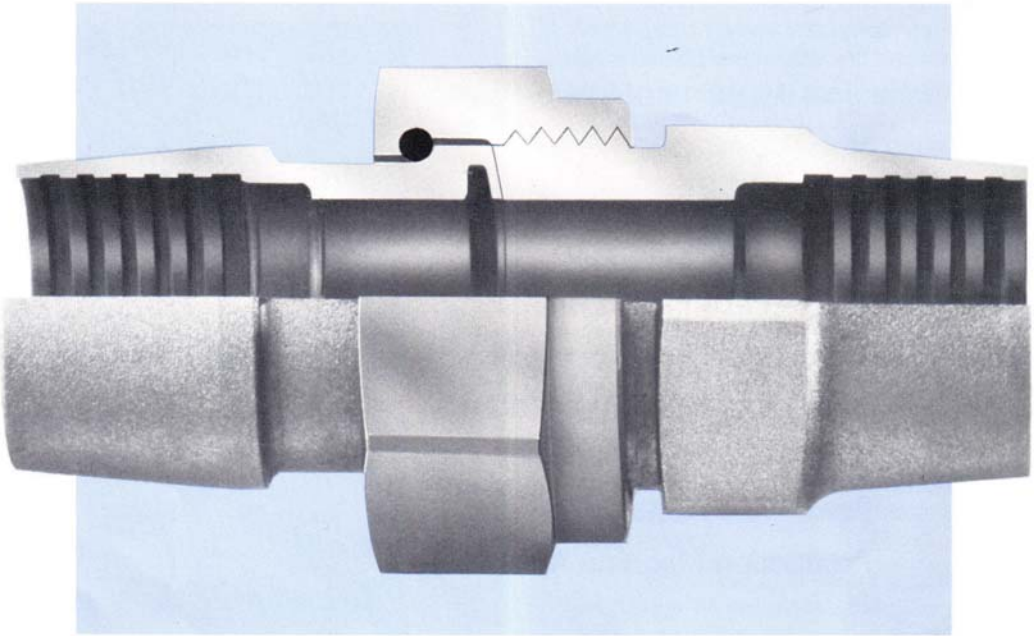
DYNATUBE® FITTING

INSTALLATION INSTRUCTIONS



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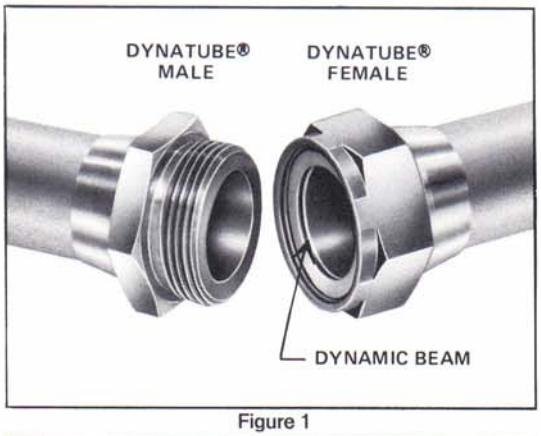


