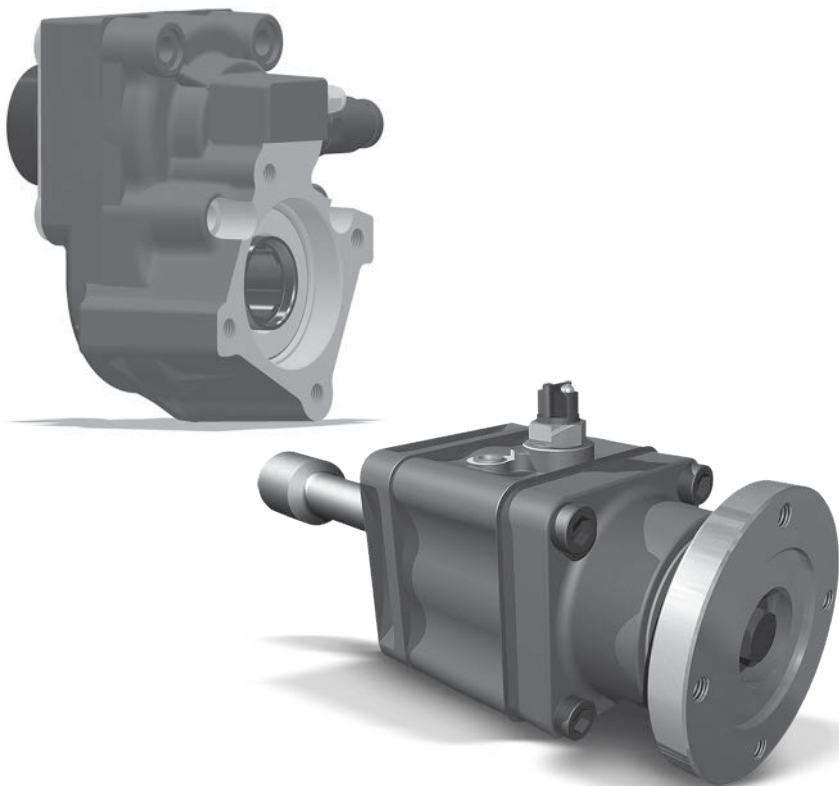


Effective: HY25-1501V-M1/US June 2019
Supersedes: HY25-1501V-M1/US April 2019
HY25-1500-M1/US October 2014



Power Take-Offs Owner's Manual

Volvo I-Shift & Mack mDrive Adapter Manual
511, 524 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

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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

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

Other patents pending.

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General Information

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Installation Instructions

Volvo I-Shift & Mack mDrive Transmissions for 524 Series (SK-636)2

Installation Sketches

Volvo I-Shift & Mack mDrive w/o Intarder
329980X – Input Adapter Kit for 524 Series (AS Input).....3

Volvo I-Shift & Mack mDrive w/o Intarder
329735X – Input Adapter Kit for 511 Series (AS Input).....4

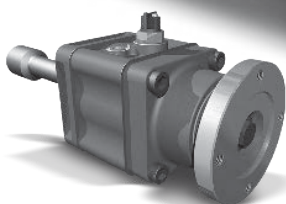
Volvo I-Shift & Mack mDrive – Shift Option V for 524 Series (SK-637)5

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PTO Maintenance7

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VOLVO/MACK



Overview – Volvo I-Shift & Mack mDrive 511/524 Series

Connection to Volvo/Mack system is required for Volvo I-Shift or Mack mDrive, the vehicle needs to be ordered with PTO prep package. Vehicle ECU must be programmed by dealer for PTO operation.

Reliable engagement is carried out by a pneumatic system controlled by the Transmission Management System (TMS).

Speed and output are governed by the engine's speed and the transmission's gear ratio in low and high split, which varies between Overdrive and Direct Drive transmissions. Splitter position in PTO mode is controlled by customer parameter settings:

1. Auto low split
2. Auto high split
3. Driver selectable (Requires the premium shifter and bodybuilder module)

PTO Shifting Procedure & Precautions

CAUTION: This vehicle is equipped with a POWER TAKE-OFF. Shut engine off before working on POWER TAKE-OFF or getting below vehicle. Consult Operating Instructions Before Using. (See Sun Visor)

POWER TAKE-OFF OPERATION – VEHICLE STATIONARY

Engagement and disengagement is done with the OE provided switch on the instrument panel. The sequence below explains how the I-Shift/mDrive PTO is engaged.

