TO: ALL HOLDERS OF NOSE GEAR SPRING CARTRIDGE ASSEMBLY OVERHAUL MANUAL, 32-22-31

REVISION NO. 3, DATED MAR 1/00

HIGHLIGHTS

DESCRIPTION OF CHANGE	TOPICS AFFECTED												
	D & O	D / Assy	Cleaning	Insp / Chk	Repair	Assy	F / C	Test	T / Shooting	S / Tools	Storage	IPL	L / Overhaul
Added repair figures and more refinish details					X								
Added clarifications and updated callouts. Deleted procedures which can be done by standard industry practices	X	X	X	X	X	X	X	X	X	X	X	X	
NOTE: Remove and discard all pages of OHM 32-22-31 that are dated before this revision. This revision makes them obsolete.													

NOSE GEAR SPRING CARTRIDGE ASSEMBLY

32-22-31

BOEING P/N 65-54220-1, -2, -3

AIRLINE P/N

THE FOLLOWING DIRECTIVES APPLY TO THIS SUBJECT:

BOEING SERVICE BULLETIN	BOEING TEMPORARY REVISION	OTHER DIRECTIVES	DATE DIRECTIVE INCORPORATED INTO TEXT
32-1055		PRR 32000	Sep 10/71

LIST OF EFFECTIVE PAGES

* Indicates pages revised, added or deleted in latest revision

F Indicates foldout pages - print one side only

	PAGE	DATE	PAGE	DATE	PAGE	DATE
32-22-31						
*	T-1	Mar 1/00				
	T-2	BLANK				
*	LEP-1	Mar 1/00				
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*	T/C-1	Mar 1/00				
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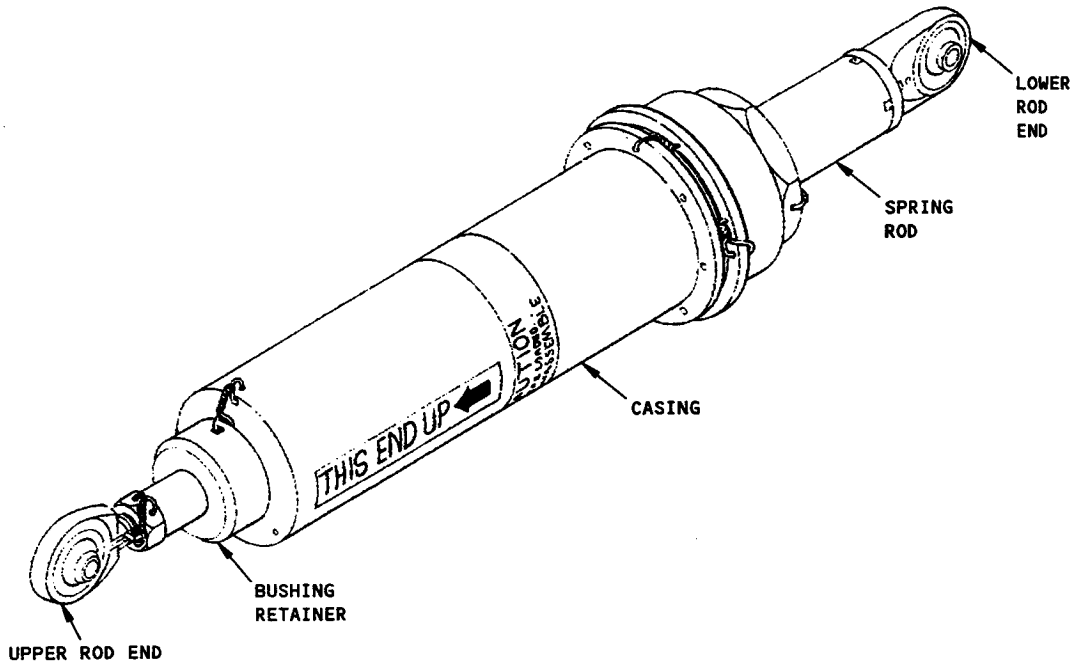
NOSE GEAR SPRING CARTRIDGE ASSEMBLY



Nose Gear Spring Cartridge Assembly
Figure 1

1. DESCRIPTION AND OPERATION

A. Description

(1) The nose gear spring cartridge assembly has rod ends and a casing with a compressed spring between the heads of a spring shaft and a spring retainer. The upper rod end is in a ball bearing and can freely turn around its axis.

