Aerolineas Argentinas

PAGE	DATE	CODE
CHAPTER 32 TAB		
LANDING GEAR		
EFFECTIVE PAGES		
SEE LAST PAGE OF LIST		
FOR NUMBER OF PAGES		
32-CONTENTS		
1	AUG 01/06	ARG
2	AUG 01/06	ARG
3	AUG 01/06	ARG
4	AUG 01/06	ARG
5	AUG 01/06	ARG
R 6	AUG 01/07	ARG.1
R 7	AUG 01/07	ARG.1
R 8	AUG 01/07	ARG.1
32-00-00		
1	AUG 01/06	11
2	AUG 01/05	01
3	AUG 01/05	01
4	AUG 01/05	01
5	AUG 01/06	02
6	AUG 01/06	04
7	AUG 01/05	02
8	AUG 01/05	02
9	AUG 01/06	05
10	AUG 01/06	04
11	AUG 01/06	01
12	AUG 01/06	01
32-00-01		
201	DEC 01/04	01
202	DEC 01/04	01
203	DEC 01/04	01
204	BLANK	
32-09-100		
1	DEC 01/04	01
2	DEC 01/04	01
3	DEC 01/04	03
4	BLANK	
32-09-100		
401	DEC 01/04	01
402	BLANK	
32-09-100		
R 501	AUG 01/07	ARG.1
R 502	AUG 01/07	12.1
R 503	AUG 01/07	16.1
R 504	AUG 01/07	19.1
R 505	AUG 01/07	19.1
R 506	AUG 01/07	15.1
R 507	AUG 01/07	19.1
R 508	AUG 01/07	18.1
R 509	AUG 01/07	18.101

PAGE	DATE	CODE
32-09-100		CONT.
R 510	AUG 01/07	20.1
R 511	AUG 01/07	19.1
R 512	AUG 01/07	18.1
R 513	AUG 01/07	20.1
R 514	AUG 01/07	20.1
R 515	AUG 01/07	20.1
R 516	AUG 01/07	20.1
R 517	AUG 01/07	19.1
R 518	AUG 01/07	18.1
R 519	AUG 01/07	14.1
R 520	BLANK	
32-09-200		
1	DEC 01/04	01
2	BLANK	
32-09-200		
401	DEC 01/04	01
402	DEC 01/04	01
403	DEC 01/04	01
404	BLANK	
32-09-200		
501	DEC 01/04	04
502	DEC 01/04	01
503	DEC 01/04	01
504	DEC 01/04	01
505	DEC 01/04	02
506	BLANK	
32-11-0		
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2	DEC 01/04	01
3	DEC 01/04	01
4	DEC 01/04	01
5	DEC 01/04	01
6	DEC 01/04	01
7	DEC 01/04	01
8	DEC 01/04	01
32-11-0		
R 401	AUG 01/07	ARG.1
402	DEC 01/04	07
403	DEC 01/04	01
404	DEC 01/04	07
405	DEC 01/04	02
406	DEC 01/04	04
407	DEC 01/04	02
408	DEC 01/04	02
409	DEC 01/04	09
410	DEC 01/04	02
411	DEC 01/04	02
412	DEC 01/04	02
413	DEC 01/04	02
414	DEC 01/04	02
415	DEC 01/04	16
416	DEC 01/04	09
417	DEC 01/04	10

PAGE	DATE	CODE
32-11-0		CONT.
418	DEC 01/04	10
419	DEC 01/04	10
420	DEC 01/04	14
421	DEC 01/04	14
422	DEC 01/04	12
32-11-0		
601	DEC 01/04	01
602	DEC 01/04	01
603	DEC 01/04	01
604	DEC 01/04	01
32-11-11		
401	AUG 01/05	03
402	AUG 01/05	08
403	AUG 01/05	03
404	DEC 01/04	01
405	AUG 01/05	03
406	DEC 01/04	03
407	DEC 01/04	15
408	AUG 01/05	03
409	AUG 01/05	03
410	BLANK	
32-11-11		
601	AUG 01/05	01
602	DEC 01/04	01
603	DEC 01/04	01
604	BLANK	
32-11-21		
R 401	AUG 01/07	01.1
402	DEC 01/04	01
403	DEC 01/04	01
404	DEC 01/04	01
405	DEC 01/04	01
406	DEC 01/04	05
32-11-21		
801	AUG 01/06	01
802	AUG 01/06	01
803	AUG 01/06	01
804	AUG 01/06	01
805	DEC 01/04	07
806	DEC 01/04	01
807	DEC 01/04	01
808	AUG 01/06	01
809	AUG 01/06	01
810	AUG 01/06	01
811	AUG 01/06	01
812	AUG 01/06	01
32-11-31		
R 401	AUG 01/07	01.1
402	DEC 01/04	01
403	DEC 01/04	01
404	AUG 01/05	01

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PAGE	DATE	CODE
32-11-31		
601	DEC 01/04	01
602	DEC 01/04	01
32-11-41		
R 401	AUG 01/07	03.1
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403	DEC 01/04	01
404	BLANK	
32-11-41		
601	DEC 01/04	02
602	DEC 01/04	03
603	DEC 01/04	03
604	DEC 01/04	09
32-11-42		
R 401	AUG 01/07	01.1
402	DEC 01/04	02
403	DEC 01/04	01
404	BLANK	
32-11-51		
R 401	AUG 01/07	08.1
402	AUG 01/05	07
403	AUG 01/05	10
404	AUG 01/05	07
32-11-51		
601	DEC 01/04	01
602	DEC 01/04	02
603	DEC 01/04	03
604	DEC 01/04	02
605	DEC 01/04	02
606	BLANK	
32-11-51		
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802	DEC 01/04	02
803	DEC 01/04	02
804	BLANK	
32-11-61		
R 401	AUG 01/07	01.1
402	DEC 01/04	01
403	DEC 01/04	01
404	AUG 01/05	01
32-11-61		
601	DEC 01/04	01
602	DEC 01/04	01
603	DEC 01/04	01
604	BLANK	
32-11-71		
R 401	AUG 01/07	02.1
402	DEC 01/04	02
403	DEC 01/04	02
404	AUG 01/05	02

PAGE	DATE	CODE
32-11-71		CONT.
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406	BLANK	
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601	DEC 01/04	01
602	DEC 01/04	01
603	DEC 01/04	01
604	DEC 01/04	01
32-11-81		
R 401	AUG 01/07	01.1
402	DEC 01/04	01
403	DEC 01/04	02
404	DEC 01/04	01
32-11-81		
501	DEC 01/04	01
502	DEC 01/04	02
32-11-81		
601	DEC 01/04	01
602	DEC 01/04	01
603	DEC 01/04	01
604	DEC 01/04	01
32-11-85		
601	DEC 01/04	01
602	DEC 01/04	01
603	DEC 01/04	01
604	DEC 01/04	01
32-11-101		
401	DEC 01/04	01
402	DEC 01/04	02
403	DEC 01/04	02
404	BLANK	
32-11-101		
601	DEC 01/04	01
602	AUG 01/05	01
603	DEC 01/04	01
604	BLANK	
32-11-111		
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802	AUG 01/05	02
803	AUG 01/05	02
804	AUG 01/05	02
32-11-121		
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402	DEC 01/04	01
403	DEC 01/04	04
404	DEC 01/04	04
405	DEC 01/04	01
406	BLANK	

PAGE	DATE	CODE
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403	DEC 01/04	02
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32-12-01		
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32-12-12		
401	DEC 01/04	02
402	DEC 01/04	01
32-12-12		
601	AUG 01/05	02
602	DEC 01/04	02
603	DEC 01/04	02
604	BLANK	
32-13-0		
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2	DEC 01/04	03
32-13-11		
401	AUG 01/06	07
402	DEC 01/04	06
403	DEC 01/04	02
404	DEC 01/04	02
R 405	AUG 01/07	05.1
R 406	AUG 01/07	04.101
32-13-11		
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602	DEC 01/04	01
603	DEC 01/04	01
604	BLANK	
32-13-21		
401	DEC 01/04	03
402	DEC 01/04	06
403	DEC 01/04	05
404	BLANK	
32-13-21		
501	DEC 01/04	01
502	DEC 01/04	01
32-21-0		
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2	DEC 01/04	02
3	DEC 01/04	06
4	DEC 01/04	04
5	DEC 01/04	02
6	DEC 01/04	02
7	DEC 01/04	02
8	DEC 01/04	02

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PAGE	DATE	CODE
32-21-0		
R 401	AUG 01/07	07.1
402	DEC 01/04	06
403	AUG 01/05	06
404	DEC 01/04	02
405	DEC 01/04	02
406	DEC 01/04	02
407	DEC 01/04	02
408	DEC 01/04	06
409	DEC 01/04	07
410	DEC 01/04	01
32-21-0		
601	AUG 01/05	02
602	AUG 01/05	02
603	AUG 01/05	02
604	DEC 01/04	01
32-21-11		
801	AUG 01/06	ARG
802	DEC 01/04	07
803	DEC 01/04	07
804	DEC 01/04	07
805	DEC 01/04	07
806	DEC 01/04	08
807	DEC 01/04	08
808	DEC 01/04	09
809	DEC 01/04	09
810	DEC 01/04	07
811	DEC 01/04	05
812	DEC 01/04	06
813	DEC 01/04	04
814	DEC 01/04	05
32-21-21		
R 401	AUG 01/07	02.1
402	AUG 01/05	01
403	AUG 01/05	01
404	DEC 01/04	01
405	DEC 01/04	01
406	BLANK	
32-21-21		
R 601	AUG 01/07	01.1
602	DEC 01/04	01
603	DEC 01/04	01
604	DEC 01/04	01
605	AUG 01/06	01
606	BLANK	
32-21-31		
R 401	AUG 01/07	17.1
402	AUG 01/05	20
403	AUG 01/05	19
404	DEC 01/04	15
405	DEC 01/04	16
406	DEC 01/04	15
407	AUG 01/05	07
408	BLANK	
32-21-31		
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602	DEC 01/04	02
603	DEC 01/04	02
604	AUG 01/05	02
32-21-31		
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802	DEC 01/04	01
803	DEC 01/04	01
804	BLANK	
32-21-51		
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32-21-61		
R 401	AUG 01/07	02.1
402	DEC 01/04	01
32-21-71		
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602	DEC 01/04	01
603	DEC 01/04	01
604	DEC 01/04	01
32-22-0		
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2	DEC 01/04	01
32-22-11		
401	AUG 01/06	02
402	DEC 01/04	01
403	DEC 01/04	01
404	DEC 01/04	01
405	DEC 01/04	01
406	DEC 01/04	01
32-31-0		
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5	DEC 01/04	01
6	DEC 01/04	02
7	DEC 01/04	01
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32-31-0		
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102	DEC 01/04	01
32-31-0		
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502	DEC 01/04	01
503	DEC 01/04	01
504	BLANK	
32-31-11		
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402	DEC 01/04	02
403	DEC 01/04	01
404	BLANK	
32-31-21		
101	DEC 01/04	01
102	BLANK	
32-31-31		
401	DEC 01/04	01
402	DEC 01/04	01
32-31-41		
401	DEC 01/04	02
402	DEC 01/04	02
403	DEC 01/04	02
404	BLANK	
32-31-51		
401	DEC 01/04	01
402	DEC 01/04	01
32-31-61		
401	DEC 01/04	01
402	DEC 01/04	01
32-31-61		
601	AUG 01/05	01
602	DEC 01/04	01
603	DEC 01/04	01
604	BLANK	
32-32-0		
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5	AUG 01/05	01
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7	DEC 01/04	01
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12	DEC 01/04	01
13	DEC 01/04	01
14	DEC 01/04	01
15	AUG 01/05	05
16	DEC 01/04	05
32-32-0		
101	DEC 01/04	01
102	DEC 01/04	01
103	DEC 01/04	01
104	DEC 01/04	01

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PAGE	DATE	CODE
32-32-0		
501	AUG 01/06	03
502	AUG 01/06	02
32-32-11		
R 401	AUG 01/07	02.1
402	AUG 01/05	02
403	AUG 01/05	02
404	AUG 01/06	02
405	AUG 01/05	02
406	AUG 01/05	02
407	AUG 01/06	02
408	AUG 01/06	03
32-32-11		
601	AUG 01/05	01
602	DEC 01/04	01
603	DEC 01/04	01
604	DEC 01/04	01
605	AUG 01/05	01
606	BLANK	
32-32-31		
401	AUG 01/05	01
402	AUG 01/05	01
403	AUG 01/05	01
404	AUG 01/05	01
405	AUG 01/05	01
406	DEC 01/04	01
407	DEC 01/04	01
408	AUG 01/05	01
409	AUG 01/05	01
410	AUG 01/05	01
32-32-31		
601	DEC 01/04	01
602	DEC 01/04	01
603	DEC 01/04	01
604	AUG 01/05	01
32-32-41		
R 401	AUG 01/07	01.1
R 402	AUG 01/07	01.1
R 403	AUG 01/07	01.101
R 404	BLANK	
32-32-51		
R 401	AUG 01/07	01.1
R 402	AUG 01/07	01.1
403	AUG 01/05	02
404	BLANK	
32-32-61		
401	DEC 01/04	01
402	DEC 01/04	01

PAGE	DATE	CODE
32-32-71		
401	AUG 01/06	01
402	DEC 01/04	01
32-32-91		
R 401	AUG 01/07	04.1
402	DEC 01/04	03
32-32-101		
R 401	AUG 01/07	05.1
402	DEC 01/04	01
403	DEC 01/04	05
R 404	AUG 01/07	04.1
405	DEC 01/04	04
406	BLANK	
32-32-111		
401	DEC 01/04	04
402	DEC 01/04	04
32-32-121		
401	AUG 01/06	04
402	DEC 01/04	01
403	DEC 01/04	04
404	BLANK	
32-33-0		
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2	DEC 01/04	01
3	DEC 01/04	01
4	AUG 01/05	01
5	DEC 01/04	01
6	DEC 01/04	01
7	AUG 01/05	01
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10	AUG 01/05	01
11	AUG 01/05	01
12	AUG 01/05	01
13	AUG 01/05	01
14	BLANK	
32-33-0		
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102	DEC 01/04	01
103	DEC 01/04	01
104	AUG 01/05	01
105	DEC 01/04	01
106	BLANK	
32-33-0		
501	DEC 01/04	01
502	DEC 01/04	01
32-33-11		
R 401	AUG 01/07	01.1
402	DEC 01/04	01
403	DEC 01/04	01
404	DEC 01/04	01

PAGE	DATE	CODE
32-33-11		CONT.
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406	BLANK	
32-33-21		
R 401	AUG 01/07	02.1
402	DEC 01/04	01
403	DEC 01/04	01
404	DEC 01/04	01
32-33-31		
401	DEC 01/04	02
402	DEC 01/04	01
32-33-41		
401	DEC 01/04	02
402	DEC 01/04	02
32-33-51		
R 401	AUG 01/07	02.1
402	DEC 01/04	01
403	DEC 01/04	01
404	DEC 01/04	01
405	DEC 01/04	01
406	BLANK	
32-33-51		
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602	DEC 01/04	01
603	DEC 01/04	01
604	AUG 01/05	01
605	AUG 01/05	01
606	BLANK	
32-33-61		
R 401	AUG 01/07	02.1
402	DEC 01/04	02
403	DEC 01/04	02
404	BLANK	
32-33-61		
501	AUG 01/06	02
502	DEC 01/04	01
503	DEC 01/04	02
504	BLANK	
32-33-61		
601	DEC 01/04	01
602	DEC 01/04	01
603	DEC 01/04	01
604	BLANK	
32-34-0		
1	DEC 01/04	04
2	DEC 01/04	04
3	DEC 01/04	10
4	DEC 01/04	04
5	DEC 01/04	05
6	DEC 01/04	04

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PAGE	DATE	CODE
32-34-0		CONT.
7	DEC 01/04	04
8	BLANK	
32-34-0		
101	AUG 01/05	03
102	AUG 01/05	03
32-34-0		
501	DEC 01/04	05
502	DEC 01/04	05
503	DEC 01/04	04
504	DEC 01/04	04
505	DEC 01/04	04
506	DEC 01/04	05
507	DEC 01/04	04
508	BLANK	
32-34-11		
401	DEC 01/04	03
402	DEC 01/04	03
403	DEC 01/04	03
404	DEC 01/04	03
32-34-21		
401	DEC 01/04	03
402	DEC 01/04	02
403	DEC 01/04	02
404	DEC 01/04	02
405	DEC 01/04	03
406	BLANK	
32-34-31		
401	AUG 01/06	04
402	DEC 01/04	04
403	DEC 01/04	05
404	DEC 01/04	05
405	AUG 01/06	04
406	BLANK	
32-35-0		
1	DEC 01/04	02
2	DEC 01/04	02
3	DEC 01/04	02
4	DEC 01/04	02
5	DEC 01/04	02
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32-35-0		
101	DEC 01/04	02
102	DEC 01/04	02
32-35-0		
501	DEC 01/04	02
502	DEC 01/04	02
503	DEC 01/04	02
504	DEC 01/04	02
505	DEC 01/04	02
506	BLANK	

PAGE	DATE	CODE
32-35-11		
R 401	AUG 01/07	11.1
402	DEC 01/04	11
403	DEC 01/04	07
404	DEC 01/04	06
32-35-21		
401	AUG 01/06	03
402	AUG 01/06	03
403	AUG 01/06	03
404	AUG 01/06	03
32-40-0		
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2	BLANK	
32-41-0		
1	DEC 01/04	04
2	DEC 01/04	03
3	DEC 01/04	04
4	DEC 01/04	15
5	DEC 01/04	02
6	DEC 01/04	02
7	DEC 01/04	02
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12	DEC 01/04	04
13	DEC 01/04	04
14	DEC 01/04	04
15	DEC 01/04	15
16	DEC 01/04	13
32-41-0		
101	AUG 01/06	13
102	DEC 01/04	13
103	DEC 01/04	12
104	BLANK	
32-41-0		
201	DEC 01/04	04
202	DEC 01/04	03
203	DEC 01/04	03
204	BLANK	
32-41-0		
501	AUG 01/05	01
502	AUG 01/06	01
503	DEC 01/04	01
504	DEC 01/04	01
505	DEC 01/04	01
506	AUG 01/06	04
507	DEC 01/04	02
508	BLANK	

PAGE	DATE	CODE
32-41-00		
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402	DEC 01/04	01
403	DEC 01/04	01
404	DEC 01/04	01
405	DEC 01/04	01
406	DEC 01/04	01
407	DEC 01/04	01
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32-41-21		
401	DEC 01/04	01
402	DEC 01/04	01
32-41-21		
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602	DEC 01/04	01
603	DEC 01/04	01
604	BLANK	
32-41-31		
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402	DEC 01/04	01
403	DEC 01/04	01
404	DEC 01/04	01
32-41-41		
401	AUG 01/06	02
402	DEC 01/04	01
403	DEC 01/04	01
404	AUG 01/05	01
405	AUG 01/06	01
406	AUG 01/06	03
407	DEC 01/04	01
408	DEC 01/04	01
32-41-41		
601	AUG 01/06	02
602	AUG 01/06	09
603	DEC 01/04	02
604	DEC 01/04	06
32-41-41		
801	DEC 01/04	01
802	DEC 01/04	01
803	DEC 01/04	01
804	BLANK	
32-41-51		
401	DEC 01/04	02
402	DEC 01/04	04
403	DEC 01/04	01
404	BLANK	
32-41-61		
401	DEC 01/04	02
402	DEC 01/04	01

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PAGE	DATE	CODE
32-41-81		
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402	DEC 01/04	01
403	DEC 01/04	02
404	DEC 01/04	02
32-42-0		
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2	DEC 01/04	15
3	DEC 01/04	14
4	DEC 01/04	12
5	DEC 01/04	10
6	DEC 01/04	07
7	DEC 01/04	08
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15	DEC 01/04	14
16	DEC 01/04	13
17	DEC 01/04	13
18	DEC 01/04	10
19	DEC 01/04	11
20	BLANK	
32-42-0		
101	DEC 01/04	01
102	DEC 01/04	08
103	DEC 01/04	05
104	BLANK	
32-42-0		
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502	DEC 01/04	16
503	DEC 01/04	08
504	DEC 01/04	10
505	DEC 01/04	16
506	DEC 01/04	15
507	DEC 01/04	13
508	AUG 01/05	14
509	AUG 01/06	14
510	BLANK	
32-42-0		
601	DEC 01/04	01
602	DEC 01/04	01
32-42-11		
401	AUG 01/06	15
402	DEC 01/04	17
403	DEC 01/04	14
404	DEC 01/04	16
405	DEC 01/04	15
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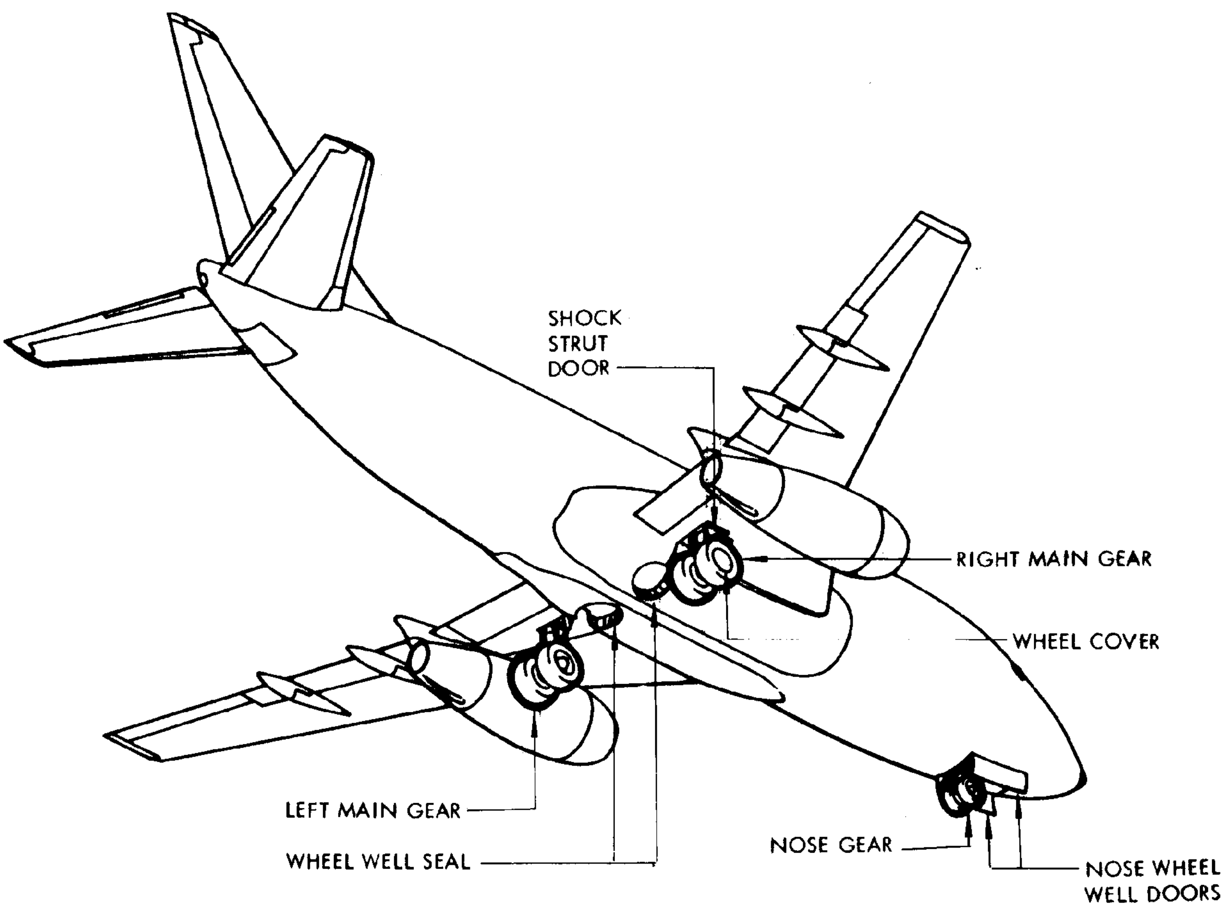
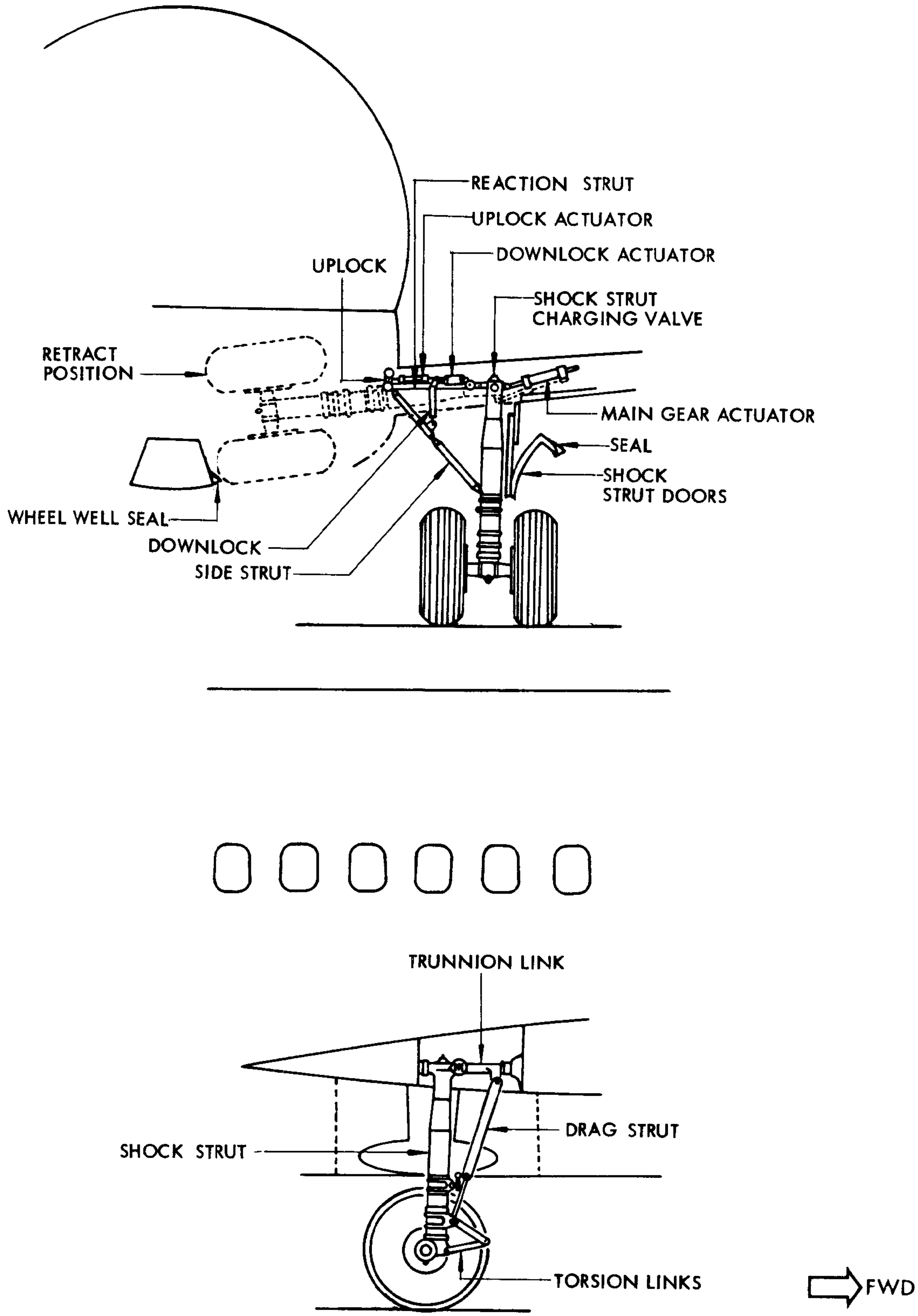
LANDING GEAR - DESCRIPTION AND OPERATION

