Bulletin 4480-T20-USA

Technical Manual

Effective: July 2006
Supersedes: March 2002

Parkrimp 1

- Read the entire Technical Manual prior to mounting and operating this crimper.
- View the enclosed CD prior to operating this crimper.

WARNING — When using this machine, always exercise basic safety precautions, including the following:

1. Use this machine only for its intended purpose: to fabricate Parker hose assemblies.

2. Parker Hannifin will not accept responsibility for any incidental, consequential or special damages of any kind or nature whatsoever that result from any subsequent alterations to any Parkrimp machine. Parker Hannifin disclaims any warranties on items altered after leaving the Parker Hannifin facility.

3. This machine must be properly installed and located in accordance with the installation instructions before it is used.

To minimize the possibility of injury:

1. The power unit must be connected to a grounded, properly rated, protected and sized power-supply circuit to prevent electrical shock and to avoid electrical overload;

2. DO NOT OPERATE OVER MAXIMUM RATED WORKING PRESSURE.

3. CHECK FOR SAFE SYSTEM SETUPS.

Make sure that the valve, connecting hoses, etc. are protected from any external source of damage, such as: excessive heat, flame, moving machine parts, sharp edges, falling objects, corrosive chemicals, etc.

Table of Contents

Help us help you ...

Read this guide carefully.

It is designed to help you operate and maintain your Parkrimp 1. If you don't understand something or need more help, call:

Technical Service Department
Parker Hannifin Corporation
Hose Products Division
Phone: (440) 943-5700
Fax: (440) 943-7088

or submit your question to our Web site:
www.parkerhose.com
In the sidebar on the left of the Web page, select "Tech Talk", then "Ask the Professional".

Write down the Model and Serial Numbers:

_____
Model Number

_____
Serial Number

Use these numbers in any correspondence or service calls.

RECEIVING INSTRUCTIONS: UNPACKING – Remove all documents and components from shipping containers.

INSPECTION – Visually inspect all components for shipping damage. If any shipping damage is found, notify the carrier at once. Shipping damage is not covered by the Parker warranty. The carrier is responsible for all repair and replacement costs resulting from such damage.

Figure 1: Parkrimp 1 Crimping Machine

Specifications

Dimensions:	Height	25”
	Depth	20”
	Width	26"
Weight:	275 lbs.	
Capability:	1-1/4" SAE 100R1AT maximum 1" DIN 20 022-1SN maximum 1-1/4" SAE 100R2AT maximum 1-1/4" DIN 20 022-2SN maximum 1" SAE 100R3 maximum 1-1/4" SAE 100R4 maximum 7/8" SAE 100R5 maximum 7/8" SAE J1402 AI maximum 7/8" SAE J1402 AII maximum 1" SAE 100R9AT maximum 1" SAE 100R16 maximum	

Note: For the latest crimper capability, reference Parker Catalog 4400 online at *www.parkerhose.com* or contact your Parker products supplier.

Set-up Time:	20 Seconds
Full Cycle Time:	20 Seconds

Note: Cycle times vary depending on hose and fitting styles and sizes.

Model Numbers

80C-101 includes:

• Parkrimp 1 Crimper with 115/230 volt, 1 phase, 60 hertz power unit wired for 115 volt.		80C-181
• Die ring Silver		80C-R01
• Die ring Black		80C-R02
43 Series Dies		
• -4 (1/4")	Color Coded Red	80C-A04
• -6 (3/8")	Color Coded Yellow	80C-A06
• -8 (1/2")	Color Coded Blue	80C-A08
• -12 (3/4")	Color Coded Green	80C-A12
• -16 (1")	Color Coded Black	80C-A16

80C-061 includes:

• Parkrimp 1 Crimper	80C-181
• Die ring Silver	80C-R01
• Die ring Black	80C-R02
• No Dies - Order separately	

80C-181 includes:

• Parkrimp 1 Crimper	80C-080
• 115/230 volt, 1 phase, 60 Hz power unit	80C-115
• No Dies or Die Rings - Order Separately	

Installing the Parkrimp 1 Crimper

1. Obtain a sturdy, level work surface capable of supporting at least 300 pounds which is 34"-38" high and located in a well-illuminated area. The work surface area must be able to fit the mounting hole pattern shown in Figure 2.

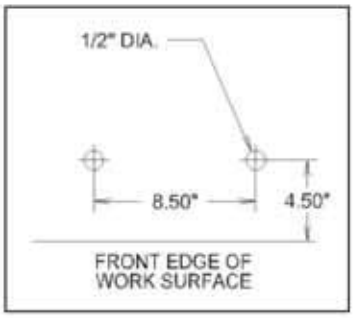


Figure 2: Mounting holes

2. Unpack crimper and accessories from shipping container. Verify that you have received the following:

Model Number			Description	Accessory Part Number
80C-101	80C-061	80C-181		
•	•	•	Base crimper with 115V. power unit	80C-181
•	•	•	Technical Manual	4480-T20-US
•	•	•	Training CD	8XC-CD-ROM
•	•	•	Grease	84Z205
•	•		Silver Die Ring	80C-RO1
•	•		Black Die Ring	80C-RO2
•			43 Series Dies (sizes: -4, -6, -8, -12, -16)	80C-AXX

3. Remove the crimper from the pallet and position onto the work surface so that the base plate overhangs the front of the work surface by six inches.

   Caution: Observe normal safety precautions when lifting, lowering, or moving this unit.

4. Secure the unit to the work surface using the mounting hole pattern shown in Figure 2. Two 1/2" holes are provided in the crimper mounting bracket for this purpose.
5. **Remove the reservoir breather shipping plug**.
6. **Attach the enclosed breather cap to the reservoir**.
7. The crimper has been filled with oil and cycled. Check the oil level in the reservoir prior to start-up. The oil level should be within 1" of the fill port. Add AW-32 anti-wear hydraulic oil if filling is required.
8. Plug machine into a properly rated receptacle (see page 4).

Removal of Air from the Parkrimp 1 Hydraulic Circuit

The hydraulic system, when connected for the first time, will have air in the system. The air must be removed for safety and proper operation. Air can generally be removed from the system by fully advancing and retracting the hydraulic cylinder several times. When the trapped air is removed from the hydraulic circuit, the cylinder will advance and retract smoothly. Sluggish cylinder action is usually the first sign of air in the system.

To Test and Operate the Parkrimp 1 Crimper

1. Toggle the On/Off to the On position, located on the left side of the motor conduit box.
2. Place either the black or silver die ring on the crimper base plate.
   Note: It is not necessary to place any dies into the machine for this step.
3. Pull the valve handle toward you to lower the cylinder until the pusher bottoms out against the die ring.

   Caution: Keeping the crimper in this bottomed out position for more than a few seconds can damage the power unit.
4. Push the valve handle away from you to raise the cylinder.

Parkrimp 1 Crimper electrical requirements:

The power supply should be brought via seperate branch circuit to a single grounded receptacle. The Parkrimp 1 unit has been shipped with a 6ft. long cord and plug. Figure 3 shows the proper NEMA configuration plug and receptacle approved for use with this machine.

Note: It is against the National Electrical Code to remove the plug from the cord or to install the mating receptacle in a system rated for less than 20 amps.

ANY CHANGES OR ELECTRICAL WORK PERFORMED ON THIS UNIT MUST ONLY BE MADE BY A QUALIFIED ELECTRICIAN.