1. Engine Running and transmission in Neutral or in Gear
2. TMS (Transmission Management System) receives command on the J1939 link to activate the PTO (OE Supplied PTO switch = ON)
3. TMS disengages the clutch, activates the countershaft brake to stop the countershaft from rotating, selects the correct split ratio and engages the PTO.
4. TMS engages the clutch slowly.
5. PTO off = OE Supplied Switch off.

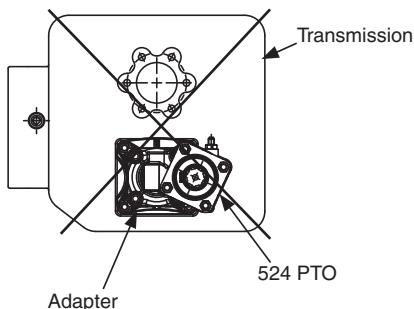
IMPORTANT: Failure to follow proper shifting or operating sequences will result in premature PTO failure with possible damage to other equipment.



This symbol warns of possible personal injury.

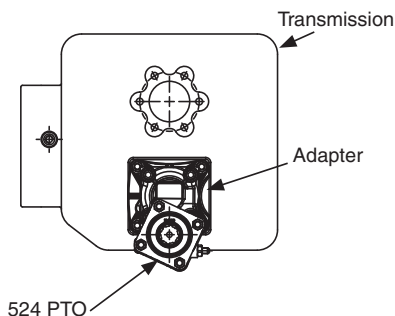
Acceptable Installation Volvo I-Shift & Mack mDrive Transmissions 524 Series

PTO at 3 O'Clock Position

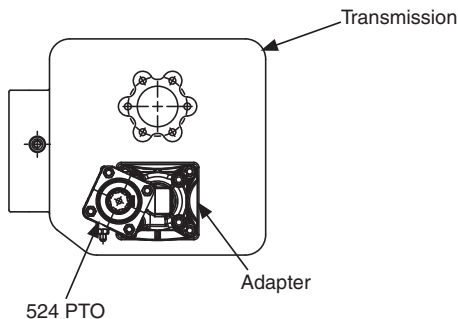


NOTE: PTO Indicator Switch interferes with the main drive line in this position

PTO at 6 O'Clock Position



PTO at 9 O'Clock Position



CAUTION: Hose is required for Supplementary Cooling of PTO.

! All capscrews and studs are to be assembled using a medium-strength, thread locking product (such as Loctite® 243) to prevent loosening due to vibration. See directions on product. Tighten all assembly hardware to the torque values shown in this manual.

! Mandatory action needed.

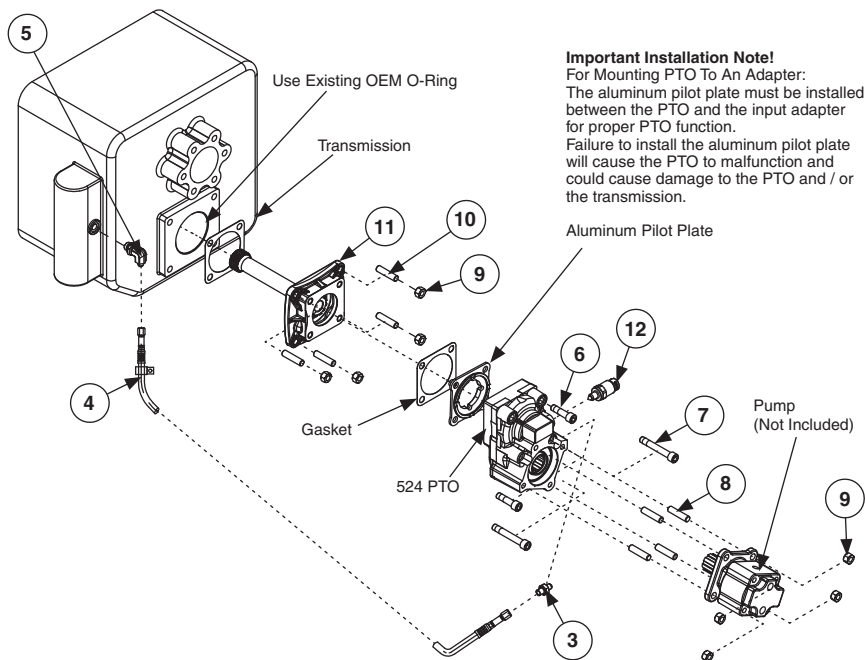
Volvo I-Shift & Mack mDrive w/o Intarder 329980X – Input Adapter Kit 524 Series

