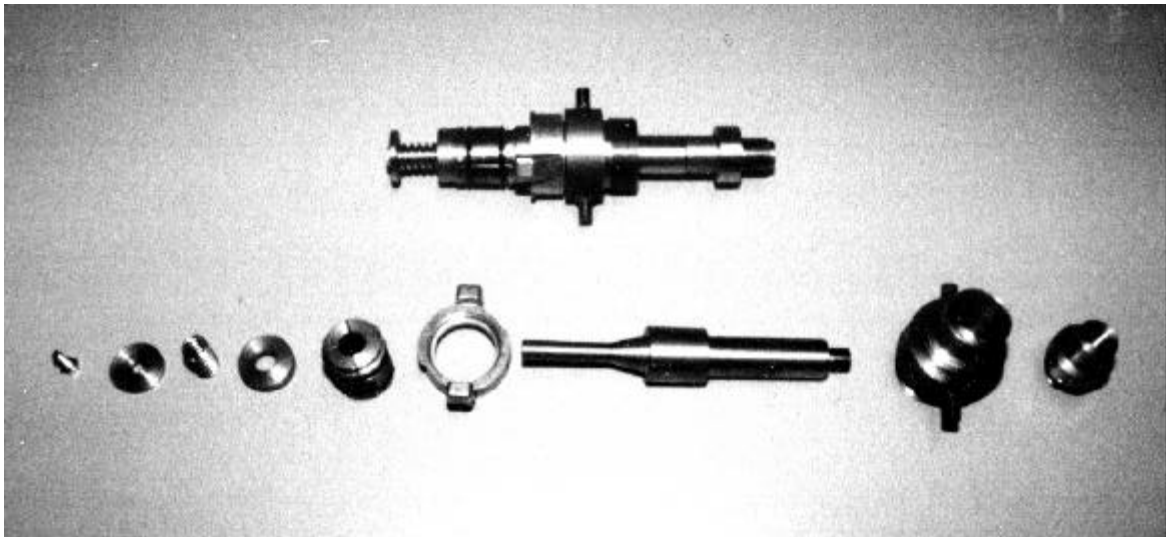


Roscommon Equipment Center Program

Project Number 59

## **EXPANSION RING REMOVER**

### **FOR 1-1/2 INCH HOSE**



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**Northeast Forest Fire Supervisors**

In Cooperation with

**Michigan's Forest Fire Experiment Station**

# Expansion Ring Remover for 1½ Inch Hose

## REC Project #59

The New Brunswick Department of Natural Resources & Energy made a device for removal of brass expansion rings from inside the couplings of soft fire hose. The device adapts to a hose coupling expander using the machine's stroke to remove the ring. The Rhode Island Department of Environmental Management asked REC to document the tool. Rhode Island caches and repairs large quantities of hose for fire department wildfire use.<sup>1</sup>

The drawings that follow show how to make the expansion ring remover. New Brunswick, as well as Rhode Island, use quarter turn couplings. The design shows a quarter turn adapter. Agencies that use threaded couplings need to make a similar adapter with the agency's thread standard.

The ring remover works as follows (refer to drawing 90-5910B):

1. The shaft (#1) slides within the adapter sleeve (#2). The thread adapter (#3), holds the shaft within the sleeve.
2. A coupling adapter (#5) is threaded onto the adapter sleeve (#2). As mentioned, the drawings show a quarter turn adapter. The standoff distance between the adapter and collet (#6) is important. This distance can be adjusted by tightening the adapter against an O-ring (#4). For other coupling systems (i.e., threads), use an appropriate adapter. Those using threaded couplings will need to be determined the proper location of the threaded adapter relative to the collet. This could be adjusted by tightening or loosening the coupling on the adapter. Refer to Figure 1.
3. Two O-rings (#7) hold the collet (#6) together. The collet, collet end bushing (#8), spring (#9), washer (#10) and screw (#11) fit on the end of the shaft (#1). The amount of preload placed on the collet by the spring can be varied by adjusting the screw.
4. Slide a used coupling over the spring end of the shaft and mate it to the adapter (#5). You are now ready to use machine force to remove the ring from the coupling.
5. The machine (usually an expansion ring installation machine) applying the force must hold the adapter sleeve while applying a force to the thread adapter end. This moves the shaft (#1), expanding the collet (#6) as the collet slides up the conical section of the shaft<sup>2</sup>. The collet grips on the inside ridge of the hose retaining ring. The force on the shaft moves the ring out of the coupling.