Model	**80C-181**
Phase	1 Phase
Voltage	115
Cycle	60Hz
Full Load Amperes	16 Amps
Circuit Fuse	20 Amps

Wire size receptacle must conform to the requirements of the National Electrical Code or the prevailing local code. The outlet box should be located within the range of the provided cord. **We strongly recommend against the use of an extension cord.** The installer **must perform a ground continuity check.** on the power outlet box to ensure it is properly grounded.

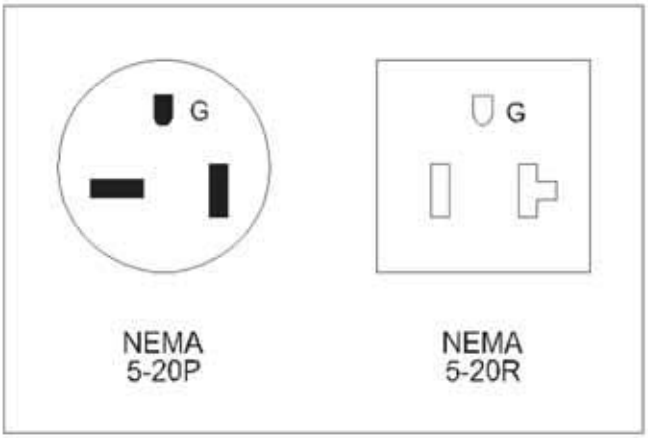


Figure 3: NEMA Configuration of Plug and Receptacle

Alternate Motor Voltages:

	Full Load Amperes	
Voltage (Standard)	115	16
Voltage (Alternate)	230	8

*Reference motor nameplate for wiring diagrams.

IMPORTANT SAFETY NOTICE

THIS INFORMATION IS INTENDED FOR USE BY INDIVIDUALS POSSESSING ADEQUATE BACKGROUNDS OF ELECTRICAL, ELECTRONIC AND MECHANICAL EXPERIENCE. ANY ATTEMPT TO REPAIR THIS MACHINE MAY RESULT IN PERSONAL INJURY AND PROPERTY DAMAGE. THE MANUFACTURER OR SELLER CANNOT BE RESPONSIBLE FOR THE INTERPRETATION OF THIS INFORMATION, NOR CAN IT ASSUME ANY LIABILITY IN CONNECTION WITH ITS USE.

DISCONNECT POWER CORD BEFORE SERVICING

IMPORTANT — RECONNECT ALL GROUNDING DEVICES

Safety First

Power units are wired, tested, and shipped from the factory ready for use at 115 volts, 60Hz. To obtain other voltages shown, the motor connections must be rewired at the terminal box located on the top of the motor and must be wired as shown on the motor nameplate by qualified personnel.

The following crimping dies are available for use with the Parkrimp 1 machine:

26 Series Fitting Dies (Silver)		
80C-E04	Size -4 (3/16")	Color Coded Red
80C-E05	Size -5 (1/4")	Color Coded Purple
80C-E06	Size -6 (5/16")	Color Coded Yellow
80C-E08	Size -8 (13/32")	Color Coded Blue
80C-E10	Size -10 (1/2")	Color Coded Orange
80C-E12	Size -12 (5/8")	Color Coded Green
80C-E16	Size -16 (7/8")	Color Coded Black

43 Series Fitting Dies (Silver)		
80C-A04	Size -4 (1/4")	Color Coded Red
80C-A05	Size -5 (5/16")	Color Coded Purple
80C-A06	Size -6 (3/8")	Color Coded Yellow
80C-A08	Size -8 (1/2")	Color Coded Blue
80C-A10	Size -10 (5/8")	Color Coded Orange
80C-A12	Size -12 (3/4")	Color Coded Green
80C-A16	Size -16 (1")	Color Coded Black
80C-A20	Size -20 (1-1/4")	Color Coded White

81 Series Fitting Dies (Silver)		
80C-V12	Size -12 (3/4")	Color Coded Green
80C-V16	Size -16 (1")	Color Coded Black
80C-V20	Size -20 (1-1/4")	Color Coded White

The Parkrimp 1 can be used to crimp some Parflex Division products. Please contact Parflex Division for more information.

The Parkrimp 1 Model 80C-101 is shipped with 1/4", 3/8", 1/2", 3/4", and 1" 43 Series dies as standard. 5/16", 5/8", and 1-1/4" dies are optional. 26 and 81 Series dies are also available.

The 43 Series dies are silver and inserts are color coded by size. Refer to the die selection chart on the Parkrimp 1 machine or Parker Catalog 4400 to determine which die set and die ring to use when crimping a particular fitting, hose size and type.

Figure 5: Die Rings and Die Set

The following tooling is used for crimping:

80C-R01 Silver Die Ring

To determine when to use, refer to die selection chart in Parker Catalog 4400 or decal on side of crimper.

80C-R02 Black Die Ring

To determine when to use, refer to die selection chart in Parker Catalog 4400 or decal on side of crimper.

80C-Axx Die Set – 43 Series
80C-Exx Die Set – 26 Series
80C-Vxx Die Set – 81 Series

PN: PK1/KK HOSE DECAL Hose			Fittings	Hose/Die Selection and Crimp Diameters PN:PK1/KK MASTER DECAL								
				– 4 RED	– 5 PUR	– 6 YEL	– 8 BLU	– 10 ORG	– 12 GRN	– 16 BLK	– 20 WHT	Die Ring
Die				80C-A04	80C-A05	80C-A06	80C-A08	80C-A10	80C-A12	80C-A16	80C-A20	
351TC 351ST 422 424 426	431 436 451TC 451ST 471TC	471ST 472TC 482TC 482ST	43 Series	0.645 0.665	0.710 0.730	0.825 0.845	0.945 0.965	1.060 1.080	1.245 1.265	1.590 1.610	1.970 1.990	Silver
421WC 302/301 301LT	304 341 381	601 604 881	43 Series	0.685 0.705	0.750 0.770	0.865 0.885	0.985 1.005	1.100 1.120	1.285 1.305	1.630 1.650	2.010 2.030	Black
Die				80C-E04	80C-E05	80C-E06	80C-E08	80C-E10	80C-E12	80C-E16		
213	221FR 285	293	26 Series	0.460 0.480	0.520 0.540	0.575 0.595	0.670 0.690	0.805 0.825	0.915 0.935	1.175 1.195		Silver
201 206	225 244	266	26 Series	0.500 0.520	0.560 0.580	0.615 0.635	0.710 0.730	0.845 0.865	0.955 0.975	1.215 1.235		Black
Die									80C-V12	80C-V16	80C-V20	
811	811HT	881	81 Series						1.155 1.175	1.450 1.470	1.740 1.760	Silver
Die				80C-H585		80C-H735	80C-H840	80C-H970	80C-H1120			
AX			HY Series	0.575 0.595		0.725 0.745	0.830 0.850	0.960 0.980	1.110 1.130			Silver
Die				80C-H605		80C-H775	80C-H885	80C-H1010	80C-H1170			
BXX			HY Series	0.635 0.655		0.805 0.825	0.915 0.935	1.040 1.060	1.200 1.220			Black

Parker Hannifin Corp.
Hose Products Divison
30240 Lakeland Blvd.
Wickliffe, Ohio 44092

Caution: Read the operations and technical manual before attempting to operate this machinery. Do not operate this machine without guard in place. Keep hands clear of moving parts when operating machine.

