

Power Take-Offs Owner's Manual

Detroit® DT12® Adapter Manual for Bottom Mount PTOs
238, 489, 680, 823, 880 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.



WARNING: This product can expose you to chemicals including Lead and Lead Compounds, and Di (2-ethylhexyl) phthalate (DEHP) which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

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:

7,159,701 7,007,565 6,962,093 1,326,036 60,321,840.7 9494227 B2 11,149,796 B2

Other patents pending.

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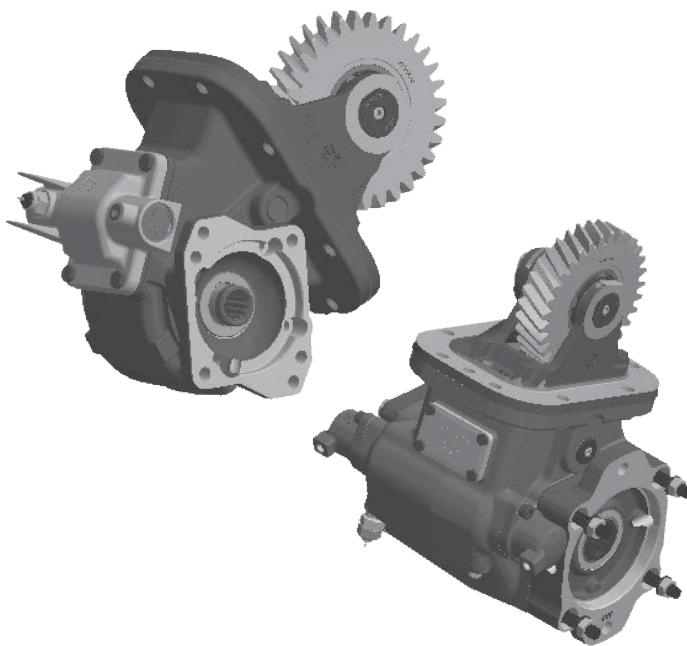
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Foreword

Since it is our major objective 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. A mismatched transmission and PTO combination can result in unsatisfactory performance of the equipment right from the start.

Before you order new trucks, be sure that you're getting the right transmission and PTO combination. This is vital for efficient performance and adequate power. To help you select the proper type, size, and design of PTO, discuss your specific requirements with a Chelsea PTO representative. They know their products and have easy access to equipment, transmission, and Power Take-Off manufacturers. They can tell you everything you need to know about power, at the right time, before you specify components.

Safety Information

Proper Matching of PTO



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 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's catalogs, literature, and owner's manuals.
- Follow Chelsea's recommendations when selecting, installing, repairing, or operating a PTO.
- Never attempt to use a PTO that is not specifically recommended by Chelsea for the vehicle, transmission, and application.
- Always match the PTO's specified output capabilities with the requirements of the equipment to be powered.
- Never exceed the maximum speed listed in Chelsea's Applications Catalog.
- Only use 329932X, 329954X & 329955X Adapter assemblies with Chelsea 489 and 238 Series Power Take-Offs. A keyed feature is integrated into both the PTO and adapter flanges to ensure only these PTOs and adapters can be used together (see diagram on [page 2](#)).

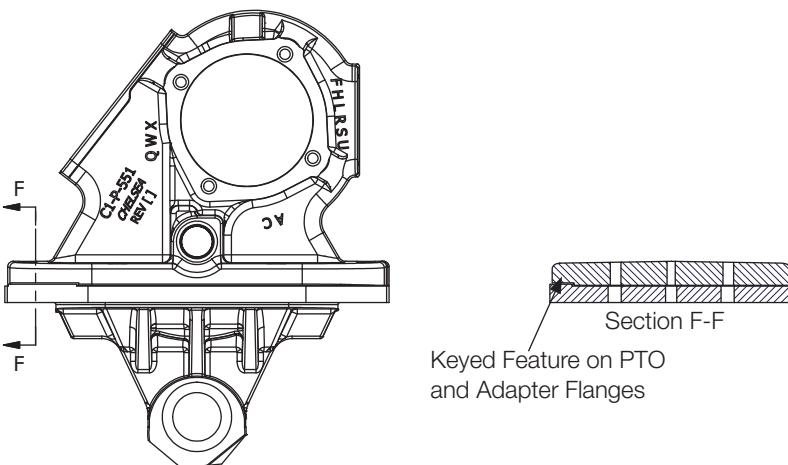


This symbol warns of possible personal injury.

Safety Information (Continued)

To avoid personal injury and/or equipment damage (Continued):

- Use of 329932X, 329954X & 329955X Adapter assemblies with any other Chelsea Power Take-Off series could cause severe damage to the vehicle transmission, transmission components or the Power Take-Off.
- The Power Take-Off warranty will be void if 329932X, 329954X & 329955X Adapter assemblies are used with any other Power Take-Offs other than Chelsea 489 and 238 Series Power Take-Offs. See diagram.



- Use of other Chelsea Power Take-Offs such as 680, 880 or 823 series with 329932X, 329954X and 329955X Adapter assemblies will result in a visible gap between the adapter and the Power Take-Off. This gap will be present because the PTO/adapter combination is incorrect. If the incorrect Power Take-Off and adapter combination is installed on the transmission, fluid leakage will occur during initial transmission fluid filling.