B. Operation

(1) In the neutral position, the compressed spring keeps the spring shaft and the spring retainer down against the ends of the casing. The spring rod is attached between the spring shaft and the spring retainer.

(2) A force that moves the spring rod in or out will compress the spring inside the housing. When the force on the spring rod is relaxed, the rod will return into its neutral position.

C. Leading Particulars (approximate)

Length	-- 15 inches
Diameter	-- 2.5 inches
Weight	-- 5 pounds

2. DISASSEMBLY (Fig. 8)

A. Remove all lockwire.

B. Bend up the tab of lockwasher (2). Unscrew rod end assembly (1). Remove the lockwasher.

C. Unscrew nut (5) and retainer (3). Remove scraper (4).

WARNING: THE INSTALLED SPRING (20) IS COMPRESSED APPROXIMATELY 90 POUNDS.

D. Pull spring rod (18) with attached parts out of spring casing (24). Hold the heads of parts (19, 21) in a vise. Compress spring (20) until washer (17) and nut (16) are free.

E. Remove cotter pin (15). Unscrew nut (16). Remove washer (17). Carefully release the compression in the spring. Remove parts (18 thru 21).

F. Unscrew retainer (10). Pull out rod end assembly (11) with attached parts. Disassemble parts (6 thru 14).

3. CLEANING (Fig. 8)

A. Clean all parts but bearing (8) by standard industry practices and the instructions in SOPM 20-30-03.

B. Clean bearing (8) by the instructions for teflon lined bearings in SOPM 20-30-01.

4. INSPECTION/CHECK (Fig. 8)

A. Examine all parts by standard industry practices.

B. Magnetic particle examine spring (20) and casing (24) per SOPM 20-20-01.

C. Spring (20) check.

(1) Compress the spring to 7.13 inches length. The load must be 81-99 pounds.

(2) Compress the spring to 4.48 inches length. The load must be 162-198 pounds.

5. REPAIR (Fig. 8)

A. Materials

NOTE: Equivalent substitutes can be used.

(1) Primer -- BMS 10-11, Type 1 (SOPM 20-60-02)

(2) Enamel -- BMS 10-11, Type 2 (SOPM 20-60-02)

B. Repair small defects by standard industry practices.

C. Refinish

NOTE: Refer to SOPM 20-30-02 for stripping of protective finishes. Refer to SOPM 20-41-01 for explanation of F and SRF finish codes.

(1) Retainer (3) -- No finish. Material: 17-4PH CRES, 150-170 ksi.

(2) Nut (5) -- Passivate (F-17.25, which replaces F-17.09). Apply BMS 10-11, Type 1 primer (F-20.02) and BMS 10-11, Type 2 enamel (SRF-12.63) to outside surfaces. Material: 17-4PH CRES, 150-170 ksi.

(3) Retainer (10) -- No finish. Material: Al-Ni-bronze.

(4) Fitting (14) -- Fig. 2.

(5) Washer (17) -- No finish. Material: 303 CRES Condition H, or 17-4PH CRES, 150-170 ksi.

(6) Rod (18) -- Fig. 3.

(7) Shaft (19) -- Fig. 4.

