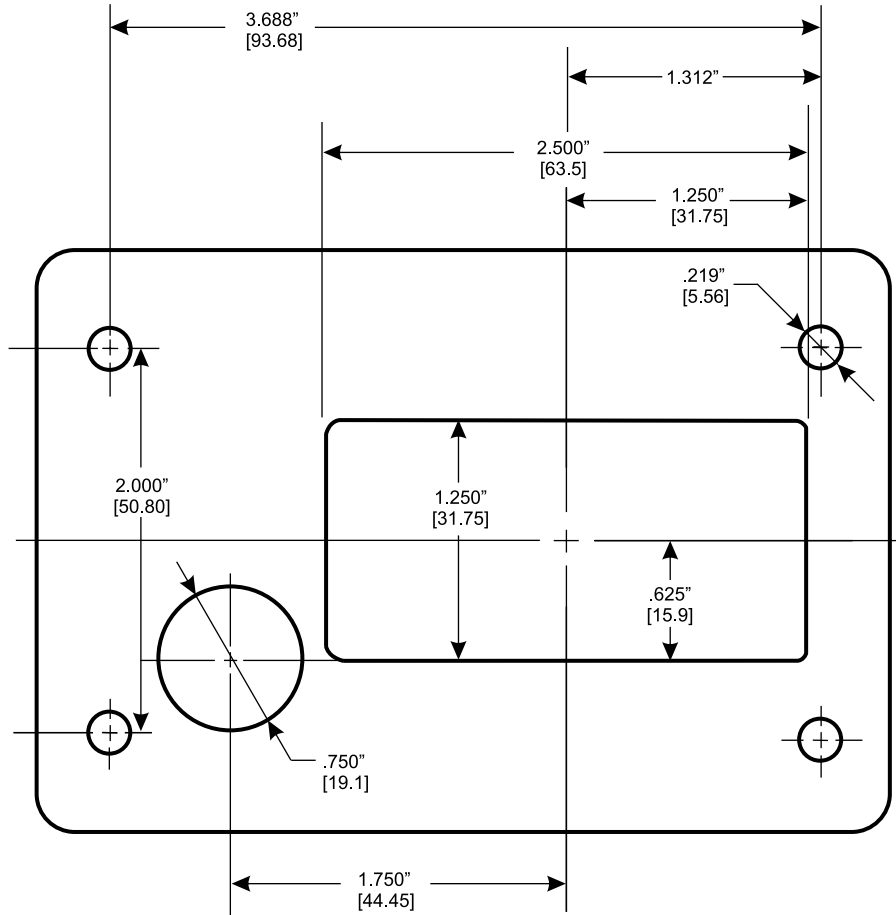
Dash Drilling Template



Dash Drilling Template for 6 & 8 Bolt Air Shift for Williams Valve (SK-204 Rev C)



Dash Drilling Template for 6 & 8 Bolt Air Shift for Williams Valve (SK-204 REV C)

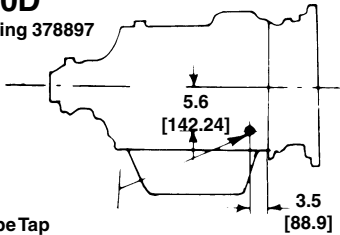


P.T.O. Openings for Automatic Transmissions Allison Models

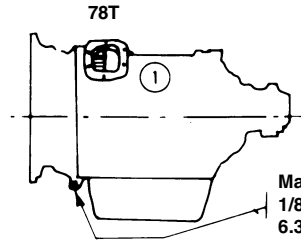
HT-740

HT-750D

T Fitting 378897



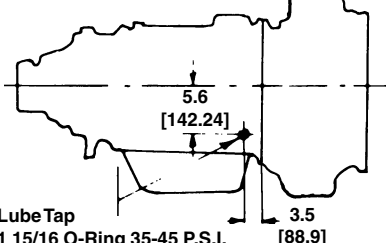
Lube Tap
 1 15/16 O-Ring 35-45 P.S.I.
 2.4-3.2 Kg/cm²