Figure 1

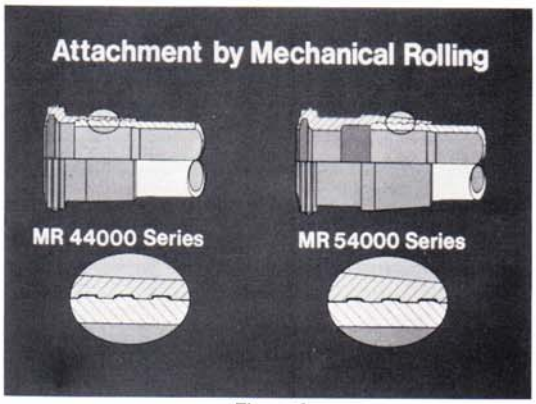


Figure 2

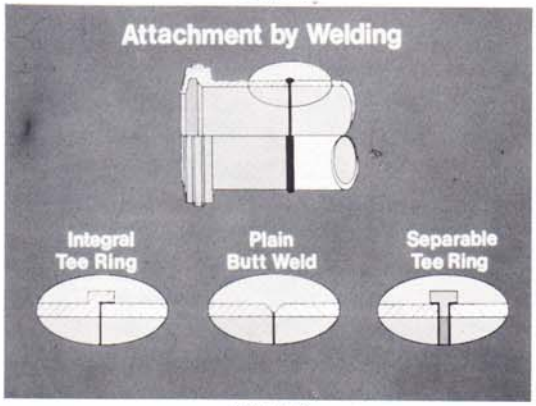


Figure 3

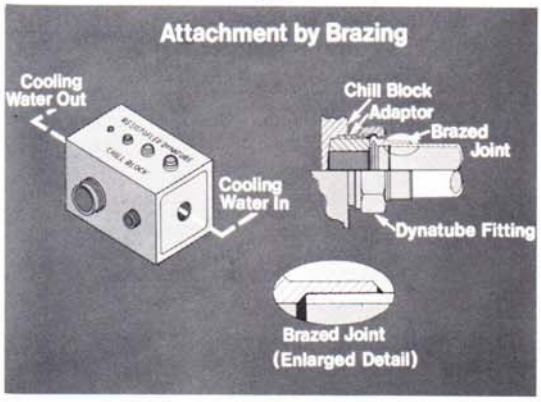


Figure 4

A - GENERAL DESCRIPTION

This manual provides installation instructions for mechanically attaching DYNATUBE® fittings. The fittings are divided into two general categories — male and female — and form a metal to metal seal when coupled. The female fitting incorporates a convex dynamic lip sealing surface and a nut. The lip deflects when torqued to a male fitting and returns to its original position when loosened. The male fitting incorporates external threads and a concave sealing surface.

B - METHODS OF ATTACHMENT

DYNATUBE® fitting designs are available for attachment to rigid tubing by welding, brazing or mechanical means. Parker does not normally provide procedures for brazing or welding since most companies establish their own requirements; regardless of the procedure used, precautions must be taken to prevent high temperatures in the area of the beam sealing surface. Chill blocks should be used to protect this area during brazing and are available from Parker.

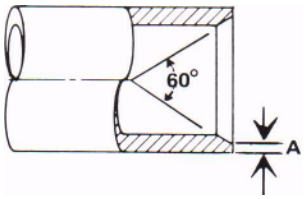
Welding can be accomplished manually or mechanically, and brazing by torch or induction. Socket and butt designs are available for brazing and welding applications.

The mechanical attachment procedure employs the technique of expanding the tube by internal swage into specially machined grooves of the fitting. To perform this operation, a tube expander with rollers acting on a tapered, self feeding mandrel is used. Tubing and fittings are positioned and restrained with special holding fixtures.

C - PACKAGING OF FITTINGS

DYNATUBE® components are assembled, if required, before packaging and individually protected by capping all threaded openings with high density polyethylene closures. Components are then placed on a cardboard flat and skin packaged with a heat bonded, thin polyethylene film. Each component is thus encased to prevent damage in transit or handling. Prior to installation, insure that no skin packaging material remains in or on the fitting.

Mechanical Attachment Instructions



Tube Wall	"A"
.016 - .022	.005
.023 - .040	.015
.041 - .050	.020
.051 - .060	.040
.061 - .Thicker	.050

Figure 5

HAND ASSEMBLY

TUBE PREPARATION

Cut, deburr, and chamfer tube ends as shown in Fig. 5. Clean and degrease tube ends prior to swaging.

TOOL SELECTION

Expanders, die sets and collars are identified by part number and size in Table I.

EXPANDER LUBRICATION

The expander mandrel and rollers must be lubricated before use and after each swage. When expanding stainless steel, titanium or aluminum tubing, use Titanlube 1129* lubricant available from Parker as Part Number R24837-8-3. In oxygen or other systems where lubricant compatibility is a factor, the recommended lubricant is Krytox®** 240, available from Parker as Part Number R24837-8-2.