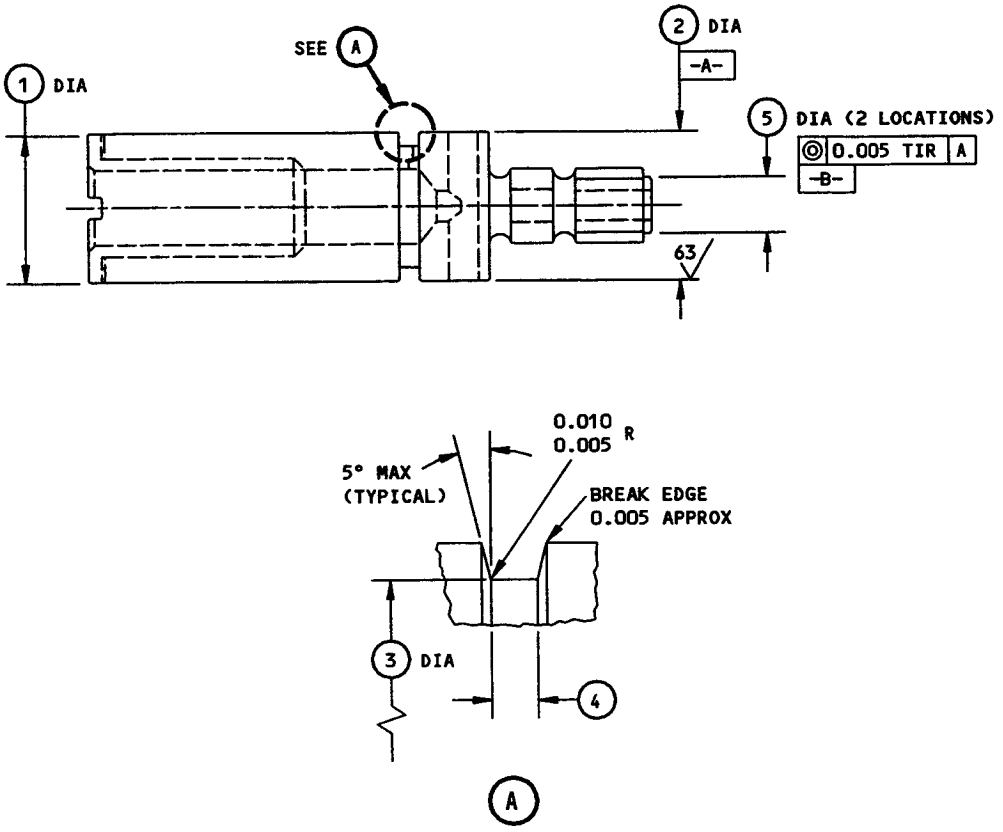
(8) Spring (20) -- Cadmium plate and apply BMS 10-11, Type 1 primer (F-16.03). Material: QQ-W-412 Composition 2, Type 1 spring steel wire.

(9) Retainer (21) -- Fig. 5.

(10) Casing (24) -- Fig. 6.

D. Replacement

(1) Replace lockwasher (2), scraper (4), cotter pin (15) and O-ring (25) at each overhaul.



	1	2	3	4	5
DESIGN DIM	0.624 0.590	0.624 0.623	0.507 0.502	0.085 0.080	0.25 0.24
REPAIR LIMIT	—	—	—	—	—

REFINISH

NO FINISH

REPAIR

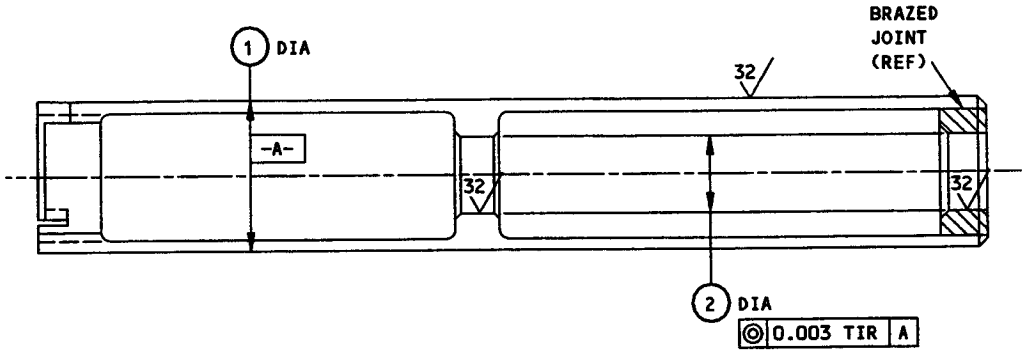
125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

MATERIAL: 17-4PH CRES, 150-170 KSI

ALL DIMENSIONS ARE IN INCHES

FITTING (14)

Rod End Fitting Repair and Refinish
Figure 2



	1	2
DESIGN DIM	0.998 0.996	0.508 0.506
REPAIR LIMIT	—	—

REFINISH

CHROME PLATE (F-1.90, WHICH REPLACES F-1.842) DIA -A-, 0.002-0.004 THICK. PASSIVATE (F-8.07) OTHER SURFACES.

