

Electric- Hydraulic Bore Cleaning System User Manual:



General Information:

- **Operates off of any vehicles 24VDC Slave Connector**
- **Versatile; The EHBCS can clean any tube from 105mm to 155mm**
- **Compact; can travel with mobile artillery or support vehicles**
- **Simple operation; allows one man to clean a gun tube**
- **Fast 20-25 minutes is all the time needed to clean a gun tube.**
- **Clean EPA friendly; A tube can be cleaned and preserved with as little as 10 oz. of oil**
- **No special equipment required; the EHBCS can be used with standard shop rags or even tee-shirts**
- **Allows for easy maintenance in the field**

System Specifications:

- Stroke: 3 inches
- Velocity: 3 inches in 75 milliseconds.
- Input voltage: 24 VDC
- Peak current rating: 70 amps
- Continuous current: 25 – 36 amps
- Component Weight (lbs.):
EHBCS System in Case 130 lbs
- Dimensions (Case): 24.81”L x19.37”W x13.87”D

MISC. PARTS LIST:

(EHB22EB)
Eye Bolt (1)



(EHB21RS)
Ram Staff Segment (3)



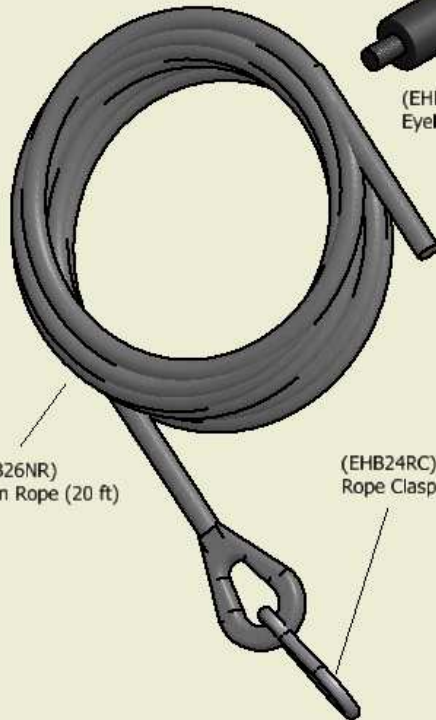
(EHB22EA)
Eyelet Adapter (1)



(EHB40HH)
Hydraulic Hose (20ft)

