TO: ALL HOLDERS OF GRAVEL DEFLECTOR ACTUATOR ASSEMBLY OVERHAUL MANUAL, 32-26-18

REVISION NO. 3, DATED NOV 1/04

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 optional body 1087-037												X	
Updated vendor data										X			
Added clarifications and updated callouts	X	X	X	X	X	X	X	X	X	X	X	X	

GRAVEL DEFLECTOR ACTUATOR ASSEMBLY

32-26-18

BOEING P/N 65-44660-4, -5

AIRLINE P/N

THE FOLLOWING DIRECTIVES APPLY TO THIS SUBJECT:

BOEING SERVICE BULLETIN	BOEING TEMPORARY REVISION	OTHER DIRECTIVES	DATE DIRECTIVE INCORPORATED INTO TEXT
		PRR 32290-2	Dec 25/73

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
	32-26-18					
*	T-1	Nov 1/04				
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*	LEP-1	Nov 1/04				
	LEP-2	BLANK				
*	T/C-1	Nov 1/04				
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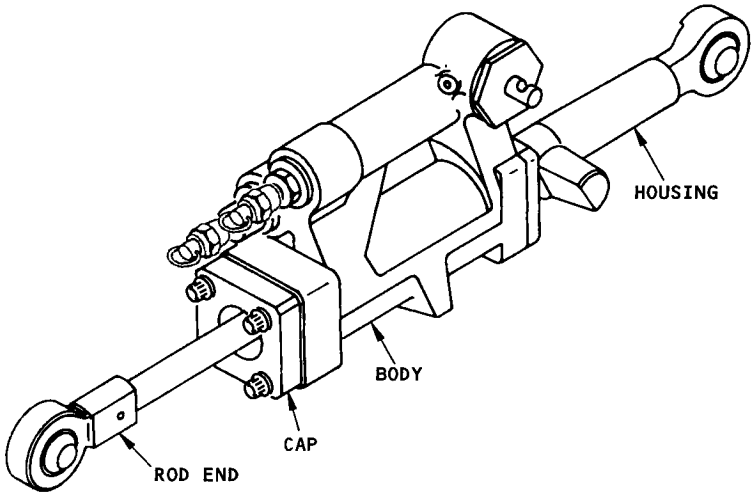
*[1] Special instructions are not necessary. Use standard industry practices.
*[2] Also use the instructions in SOPM 20-30-01 and 20-30-03.
*[3] Also use the instructions in SOPM 20-44-02 and 20-70-01.

GRAVEL DEFLECTOR ACTUATOR ASSEMBLY



Gravel Deflector Actuator Assembly
Figure 1

1. DESCRIPTION AND OPERATION

A. The gravel deflector actuator is a hydraulic actuator with a rod end, housing, seals, scraper, cap, body, and piston. Internal bores contain slide, sleeve, and spool to direct hydraulic fluid for extension or retraction. Bore plugs include hydraulic pressure/return ports.

B. Hydraulic pressure through the inlet ports extends or retracts the piston to keep the gravel deflector parallel with the wing chord during nose gear transit.

C. Leading Particulars (approximate)

Length (between bearing centerlines)
Retracted -- 16.7 inches
Extended -- 21.4 inches
Stroke -- 4.8 inches
Weight -- 10 pounds
Operating pressure -- 3000 psi
Proof pressure -- 5400 psi
Operating fluid -- BMS 3-11 hydraulic fluid

2. DISASSEMBLY

A. Use standard industry practices and these steps.

B. Bearing (3) and shaft (5), and slide and sleeve (49, 51) are matched sets. Be careful and give protection to lapped surfaces. Keep the mating parts together as a matched set.

C. Make a note of the thickness of shims (37, 57) to help during assembly.

D. Do not remove bearings (67, 95) from rod end (65) or housing (93) unless necessary for part replacement. Keep rod end (65) and piston rod (113) together as a matched set.

3. INSPECTION/CHECK

A. Examine all parts for defects by standard industry practices.

B. Penetrant examine (SOPM 20-20-02): plugs (25, 41), stop (61), cap (73), gland (79), housing (93), body (123).

C. Magnetic particle examine (SOPM 20-20-01): rod end (65), piston (113).

4. REPAIR

A. Materials and Equipment

NOTE: Equivalent substitutes can be used.

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

(2) Stake tool -- 1087-506, V60029

B. Repair small defects by standard industry practices. Refer to Fits and Clearances for design dimensions and wear limits.