If a gap is present between the adapter and Power Take-Off during assembly or leakage occurs after initial fluid filling, remove the Power Take-Off and adapter immediately. Double check and ensure the correct Power Take-Off and Adapter assembly are being used for the application.

See directions and compatibility chart on the following page for correct Transmission/Adapter/PTO combinations.

⚠ This symbol warns of possible personal injury.

Compatibility Chart



CAUTION: The Detroit® DT12® transmission is offered in 3 model numbers for Power Take-Off (PTO) applications. It is critical that each transmission is matched with a specific adapter and compatible PTO input gear for correct system function. A compatibility chart is listed below so the installer can verify the correct adapter and PTO input gear are being used with the transmission.

Directions:

Look at the white tag on your PTO to determine the PTO Series. 489 Series will use the top chart (1-4) and 680, 823 and 880 Series will use the bottom chart (5-8).

In the chart below find the transmission model and then reading left to right confirm the P/N of your adapter gear and the part number on the PTO input gear. Make sure the part number on the side of your adapter gear and the side of the PTO input gear match your Transmission Model **BEFORE INSTALLING** onto the transmission.

Failure to use compatible Adapter Assembly and PTO input gears with the correct transmission could result in personal injury, equipment damage, and voided warranty.

1 – IF THE MODEL NUMBER ON YOUR WHITE PTO TAG STARTS WITH 489 OR 238 SERIES PTO		
2 – And your DT12® Transmission is:	3 – The Part No. stamped on your adapter gear must be:	4 – And the Part No. on your PTO input gear must be one of these:
OV/OHE G 320-12	43-P-170	5-P-1596/5-P-1733/5-P-1607/5-P-1709
DV/DHE G 271-12	43-P-171	5-P-1599/5-P-1710
OVX G 340-12	43-P-172	5-P-1601/5-P-1734/5-P-1615/5-P-1711

- OR -

5 – IF THE MODEL NUMBER ON YOUR WHITE PTO TAG STARTS WITH 680, 823 OR 880 SERIES PTO		
6 – And your DT12® Transmission is:	7 – The Part No. stamped on your adapter gear must be:	8 – And the Part No. on your PTO input gear must be one of these:
OV/OHE G 320-12	43-P-175	5-P-1619/5-P-1621/5-P-1623/5-P-1638/ 5-P-1640/5-P-1641/5-P-1678
DV/DHE G 271-12	43-P-176	5-P-1627/5-P-1628/5-P-1658/5-P-1647/ 5-P-1648/5-P-1649/5-P-1679
OVX G 340-12	43-P-177	5-P-1631/5-P-1633/5-P-1635/5-P-1652/ 5-P-1654/5-P-1655/5-P-1680

This symbol warns of possible personal injury.

PTO 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 PTO (See sun visor).

Engage the PTO with the engine at idle speed.

IMPORTANT:

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



WARNING: Cold Weather Operation of PowerShift PTOs

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 rotation of the PTO's output shaft 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 PTOs experience, operators should follow a set maintenance schedule for inspections. Failure to service loose bolts or PTO leaks could result in potential auxiliary Power Take-Off or transmission damage.

Periodic PTO 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 PTO and 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's specifications. If applicable, ensure that splines are properly lubricated. Perform maintenance as required.

With regards to the direct mounted pump splines, the PTO requires the application of a specially formulated anti-fretting grease. This grease must be specified for both high pressure and high temperature applications. The addition of the grease has been proven to reduce the effects of torsional vibrations, which result in fretting corrosion on the PTO's internal splines as well as the pump's external splines. Fretting corrosion appears as a "rusting and wearing" of the pump shaft splines. Severe duty applications, which require long PTO running times and high torque, may require more frequent regreasing. Continuous duty applications with light loads require frequent regreasing due to the higher number of running hours, an example of this is utility trucks. It is important to note that service intervals will vary for every application and they are the responsibility of the end user of the product. Chelsea also recommends that you consult your pump's owner's manual 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 anti-fretting grease to our customers in two package sizes:

- 5/8 fluid ounce tube (PN 379688) - Provided with PTO where applicable
- 14-ounce grease cartridge (PN 379831)

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

⚠ WARNING: Ensure all fasteners and fittings are torqued according to their manufacturer's specification.

NOTE: The following installation instructions are supplemental and are to be used in conjunction with the PTO installation instructions.

Detroit® DT12®

PTO/Adapter Backlash Settings

1. On a workbench and starting with (1) thick gasket, bolt the adapter to the PTO with (8) M12-.438" hex head bolts, washers and nuts. Torque to 40-45 lb-ft [54-61 N·m] (**Fig. 1**).
2. With a dial indicator measure the backlash between the PTO gear and the adapter gear (**Fig. 2**).
3. Acceptable backlash measurement is .006"-.012" (0.15-0.30 mm) (**Fig. 3**).
4. If backlash is less than .006" (0.15 mm) then repeat assembly and add a thin gasket. If the backlash is more than .012" (0.30 mm) then replace the thick gasket with a thin gasket.
5. Disassemble adapter from PTO and retain gasket(s).
6. Install the proper studs (furnished with PTO) in the PTO aperture pad using a stud driver. Studs should be threaded into the transmission holes until the stud shank is even with transmission mounting surface.
DO NOT install studs with shank below the aperture surface. Install studs with hand tools. **DO NOT** use power tools to install studs.