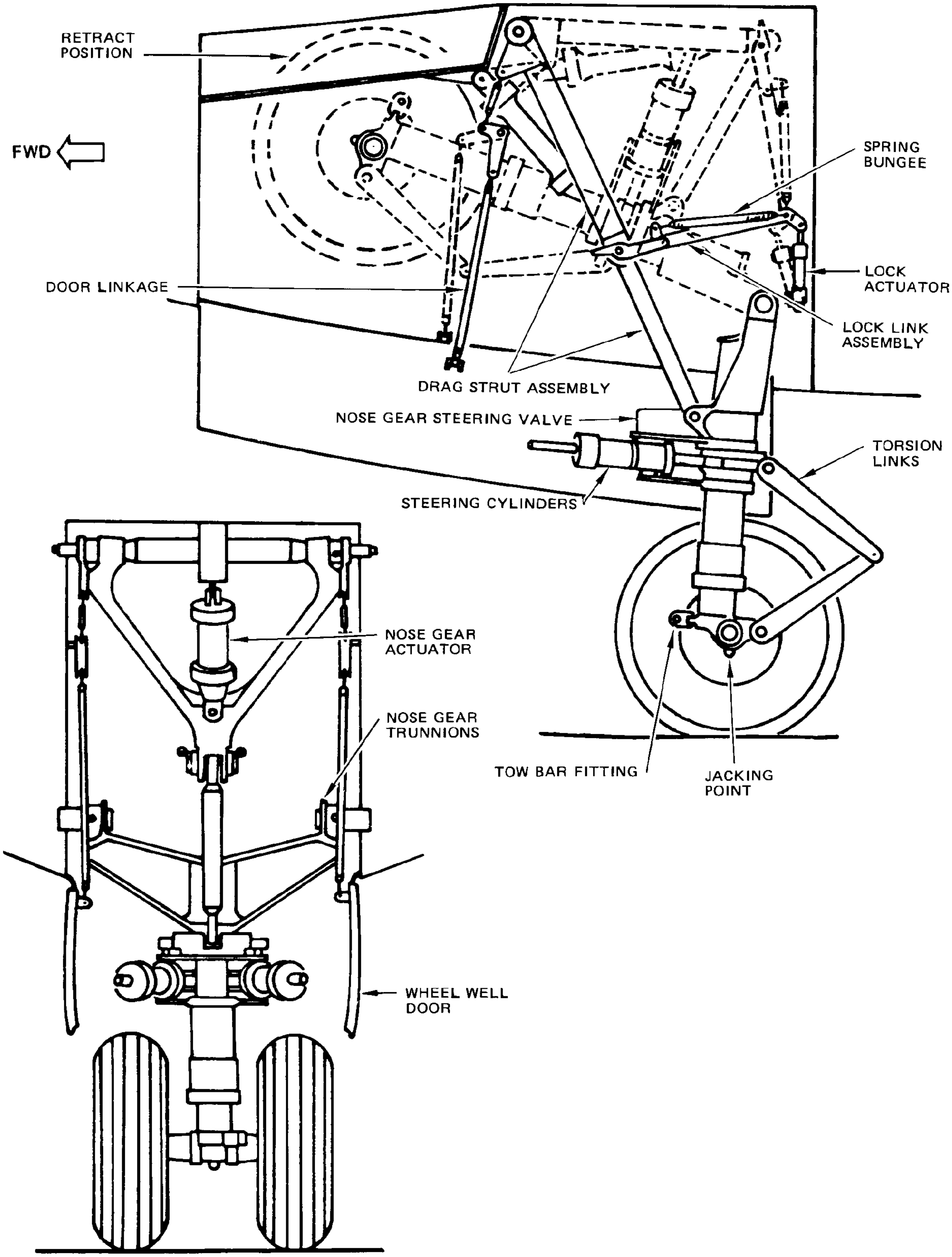
1. General
   A. The landing gear consists of two main gear and one nose gear (Fig. 1). Each main gear is located aft of the rear wing spar inboard of the engine nacelles. The nose gear is located below the aft bulkhead of the control cabin.
   B. The main and nose gear use air-oil type shock struts to absorb impact on landing and vibrations and shock from movement of the airplane on the ground. Each nose and main gear is equipped with two tire and wheel assemblies. Each main gear wheel is fitted with disc-type hydraulic brakes modulated by an antiskid system.
   C. The main gear (Fig. 2) is hydraulically actuated to retract inboard into the fuselage. Each main gear is locked in the down position by a folding lock strut and in the up position by an uplock hook and mechanism. Shock strut doors close the opening in the wing for the main gear shock strut and drag strut. A wheel well seal closes against the main gear tire circumference when the airplane is in flight with gear retracted.
   D. The nose gear (Fig. 3) is hydraulically actuated to retract forward into the fuselage. A lock strut assembly locks the nose gear in the up and down positions. Clamshell-type nose gear doors close to fair with the fuselage contour when the nose gear is retracted and remains open when the nose gear is extended.
   E. The main and nose gear manual extension systems are cable operated to release each gear from the up and locked position and allow the gear to free fall to the down and locked position.
   F. Nose wheel steering is provided for aircraft directional control during ground maneuvers. Normal steering is accomplished by using a steering wheel located at the captain's position. Rudder pedal steering is available during takeoff, landing, and taxiing where small directional changes are required.
2. Landing Gear Air-Ground Sensing
   A. Certain systems of the airplane require electrical control depending upon the condition of the airplane (airborne or on the ground) (Fig. 4). The condition of the airplane is indicated by the landing gear ground and air safety sensors (proximity switches). The safety sensors transmit signals to circuits and relays in a landing gear electrical module to provide "air" or "ground" control of the systems or components. The landing gear systems controlled by air-ground sensing are the control lever lock system and the antiskid system. Other airplane systems and components controlled by air-ground sensing are: APU fire horn system, thrust reverser, hydraulic system interconnect valve, electrical system static inverter, drain mast heater (provisions only), stall warning system, flight recorder system, air conditioning turbofans, takeoff warning system, cabin pressurization control system, voice recorder system (if installed), wing anti-ice system, electrical system, main cargo door control system, flap load limiter system, and automatic braking system. For additional information on the landing gear electrical module and the landing gear safety sensors, refer to AMM 32-09-100, and AMM 32-09-200.



Landing Gear Location
Figure 1



Main Gear Schematic
Figure 2



Nose Gear Schematic
Figure 3

B. An air-sensing test switch and a ground sensing test switch on the electrical module are normally used to simulate airplane-in-air condition. When the airplane is operating in the ground mode, the air sensing test switch energizes the air sensing relays and the ground sensing test switch de-energizes the ground sensing relays. Both switches must be pressed and held down to simulate the airplane-in-air condition. When the switches are released, the systems return to airplane-on-ground condition. When the airplane-in-air condition is simulated, certain precautions regarding the systems listed in Fig. 5 should be observed.

3. Landing Gear Extension and Retraction

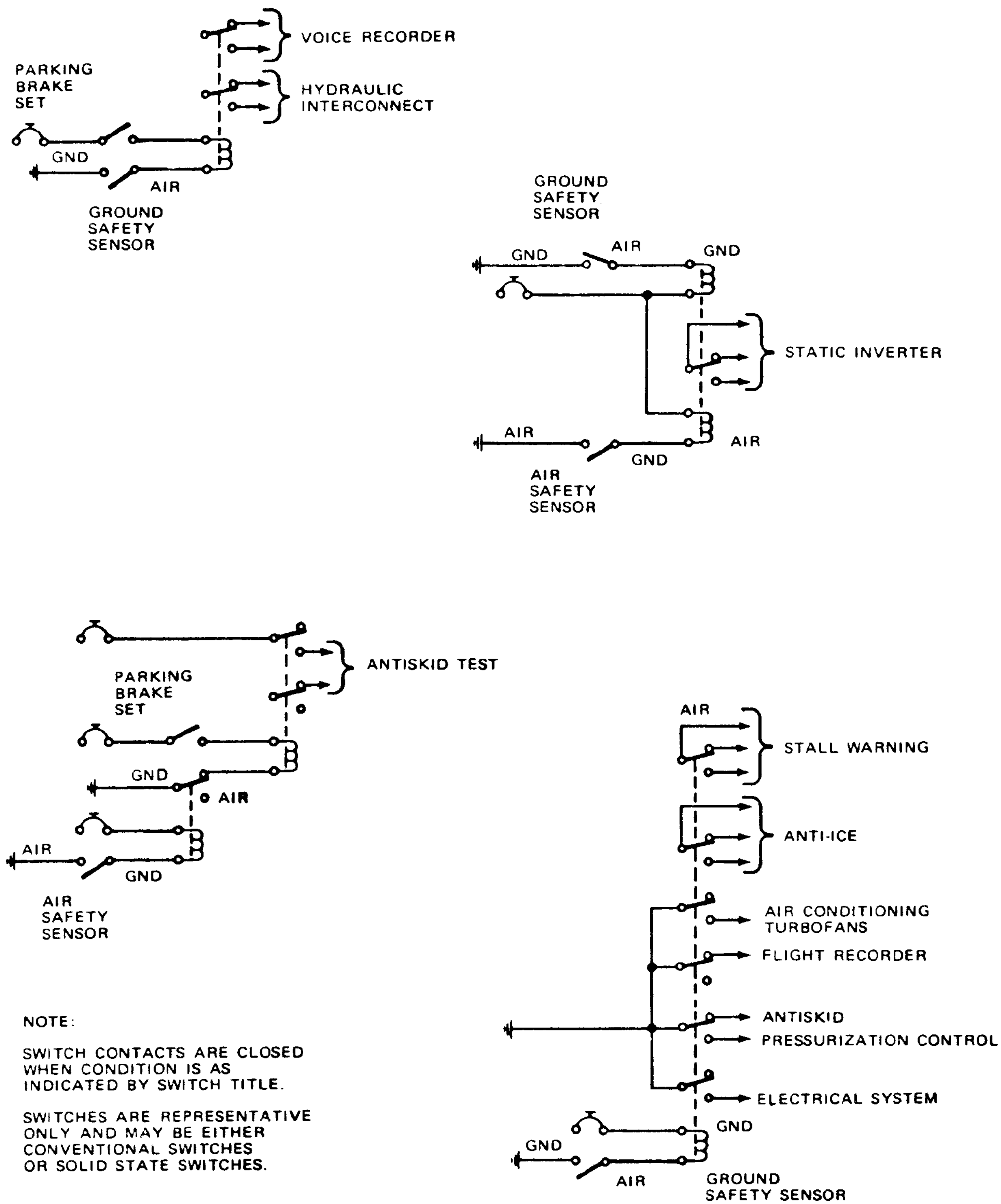
A. Extension and retraction of the main and nose gear is by hydraulic power with a manual extension system for lowering the gear when hydraulic power is not available. The landing gear is controlled by a single control lever mounted on the pilots' center panel. Cables from a drum actuated by the control lever transfer motion to a selector valve that directs hydraulic pressure for gear actuation. A safety lock prevents the control lever from entering the UP position where conditions are not right for gear retraction.

B. When the control lever is moved to the UP position, the gear retracts. When the main gears are fully retracted, a seal closes up against the main gear tire circumference. A special hubcap on the outboard wheel fairs the retracted wheel. The shock strut aperture in wing is closed by a shock strut door. A movable section of the shock strut doors carries a section of the seal to close off the upper portion of the tire below the shock strut. Mechanical linkage operates the shock strut door flap as the gear retracts and extends. Doors operated by a linkage connected to the nose gear close off the nose wheel well when the gear retracts. Moving the control lever to the DN position extends all gears. On extension, the nose gear doors open and remain open when the gear is down. With the control lever in OFF position, hydraulic pressure is released from all landing gear hydraulic lines and actuators. The gears are then held in the extended or retracted position by the mechanical locks. A tee handle actuates a crank and cable system for manual extension, which unlocks the gears and allows them to fall to the extended position by gravity. The nose gear doors are opened by mechanical linkage as the gear extends. When operated by the manual extension system, the gears free fall to the down and locked position.

C. When the landing gear is to be retracted with the airplane on the ground, the airplane must be jacked and electrical and hydraulic power must be available.

4. Landing Gear Position Indicating and Warning System

A. In landing gear position indicating and warning system, a warning horn and indicator and warning lights provide indication for landing gear down and locked, landing gear not locked, and landing gear position not in accordance with control lever position.

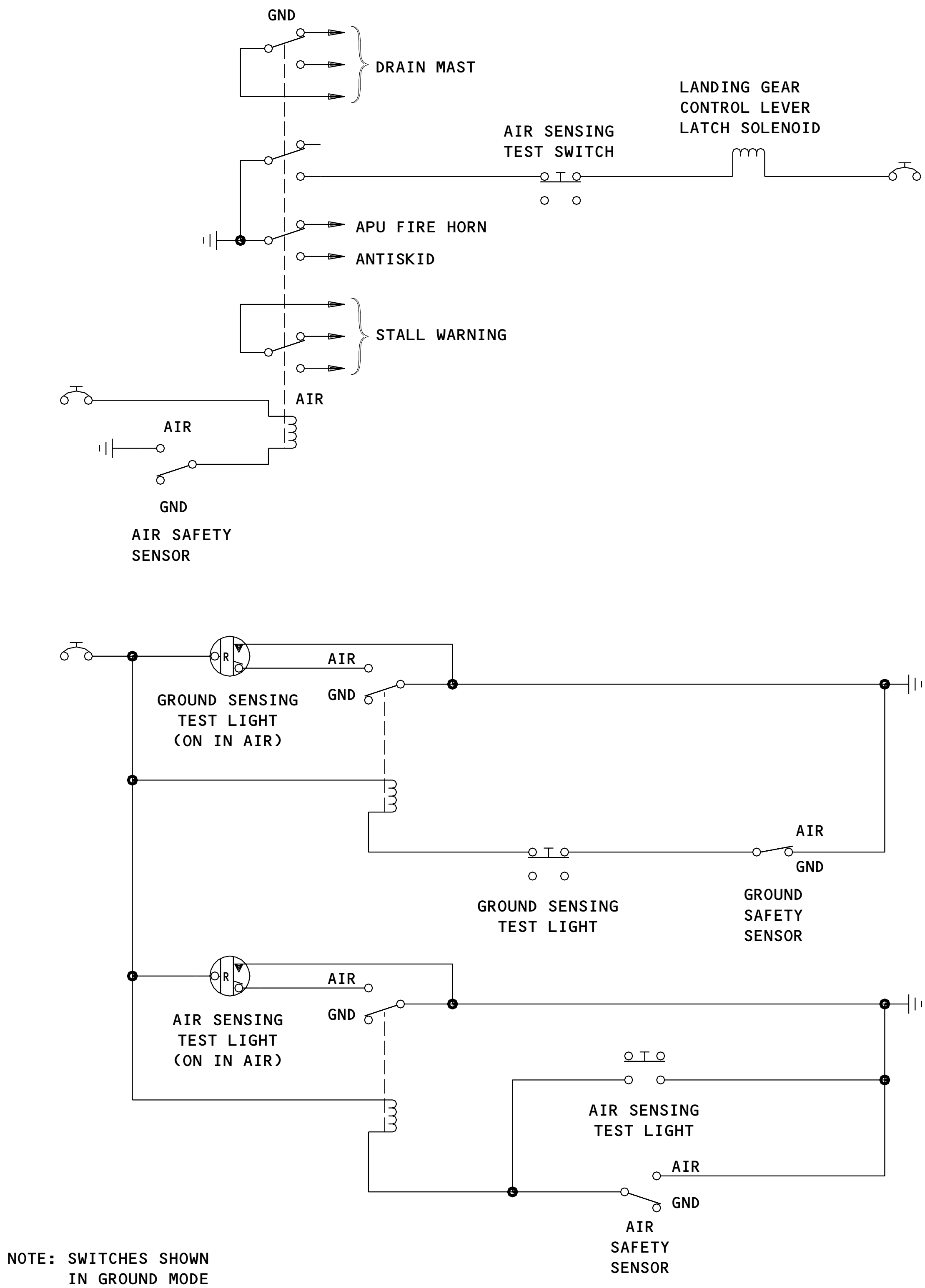


NOTE:

SWITCH CONTACTS ARE CLOSED WHEN CONDITION IS AS INDICATED BY SWITCH TITLE.

SWITCHES ARE REPRESENTATIVE ONLY AND MAY BE EITHER CONVENTIONAL SWITCHES OR SOLID STATE SWITCHES.

Air-Ground Sensing Functional Schematic
Figure 4 (Sheet 1)



Air-Ground Sensing Functional Schematic
Figure 4 (Sheet 2)

SYSTEM	SAFETY SENSOR FUNCTION	TO SIMULATE AIRPLANE-IN-AIR	PRECAUTIONS
Drain mast heater	Provisions only		
Voice recorder	Permits erasure of tape after parking brake is set	Press and hold ground sensing test switch	None
Landing gear control lever lock	Prevents control lever from being placed in UP position when airplane is on ground	Cannot be simulated	None
Antiskid (inboard brakes)	Prevents application of brakes before touchdown and loss of brakes at low speed	Press and hold air sensing test switch	None
Wing anti-ice	Prevents hot air from entering anti-ice ducts when airplane is on ground	Press and hold ground sensing test switch	None
Stall warning	Activates system when airplane is in air	Press and hold air and ground sensing test switches	Avoid contact with angle of airflow sensor vane as vane will be hot
Flight recorder	Activates system when airplane is in air	Press and hold ground sensing test switches	If electrical power is being used, open flight recorder circuit breaker to prevent unnecessary operation of flight recorder. Close circuit breaker when maintenance is completed

SYSTEM	SAFETY SENSOR FUNCTION	TO SIMULATE AIRPLANE-IN-AIR	PRECAUTIONS
Main cargo door control	Prevents cargo door electrical control from functioning when airplane is in air	Press and hold ground sensing test switch	None

SYSTEM	SAFETY SENSOR FUNCTION	TO SIMULATE AIRPLANE-IN-AIR	PRECAUTIONS
Air conditioning turbo-fans	Opens turbofan valves when airplane is on ground	Press and hold ground sensing test switch	Check that air conditioning switches are off to prevent overheating air conditioning pack. Keep hand clear of ram air inlet deflector
Hydraulic system interconnect valve	Permits hydraulic system interconnection after parking brake is set	Press and hold ground sensing test switch	None
Electrical power	Prevents APU generator being switched from two busses (ground condition) to one bus (air condition)	Press and hold ground sensing test switch	None
Takeoff warning	Prevents takeoff warning horn sounding when airplane is in air	Press and hold air sensing test switch	None
Cabin pressurization control	Maintains cabin pressurization when airplane is in air	Press and hold ground sensing test switch	None
Electrical system static inverter	Prevents static inverter from draining battery on ground	Press and hold ground sensing test switch	Place standby power switch on OFF position unless 115 volt ac power is available and equipment cooling blower circuit breakers are closed to prevent overheating static inerter

SYSTEM	SAFETY SENSOR FUNCTION	TO SIMULATE AIRPLANE-IN-AIR	PRECAUTIONS
APU fire horn	Prevents APU fire horn from sounding when airplane is in air	Press and hold air sensing test switch	None

5. Structural Fuse Points
   A. Certain connections are made with fasteners designed to fail first under excessive shock loads. The fasteners are designed to minimize damage to primary structure if attached components are subjected to severe impact loads. Figure 6 lists those connections in landing gear systems with the subject number where additional information may be found.

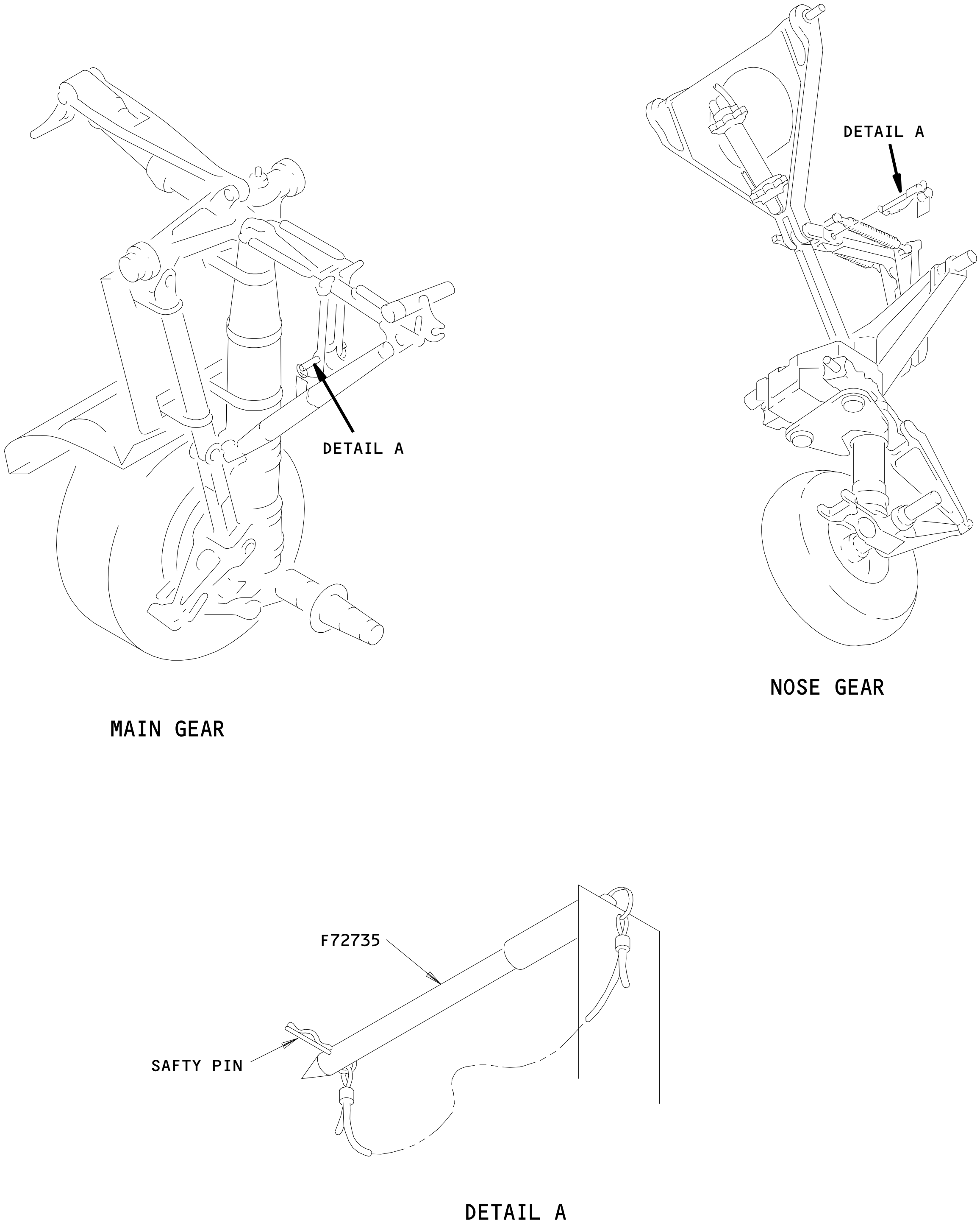
Subject No.	Fastener Type	Part Containing Fastener
32-11-0	(2) NAS1304-31 (2) NAS1306-31	MAIN GEAR REAR TRUNNION BEARING
32-11-0	69-42196-( )	MAIN GEAR FORWARD TRUNNION BEARING
32-11-31	69-39476-( )	MAIN GEAR DRAG STRUT UPPER ATTACHMENT
32-51-21	MS20426A5	RUDDER PEDAL STEERING CONTROL ROD

GROUND LOCK ASSEMBLIES - MAINTENANCE PRACTICES

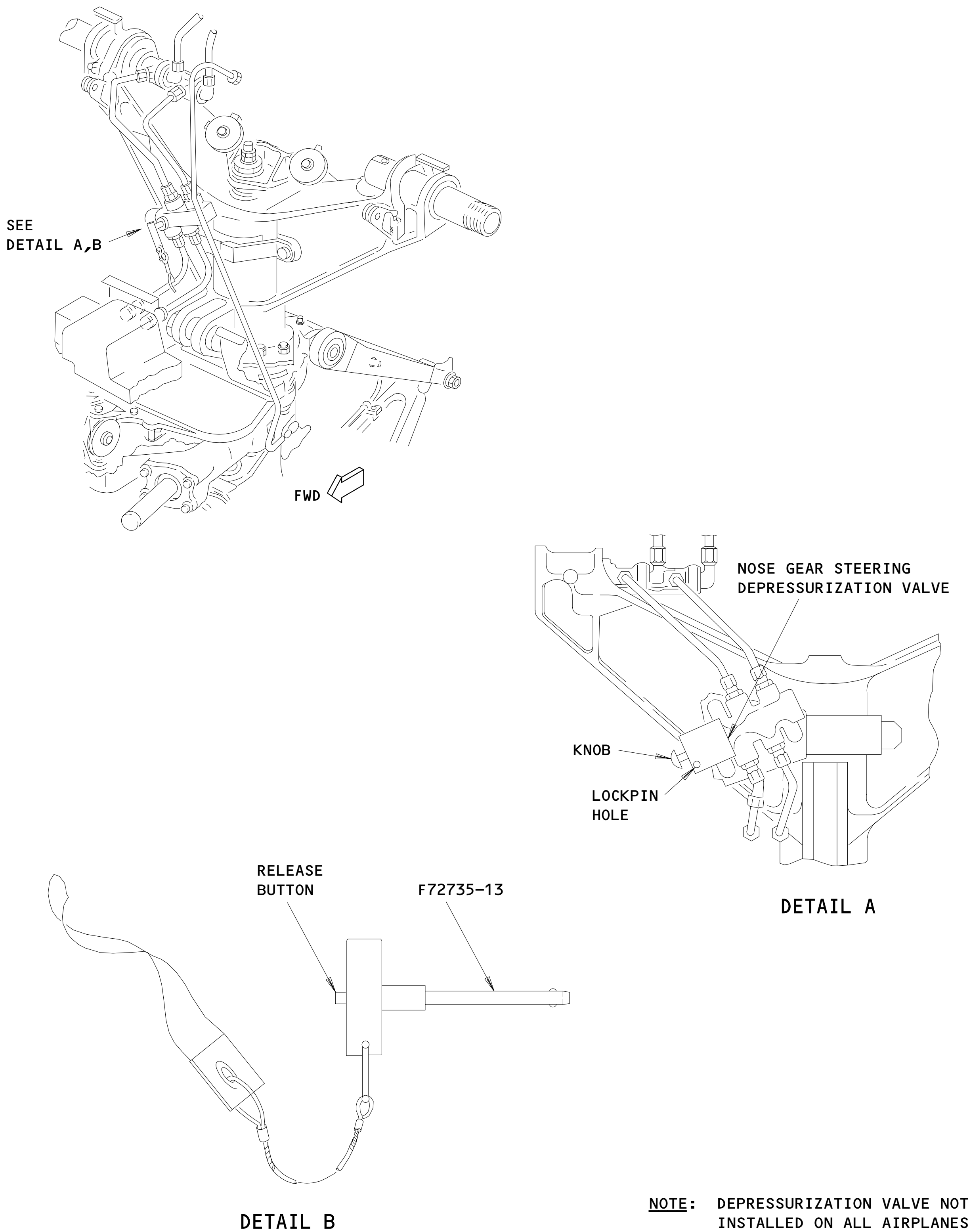
1. Equipment and Materials
   A. Ground Lock Assembly - F72735
   B. Nose Gear Steering Lockout Pin - F72735-13 (airplanes with nose gear steering depressurization valve installed)
2. Gear Ground Lock Assembly Removal/Installation (Fig. 201)
   A. Install Gear Ground Lock Assembly
      (1) Insert ground lock assembly in lock brace.
      (2) Insert safety pin in ground lock assembly.
   B. Remove Gear Ground Lock Assembly
      (1) Remove safety pin from ground lock assembly installed in main gear lock brace.
      (2) Pull ground lock assembly from lock brace.
3. Nose Gear Steering Lockout Pin Removal/Installation (Fig. 202 for effectivity)
   A. Install Nose Gear Steering Lockout Pin.
      (1) Depress knob on nose gear steering depressurization valve and hold.
      (2) Depress button on lockout pin and insert pin in hole in side of depressurization valve until it bottoms.
      (3) Release button to secure pin in hole.
      (4) Release knob on nose gear steering depressurization valve.
   B. Remove Nose Gear Steering Lockout Pin
      (1) Make certain nose gear is centered before removing lockout pin.

      CAUTION: NOSE GEAR WILL MOVE TO CENTERED POSITION IF HYDRAULIC SYSTEM IS PRESSURIZED WHEN LOCKOUT PIN IS REMOVED.

      (2) Depress knob on nose gear steering depressurization valve and hold.
      (3) Depress button on lockout pin and remove.
      (4) Release knob on nose gear steering depressurization valve.