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<sup>1</sup> REC would like to thank Klaus Barth, New Brunswick DNR&E (retired), Russ Arnold, RI Dept. of Environmental Management, and the Northeast Fire Compact for their contributions to this project.

<sup>2</sup> The collet must be closed in order to slide a coupling onto the device. For this to happen, the shaft must move to release the force in spring (#9).

There are several expansion ring installation machines; the adapter sleeve (#2) and threaded adapter (#3) must be made to accommodate the specific machine used. Hence, the user may need to modify the attached plans to accommodate their expander and hose thread or coupling standard.

We also set up a small "H" press to pull out the expansion rings. In this case, the setup held the adapter sleeve (#2) while a hydraulic ram pushed on the threaded adapter, forcing the shaft to expand the collet and pushing the expansion ring out of the fitting. The hydraulic ram was from a 4-ton hydraulic repair kit with hand operated pump.

The collet is the most critical item to make. After machining the shape, the part is cut into four quarters. We carefully cut it with a band saw. The size of the saw kerf will affect the final dimensions, but there should be enough adjustment in the ring remover assembly to compensate. If the final outside diameter of the collet's flange is greater than the inside diameter of the expansion ring, remove some material by sanding the sawed surfaces of the collet. A stationary belt sander is a good tool for this job. The O-rings (#7) slip into the collet's grooves to hold the four quarters together.

The collet and the shaft working in relation with the hose coupling adapter are the keys to this device. The user will need to look at the machine that powers these parts and make them fit the system. A moderate amount of trial and error may be needed to use this system with differing couplings and machines. Remember that expansion ring diameter will vary for different hose thickness. Hence if the device is adjusted for couplings with linen hose, it may need to be readjusted for those with synthetic hose.

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**Inquiries, comments and suggestions regarding this project may be directed to:**

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Roscommon Equipment Center  
c/o Forest Fire Experiment Station  
P.O. Box 68  
Roscommon, Michigan 48653-0068