TOOLING COMPONENTS

	FOR STAINLESS STEEL FITTINGS MR44XXX SERIES	FOR TITANIUM FITTINGS MR54XXX SERIES
EXPANDER	R5166XX - XXXXXX PROGRAM TUBE MATERIAL (D - ALUMINUM, BLANK - STAINLESS STEEL) TUBE WALL THICKNESS IN THOUSANDTHS TUBE O. D. IN SIXTEENTHS EXAMPLE R5166L - 04016 LOCKHEED LIOII NO LETTER INDICATES STAINLESS STEEL TUBING .016 TUBE WALL 1/4" TUBE O. D.	R5170XX - XXXXXX PROGRAM TUBE MATERIAL (S - STAINLESS STEEL, D - ALUMINUM, BLANK - TITANIUM) TUBE WALL THICKNESS IN THOUSANDTHS TUBE O. D. IN SIXTEENTHS EXAMPLE R5170GD - 10035D GENERAL DYNAMICS F-16 ALUMINUM TUBING .035 TUBE WALL 5/8" TUBE O. D.
DIE SET	RF24820 - 2 - XX — FOR STANDARD FEMALE FITTINGS — TUBE O. D. IN SIXTEENTHS RF24890 - 2 - XX XX — FOR REDUCER FEMALE FITTINGS — TUBE O. D. IN SIXTEENTHS; SEAL FACE SIZE IN SIXTEENTHS RM24837 - 2 - XX — FOR MALE FITTINGS — TUBE O. D. IN SIXTEENTHS RM24890 - 2 - XX XX — FOR REDUCER MALE FITTINGS — TUBE O. D. IN SIXTEENTHS; SEAL FACE SIZE IN SIXTEENTHS	RF26826 - 2 - XX — FOR STANDARD FEMALE FITTINGS AND REDUCER FEMALE FITTINGS (Up to 2 sizes) — TUBE O. D. IN SIXTEENTHS RM26826 - 2 - XX — FOR ALL MALE FITTINGS — TUBE O. D. IN SIXTEENTHS RF26837 - 2 - XX — FOR ALL FEMALE FITTINGS AND ALL REDUCERS — TUBE O. D. IN SIXTEENTHS
COLLAR	R24837 - 1 - 06 — FOR TUBE SIZES — 3/16" - 3/8" R24837 - 1 - 12 — FOR TUBE SIZES — 1/2" - 3/4" R24837 - 1 - 16 — FOR TUBE SIZES — 1" R24837 - 1 - 20 — FOR TUBE SIZES — 1-1/4" R24837 - 1 - 24 — FOR TUBE SIZES — 1-1/2"	R24837 - 1 - 06 — FOR TUBE SIZES — 3/16" - 3/8" R24837 - 1 - 12 — FOR TUBE SIZES — 1/2" - 3/4" R26826 - 1 - 16 — FOR TUBE SIZES — 7/8" - 1" R26826 - 1 - 20 — FOR TUBE SIZES — 1-1/4" R26826 - 1 - 24 — FOR TUBE SIZES — 1-1/2"

Table I

SWAGING PROCEDURE

1. Select the appropriate DYNATUBE® fitting to be installed.
2. Check that the tubing has been properly prepared and inserts cleanly into the fitting socket to the positive stop. Tube insertion depths are shown in Table II.
3. Select the expander appropriate to the tubing material and wall thickness. Lubricate the rollers and mandrel, and insert the expander cage into the fitting bore as shown in Fugure 6. The mandrel should be in the full pull-back position to allow the rollers to enter the fitting. The expander identification band indicates the tubing for which the expander is set.
4. Place the combined expander-fitting-tube into the correct die set half. The fitting must be positioned in its nest and the expander lip must engage the groove in the die set. See Figure 7.
5. Lightly push the mandrel in and turn clockwise several revolutions. All parts will be held in position.
6. Place second half of die set over first half.
7. Slip correct collar over die sets from expander end. Larger diameter of tapered collar bore goes first. Position thumb screw(s) approximately 15°-45° from die set parting line and finger tighten thumb screw(s) into 'V' groove of die sets.
8. Place assembled tooling in vise using the parallel flats of the collar as a gripping surface. (optional)
9. Turn mandrel clockwise with a wrench; mandrel will self feed at the proper rate — *do not force mandrel into expander.*
10. Continue turning mandrel until drive end contacts stop collar and causes it to rotate, for at least 10 revolutions.
11. Turn mandrel counter-clockwise until it backs out of the expander sufficiently to disengage the rollers and be withdrawn to the full pull-back position.
12. Loosen thumb screw(s) and remove collar.
13. Open die halves and remove expander and tube assembly.

* Manufactured by Penreco Inc., Cleveland, Ohio.
®** Registered Trademark of E. I. Dupont, Inc.