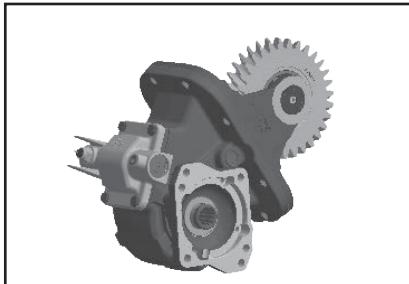


Figure 1

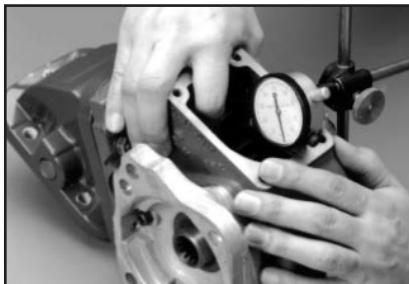


Figure 2

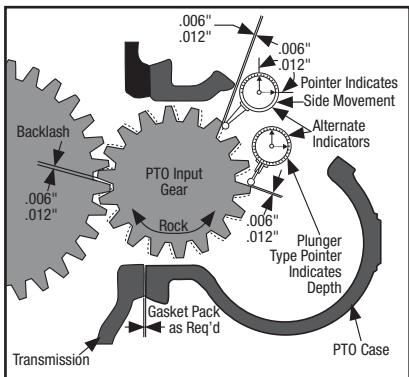


Figure 3

⚠ This symbol warns of possible personal injury.

Detroit® DT12®**PTO/Adapter Backlash Settings
(Continued)**

CAUTION: Over tightening of studs or running the shoulder past the transmission mounting surface may damage stud and/or transmission. Use of air impact tools is not recommended (Fig. 4).

7. Install dowel pins into transmission (some grease will help keep the pins in place).

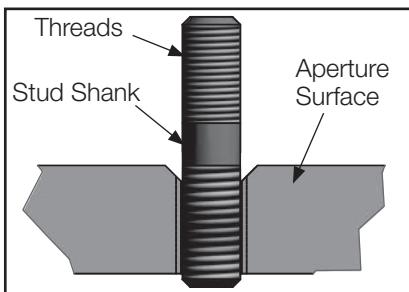


Figure 4

Detroit® DT12®**Adapter Gasket Installation**

1. Install adapter gasket over studs and dowel pins. Begin with (1) thick gasket.
2. Offset to be towards the rear of the transmission (Fig. 5).

Gasket Thickness:

Thin Gasket = 0.010" (0.25 mm)

Thick Gasket = 0.020" (0.51 mm)

Self Locking Flange Nut 7/16"-20 Thread

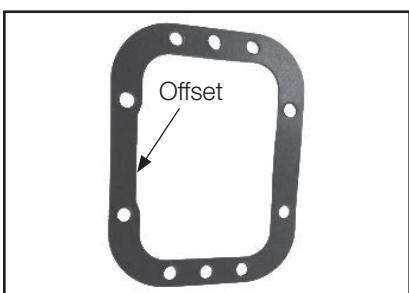


Figure 5

Detroit® DT12® Adapter Installation

1. Position adapter so ribs are towards the front of the transmission (Fig. 6).
2. Install adapter over studs and dowel pins. Rotate adapter gear to mesh with PTO drive gear in transmission.
3. Install locking nuts with washers to secure adapter in place. Washers are to protect the machined surface. Torque to 30-33 lb-ft [40-45 N-m].

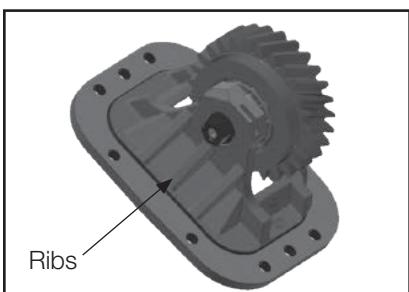


Figure 6

Detroit® DT12® Adapter Gasket Installation (Continued)

- With a dial indicator measure the backlash between the adapter gear and the PTO drive gear in transmission.
- Acceptable backlash measurement is .006"-.012" (0.15-0.30 mm) (**Fig. 7**).
- If backlash is less than .006" (0.15 mm) then add the thin gasket.
- Remove locking nuts and washers. Install gasket(s) from PTO/adapter assembly over studs in transmission (step 5, [page 6](#)).
- Support adapter with locking pliers so the adapter does not fall off the studs (be careful not to damage the threads).
- Use the PTO inspection/shifter opening to gain access to the PTO internal gears.
- Install PTO over studs and dowel pins.
- Temporarily secure PTO with 2-3 locking nuts and remove locking pliers.
- While rotating the input gear of the PTO, move the PTO into place until the PTO gear meshes with the adapter gear.
- Install all locking nuts and torque to 55-60 lb-ft [75-81 N-m] (**Fig 8 & 9**).
- Continue with PTO installation on page 16 of the HY25-1135 PTO Owner's Manual.