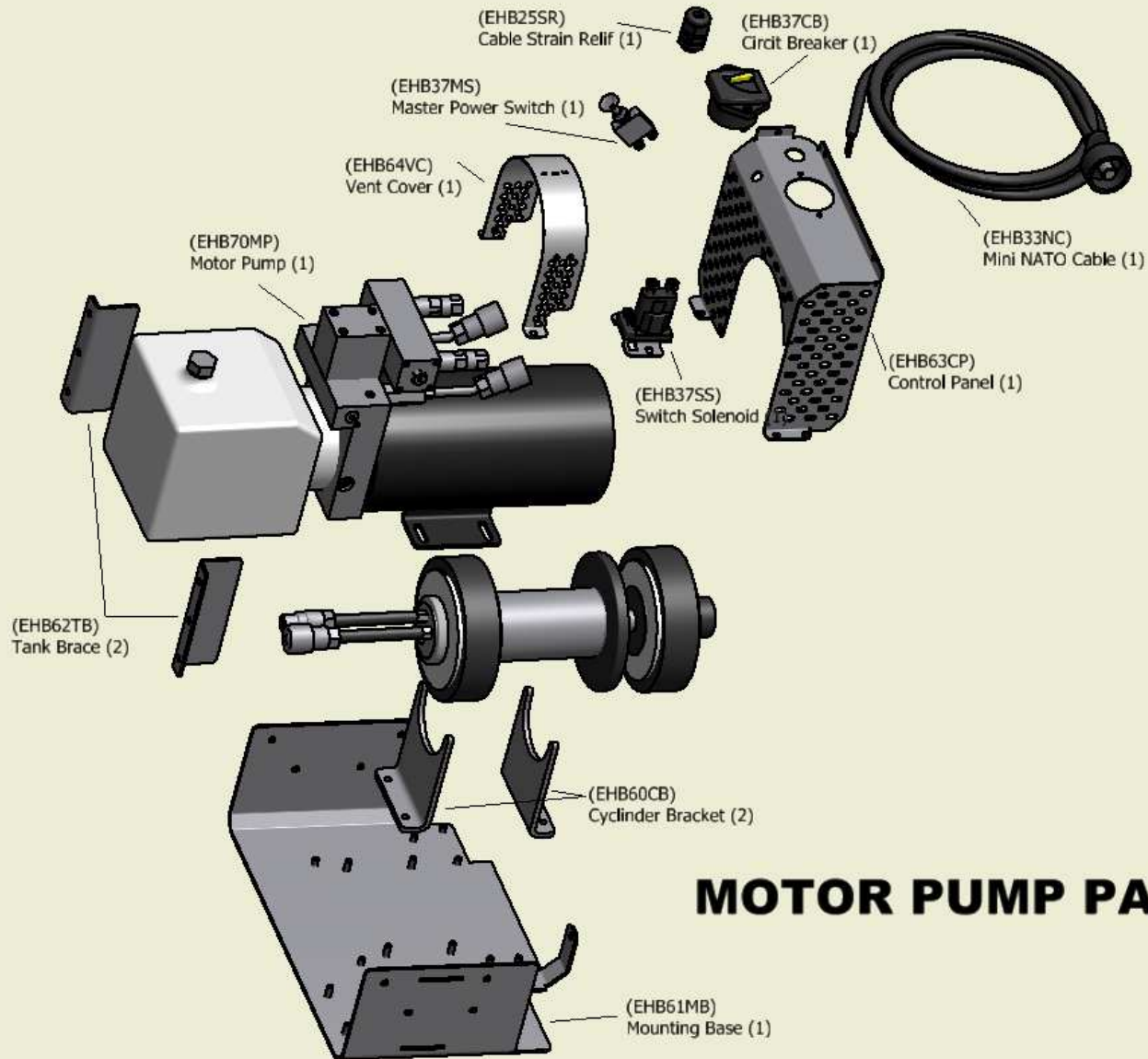


(EHB26NR)
Nylon Rope (20 ft)

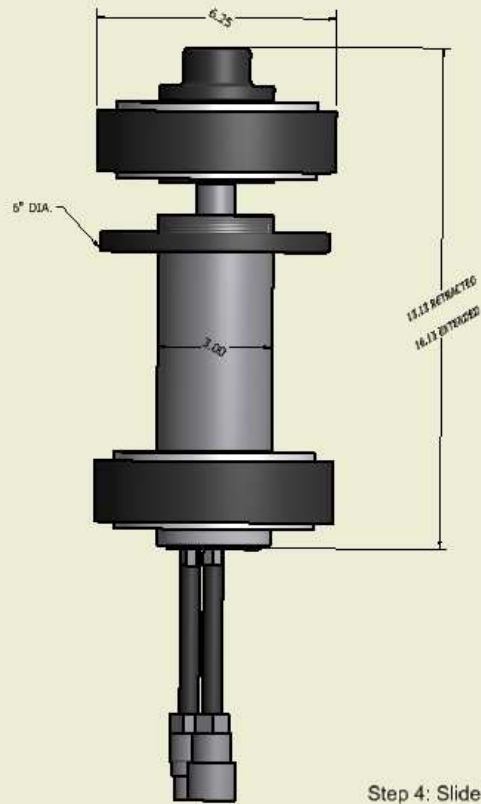


(EHB24RC)
Rope Clasp (1)

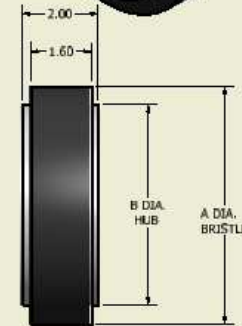
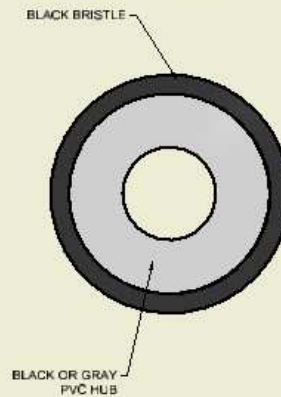




MOTOR PUMP PARTS LIST:



BORE SIZE	DIM A (IN)	DIM B (IN)	WEIGHT (LBS)
105 MM	4.20	3.30	.55
120 MM	4.82	3.92	.65
155 MM	6.20	5.30	2.05



Step 6: Thread on large Knob, hand tight. (Turn clockwise to thread on)

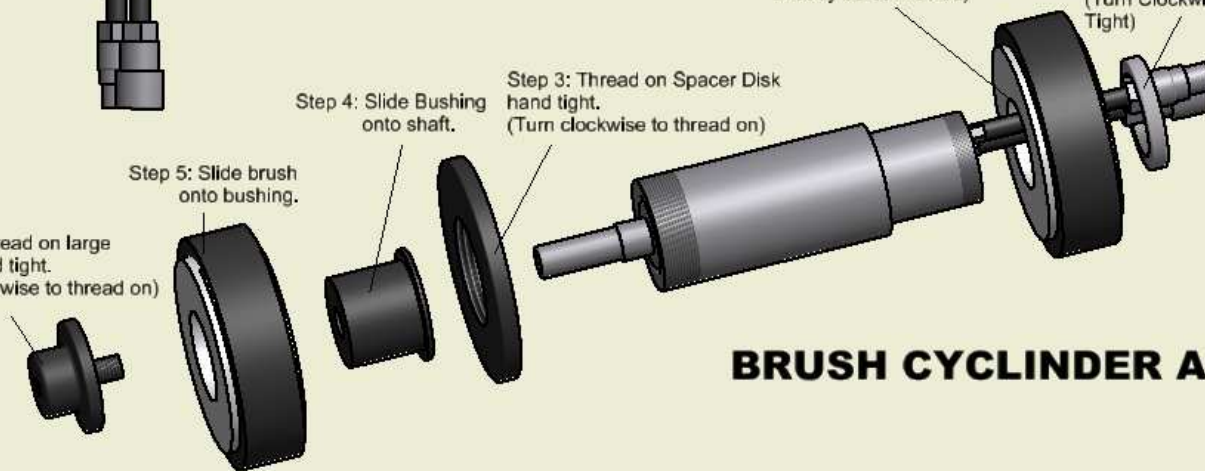
Step 5: Slide brush onto bushing.

Step 4: Slide Bushing onto shaft.

Step 3: Thread on Spacer Disk hand tight. (Turn clockwise to thread on)