TUBE INSERTION DEPTHS

Size	Fittings of MR44XXX Series	Fittings of MR54XXX Series
– 03	.325	.325
– 04	.355	.355
– 05	.355	.355
– 06	.355	.355
– 08	.430	.430
– 10	.430	.505
– 12	.430	.505
– 16	.505	.585
– 20	.505	.660
– 24	.505	.735

Table II

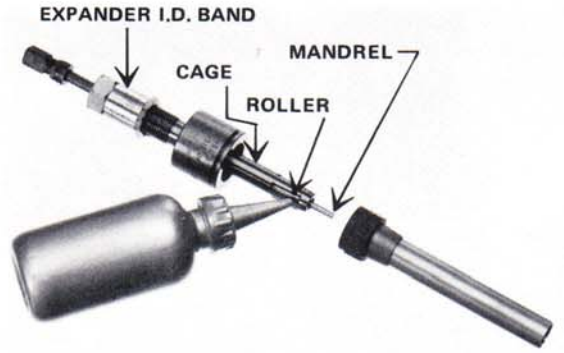


Figure 6

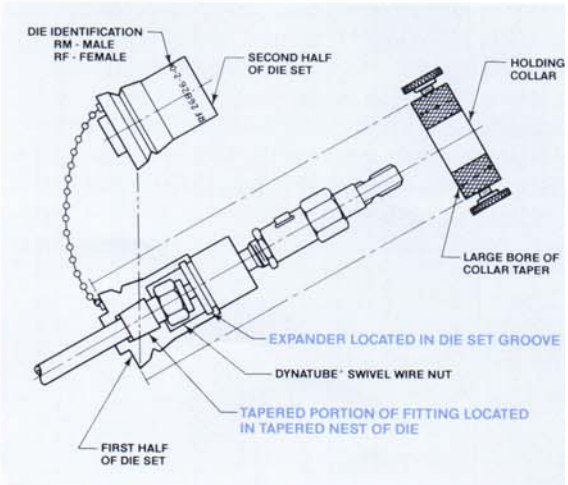


Figure 7

INSPECTION PROCEDURE

The tube within the fitting socket has been expanded and the inside diameter enlarged. If the expansion has been made correctly, the inside diameter measurement will agree with the value shown on the expander identification band. To inspect a completed swage it is necessary to measure the inside diameter of the expanded tube and compare it with the correct values. To allow for tolerances in the tube and fitting dimensions, the finished swage I. D. is permitted to vary by ±.002″. When swaging 21-6-9 stainless steel tubing, the allowable variation is ±.003″.

For measuring the finished swage I. D., Resistoflex provides dial reading intertest gauges. See Figure 8. After positioning the gauge, gently rock the instrument back and forth until the lowest consistent reading appears on the dial. This reading is the diameter of the particular expansion. See Figure 9.

Measurements should be made at each end of the swaged area to inspect for taper, which should not exceed .002″.

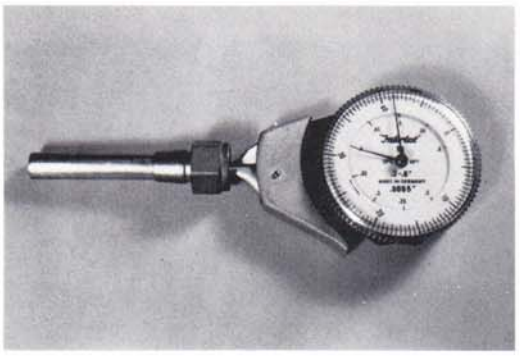


Figure 8

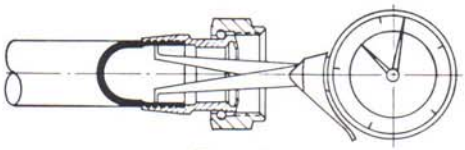


Figure 9

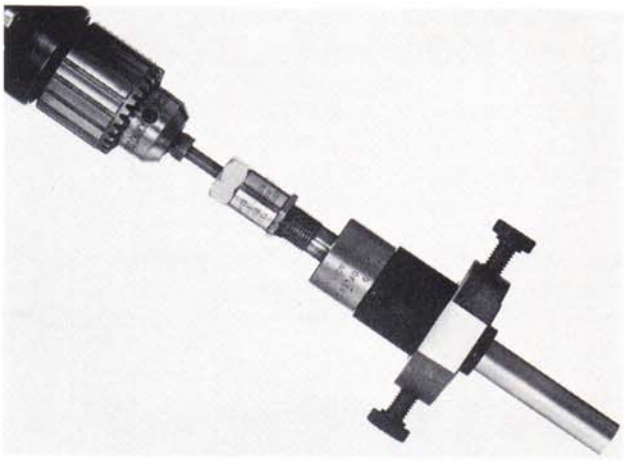
TUBE ASSEMBLY INSTALLATION

Prior to installing the completed tube assembly, the residue of lubricant used to expand the tubing into the fitting must be removed, using a cleaner such as Stoddard Solvent or equal. Pressure test requirements are determined by the using facility. When installing the tube assembly, use the torque chart shown in Table III.