C. Refinish (Fig. 4)

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) Adapter fitting (25) -- Passivate (F-8.07) all surfaces. Material: AISI 316 or 303 CRES, condition B.

(2) Plugs (25, 41), cap (73), gland (79), housing (93), body (123) -- Anodize (F-17.01) all surfaces. Material: Al alloy.

(3) Spool (31) -- Chromic acid anodize (F-2.26) all surfaces. Material: Al alloy.

(4) Rod end (65) -- Cadmium plate (F-1.1913), but not on bearing surface.

(5) Retainer (77), gland (79) -- Cadmium plate (Fl.1913) outer surfaces.

(6) Bracket (92) -- Chemical treat or chromic acid anodize and apply primer BMS 10-11, Type 1 (SRF-2.30) all surfaces. Material: Al alloy.

(7) Nameplate (97) -- Chemical treat or chromic acid anodize (F-2.22). Material: Al alloy.

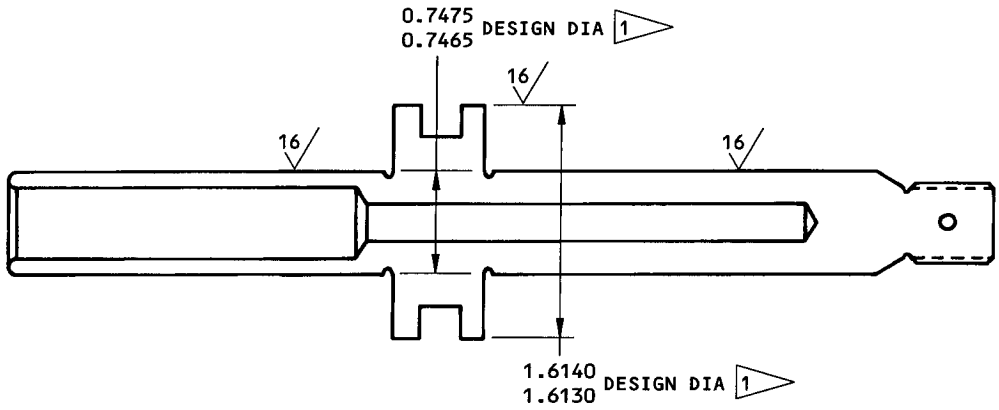
(8) Piston (113) -- Fig. 2.

D. Replacement

(1) Replace O-rings, backup rings, cap rings, seals, and scraper (75) at each overhaul.

(2) Bearing (67, 95) -- Install a replacement bearing and roller stake in place with stake tool 1087-506 (SOPM 20-50-03).

(3) Insert (121) -- Install a replacement insert in body with top of insert 0.125 to 0.145 inch below surface of body. Break and remove driving tang at bottom of insert.



REFINISH

CHROME PLATE (F-1.843) ALL EXTERNAL SURFACES BUT NOT THE PISTON FILLET AREA AND THREADS. NICKEL PLATE (F-1.803) PISTON FILLET AREA, THREADS, AND INTERIOR SURFACES

1 CHROME PLATE AND GRIND TO DESIGN DIMENSIONS AND FINISH. PUT A 0.08 PLATING RUNOUT AT END CHAMFER, THREAD RELIEF, AND PISTON FILLET AREA.

REPAIR
(SAME AS REFINISH)

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

MATERIAL: STEEL (150-180 KSI)

ALL DIMENSIONS ARE IN INCHES

PISTON (113)

Piston Refinish
Figure 2

5. ASSEMBLY

A. Materials

(1) Hydraulic fluid -- BMS 3-11 (SOPM 20-60-03)

(2) Assembly Lube -- MCS 352 (SOPM 20-60-03)

(3) Corrosion preventive compound -- MIL-C-11796, class 3 (SOPM 20-60-02)

B. Lubricate all parts with hydraulic fluid or assembly lube as parts are installed and assembled.

C. Install the expander (119) and piston ring (117) into the piston (113) slot, and the piston rod in the body (123) (Fig. 4).

D. Install the O-ring (111) and backup rings (109) in the groove on the gland (103), and O-ring (107) and seal (105) in gland ID. Slide the gland (103) on the piston rod (113) into the body (123).

E. Slide the retainer (101) and scraper (99) on the piston rod (113) and into the gland (103).

F. Install the housing (93) on the body (123), with the bracket (92) (when applicable) on the housing upper bolt. Attach with fasteners (91, 89) (but no washers (91) on the bracket bolts).