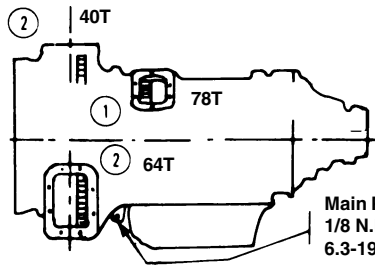
Main Pressure
 1/8 N.P.T. 90-175 P.S.I.
 6.3-12.2 Kg/cm²

CLT-750

T Fitting 378897

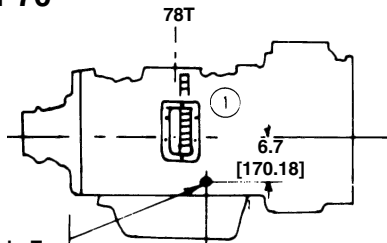


Lube Tap
 1 15/16 O-Ring 35-45 P.S.I.
 2.4-3.2 Kg/cm²

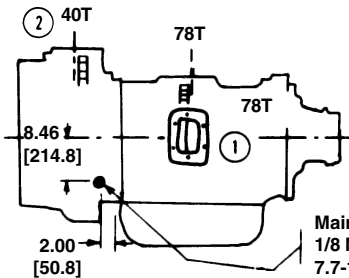


Main Pressure
 1/8 N.P.T. 90-270 P.S.I.
 6.3-19 Kg/cm²

HT-70

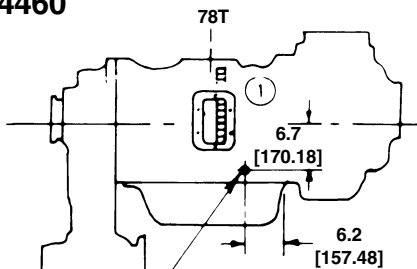


Lube Tap
 1/8 N.P.T. 5-15 P.S.I.
 .35-1.05 Kg/cm²

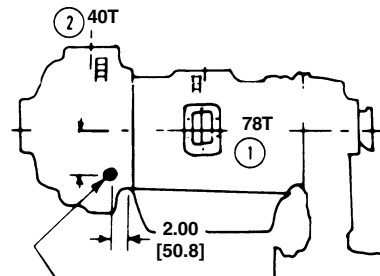


Main Pressure
 1/8 N.P.T. 90-240 P.S.I.
 7.7-16.8 Kg/cm²

4460



Lube Tap
 1/8 N.P.T. 5-15 P.S.I.
 .35-1.05 Kg/cm²

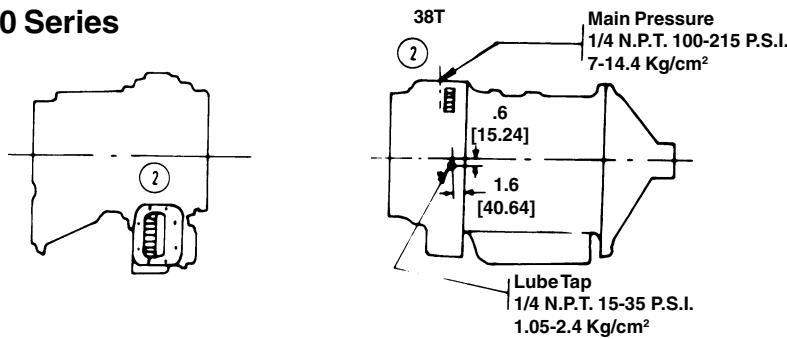


Main Pressure
 1/8 N.P.T. 110-240 P.S.I.