Fitting Size	INSTALLATION TORQUE					
	Minimum		Nominal		Maximum	
	Ft-Lbs	In-Lbs	Ft-Lbs	In-Lbs	Ft-Lbs	In-Lbs
03	5	60	7	84	9	108
04	10	120	12	144	14	168
05	10	120	13	156	16	192
06	15	180	20	240	25	300
08	30	360	35	420	40	480
10	41	492	48	576	55	660
12	50	600	60	720	70	840
14	60	720	72	864	85	1020
16	70	840	82	984	94	1128
20	90	1080	105	1260	120	1440
21	108	1296	124	1488	140	1680
24	110	1320	130	1560	150	1800
25	125	1500	145	1740	165	1980

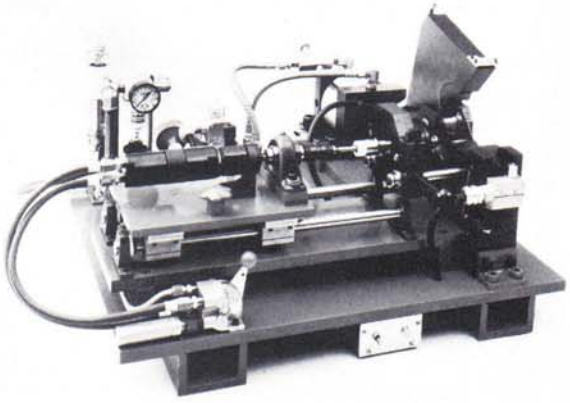
Table III

Self Aligning Fitting



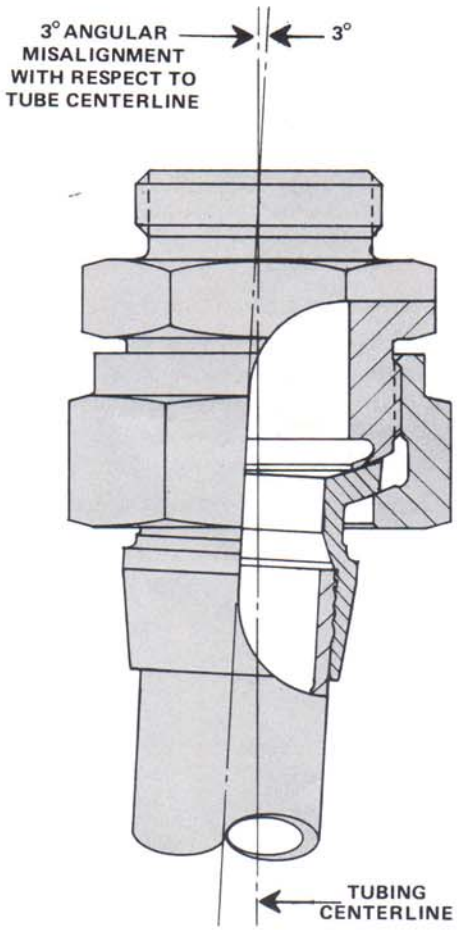
POWER ASSEMBLY

To increase the rate of attachment of DYNATUBE® fittings, a hand electric drill or pneumatic tool may be used to drive the expander. Rotational speed should not exceed 450 RPM while swaging, and reverse direction control is necessary to loosen and withdraw the mandrel. Square drive adapters are required to fit expander mandrel drives. —
1/4″ drive for expander sizes 1/4″ - 3/8″
3/8″ drive for expander sizes 1/2″ - 1-1/2″



PRODUCTION MACHINE ASSEMBLY

Mechanical attachment of DYNATUBE® fittings may also be accomplished by the use of a semi-automatic, heavy duty power operated machine. Details and operation of this machine are described in Bulletin DY10.