G. Install the O-ring (87) and backup rings (109) in the groove on the gland (79), and O-ring (83) and seal (81) in gland ID. Slide the gland on the piston rod (113) into the body (123).

H. Slide the retainer (77) and scraper (75) on the piston rod (113) and into the gland (79).

I. Install the cap (73) on the body (123) with fasteners (71, 69). Tighten bolts (69) to 150-200 lb-in.

J. Thread the rod end (65) on the piston rod (113). Hold the piston rod with a wrench on the flats, and tighten the rod end to 600-700 lb-in. with a 1087-507 torque wrench adapter. Install the spring pin (63) through the rod end and piston rod (113). If you install a new piston (113), drill a 0.187-0.192-inch diameter hole through the piston rod (use the hole in the rod end (65) as a guide).

K. Install the stop (61) and spring (59) in the lap assembly bore of the body (123).

L. Install the O-rings (55) and backup rings (53) on the sleeve (51).

M. Put the shims (57) over the long end of the slide (49) and assemble with sleeve (51). Put the lap assembly (47) in the body (123). Make sure the maximum slide movement is 0.003 inch.

NOTE: Install the same thickness of shims (57) as removed in disassembly.

N. Install the O-ring (45) and backup rings (43) on the plug (41), and turn the plug into the body (123). Tighten the plug to 400-500 lb-in.

O. If applicable, install the shim (37) in the body (123).

NOTE: Install the same thickness shim (37) as removed in disassembly. Shim (37) is used with 69-54676-1 spool (31).

P. Install the O-rings (35) and backup rings (33) on the spool (31) and slide the spool into the body (123).

Q. As applicable, install the O-ring (29) and cap ring (27) on the plug (25) or O-ring (29) and backup ring (27) on the adapter (25). Install the plug in the body (123), and use 1087-504 sizing ring to compress the cap ring (27). Tighten the plug to 400-500 lb-in.

R. Install the races (11), bearing (13), O-ring (17), and cap ring (15) on the shaft (5).

S. Put the spring (21) and plunger (19) in the shaft (5).

T. Install the O-ring (9) and cap ring (7) on the bearing (3).

U. Put the shaft (5) in the bearing (3). Install the shaft assembly (1) in the body (123), and use 1087-504 sizing ring to compress the cap rings (15, 7). With the 1087-508 torque wrench adapter, tighten bearing (3) to 500-600 lb-in.

V. Do the functional test (par. 7.).

W. After the test, lockwire these parts by the double-twist method (SOPM 20-50-02):

(1) Bolts (89) with bearing (3)

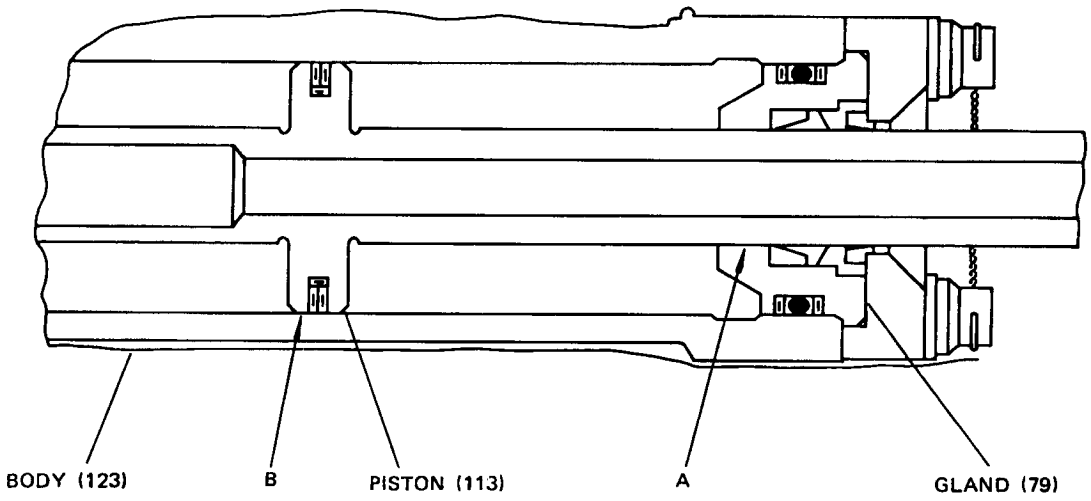
(2) Bolts (69)

(3) Spring pin (63) and rod end (65)

(4) Plug (41) with plug or adapter (25)