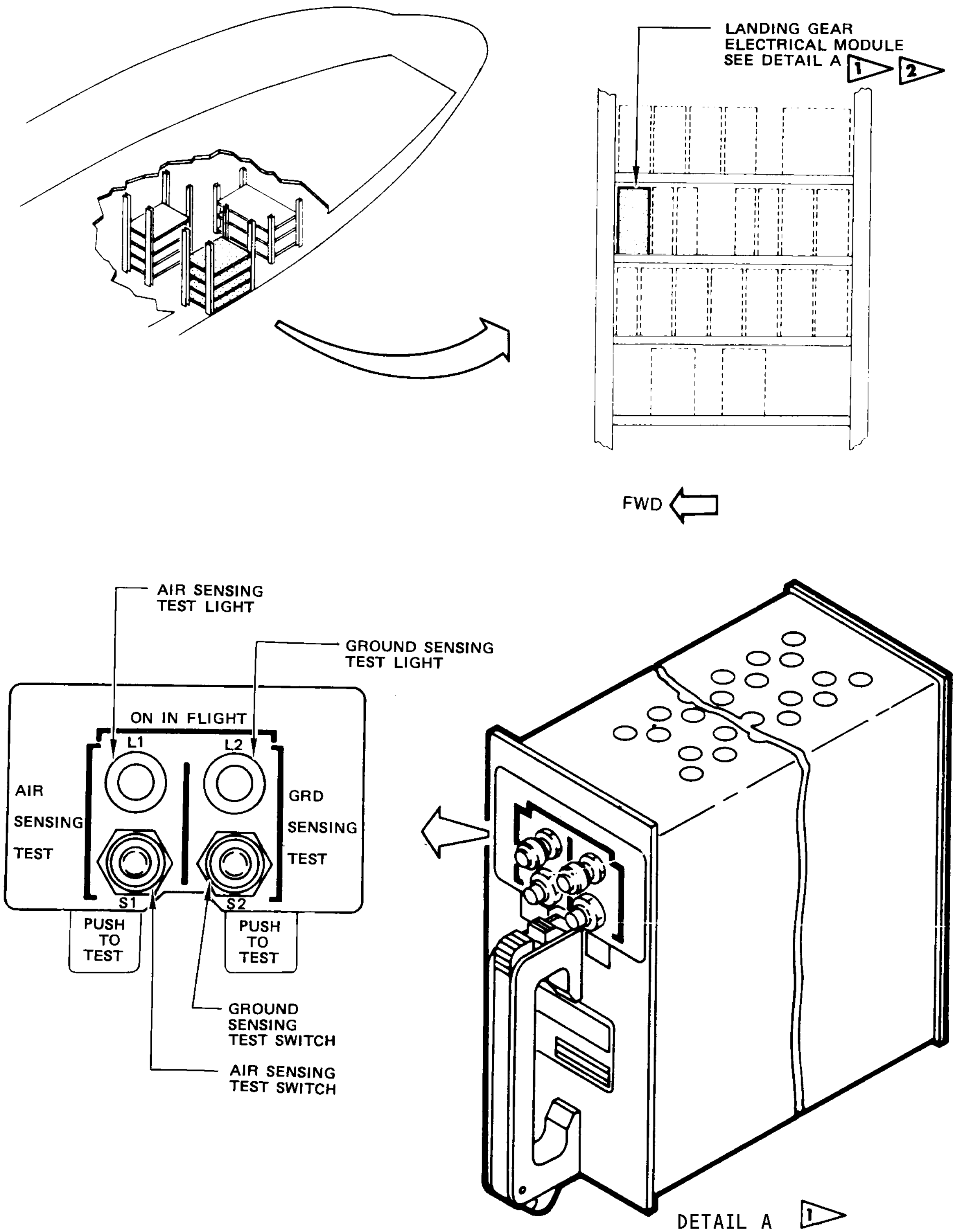
Ground Lock Assembly
Figure 201



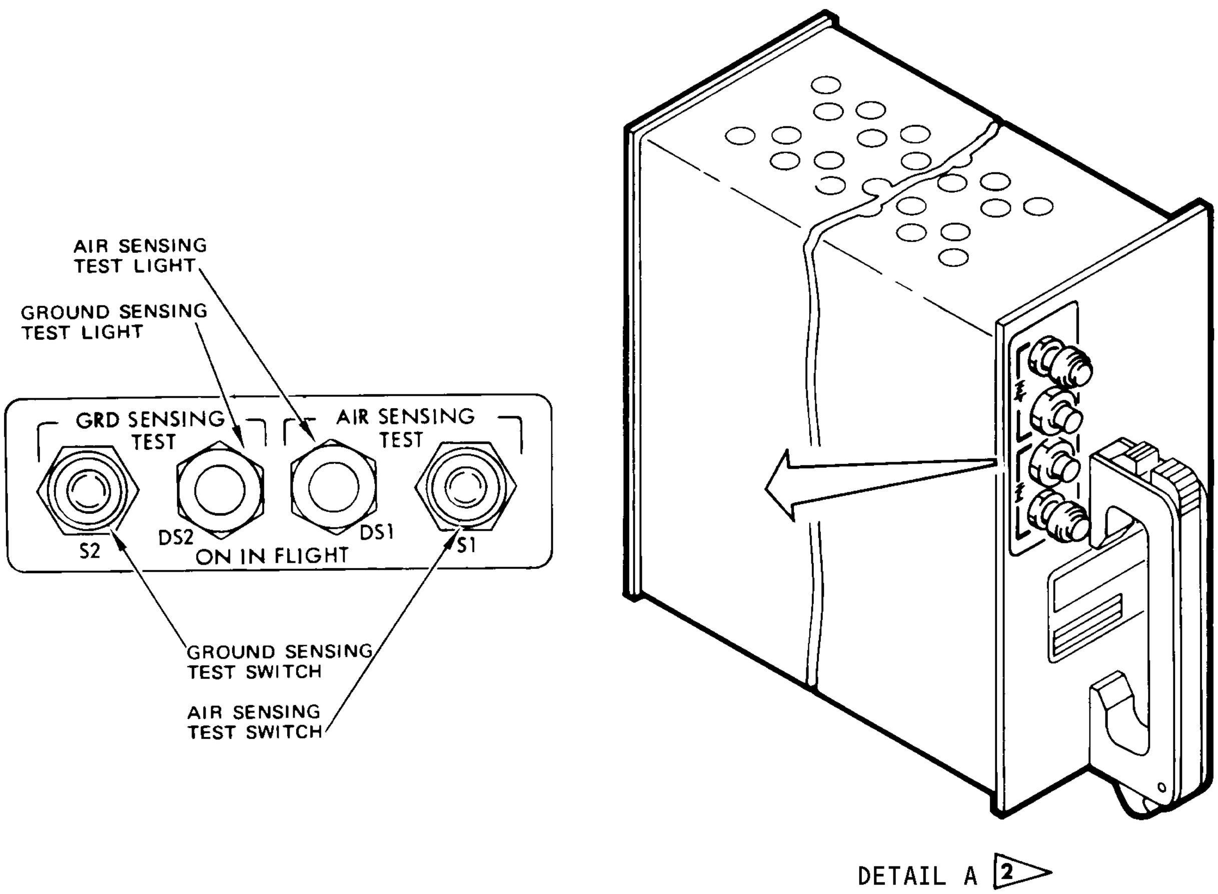
Nose Gear Steering Lockout Pin Installation
Figure 202

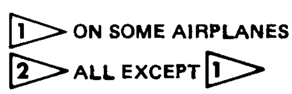
LANDING GEAR ELECTRICAL MODULE - DESCRIPTION AND OPERATION

1. General
   A. The landing gear electrical module (Fig. 1) is a rack-mounted box containing the control and safety relays, solid-state circuits, and the necessary wiring and connectors. The module is located in the right equipment rack in the electrical/electronic equipment compartment.
   B. Control and indication of the landing gear is accomplished primarily by proximity switches. The proximity switch is a solid-state switching circuit consisting of a sensor installed on the landing gear and solid-state circuits in the landing gear electrical module. The sensor is a proximity sensor that senses the proximity of a metal actuator, or conversely, the absence of the actuator, and thus provides the appropriate signal to a solid-state circuit in the module. The sensor and solid-state circuit function together as a switch. The solid-state circuit uses the signal from the sensor to control the relays. The relays in turn provide the required control and indication of the landing gear.
   C. The module contains air and ground sensing test switches and lights to check for malfunction in the module and to isolate the safety relays for maintenance purposes. The air sensing test switch and the ground sensing test switch are also used to simulate an airplane-in-air condition. The various airplane systems normally used while the airplane is airborne, with the exception of landing gear operation, can be operated when the air and ground sensing test switches are actuated. When the switches are released, the systems return to airplane-in-ground position. The red air and ground sensing test lights show use of the test switches during maintenance and also indicate malfunction in the module. If a test light is on when the airplane is on the ground and the corresponding test switch is not being used, a malfunction in the module is indicated.



Landing Gear Electrical Module
Figure 1 (Sheet 1)





Landing Gear Electrical Module
Figure 1 (Sheet 2)

LANDING GEAR ELECTRICAL MODULE - REMOVAL/INSTALLATION

1. General
    A. To remove the landing gear electrical module, make sure that power is removed from airplane; then release latch and remove unit from rack. When installing landing gear electrical module, make sure that pins are straight in component and rack; insert component in rack and secure latch.
    B. Whenever the landing gear module is replaced, perform landing gear electrical module adjustment/test.

LANDING GEAR ELECTRICAL MODULE - ADJUSTMENT/TEST

1. Landing Gear Electrical Module Test

FL A. General

NOTE: This test may be performed with the airplane on jacks, providing the ground mode is simulated when required.

(1) This test is performed only to test the function of those system circuits which are electrically connected to the module when the landing gear electrical module has been replaced. This test is not conclusive unless the individual systems have been tested and found to be operating satisfactorily except where the system test and/or troubleshooting indicates that the module be replaced. If any component (such as switches, valves, or sensors) of the individual system has been altered or replaced, the individual system must be tested before this test can be performed.

(2) It is preferred that the complete landing gear electrical module test be performed whenever the module has been replaced. However, at least the following portions of the test must always be performed to ensure system integrity and airplane safety after module replacement.

(a) Landing gear position indicating and warning function
(b) Aural warning function
(c) Antiskid function
(d) Automatic speedbrake function
(e) Stall warning function
(f) APU fire horn function
(g) Standby electrical power system function

(3) For all tests that require positioning of thrust levers, the thrust lever position is given in degrees from idle stop. If it is desirable to use linear dimensions (arc length at control stand cover top) for positioning thrust levers, refer to AMM Chapter 76, Engine Control Cables - Maintenance Practices, for conversion data.

B. Equipment and Materials

(1) Actuator - 1020 steel per MIL-S-7952, 17-4PH steel per AMS 5643, 15-5PH steel, Permalloy - HYMU (carpenter steel), Molly Permalloy (Allegheny Ludlum)

(a) Size - 0.05 inch thick, large enough to completely cover sensor face (also called a slug in the procedure)

(2) Deactuator - 5062, 6061, 7075, or 2024 aluminum copper
  (a) Size - 0.05 inch thick, large enough to completely cover sensor face (also called a copper shield in the procedure)
(3) Ground Lock Assemblies (AMM 32-00-01)
(4) Airplane Control Surfaces Protractor - F52485-500
(5) Hydraulic Ground Cart
(6) Automatic Speedbrake Test Box - F80208-1 or 2TE65-45113 (Fig. 501)
(7) Antiskid/Autobrake Tester - F80129-100 (airplanes with automatic braking)

C. Prepare for Test
(1) Make sure that thrust levers are in IDLE position.
(2) Make sure that electrical power is connected.
(3) Make sure that external hydraulic pressure supply is connected but do not pressurize hydraulic systems A and B until instructed.
(4) Make sure that landing gear is down and locked with lockpins installed.
(5) Place protractor in position on thrust lever(s) and set protractor to 0 degree.

D. Test Landing Gear Electrical Module
(1) Test landing gear position indicating and warning function of landing gear electrical module.
  (a) Make sure that LANDING GEAR - LIGHTS, LANDING GEAR - ANTISKID TEST, ANTISKID FAILURE WARNING AND PARKING BRAKE circuit breakers, and all circuit breakers under INDICATOR LIGHTS MASTER DIMMING BUS located on P6 panel are closed.
  (b) With landing gear lever in DN position and both throttle levers retarded to a position less than 7 degrees above idle stop, make sure that landing gear green indicator lights are on and red warning lights are off.

  NOTE: Change in throttle setting will not affect landing gear green indicator lights.

  (c) Advance both throttle levers to a position greater than 15 degrees but less than 17 degrees above idle stop. Make sure that landing gear green indicator lights remain on and red warning lights remain off.
  (d) Place landing gear lever in OFF position. Make sure that landing gear red warning lights come on and green indicator lights remain on.
  (e) Hold a slug near the sensitive face of the nose gear UP LOCK sensor. Make sure that nose gear red warning light goes off.
  (f) Remove slug and make sure that the nose gear red warning light comes on.
  (g) Repeat steps (e) and (f) for right main gear UP LOCK sensor. Results should be the same for the respective warning light.
  (h) Repeat steps (e) and (f) for left main gear UP LOCK sensor. Results should be the same for the respective warning light.
  (i) Place landing gear lever in DN position. Make sure that the three gear red warning lights go off and that the green indicator lights remain on.

(j) Hold a copper shield between nose gear downlock sensor and downlock sensor actuator. Make sure that nose gear green indicator light goes off and nose gear red warning light comes on.
(k) Remove shield and make sure that nose gear red warning light goes off and green indicator light comes on.
(l) Repeat steps (j) and (k) for right main gear downlock sensor. Results should be the same for the respective lights.
(m) Repeat steps (j) and (k) for left main gear downlock sensor. Results should be the same for the respective lights.

(2) Test aural warning function of landing gear electrical module.
(a) Pressurize hydraulic systems A and B (AMM 29-11-0/201 and AMM 29-12-0/201).
(b) Make sure that the following circuit breakers on panel P6 are closed:
1) AURAL WARNING
2) EPR WARNING
3) ENGINE NO. 1 EPR & LG WARNING
4) ENGINE NO. 2 EPR & LG WARNING
(c) To avoid nuisance takeoff warning signals during the test, perform the following:
1) Make sure that stabilizer trim indicated reads in green band.
2) Make sure that the speedbrakes are stowed.
3) AR LV-JMW thru LV-JMZ, LV-JND, and LV-JNE;
NH JA8401 thru JA8411;
TM CR-BAA and CR-BAB;
Extend flaps to the 25-unit position.
4) AR ALL EXCEPT LV-JMW thru LV-JMZ, LV-JND, and LV-JNE;
NH ALL EXCEPT JA8401 thru JA8411;
TM ALL EXCEPT CR-BAA and CR-BAB;
Extend flaps to the 15-unit position.
5) Make sure that wheel chocks are in place.
6) Release parking brake.
(d) Advance both throttles all the way forward.

(e) Hold copper shield between the nose gear downlock sensor and downlock sensor actuator. Make sure that aural warning horn sounds continuously.

(f) Press and hold either ENG-1 EPR > 1.6 or ENG-2 EPR > 1.6 switch on the front of the engine accessory module located on electrical shelf E3.

(g) Make sure that BOTH EPRS > 1.6 light on the front of the engine accessory module goes off and aural warning horn stops sounding.

(h) Press and hold AIR SENSING switch on landing gear electrical module. Extend flaps to the 30-unit position and make sure that aural warning horn sounds continuously.

(i) Release the ENG EPR > 1.6 switch on the engine accessory module.

(j) AR LV-JMW thru LV-JMZ, LV-JND, and LV-JNE;
NH JA8401 thru JA8411;
TM CR-BAA and CR-BAB;
Retract flaps to the 15-unit position and make sure that aural warning horn stops sounding.

(k) AR ALL EXCEPT LV-JMW thru LV-JMZ, LV-JND, and LV-JNE;
NH ALL EXCEPT JA8401 thru JA8411;
TM ALL EXCEPT CR-BAA and CR-BAB;
Retract flaps to the 10-unit position and make sure that aural warning horn stops sounding.

(l) Remove the copper shield.

(m) Place landing gear lever in OFF position.

(n) Hold copper shield between nose gear downlock sensor and downlock sensor actuator. At the same time, hold slug near sensitive face of nose gear uplock sensor. Make sure that the following lights are on: left main gear red warning light, left main gear green indicator light, right main gear red warning light and right main gear green indicator light. Make sure that the following lights are off: nose gear red warning light and nose gear green indicator light.

(o) Retard throttle No. 1 to idle stop. Make sure that nose gear red warning light comes on and aural warning horn sounds.

(p) Depress warning horn reset switch on control stand. Make sure that horn stops sounding and nose gear red warning light remains on.
(q) Remove slug from nose gear uplock sensor.
(r) Remove shield from nose gear downlock sensor.
(s) Hold slug near the sensitive face of right main gear uplock sensor.
(t) Hold copper shield between right main gear downlock sensor and sensor actuator.
(u) Advance throttle No. 1 all the way forward. Make sure that the following lights are on: left main gear red warning light, left main gear green indicator light, nose gear red warning light, nose gear green indicator light. Make sure that the following lights are off: right main gear red warning light and right main gear green indicator light.
(v) Retard throttle No. 2 to idle stop. Make sure that right main gear red warning light comes on and that aural warning horn sounds.
(w) Retard throttle No. 2 to a position less than 7 degrees above idle stop. Make sure that right main gear red warning light comes on and that aural warning horn sounds.
(x) Depress warning horn reset switch. Make sure that aural warning horn stops sounding and right main gear red warning light remains on.
(y) Advance throttle No. 2 all the way forward.
(z) Remove slug and shield from right main gear and repeat steps (r) thru (t) for left main gear. Make sure the following lights are on: right main gear red warning light, right main gear green indicator light, nose gear red warning light, and nose gear green indicator light. Make sure the following lights are off: left main gear red warning light and left main gear green indicator light.
(aa) Retard throttle No. 1 to less than 7 degrees above idle stop. Ensure the left main gear red warning light comes on and the aural warning horn sounds.
(ab) Retract flaps to the full up position. Ensure aural warning horn stops sounding.
(ac) Remove slug and copper shield.
(ad) Set the parking brake.
(ae) Depressurize hydraulic systems A and B (AMM 29-11-0 and AMM 29-12-0).

(3) AR LV-JMW thru LV-JMZ;
Test takeoff warning function of landing gear electrical module
(a) Pressurize hydraulic systems A and B (AMM 29-11-0 and AMM 29-12-0).
(b) Make sure that flaps are in full up position.
(c) Advance a throttle to a position more than 25 degrees above idle stop. Make sure warning horn sounds.

(d) Press AIR SENSING TEST switch on front of landing gear electrical module. Make sure warning horn stops sounding and that air sensing ON-IN-FLIGHT light on front of landing gear module comes on.

(e) Retard throttle and release AIR SENSING TEST switch. Make sure that air sensing ON-IN-FLIGHT light goes off.

(f) Depressurize hydraulic systems A and B (AMM 29-11-0 and AMM 29-12-0).

(4) AR ALL EXCEPT LV-JMW thru LV-JMZ;
Test takeoff warning function of landing gear electrical module .

(a) Pressurize hydraulic systems A and B (AMM 29-11-0 and AMM 29-12-0).

(b) Make sure that flaps are in full up position.

(c) Advance a throttle to a position more than 25 degrees above idle stop. Make sure interrupted warning horn sounds.

(d) Extend flaps to full down. As flaps extend, make sure warning horn stops sounding as flaps extend to the 1-unit position, remains silent as flaps extend to the 25-unit position, and sounds as flaps extend more than the 25-unit position.

(e) Press AIR SENSING TEST switch on front of landing gear electrical module. Make sure warning horn stops sounding and that ON-IN-FLIGHT light on front of landing gear electrical module comes on.

(f) Retard throttle and release AIR SENSING TEST switch. Make sure that ON-IN-FLIGHT light goes off.

(g) Depressurize hydraulic systems A and B (AMM 29-11-0 and AMM 29-12-0).

(5) Test antiskid function of landing gear electrical module.

(a) Make sure that the following circuit breakers on P6 panel are closed:
1) ANTISKID TEST
2) OUTBOARD ANTISKID
3) INBOARD ANTISKID

(b) Make sure that wheel chocks are in place and release parking brake. Make sure that lights on front of landing gear electrical module and antiskid module are off.

<u>NOTE</u>: Disregard the antiskid lights in control cabin for this test.

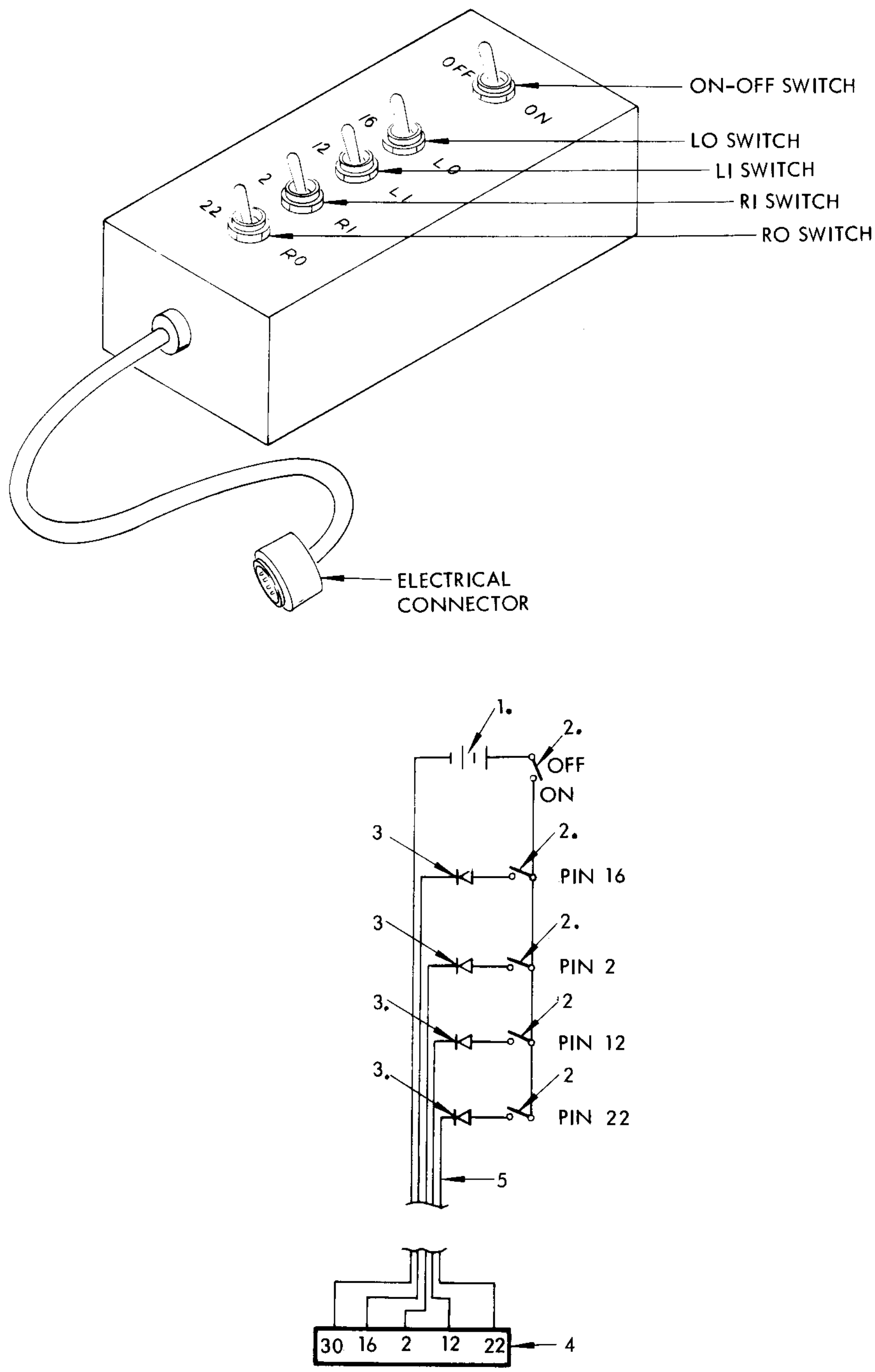
(c) Push SYSTEM TEST switch on front of the antiskid module to left position and then to right position. Ensure all lights on front of antiskid module remain off with switch in either left or right position.

(d) Set parking brake. Ensure parking brake light comes on and all other lights remain off.

(e) Push SYSTEM TEST switch to the left position. Make sure the right inboard and the right outboard lights come on.
(f) Release SYSTEM TEST switch. Make sure that left inboard and left outboard lights come on momentarily. All four lights should then go off.
(g) Push SYSTEM TEST switch to the right position. Make sure left inboard and left outboard lights on the module come on.
(h) Release SYSTEM TEST switch. Ensure right inboard and right outboard lights come on momentarily. All four lights should then go off.
(i) Press and hold AIR SENSING TEST switch on the front of the landing gear electrical module. Make sure that air sensing ON-IN-FLIGHT light comes on.
(j) AR LV-JMW thru LV-JMZ, LV-JND, and LV-JNE;
Make sure that right and left inboard lights on the antiskid module come on.
(k) AR ALL EXCEPT LV-JMW thru LV-JMZ, LV-JND, and LV-JNE;
Make sure that four lights on the antiskid module come on.
(l) AR ALL EXCEPT LV-JMW thru LV-JMZ, LV-JND, LV-JNE;
Release parking brake and push SYSTEM TEST switch to the left position while depressing AIR SENSING TEST switch. Make sure that right and left inboard lights on the antiskid module come on.
(m) AR LV-JMW thru LV-JMZ, LV-JND, and LV-JNE;
Push SYSTEM TEST switch on antiskid module to left then right. Make sure there is no further change to the lights on the antiskid module.
(n) Release all switches and make sure that all lights on both modules go off.

(6) AR LV-JMW thru LV-JMZ, LV-JND, and LV-JNE;
Test automatic speedbrake function of landing gear electrical module.
(a) Make sure that the following circuit breakers are closed:
1) AUTO SPEEDBRAKE
2) OUTBOARD ANTISKID
3) INBOARD ANTISKID
(b) Pressurize hydraulic systems A and B. Make sure that automatic spoilers are in DN position. Depressurize hydraulic systems A and B (AMM 29-11-0 and AMM 29-12-0).
(c) Make sure that throttles are fully retarded, antiskid system is operational, and parking brake is released.
(d) Place SPEEDBRAKE HANDLE switch in ARMED position. Make sure that speedbrake ARMED light comes on and the DO NOT ARM light is off.
(e) Connect automatic speedbrake test box (Fig. 501) to receptacle on the front of the antiskid module.
(f) Place ON-OFF switch of automatic speedbrake test box in ON position.
(g) Turn LI switch on. Make sure that speedbrake ARMED light goes off and DO NOT ARM light comes on.

(h) Turn LI switch off. Make sure that ARMED light comes on and DO NOT ARM light goes off.
(i) Turn RO switch on. Make sure that ARMED light goes off and DO NOT ARM light comes on.
(j) Turn LO switch on. Make sure that ARMED light comes on, DO NOT ARM light goes off, and the speedbrake handle moves to UP position.
(k) Turn LO and RO switches off. Ensure ARMED light goes off and DO NOT ARM light comes on.
(l) Advance one throttle to a position more than 25 degrees above idle stop. Make sure that ARMED light comes on, DO NOT ARM light goes off, and speedbrake handle moves to DN position. As speedbrake handle completes travel, make sure that ARMED light goes off.
(m) Retard throttle to idle stop and place speedbrake handle in ARMED position. Make sure that ARMED light comes on.
(n) Depress and hold speedbrake indicator test switch No. 2. Make sure that ARMED light goes off and DO NOT ARM light comes on.
(o) Release test switch. Make sure that ARMED light comes on and DO NOT ARM light goes off.
(p) Open OUTBOARD ANTISKID circuit breaker. Make sure that ARMED light remains on and DO NOT ARM light remains off.
(q) Open INBOARD ANTISKID circuit breaker. Make sure that ARMED light goes off and DO NOT ARM light comes on.
(r) Close OUTBOARD ANTISKID circuit breaker. Make sure that ARMED light comes on and DO NOT ARM light goes off.
(s) Close INBOARD ANTISKID circuit breaker. Make sure that ARMED light remains on and DO NOT ARM light remains off.
(t) Depress and hold speedbrake indicator test switch No. 1. Make sure that ARMED light goes off and DO NOT ARM light comes on.
(u) Release test switch. Ensure ARMED light comes on and DO NOT ARM light goes off.
(v) Depress and hold speedbrake indicator test switch No. 3. Ensure ARMED light goes off and DO NOT ARM light comes on.
(w) Release test switch. Ensure ARMED light comes on and DO NOT ARM light goes off.
(x) Turn RI switch on. Ensure ARMED light goes off and DO NOT ARM light comes on.
(y) Turn RI switch off. Ensure ARMED light comes on and DO NOT ARM light goes off.



1. 9-1/2 VOLTS MERCURY BATTERY (ONE REQUIRED)
2. SINGLE POLE SINGLE THROW SWITCH (FIVE REQUIRED)
3. DIODE, 1N4384 (FOUR REQUIRED)
4. CONNECTOR, BACC45FT18-31P OR EQUIVALENT (ONE REQUIRED)
5. WIRE, AS REQUIRED

Automatic Speed Brake Test Box
Figure 501

(z) Turn LO switch on. Ensure ARMED light goes off and DO NOT ARM light comes on.
(aa) Turn LO switch off. Ensure ARMED light comes on and DO NOT ARM light goes off.
(ab) Place speedbrake handle in DN position. Make susre that ARMED light goes off and DO NOT ARM light remains off.
(ac) Place test box ON-OFF switch in OFF position and remove plug from receptacle on front of antiskid module.

(7) AR ALL EXCEPT LV-JMW thru LV-JMZ, LV-JND, LV-JNE;
Test automatic speedbrake function of landing gear electrical module.
(a) Make sure that the following circuit breakers on panel P6 are closed:
1) AUTO SPEEDBRAKE
2) OUTBOARD ANTISKID
3) INBOARD ANTISKID
(b) Pressurize hydraulic systems A and B. Make sure that automatic spoilers are in DN position. Depressurize hydraulic systems A and B (AMM 29-11-0 and AMM 29-12-0).
(c) Make sure that throttles are fully retarded and antiskid system is operational.
(d) Make sure that wheel chocks are in place and release parking brake.
(e) Place SPEED BRAKE HANDLE switch in ARMED position. Make sure that speed brake ARMED light comes on and DO NOT ARM light is off.
(f) Connect antiskid/autobrake tester to receptacle on front of antiskid module.
(g) Set tester master switch to ON position.
(h) Set tester wheel speed LO, LI, RO, and RI switches to OFF position.
(i) Set tester wheel speed velocity switch to VEL position.
(j) Set tester wheel speed velocity potentiometer to a position greater than 62 knots.