NOTE: Do not use these machines to assemble 341-20, 451TC-20, 451ST-20 or any size stainless steel fittings.

FOR REFERENCE ONLY

Notes:

This chart is displayed on the yellow cover of the Parkrimp 1 machine.

The 43 Series dies listed are interchangeable between all of the Parkrimp machines. The die rings ***are not*** interchangeable between machines. Use only 80C-R01 and 80C-R02 die rings on the Parkrimp 1 machine.

For a complete selection of hose and fittings, see Parker Catalog 4400 online at www.parkerhose.com.

Caution: To ensure consistent quality, crimp diameters must be checked —

1. After first assembly.
2. At regular intervals during the production, such as first, last and every 50th assembly.

If you find your crimp diameters out of tolerance, inspect each assembly made. **Never allow hose assemblies with an incorrect crimp diameter to be used**. Use the appropriate Parker Machine Troubleshooting Guide to determine the cause. If you are unable to determine the cause of the problem, call our Hose Products Division Technical Service Department, (440) 943-5700, for assistance.

Additional Hose Die Selection Charts are available upon request from your Parker products supplier.

Crimping Instructions for 26, 43, and 81 Series

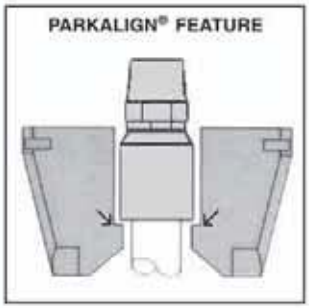
1. The Hose Insertion Depth Fixture can be used to mark the insertion depth on the hose.

2. Push the hose all the way into the coupling to the insertion depth mark.

3. Lubricate die bowl to prevent wear. Place unitized die-train into bowl. See decal on crimper for proper die set.

   -Note: Die sets are color coded by size.

4. Position the hose and fitting in dies from below.



5. Rest bottom of coupling on die step using PARKALIGN® feature.

6. Place the die ring on top of the dies. **See decal on crimper for proper die ring; Silver or Black.**

7. To activate pump, pull the valve handle toward you until die ring fully contacts crimper bowl.

8. Release pressure by pushing valve handle away from you until the dies open and the finished assembly releases.

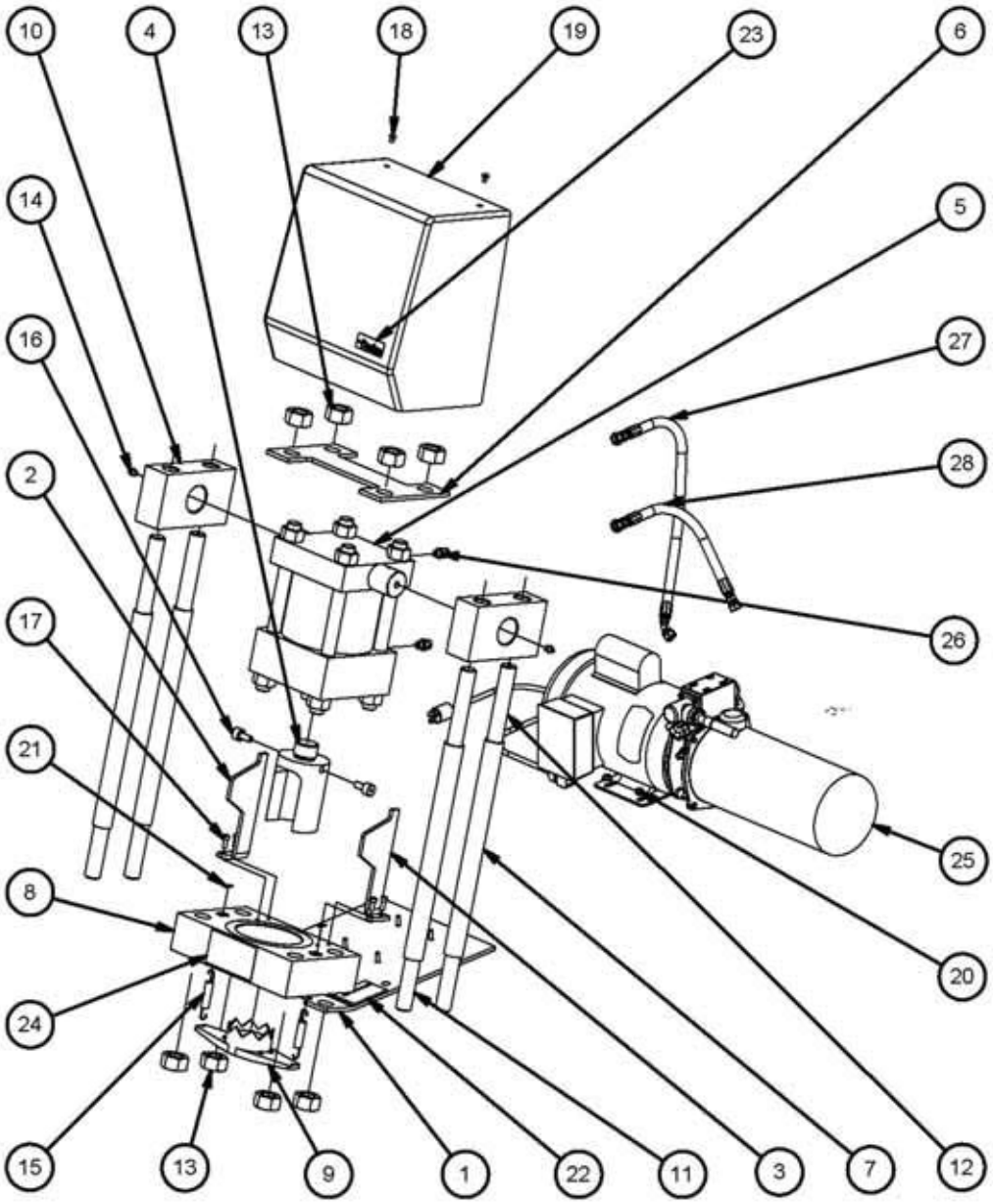
Note: See Hose Insertion Depth table at the right.

Important: Hose assemblies must be inspected for cleanliness and free of all foreign particles.

Note: Parker Hannifin will not accept responsibility for the operation of, or provide warranty coverage for, a crimper that is operated by a power unit other than equipment supplied by Parker Hannifin for the express purpose of operating the designated crimper.