REPAIR (SAME AS REFINISH)

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

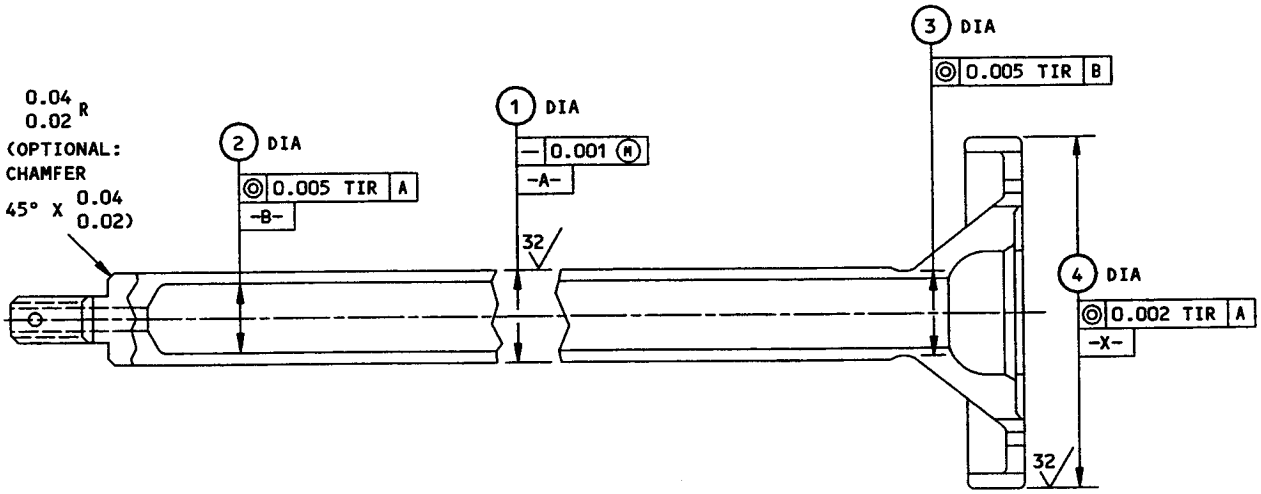
MATERIAL: 17-4PH CRES, 150-170 KSI

DIMENSIONS APPLY AFTER PLATING

ALL DIMENSIONS ARE IN INCHES

ROD (18)

Rod Repair and Refinish
Figure 3



	1	2	3	4
DESIGN DIM	0.502 0.500	0.379 0.375	0.485 0.475	1.930 1.920
REPAIR LIMIT	—	—	—	—

REFINISH

CHROME PLATE (F-15.03) DIAS -A-, -X-, 0.002-0.004 THICK. PASSIVATE (F-17.25, WHICH REPLACES 5-17.09) OTHER SURFACES.

REPAIR (SAME AS REFINISH)