NOTE: Disregard all lights on the tester and all antiskid and autobrake lights in the control cabin for this test.

(k) Place tester wheel speed LI switch in ON position. Make sure that speed brake ARMED light goes off and DO NOT ARM light comes on.
(l) Place tester wheel speed LI switch in OFF position. Make sure that ARMED light comes on and DO NOT ARM light goes off.
(m) Place tester wheel speed RO switch in ON position. Make sure that ARMED light goes off and DO NOT ARM light comes on.
(n) Place tester wheel speed LO switch in ON position. Make sure that ARMED light comes on, DO NOT ARM light goes off, and speed brake handle moves to UP position.
(o) Place tester wheel speed LO and RO switches in OFF position. Make sure that ARMED light goes off and DO NOT ARM light comes on.

(p) Advance one throttle to a position more than 34 degrees above idle stop. Make sure that ARMED light comes on, DO NOT ARM light goes off, and speed brake handle moves to DN position. As speed brake handle completes travel, make sure that ARMED light goes off.
(q) Retard throttle to idle stop and place speed brake handle in ARMED position. Ensure ARMED light comes on.
(r) Depress and hold speed brake indicator test switch No. 2. Make sure that ARMED light goes off and DO NOT ARM light comes on.
(s) Release test switch. Ensure ARMED light comes on and DO NOT ARM light goes off.
(t) Open OUTBOARD ANTISKID circuit breaker. Ensure ARMED light remains on and DO NOT ARM light remains off.
(u) Open INBOARD ANTISKID circuit breaker. Ensure ARMED light goes off and DO NOT ARM light comes on.
(v) Close OUTBOARD ANTISKID circuit breaker. Ensure ARMED light comes on and DO NOT ARM light goes off.
(w) Close INBOARD ANTISKID circuit breaker. Ensure ARMED light remains on and DO NOT ARM light remains off.
(x) Depress and hold speed brake indicator test switch No. 1. Ensure ARMED light goes off and DO NOT ARM light comes on.
(y) Release test switch. Ensure ARMED light comes on and DO NOT ARM light goes off.
(z) Depress and hold speed brake indicator test switch No. 3. Ensure ARMED light goes off and DO NOT ARM light comes on.
(aa) Release test switch. Ensure ARMED light comes on and DO NOT ARM light goes off.
(ab) Place tester wheel speed RI switch in ON position. Ensure ARMED light goes off and DO NOT ARM light comes on.
(ac) Place tester wheel speed RI switch in OFF position. Ensure ARMED light comes on and DO NOT ARM light goes off.
(ad) Place tester wheel speed LO switch in ON position. Ensure ARMED light goes off and DO NOT ARM light comes on.
(ae) Place tester wheel speed LO switch in OFF position. Ensure ARMED light comes on and DO NOT ARM light goes off.
(af) Press and then release GROUND SENSING TEST switch on the front of the landing gear electrical module. Make sure that ARMED light goes off and remains off for 2 to 6 seconds after switch is released and then comes on. Make sure that DO NOT ARM light comes on and remains on for 2 to 6 seconds after switch is released and then goes off.

(ag) Press and then release AIR SENSING TEST switch. Make sure that ARMED light goes off and remains off for 2 to 6 seconds after switch is released and then comes on. Make sure that DO NOT ARM light comes on and remains on for 2 to 6 seconds after switch is released and then goes off.
(ah) Place speed brake handle in DN position. Ensure ARMED light goes off and DO NOT ARM light remains off.
(ai) Place tester master switch in OFF position and disconnect tester from antiskid module.

(8) Test stall warning function of landing gear electrical module.
(a) Check that STALL WARNING DC & STALL WARNING AC circuit breakers on panel P18, 28 VOLT DC NO. 1 ELECTRONIC BUS and NO. 1 ELECTRONIC AC BUS circuit breakers on panel P6 are closed. Check that stall warning OFF light in panel P5 is on.
(b) Press AIR SENSING TEST switch on the front of landing gear electrical module. Check that stall warning OFF light goes off.
(c) Release AIR SENSING TEST switch and check that stall warning OFF light comes on.
(d) Press the GROUND SENSING TEST switch on the landing gear electrical module. Check that stall warning OFF light goes off.
(e) Release the GROUND SENSING TEST switch and make sure that stal1 warning OFF light comes on.

(9) Test landing gear control lever lock function of landing gear electrical module.
(a) Check that LEVER LATCH and PRESS WARN, TEST, and INDICATOR LIGHTS circuit breakers on P6 panel are closed.
(b) Check that landing gear control lever is in DN position.
(c) Hold a slug against the sensitive surface of the air sensing sensor. Make sure that lever lock solenoid energizes and that landing gear control lever moves freely to UP without using override trigger.
(d) Remove slug from sensor and return landing gear control lever to DN position.

(10) Test flight recorder function of landing gear electrical module.
(a) Check that standby bus power ac and No. 1 transfer bus circuit breakers on panel P6 and flight recorder circuit breakers on P18 panel are closed. Check that FLIGHT RECORDER FAILURE light is on.
(b) Press the GROUND SENSING TEST switch on the landing gear electrical module. Check that FLIGHT RECORDER FAILURE light goes off.
(c) Release GROUND SENSING TEST switch. Check that FLIGHT RECORDER FAILURE light comes on.

(11) Test electrical system function of landing gear electrical module.
(a) Make sure that the following circuit breakers located on panel P6 are closed:
1) APU CONTROL

2) TRANSFER BUS DC INDICATION
3) No. 1 TRANSFER CONTROL
4) No. 2 TRANSFER CONTROL
5) GENERATOR CONTROL HOT BATTERY
6) FUELING and EXTERNAL CONTROL HOT BATTERY
7) No. 1 GENERATOR CONTROL
8) No. 2 GENERATOR CONTROL
9) APU GENERATOR CONTROL

(b) Check that ground power switch located on panel P5 is turned to ON position.
(c) With ground power supplying the electrical system and APU running, press the APU Generator No. 1 switch located on panel P5 to ON position and release.
(d) Make sure that APU Generator No. 2 BUS OFF light remains on. APU Generator No. 1 BUS OFF, APU Generator No. 1 TRANSFER BUS OFF, and APU Generator No. 2 TRANSFER BUS OFF lights located on panel P5 go off.
(e) Press and hold GROUND SENSING TEST switch on landing gear electrical module.
(f) Press APU Generator No. 2 switch located on panel P5 to ON position and release. Make sure that lights located on panel P5 are not affected.
(g) Ensure APU Generator No. 2 BUS OFF light goes off.
(h) Release GROUND SENSING TEST switch and press APU Generator No. 2 switch to ON position and release.

(12) Test APU fire horn function of landing gear electrical module.
(a) Make sure that the following circuit breakers on P6 panel are closed:
1) APU FIRE DETECTION
2) AURAL MASTER WARNING AND CONTROL
(b) Press and hold FIRE TEST switch on P8 module in FIRE position. Make sure that APU fire warning horn in main gear wheel well sounds. Make sure that APU remote fire light flashes intermittently.
(c) Press and hold AIR SENSING TEST switch on landing gear electrical module. Make sure that APU fire warning horn stops sounding but APU remote fire light continues to flash.
(d) Release both test switches. Make sure that horn remains silent and APU remote fire light stops flashing.

(13) Test air conditioning turbofan function of landing gear electrical module.
(a) Make sure that the following circuit breakers on the P6 pa el are closed:
1) OVERHEAT
2) LEFT RAM AIR ACTUATOR
3) RIGHT RAM AIR ACTUATOR
(b) Pressurize hydraulic systems A and B (AMM 29-11-0 and AMM 29-12-0).
(c) Extend flaps to the 15-unit position.

(d) Press and hold GROUND SENSING TEST switch on front of the landing gear electrical module. Ensure ram air inlet deflector retracts.
(e) Release GROUND SENSING TEST switch. Ensure ram air inlet deflector extends.
(f) Retract flaps fully.
(g) Depressurize hydraulic systems A and B (AMM 29-11-0 and AMM 29-12-0).

(14) Test wing anti-ice function of landing gear electrical module.
(a) Make sure that the following circuit breakers on P18 panel are closed:
1) ENG NO. 1 & WING ANTI-ICE VALVE
2) ENG NO. 2 & WING ANTI-ICE VALVE
3) ENG NO. 1 WING ANTI-ICE CONT
(b) Turn on wing anti-ice switch on P5 panel. Make sure that left and right wing anti-ice VALVE OPEN lights on P5 panel come on.
(c) Press and hold GROUND SENSING TEST switch on the landing gear electrical module. Make sure that both right and left wing anti-ice VALVE OPEN lights become dim.
(d) Release GROUND SENSING TEST switch. Make sure that VALVE OPEN lights become bright.

(15) Test hydraulic system interconnect valve function of landing gear electrical module.
(a) Make sure that GROUND INTERCONNECT VALVE circuit breaker on P6 panel is closed.
(b) Set parking brake.
(c) Place GROUND INTERCONNECT VALVE switch on P5 panel to OPEN position. Ensure interconnect valve opens.
(d) Release parking brake. Ensure interconnect valve closes.
(e) Reset parking brake. Ensure interconnect valve opens.
(f) Press and hold GROUND SENSING TEST switch on landing gear electrical module. Ensure interconnect valve closes.
(g) Release GROUND SENSING TEST switch. Ensure interconnect valve opens.

(16) Test thrust reverser function of landing gear electrical module.
(a) Make sure that LIGHTS circuit breaker located on panel P6 is closed.
(b) Make sure that the following circuit breakers located on panel P6 are closed:
1) ENGINE - 1 THRUST REVERSER

2) ENGINE - 2 THRUST REVERSER

(c) Connect a voltmeter from ground to pin 13 of J2 test receptacle No. 1 located on the front of engine accessory module.

(d) Make sure that voltmeter indicates approximately 28 volts dc.

(e) Release AIR SENSING TEST switch and ensure voltmeter indicates approximately 5 volts dc.

(f) Disconnect voltmeter from J2-13.

(g) Repeat steps (c) thru (g) using J3-13 instead of J2-13. Results should be the same.

(17) Test cabin pressurization control function of landing gear electrical module.

(a) Make sure that the following circuit breakers on the P6 panel are closed:

1) AUTO AC POWER
2) AUTO DC POWER
3) MANUAL AC POWER
4) MANUAL DC POWER
5) STANDBY AC POWER
6) STANDBY DC POWER

(b) Set first officer's altimeter located on panel P3 to maximum (31.01 inches).

(c) Set pressurization switch on the P5 panel in STANDBY position.

(d) Set cabin altitude to -990 feet on pressurization selector panel. Make sure that outflow valve is open.

(e) Press and hold GROUND SENSING TEST switch on landing gear electrical module. Make sure that outflow valve closes.

(f) Release GROUND SENSING TEST switch. Make sure that outflow valve opens.

(18) Test voice recorder function of landing gear electrical module (if installed).

(a) Make sure that VOICE RECORDER circuit breaker on P6 panel is closed.

(b) Make sure that parking brake is set.

(c) Monitor voice recorder control unit with headset.

(d) Press and hold the erase switch on P5 panel for 5 seconds. Make sure that a loud tone is heard when switch is released.

(e) Press and hold GROUND SENSING TEST switch on landing gear module.

(f) Press and hold the erase switch for 2 seconds. Make sure that no tone is heard.

(g) Release GROUND SENSING TEST switch.

(h) Release parking brake.

(i) Repeat step (f). Result should be the same.

(j) Set parking brake.

(19) 737-287C;
Test flap load limiter function of landing gear electrical module.

(a) Make sure that FLAP LOAD LIMITER circuit breaker on P6 panel is closed.

(b) Position flap handle in any position except 40 units.

(c) Set FLAP LOAD LIMITER TEST switch in TEST position. Switch is located at station 350 near the equipment rack light. Check that load limiter test light comes on.
(d) Press GROUND SENSING TEST switch on front of landing gear electrical module. Check that load limiter test light goes off.
(e) Release GROUND SENSING TEST switch. Check that load limiter test light comes on.
(f) Set FLAP LOAD LIMITER TEST switch in normal position. Check that load limiter test light goes off.

(20) 737-287C;
Test cargo door control function of landing gear electrical module.
(a) Make sure that MAIN CARGO DOOR CONTROL circuit breaker on P6 load control panel is closed.
(b) Set parking brake.
(c) Pressurize hydraulic system B (AMM 29-12-0).
(d) Make sure that hatracks near the main cargo door are up and locked.
(e) Make sure that main cargo door UNLOCKED light goes off.
(f) Move the external manual lock handle to the NOT LOCKED position.
(g) Press and hold the GRD SENSING TEST switch on the landing gear electrical module.
(h) Hold cargo door switch No. 1 in the UP TO CANOPY position.
(i) Make sure that the door does not open.
(j) Release the GRD SENSING TEST switch on the landing gear electrical module.
(k) Make sure that the door starts to open.
(l) Press and hold the GRD SENSING TEST switch on the landing gear electrical module.
(m) Make sure that the door stops.
(n) Release the parking brake and then release the GRD SENSING TEST switch.
(o) Make sure that the door does not move.
(p) Put cargo door switch No. 1 in the OFF position.
(q) Set the parking brake.
(r) Fully close the door.
(s) Move the external manual lock handle to the LOCKED position.
(t) Depressurize hydraulic system B (AMM 29-12-0).

(21) AR ALL EXCEPT LV-JMW thru LV-JMZ, LV-JND, LV-JNE;
Test automatic braking function of landing gear electrical module.
(a) Make sure that the following circuit breakers and all circuit breakers under INDICATOR LIGHTS MASTER DIMMING BUS located on P6 panel are closed:
1) LANDING GEAR - LIGHTS

2) LANDING GEAR - ANTISKID TEST
3) ANTISKID FAILURE WARNING AND PARKING BRAKE

(b) Make sure that the following circuit breakers located on P6 panel are closed:
1) OUTBOARD ANTISKID
2) INBOARD ANTISKID
3) AUTOBRAKES CONTR
4) AUTOBRAKES FAIL WARN
5) AUTOBRAKES PRESS COMPTR

(c) Turn AUTOBRAKE switch located on pilots' center panel to MIN position.
(d) Place speed brake handle in DN position.
(e) Make sure that throttles are fully retarded and antiskid system is operational.
(f) Make sure that wheel chocks are in place and release parking brake.
(g) Connect antiskid/autobrake tester to receptacle on front of antiskid module.
(h) Set tester master switch to ON position.
(i) Set tester wheel speed LO, LI, RO, and RI switches to OFF position.
(j) Set tester wheel speed velocity switch to VEL position.
(k) Set tester wheel speed velocity potentiometer to a position greater than 62 knots.
(l) Place speed brake handle in ARMED position.

NOTE: Disregard all lights on the tester and all antiskid and autobrake lights in the control cabin for this test.

(m) Open LANDING GEAR - LIGHTS circuit breaker.
(n) Place tester wheel speed RI switch in ON position. Press S1 TEST switch on front of autobrake control module and make sure that DS3 A/B NOT RST light on autobrake control module remains off.
(o) Place tester wheel speed RI switch in OFF position. Press S1 TEST switch and make sure that DS3 A/B NOT RST light remains off.
(p) Place tester wheel speed LO switch in ON position. Press S1 TEST switch and make sure that DS3 A/B NOT RST light remains off.
(q) Place tester wheel speed LO switch in OFF position. Press S1 TEST switch and make sure that DS3 A/B NOT RST light remains off.
(r) Place tester wheel speed LI switch in ON position. Press S1 TEST switch and make sure that DS3 A/B NOT RST light remains off.
(s) Place tester wheel speed LI switch in OFF position. Press S1 TEST switch and make sure that DS3 A/B NOT RST light remains off.

(t) Place tester wheel speed RO switch in ON position. Press S1 TEST switch and make sure that DS3 A/B NOT RST light remains off.
(u) Place tester wheel speed RO switch in OFF position. Press S1 TEST switch and make sure that DS3 A/B NOT RST light remains off.
(v) Place tester wheel speed RI and LI switches in ON position. Make sure that speed brake handle moves to UP position. Press S1 TEST switch and make sure that DS3 A/B NOT RST light remains off.
(w) Place tester wheel speed RI and LI switches in OFF position. Press S1 TEST switch and make sure that DS3 A/B NOT RST light comes on.
(x) Place speed brake handle in DN position. Press S1 TEST switch and make sure that DS3 A/B NOT RST light remains off.
(y) Place speed brake handle in ARMED position. Press S1 TEST switch and make sure that DS3 A/B NOT RST light remains off.
(z) Place tester wheel speed RI and LO switches in ON position. Press S1 TEST switch and make sure that DS3 A/B NOT RST light remains off.
(aa) Place tester wheel speed RI and LO switches in OFF position. Press S1 TEST switch and make sure that DS3 A/B NOT RST light comes on.
(ab) Place speed brake handle in DN position. Press S1 TEST switch and make sure that DS3 A/B NOT RST light remains off.
(ac) Place speed brake handle in ARMED position. Press S1 TEST switch and make sure that DS3 A/B NOT RST light remains off.
(ad) Place tester wheel speed RO and LI switches in ON position. Press S1 TEST switch and make sure that DS3 A/B NOT RST light remains off.
(ae) Place tester wheel speed RO and LI switches in OFF position. Press S1 TEST switch and make sure that DS3 A/B NOT RST light comes on.
(af) Place speed brake handle in DN position. Press S1 TEST switch and make sure that DS3 A/B NOT RST light remains off.
(ag) Place speed brake handle in ARMED position. Press S1 TEST switch and make sure that DS3 A/B NOT RST light remains off.
(ah) Place tester wheel speed RO and LO switches in ON position. Make sure that speed brake handle moves to UP position. Press S1 TEST switch and make sure that DS3 A/B NOT RST light remains off.
(ai) Place tester wheel speed RO and LO switches in OFF position. Press S1 TEST switch and make sure that DS3 A/B NOT RST light comes on.
(aj) Place tester wheel speed RI switch in ON position. Press S1 TEST switch and make sure that DS3 A/B NOT RST light remains off.
(ak) Place tester wheel speed RI switch in OFF position. Press S1 TEST switch and make sure that DS3 A/B NOT RST light comes on.

(al) Place tester wheel speed LO switch in ON position. Press S1 TEST switch and make sure that DS3 A/B NOT RST light remains off.
(am) Place tester wheel speed LO switch in OFF position. Press S1 TEST switch and make sure that DS3 A/B NOT RST light comes on.
(an) Place tester wheel speed LI switch in ON position. Press S1 TEST switch and make sure that DS3 A/B NOT RST light remains off.
(ao) Place tester wheel speed LI switch in OFF position. Press S1 TEST switch and make sure that DS3 A/B NOT RST light comes on.
(ap) Place tester wheel speed RO switch in ON position. Press S1 TEST switch and make sure that DS3 A/B NOT RST light remains off.
(aq) Place tester wheel speed RO switch in OFF position. Press S1 TEST switch and make sure that DS3 A/B NOT RST light comes on.
(ar) Close LANDING GEAR - LIGHTS circuit breaker. Press S1 TEST switch and make sure that DS3 A/B NOT RST light remains off.
(as) Place speed brake handle in DN position.
(at) Disconnect tester from antiskid module.

E. Restore Airplane to Normal
(1) Remove throttle position protractor.
(2) Determine if there is further need for electrical power on airplane, if not, shut down sources.
(3) Determine if there is further need for hydraulic power on airplane, if not, remove systems A and B hydraulic power (AMM 29-11-0 and AMM 29-12-0).

LANDING GEAR SAFETY SENSORS - DESCRIPTION AND OPERATION

1. General
   A. The landing gear safety sensors provide signals to solid state circuits in the landing gear electrical module to energize or de-energize the safety relays depending upon whether the airplane is airborne or on the ground. The sensors are mounted near the ground spoiler (lockout) valve above the right main gear (Fig. 1). The sensors are proximity switches that sense the presence or the absence of a metal actuator. A double-paddle metal actuator to actuate the sensors is connected to the spoiler valve linkage. The spoiler valve linkage is operated through a teleflex cable by extension and compression movement of the shock strut. Linkage movement positions the actuator near or away from the respective sensor to provide the appropriate signal to the landing gear electrical module.
   B. For the nose gear air ground switch, you can find the information in the Thrust Reverser Control System - Description and Operation (Ref 78-34-01).

LANDING GEAR SAFETY SENSORS - REMOVAL/INSTALLATION

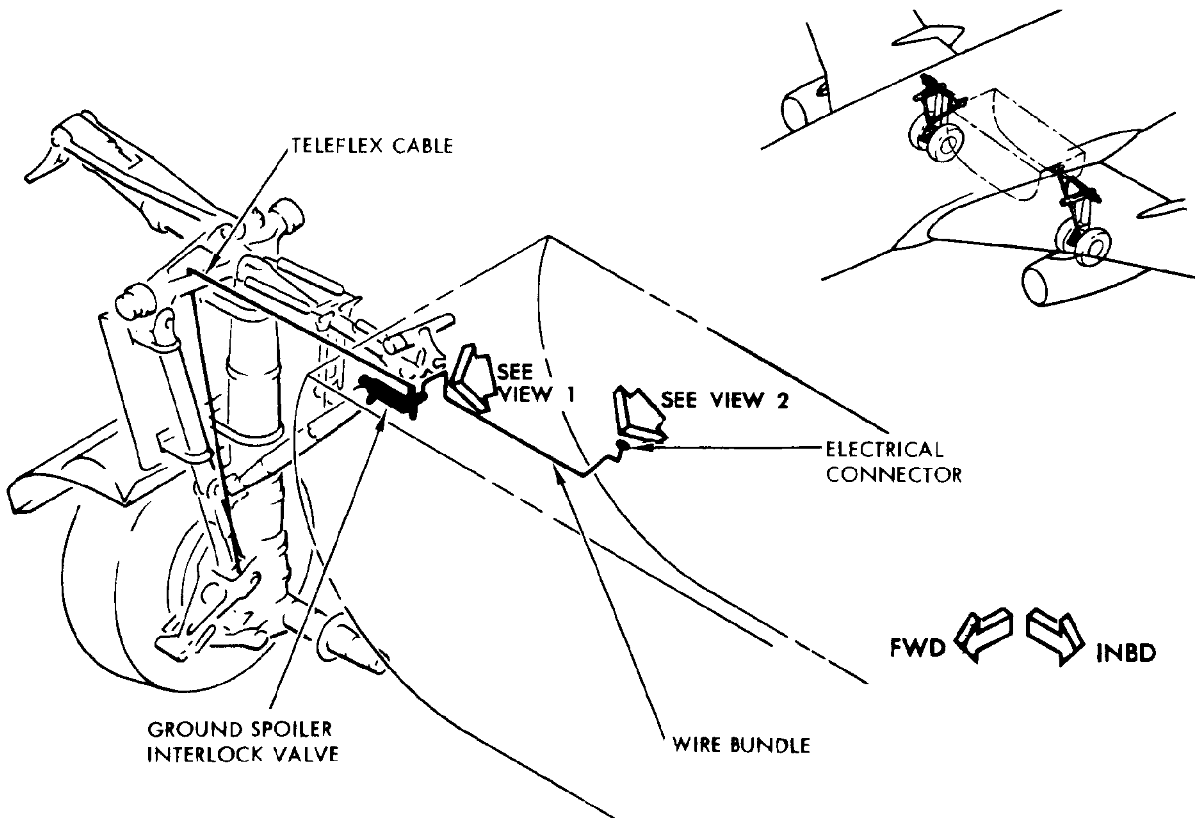
1. General
   A. The landing gear safety sensors provide electrical control of certain systems of the airplane. When performing maintenance on the safety sensors, the systems controlled by air-ground sensing should be shut down (Ref 32-00, Landing Gear Air-Ground Sensing).
   B. The landing gear ground and air safety sensors are attached to the ground spoiler interlock valve support. The removal and installation procedures are the same for either sensor (Fig. 401).
   C. For the airplanes with the nose landing gear air ground switch, you can find the removal/installation for this switch in 78-34-61.
2. Equipment and Material
   A. Ground Lock Assemblies - F72735 (Ref 32-00-01)
3. Remove Landing Gear Safety Sensors
   A. Open all circuit breakers on landing gear circuit breaker panel (P6-2).
   B. Check that ground lock assemblies are installed in all landing gear (Ref 32-00-01).
   C. Remove sensor from mounting bracket (Fig. 401).
   D. Remove sensor lead clamp from ground spoiler interlock valve bracket.
   E. Remove sensor leads from wire bundle.
   F. Disconnect electrical connector at body station 675 right and remove sensor pin contacts from connector insert.

      NOTE: Mark or record pin location of color coded leads for installation of new sensor.

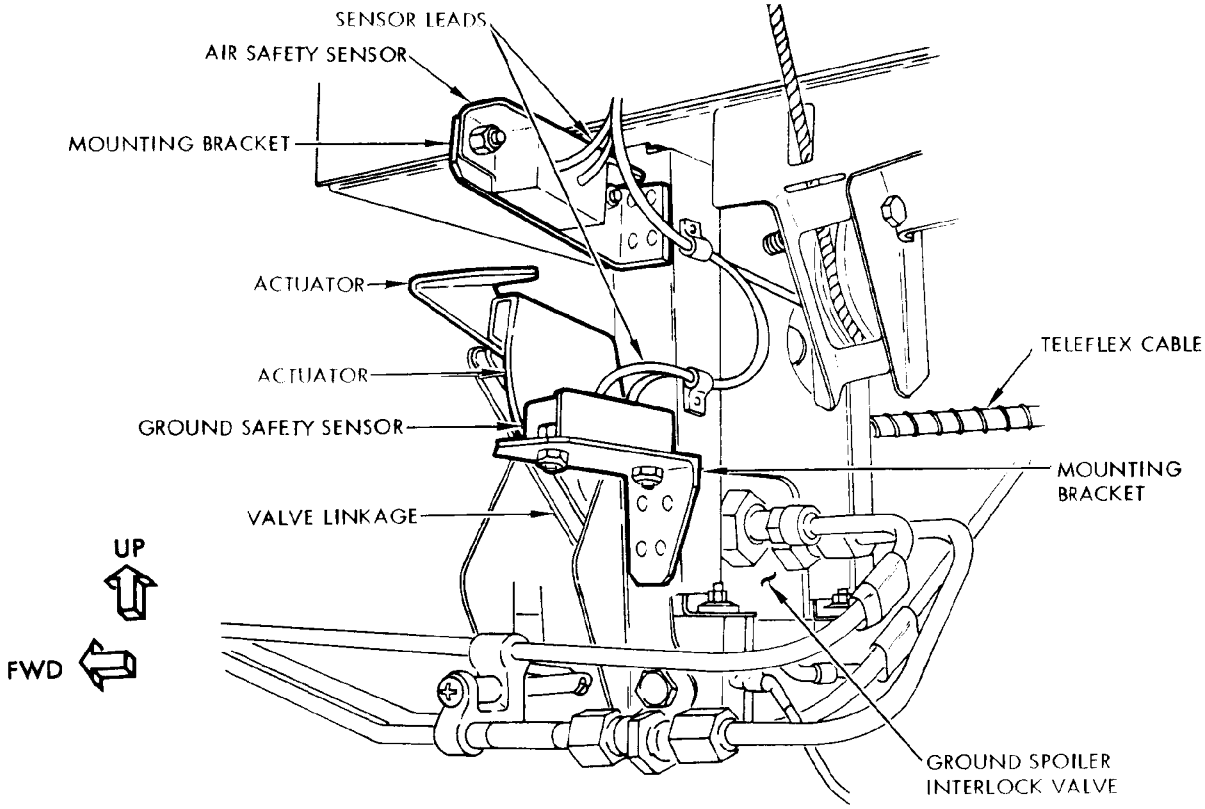
4. Install Landing Gear Safety Sensors
   A. Check that all circuit breakers on landing gear circuit breaker panel (P6-2) are open.
   B. Check that gear ground lockpins are installed in all landing gear.
   C. Position landing gear safety sensor in place on mounting bracket but do not tighten mounting bolts (Fig. 401).

      NOTE: Check that mounting bolts for air safety (upper) sensor are installed with head forward.