Hose Insertion Depth

Hose by Dash Size	Fitting Series					
	26	43	81			
-4 -5	13/16" 13/16"	13/16" 15/16"				
-6 -8	13/16" 13/16"	1-1/8" 1-5/16"				
-10 -12	7/8" 7/8"	1-9/16" 1-1/2"	1-1/8"			
-16 -20	1"	1-3/4" 1-7/8"	1-1/4" 1-5/16"			



ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
* 1	1	792011	MOUNTING BRACKET	15	2	792065	EXTENSION SPRING
2	1	792019	LEFT CAM RAMP	16	2	792067	CAM FOLLOWER
3	1	792020	RIGHT CAM RAMP	17	4	792068	1/4-20 X 5/8 S.H.C.S.
4	1	792021	PUSHER	18	2	802001	1/4-20 X 3/8" BHCS
* 5	1	792024	CYLINDER	19	1	802002	GUARD
* 6	1	792025	CAP PLATE	20	4	802015	1/4-20 HEX NUT
* 7	4	792027	COMPRESSION SLEEVE	21	2	832001	1/8" X 3/4" SPRING PIN
* 8	1	792029	BASE PLATE	22	1	DEC-SNBR	SERIAL NUMBER DECAL
9	1	792030	DIE SEPARATOR	23	1	881620-B	PARKER LOGO DECAL
* 10	2	792031	TRUNNION CAP	24	1	DEC-CAUTION	CRIMP CAUTION DECAL
* 11	2	792032	FRONT TIE ROD	25	1	80C-115	POWER UNIT
* 12	2	792062	REAR TIE ROD	26	2	4 F5OLO	ADAPTER
* 13	8	792063	1-14 HEX NUT	27	1	80C-HHAB	HOSE ASSEMBLY
14	2	792064	GREASE FITTING	28	1	80C-HHAA	HOSE ASSEMBLY

* These components are not sold as individual items, contact Technical Services.

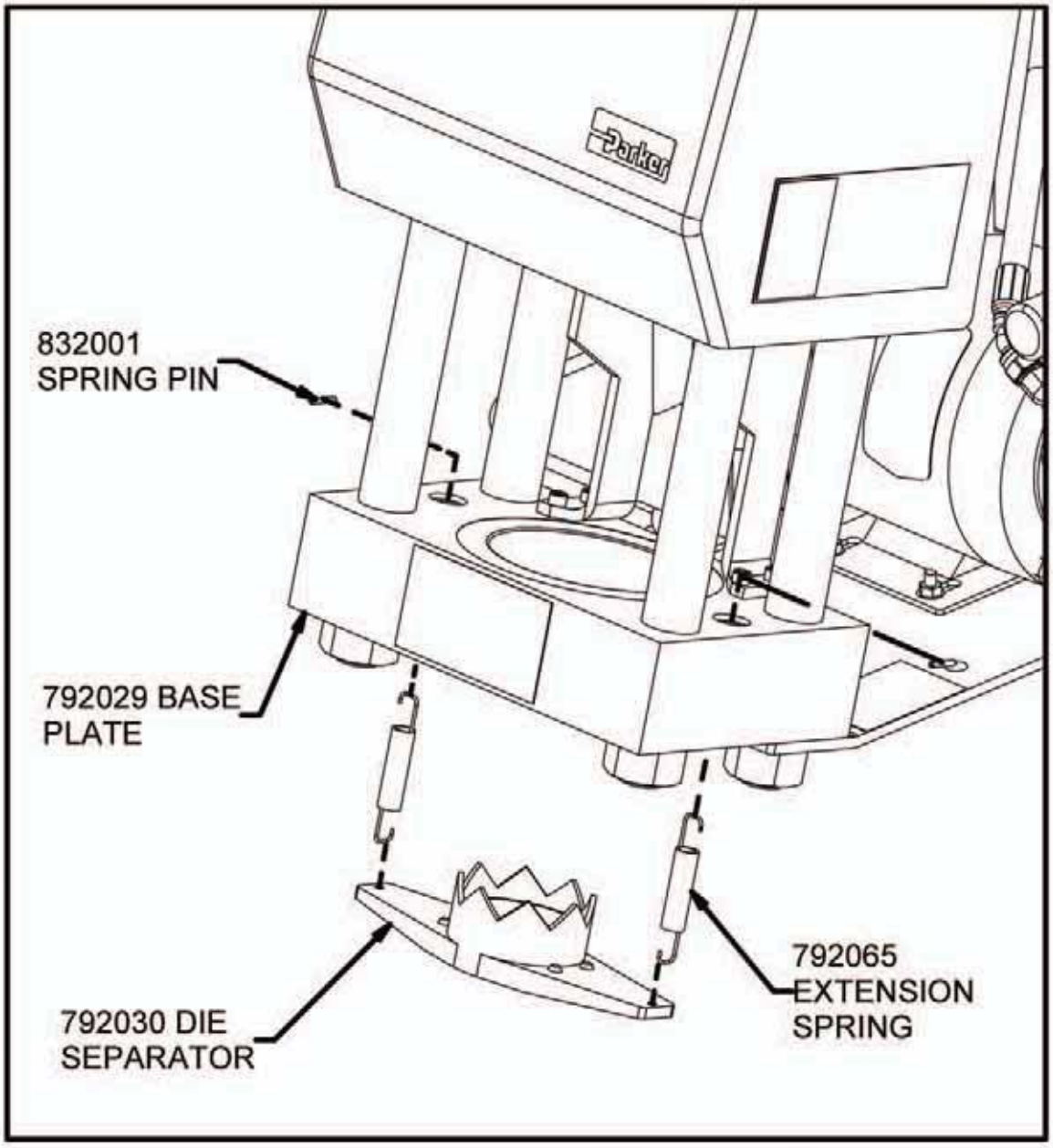
Die Separator Replacement (Part Number 792030)

REMOVAL

1. Remove the two 3/4" x 1/8" spring pins (832001).
2. Remove the die separator (792030) and springs (792065) from the crimper base plate (792029).
3. Remove the springs (792065) from the die separator (792030).

INSTALLATION

To install the new die separator, follow the above steps in reverse.



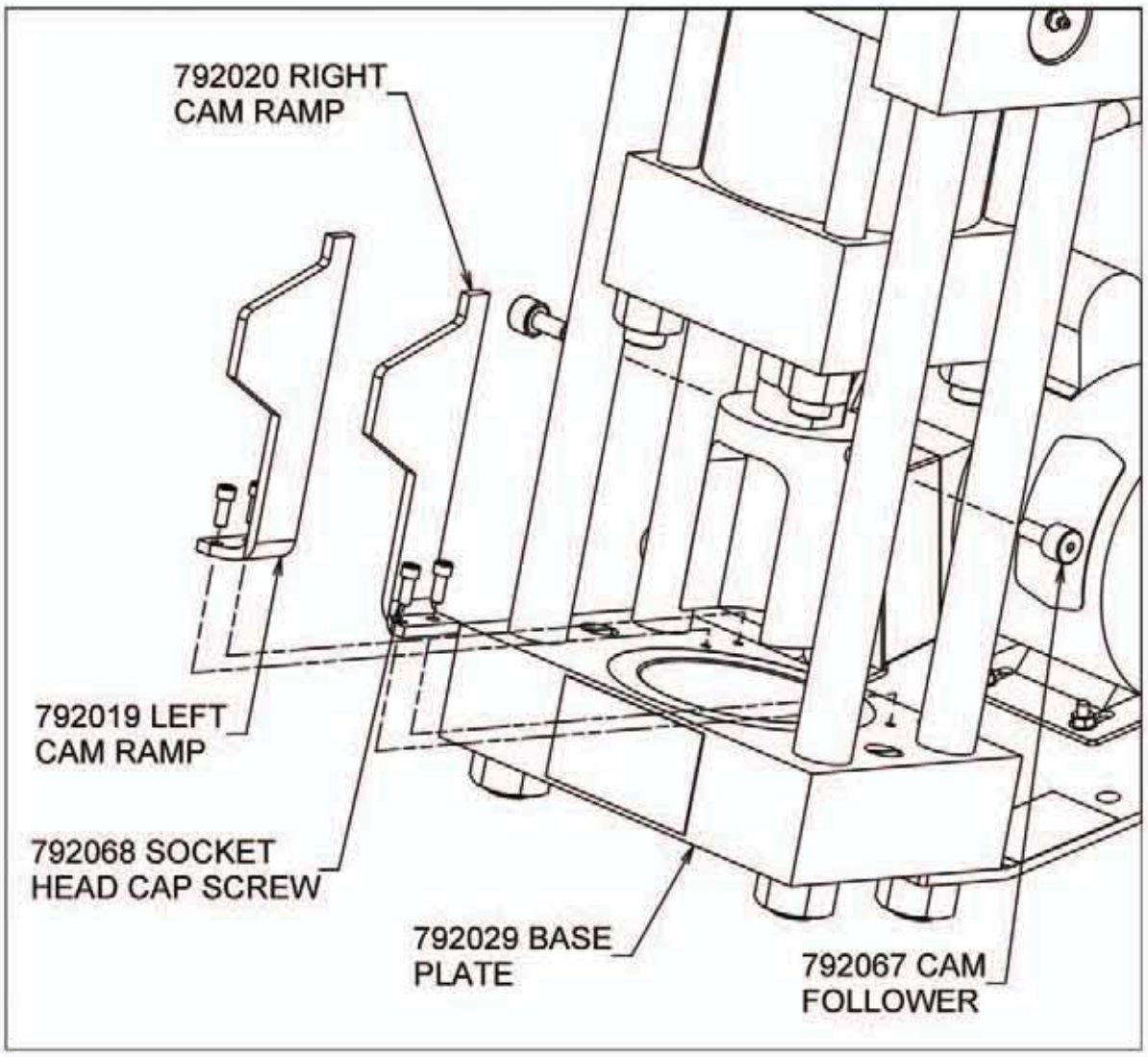
Replacement of Parkrimp 1 Cam Ramps and Cam Followers