(5) Cap (39) with cap (23)

6. FITS AND CLEARANCES



Ref Letter Fig. 3	Mating Item No. Fig. 4	Design Dimensions				Service Wear Limits		
		Dimensions		Assembly Clearance		Dimension Limits		Maximum Allowable Clearance
		Min	Max	Min	Max	Min	Max	
A	ID 79	0.7515	0.7525	0.0040	0.0060		0.7545	0.0080
	OD 113	0.7465	0.7475			0.7465		
B	ID 123	1.6180	1.6190	0.0030	0.0050		1.6210	0.0080
	OD 113	1.6130	1.6140			1.6130		

ALL DIMENSIONS ARE IN INCHES

Fits and Clearances
Figure 3

462365

7. TESTING

A. Test Equipment

(1) Hydraulic test stand to supply controlled hydraulic pressure to 3000 psi. Fluid must be filtered to 15 microns absolute.

B. Functional Test

(1) Do the test at 70 to 80°F with BMS 3-11 hydraulic fluid.

(2) With the actuator retracted, apply a pressure of 3000 psi to the bottom port (top port open). Make sure the actuator extends and that the leakage at the open port is not more than 60 cc per minute. No other external leakage is permitted.

(3) With the actuator extended, apply a pressure of 3000 psi to the top port (bottom port open). Make sure the actuator retracts and that the leakage at the open port is not more than 60 cc per minute. No other leakage is permitted.

(4) After the test, partially fill the unit with BMS 3-11 hydraulic fluid. Install the cap (23) on the plug or adapter (25) and the cap (39) on the plug (41) and retract the actuator.

8. TROUBLE SHOOTING

Trouble	Possible Cause
Too much leakage at the open port	Lap assembly (47) worn. Damaged piston ring (115)
External leakage at the cap or housing end	Damaged O-rings (87, 107, 111), backup rings (85, 109) or seal (105)
Too much leakage at the rod end	Damaged O-ring (83) or seal (81)
External leakage at the top or bottom plug or adapter	Damaged O-ring (29, 45), cap ring or backup ring (27), or backup rings (43)
External leakage at the bearing	Damaged O-rings (9, 15) or cap rings (7, 17)

9. SPECIAL TOOLS, FIXTURES, AND EQUIPMENT

NOTE: The vendor is Smiths Aerospace (V60029). Equivalent tools can be used.