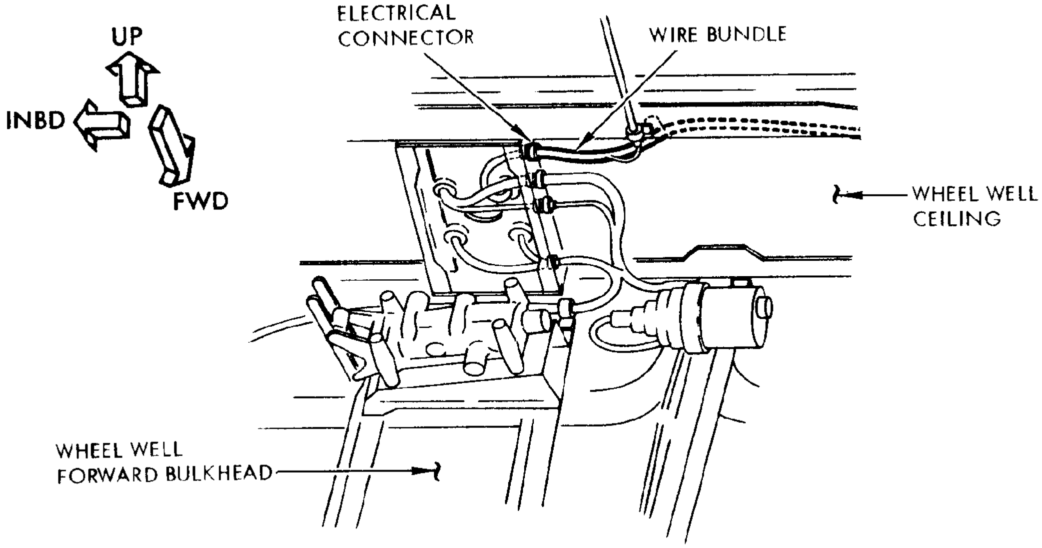
   D. Thread sensor leads through clamp and install clamp on ground spoiler interlock valve bracket.
   E. Twist sensor leads together and insert leads in wire bundle. Tie and clamp wire bundle.
   F. Trim sensor leads to length, install pin contacts on lead ends, and install pin contacts in connector insert in correct pin locations as noted in par. 3.F.
   G. Connect electrical connector.
   H. Adjust and test sensor in accordance with adjustment/test procedure.



Landing Gear Safety Sensors Installation
Figure 401 (Sheet 1)



VIEW 1



VIEW 2

Landing Gear Safety Sensors Installation
Figure 401 (Sheet 2)

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LANDING GEAR SAFETY SENSORS - ADJUSTMENT/TEST

1. Landing Gear Safety Sensor Adjustment
   A. Landing Gear Ground Safety Sensor Adjustment
      (1) Equipment and Materials
         (a) Ground Lock Assemblies - F72735, F72735-7 (Ref 32-00-01)
      (2) Adjust Landing Gear Ground Safety Sensor
         (a) With weight of airplane resting on landing gear and safety sensor protective cover in place, loosen ground safety sensor mounting bolts (Fig. 501).
         (b) Slide sensor on mounting bracket to obtain gaps in Fig. 501 between sensor face and actuator. Tighten mounting bolts.
         (c) Check that hydraulic system is depressurized (Ref 29-11-0 MP and 29-12-0 MP). Check that leading gear control lever is in DN or OFF position, main and nose landing gear are down and locked, and ground lock assemblies are installed in all gear (Ref 32-00-01).
         (d) Check that external electrical power supply is connected.
         (e) Close all circuit breakers on landing gear circuit breaker panel P6.
         (f) Check that air and ground sensing test lights on landing gear electrical module are off and landing gear control lever is prevented from being placed in UP position.
         (g) Disconnect teleflex cable at right main gear upper torsion link.
         (h) Energize air safety sensor by moving landing gear air safety sensor actuator to maintain the gap per detail A between sensor face and actuator.
         (i) Check that air and ground sensing test lights come on and control lever can be placed in UP position without use of override trigger.
         (j) Connect teleflex cable at right main gear upper torsion link.
         (k) Test operation of landing gear safety sensors.
   B. Landing Gear Air Safety Sensor Adjustment
      (1) Equipment and Materials
         (a) Ground Lock Assemblies - F72735 (Ref 32-00-01)
         (b) Rigging Pin SB-3 - 0.311 +0.000/-0.002 inch diameter, minimum length 1.5 inches (MS20392-4)
            NOTE: Rigging pin is part of F70207-3.
      (2) Adjust Landing Gear Air Safety Sensor
         (a) Check that ground lock assemblies are installed in all gear (Ref 32-00-01).
         (b) With protective cover in place, loosen air safety sensor mounting bolts (Fig. 501).
         (c) Jack airplane until all tires clear ground (Ref Chapter 7, Jacking Airplane).

(d) Install rigging pin SB-3 through ground spoiler interlock valve yoke. Check that rigging pin fits freely.
(e) Slide sensor on mounting bracket to obtain the gap per detail A between sensor face and actuator. Tighten mounting bolts.
(f) Remove rigging pin SB-3.
(g) Test operation of landing gear safety sensors.
(h) Lower airplane and remove jacks (Ref Chapter 7, Jacking Airplane).

2. Landing Gear Safety Sensors Test

A. Equipment and Material
(1) Ground Lock Assemblies - F72735 (Ref 32-00-01)
(2) Axle Jack for Right Main Landing Gear

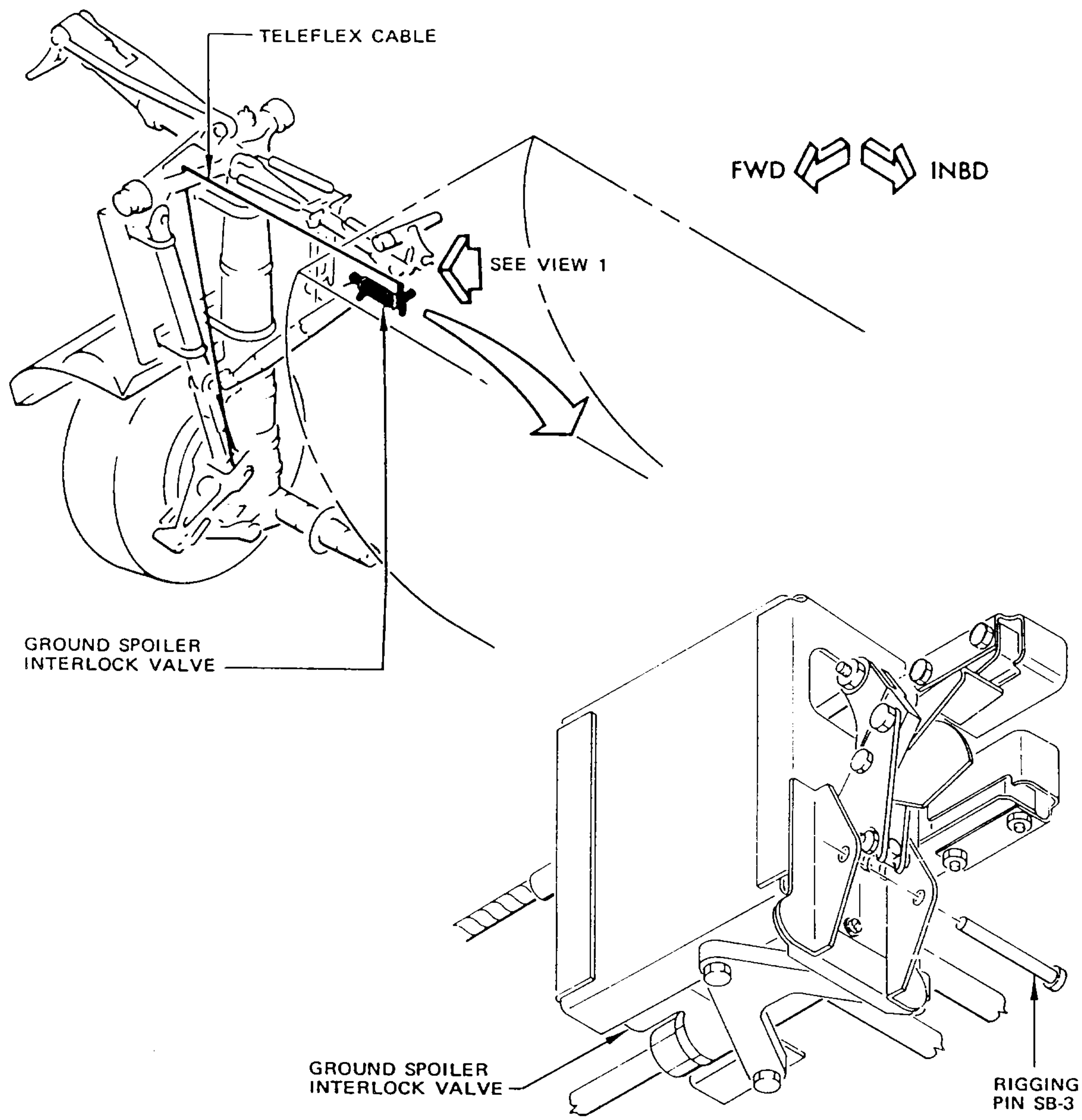
B. Prepare to Test Landing Gear Safety Sensors
(1) Jack airplane until all tires clear ground (Ref Chapter 7, Jacking Airplane).
(2) Check that hydraulic system is depressurized, landing gear control lever is in DN or OFF position, main and nose landing gear are down and locked, and ground lock assemblies are installed in all gear (Ref 32-00-01).
(3) Check that external electrical power supply is connected.
(4) Check that all circuit breakers on landing gear circuit breaker panel P6 are closed.
(5) Deflate right main gear shock strut by removing valve cap from charging valve and loosening air release nut one or two turns.

WARNING: DO NOT LOOSEN VALVE BODY UNLESS SHOCK STRUT IS COMPLETELY DEFLATED. AIR PRESSURE CAN BLOW VALVE BODY OUT, CAUSING INJURY TO PERSONNEL.

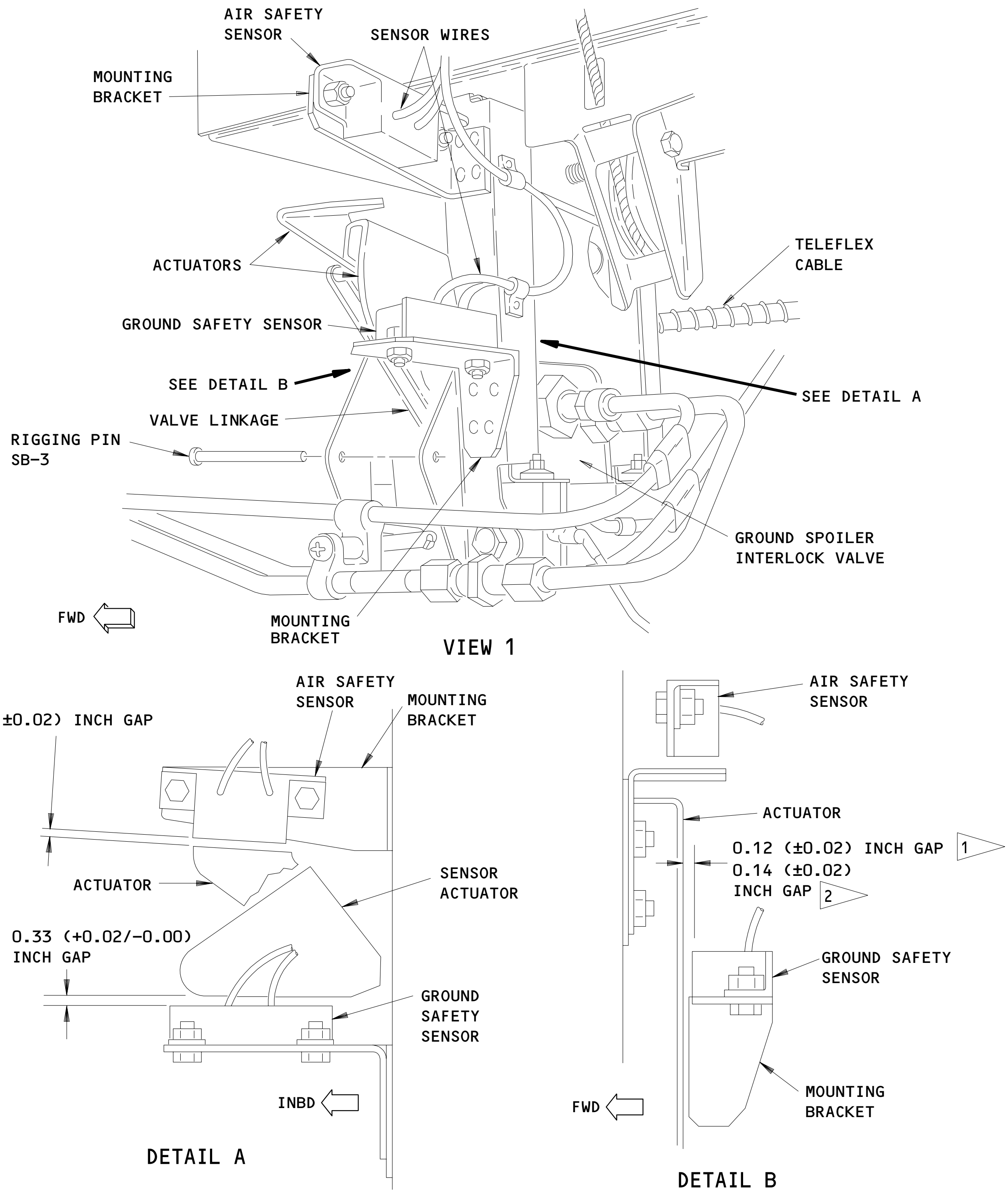
C. Test Landing Gear Safety Sensors
(1) Place landing gear control lever in UP position and check that control lever moves freely into UP position without use of override trigger.
(2) Place control lever in DN position.
(3) Place axle jack under right main gear and slowly raise jack to compress shock strut to 5.00 inches from full extension.
(a) Check that air sensing test light on landing gear electrical module goes off before the ground sensing test light.
(b) Check that control lever is prevented from being placed in UP position when air sensing test light is off.
(c) Check that ground sensing test light on landing gear electrical module goes off by the time shock strut is compressed 5.00 inches from full extension.
(4) Continue to compress shock strut and check that results listed in step (3) remain the same for all additional shock strut compression.

(5) Slowly lower jack to extend shock strut and check that ground sensing test light comes on before the air sensing light comes on.
(6) Continue to allow shock strut to extend. Check that control lever remains latched until shock strut reaches 1.75 inches from fully extended position.
(7) Continue to allow shock strut to extend by small increments and check that air sensing test light comes on and control lever can be placed in UP position without use of override trigger by the time shock strut reaches 0.50 inch from fully extended position. Results should remain the same when shock is fully extended.

D. Restore Airplane to Normal Configuration
(1) Remove axle jack from main gear.
(2) Lower airplane and remove jacks (Ref Chapter 7, Jacking Airplane).
(3) Determine if there is further need for electrical power on airplane; if not, disconnect external electrical power supply.
(4) Service right main gear shock strut (Ref Chapter 12, Main Landing Gear Shock Strut Servicing).



Landing Gear Safety Sensors Adjustment
Figure 501 (Sheet 1)



1 AIRPLANES WITH SENSOR 10-61226-3 INSTALLED

2 AIRPLANES WITH ALL OTHER SENSORS

Landing Gear Safety Sensors Adjustment
Figure 501 (Sheet 2)

MAIN GEAR - DESCRIPTION AND OPERATION

1. General
   A. Each main gear consists of a trunnion link, a shock strut, a drag strut, torsion links, a damper, a side strut, and a reaction link. (See figure 1.) In addition, the right main gear carries ground speed brake operating rods and cable.
   B. The shock strut assembly is attached to the trunnion link by a pin joint and the two are mounted between the rear wing spar and a trunnion support beam. The shock strut is charged with oil and compressed nitrogen to provide a shock absorbing medium. Main gear axles and the shock strut inner cylinder are machined from a one piece forging. Replaceable sleeves are assembled over axles to provide a mounting for wheel bearings and protect axles from damage. The reaction link is connected to the shock strut and to the upper end of the side strut. Refer to 32-32-0 for information on main gear extension and retraction.
2. Main Gear Trunnion Link
   A. The main gear trunnion link provides the forward pin of the hinge for main gear retraction and transmits landing gear loads from the drag strut into airplane structure. The trunnion link is mounted between the shock strut and the rear wing spar. (See figure 2.) The aft end of the link is pinned to the shock strut and the forward end pivots in a spherical bearing mounted in the rear wing spar. The top end of the drag strut is attached to a lug on the underside of the link, near the spherical bearing. A pushrod from a bracket on the underside of the link operates a shock strut door hinged to the wing. The door covers part of the shock strut aperture in the wing when the gear retracts. A swivel fitting for hydraulic lines is mounted on top of the link. The trunnion link is machined from a high tensile steel forging.
   B. The trunnion forward bearing bolt is designed to fail if the landing gear receives a severe impact, thus minimizing damage to structure.
3. Main Gear Shock Strut
   A. The main gear shock strut is the primary supporting member of the landing gear. The shock strut is made of steel and consists of an inner cylinder, an outer cylinder, an orifice support tube and a metering pin. (See figure 3.) The orifice support tube is attached to the top of the outer cylinder. Upper and lower bearings provide sliding surfaces and locate the inner cylinder concentric with outer cylinder. A snubber valve located below the upper bearing provides control of shock strut rebound. A packing adaptor with annular grooves is installed between the lower bearing and a spacer. A channel seal in the packing adaptor is in contact with the inner cylinder. An O-ring between two backup rings makes contact with the outer cylinder. The channel seal and the O-ring provide an air-oil seal between the cylinders. Annular grooves in the lower bearing are used to store spare O-rings. The spare rings in the lower bearing can be used to replace active seals without removing the inner cylinder. The shock strut is attached to airplane structure by an extension on the outer cylinder and by the trunnion link. The lower end of the shock strut is held in position by the side strut and the drag strut.

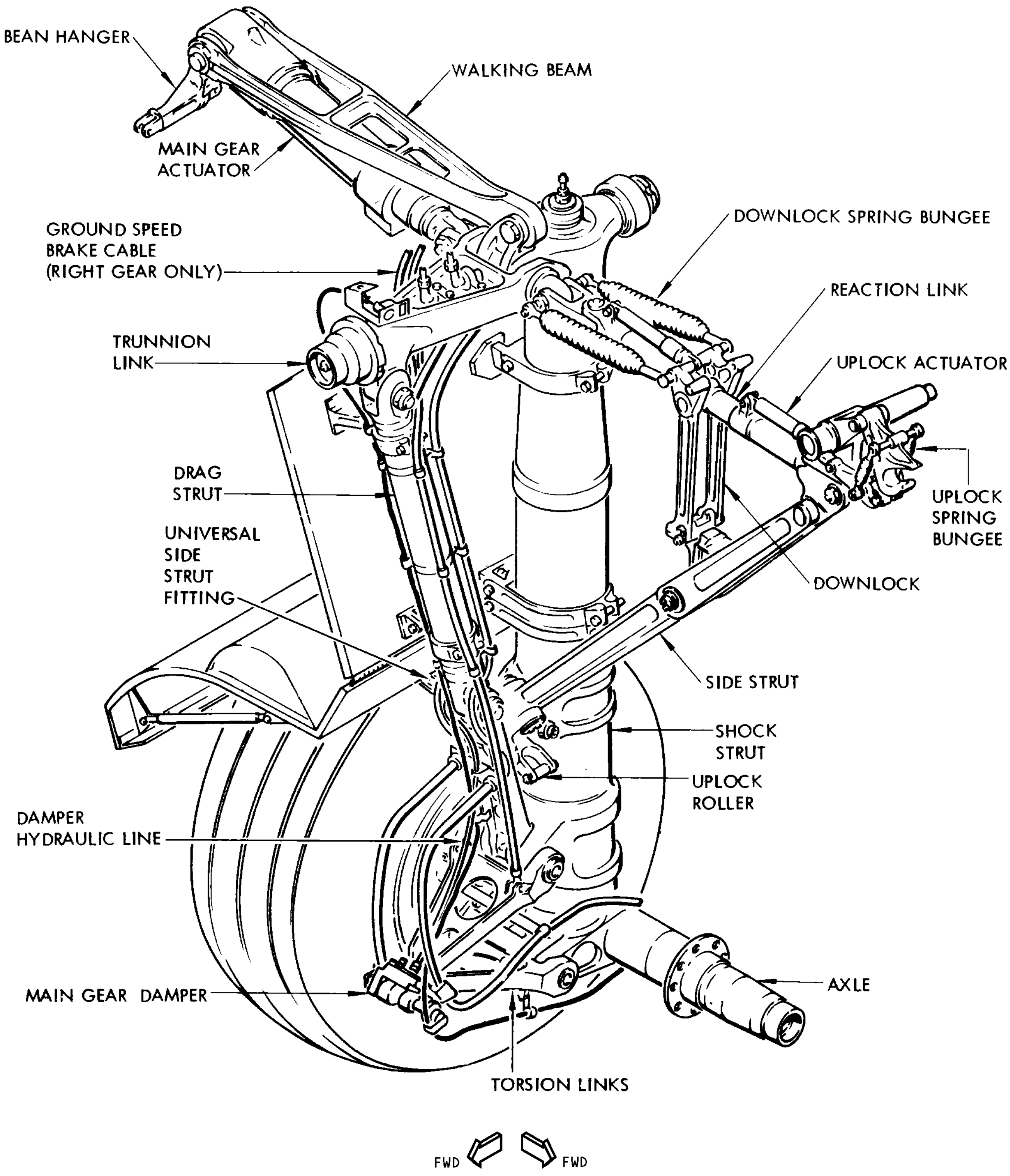
B. The outer cylinder is a single piece forging, bored to fit the inner cylinder. The upper portion provides an extension for attachment to airplane structure. (See figure 2.) A full shock strut width lug on the opposite side, provides an attachment for the trunnion link. Lugs on the lower end provide attachment points for drag strut, torsion links and universal side strut attachment. The orifice support tube projects through the top of the outer cylinder where it is secured by a nut. A charging valve is installed in the top of the orifice support tube.

C. The inner cylinder, with all lugs and the axle, including brake flanges, is machined from one forging. A diaphragm integral with the metering pin seals off the inside bore of the inner cylinder. A drain tube attached to the metering pin is secured by a nut to the underside of the inner cylinder. A drain plug or check valve is installed at the bottom of the cylinder for strut servicing. In addition to axles, the lower end of the cylinder has a towing lug and a jacking pad.

D. A snubber valve is installed on the inner cylinder, just below the upper bearing. The valve consists of an angular sectioned bronze ring that moves up and down when the shock strut operates, to act as a one way restrictor. When the shock strut is compressing, the snubber valve allows an unrestricted flow of oil from the upper chamber into the annular space between inner and outer cylinders. When the shock strut extends, the snubber valve moves up to close off holes in the upper bearing; this restricts flow from the annular space and so absorbs shock strut rebound.

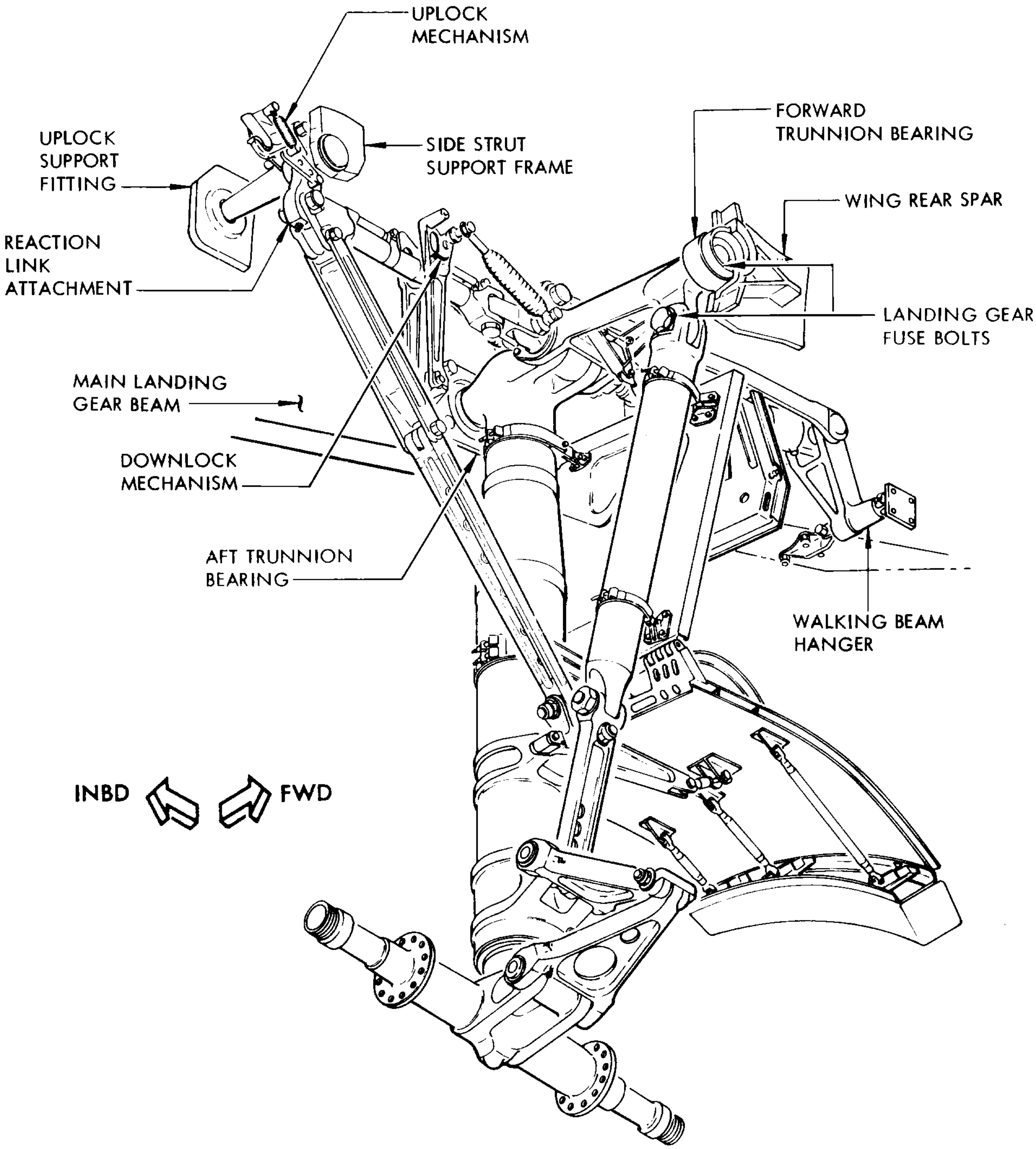
E. With the shock strut compressed and serviced with oil, the outer cylinder contains oil all around the piston rod and in the space between inner and outer cylinders. The shock strut is then inflated with nitrogen or air to the specified pressure.

F. Shocks are absorbed by the flow of hydraulic fluid through the annular space between the orifice and the tapered metering pin. As the shock strut is compressed, oil flows through the orifice and the movement of the tapered metering pin through the orifice progressively varies the area of the annular space between orifice and pin. The variation in area results in an adjusted rate of hydraulic flow from the inner cylinder chamber to the upper side of the piston, thus providing uniform control of the impact loads on the airplane structure when landing. Landing and taxi shocks are also cushioned by the increasing volume of hydraulic fluid above the piston further compressing the volume of compressed air or nitrogen in the upper end of the outer cylinder. As the shock strut extends, there is a reversal of flow through the orifice. The hydraulic fluid now being forced from the upper to the lower side of the piston must pass through the space around the metering pin, and through holes in the orifice support tube. Also, fluid in the annular space between the inner and outer cylinders is forced through the snubber valve restriction, and through the upper bearing into the upper chamber. The resulting resistance to hydraulic flow dampens the return movement of the shock strut.