Also available for attachment to rigid tubing by welding, brazing, or mechanical means is the Parker self- aligning fitting, which permits up to 3º angular misalignment without affecting sealing integrity. Details are available in Bulletin SAF-1.

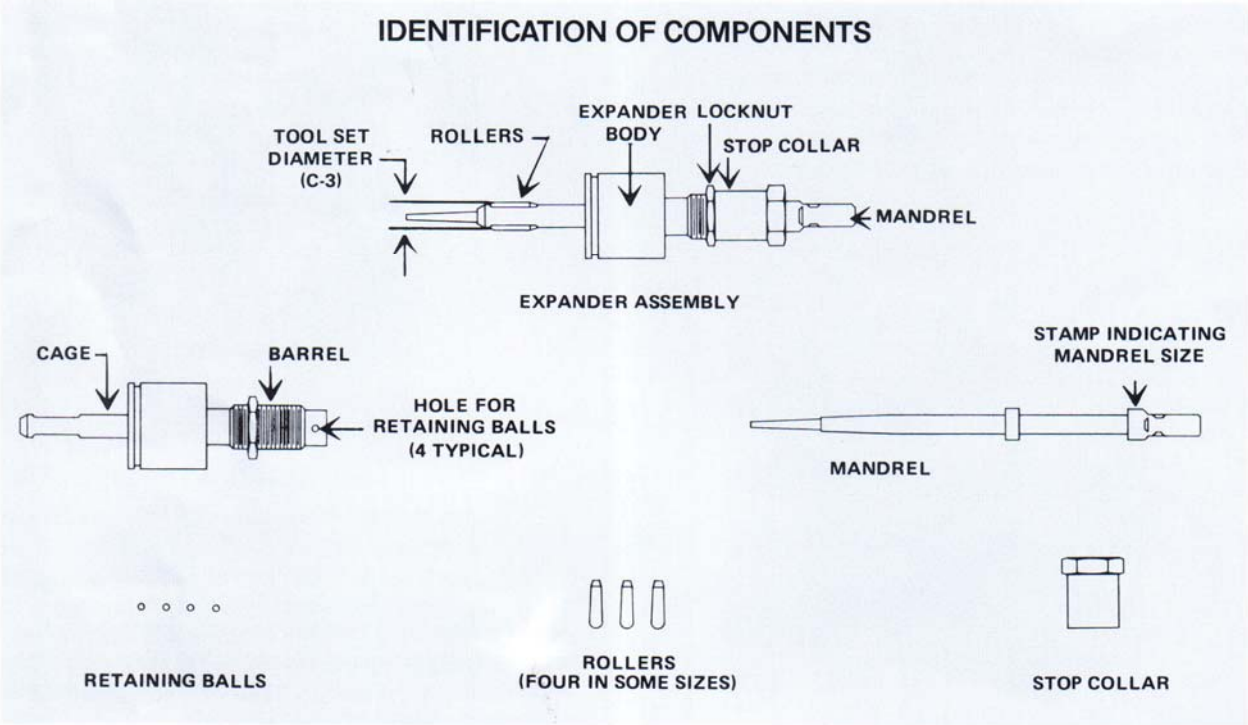
Recommendations To Prolong Expander Service Life

For optimum service life, expanders must be cleaned and lubricated on a regular basis. A high quality, extreme pressure lubricant should be applied to the rollers and mandrel prior to each swage. At the end of each day's use and after every 6-10 swages, the expander should be cleaned and checked. Cleaning is best accomplished by immersing the rollers and lower cage area in an ultrasonic tank containing Stoddard Solvent or equal. The expander body must not be immersed in cleaning fluid, since it contains lubricated bearings and spacers. After cleaning and with the mandrel in the full forward position, dry the rollers and lower cage area with a jet of compressed air.

For more efficient production, two or more expanders should be used. After completing 6-10 swages on the first expander, place in an ultrasonic cleaning tank, and continue production with another, previously cleaned expander. Alternate use every 6-10 swages. By locating a bench model ultrasonic cleaning unit near the work station, expanders may be conveniently alternated.

After cleaning the expander, visually examine the rollers and mandrel for signs of pitting or spalling. When wear is observed, the tool should be set aside for repair. The nature of pitting wear is such that, once started, damage accumulates at an accelerated pace. Sometimes a bluish-brown heat stain will be seen on the mandrel. This is not detrimental nor is it cause for removing a tool from service.

For expander service procedure refer to bulletin DY-6A.



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