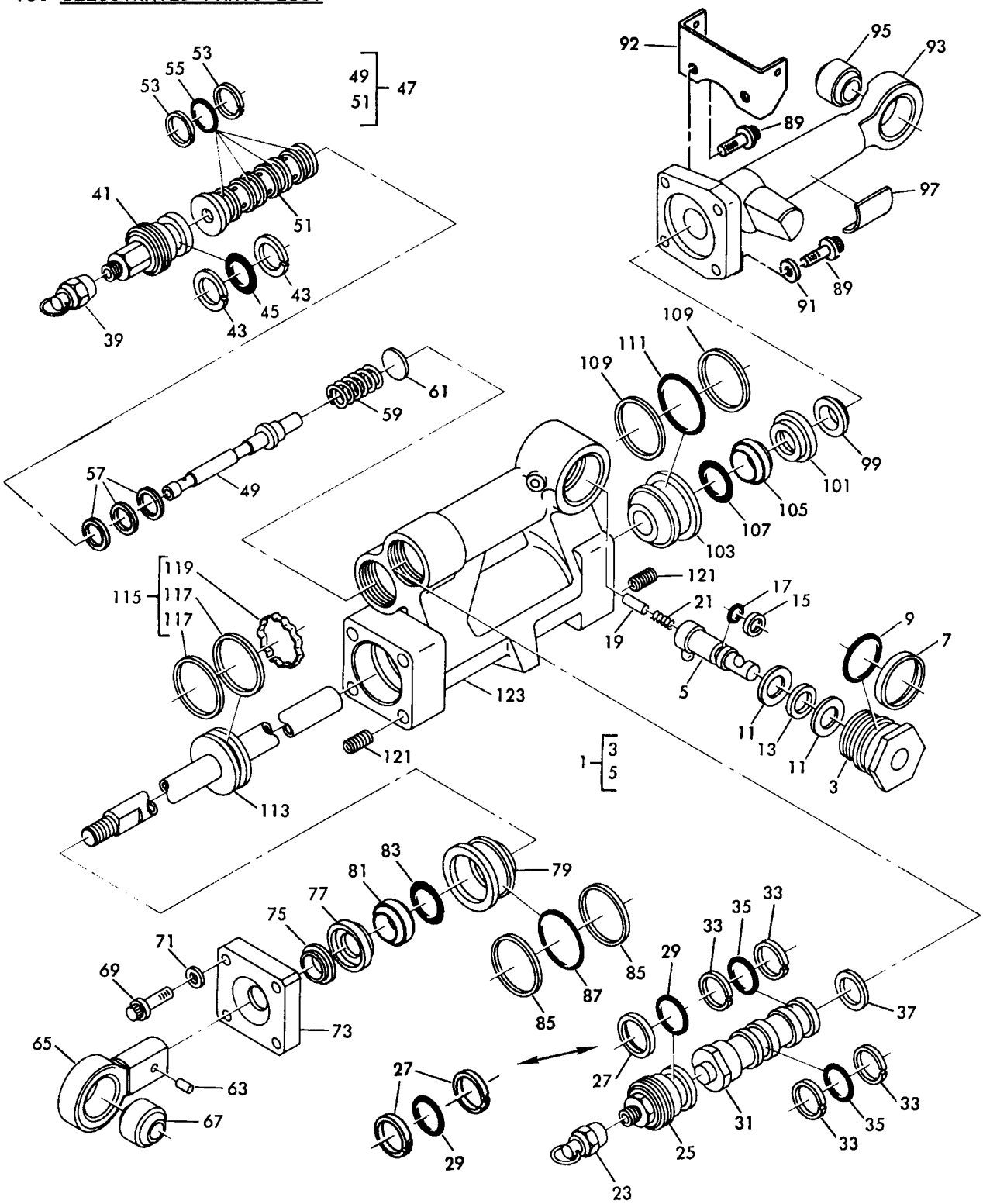
A. 1087-504 -- Sizing ring

B. 1087-506 -- Bearing staking tool

C. 1087-507 -- Torque wrench adapter

D. 1087-508 -- Torque wrench adapter

10. ILLUSTRATED PARTS LIST



Gravel Deflector Actuator Assembly
Figure 4

FIG. & ITEM NO.	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USE CODE	QTY PER ASSY
4-					
	65-44660-3		DELETED		
	65-44660-4		ACTUATOR ASSY	A	RF
	65-44660-5		ACTUATOR ASSY	B	RF
1	1087-21		. SHAFT ASSY, V60029		1
3	1087-22		. . BEARING, V60029		1
5	1087-23		. . SHAFT, V60029		1
7	BACR12BE216		. RING, CAP		1
9	NAS1611-215		. O-RING		1
11	TRA1018		. RACE, V60380		2
13	NTA1018		. BEARING, V60380		1
15	BACR12AS111		. RING, CAP		1
17	BACP11W111		. O-RING		1
19	1087-24		. PLUNGER, V60029		1
21	1087-20		. SPRING, V60029		1
23	MS21914-5		. CAP	A	1
23	BACC14AD5		DELETED		
23	MS21914-4		. CAP	B	1
23	BACC14AD4		DELETED		
25	1087-17		. PLUG, V60029	A	1
25	69-54677-1		. ADAPTER, FITTING	B	1
27	BACR12BE211		. RING, CAP	A	1
27	MS28774-211		. RING, BACKUP	B	2
29	NAS1611-210		. O-RING	A	1
29	NAS1611-211		. O-RING	B	1
31	69-54676-1		. SPOOL (REPL BY 69-54676-2)		1
31	69-54676-2		. SPOOL (REPLS 69-54676-1)		1
33	MS28774-115		. RING, BACKUP *[1]		4
35	NAS1611-115		. O-RING		2
37	1087-33		. SHIM (USED WITH 69-54676-1)		1
39	BACC14AD4		DELETED		
39	MS21914-4		. CAP		1
41	1087-18		. PLUG, V60029		1
43	MS28774-211		. RING, BACKUP		2
45	NAS1611-211		. O-RING		1
47	1087-14		. LAP ASSY, V60029		1
49	1087-16		. . SLIDE, V60029		1
51	1087-15		. . SLEEVE, V60029		1
53	MS28774-115		. RING, BACKUP *[1]		8
55	NAS1611-115		. O-RING		4
57	1087-36		. SHIM, V60029		3
59	1087-19		. SPRING, V60029		1
61	1087-34		. STOP, V60029		1
63	MS171592		. PIN, SPRING		1
65	1087-31		. ROD END, V60029		1