REMOVAL

1. Start the power unit and run the pusher completely up.
2. Unplug the power unit.
3. Remove the four 1/4 - 20 x 5/8" socket head cap screws (792068) holding the cam ramps using a 3/16" allen wrench.
4. Unscrew and remove the cam followers (792067) from the pusher

INSTALLATION

To reassemble, follow the above steps in reverse.



Control Valve Replacement (Part Number DIVL9CN)

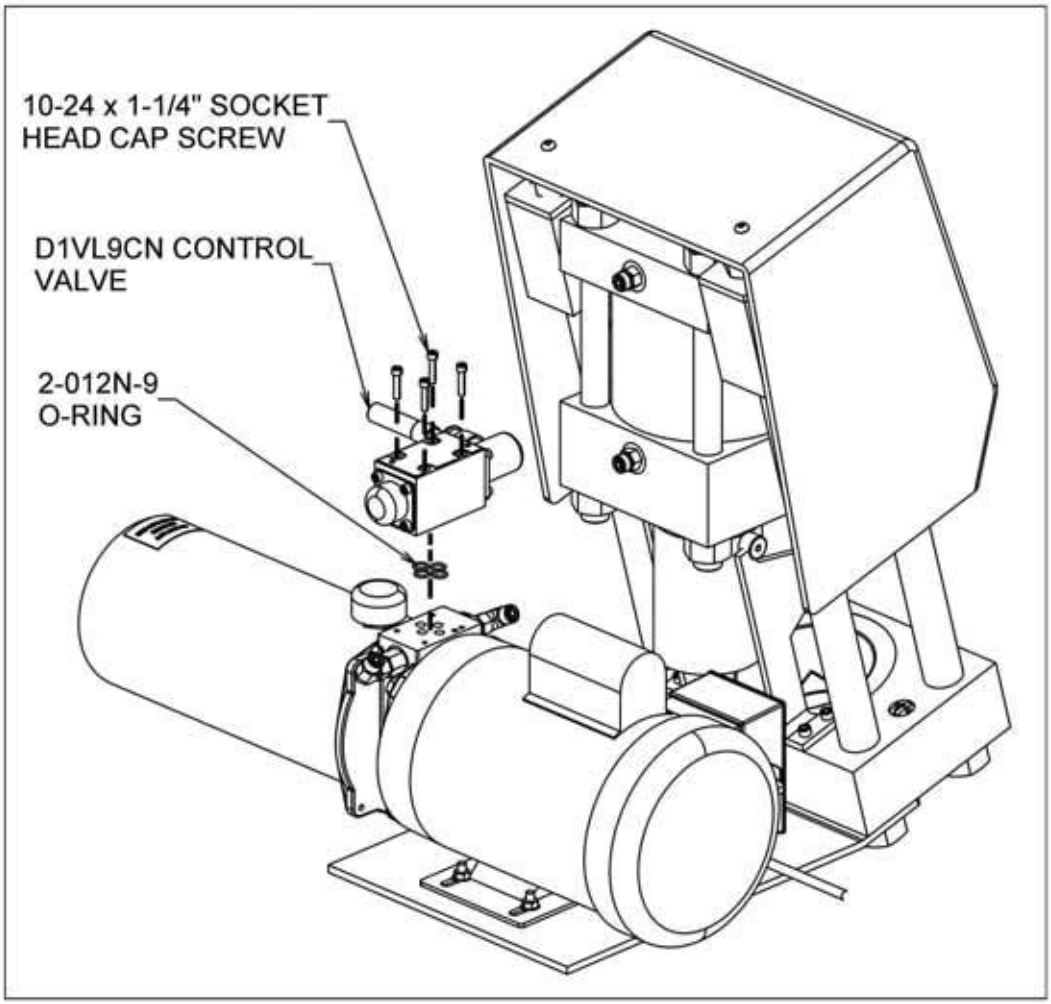
REMOVAL

1. Unplug the power unit.
2. Remove the four 10-24 socket head bolts that hold the valve in place.
3. Remove the valve DIVL9CN.

NOTE: This valve is available through Parker Valve Division

INSTALLATION

1. Mount the new valve to the pump assembly. Make sure the four o-rings are in place on the underside of the valve.
2. Insert the four 10-24 socket head bolts into the valve and tighten them to 50-60 lb. ins. in a diametrically opposed pattern.
3. Run the power unit and check for leaks.



If you have a problem with your Parkrimp 1 machine:

- **First** check that the proper tooling, hose and fitting combinations are being used as identified in the Parker Catalog 4400.
- **Then** check the following recommendations. If after the following suggested remedy, the problem persists, call our Technical Service Department at (440) 943-5700.

Symptoms	Possible Causes	What To Do
Power unit does not operate	Blown fuse(s)	Replace with time-delay fuse(s) or circuit breaker(s) and check for the cause of the overload.
	Low voltage at motor	Call a qualified electrician.
	On-off switch faulty	Disconnect power. Replace off-on switch.
	Motor or pump assembly faulty	Contact Technical Service Department.
Power unit stalls before pusher bottoms out	Low voltage at motor	Call a qualified electrician.
	Lack of lubrication between dies and die cavity	**Lubricate die cavity with Citgo MP Lithoplex lithium grease or equivalent.**
	Wrong fitting, hose or die ring combination	Use correct combination. See Catalog No. 4400.
Motor vibrates or is excessively noisy	High voltage	Call a qualified electrician.
	Motor fan loose, damaged, or out of balance	With power disconnected, remove motor fan guard. Tighten fan screw(s), or repair fan or fan guard by straightening. If problem continues, contact Technical Service Department.
Power unit runs but cylinder does not move up or down when valve handle is actuated.	Low oil supply	Refill oil reservoir with high grade AW32 hydraulic oil. Tank capacity is 1 gallon.
	Valve or pump faulty	Contact Technical Service Department for trouble shooting or analysis.
Pusher does not follow cam ramps	Machine is not installed properly	Work table must be level. Refer to installation instructions on page 3. Front of base plate must overhang the work surface by 6 inches. The front tie rod nuts must not be on the work surface.
	Cam Ramp(s) bent or damaged	Repair or place cam ramp(s). Refer to page 11 for replacement.
	Cam follower(s) bent or damaged	Repair or replace cam follower(s). Refer to page 11 for replacement.