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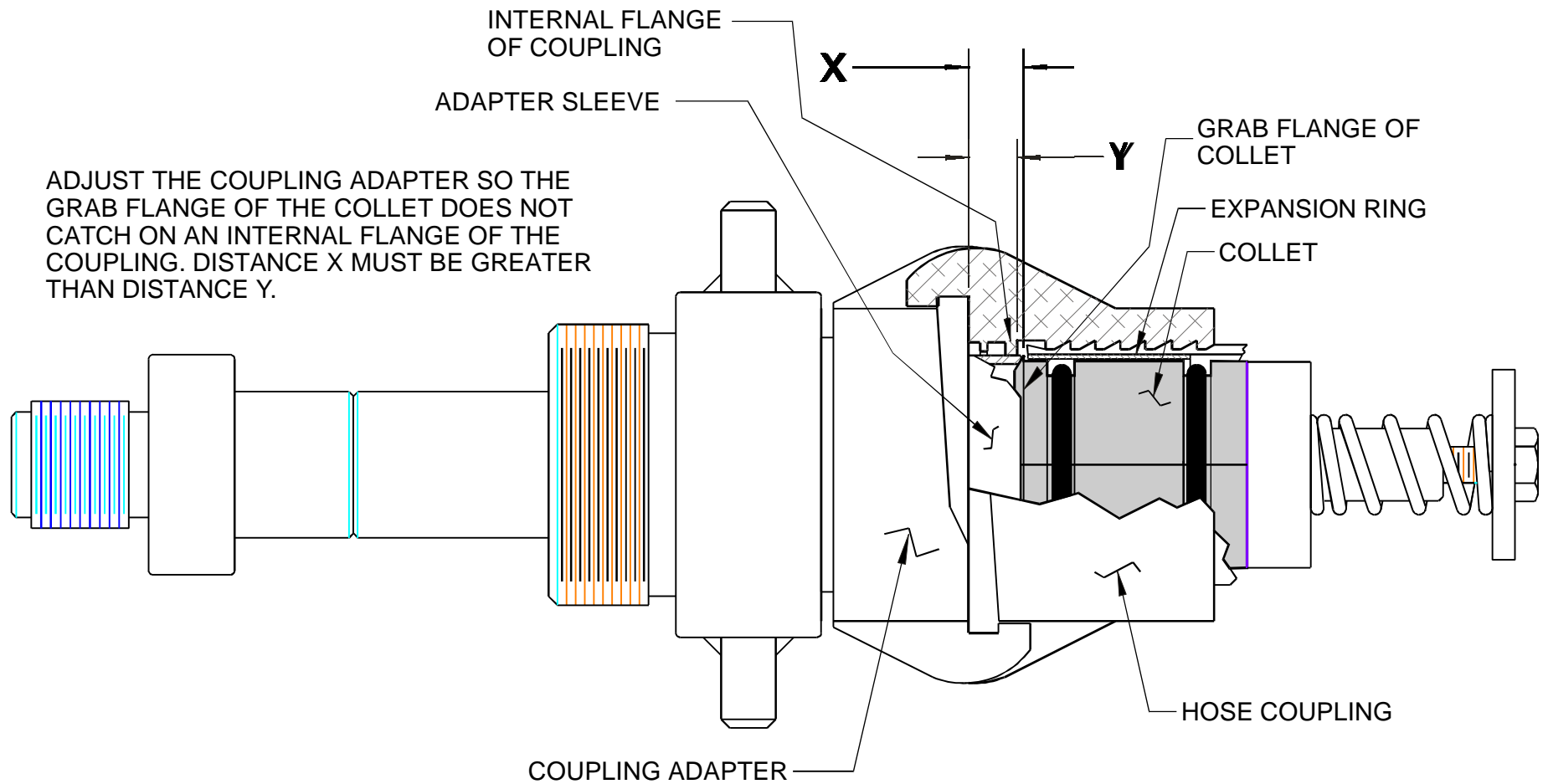
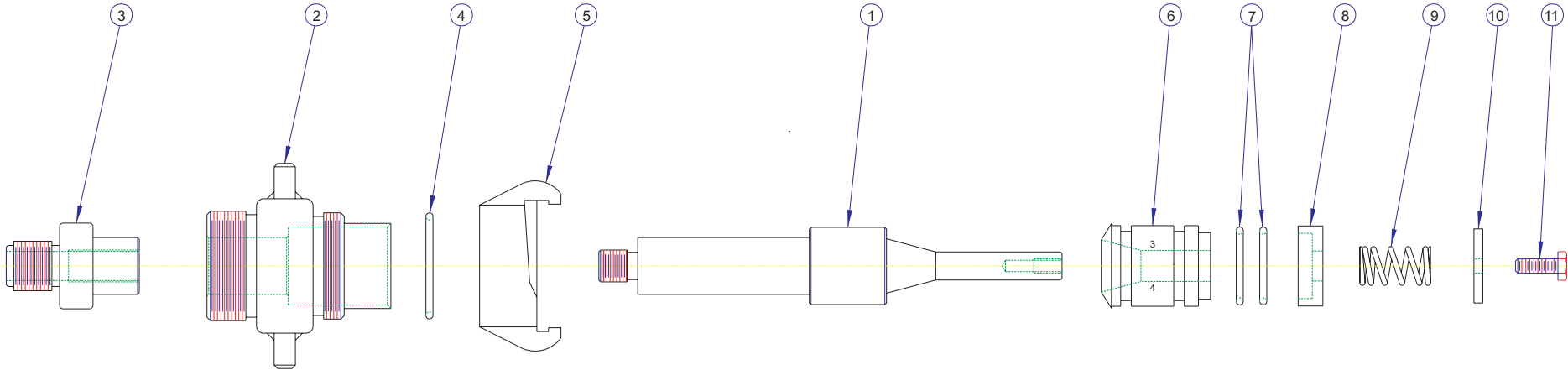


Figure 1. - The coupling adapter must be positioned so the collet's flange grabs the expansion ring and not an inner flange of the coupling.