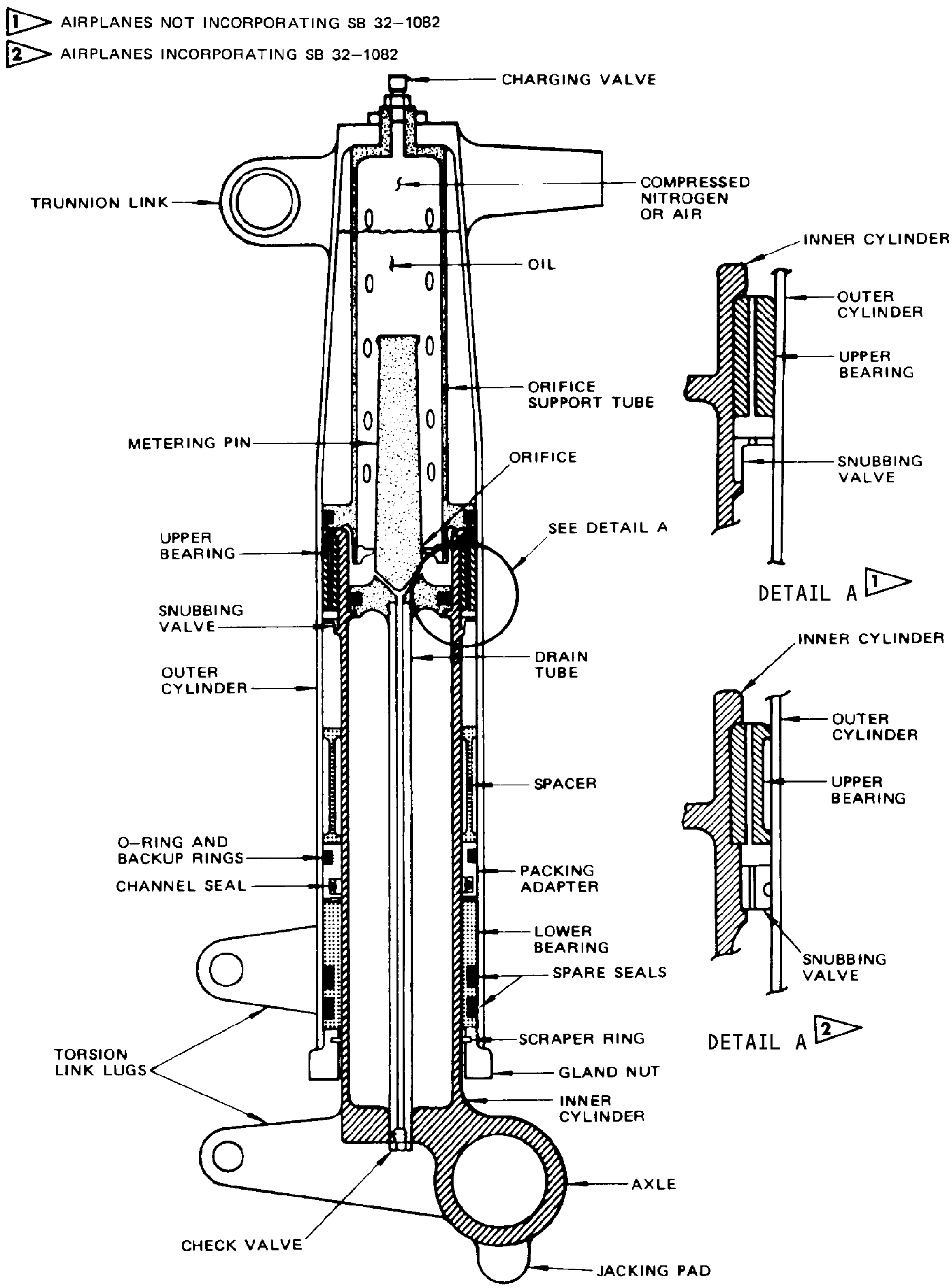


Main Gear Components Location
Figure 1

4. Main Gear Drag Strut
   A. The main gear drag strut stabilizes the shock strut in a fore and aft direction. The drag strut is in two parts. The upper drag strut is attached to a lug on the trunnion link at the top end, and to the lower drag strut at the bottom end. The lower drag strut is connected to the upper torsion link lugs on the outer cylinder, and to the side strut universal attachment on the shock strut (Fig. 1). A special shear bolt is used for the upper attachment to minimize damage to structure should landing gear receive a severe impact from the front. Clamps and attachments on the drag strut support linkage for the shock strut door.
5. Main Gear Torsion Links
   A. The main gear torsion links prevent rotation between shock strut inner and outer cylinders without affecting the reciprocating action during normal operation of strut. The upper torsion link and bottom attachment of the lower drag strut share the same lugs on the shock strut outer cylinder. The lower torsion link is connected to lugs on the inner cylinder. (See figure 2.) Upper and lower torsion links are joined at their forward ends by a single bolt.
6. Main Gear Damper
   A. The main gear damper prevents excessive vibration buildup in landing gear, during high speed taxi, and under heavy braking. The damper is a hydraulic unit containing an actuator, a compensator, relief and check valves. (See figure 4.) The main body of the damper is attached to the forward end of the upper torsion link. The actuator piston rod passes the forward ends of both upper and lower links to provide an apex bolt. Rotary oscillation between the shock strut inner and outer cylinders is absorbed by the actuator piston displacing hydraulic fluid in the cylinder. The rate of displacement is controlled by the damping orifice in the actuator piston. The compensator is provided to maintain a pressure of 30 to 70 psi on the fluid contained in the actuator. A 3000 psi relief valve protects the actuator from very high pressures caused by thermal expansion of hydraulic fluid. A 70 psi relief valve protects the compensator from thermal expansion damage. Two check valves are provided to allow hydraulic fluid to enter the actuator and make up for slight leakage or to compensate for fluid contraction. A third check valve permits fluid to enter the unit from the hydraulic system A return and so keep the damper fully charged with fluid. Bleeder plugs are provided to enable trapped air to be cleared after disconnection of the hydraulic line, or when filling an empty unit.



Main Gear Attachment
Figure 2



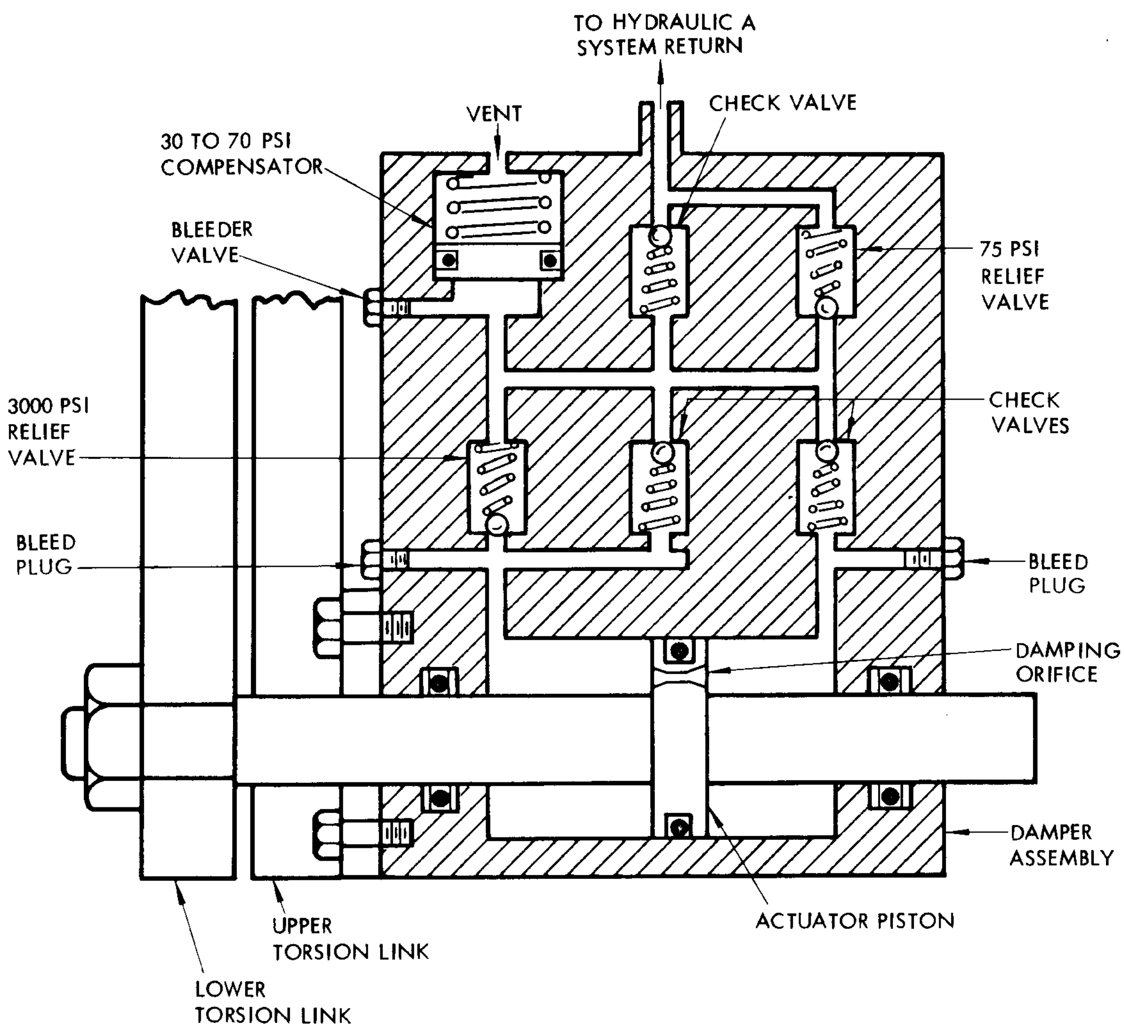
Main Gear Shock Strut Schematic
Figure 3

7. Main Gear Side Strut

A. The main gear side strut gives lateral support to the shock strut. The side strut consists of an upper and a lower segment, hinged near the center. The upper end of the side strut is connected to a lug on the reaction link. The bottom end of the lower segment is connected to the universal side brace attachment. A lock strut is mounted between the reaction link and the side strut hinge. (See figure 2.) The side strut folds about the hinge when the gear retracts.

8. Main Gear Reaction Link

A. The main gear reaction link forms the upper member of a space frame, consisting of the shock strut, the side strut, and the reaction link. (See figure 1.) Most of the side loads acting on landing gear are transferred through the reaction link to the upper end of the shock strut. The outboard end of the reaction link is attached through a universal joint to the trunnion link connection. The inboard end is attached to structure at the main gear uplock brackets. All the landing gear lock actuating mechanism is mounted on the reaction link.



Main Landing Gear Damper Schematic
Figure 4

NZ

MAIN LANDING GEAR - REMOVAL/INSTALLATION

1. General
   A. The main landing gear may be removed and installed without special equipment; by using man power to maneuver the gear into or out of position. Three men are required to handle the gear.
   B. The gear removal procedure described in this section does not require the use of special tools. If desired, a Main Landing Gear Dolly, is available for gear handling.
2. Equipment and Materials
   A. Ground lock assemblies - (Ref 32-00-01)
   B. Adapter Wrench, Main Gear Trunnion Nut - F80020 -5. Use to remove and install trunnion link pin nut.
   C. Wrench, Main Gear Trunnion Link Socket - ST2580-202. Use to remove and install main landing gear forward trunnion bearing bolt.
   D. Spanner Wrench, Main Gear Forward Trunnion Bearing - 7ME65-73761-1. Use to remove forward trunnion bearing assembly from landing gear beam, and to tighten assembly in beam while installed on trunnion link.
   E. Length of rope or cord for extending downlock springs during installation of main landing gear.
   F. Main Landing Gear Thread Protector and Pin Alignment Tool - F80141-1. Use on end of shock strut upper journal to facilitate entry into aft trunnion bearing.
   G. Lock Assembly, Oleo Main Gear
      (1) Preferred - F80234 - Applicable to all airplanes
      (2) Alternate - F80016-19 - Applicable to airplanes with antirotation bolt in torsion links
   H. Bullet Shaped Thread Protector - F80115-1 or F80115-10
   I. Bullet Shaped Thread Protector - F80115-2 or F80115-11
   J. Lead hammer
   K. Wheel chocks
   L. Container, suitable for Hydraulic Fluid, Fire Resistant BMS 3-11 in which to drain brake lines
   M. Grease - BMS 3-33 (Preferred)
   N. Grease - MIL-PRF-23827 (Supercedes MIL-G-23827) (Alternate)
   O. Sealant - BMS 5-95
   P. Installation Dolly, Main Landing Gear - Model 100-C, Ground Support Engineering, Inc., 5095 NW 79 Ave., Miami, Florida 33166
   Q. Antiskid Functional Test Tool - 3TE65-45113
      Antiskid Functional Test Tool - F80208-1 (replaces 3TE65-45113 for future procurement)
   R. DC voltmeter - 0- to 10-volt range
   S. Axle jacks
3. Prepare for Removal of Main Gear
   A. Check that landing gear ground lockpins are installed in all gear.
   B. Extend flaps to gain access to aft side of main gear support beam.
   C. Depressurize hydraulic systems A and B. Operate brakes eight times to depressurize brake accumulators.

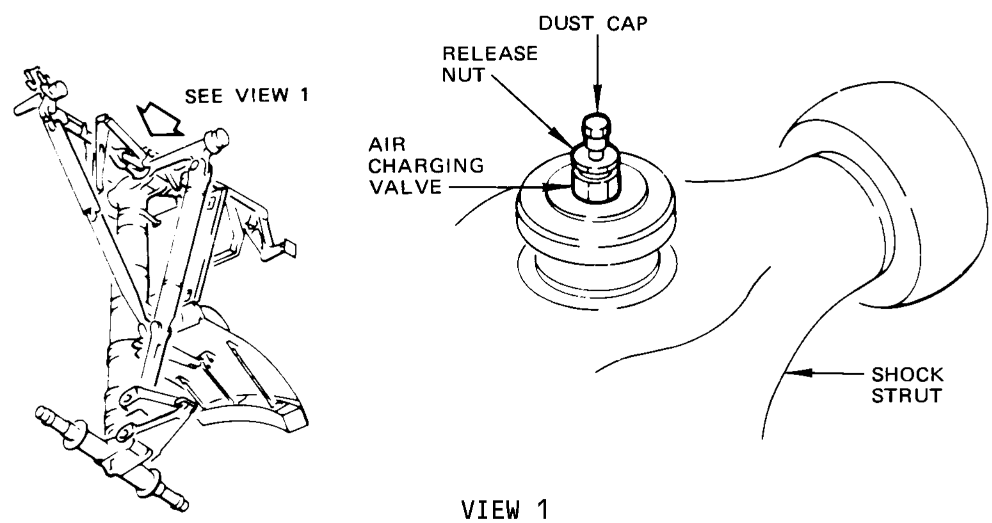
D. Open all landing gear circuit breakers on P6 panel. Remove hydraulic access panel 8401 left or 8501 right from underside of wing.
E. Remove main gear shock strut doors (Ref 32-13-11, Removal/Installation).
F. Deflate and compress shock strut by removing dust cap from charging valve and loosening release nut one or two turns (Fig. 401).

WARNING: DO NOT LOOSEN VALVE BODY UNLESS SHOCK STRUT IS COMPLETELY DEFLATED. AIR PRESSURE CAN BLOW VALVE BODY OUT, CAUSING INJURY TO PERSONNEL. CHECK THAT PERSONNEL AND EQUIPMENT ARE CLEAR OF AIRPLANE AS AIRPLANE DESCENDS.

G. Install main gear oleo lock assembly to keep shock strut compressed.
H. Jack airplane until tires just make sufficient contact to prevent wheels rotating. Jacking height will be about 4 inches (Ref Chapter 7, Jacking Airplane).
I. Mark tire footprint on ground by drawing line around tire contact area.
J. Remove main gear damper (Ref 32-11-81 R/I).

4. Remove Main Landing Gear
   A. Remove hydraulic lines from drag strut.
      (1) Disconnect hydraulic lines from upper side of trunnion link hydraulic swivel (11, Fig. 402), and from connection on wheel well ceiling. Drain hydraulic lines into container.
      (2) Remove trunnion link hydraulic swivel (11) and door actuation fitting (13).
      (3) Undo all clamps (8) holding hydraulic lines (7) to drag strut.
      (4) Disconnect hydraulic lines from bracket (3) on lower drag strut, and from connection on main gear damper (6). Drain lines into container.
      (5) Remove all hydraulic lines from drag strut. Plug and cap all lines and connections.
   B. Remove electrical harness.
      (1) Disconnect harness (9) near top of shock strut, and at axle entry point.
      (2) Undo clamps (8) for electrical harness (9) on upper drag strut.
      (3) Coil harness and tape to lower drag strut.
      (4) Disconnect electrical harness (9) (with links [4]) from underside of torsion links, and at main gear damper (5).
      (5) Coil harness and tape to lower drag strut.
   C. Remove the actuator assembly of the main landing gear as follows:
      (1) If it is necessary, remove the actuator assembly (AMM 32-32-11/401).

NOTE: If the stabilizing beam for the main landing gear was removed to make the removal of the actuator assembly easier, install the stabilizing beam again.



Shock Strut Air Charging Valve
Figure 401

(2) If it is not necessary, disconnect the actuator assembly from the walking beam arm and the trunnion pin (AMM 32-32-11/401).
  (a) Attach the cord to the actuator assembly.
  (b) Move the actuator assembly away from the main landing gear.

D. Disconnect bottom end of lower side strut from side strut universal (Fig. 404). Allow strut to hang from center pivot.

E. If right gear is being removed, disconnect the ground spoiler interlock valve cable (AMM 27-62-51/401).

F. Disconnect reaction link.
  (1) Disconnect downlock springs (1, Fig. 406) from outboard attachments.

  NOTE: To relieve attachment points of spring load, attach a cord to end of spring, pass over uplock support shaft and pull on cord or use spring expander assembly to extend springs.

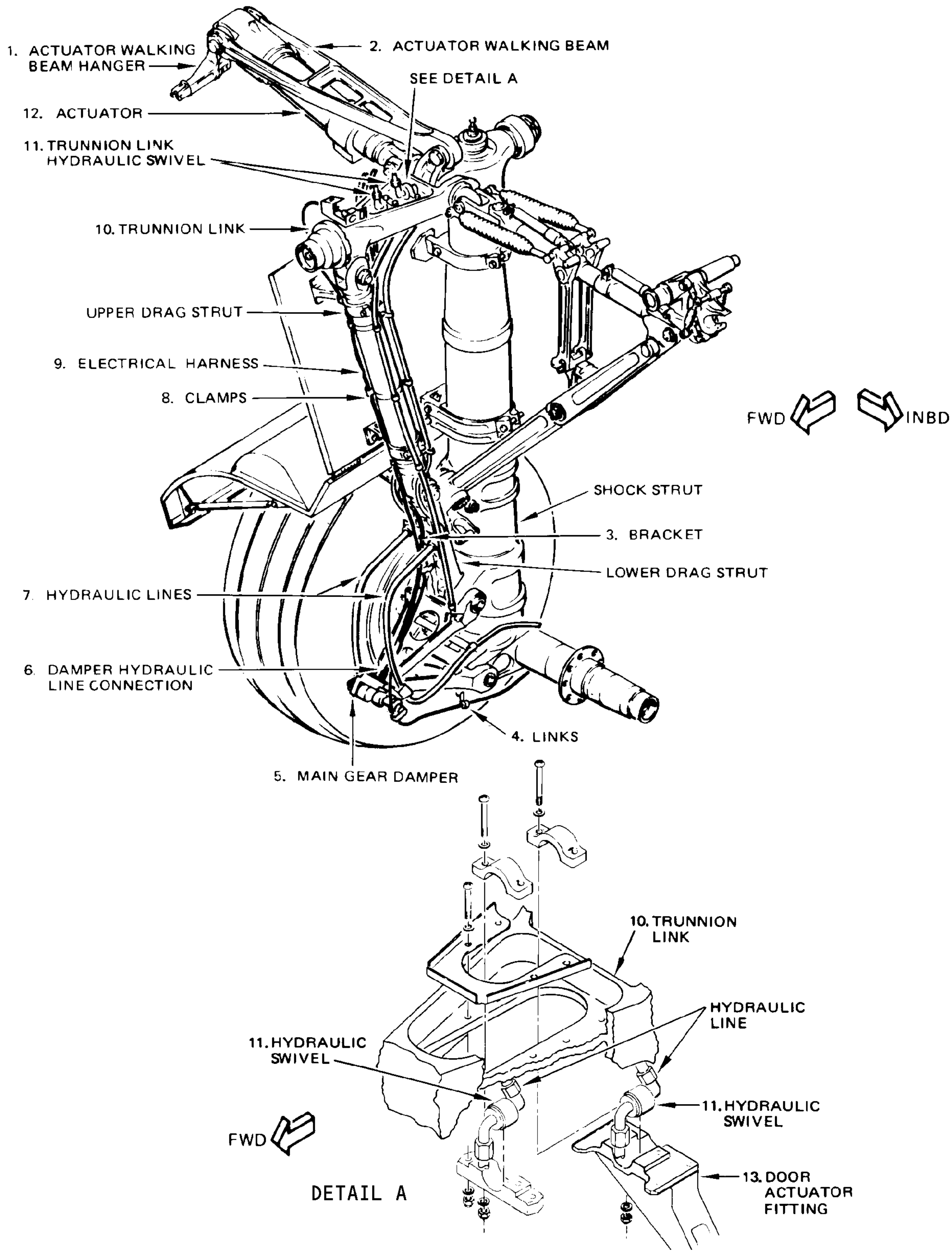
  (2) Disconnect reaction link universal (3) from shock strut. Raise and support reaction link (4) clear of shock strut.

G. Chock aft side of wheels and support gear by hand (stage 1, Fig. 407).

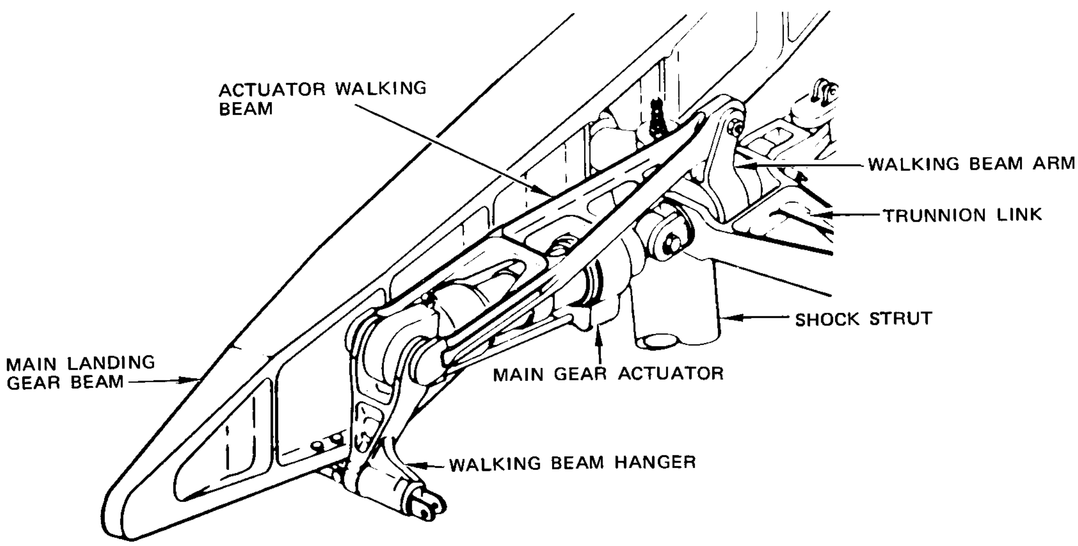
H. Disconnect trunnion link.
  (1) Disconnect upper end of drag strut (4, Fig. 408) and secure with line to shock strut.
  (2) Mark and retain drag strut upper attachment bolt (5) for installation in same location. On some airplanes, bolt is identified by a yellow head.
  (3) Remove antirotation bolt (l, Fig. 409) from walking beam arm (2).
  (4) Remove nuts and washers from trunnion link pin lockbolts (4).
  (5) Remove retainer washer (5), nut (6), and special washer (5A) from pin (9).
  (6) Install thread protector (8) on pin (9). Tap out pin.
  (7) Remove walking beam arm (2) as pin comes out.
  (8) Remove locking key (2, Fig. 408) from forward trunnion bearing (3).
  (9) Jack airplane until tires clear ground just enough for partial gear retraction and swing landing gear inboard (toward retraction).
  (10) With lead hammer, tap wide end of trunnion link up and clear of shock strut lugs (stage 2, Fig. 407). Secure link in position clear of gear.

I. Remove trunnion link.
  (1) Screw out trunnion bearing assembly (3, Fig. 408) and remove trunnion link from airplane.
  (2) If necessary, due to damage or wear, remove forward trunnion bearing assembly from link.

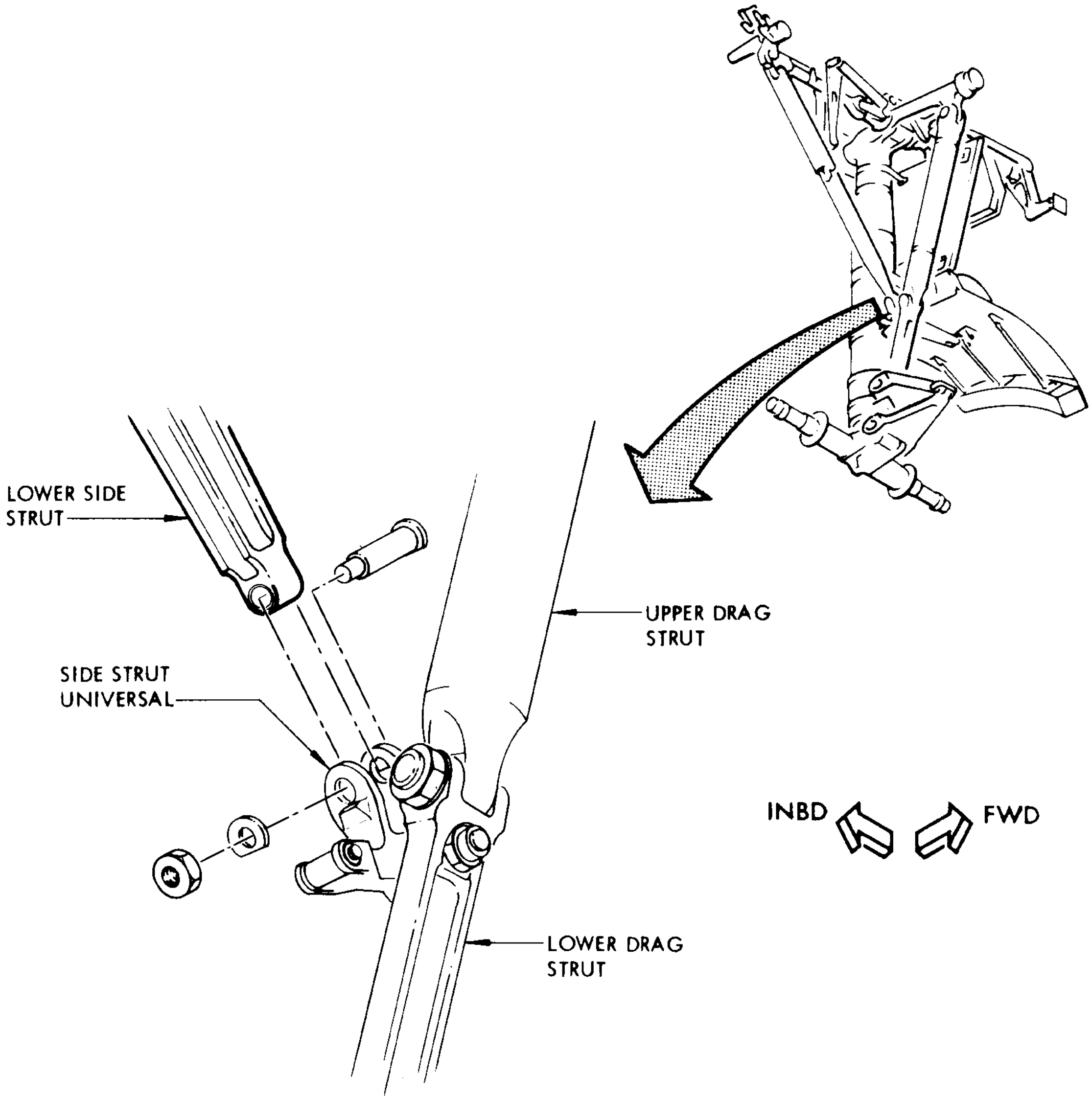
J. Provide access to trunnion bearing (Fig. 406).
  (1) On airplanes without grease reservoir, remove dust covers.
  (2) On airplanes with grease reservoir, unscrew trunnion bearing grease reservoir from aft side of landing gear support beam.