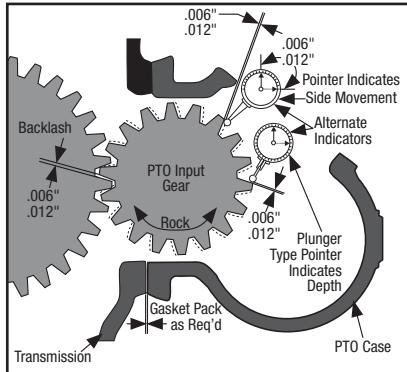


Figure 7

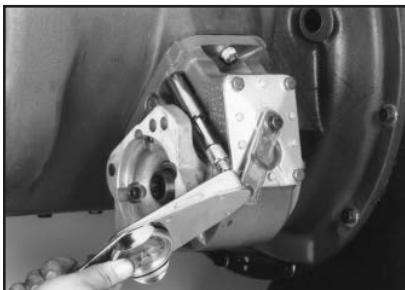


Figure 8

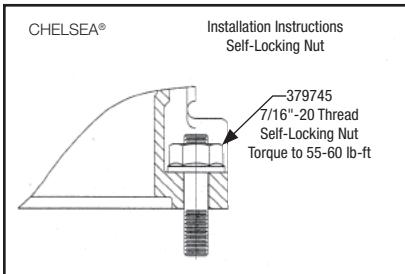
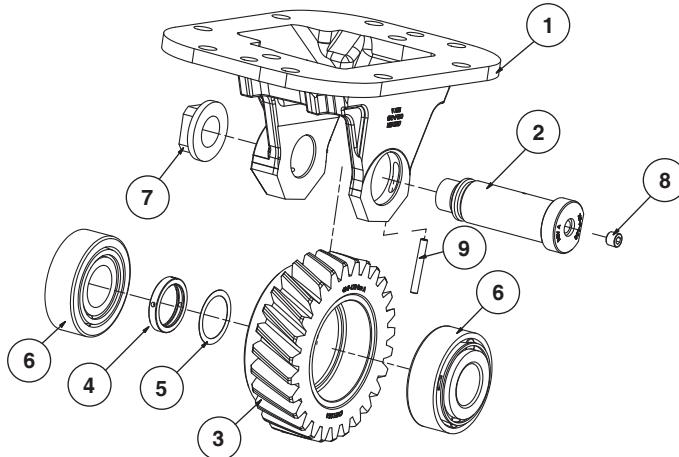
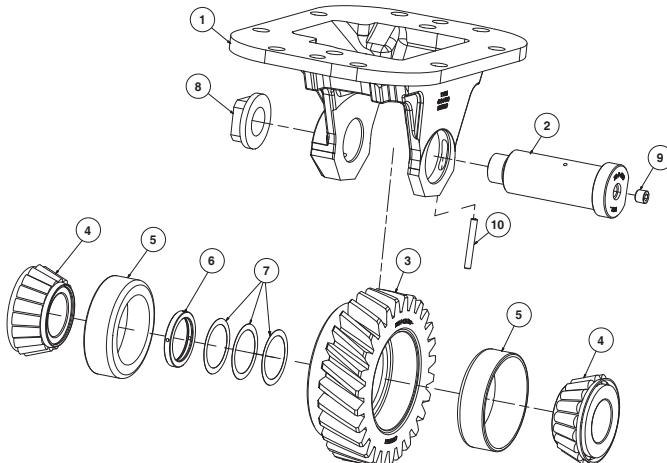


Figure 9

Standard Duty Adapters for Detroit® DT12®**329932X – Fits DT12-OV/OHE****329954X – Fits DT12-DV/DHE****329955X – Fits DT12-OVX****NOTE:** For Chelsea 489 and 238 Series PTOs Only

Item	Part Number	Description	Used on Assembly	Qty.
1	42-P-250 42-P-252 42-P-250	Adapter Housing	329932X 329954X 329955X	1
2	9-P-130	Adapter Shaft	All	1
3	43-P-170 43-P-171 43-P-172	Adapter Gear	329932X 329954X 329955X	1
4	14-P-92	Bearing Spacer (1.193" x 1.525" x .243")	All	1
5	55-P-44-1	Shim (1.196" x 1.525" x .001")	All	A.R.
	55-P-44-2	Shim (1.196" x 1.525" x .003")	All	A.R.
	55-P-44-3	Shim (1.196" x 1.525" x .006")	All	A.R.
	55-P-44-4	Shim (1.196" x 1.525" x .009")	All	A.R.
	55-P-44-5	Shim (1.196" x 1.525" x .012")	All	A.R.
	55-P-44-6	Shim (1.196" x 1.525" x .015")	All	A.R.
6	562001.CHD	Tapered Roller Bearing Assembly (1.181" x 2.835" x 1.132")	All	2
7	380675.CHD	Flange Nut	All	1
8	379231	Pipe Plug (.125"-27)	All	1
9	500597-18	Roll Pin (.188" x 1.500")	All	1