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

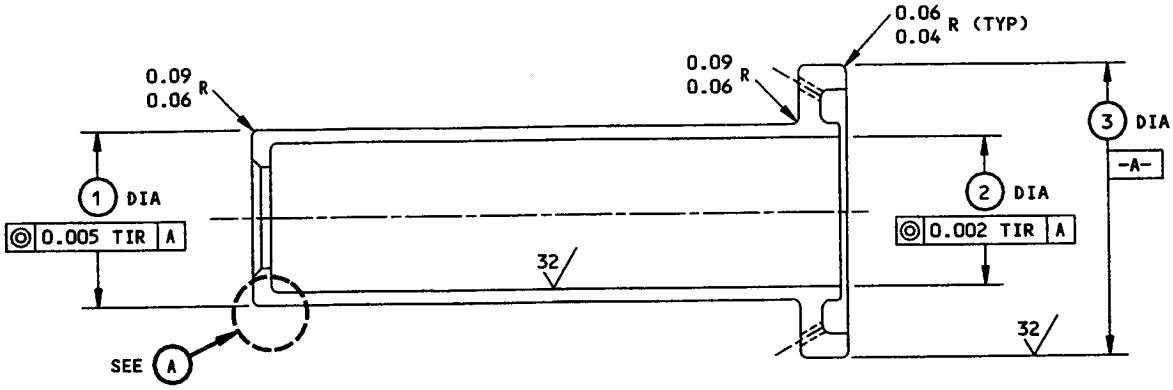
MATERIAL: 17-4PH CRES, 150-170 KSI

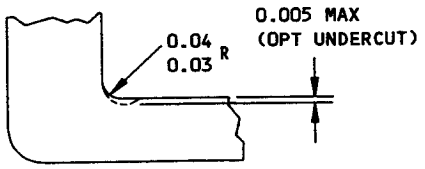
DIMENSIONS APPLY AFTER PLATING

ALL DIMENSIONS ARE IN INCHES

SHAFT (19)

Shaft Repair and Refinish
Figure 4





A

	1	2	3
DESIGN DIM	1.170 1.160	1.004 1.002	1.930 1.920
REPAIR LIMIT	---	---	---

REFINISH

CHEMICAL TREAT AND APPLY BMS 10-11 TYPE 1 PRIMER (F-18.05). OPTIONAL: NO FINISH (F-4.10)

REPAIR (SAME AS REFINISH)

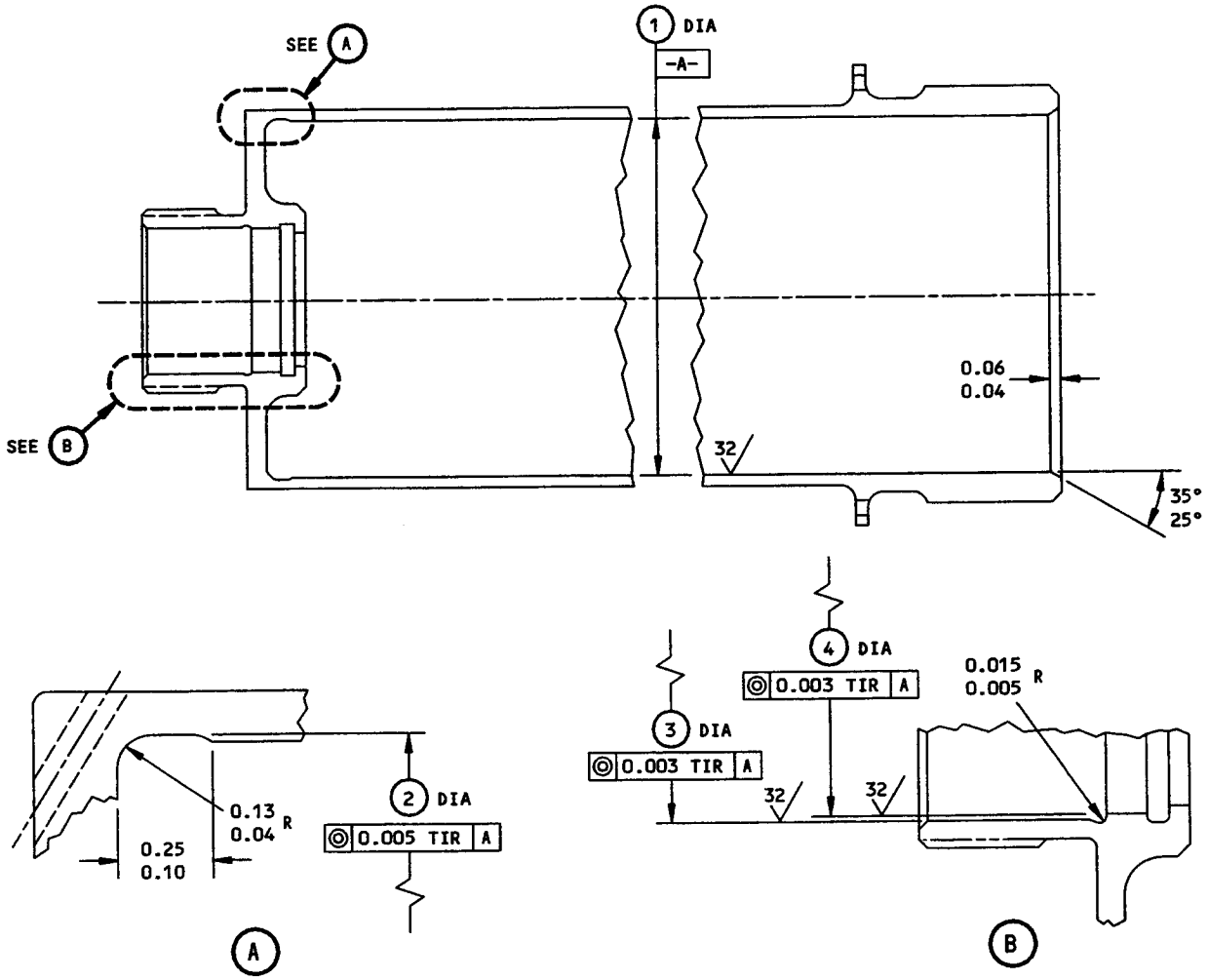
125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