 7.7-16.8 Kg/cm²

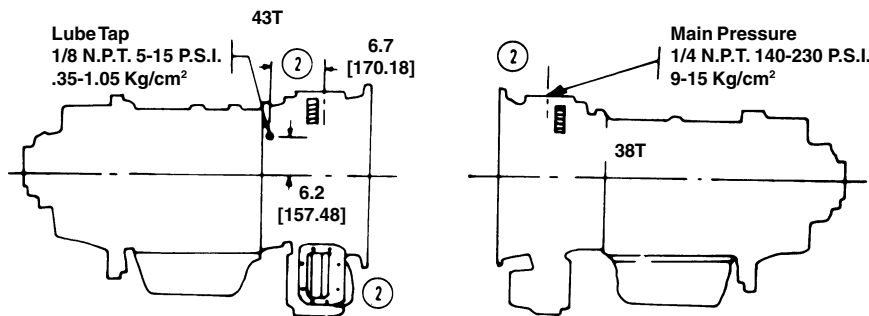
1. Converter Driven P.T.O. Drive Gear
2. Engine Driven P.T.O. Drive Gear

P.T.O. Openings for Automatic Transmissions Allison Models

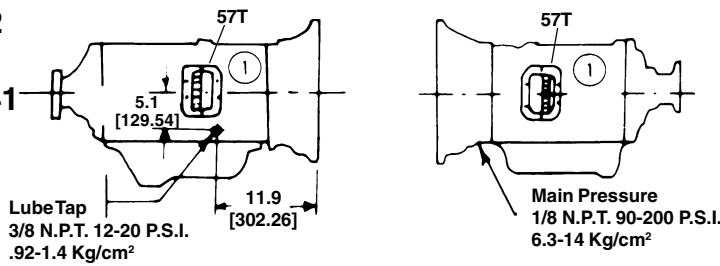
5000 Series



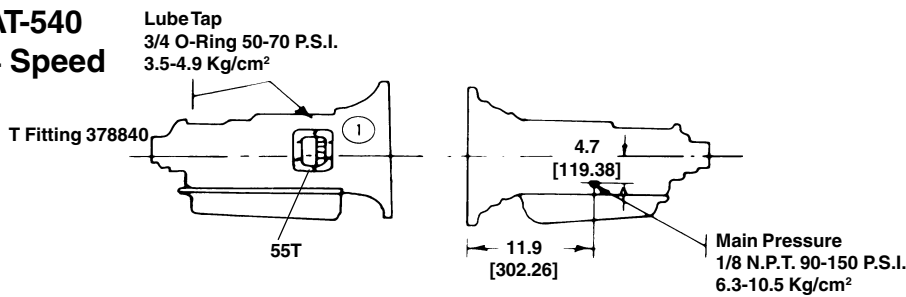
8000 Series



MT-30-42
6 Speed
3341-3441



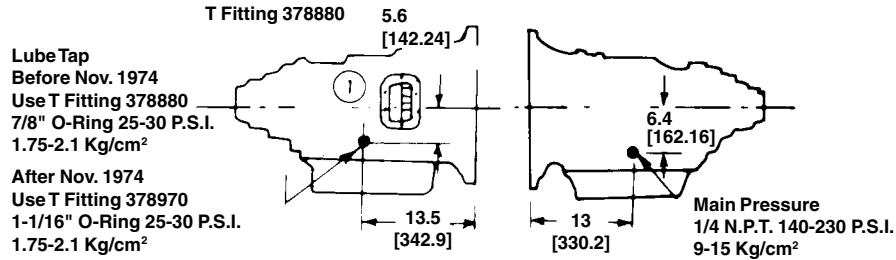
AT-540
4 Speed



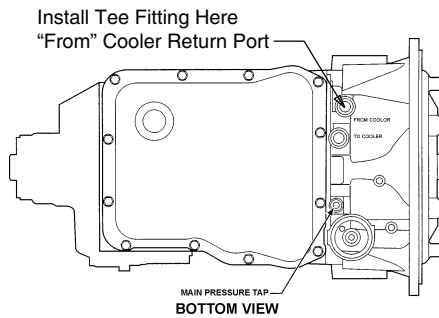
- 1. Converter Driven P.T.O. Drive Gear
- 2. Engine Driven P.T.O. Drive Gear

P.T.O. Openings for Automatic Transmissions Allison Models

**MT-640, MT-650 (64 Teeth)
 4 & 5 Speed**



Allison 1000, 2000/2400 (64 Teeth)