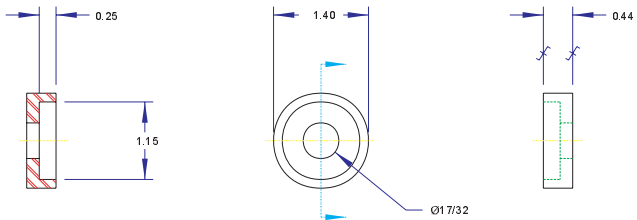
NOTES: ITEM 4 - THIS PART MAY BE NEEDED TO ADJUST POSITION OF ITEM 5.  
 ITEM 5 - SHOWN WITH 1/4 TURN ADAPTER; MAKE AN ADAPTER WITH APPROPRIATE THREAD FOR USE WITH THREADED FITTINGS.

ITEM	DRAWING	DESCRIPTION	QTY	EST WT
1	90-5913B	SHAFT	1	1.50
2	90-5912B	ADAPTER SLEEVE	1	1.63
3	90-5913B	THREAD ADAPTER	1	0.48
4	90-5911B	"O"-RING: 1/8" X 1.5/8"ID X 1.7/8"OD	1	0.01
5	90-5911B	QUARTER TURN ADAPTER: 1.1/2" NPSH THD FEM	1	0.16
6	90-5912B	COLLET	1	0.56
7	90-5911B	"O"-RING: 1/8" X 1.1/8"ID X 1.3/8"OD	2	0.01
8	90-5911B	COLLET END BUSHING	1	0.11
9	90-5911B	UTILITY COMPRESSION SPRING	1	0.03
10	90-5911B	SPRING RETAINER WASHER	1	0.06
11	HARDWARE	SCREW, CAP 1/4"-20UN X 3/4" LONG HEX HD, GRADE 5, PLATED	1	0.02



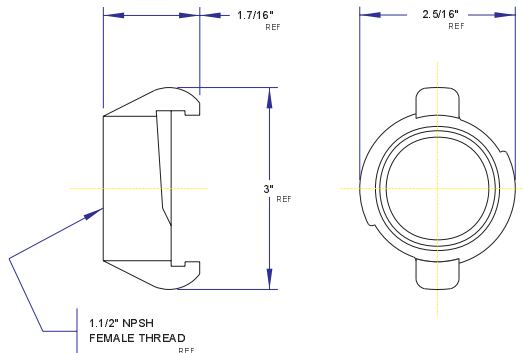
PART NUMBER: 90-5910  
 EST WT: 4.58 LBS

<b>STD. TOLERANCES</b> FRACTIONAL: 0 TO 6 IN $\pm 1/32$ 6 IN AND UP $\pm 1/16$		DRAWN: R.GREENLAW	
DECIMAL: 1 PLACE $\pm 0.1$ 2 PLACE $\pm 0.01$ 3 PLACE $\pm 0.005$	ANGULAR: $\pm 1$ DEG		
NO. BY DATE		APPROVED:	PROJECT NO.: REC 59
<b>FOREST FIRE EXPERIMENT STATION</b> P.O. BOX 68 ROSCOMMON, MICHIGAN 48653			DWG NO. <b>90-5910B</b>
TITLE: HOSE EXPANSION RING REMOVER ASSEMBLY		SCALE: HALF	DATE: 29 JUL 96



**8 COLLET END BUSHING**

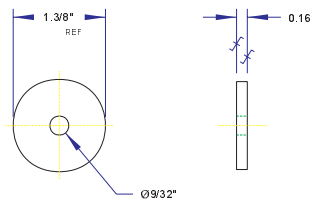
MAT'L: BAR, ROUND 1.1/2" DIA CD  
UNS G10180  
1 - REQUIRED/EA ASSEMBLY  
EST WT: 0.11 LBS



**5 QUARTER TURN ADAPTER**

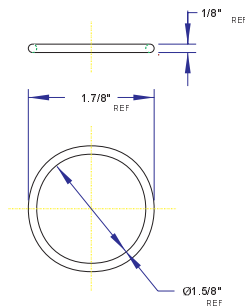
1 - REQUIRED/EA ASSEMBLY  
SIZE: 1.1/2" NPSH FEMALE  
MAT'L: ALUMINUM ALLOY  
EST WT: 0.16 LBS

**PURCHASE INFORMATION:**  
WILDLAND-PACIFIC FIRE EQUIPMENT  
PO BOX 88540  
SEATTLE, WASHINGTON 98138  
PART NUMBER: 8-QTF15S