MATERIAL: AL-NI-BRONZE

ALL DIMENSIONS ARE IN INCHES

RETAINER (21)

Retainer Repair and Refinish
Figure 5



	1	2	3	4
DESIGN DIM	1.945 1.939	1.955 1.950	0.815 0.814	0.8129 0.8124
REPAIR LIMIT	—	—	—	—

REFINISH

PASSIVATE (F-17.25, WHICH REPLACES F-17.09). APPLY BMS 10-11 TYPE 1 PRIMER (F-20.02) AND BMS 10-11 TYPE 2 ENAMEL (F-21.02) ON EXTERNAL SURFACES BUT NOT ON THREADS

REPAIR (SAME AS REFINISH)

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

MATERIAL: 17-4PM CRES, 150-170 KSI

ALL DIMENSIONS ARE IN INCHES

CASING (24)

Casing Repair and Refinish
Figure 6

6. ASSEMBLY (Fig. 8)

A. Materials

NOTE: Equivalent substitutes can be used.

(1) Corrosion preventive compound -- MIL-C-16173, Grade 2 (SOPM 20-60-02).

(2) Oil -- MIL-L-7870 (SOPM 20-60-03).

B. Put key (13) in the slot of rod end (11). Apply corrosion preventive compound to the threads of nut (12) and rod end (11). Turn nut (12) onto the shaft of the rod end assembly.

C. Put bearing (8) on rod end fitting (14). Install washer (7) and nut (6). Tighten the nut 70-90 lb-in.

D. Lubricate O-ring (25) and install it in the groove on rod end fitting (14). Install bushing (9) and retainer (10). Apply corrosion preventive compound to the threads of retainer (14) and spring casing (24).

E. Turn rod end assembly (11) into fitting (14). Do not tighten nut (12) at this time.

F. Put bearing (8) and bushing (9) into the bore of casing (24) and push down to the bottom. Tighten the retainer (10) to 20-70 lb-in.

G. Apply a thin layer of oil to the ID of spring casing (24), to the ID and OD of spring retainer (21) and to the lands and OD of spring rod (18).

H. Slide spring rod (18) into the bore of spring retainer (21). Install spring (20) on spring retainer (21). Slide spring shaft (19) into spring rod (18).

I. Put the heads of shaft (19) and retainer (21) in a vise. Compress the spring until the threads of shaft (19) are free. At this point, the spring will be compressed approximately 100 pounds.

J. Install washer (17) and nut (16) on spring shaft (19). Tighten the nut to 20-70 lb-in. Install cotter pin (15). Remove the unit from the vise.

K. Slide spring rod (18) with attached parts into casing (24) down to the bottom.

L. Apply corrosion preventive compound to the threads of retainer (3) and nut (5).

M. Install nut (5) on casing (24). Tighten the nut to 20-70 lb-in.

N. Slide scraper (4) on rod (18). Install retainer (3). Tighten the retainer to 20-70 lb-in.

O. Put lockwasher (2) on spring rod (18) with the tab in the slot of the rod. Apply corrosion preventive compound to mating threads, then turn rod end assembly (1) into rod (18). Tighten to 450-500 lb-in. While you tighten the rod end assembly (1), hold the tab of the lockwasher against the edge of the rod slot in a counterclockwise direction.

P. With an approximately a 0.14-inch square punch, break the flange of lockwasher (2) into the slot on the rod end assembly (1). Use the slot in the rod end farthest from the slot used in spring rod (18). Make sure the break is complete.