A.R. – As Required

Heavy-Duty Adapters for Detroit® DT12®**330032X – Fits DT12-OV/OHE****330033X – Fits DT12-DV/DHE****330034X – Fits DT12-OVX****NOTE:** For Chelsea 680, 823 and 880 Series PTOs Only

Item	Part Number	Description	Used on Assembly	Qty.
1	42-P-255 42-P-256 42-P-255	Adapter Housing	330032X 330033X 330034X	1
2	9-P-133	Adapter Shaft	All	1
3	43-P-175 43-P-176 43-P-177	Adapter Gear	330032X 330033X 330034X	1
4	562004	Tapered Roller Bearing Cone	All	2
5	562005	Tapered Roller Bearing Cup	All	2
6	14-P-93	Bearing Spacer	All	1
7	55-P-45-1	Shim (1.328" x 1.700" x .001")	All	A.R.
	55-P-45-2	Shim (1.328" x 1.700" x .003")	All	A.R.
	55-P-45-3	Shim (1.328" x 1.700" x .006")	All	A.R.
	55-P-45-4	Shim (1.328" x 1.700" x .009")	All	A.R.
	55-P-45-5	Shim (1.328" x 1.700" x .012")	All	A.R.
	55-P-45-6	Shim (1.328" x 1.700" x .015")	All	A.R.
8	380675.CHD	Flange Nut	All	1
9	379231	Plug (.125"-27)	All	1
10	500597-18	Roll Pin (.188" x 1.500")	All	1

A.R. – As Required

Notes

Notes

Offer of Sale

1. Definitions. As used herein, the following terms have the meanings indicated.

Buyer: means any customer receiving a Quote for Products.

Buyer's Property: means any tools, patterns, plans, drawings, designs, specifications materials, equipment, or information furnished by Buyer, or which are or become Buyer's property.

Confidential Information: means any technical, commercial, or other proprietary information of Seller, including, without limitation, pricing, technical drawings or prints and/or part lists, which has been or will be disclosed, delivered, or made available, whether directly or indirectly, to Buyer.

Goods: means any tangible part, system or component to be supplied by Seller.

Intellectual Property Rights: means any patents, trademarks, copyrights, trade dress, trade secrets or similar rights.

Products: means the Goods, Services and/or Software as described in a Quote.

Quote: means the offer or proposal made by Seller to Buyer for the supply of Products.

Seller:

means Parker-Hannifin Corporation, all divisions, subsidiaries and businesses selling products under these terms.

Seller's IP:

means patents, trademarks, copyrights, or other intellectual property rights relating to the Products, including without limitation, names, designs, images, drawings, models, Software, templates, information, any improvements or creations or other intellectual property developed prior to or during the relationship contemplated herein.

Services:

means any services to be provided by Seller.

Software:

means any software related to the Goods, whether embedded or separately downloaded.

Special Tooling:

means equipment acquired by Seller or otherwise owned by Seller necessary to manufacture Goods, including but not limited to tools, jigs, and fixtures.

Terms:

means the terms and conditions of this Offer of Sale.

2. Terms. All sales of Products by Seller will be governed by, and are expressly conditioned upon Buyer's assent to, these Terms. These Terms are incorporated into any Quote provided by Seller to Buyer. Buyer's order for any Products whether communicated to Seller verbally, in writing, by electronic data interface or other electronic commerce, shall constitute

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WARNING: This product can expose you to chemicals including Lead and Lead Compounds, and Di (2-ethylhexyl) phthalate (DEHP) which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Offer of Sale (Cont'd)

acceptance of these Terms. Seller objects to any contrary or additional terms or conditions of Buyer. Reference in Seller's order acknowledgement to Buyer's purchase order or purchase order number shall in no way constitute an acceptance of any of Buyer's terms or conditions of purchase. Any Quote made by Seller to Buyer shall be considered a firm and definite offer and shall not be deemed to be otherwise despite any language on the face of the Quote. Seller reserves all rights to accept or reject any purported acceptance by Buyer to Seller's Quote if such purported acceptance attempts to vary the terms of the Quote. If Seller ships Products after Buyer issues an acceptance to the Quote, any additional or different terms proposed by Buyer will not become part of the parties' business relationship unless agreed to in a writing that is signed by an authorized representative of Seller, excluding email correspondence. If the transaction proceeds without such agreement on the part of Seller, the business relationship will be governed solely by these Terms and the specific terms in Seller's Quote.

3. Price; Payment. The Products set forth in the Quote are offered for sale at the prices indicated in the Quote. Unless otherwise specifically stated in the Quote, prices are valid for thirty (30) days and do not include any sales, use, or other taxes or duties. Seller reserves the right to modify prices for any reason and at any time by giving ten (10) days prior written notice. Unless otherwise specified by Seller, all prices are F.C.A. Seller's facility (INCOTERMS 2020). All sales are contingent upon credit approval and full payment for all purchases is due thirty (30) days from the date of invoice (or such date as may be specified in the Quote). Under any circumstances, Buyer may not withhold or suspend payment of any amounts due and payable as a deduction, set-off or recoupment of any amount, claim or dispute with Seller. Unpaid invoices beyond the specified payment date incur interest at the rate of 1.5% per month or the maximum allowable

rate under applicable law. Seller reserves the right to require advance payment or provision of securities for first and subsequent deliveries if there is any doubt, in Seller's sole determination, regarding the Buyer's creditworthiness or for other business reasons. If the requested advance payment or securities are not provided to Seller's satisfaction, Seller reserves the right to suspend performance or reject the purchase order, in whole or in part, without prejudice to Seller's other rights or remedies, including the right to full compensation. Seller may revoke or shorten any payment periods previously granted in Seller's sole determination. The rights and remedies herein reserved to Seller are cumulative and in addition to any other or further rights and remedies available at law or in equity. No waiver by Seller of any breach by Buyer of any provision of these terms will constitute a waiver by Seller of any other breach of such provision.