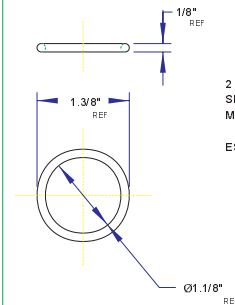
**10 SPRING RETAINER WASHER**

MAT'L: BAR, ROUND 1.3/8" DIA CD  
UNS G10180  
1 - REQUIRED/EA ASSEMBLY  
EST WT: 0.06 LBS



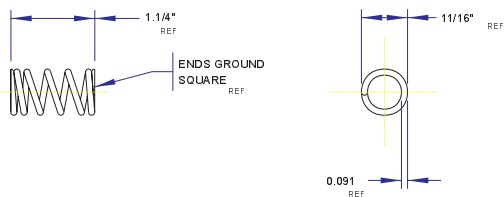
**4 "O"-RING**

1 - REQUIRED/EA ASSEMBLY  
SIZE: 1/8" X 1.5/8" ID X 1.7/8" OD  
MAT'L: BUNA-N ELASTOMER  
(NITRILE)  
EST WT: 0.01 LBS



**7 "O"-RING**

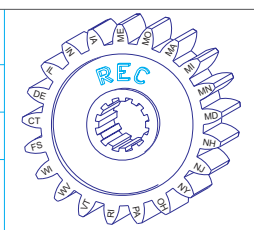
2 - REQUIRED/EA ASSEMBLY  
SIZE: 1/8" X 1.1/8" ID X 1.3/8" OD  
MAT'L: BUNA-N ELASTOMER  
(NITRILE)  
EST WT: 0.01 LBS



**9 UTILITY COMPRESSION SPRING**

1 - REQUIRED/EA ASSEMBLY  
SPRING RATE: 103 LBS/IN  
MAT'L: ZINC PLATED  
HIGH CARBON STEEL  
EST WT: 0.03 LBS

STD. TOLERANCES									DRAWN: BAH
FRACTIONAL: 0 TO 6 IN +-.1/32 6 IN AND UP +-.1/16									CHECKED: BAH
DECIMAL: 1 PLACE +-.01 2 PLACE +-.001 3 PLACE +-.0005	ANGULAR: +-.1 DEG								APPROVED:



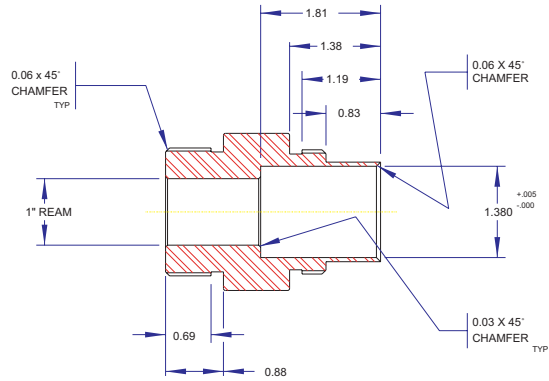
**FOREST FIRE EXPERIMENT STATION**  
P.O. BOX 68 ROSCOMMON, MICHIGAN 48653

PROJECT NO.: **REC 59**

TITLE: **HOSE EXPANSION RING REMOVER DETAILS**

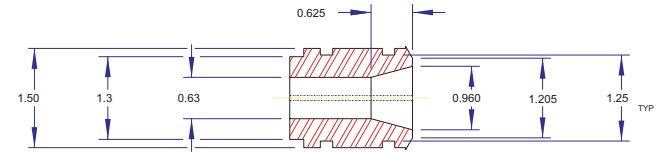
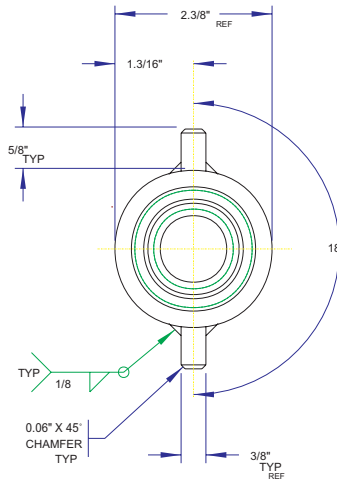
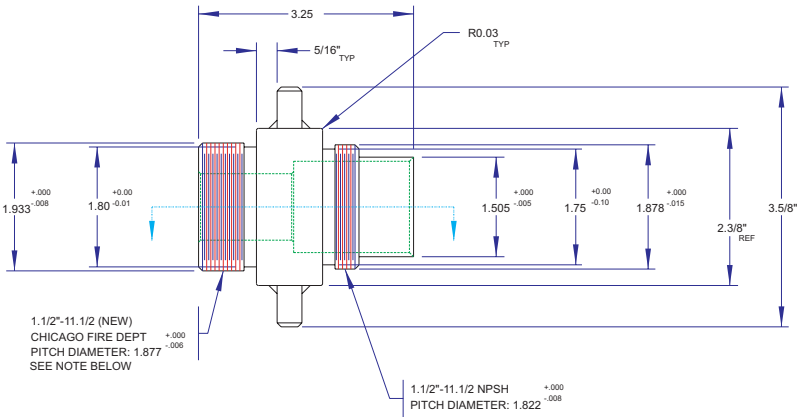
SCALE: **HALF**