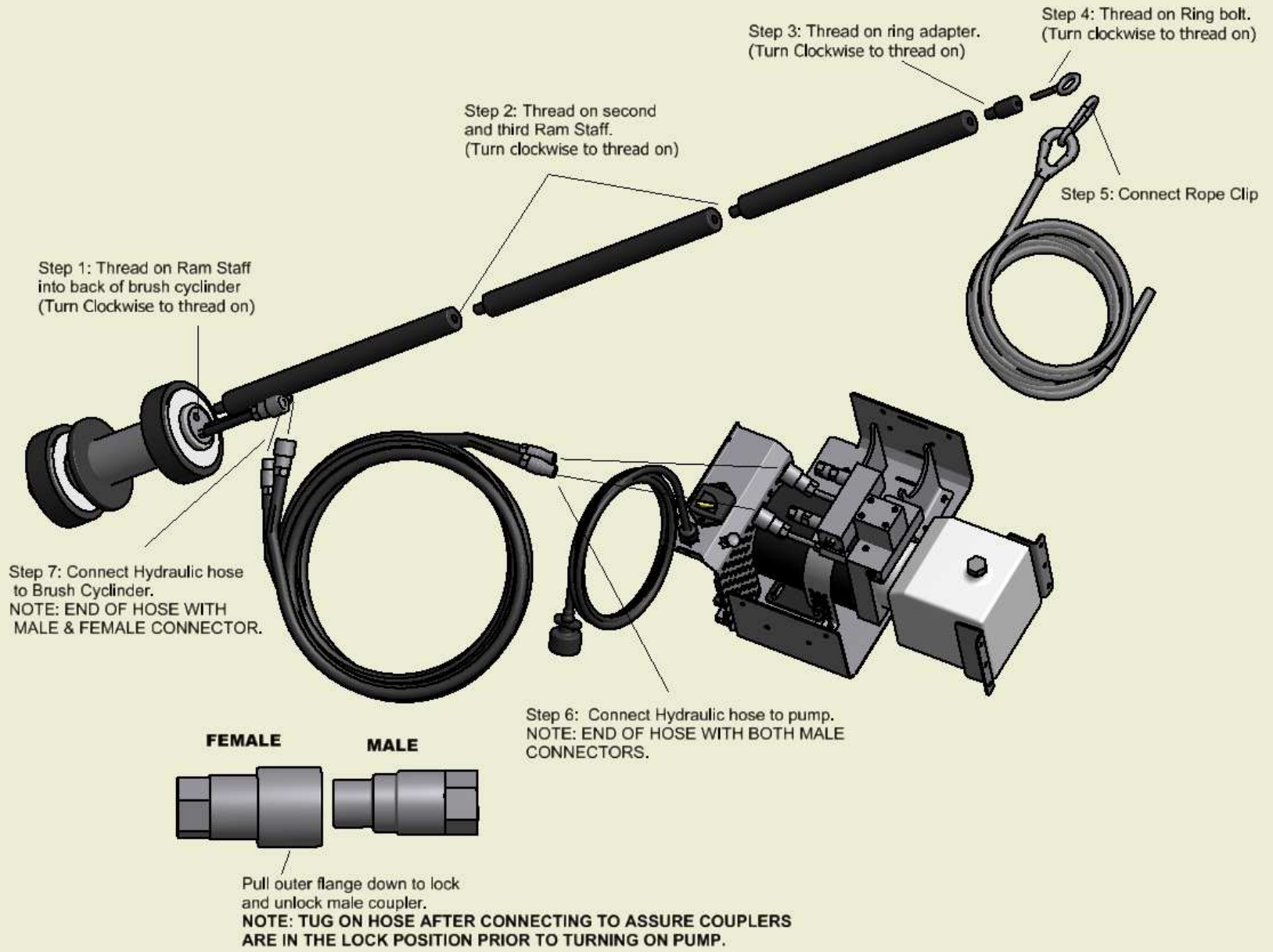
Step 1: Slide brush onto cylinder end with hoses. (Note: Hoses will already be connected)

Step 2: Thread on retainer ring (Turn Clockwise to thread on hand Tight)

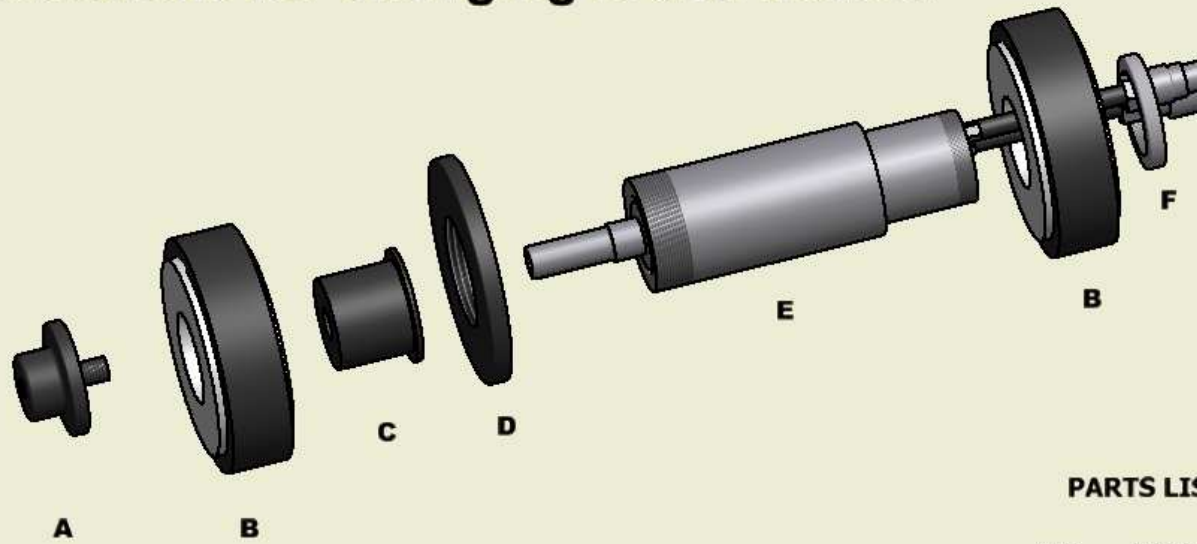


BRUSH CYLINDER ASSEMBLY:

ASSEMBLY OF THE HYDRAULIC BORE CLEANER:



Instructions for changing brush heads:



FRONT BRUSH REPLACEMENT (Opposite Hoses)

- Unthread large knob (A) located at front of brush. This knob is only hand tight.
- Slide brush (B) off bushing (C) to remove.
- Slide bushing (C) off cylinder shaft to remove.
- Unthread spacer (D) turning counter clockwise. This spacer is only hand tight, and remove.
- Replace Spacer (D) with new size threading on clockwise until hand tight.
- Slide new size bushing (C) onto cylinder shaft.
- Slide new size brush (B) onto bushing (C).
- Thread on large knob (A) hand tight.

REAR BRUSH REPLACEMENT (Hose end)

- Unthread retainer ring (F) counter clockwise and slide over hoses to remove.
- Slide brush (B) off cylinder and over hoses to remove.
- Slide new size brush (B) over hoses and onto cylinder.
- Slide retainer ring (F) over hoses and thread on clockwise until hand tight.

PARTS LIST:

ITEM	DESCRIPTION	PART NO.	QTY.
A	Front Retaining Nut	EHB27 FN	1
B	Nylon Brush /155 mm	EHB28BS155	2
	Nylon Brush /120 mm	EHB29BS120	2
	Nylon Brush /105 mm	EHB30BS105	2
C	Hub	EHB28BSHUB	1
D	Spacer Disk for 155 mm	EHB34SD155	1
	Spacer Disk for 120 mm	EHB35SD120	1
	Spacer Disk for 105 mm	EHB36SD105	1
E	EHBCS Main Cylinder	EHB40MC	1
F	Rear Retaining Nut	EHB31RN	1

Preparing the gun tube for cleaning (Wet Punch):

The gun tube should be positioned as if it were being cleaned in the conventional method.

Applying a thin layer of oil to the gun tube using a spray bottle is an ideal way to ensure an even coat of oil throughout the gun tube.

Approximately 1-2 ounces of oil will be adequate for a wet punch cycle. Spraying the tube from the muzzle end as well as the breach end is ideal. In addition, apply a light spray of oil directly to the brush heads.



Wet Punching:

Insert the Brush cylinder into the tube; be sure to insert the lead brush, the cylinder and the entire rear brush into the end of the tube **(a)**. The full length of the EHBCS cylinder should be inserted into the tube, leaving only the ram staffs, cabling and rope protruding from the end. Be certain that the rope and cabling are free of tangles and the operator is not standing on them.



(a)

Starting the EHBCS system:

Be sure the EHBCS master switch is in the off position prior to connecting to 24 VDC power.

Connect the EHBCS NATO/Slave Plug to the desired Vehicle NATO/Slave receptacle in the vehicle. The vehicle does not need to be running if the battery bank is healthy. The master power must be on in order to get power to the EHBCS. If the battery bank is low and the vehicle needs to be started, disconnect the EHBCS Plug prior to starting the vehicle.

When DC power is present; the EHBCS will make a slight whining sound even with the master power switch in the off position. This is a normal sound and indicates that the system is operating properly. You are now ready to turn the system on. Simply turn the master power switch to the on position.

System Operation:

Although you can not see this function at this point, the front brush will begin to plunge into the tube, pulling the EHBCS down the tube at a rate of approximately 15 ft per 85 seconds. Simply allow the EHBCS to walk down the tube while the operator makes certain that the cables and rope do not tangle **(b)**. When operating the EHBCS in the field, it is recommended that a rag is used to wipe of any debris that the rope and cabling may be dragging into the tube during operation.