Q. If necessary, turn rod end (11) in or out to adjust the distance between centerlines of rod end bearings to 14.10-14.60 inches.

R. Tighten nut (12) to 95-110 pound-inches.

S. Lockwire retainer (3) to nut (5), nut (5) and retainer (10) to casing (24), and nut (12) to key (13). Use the double twist method (SOPM 20-50-02).

7. FITS AND CLEARANCES

Ref IPL		NAME	TORQUE *	
Fig. No.	Item No.		Pound-Inches	Pound-Feet
8	1	ROD END	450-500	
8	3	RETAINER	20-70	
8	5	NUT	20-70	
8	6	NUT	70-90	
8	10	RETAINER	20-70	
8	12	NUT	95-110	
8	16	NUT	20-70	

* Refer to SOPM 20-50-01 for torque values of standard fasteners.

Torque Table
Figure 7

8. TESTING (Fig. 2)

A. Test Equipment

(1) A test fixture that can put a load on spring shaft (19) up to 200 pounds in each direction.

B. Preparation for Test

(1) Install the unit in the test fixture on both rod end bearings.

C. Functional Test

(1) Make a check of the breakout load in each direction with spring shaft (19) in neutral position (14.10-14.60 inches between centerlines of rod end bearing). The load must be 75-105 pounds.

(2) Extend the spring shaft to 16.90-17.10 inches between bearing centerlines. The load must be 165-195 pounds.

(3) Retract the spring shaft to 12.36-12.5 6 inches between bearing centerlines. The load must be 140-170 pounds.

(4) Make sure the cartridge unit extends and retracts freely.

(5) Make sure rod end (11) turns freely by hand.

D. If you cannot get the specified loads, or if the parts do not move freely, disassemble the unit and look for defects or unwanted matter.

9. STORAGE INSTRUCTIONS

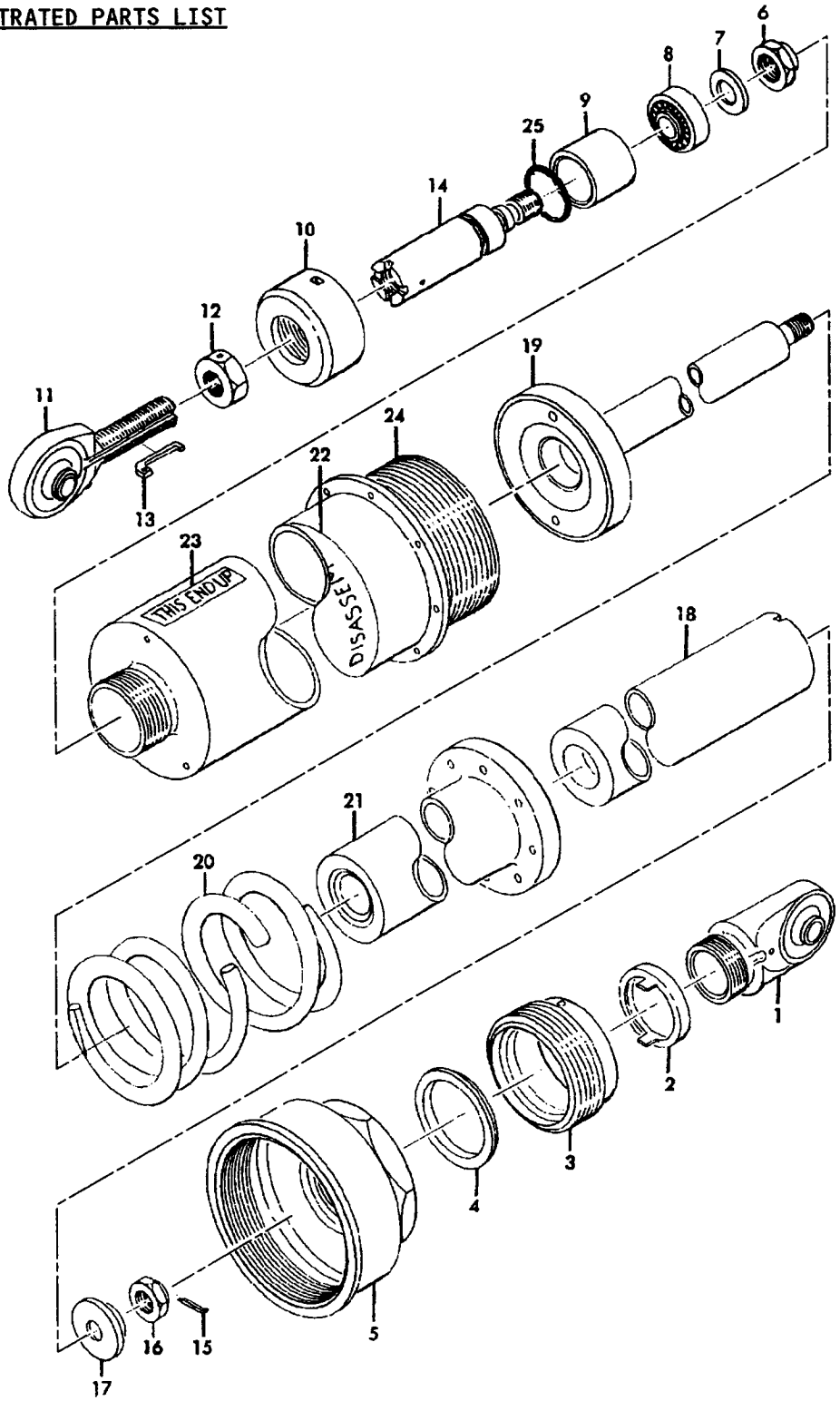
A. Apply BMS 3-33 or MIL-G-23827 grease to lube fittings on rod end bearings.