Symptoms	Possible Causes	What To Do
Valve leaks	Valve hold down bolts loose	Tighten hold down bolts to 50-60 inch pounds.
	O-rings at valve to subplate worn or damaged	Replace O-rings. Valve replacement instructions are found on page 12.
Coupling crimp diameter above or below specification	Wrong fitting style being used	Only approved fittings can be used with the Parkrimp 1 machine. For a complete selection and correct combinations of hose and fittings, see Parker Catalog 4400.
	Wrong hose being used	Use only Parker No-Skive hose. For a complete selection of hose and fittings, see Parker Catalog 4400.
	Wrong die ring being used	See crimper decal or Parker Catalog 4400 for correct die ring.
	Pusher is not being bottomed out on die ring and base plate (usually inconsistent crimp diameters)	**Lubricate die cavity with Citgo MP Lithoplex lithium grease or equivalent.** Bottom out the pusher on the die ring completely. When bottomed, you will hear the relief valve open. You can also check for proper bottoming by placing a piece of paper between die ring and base plate. If properly bottomed, you should not be able to remove paper.
	Relief valve set too low	Relief valve setting should be 3000 psi. Relief valve can only be set at factory.
	High or low voltage	Call a qualified electrician.
	Worn, damaged or faulty die ring	Replace die ring.
	Low on oil	Refill oil reservoir with high grade hydraulic AW32 oil. Tank capacity is 1 gallon.
	Crimp dies or die rings damaged, worn or faulty	Visually inspect all wear surfaces for raised metal dent or gouges. Replace damaged die sets or die rings. Worn or faulty die sets will crimp above or below specification by the same amount with both the silver **and** black die rings. Replace worn or faulty die sets. **Lubricate the die cavity in base plate frequently to prevent wear.**
	Die cavity in base plate worn or faulty	Check crimp diameter of several different sizes of die sets with **both** the silver and black die rings. If all crimp diameters are out of specification by the same amount, the die cavity in the base plate may be out of specification. Contact Technical Service Department for replacement. **Lubricate the die cavity in the base plate frequently to prevent wear.**

Maintenance

- Check hydraulic oil level every 40 hours of operation.
  - Oil level should be within 1" of the fill port.
  - If it is necessary to add oil, use Citgo AW32 or equivalent.
  - If oil temperature rises to 140°F, turn off machine and let cool to 120°F.
- Drain and refill the reservoir every 1000 hours of operation.
- Check the crimp bowl weekly for signs of wear.
- Clean the crimp bowl of old grease on a weekly basis. Re-grease the crimp bowl after the bowl has been cleaned.
- Apply approved grease to the dies and crimp bowl each time the dies are changed. If dies are not changed through the day's operation, grease should be applied twice a day.

Safety Guide for Selecting and Using Hose, Fittings and Related Accessories

Parker Safety Guide for Selecting and Using Hose, Tubing, Fittings and Related Accessories

Parker Publication No. 4400-B.1
Revised: May, 2002

WARNING: Failure or improper selection or improper use of hose, tubing, fittings, assemblies or related accessories ("Products") can cause death, personal injury and property damage. Possible consequences of failure or improper selection or improper use of these Products include but are not limited to:

- Fittings thrown off at high speed.
- High velocity fluid discharge.
- Explosion or burning of the conveyed fluid.
- Electrocution from high voltage electric powerlines.
- Contact with suddenly moving or falling objects that are controlled by the conveyed fluid.
- Injections by high-pressure fluid discharge.
- Dangerously whipping Hose.
- Contact with conveyed fluids that may be hot, cold, toxic or otherwise injurious.
- Sparking or explosion caused by static electricity buildup or other sources of electricity.
- Sparking or explosion while spraying paint or flammable liquids.
- Injuries resulting from inhalation, ingestion or exposure to fluids.

Before selecting or using any of these Products, it is important that you read and follow the instructions below. Only Hose from Parker's Stratoflex Products Division is approved for in flight aerospace applications, and no other Hose can be used for such in flight applications.

1.0 GENERAL INSTRUCTIONS

1.1 Scope: This safety guide provides instructions for selecting and using (including assembling, installing, and maintaining) hose (including all rubber and/or plastic products commonly called "hose" or "tubing"), fittings (including all products commonly called "fittings" or "couplings" for attachment to hose), and related accessories (including crimping and swaging machines and tooling). This safety guide is a supplement to and is to be used with, the specific Parker publications for the specific hose, fittings and related accessories that are being considered for use.

1.2 Fail-Safe: Hose and hose assemblies can and do fail without warning for many reasons. Design all systems and equipment in a fail-safe mode, so that failure of the hose or hose assembly will not endanger persons or property.

1.3 Distribution: Provide a copy of this safety guide to each person that is responsible for selecting or using hose and fitting products. Do not select or use hose and fittings without thoroughly reading and understanding this safety guide as well as the specific Parker publications for the products considered or selected.

1.4 User Responsibility: Due to the wide variety of operating conditions and uses for hose and fittings, Parker and its distributors do not represent or warrant that any particular hose or fitting is suitable for any specific end use system. This safety guide does not analyze all technical parameters that must be considered in selecting a product. The user, through its own analysis and testing, is solely responsible for:

- Making the final selection of the hose and fitting.
- Assuring that the users requirements are met and that the use presents no health or safety hazards.
- Providing all appropriate health and safety warnings on the equipment on which the hose and fittings are used.

1.5 Additional Questions: Call the appropriate Parker technical service department if you have any questions or require any additional information. See the Parker publication for the product being considered or used, for telephone numbers of the appropriate technical service department.

2.0 HOSE AND FITTING SELECTION INSTRUCTIONS

2.1 Electrical Conductivity: Certain applications require that a hose be nonconductive to prevent electrical current flow. Other applications require the hose to be sufficiently conductive to drain off static electricity. Extreme care must be exercised when selecting hose and fittings for these or any other applications in which electrical conductivity or nonconductivity is a factor.

For applications that require hose to be electrically nonconductive, including but not limited to applications near high voltage electric lines, only special nonconductive hose can be used. The manufacturer of the equipment in which the non-conductive hose is to be used must be consulted to be certain that the hose and fittings that are selected are proper for the application. Do not use any Parker hose or fitting for any such application requiring nonconductive hose, including but not limited to applications near high voltage electric lines, unless (i) the application is expressly approved in the Parker technical publication for the product, (ii) the hose is both orange color and marked "nonconductive," and (iii) the manufacturer of the equipment on which the hose is to be used specifically approves the particular Parker hose and fitting for such use.