4. Shipment; Delivery; Title and

Risk of Loss. All delivery dates are approximate, and Seller is not responsible for damages or additional costs resulting from any delay. All deliveries are subject to our ability to procure materials from our suppliers. Regardless of the manner of shipment, delivery occurs and title and risk of loss or damage pass to Buyer, upon placement of the Products with the carrier at Seller's facility. Unless otherwise agreed prior to shipment and for domestic delivery locations only, Seller will select and arrange, at Buyer's sole expense, the carrier and means of delivery. When Seller selects and arranges the carrier and means of delivery, freight and insurance costs for shipment to the designated delivery location will be prepaid by Seller and added as a separate line item to the invoice. Buyer shall be responsible for any additional shipping charges incurred by Seller due to Buyer's acts or omissions. Buyer shall not return or repack any Products without the prior written authorization from Seller, and any return shall be at the sole cost and expense of Buyer.

(Continued on Next Page)

Offer of Sale (Cont'd)

5. Warranty. The warranty for the Products is as follows:

(i) Seller 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); (ii) Services shall be performed in accordance with generally accepted practices and using the degree of care and skill that is ordinarily exercised and customary in the field to which the Services pertain and are warranted for a period of six (6) months from the date of completion of the Services; and (iii) Software is only warranted to perform in accordance with applicable specifications provided by Seller to Buyer for ninety (90) days from the date of delivery or, when downloaded by a Buyer or end-user, from the date of the initial download. All prices are based upon the exclusive limited warranty stated above, and upon the following disclaimer: **EXEMPTION CLAUSE; DISCLAIMER OF WARRANTY, CONDITIONS, REPRESENTATIONS: THIS WARRANTY IS THE SOLE AND ENTIRE WARRANTY, CONDITION, AND REPRESENTATION, PERTAINING TO PRODUCTS. SELLER DISCLAIMS ALL OTHER WARRANTIES, CONDITIONS, AND REPRESENTATIONS, WHETHER STATUTORY, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THOSE RELATING TO DESIGN, NONINFRINGEMENT, MERCHANTABILITY, AND FITNESS FOR A PARTICULAR PURPOSE. SELLER DOES NOT WARRANT THAT THE SOFTWARE IS ERROR-FREE OR FAULT-TOLERANT, OR THAT BUYER'S USE THEREOF WILL BE SECURE OR UNINTERRUPTED, UNLESS OTHERWISE AUTHORIZED IN WRITING BY SELLER, THE SOFTWARE SHALL NOT BE USED IN CONNECTION WITH HAZARDOUS OR HIGH-RISK ACTIVITIES OR ENVIRONMENTS. EXCEPT AS EXPRESSLY STATED**

HEREIN, ALL PRODUCTS ARE PROVIDED "AS IS".

6. Claims; Commencement of Actions.

Buyer shall promptly inspect all Products upon receipt. No claims for shortages will be allowed unless reported to Seller within ten (10) days of delivery. Buyer shall notify Seller of any alleged breach of warranty within thirty (30) days after the date the non-conformance is or should have been discovered by Buyer. Any claim or action against Seller based upon breach of contract or any other theory, including tort, negligence, or otherwise must be commenced within twelve (12) months from the date of the alleged breach or other alleged event, without regard to the date of discovery.

7. LIMITATION OF LIABILITY. IN THE EVENT OF A BREACH OF WARRANTY, SELLER WILL, AT ITS OPTION, REPAIR OR REPLACE THE NON-CONFORMING PRODUCTS, RE-PERFORM THE SERVICES, OR REFUND THE PURCHASE PRICE PAID WITHIN A REASONABLE PERIOD OF TIME. IN NO EVENT IS SELLER LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES INCLUDING ANY LOSS OF REVENUE OR PROFITS, WHETHER BASED IN CONTRACT, TORT OR OTHER LEGAL THEORY. IN NO EVENT SHALL SELLER'S LIABILITY UNDER ANY CLAIM MADE BY BUYER EXCEED THE PURCHASE PRICE PAID FOR THE PRODUCTS.

8. Confidential Information. Buyer acknowledges and agrees that Confidential Information has been and will be received in confidence and will remain the property of Seller. Buyer further agrees that it will not use Seller's Confidential Information for any purpose other than for the benefit of Seller and shall return all such Confidential Information to Seller within thirty (30) days upon request.