Transmissions:

AT2412 / V2412AT, AT2512 / V2512AT, AT2612, AT2812 / V2812AT,
ATO2512 / VO2512AT, ATO2612, ATO3112 / VO3112AT

Kit Designator: AS

NOTE: PTOs require interface coupling with a 45mm - 12 Tooth Spline for this application.



Item	Part Number	Description	Torque	
3	380660	Hyd Fitting	26 lbs-ft	[35 Nm]
4	329075-1X	Hose for supplementary cooling of PTO		
5	385097	Hyd Fitting		
6		Socket HD Capscrew - M12-1.75 x 90mm	59-66 lbs-ft	[80-90 Nm]
7		Socket HD Capscrew - M12-1.75 x 114mm	59-66 lbs-ft	[80-90 Nm]
8		Stud - M12-1.75 x 50mm	15-22 lbs-ft	[20-30 Nm]
9		Hex Nut - M12-1.75	59-66 lbs-ft	[80-90 Nm]
10		Stud - M12-1.75 x 46.5mm	15-22 lbs-ft	[20-30 Nm]
11	329980X	Input Adapter Kit		
12		Indicator Switch	18.5 lbs-ft	[25 Nm]

Volvo I-Shift & Mack mDrive w/o Intarder 329735X – Input Adapter Kit 511 Series

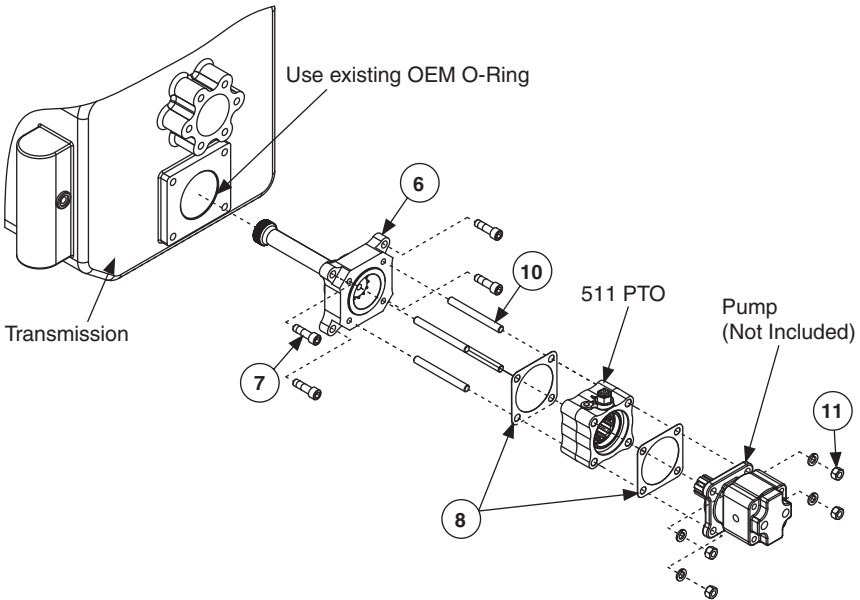
Transmissions:

AT2412 / V2412AT, AT2512 / V2512AT, AT2612, AT2812 / V2812AT,
ATO2512 / VO2512AT, ATO2612, ATO3112 / VO3112AT

Kit Designator: AS

NOTE: PTOs require interface coupling with a 45mm - 12 Tooth Spline for this application.