The electrical conductivity or nonconductivity of hose and fittings is dependent upon many factors and may be susceptible to change. These factors include but are not limited to the various materials used to make the hose and the fittings, manufacturing methods (including moisture control), how the fittings contact the hose, age and amount of deterioration of damage or other changes, moisture content of the hose at any particular time, and other factors.

Parker manufactures a special hose for conveying paint in airless paint spraying applications. This hose is labeled "Electrically Conductive Airless Paint Spray Hose" on its layline and on its packaging. This hose must be properly connected to Parker fittings and properly grounded in order to dissipate dangerous static charge buildup which occurs in all airless paint spraying. Do not use any other hose, even if electrically conductive, for airless paint spraying. Use of any other hose or failure to properly connect the hose can cause a fire or an explosion resulting in death, personal injury, and property damage.

Parker manufactures a special hose for certain compressed natural gas (CNG) applications where static electricity buildup may occur. Parker CNG hose assemblies comply with AGA Requirements 1-93, "Hoses for Natural Gas Vehicles and Fuel Dispensers". This hose is labeled "Electrically Conductive for CNG Use" on its layline and on its packaging. This hose must be properly connected to Parker fittings and properly grounded in order to dissipate dangerous static charge buildup which occurs in, for example, high velocity CNG dispensing or transfer. Do not use any other hose, even if electrically conductive, for CNG transfer where static charge buildup may occur. Use of any other hose in such application or failure to properly connect this hose can cause a fire or an explosion resulting in death, personal injury, and property damage. Care must also be taken to protect against dangerous gas permeation through the hose wall. See section 2.6, Permeation, for more information.

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Parker CNG hose is intended for dispenser and vehicle use at maximum temperature of 180°F. Parker CNG hose should not be used in confined spaces or areas exceeding 180°F. Final Assemblies must be tested for leaks. **Caution:** Matches, candles, open flame or other sources of ignition shall not be used for this purpose. Leak check solutions should be rinsed off after use. Special care should be taken to ensure the hose is not kinked, twisted, torque, exposed to abusive environmental conditions specified in Section 2.9, or exceed the pressure requirements specified in Section 2.2, "Pressure". Hose assemblies should be tested on at least a monthly basis per Section 4.2 "Visual Inspection Hose/Fitting". Recommended procedures are to pressurize the hose and check for leaks and to visually inspect the hose for damage. Hose assemblies should be tested on a monthly basis for conductivity per AGA 1-93.

2.2 Pressure: Hose selection must be made so that the published maximum recommended working pressure of the hose is equal to or greater than the maximum system pressure. Surge pressures in the system higher than the published maximum recommended working pressure will cause failure or shorten hose life. Do not confuse burst pressure or other pressure values with working pressure and do not use burst pressure or other pressure values for this purpose.

2.3 Suction: Hoses used for suction applications must be selected to insure that the hose will withstand the vacuum and pressure of the system. Improperly selected hose may collapse in suction application.

2.4 Temperature: Be certain that fluid and ambient temperatures, both steady and transient, do not exceed the limitations of the hose. Temperatures below and above the recommended limit can degrade hose to a point where a failure may occur and release fluid. Care must be taken when routing hose near hot objects (e.g. manifolds) to properly insulate and protect the hose.

2.5 Fluid Compatibility: Hose selection must assure compatibility of the hose tube, cover, reinforcement, and fittings with the fluid media used. See the fluid compatibility chart in the Parker publication for the product being considered or used. This information is offered only as a guide. Actual service life can only be determined by the end user by testing under all extreme conditions and other analysis.

2.6 Permeation: Permeation (that is, seepage through the hose) will occur from inside the hose to outside when hose is used with gases, liquid and gas fuels, and refrigerants (including but not limited to such materials as helium, fuel oil, natural gas, or freon). This permeation may result in high concentrations of vapors which are potentially flammable, explosive, or toxic, and in loss of fluid. Dangerous explosions, fires, and other hazards can result when using the wrong hose for such applications. The system designer must take into account the fact that this permeation will take place and must not use hose if this permeation could be hazardous. The system designer must take into account all legal, government, insurance, or any other special regulations which govern the use of fuels and refrigerants. Never use a hose even though the fluid compatibility is acceptable without considering the potential hazardous effects that can result from permeation through the hose assembly.

Permeation of moisture from outside the hose to inside the hose will also occur in hose assemblies, regardless of internal pressure. If this moisture permeation would have detrimental effects (particularly but not limited to refrigeration and air conditioning systems), incorporation of sufficient drying capacity in the system or other appropriate system safeguards should be selected and used.

2.7 Size: Transmission of power by means of pressurized fluid varies with pressure and rate of flow. The size of the components must be adequate to keep pressure losses to a minimum and avoid damage due to heat generation or excessive fluid velocity.

2.8 Routing: Attention must be given to optimum routing to minimize inherent problems (kinking or flow restriction due to hose collapse).

2.9 Environment: Care must be taken to insure that the hose and fittings are either compatible with or protected from the environment (that is, surrounding conditions) to which they are exposed. Environmental conditions including but not limited to ultraviolet radiation, sunlight, heat, ozone, moisture, water, salt water, chemicals, and air pollutants can cause degradation and premature failure.

2.10 Mechanical Loads: External forces can significantly reduce hose life or cause failure. Mechanical loads which must be considered include excessive flexing, twist, kinking, tensile or side loads, bend radius, and vibration. Use of swivel type fittings or adapters may be required to insure no twist is put into the hose. Unusual applications may require special testing prior to hose selection.

2.11 Physical Damage: Care must be taken to protect hose from wear, snagging and cutting, which can cause premature hose failure.

2.12 Proper End Fitting: See instructions 3.2 through 3.5 below. These recommendations may be substantiated by testing to industry standards such as SAE J517.

2.13 Length: When establishing a proper hose length, motion absorption, hose length changes due to pressure, and hose and machine tolerances must be considered.

2.14 Specifications and Standards: When selecting hose and fittings, government, industry, and Parker specifications and recommendations must be reviewed and followed as applicable.

2.15 Hose Cleanliness: Hose components may vary in cleanliness levels. Care must be taken to insure that the assembly selected has an adequate level of cleanliness for the application.

2.16 Fire Resistant Fluids: Some fire resistant fluids require the same hose as petroleum oil. Some use a special hose, while a few fluids will not work with any hose at all. See instructions 2.5 and 1.5. The wrong hose may fail after a very short service. In addition, all liquids but pure water may burn fiercely under certain conditions, and even pure water leakage may be hazardous.

2.17 Radiant Heat: Hose can be heated to destruction without contact by such nearby items as hot manifolds or molten metal. The same heat source may then initiate a fire. This can occur despite the presence of cool air around the hose.

2.18 Welding or Brazing: When using a torch or arc-welder in close proximity to hydraulic lines, the hydraulic lines should be removed or shielded with appropriate fire resistant materials. Flame or weld spatter could burn through the hose and possibly ignite escaping fluid resulting in a catastrophic failure. Heating of plated parts, including hose fittings and adapters, above 450°F (232°C) such as during welding, brazing, or soldering may emit deadly gases.

2.19 Atomic Radiation: Atomic radiation affects all materials used in hose assemblies. Since the long term effects may be unknown, do not expose hose assemblies to atomic radiation.

3.0 HOSE AND FITTING ASSEMBLY AND INSTALLATION INSTRUCTIONS

3.1 Pre-Installation Inspection: Prior to installation, a careful examination of the hose must be performed. All components must be checked for correct style, size, catalog number, and length. In addition, the hose must be examined for cleanliness, obstructions, blisters, cover looseness, or any other visible defects.