FIG. & ITEM NO.	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USE CODE	QTY PER ASSY
4-					
67	MS14101-10		. BEARING (REPLS 10-60545-117S AND MS21232-10)		1
67	SBS20ATC-38		. BEARING, V21335 (BOEING 10-60545-117S) (OPT)	A	1
67	TFA10A		. BEARING, V77896 (BOEING 10-60545-117S) (OPT)	A	1
67	BLFN10-021		. BEARING, V81376 (BOEING 10-60545-117S) (OPT)	A	1
67	KSBG10N5		. BEARING, V97613 (BOEING 10-60545-117S) (OPT)	A	1
67	03-728-0625		. BEARING, V09455 (BOEING 10-60545-117S) (OPT)	A	1
67	MS21232-10		. BEARING (OPT)	B	1
69	NAS625H9		. BOLT		4
71	MS20002C5		. WASHER		4
73	1087-28		. CAP, V60029		1
75	BACS34A5		. SCRAPER		1
77	1087-30		. RETAINER, V60029		1
79	1087-29		. GLAND, V60029		1
81	BACS11AA210		. SEAL		1
83	NAS1611-210		. O-RING		1
85	MS28774-220		. RING, BACKUP		2
87	NAS1611-220		. O-RING		1
89	NAS625H9		. BOLT		4
91	MS20002C5		. WASHER	A	4
91	MS20002C5		. WASHER	B	2
92	66-25665-1		. BRACKET	B	1
93	1087-27		. HOUSING, V60029		1
95	MS14101-10		. BEARING (REPLS 10-60545-117S AND MS21232-10)		1
95	SBS20ATC-38		. BEARING, V21335 (BOEING 10-60545-117S) (OPT)	A	1
95	TFA10A		. BEARING, V77896 (BOEING 10-60545-117S) (OPT)	A	1
95	BLFN10-021		. BEARING, V81376 (BOEING 10-60545-117S) (OPT)	A	1
95	KSBG10N5		. BEARING, V97613 (BOEING 10-60545-117S) (OPT)	A	1
95	03-728-0625		. BEARING, V09455 (BOEING 10-60545-117S) (OPT)	A	1
95	MS21232-10		. BEARING (OPT)	B	1
97	69-54679-1		. NAMEPLATE		1
99	BACS34A5		. SCRAPER		1

FIG. & ITEM NO.	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USE CODE	QTY PER ASSY
4-					
101	1087-30		. RETAINER, V60029		1
103	1087-29		. GLAND, V60029		1
105	BACS11AA210		. SEAL		1
107	NAS1611-210		. O-RING		1
109	MS28774-220		. RING, BACKUP		2
111	NAS1611-220		. O-RING		1
113	1087-26		. PISTON, V60029		1
115	S12230-220		. RING, PISTON, V09257		1
117	S12231-220		. . RING, V09257		2
119	S12235-220		. . EXPANDER, V09257		1
121	MS124697		DELETED		
123	1087-10		. BODY, V60029		1
123	1087-037		. BODY, V60029 (OPT)		1

*[1] MS28782-13 OPT TO MS28774-115

VENDORS

V09257	BUSAK & W.S. SHAMBAN, INC., 2531 BREMER DR., FORT WAYNE, INDIANA 46801-0176
V09455	RBC TRANSPORT DYNAMICS CORP., P.O. BOX 1953, 3131 W. SEGERSTROM AVE., SANTA ANA, CALIFORNIA 92704-5872
V21335	TIMKEN US CORP., FAFNAIR BEARING DIV., 59 FIELD ST., TORRINGTON, CONNECTICUT 06790-1002
V60029	SMITHS AEROSPACE, INC., 1700 BUSINESS CENTER DR., DUARTE, CALIFORNIA 91010-2859
V60380	TIMKEN US CORP., NEEDLE BEARING DIV., 59 FIELD ST., TORRINGTON, CONNECTICUT 06790-1008
V77896	REXNORD INDUSTRIES, INC., BEARING OPERATION, 2400 CURTIS ST., DOWNERS GROVE, ILLINOIS 60515-0722
V81376	SOUTHWEST PRODUCTS COMPANY, 2240 BUENA VISTA, IRVINDALE, CALIFORNIA 91010-3318
V97613	SARGENT CONTROLS & AEROSPACE, KAHR BEARING DIV., 5675 W. BURLINGAME RD., TUCSON, ARIZONA 85743-9453