(b)

When the EHBCS reaches the end of the tube, either the chamber or the muzzle; depending on the end you are cleaning from, the system will stop plunging forward. To reverse the EHBCS give the **Rope** a firm tug and hold until you feel the system reverse direction and crawl back toward you. **(Do not pull the Hoses to reverse The EHBCS)** NOTE: depending on the condition of the tube you may need to keep some pressure on the rope as the EHBCS returns to the end of the tube. The operator will need to lightly pull the hoses and rope back as the EHBCS returns up the tube. This will prevent the EHBCS from running over the rope and cabling inside the gun tube (c). Just prior to the Rear brush reaching the end of the tube, shut off the master switch and secure the ram staff lengths to prevent the EHBCS from falling out of the tube when it returns. Note: Never allow the full weight of the ram staffs protruding from the gun tube to be supported only by the cylinder and brushes, this could damage the cylinder.



(c)

Repeat this cycle as often as required to adequately apply a thin layer of oil and loosen debris. Typically 3 - 4 cycles down and back are adequate for a normally maintained tube. Dirtier tubes will require more punches.

Rag Punches:

When using rags to punch the tube, be certain to use similar rags or shirts for each brush head. Changing the dimension of one brush head dramatically more than the other will result in decreased performance of the EHBCS or possible failure to crawl down the tube. Place a rag over the front brush by simply laying it over the entire brush end and pressing the rag into the bristles of the brush. This will help to keep the rag on the brush head **(d)**.



(d)

Position the loose ends of the rag behind the brush head; this will prevent the rag from bunching up on the return cycle of the EHBCS. When placing a rag on the rear brush simply wrap the rag around the entire surface of the brush diameter **(f)**, again be certain that no loose ends are going to interfere with the return cycle of the EHBCS.



(e)

Wet Rag Punch:

Like in image (e) simply saturate the front and rear rag with oil and repeat the process described in the wet punch section, only this time you will be using rags.

Typically 2 – 3 cycles of Wet rag punches are adequate for removing debris on most normally maintained tubes.

Dry Punching:

Simply repeat the above steps for rag punching, but without oil on the rag. Typically 1 – 2 cycles of dry punches are adequate for most normally maintained tubes.

Cleaning Process Review:

The following process is adequate for most normally maintained gun tubes, obviously dirtier, less maintained gun tubes will require additional cycles. Although the EHBCS has had success cleaning very dirty gun tubes, the EHBCS system was designed as a regular maintenance tool. The EHBCS was not designed to recover damaged gun tubes due to: Corrosion from rust, Age, or neglect.

Wet Punch: Brush heads only, saturated with oil, 3 – 4 cycles down and back

Wet Rag Punch: Rag on front and rear brush head, Saturated with oil, 2 – 3 cycles down and back

Dry Rag Punch: Rag on front and rear brush head, no oil, 1 – 2 cycles down and back

LIMITED WARRANTY

This Warranty covers any defects in workmanship or materials of the product under normal use and service for a period of one (1) year from the date of delivery.

Graywacke Engineering Inc. (GEI) will, at its option, replace or repair any GEI product found by Graywacke Engineering Inc. (GEI) to be defective at no charge to the customer. The repaired or replaced GEI product will be shipped from Graywacke within 5 business days (Monday, Tuesday, Wed, Thursday and Friday) of the date of receipt of the returned product from the end user with a written description of the problem unless further information is needed from the end user. All replaced GEI products or parts will remain the property of Graywacke Inc.

Graywacke will not be responsible under this warranty if Graywacke determines that upon examination that the GEI product failure was (a) caused by misuse, neglect, accident, abnormal condition of operating or handling (including the failure to install the GEI product in accordance to the product instructions and observe the warnings on the GEI product and the instruction manual), alteration to the GEI product (other than external aesthetic alterations which Graywacke determines does not affect electronic components or function), or other conditions beyond the control of Graywacke or (b) damaged in transit to Graywacke.

IN NO EVENT SHALL GRAYWACKE ENGINEERING INC. BE LIABLE FOR ANY DIRECT, SPECIAL, INDIRECT, CONSEQUENTIAL, INCIDENTAL, PUNITIVE, OR EXEMPLARY DAMAGES, EXPENSES, LOST SAVINGS OR LOST PROFITS OR ANY OTHER DAMAGES OF ANY KIND.

Send the GEI product postage pre-paid with proof of the delivery date within the warranty period and written description of the problem to

Graywacke Engineering Inc.
120 Industrial Dr. Lexington, OH 44904

This warranty is the sole and exclusive remedy and is in lieu of all other warranties express or imply, including but not limited to any applied warranty of merchantability or fitness for a particular purpose.