B. Put the unit away by standard industry practices and the instructions in SOPM 20-44-02 and SOPM 20-70-01.

10. SPECIAL TOOLS, FIXTURES, AND EQUIPMENT

A. Test fixture to apply up to 200 pounds compression and tension loads.

11. ILLUSTRATED PARTS LIST



Nose Gear Spring Cartridge Assembly
Figure 8

FIG. & ITEM NO.	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USE CODE	QTY PER ASSY
8-					
	65-54220-1		CARTRIDGE ASSY, NOSE GEAR SPRING	A	RF
	65-54220-2		CARTRIDGE ASSY, NOSE GEAR SPRING (SB 32-1055)	B	RF
	65-54220-3		CARTRIDGE ASSY, NOSE GEAR SPRING	C	RF
1	MK413-23AFG		. ROD END, V73134		1
2	66-12156-20		. LOCKWASHER		1
3	69-40840-1		. RETAINER		1
4	MS28776M2-9		. SCRAPER		1
5	69-40841-1		. NUT	A	1
5	69-40841-2		. NUT (SB 32-1055)	BC	1
6	NAS679A5		. NUT		1
7	AN960C516		. WASHER		1
8	BACB10BX5		. BEARING (REPLS BACB10A683)		1
9	BACB28Y10B67		. BUSHING		1
10	69-40842-1		. RETAINER, BUSHING		1
11	MK45-23AFG		. ROD END, V73134		1
12	NAS509-6		. NUT		1
13	NAS559-2		. KEY		1
14	69-40843-1		. FITTING, ROD END	A	1
14	69-40843-2		. FITTING, ROD END	B	1
14	69-40843-3		. FITTING, ROD END (SB 32-1055)	C	1
15	MS24665-134		. PIN, COTTER		1
16	AN310C4		. NUT		1
17	69-40903-1		. WASHER		1
18	69-40837-1		. ROD		1
19	69-40835-1		. SHAFT	A	1
19	69-40835-2		. SHAFT (SB 32-1055)	BC	1
20	69-40836-1		. SPRING		1
21	69-40833-1		. RETAINER		1
22	BACM10C37J		. FOIL MARKER		1
23	BACM9L10ACW		. FOIL MARKER		1
24	65-54216-1		. CASING		1
25	NAS1611-014		. O-RING	BC	1

VENDORS

V73134 ROLLER BEARING CO. OF AMERICA, HEIM BEARINGS, DIV., 60 ROUND HILL RD., FAIRFIELD, CONNECTICUT 06430-0430