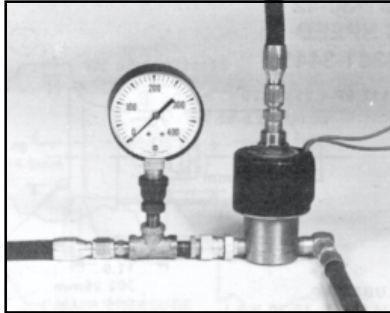


1. Converter Driven P.T.O. Drive Gear
2. Engine Driven P.T.O. Drive Gear

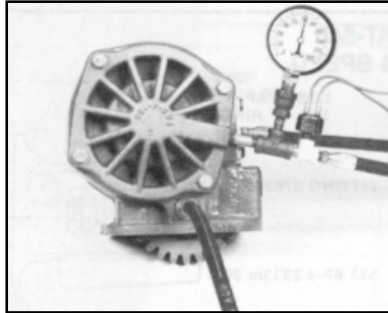
Circuit Check for Powershift P.T.O. for 270, 271, 800 and 852 Series on Automatic Transmissions

Perform the following steps. Record the results when installing the P.T.O. originally, as a replacement, or while troubleshooting.

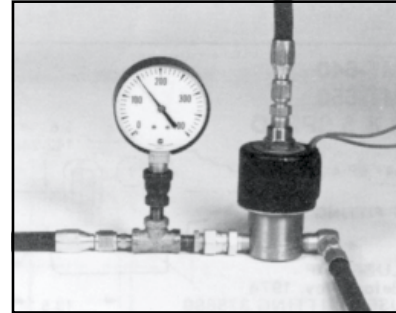
1. Install 2 Pressure Gauges in the circuit as shown: 300 - 400 PSI Gauges for Allison's.
2. With the Solenoid Valve "Off," record the pressures at inlet to Solenoid Valve for the transmission both cold (ambient) and at the operating temperature for engine idle R.P.M. and engine maximum R.P.M.



Before 378965 Screen Adapter @ "In" Port of Solenoid Valve.



Between 378966 Screen Adapter and P.T.O. Port.



For Allison's should be 90-270 PSI.

R.P.M.	Transmission Cold (Ambient)	Transmission At Operating Temperature
Engine Idle	PSI	PSI
Engine Maximum	PSI	PSI

Circuit Check for Powershift P.T.O. for 270, 271, 800 and 852 Series on Automatic Transmissions

3. With the Solenoid Valve "On," record the corresponding pressures at the 2 gauges with the transmission both cold (ambient) and at the operating temperature for engine idle R.P.M. and engine maximum rpm.

Engine R.P.M.	Transmission Cold (ambient)		Transmission At Operating Temperature	
	Into Solenoid	Into PTO	Into Solenoid	Into PTO
Idle	PSI	PSI	PSI	PSI

If at any time the above pressures are below 90 PSI or there is a 50 PSI or more difference in two of the corresponding readings in Part 3:

- (a) Check the circuit for correct installation.
- (b) Check hoses and screens for obstruction.
4. Remove the "B" line from the P.T.O. with the Solenoid Valve "On." No oil should appear from the line. Then turning the Solenoid Valve to "Off" should dump the oil from the P.T.O. Clutch Pack through this line.
5. Remove the "C" line from the P.T.O. Idler Shaft end, and confirm that oil is running to this shaft for lubrication.

Retain the findings of these tests for future comparison. Re-check the oil level in the transmission after testing is complete. This concludes your installation and circuit checks. Make sure all lines are reconnected (lube lines and pressure solenoid lines).

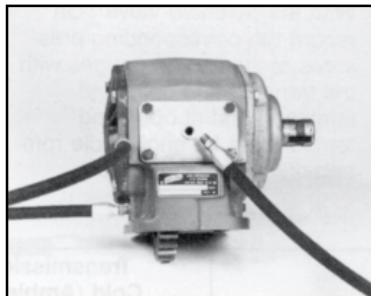


Fig. 1

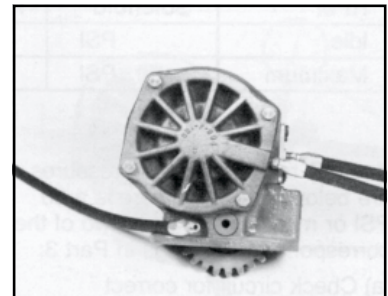


Fig. 2

P.T.O. Shifting Procedure & Precautions for 1000, 2000/2400, AT, MT & HT Series Transmissions

CAUTION: This vehicle is equipped with a Power Take-Off. Shut the engine off before working on the Power Take-Off or getting below the vehicle.