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WARNING: This product can expose you to chemicals including Lead and Lead Compounds, and Di (2-ethylhexyl) phthalate (DEHP) which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Offer of Sale (Cont'd)

9. Loss to Buyer's Property. Buyer's Property will be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer ordering the Products manufactured using Buyer's Property. Also, Seller shall not be responsible for any loss or damage to Buyer's Property while it is in Seller's possession or control.

10. Special Tooling. Seller may impose a tooling charge for any Special Tooling. Special Tooling shall be and remain Seller's property. In no event will Buyer acquire any interest in the Special Tooling, even if such Special Tooling has been specially converted or adapted for manufacture of Goods for Buyer and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller has the right to alter, discard or otherwise dispose of any Special Tooling or other property owned by Seller in its sole determination at any time.

11. Security Interest. To secure payment of all sums due from Buyer, Seller retains a security interest in all Products delivered to Buyer and, Buyer's acceptance of these Terms is deemed to be 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 Seller's security interest.

12. User Responsibility. Buyer, through its own analysis and testing, is solely responsible for making the final selection of the Products and assuring that all performance, endurance, maintenance, safety and warning requirements of the application of the Products are met. Buyer must analyze all aspects of the application and follow applicable industry standards, specifications, and any technical information provided with the Quote or the Products, such as Seller's instructions, guides and specifications. If Seller provides options of or for Products based upon data or specifications provided by Buyer, Buyer is responsible for determining that such data and

specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the Products. In the event Buyer is not the end-user of the Products, Buyer will ensure such end-user complies with this paragraph.

13. Use of Products, Indemnity

by Buyer. Buyer shall comply with all instructions, guides and specifications provided by Seller with the Quote or the Products. If Buyer uses or resells the Products in any way prohibited by Seller's instructions, guides or specifications, or Buyer otherwise fails to comply with Seller's instructions, guides and specifications, Buyer acknowledges that any such use, resale, or non-compliance is at Buyer's sole risk. Further, Buyer shall indemnify, defend, and hold Seller harmless from any losses, claims, liabilities, damages, lawsuits, judgments and costs (including attorney fees and defense costs), whether for personal injury, property damage, intellectual property infringement or any other claim, arising out of or in connection with: (a) improper selection, design, specification, application, or any misuse of Products; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller's use of Buyer's Property; (d) damage to the Products from an external cause, repair or attempted repair by anyone other than Seller, failure to follow instructions, guides and specifications provided by Seller, use with goods not provided by Seller, or opening, modifying, deconstructing, tampering with or repackaging the Products; or (e) Buyer's failure to comply with these Terms, including any legal or administrative proceedings, collection efforts, or other actions arising from or relating to such failure to comply. Seller shall not indemnify Buyer under any circumstance except as otherwise provided in these Terms.

14. Cancellations and Changes. Buyer may not cancel or modify, including but not limited to movement of delivery dates for the Products, any order for any reason except with Seller's written consent and

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Offer of Sale (Cont'd)

upon terms that will indemnify, defend and hold Seller harmless against all direct, incidental and consequential loss or damage and any additional expense. Seller, at any time, may change features, specifications, designs and availability of Products.

15. Assignment. Buyer may not assign its rights or obligations without the prior written consent of Seller.

16. Force Majeure. Seller is not liable for delay or failure to perform any of its obligations by reason of any events or circumstances beyond its reasonable control. Such circumstances include without limitation: accidents, labor disputes or stoppages, government acts or orders, acts of nature, pandemics, epidemics, other widespread illness, or public health emergency, cyber related disruptions, cyber-attacks, ransomware sabotage, delays or failures in delivery from carriers or suppliers, shortages of materials, sudden increases in the price of raw material or components, shutdowns or slowdowns affecting the supply of raw materials or components, or the transportation thereof, oil shortages or oil price increases, energy crisis, energy or fuel interruption, war (whether declared or not) or the serious threat of same, riots, rebellions, acts of terrorism, embargoes, fire or any reason whether similar to the foregoing or otherwise. Seller will resume performance as soon as practicable after the event of force majeure has been removed. All delivery dates affected by an event of force majeure shall be tolled for the duration of such event of force majeure and rescheduled for mutually agreed dates as soon as practicable after the event of force majeure ceases to exist. The right to allocate capacity is in the Seller's sole discretion. An event of force majeure shall not include financial distress, insolvency, bankruptcy, or other similar conditions affecting one of the parties, affiliates and/or subcontractors. An event of force majeure in the meaning of these Terms means any circumstances beyond Seller's control that permanently

or temporarily hinders performance, even where that circumstance was already foreseen. Buyer shall not be entitled to cancel any orders following its claim of an event of force majeure.

17. Waiver and Severability. Failure to enforce any provision of these Terms will not invalidate that provision; nor will any such failure prejudice either party's right to enforce that provision in the future. Invalidation of any provision of these Terms shall not invalidate any other provision herein and, the remaining provisions will remain in full force and effect.

18. Duration. Unless otherwise stated in the Quote, any agreement governed by or arising from these Terms shall: (a) be for an initial duration of one (1) year; and (b) shall automatically renew for successive one-year terms unless terminated by Buyer with at least 180-days written notice to Seller or if Seller terminates the agreement pursuant to Section 19 of these Terms.