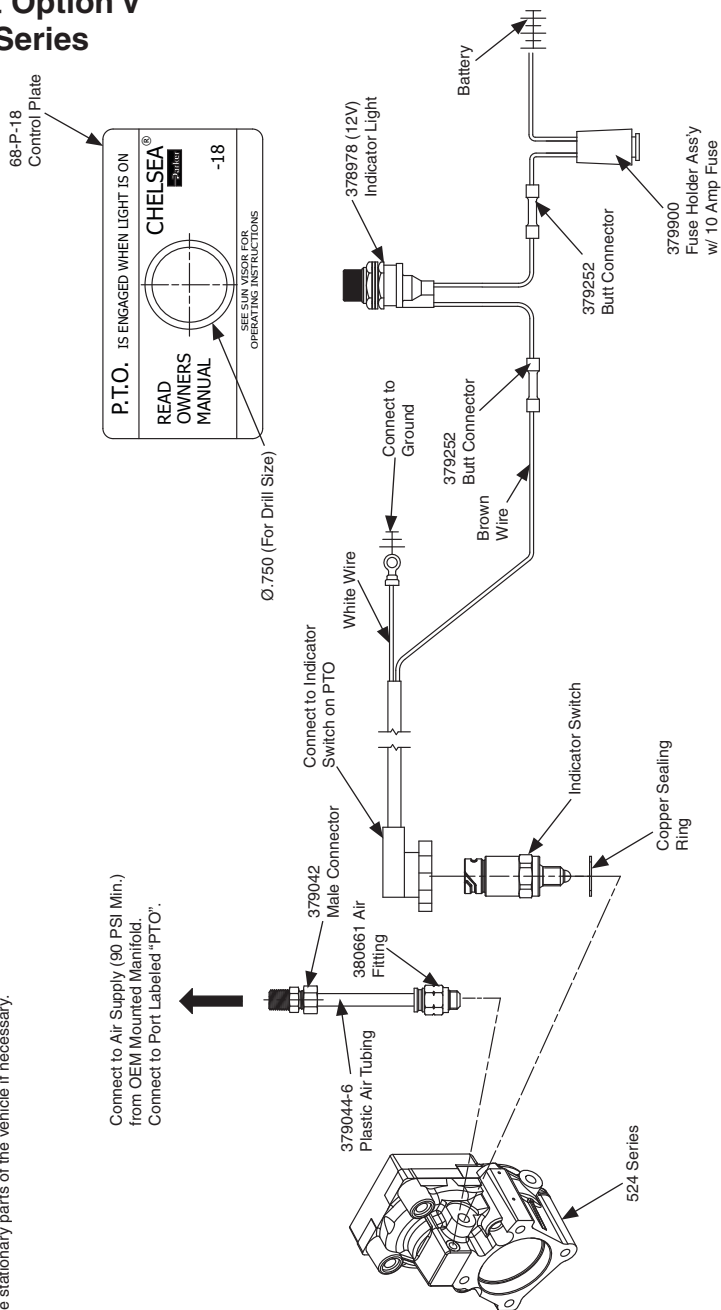
NOTE: The 511 Series PTO is a coaxial style PTO. Pump selection is limited to smaller pumps due to the lack of supporting means.



Item	Part Number	Description	Torque	
6	329735X	Adapter		
7		Capscrew - M12-1.75 x 40mm	59-66 lbs-ft	[80-90 Nm]
8	22-P-84	Gasket		
10	8000-29X	Stud - M12-1.75 x 115mm Lg	15-22 lbs-ft	[20-30 Nm]
11		Locknut - M12-1.75	59-66 lbs-ft	[80-90 Nm]

Volvo I-Shift & Mack mDrive Shift Option V 524 Series

(SK-637)