Consult operating instructions before using. (See Sun Visor)

POWER TAKE-OFF OPERATION VEHICLE STATIONARY.

1. Automatic Transmission with Powershift P.T.O.
Engage P.T.O. with the engine at idle speed.
2. **Manually Shifted Transmission with Powershift P.T.O.**
Engage P.T.O. with the engine at idle speed.

NOTE: Powershift P.T.O.: The engine must be at idle or below 1,000 R.P.M. when the P.T.O. is initially engaged. See the transmission manufacturer's instructions for special procedures.

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

NOTE: There is a torque converter lock up feature available with the 1000/2000/2400 Series transmissions. The torque converter lock up feature comes on and is controlled by the Transmission Control Module (TCM) at 1100 engine RPM when a signal is provided to the "P.T.O. Enable" circuit of the TCM by the P.T.O. switch. Lock up will only come on in the "NEUTRAL" and "PARK" positions. The lock up clutch does not come on automatically in "DRIVE" at 1100 R.P.M.

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. Insure 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.

Offer of Sale

The items described in this document and other documents or descriptions provided by Parker Hannifin Corporation, its subsidiaries and its authorized distributors are hereby offered for sale at prices to be established by Parker Hannifin Corporation, its subsidiaries and its authorized distributors. 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 such items, when communicated to Parker Hannifin Corporation, its subsidiary or an authorized distributor ("Seller") verbally or in writing, shall constitute acceptance of this offer.

1. Terms and Conditions of Sale: All descriptions, quotations, proposals, offers, acknowledgments, acceptances and sales of Seller's products are subject to and shall be governed exclusively by the terms and conditions stated herein. Buyer's acceptance of any offer to sell is limited to these terms and conditions. Any terms or conditions in addition to, or inconsistent with those stated herein, proposed by Buyer in any acceptance of an offer by Seller, are hereby objected to. No such additional, different or inconsistent terms and conditions shall become part of the contract between Buyer and Seller unless expressly accepted in writing by Seller. Seller's acceptance of any offer to purchase by Buyer is expressly conditional upon Buyer's assent to all the terms and conditions stated herein, including any terms in addition to, or inconsistent with those contained in Buyer's offer. Acceptance of Seller's products shall in all events constitute such assent.

2. Payment: Payment shall be made by Buyer net 30 days from the date of delivery of the items purchased hereunder. Amounts not timely paid shall bear interest at the maximum rate permitted by law for each month or portion thereof that the Buyer is late in making payment. Any claims by Buyer for omissions or shortages in a shipment shall be waived unless Seller receives notice thereof within 30 days after Buyer's receipt of the shipment.

3. Delivery: Unless otherwise provided on the face hereof, delivery shall be made F.O.B. Seller's plant. Regardless of the method of delivery, however, risk of loss shall pass to Buyer upon Seller's delivery to a carrier. Any delivery dates shown are approximate only and Seller shall have no liability for any delays in delivery.

4. Warranty: Seller warrants that the items sold hereunder shall be free from defects in material or workmanship for a period of:

- (A) All Power Take-Off units one (1) year from date of installation.
- (B) Except 267, 277, 278, 242, 244, 245, 250, 251 and 859 series two (2) years from date of installation.

THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO ITEMS PROVIDED HEREUNDER. SELLER MAKES NO OTHER WARRANTY, GUARANTEE, OR REPRESENTATION OF ANY KIND WHATSOEVER. ALL OTHER WARRANTIES, INCLUDING BUT NOT LIMITED TO, MERCHANTABILITY AND FITNESS FOR PURPOSE, WHETHER EXPRESS, IMPLIED, OR ARISING BY OPERATION OF LAW, TRADE USAGE, OR COURSE OF DEALING ARE HEREBY DISCLAIMED. NOTWITHSTANDING THE FOREGOING, THERE ARE NO WARRANTIES WHATSOEVER ON ITEMS BUILT OR ACQUIRED WHOLLY OR PARTIALLY, TO BUYER'S DESIGNS OR SPECIFICATIONS.

5. Limitation Of Remedy: SELLER'S LIABILITY ARISING FROM OR IN ANY WAY CONNECTED WITH THE ITEMS SOLD OR THIS CONTRACT SHALL BE LIMITED EXCLUSIVELY TO REPAIR OR REPLACEMENT OF THE ITEMS SOLD OR REFUND OF THE PURCHASE PRICE PAID BY BUYER, AT SELLER'S SOLE OPTION. IN NO EVENT SHALL SELLER BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES OF ANY KIND OR NATURE WHATSOEVER, INCLUDING BUT NOT LIMITED TO LOST PROFITS ARISING FROM OR IN ANY WAY CONNECTED WITH THIS AGREEMENT OR ITEMS SOLD HEREUNDER, WHETHER ALLEGED TO ARISE FROM BREACH OF CONTRACT, EXPRESS OR IMPLIED WARRANTY, OR IN TORT, INCLUDING WITHOUT LIMITATION, NEGLIGENCE, FAILURE TO WARN OR STRICT LIABILITY.

6. Changes, Reschedules and Cancellations: Buyer may request to modify the designs or specifications for the items sold hereunder as well as the quantities and delivery dates thereof, or may request to cancel all or part of this order, however, no such requested modification or cancellation shall become part of the contract between Buyer and Seller unless accepted by Seller in a written amendment to this Agreement. Acceptance of any such requested modification or cancellation shall be at Seller's discretion, and shall be upon such terms and conditions as Seller may require.

7. Special Tooling: A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture items sold pursuant to this contract. 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 items sold hereunder, even if such apparatus has been specially con-

verted 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.

8. 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, may be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer placing an order for the items which are 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. Taxes: Unless otherwise indicated on the face hereof, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of the items sold hereunder. If any such taxes must be paid by Seller or if Seller is liable for the collection of such tax, the amount thereof shall be in addition to the amounts for the items sold. Buyer agrees to pay all such taxes or to reimburse Seller therefore upon receipt of its invoice. If Buyer claims exemption from any sales, use or other tax imposed by any taxing authority, Buyer shall save Seller harmless from and against any such tax, together with any interest or penalties thereon which may be assessed if the items are held to be taxable.

10. 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 Part 10. Seller will defend and indemnify Buyer against allegations of infringement of U.S. Patents, U.S. Trademarks, copyrights, trade dress and trade secrets (hereinafter '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 an item sold pursuant to this contract 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 an item sold hereunder 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 said item, replace or modify said item so as to make it noninfringing, or offer to accept return of said item 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 items 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 item sold hereunder. The foregoing provisions of this Part 10 shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

If a claim is based on information provided by Buyer or if the design for an item delivered hereunder is specified in whole or in part by Buyer, Buyer shall defend and indemnify Seller for all costs, expenses or judgments resulting from any claim that such item infringes any patent, trademark, copyright, trade dress, trade secret or any similar right.

11. Force Majeure: Seller does not assume the risk of 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, acts of God, strikes or labor disputes, acts, laws, rules or regulations of any government or government agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials and any other cause beyond Seller's control.

12. Entire Agreement/Governing Law: The terms and conditions set forth herein, together with any amendments, modifications and any different terms or conditions expressly accepted by Seller in writing, shall constitute the entire Agreement concerning the items sold, and there are no oral or other representations or agreements which pertain there/to. This Agreement shall be governed in all respects by the law of the State of Ohio. No actions arising out of the sale of the items sold hereunder or this Agreement may be brought by either party more than two (2) years after the cause of action accrues.

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