19. Termination. Seller may, without liability to Buyer, terminate any agreement governed by or arising from these Terms for any reason and at any time by giving Buyer thirty (30) days prior written notice. Seller may immediately terminate, in writing, if Buyer: (a) breaches any provision of these Terms, (b) becomes or is deemed insolvent, (c) appoints or has appointed a trustee, receiver or custodian for all or any part of Buyer's property, (d) files a petition for relief in bankruptcy on its own behalf, or one is filed against Buyer by a third party, (e) makes an assignment for the benefit of creditors; or (f) dissolves its business or liquidates all or a majority of its assets.

20. Ownership of Rights. Buyer agrees that (a) Seller (and/or its affiliates) owns or is the valid licensee of Seller's IP and (b) the furnishing of information, related documents or other materials by Seller to Buyer does not grant or transfer any ownership interest or license in or to Seller's IP to Buyer, unless expressly agreed in writing. Without limiting the foregoing, Seller retains ownership of all Software supplied to Buyer. In no event

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Offer of Sale (Cont'd)

shall Buyer obtain any greater right in and to the Software than a right in a license limited to the use thereof and subject to compliance with any other terms provided with the Software. Buyer further agrees that it will not, directly or through intermediaries, reverse engineer, decompile, or disassemble any Software (including firmware) comprising or contained within a Product, except and only to the extent that such activity may be expressly permitted, either by applicable law or, in the case of open-source software, the applicable open-source license.

21. Indemnity for Infringement of Intellectual Property Rights. Seller is not liable for infringement of any Intellectual Property Rights except as provided in this Section. 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 a third-party claim that one or more of the Products infringes the Intellectual Property Rights of a third party in the country of delivery of the Products by Seller to Buyer. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of any such claim, and Seller having sole control over the defense of the claim including all negotiations for settlement or compromise. If one or more Products is subject to such a claim, Seller may, at its sole expense and option, procure for Buyer the right to continue using the Products, replace or modify the Products to render them non-infringing, or offer to accept return of the Products and refund the purchase price less a reasonable allowance for depreciation. Seller has no obligation or liability for any claim of infringement: (i) arising from information provided by Buyer (including Seller's use of Buyer's Property); or (ii) directed to any Products for which the designs are specified in whole or part by Buyer; or (iii) resulting from the modification, combination or use in a system of any Products. The foregoing

provisions of this Section constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for claims of infringement of Intellectual Property Rights.

22. Governing Law. These Terms, the terms of any Quote, and the sale and delivery of all Products are 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 the sale and delivery of the Products.

23. Entire Agreement. These Terms, along with the terms set forth in the Quote, forms the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of sale and purchase. In the event of a conflict between any term set forth in the Quote and these Terms, the terms set forth in the Quote shall prevail. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter shall have no effect. No modification to these Terms will be binding on Seller unless agreed to in a writing that is signed by an authorized representative of Seller, excluding email correspondence, 'clickwrap' or other purported electronic assent to different or additional terms. Sections 2-25 of these Terms shall survive termination or cancellation of any agreement governed by or arising from these Terms.

24. No 'Wrap' Agreements/No Authority to Bind. Seller's clicking any buttons or any similar action, such as clicking "I Agree" or "Confirm," to utilize Buyer's software or webpage for the placement of orders, is NOT an agreement to Buyer's Terms and

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Offer of Sale (Cont'd)

Conditions. NO EMPLOYEE, AGENT OR REPRESENTATIVE OF SELLER HAS THE AUTHORITY TO BIND SELLER BY THE ACT OF CLICKING ANY BUTTON OR SIMILAR ACTION ON BUYER'S WEBSITE OR PORTAL.

25. Compliance with Laws. Buyer agrees to comply with all applicable laws, regulations, and industry and professional standards, including those of the United States of America, and the country or countries in which Buyer may operate, including without limitation the U.S. Foreign Corrupt Practices Act ("FCPA"), the U.S. Anti-Kickback Act ("Anti-Kickback Act"), U.S. and E.U. export control and sanctions laws ("Export Laws"), the U.S. Food Drug and Cosmetic Act ("FDCA"), and the rules and regulations promulgated by the U.S. Food and Drug Administration ("FDA"), each as currently amended. Buyer agrees to indemnify, defend, and hold harmless Seller from the consequences of any violation of such laws, regulations and standards by Buyer, its employees or agents. Buyer represents that it is familiar with all applicable provisions of the FCPA, the Anti-Kickback Act,

Export Laws, the FDCA and the FDA and certifies that Buyer will adhere to the requirements thereof and not take any action that would make Seller violate such requirements. Buyer represents and agrees that Buyer will not make any payment or give anything of value, directly or indirectly, to any governmental official, foreign political party or official thereof, candidate for foreign political office, or commercial entity or person, for any improper purpose, including the purpose of influencing such person to purchase Products or otherwise benefit the business of Seller. Buyer further represents and agrees that it will not receive, use, service, transfer or ship any Products from Seller in a manner or for a purpose that violates Export Laws or would cause Seller to be in violation of Export Laws. Buyer agrees to promptly and reliably provide Seller all requested information or documents, including end-user statements and other written assurances, concerning Buyer's ongoing compliance with Export Law.

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