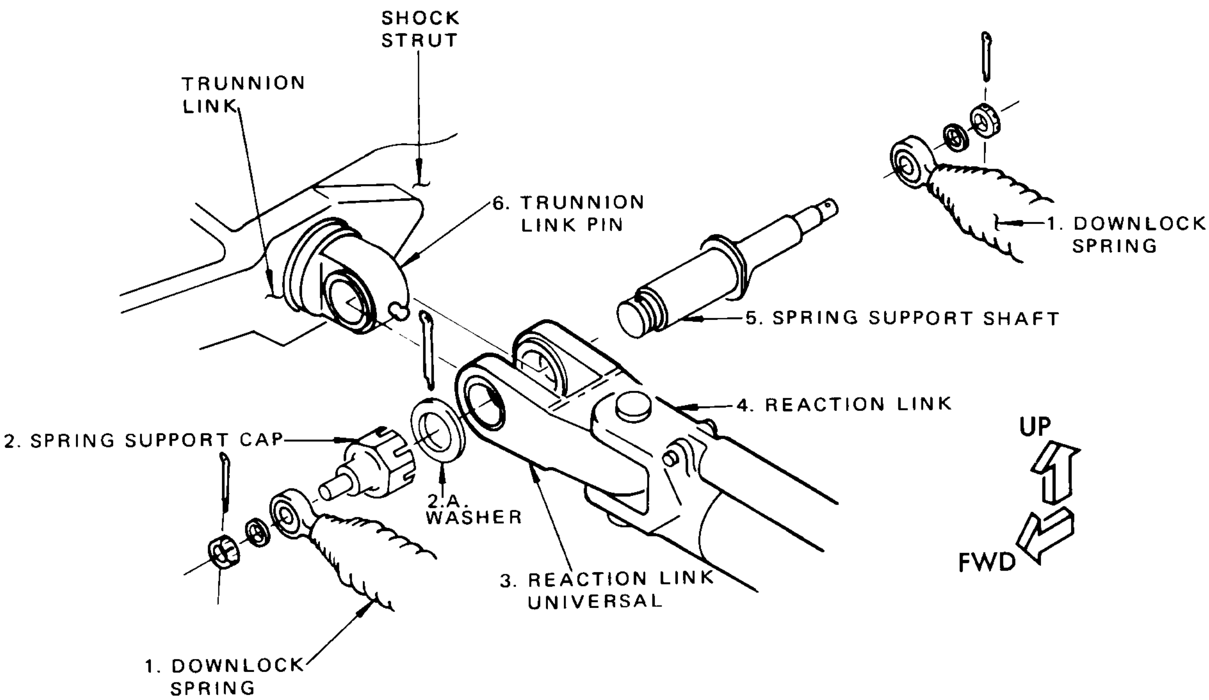
Main Gear Components
Figure 402

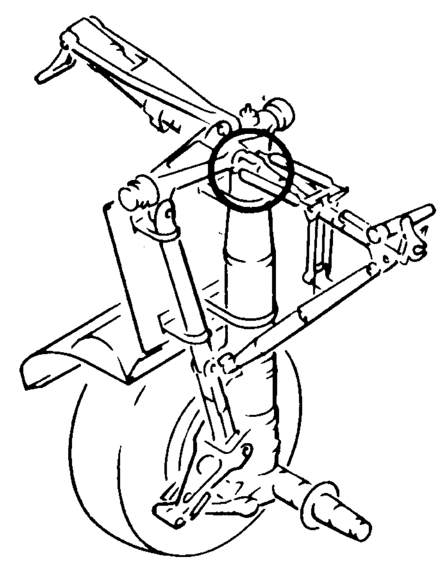


Actuator, Walking Beam and Beam Hanger Installation
Figure 403



Main Gear Side Strut Lower Attachment
Figure 404





Reaction Link Attachment to Shock Strut
Figure 405

K. Disconnect aft trunnion bearing (Fig. 406). On airplanes without grease reservoir, remove and discard bearing attachment bolts.
   (1) On airplanes with grease reservoir:
      (a) Remove lockbolt, fuse nut, washer and key.
      (b) Remove retainer lock retention bolts, bearing retainer lock, and bearing retainer nut.
L. Station three men to lower gear.
M. Gently lower gear (Stage 3, Fig. 407) and simultaneously roll gear aft. At the same time, drive aft trunnion bearing forward and out from landing gear beam.

   CAUTION: DO NOT USE EXCESSIVE FORCE TO DRIVE BEARING FROM BEAM. BOTH BEARING AND BEAM MAY BE DAMAGED.

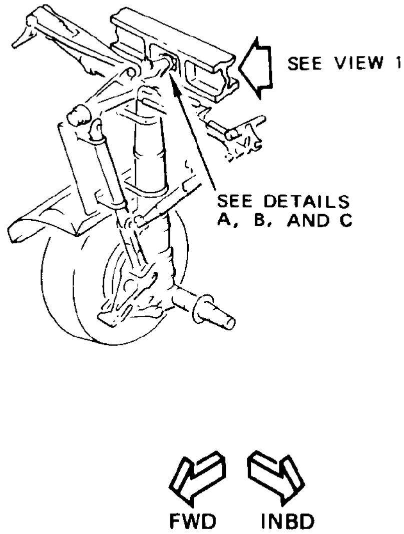
   NOTE: If bearing resists removal, proceed as follows:

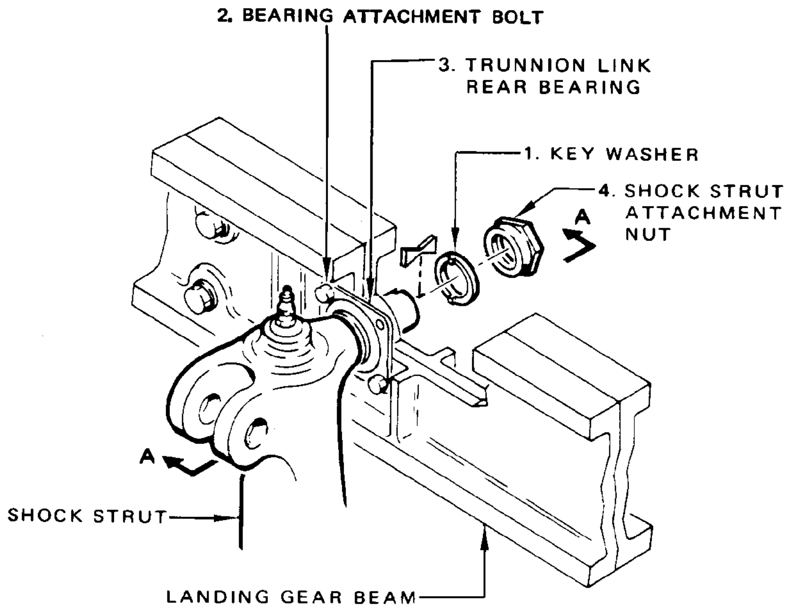
   (1) On airplanes without grease reservoir, cut lockwire and remove shock strut attachment nut (4, Fig. 406) and keywasher (1).
   (2) Gently lower gear and draw trunnion out from rear bearing (3).
   (3) When gear is clear of airplane, remove bearing from landing gear beam.
   (4) Clean corrosion or primer from outside of bearing and inside of bearing housing in landing gear beam.
   (5) Clean and lightly lubricate spherical bearing and shock strut trunnion journal with Aero Shell Grease 07.
   (6) Clean and lubricate trunnion link pin with Mastinox 6856K.

      WARNING: USE NITRILE GLOVES FOR SKIN PROTECTION AGAINST BMS 3-27 (MASTINOX 6856K). IF MASTINOX GETS ON YOUR SKIN, IMMEDIATELY REMOVE IT WITH WATER. IF THIS MATERIAL GETS IN YOUR EYES, IMMEDIATELY FLUSH YOUR EYES WITH WATER AND GET MEDICAL AID. THIS MATERIAL CONTAINS VERY POISONOUS AND FLAMMABLE AGENTS WHICH CAN CAUSE INJURIES TO PERSONS.

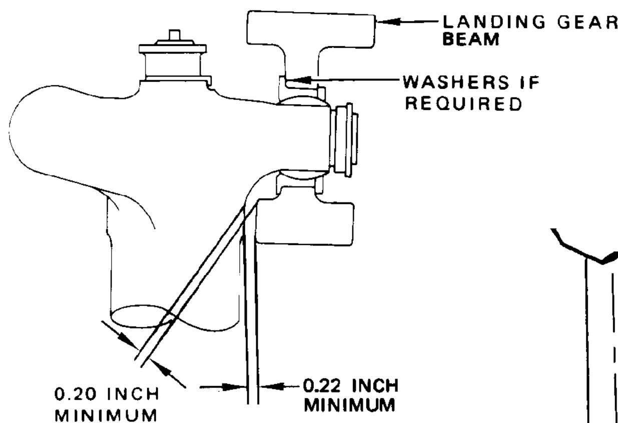
      CAUTION: REMOVE UNWANTED MASTINOX FROM SURFACES WHICH WILL BE LUBRICATED. IF YOU APPLY MASTINOX TO JOINTS THAT TURN, FAILURE OF THE LANDING GEAR TO EXTEND OR RETRACT CAN OCCUR.

   (7) On airplanes without grease reservoir, slide bearing, with flange facing shock strut on trunnion journal. Add keywasher (1) and shock strut attachment nut (4).
   (8) On airplanes with grease reservoir, slide bearing assembly on trunnion journal with grease seal toward the shock strut on trunnion journal. Add key, washer, and fuse nut.
   (9) On airplanes without grease reservoir, tighten nut (4) 1000 to 1200 pound-inches lube torque. Lockwire nut.

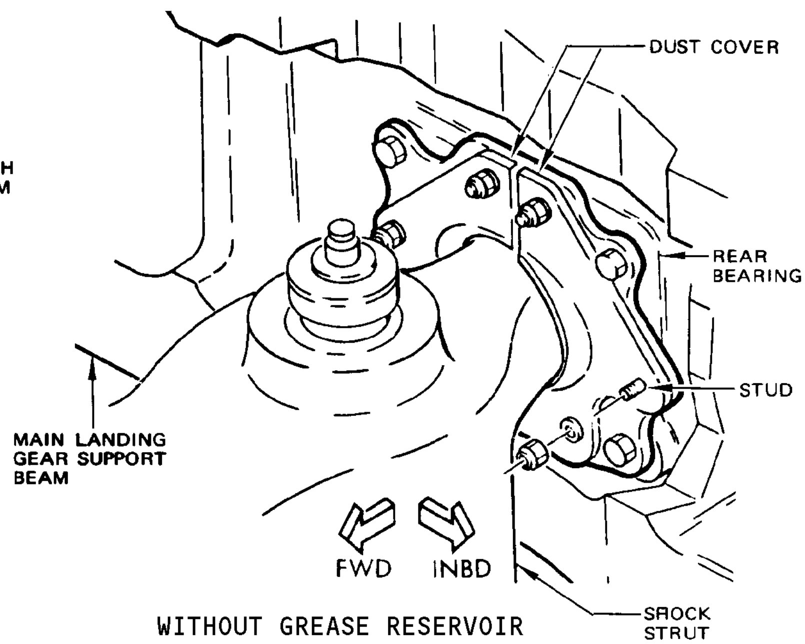




WITHOUT GREASE RESERVOIR
DETAIL A

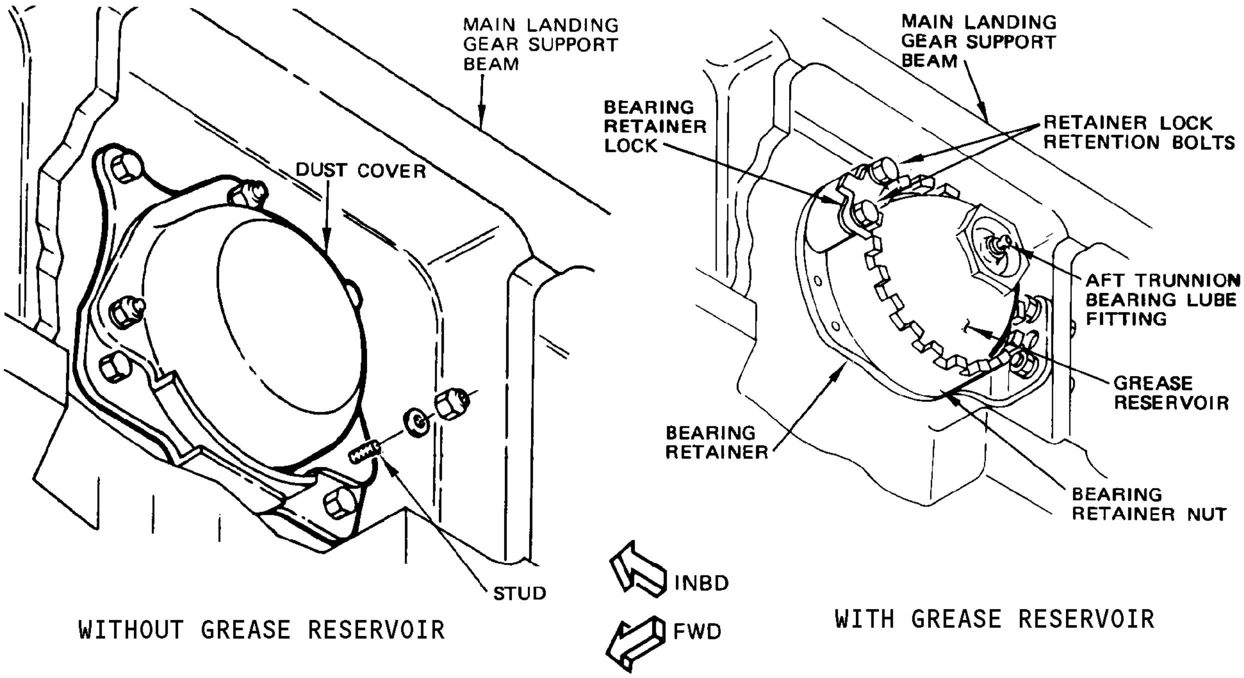


SECTION A-A



WITHOUT GREASE RESERVOIR
DETAIL B

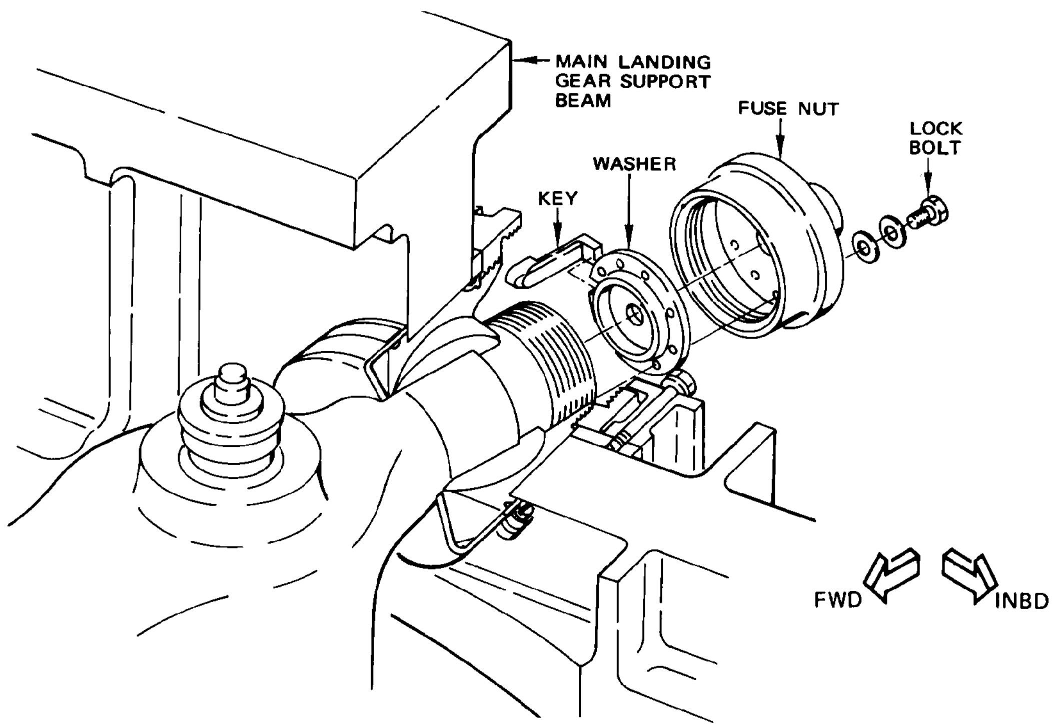
Trunnion Bearing Installation
Figure 406 (Sheet 1)



WITHOUT GREASE RESERVOIR

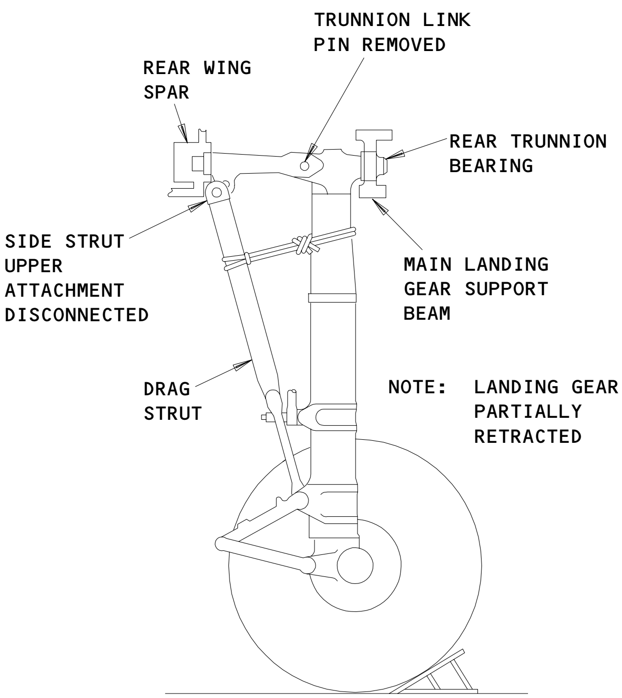
WITH GREASE RESERVOIR

VIEW 1

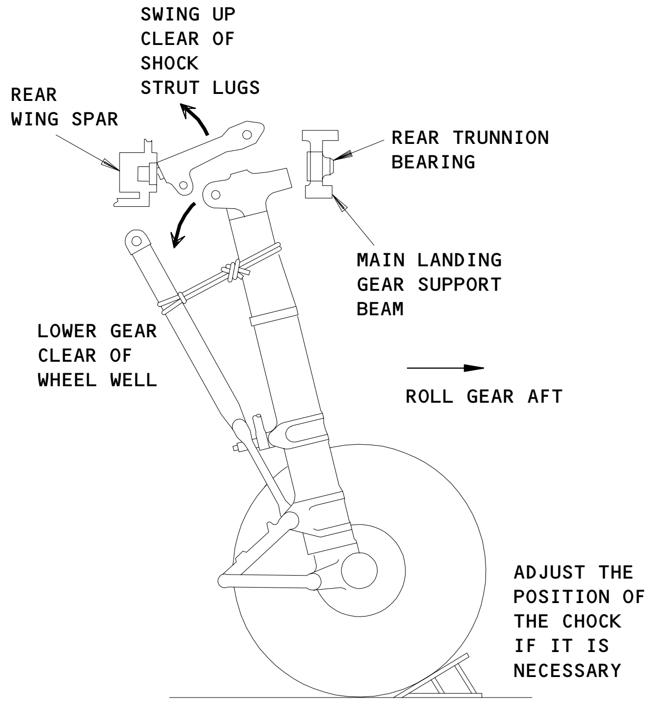


WITH GREASE RESERVOIR
DETAIL C

Trunnion Bearing Installation
Figure 406 (Sheet 2)

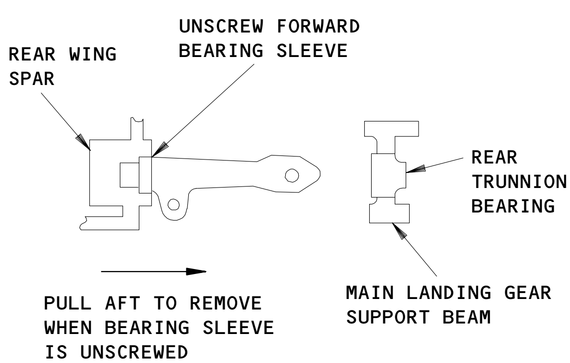


STAGE 1. DISCONNECT DRAG STRUT
AND REMOVE TRUNNION LINK PIN

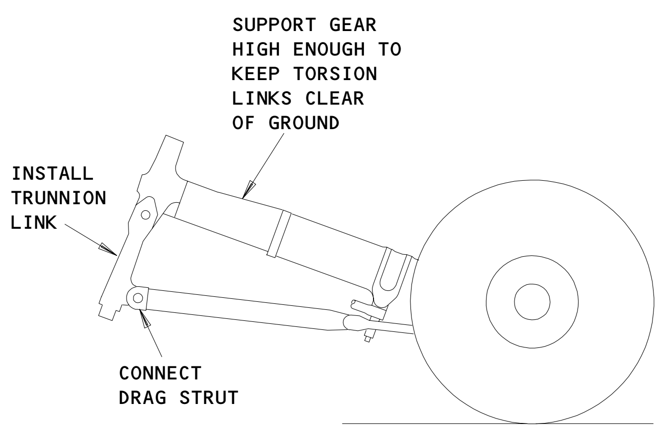


STAGE 2. REMOVE GEAR FROM
REAR TRUNNION BEARING

FWD

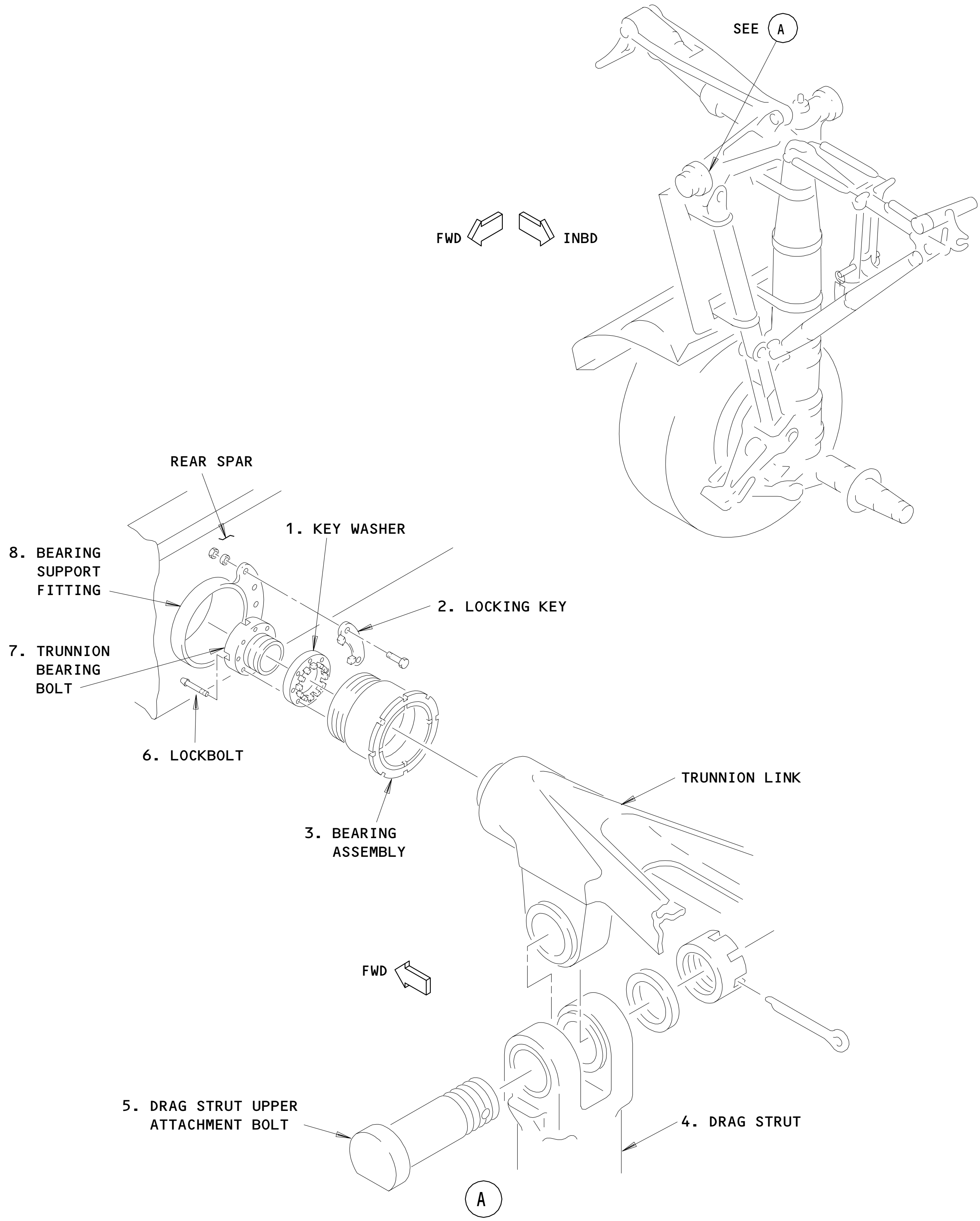


STAGE 3. REMOVE TRUNNION LINK

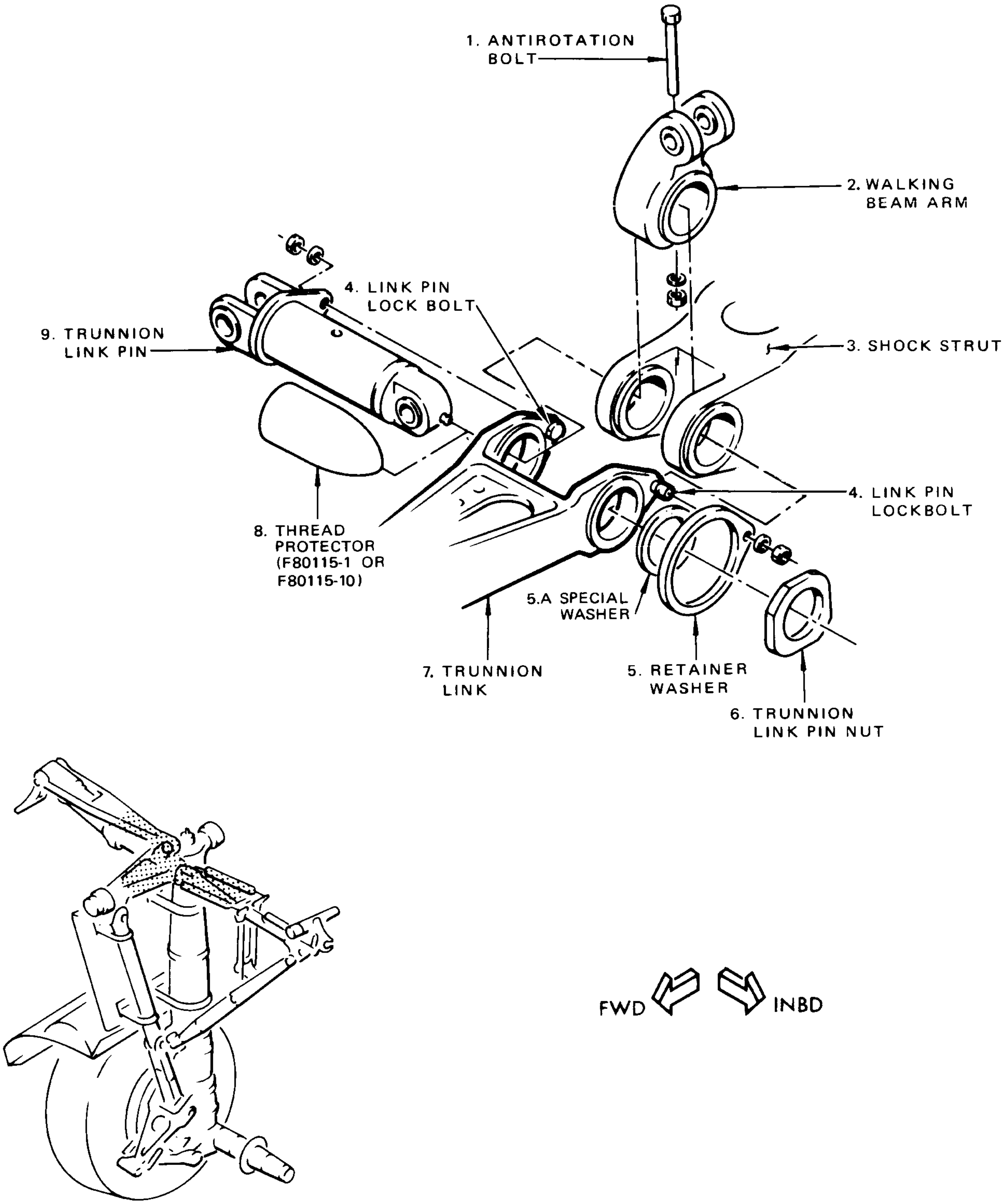


STAGE 4. REMOVE GEAR FROM AIRPLANE

Main Landing Gear Removal Sequence
Figure 407



Trunnion Link Bearing Attachment
Figure 408



Trunnion Link Shock Strut Attachment
Figure 409

(10) On airplanes with grease reservoir, tighten fuse nut 1000 to 1200 pound-inches lube torque. Install washers and lockbolt and lockwire lockbolt.

N. When gear has been lowered until top of shock strut is clear of wheel well, assemble trunnion link and drag strut. Leave nuts finger-right.

O. Continue to lower gear until gear will clear underside of wing.

P. With three men supporting shock strut, pull gear out from under airplane.

Q. Roll gear back until apex of trunnion link and drag strut can be lowered onto trestle or other support.

NOTE: Care must be taken to avoid touching main gear damper on ground.

R. Check both forward and rear trunnion bearings for damage or excessive wear.

(1) If diametral clearance between ball and outer race of forward and aft trunnion bearing exceeds 0.015 inch, bearing must be replaced (Ref 32-11-101 R/I for forward bearing).

5. Install Main Landing Gear

A. With airplane still jacked to same height as on gear removal, prepare a landing gear assembly for installation.

WARNING: USE NITRILE GLOVES FOR SKIN PROTECTION AGAINST BMS 3-27 (MASTINOX 6856K). IF MASTINOX GETS ON YOUR SKIN, IMMEDIATELY REMOVE IT WITH WATER. IF THIS MATERIAL GETS IN YOUR EYES, IMMEDIATELY FLUSH YOUR EYES WITH WATER AND GET MEDICAL AID. THIS MATERIAL CONTAINS VERY POISONOUS AND FLAMMABLE AGENTS WHICH CAN CAUSE INJURIES TO PERSONS.