DATE: **30 JUL 96**  
DWG NO: **90-5911B**

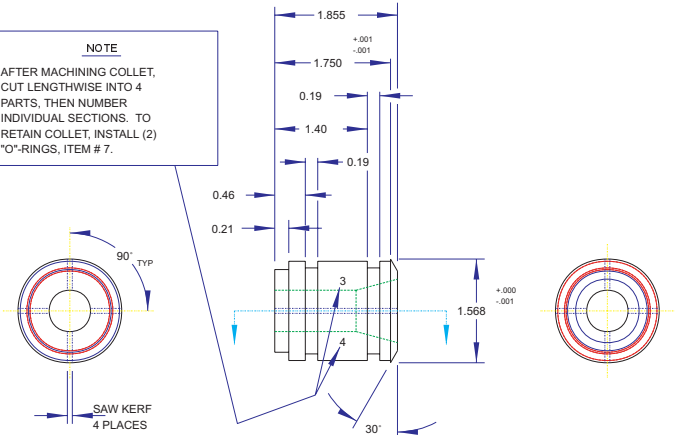


### 2 ADAPTER SLEEVE

MAT'L: BAR, ROUND 3/8" DIA CD  
UNS G10180  
BAR, ROUND 2.3/8" DIA CD  
UNS G10180  
1 - REQUIRED/EA ASSEMBLY  
EST WT: 1.63 LBS



NOTE  
AFTER MACHINING COLLET,  
CUT LENGTHWISE INTO 4  
PARTS, THEN NUMBER  
INDIVIDUAL SECTIONS. TO  
RETAIN COLLET, INSTALL (2)  
"O"-RINGS, ITEM # 7.



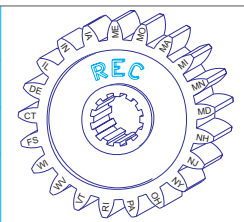
### 6 COLLET

MAT'L: BAR, ROUND 1.3/4" DIA CD  
UNS G10180  
1 - REQUIRED/EA ASSEMBLY  
EST WT: 0.56 LBS

NOTE:  
THIS PART MATES WITH THE HOSE COUPLING EXPANDER MACHINE.  
CHECK THE THREAD ON THE EXPANDER & MACHINE TO MATCH.

STD. TOLERANCES		NO.	BY	DATE	REVISION				
FRACTIONAL:									
0 TO 6 IN + - 1/32									
6 IN AND UP + - 1/16									
DECIMAL:	ANGULAR:								
1 PLACE + - 0.1	+ - 1 DEG								
2 PLACE + - 0.01									
3 PLACE + - 0.005									

DRAWN:  
BAH  
CHECKED:  
BAH  
APPROVED:



# FOREST FIRE EXPERIMENT STATION

P.O. BOX 68 ROSCOMMON, MICHIGAN 48653

PROJECT NO.: REC 59

TITLE: HOSE EXPANSION RING REMOVER DETAILS

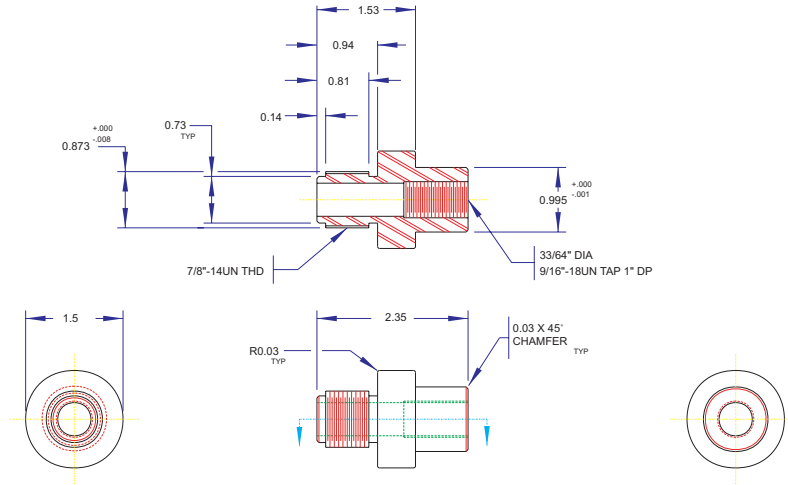
SCALE:  
HALF

DATE:  
30 JUL 96

DWG. NO. 90-5912B

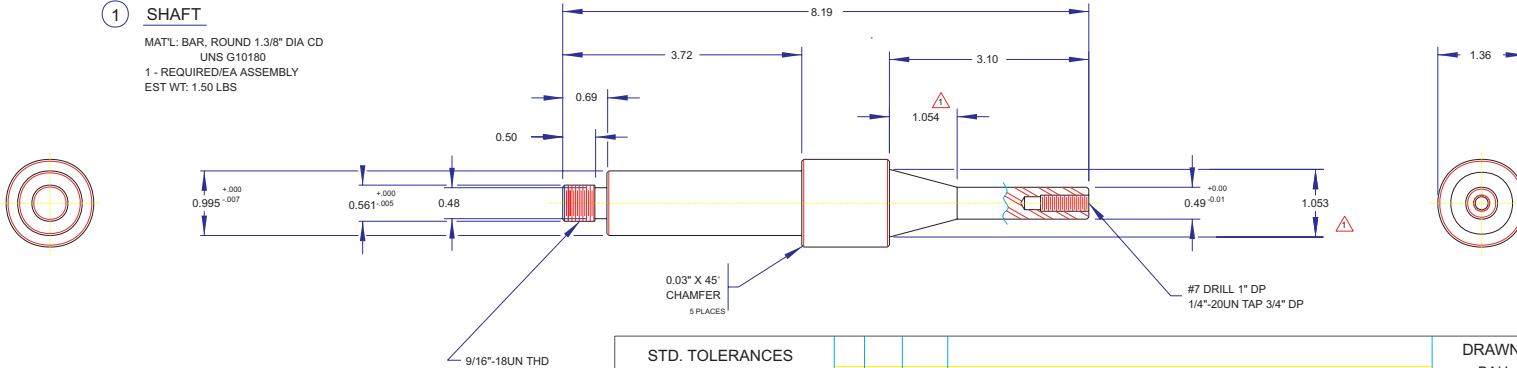
**3** THREAD ADAPTER

MATL: BAR, ROUND 1.1/2" DIA CD  
 UNS G10180  
 1 - REQUIRED/EA ASSEMBLY  
 EST WT: 0.48 LBS



**1** SHAFT

MATL: BAR, ROUND 1.3/8" DIA CD  
 UNS G10180  
 1 - REQUIRED/EA ASSEMBLY  
 EST WT: 1.50 LBS



STD. TOLERANCES						DRAWN: BAH	
FRACTIONAL: 0 TO 6 IN +- 1/32 6 IN AND UP +- 1/16						CHECKED:	
DECIMAL: 1 PLACE +- 0.1 2 PLACE +- 0.01 3 PLACE +- 0.005		ANGULAR: +/- 1 DEG		1 BH 6/96 WAS 0.960" & 0.873"		APPROVED:	
		NO.	BY	DATE	REVISION		

## FOREST FIRE EXPERIMENT STATION

P.O. BOX 68 ROSCOMMON, MICHIGAN 48653

TITLE: HOSE EXPANSION RING REMOVER DETAILS

SCALE:  
HALF

DATE:  
30 JUL 96

PROJECT NO.: REC 59

DWG NO. 90-5913B