3.2 Hose and Fitting Assembly: Do not assemble a Parker fitting on a Parker hose that is not specifically listed by Parker for that fitting unless authorized in writing by the chief engineer of the appropriate Parker division. Do not assemble a Parker fitting on another manufacturers hose or a Parker hose on another manufacturers fitting unless (i) the chief engineer of the appropriate Parker division approves the assembly in writing, and (ii) the user verifies the assembly and the application through analysis and testing. See instruction 1.4 above.

The Parker published instructions must be followed for assembling the fittings on the hose. These instructions are provided in the Parker fitting catalog for the specific Parker fitting being used.

3.3 Related Accessories: Do not crimp or swage any Parker hose or fitting with anything but the proper listed Parker swage or crimp machine and dies and in accordance with Parker published instructions. Do not crimp or swage another manufacturers hose

(Continued)

fitting with a Parker crimp or swage die unless authorized in writing by the chief engineer of the appropriate Parker division.

3.4 Parts: Do not use any Parker hose fitting part (including but not limited to socket, shell, nipple, or insert) except with the correct Parker mating parts, in accordance with Parker published instructions, unless authorized in writing by the chief engineer of the appropriate Parker division.

3.5 Reusable/Permanent: Do not reuse any reusable hose product that has blown or pulled off a hose. Do not reuse a Parker permanent (that is, crimped or swaged) hose fitting or any part thereof.

3.6 Minimum Bend Radius: Installation of a hose at less than the minimum listed bend radius may significantly reduce the hose life. Particular attention must be given to preclude sharp bending at the hose/fitting juncture.

3.7 Twist Angle and Orientation: Hose installations must be such that relative motion of machine components does not produce twisting.

3.8 Securement: In many applications, it may be necessary to restrain, protect, or guide the hose to protect it from damage by unnecessary flexing, pressure surges, and contact with other mechanical components. Care must be taken to insure such restraints do not introduce additional stress or wear points.

3.9 Proper Connection of Ports: Proper physical installation of the hose requires a correctly installed port connection insuring that no twist or torque is transferred to the hose.

3.10 External Damage: Proper installation is not complete without insuring that tensile loads, side loads, kinking, flattening, potential abrasion, thread damage, or damage to sealing surfaces are corrected or eliminated. See instruction 2.10.

3.11 System Checkout: All air entrapment must be eliminated and the system pressurized to the maximum system pressure and checked for proper function and freedom from leaks. Personnel must stay out of potential hazardous areas while testing and using.

3.12 Routing: Hose should be routed in such a manner so if a failure does occur, oil mist will not come into contact with hot surfaces, open flame, or sparks, and the chance of personal injury is minimized.

4.0 HOSE AND FITTING MAINTENANCE INSTRUCTIONS

4.1 Even with proper selection and installation, hose life may be significantly reduced without a continuing maintenance program. Frequency should be determined by the severity of the application and risk potential. A maintenance program must be established and followed by the user and, at minimum, must include instructions 4.2 through 4.7, listed below.

4.2 Visual Inspection Hose/Fitting: Any of the following conditions require immediate shut down and replacement of the hose assembly:

- Fitting slippage on hose,
- Damaged, cut or abraded cover (any reinforcement exposed);
- Hard, stiff, heat cracked, or charred hose;
- Cracked, damaged, or badly corroded fittings;
- Leaks at fitting or in hose;
- Kinked, crushed, flattened or twisted hose; and
- Blistered, soft, degraded, or loose cover.

4.3 Visual Inspection All Other: The following items must be tightened, repaired or replaced as required:

- Leaking port conditions;
- Remove excess dirt buildup;
- Clamps, guards, shields; and
- System fluid level, fluid type and any air entrapment.

4.4 Functional Test: Operate the system at maximum operating pressure and check for possible malfunctions and freedom from leaks. Personnel must avoid potential hazardous areas while testing and using the system.

4.5 Replacement Intervals: Specific replacement intervals must be considered based on previous service life, government or industry recommendations, or when failures could result in unacceptable downtime, damage, or injury risk. See instructions 1.2 above.

4.6 Inspecting a Pressurized System: Hydraulic power is accomplished by utilizing high-pressure fluids to do work. Hoses, fittings, and hose assemblies all contribute to doing work by transmitting fluids at high pressures. Fluids under pressure can be dangerous and potentially lethal and, therefore, extreme caution must be exercised when working with fluids under pressure and handling the hoses transporting the fluids. From time to time, hose assemblies will fail. Usually these failures are the result of some form of misapplication, abuse, or simply wear. When hoses fail, generally the high-pressure fluids inside escape in some sort of stream which may or may not be visible to the user. Under no circumstances should the user attempt to locate the leak by "feeling" with their hands or any other part of their body. High-pressure fluids can and will penetrate the skin and cause severe tissue damage and possibly loss of limb. Even seemingly minor hydraulic fluid injection injuries must be treated by a physician with knowledge of the tissue damaging properties of hydraulic fluid.

If a hose failure occurs, immediately shut down the equipment and leave the area until pressure has been completely released from the hose assembly. Simply shutting down the hydraulic pump may or may not eliminate the pressure in the hose assembly. Many times check valves, etc., are employed in a system and can cause pressure to remain in a hose assembly even when pumps or equipment are not operating. Tiny holes in the hose, commonly known as pinholes, can eject small, dangerously powerful but hard to see streams of hydraulic fluid. It may take several minutes or even hours for the pressure to be relieved so that the hose assembly may be examined safely.

Once the pressure has been reduced to zero, the hose assembly may be taken off the equipment and examined. It must always be replaced if a failure has occurred. Never attempt to patch or repair a hose assembly that has failed. Consult the nearest Parker distributor or the appropriate Parker division for hose assembly replacement information.

Never touch or examine a failed hose assembly unless it is obvious that the hose no longer contains fluid under pressure. The high-pressure fluid is extremely dangerous and can cause serious and potentially fatal injury.

4.7 Refrigerant gases: Special care should be taken when working with refrigeration systems. Sudden escape of refrigerant gases can cause blindness if the escaping gases contact the eye and can cause freezing or other severe injuries if it contacts any other portion of the body.

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2. Payment: Payment shall be made by Buyer net 30 days from the date of delivery of the items purchased hereunder. 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 thereunder shall be free from defects in material or workmanship for a period of 365 days from the date of shipment to Buyer, or 2,000 hours of use, whichever expires first. **THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO ITEMS PROVIDED HEREUNDER. SELLER MAKES NO OTHER WARRANTY, GAURANTEE, OR REPRESENTATION OF ANY KIND WHATSOEVER. ALL OTHER WARRANTIES, INCLUDING BUT NOT LIMITED TO, MERCHANTIBILITY AND FITNESS FOR PURPOSE, WHETHER EXPRESS, IMPLIED, OR ARISING BY OPERATION OF LAW, TRADE USAGE, OR COURSE OF DEALING ARE HEREBY DISCLAIMED.**
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6. Changes, Reschedules and Cancellations: Buyer may request to modify the designs or specifications for the items sold herunder 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 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.

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 of if Seller is liable for the collection of such tax, the amount thereof shall be in additon 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 in 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 options, 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 infriges any patent, trademark, copyright, trade dress, trade secret or any similiar 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 thereto. 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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