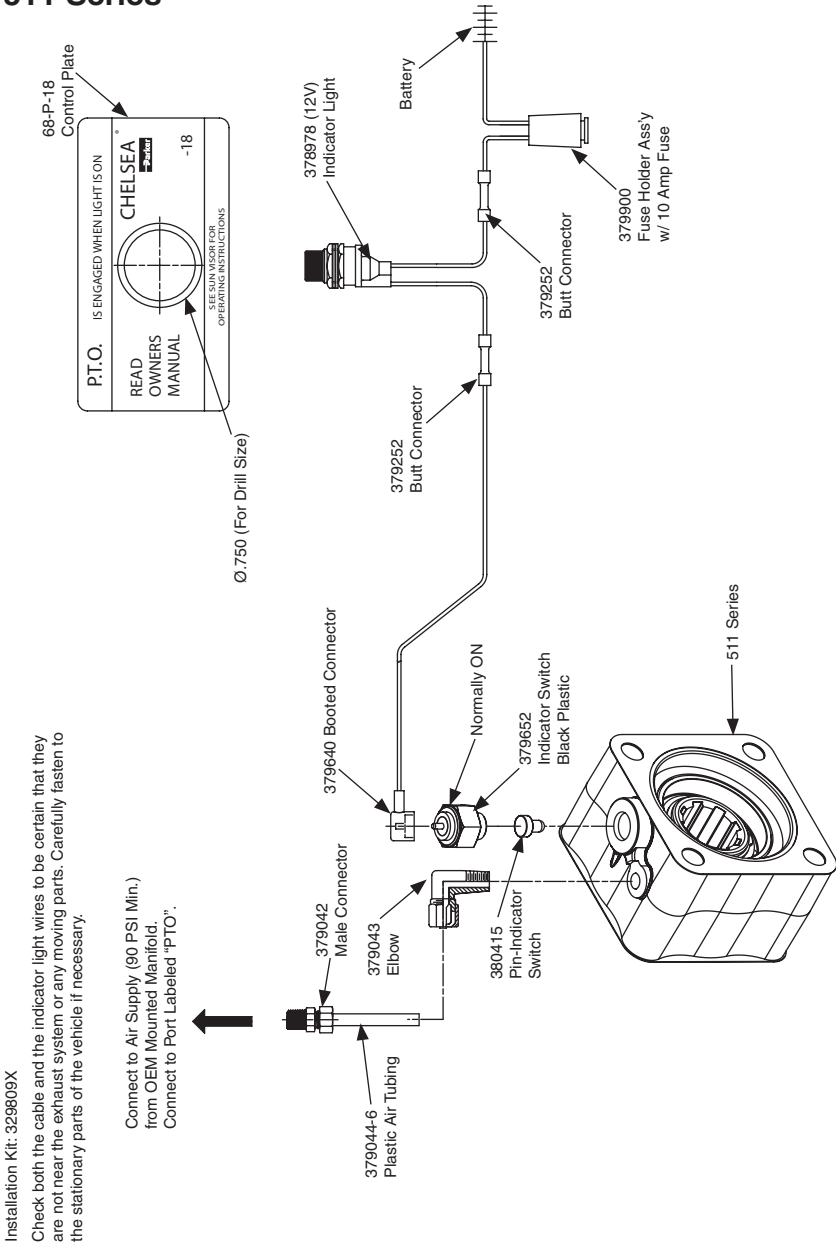


Installation Kit: 329809X

Check both the cable and the indicator light wires to be certain that they are not near the exhaust system or any moving parts. Carefully fasten to the stationary parts of the vehicle if necessary.

**Volvo
Shift Option V
Air Shift
511 Series**

(SK-563 Rev B)



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 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 Perform maintenance as required.

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

With regards to the direct mounted pump splines, the PTO 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 PTO 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 PTO 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 are 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 PTO, and the second is a 14-ounce grease cartridge (379831).

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

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There is no text or other markings on the paper.

[illegible]

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

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

4. Warranty. Seller warrants that all products sold, other than the 590 Series, 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). Seller warrants that the 590 Series will conform to the applicable Seller standard specification for the lesser period of 2 years (24 Months) from date of service or 2000 hours of usage. The prices charged for Seller's products are based upon the exclusive limited warranty stated above, and upon the following disclaimer: **DISCLAIMER OF WARRANTY: THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO PRODUCTS PROVIDED HEREUNDER. SELLER DISCLAIMS ALL OTHER WARRANTIES, EXPRESS AND IMPLIED, INCLUDING DESIGN, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.**

5. Claims; Commencement of Actions. Buyer shall promptly inspect all Products upon delivery. No claims for shortages will be allowed unless reported to the Seller within 10 days of delivery. No other claims against Seller will be allowed unless asserted in writing within 30 days after delivery. Buyer shall notify Seller of any alleged breach of warranty within 30 days after the date the defect is or should have been discovered by Buyer. Any action based upon breach of this agreement or upon any other claim arising out of this sale (other than an action by Seller for an amount due on any invoice) must be commenced within

12 months from the date of the breach without regard to the date breach is discovered.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

07/14



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

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