CAUTION: REMOVE UNWANTED MASTINOX FROM SURFACES WHICH WILL BE LUBRICATED. IF YOU APPLY MASTINOX TO JOINTS THAT TURN, FAILURE OF THE LANDING GEAR TO EXTEND OR RETRACT CAN OCCUR.

NOTE: A landing gear assembly includes a shock strut, two brake units, two tire and wheel assemblies, upper and lower torsion links, proximity switch sensors, drag strut, trunnion link, static discharge assemblies, hydraulic lines, electrical harness, and clamps. A teleflex cable for ground spoiler is installed on the right gear.

6. Parts which are not lubricated with grease after installation must be coated with Mastinox 6856K (Ref 12-12-11/201).

7. Parts which are lubricated with grease after installation must be lubricated with Aero Shell 07 (Ref 12-12-11/201).

A. On airplanes with grease reservoir, install aft trunnion bearing in beam.

(1) Verify exposed surface of bushing in beam is thoroughly clean and apply sealant around periphery of bushing on both fore and aft sides of beam.

(2) Install bearing in beam from forward side, using care to avoid damage to bearing, bushing, or beam. Note that blank spline on bearing must align with mating spline in bearing retainer (Fig. 406) which is attached to aft side of beam. Apply sealant around periphery of bearing OD on both fore and aft sides of beam.
(3) Install bearing retainer nut and use torque wrench adapter to tighten nut 4500 to 7000 pound-inches lube torque. Apply BMS 3-28 antiseize compound to the threads of the nut prior to installation.
(4) On airplanes with grease seal, install grease seal on bearing flange (forward side of beam).

B. Support forward end of trunnion link (Stage 4, Fig. 407).
C. Run gear under wheel well with torsion links facing forward.
D. Adjust position o f gear until main gear wheels are a short distance aft of tire prints marked on ground from original gear assembly.
E. Chock wheels aft.
F. With two or three men, raise shock strut.
G. Secure drag strut to shock strut with line and remove trunnion link.
H. Slowly raise gear, simultaneously rolling gear towards tire prints. Three men should be used to steady gear (Stage 3, Fig. 407).
I. If necessary, lift to extend or bear down to compress shock strut.
J. If lateral adjustment is required, remove chocks and work gear into position by rolling on wheels forward and rearward to give a lateral zig-zag movement.
K. On airplanes without grease reservoir, with the bearing aligned, continue lifting and rolling gear towards tire prints until bearing is snug in beam.

<u>NOTE</u>: Should bearing be tight or tend to cock when entering housing, it may be necessary to tap bearing into position while raising the gear. Use a long aluminum drift from forward side.

L. On airplanes without grease reservoir, insert new bearing bolts through landing gear beam with boltheads aft. Add washers and nuts. Tighten two upper nuts 70 to 90 pound-inches torque. Tighten two lower nuts 220 to 360 pound-inches torque.
M. Apply sealant around periphery of bearing and around bearing attach fasteners.
N. On airplanes with grease reservoir, install aft trunnion bearing (Fig. 406).
(1) Install thread protector and pin alignment tool in aft trunnion.
(2) Align aft trunnion with bearing center and insert trunnion into bearing while lifting and rolling gear towards tire prints until trunnion is seated in bearing.
(3) Remove aligning tool, install key, washer, and fuse nut. Tighten fuse nut to a range of 1000 to 1200 pound-inches lube torque as appropriate to align lockbolt holes. Install washers, lockbolt, and lockwire.
(4) Install bearing retainer lock, and retainer nut lockbolts and lockwire.
(5) Install seal ring and grease reservoir. Tighten grease reservoir 1200 to 1800 pound-inches lube torque and lockwire.

(6) After trunnion installation, lubricate trunnion bearing with grease until reservoir and grease seal (on some airplanes) are full. Apply sealant around periphery of bearing retainer and bearing retainer nut.

O. Install forward trunnion bearing assembly on trunnion link.
(1) Lubricate bearing assembly and fasteners with grease immediately before installation.
(2) Place bearing assembly (3, Fig. 408) on end of trunnion.
(3) Install keywasher (l). Make sure key on trunnion and washer are fully engaged.
(4) Install trunnion bearing bolt (7). Tighten bolt 5000 to 5500 pound-inches lube torque. Line up a hole in bearing bolt with tapped hole in keywasher (1).
(5) Install lockbolt (6) through head of bearing bolt and tighten to standard torque.
(6) Lockwire lockbolt to trunnion bolt.

P. Install trunnion link.
(1) Apply BMS 3-28 antiseize compound to the external threads of the forward trunnion bearing assembly and the internal threads of the bearing support fitting.
(2) Place trunnion link in position and screw bearing assembly (3, Fig. 408) into bearing support fitting (8).
(3) Tap trunnion link down over lugs on shock strut until holes in link and lugs are vertically aligned.
(4) Check that shock strut attachment (4, Fig. 406) is tightened 1000 to 1200 pound-inches lube torque.
(5) Adjust lateral alignment of holes by screwing bearing assembly (3, Fig. 408) in or out of bearing support fitting (8).
(6) Deleted.
(7) Place walking beam arm (2) in position between shock strut lugs (3) with curved lug facing inboard.
(8) Install thread protector (8) on trunnion link pin (9). Insert pin through trunnion link (7), shock strut lugs (3) and beam arm (2) from outboard side.
(9) Rotate pin to align hole in pin locking lug with lockbolt (4) in trunnion link (7).
(10) Adjust the trunnion bearing so that you can insert the trunnion pin by hand. Remove the thread protector (8). Add special washer (5A) and trunnion link pin nut (6). Leave nut finger-tight.

<u>CAUTION</u>: MAKE SURE YOU USE THE SPECIAL UNDERSIZE NUT ON TRUNNION PINS WITH UNDERSIZE THREADS. CHECK FOR BLACK MARKING WITH A YELLOW BACKGROUND ON THE TRUNNION PIN. THIS IS AN INDICATION THAT THE THREADS HAVE BEEN REWORKED (UNDERSIZE). IF YOU USE A STANDARD NUT ON UNDERSIZE THREADS, THE NUT COULD COME OFF AND CAUSE STRUCTURAL DAMAGE TO THE LANDING GEAR.

Q. Connect drag strut.
(1) Align upper end of drag strut (7, Fig. 408) with lug on trunnion link.

NOTE: It may be necessary to adjust bearing assembly (3) to align drag strut attachment.

(2) Insert attachment bolt (5) with head inboard on both left and right gear. Install washer and nut.

CAUTION: ENSURE THAT DRAG STRUT UPPER ATTACHMENT BOLT (6) IS SAME BOLT OR REPLACEMENT BOLT IS SAME PART NUMBER AS THAT WHICH WAS REMOVED IN STEP 4.H.(1). DRAG STRUT UPPER ATTACHMENT BOLT (6) IS A STRUCTURAL FUSE AND MUST BE INSTALLED IN SAME LOCATION FROM WHICH REMOVED TO MAINTAIN STRUCTURAL INTEGRITY OF THE REAR SPAR.

(3) Tighten nut as tightly as possible by hand. If necessary, back off nut to align nearest castellation with cotter pin hole in bolt. Lock nut with cotter pin.
(4) Swing lower end of side strut into position in side strut universal.
(5) Insert attachment bolt with head end outboard. Install washer and nut.
(6) Tighten nut to run-on torque plus 400 pound-inches.

R. On airplanes without grease reservoirs, check clearance between shock strut and landing gear beam at positions shown in Fig. 406.

NOTE: If clearances are less than 0.20 inch and 0.22 inch at positions shown, washers must be installed between rear trunnion bearing flange and landing gear beam.

S. On airplanes without grease reservoirs, position main gear.
(1) Remove bolts securing rear bearing to landing gear beam.
(2) Move gear forward by screwing bearing assembly into sleeve.
(3) Insert washers between rear bearing flange and landing gear beam when required clearance is obtained.

NOTE: A maximum of one AN960PD416 washer, plus one AN960PD416L washer may be installed between bearing flange and beam. Total washer thickness must not exceed 0.10 inch. Washer thickness must match adjusted clearance between flange and beam within +0.010/-0.00 inch before tightening bearing bolts. Longer bearing bolts are required when washers are used between bearing flange and beam. Use NAS1304-34 bolts in upper holes, and NAS1306-34 bolts in lower holes.

(4) Insert bolts through bearing flange and beam. Add washer and nuts.
(5) Tighten nuts on upper bolts 70 to 90 pound-inches torque. Tighten two lower nuts 220 to 360 pound-inches torque.
(6) Install dust covers.

T. Lock bearing assembly.
(1) Install locking key (2, Fig. 408) on bearing support fitting (8).

NOTE: Locking key may be installed in either of two positions to align tabs with slots.

(2) Install locking key bolts, washers, and nuts with bolt heads aft.
(3) Tighten nuts to standard torque (Ref Chapter 20).

U. Secure trunnion pin.
(1) Align small holes in beam arm (2, Fig. 409) with hole in trunnion pin (9).
(2) Insert antirotation bolt (1) from top. Add washer and nut.
(3) Tighten trunnion pin nut (6) to run-on torque plus 1000-1200 pound-inches. Loosen the nut and tighten to 250-750 pound-inches.
(4) Place retainer washer (5) over serrations on nut (6) and lockbolt (4) in trunnion link (7).
(5) If necessary, adjust position of nut (6) within torque limits to align hole in retainer washer (5) with lockbolt (4).
(6) Install washer and nut on each lockbolt (4) protruding through lugs on trunnion pin (9) and retainer washer (5).
(7) Tighten nuts 100 to 150 pound-inches lube torque.
(8) Tighten nut on beam arm antirotation bolt (1) 30 to 40 pound-inches lube torque.

V. Connect reaction link to shock strut.
(1) Place reaction link universal (3, Fig. 405) in position on trunnion pin (6) inboard eye with bolt locking flat aft.
(2) Install thread protector on spring support shaft (5). Insert shaft from aft side.
(3) Remove thread protector, install washer (2A) and spring support cap (2).
(4) Tighten cap 100 to 150 pound-inches; if necessary, back off cap to align nearest castellation with cotter pin hole in shaft. Lock cap with cotter pin.
(5) Connect downlock springs (1, Fig. 405) to spring support shaft (5) and cap (2).

NOTE: Connect cord to end of downlock spring and pass cord over trunnion link or shock strut. Spring can be extended to align with attachment points by pulling on cord or use spring expander assembly to extend spring.

W. Install main gear damper (AMM 32-11-81/401).

X. Remove hydraulic floor jack.
Y. Install hydraulic swivel (11, Fig. 403) and door actuation fitting (13) on trunnion link (10).
Z. Remove plugs and caps. Connect upper hydraulic lines.
AA. Install clamps (8, Fig. 403) and hydraulic lines (7) on gear. Remove plugs and caps. Connect all lines.
AB. Install the actuator assembly of the main landing gear as follows:
(1) If you remove the actuator assembly in the step before, install the actuator assembly (AMM 32-32-11/401).

NOTE: If the stabilizing beam for the main landing gear was installed after the removal of the actuator assembly, it may be removed to make the installation of the actuator assembly easier.

(2) If the actuator assembly was disconnected from the walking beam arm and the trunnion pin in the step before, do the steps that follow:
(a) Position the actuator assembly for installation.
(b) Remove the cord that attached to the actuator assembly.
(c) Connect the actuator assembly to the walking beam arm and the trunnion pin (AMM 32-32-11/401).
AC. Install electrical harness (9) (AMM 32-11-121/401).

CAUTION: CHECK WIRING HARNESS IN AREA PASSING UNDER AXLE FOR DAMAGE OR PREVIOUS REPAIR. IF WIRES HAVE BEEN DAMAGED OR SPLICED, REPLACE HARNESS.

AD. Install shock strut doors (AMM 32-13-11/401).
AE. Jack airplane for gear retraction (AMM 07-11-11/201).
AF. Adjust doors (AMM 32-13-11/401).
AG. Service shock strut and lubricate gear (AMM 12-15-31/201) (AMM 12-21-11/201).
AH. If right gear is being installed, connect ground spoiler interlock valve cable (Ref 27-62-51 R/I).
AI. Pressurize hydraulic systems A and B and bleed brakes by operating brake pedals four to six times (Ref 29-11-0 and 29-12-0, Maintenance Practices).
(1) Check hydraulic brake line connections for leaks and lines are not cross connected.
(a) Ensure that hydraulic ground interconnect valve is in CLOSED position.
(b) Pressurize B hydraulic system.

(c) Depress brake pedals and verify that only outboard brakes are actuated.

NOTE: Actuation of one of the inboard brakes is an indication that hydraulic tubes are cross connected.

AJ. Check operation of skid detectors of newly installed main landing gear.

(1) Provide electrical power to antiskid system.
(2) Close all landing gear circuit breakers on P6 panel.
(3) Check that wheel chocks are in place.
(4) Release parking brake.
(5) Set inboard and outboard antiskid switches on pilot's panel to OFF position. Check that ANTISKID INOP Lights are on.
(6) Set both inboard and outboard antiskid switches to ON position. Check that ANTISKID INOP lights go off.
(7) Set parking brake. Check that ANTISKID INOP lights go off.

NOTE: The ANTISKID INOP lights may come on momentarily when parking brake valve opens or closes.

(8) Release parking brake. Check that ANTISKID INOP lights remain off.

NOTE: The ANTISKID INOP lights may come on momentarily when parking brake valve opens or closes.

(9) Pull inboard antiskid circuit breaker. Check that inboard ANTISKID INOP light comes on.
(10) Push inboard antiskid circuit breaker in. Check that inboard ANTISKID INOP light goes off.
(11) Pull outboard antiskid circuit breaker. Check that outboard ANTISKID INOP light comes on.
(12) Push outboard antiskid circuit breaker in. Check that outboard ANTISKID INOP light goes off.
(13) Test Wheel Speed Transducers (airplanes without automatic braking)
(a) Check that both inboard and outboard antiskid switches on pilot's panel are in ON position.
(b) Check that parking brake is released.
(c) Jack main landing gear with axle jacks and connect antiskid functional test tool to test receptacle on antiskid control shield.
(d) Manually spin applicable wheel in sequence and check that voltmeter associated with that wheel registers between approximately 1/4 volt at 17 rpm and 1 volt at 70 rpm.
(e) Disconnect antiskid functional test tool.
(f) Lower main landing gear and remove jacks.

(14) Test Wheel Speed Transducers (airplanes with automatic braking)
(a) Remove hub caps from wheels to be tested and rotate transducer drive coupling to check for excessive bearing free play and that drive shaft is not bent.
(b) Check that parking brake is released and disconnect electrical connector D928 from parking brake shutoff valve. Check that inboard and outboard ANTISKID INOP lights on pilot's panel come on.
(c) Set parking brake.
(d) Test left outboard transducer.
1) Manually spin left outboard transducer drive coupling. Check that right outboard brake releases.
2) Stop spinning transducer drive coupling. Check that left outboard brake releases momentarily and then applies.
(e) Test left inboard transducer.
1) Manually spin left inboard transducer drive coupling. Check that right inboard brake releases.
2) Stop spinning transducer drive coupling. Check that left inboard brake releases momentarily and then applies.
(f) Test right inboard transducer.
1) Manually spin right inboard transducer drive coupling. Check that left inboard brake releases.
2) Stop spinning transducer drive coupling. Check that right inboard brake releases momentarily and then applies.
(g) Test right outboard transducer.
1) Manually spin right outboard transducer drive coupling. Check that left outboard brake releases.
2) Stop spinning transducer drive coupling. Check that right outboard brake releases momentarily and then applies.
(h) Release parking brake and connect electrical connector D928 to shutoff valve. Check that inboard and outboard ANTISKID INOP lights go off.
(i) Install hub caps.

AK. Remove ground lock assemblies (Ref 32-00-01), perform a retraction test on main landing gear only (Ref 32-32-0 A/T) and perform a manual extension system test of the main landing gear (Ref 32-34-00 A/T).
AL. Install gear ground lockpins.
AM. Lower airplane and remove jacks (Ref Chapter 7, Jacking Airplane).
AN. Set parking brake.
AO. Determine if there is further need for electrical power on airplane; if not, shut down source.
AP. Determine if there is further need for hydraulic power on airplane; if not, remove systems A and B hydraulic power (Ref 29-11-0 and 29-12-0).

MAIN LANDING GEAR - INSPECTION/CHECK

1. General
   A. Periodic inspection of the landing gear is described in paragraph 2. A special inspection is necessary after a hard landing, after a brake seizure when the airplane is being towed, or is moving at high speed on the ground, after the gear has collided with an obstacle, and after a high energy stop. For special inspections refer to Chapter 5.
2. Main Landing Gear Inspection
   A. Equipment and Materials
      (1) Axle nut thread gage - F80198
   B. Examine main landing gear.
      (1) With power off, check main actuator and all hydraulic connections for leaks.
      (2) Check shock strut for leaks and specified extension. Examine exposed surface of inner cylinder for dirt scratches or galling.
      (3) Examine main gear tires and wheels. Refer to Main Gear Tires and Wheels - Inspection/Check, 32-45-0.
      (4) Check safety switch sensors, and all electrical wiring for security and chafing.
      (5) Check hydraulic hoses for chafing, and static discharge wire for loose attachment and failure to contact ground.
      (6) Examine torsion links and lower drag strut attachment for tightness, missing cotter pins, lockrings and lockbolts.
      (7) On right gear check also ground speed brake operating cable for damage corrosion and security of attachments.
      (8) Check hydraulic damper on torsion links for security and leaks.
      (9) Examine side strut and drag strut connections to side strut universal connection for tightness, corrosion and missing cotter pins.
      (10) Check attachment lugs of torsion links, side strut, and drag strut for cracks.
      (11) Check upper drag strut attachment for security and improper locking.
      (12) Check trunnion link and hydraulic swivel for security and damage. Check swivel for leaks.
      (13) Check reaction link attachments, lock actuators, and uplock hook for security and damage.
      (14) Check downlock strut for loose attachments and damage.
      (15) Check for end play in actuator and walking beam attachment bolts.
      (16) Check wing door attachments at shock strut and side strut for looseness and improper locking.
      (17) With shock strut jacked, gage axle nut threads with machinists ID micrometer or with axle nut thread gage to check that thread minor diameter does not exceed 2.8785 inches. If axle nut thread gage can be passed through axle nut, nut should be replaced.

C. Main Landing Gear Torsional Free Play Inspection
(1) General
(a) The torsional play of each main gear must be within tolerance to ensure satisfactory shimmy stability.
(2) Equipment and Materials
(a) Dial indicator gage - 0 to 0.5 inch
(b) C-clamp - 12-inch
(c) Wooden 2 X 4 - approximately 10 feet long
(d) Sturdy box or platform - approximately 15 inches high with suitable mounting for dial indicator gage
(e) Spring scale
(3) Prepare for Examination
(a) Jack airplane until main gear is clear of ground. Refer to jacking airplane in Maintenance Manual, Chapter 7.
(b) Deflate shock strut by slowly opening air valve at top of strut. Care should be taken to ensure no loss of fluid through air valve.

WARNING: DO NOT LOOSEN VALVE BODY UNLESS SHOCK STRUT IS COMPLETELY DEFLATED. AIR PRESSURE CAN BLOW VALVE BODY OUT, CAUSING INJURY TO PERSONNEL.

(c) With 12-inch C-clamp, clamp shimmy damper in fully closed position to eliminate damper motion (Fig. 1).
(d) Set up dial indicator gage on box to read fore and aft motion of inboard wheel rim. Gage should be located on forward side of wheel on horizontal plane of axle centerline (Fig. 1).
(e) Insert 2 X 4 between shock strut and outboard wheel (Fig. 1).
(4) Measure Torsional Free Play

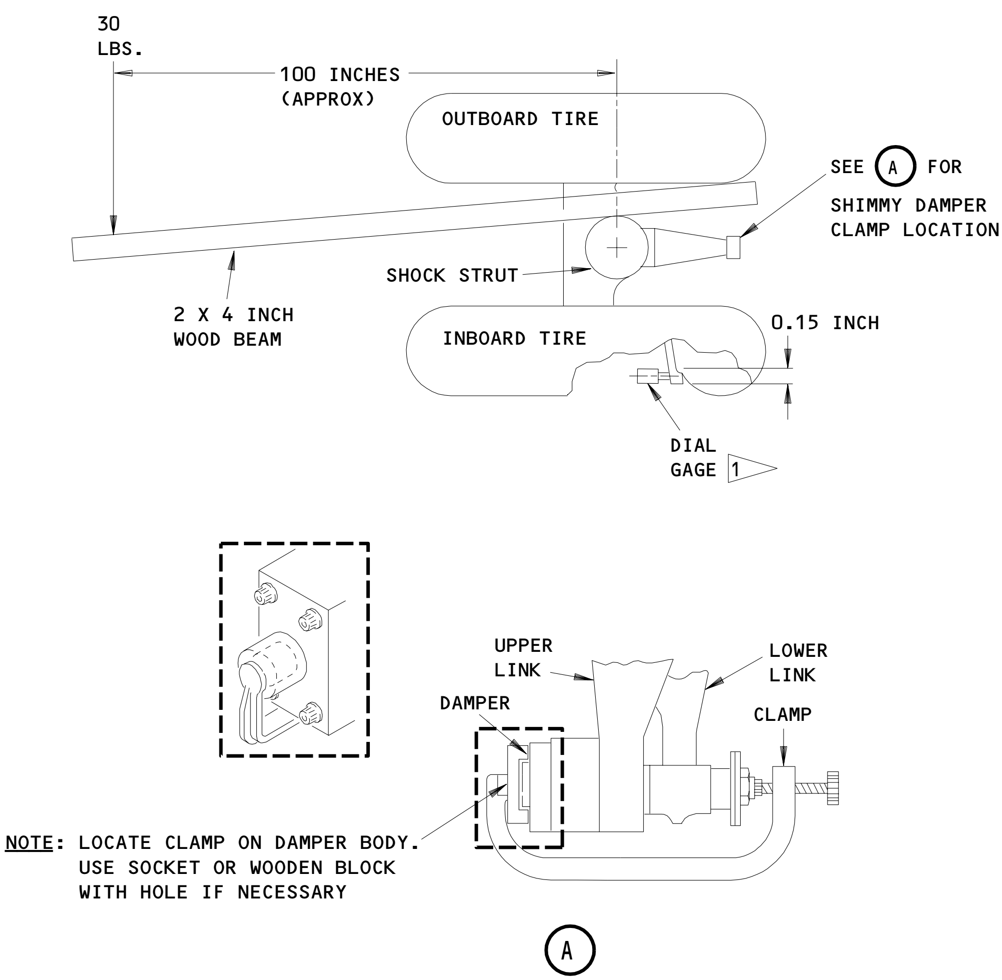
NOTE: The shimmy damper must be adjusted correctly and the apex nut of the torsion link is tightened to the specified torque before you do a check on the torsional free play of the main landing gear (Ref 32-11-81 A/T).

(a) With aid of a spring scale, apply a clockwise pull of 30 pounds on 2 X 4 at 100-inch arm from shock strut centerline. Set the dial indicator gage to zero and relax load.
(b) Apply a counterclockwise pull on 2 X 4 as in step (a). Record dial indicator reading and relax load.
(c) Repeat steps (a) and (b) for a total of 5 cycles.
(d) Deleted.
(e) Determine average free play for 5 cycles.
(f) Average value determined in step (e) should be less than 0.147 inch when standard tires, 40 X 14-16, are installed, and 0.140 inch when H40 X 14.5-19 tires are installed.

(g) If average value is greater than maximum allowable, the following parts or assemblies should be checked for permissible wear and appropriate parts replaced:
1) Torsion links
2) Shock strut inner and outer cylinder torsion link attachment lugs
3) Trunnion link to outer cylinder clevis joint
4) Forward trunnion bearing
5) Aft trunnion bearing

(h) If parts are replaced, repeat steps (a) thru (g) to verify that torsional free play is within limits.

(5) Restore Airplane to Normal
(a) Remove 12-inch C-clamp from shimmy damper.
(b) Service shock strut with air to 250-psi extend pressure prior to lowering airplane.
(c) Lower airplane and remove jacks.



1 POSITION DIAL GAGE IN FORE AND AFT DIRECTION

Main Landing Gear Torsional Free Play Inspection
Figure 601

MAIN GEAR TRUNNION LINK - REMOVAL/INSTALLATION

1. General
   A. Before the main gear trunnion link can be removed, the reaction link, upper end of drag strut, downlock spring assemblies, and hydraulic brake lines must be disconnected, and the main gear actuator and actuator walking beam removed. On the right gear, a ground speed brake cable must be disconnected in addition to all above items.
2. Equipment and Materials
   A. Ground Lock Assemblies - F72735 (AMM 32-00-01)
   B. Lead hammer
   C. Adapter Wrench, Trunnion Pin, Main Gear Nut - F80020
   D. Bullet-Shaped Thread Protector - F80115-1 or F80115-10
   E. Bullet-Shaped Thread Protector - F80115-2 or F80115-11
   F. Grease - Aero Shell 07 (AMM 20-30-21)
   G. Corrosion Inhibitor - Mastinox 6856K (AMM 20-30-21)
   H. Block and tackle
   I. Antiseize Compound - BMS 3-28 (AMM 20-30-21)
3. Prepare for Removal
   A. Check that ground lock assemblies (AMM 32-00-01) are installed in all gear.
   B. Depressurize hydraulic system.
   C. Operate brakes to depressurize brake accumulator.
   D. Remove hydraulic access panel 8401 left, or 8501 right.
   E. Jack airplane (Chapter 7, Jacking Airplane).
   F. Deflate shock strut (AMM 12-15-31/301).
   G. Pull gear inboard about 45 degrees using block and tackle.
   H. Chock wheels.
4. Remove Main Gear Trunnion Link
   A. Remove main gear actuator and actuator walking beam (AMM 32-32-11/401).

      NOTE: If the main landing gear stabilizing beam was removed to facilitate the removal of the main landing gear actuator assembly, reinstall the stabilizing beam.

B. Disconnect hydraulic lines from swivels (23) on trunnion link (20). Plug lines and cap swivel connections (Fig. 402).
C. Remove swivel connections (24) from trunnion link (20).
D. Remove downlock spring assemblies (25) (AMM 32-32-91/401).
E. On right gear, disconnect ground spoiler interlock valve cable clamps from trunnion link.
F. Disconnect drag strut (4) upper attachment.
   (1) Mark and retain drag strut upper attachment bolt (5) for installation in same location. On some airplanes, bolt is identified by a yellow head.
G. On airplanes (see Fig. 402 for effectivity) remove bolt keeper (31) retaining bolt (30).
H. Remove bolt (30) attaching lock strut (28) to reaction link (29).
I. Remove spring support shaft (26).
J. Raise reaction link (29) just clear of trunnion pin (22) and secure in position.
K. Remove nut and washer from lockbolt (17) protruding through trunnion pin nut retainer washer (18).
L. Remove retainer washer (18), trunnion link pin nut (19), and special washer (18A). Install thread protector (21).
M. Remove washer and nut from lockbolt (16) for trunnion pin (22).
N. Remove actuator beam arm antirotation bolt (12).
O. Remove nut and washer from trunnion pin lockbolt (16).
P. Tap out trunnion pin (22).
Q. Remove locking key (2) from bearing support fitting (8).
R. Force aft end of trunnion link (20) up and clear of shock strut (14). Simultaneously unscrew bearing assembly (3) from bearing support fitting (8).

   NOTE: To facilitate removal of trunnion while performing step Q, the aft end of trunnion link should be deflected inboard as well as up.

S. Apply a force to twist gear slightly and move drag strut and reaction link if needed to provide clearance when removing trunnion link from airplane.
T. Remove lockwire from lockbolt (6) and remove lockbolt.
U. Remove trunnion bearing bolt (7) and keywasher (l).
V. Slide bearing assembly (3) from trunnion link.
W. If equipped W/65C31332 series or the 65-C32649 series bearing assy.
   (1) Do a visual inspection of the bearing housing of the forward trunnion on the main landing gear (Fig. 402).
   (2) Examine the upset heads of all eight locking rivets (the interior side of the bearing race) of the bearing housing.
   (3) If all eight rivets are correctly installed. Do the inspection again at subsequent 4600 flight cycle intervals.
   (4) Continue the inspection until the bearing assembly is changed per SB 32-1217 or until six inspections are made with no deformed or distressed rivet found.

(5) If the bearing assembly is in one of the following conditions, schedule the bearing assembly to have changes made at the first maintenance opportunity, no more than 4,600 flight cycles.
(a) A minimum of five rivets must be correctly installed with no signs of deformation or distress and up to three rivets are permitted to be gone.
(b) A minimum of four rivets must be correctly installed with no signs of deformation or distress and up to four rivet heads are permitted to be gone.
(c) A minimum of three rivets must be correctly installed with no signs of deformation or distress and up to five rivets or rivet heads permitted to be gone.
(6) If the condition of the bearing assembly is less than outlined above, do the inspection again at 920 flight cycle intervals. Continue this inspection until the bearing is reworked or replaced.
(7) If the condition of the bearing assembly is more than outlined above, rework or replace the bearing assembly per SB 32-1217.

5. Install Main Gear Trunnion Link

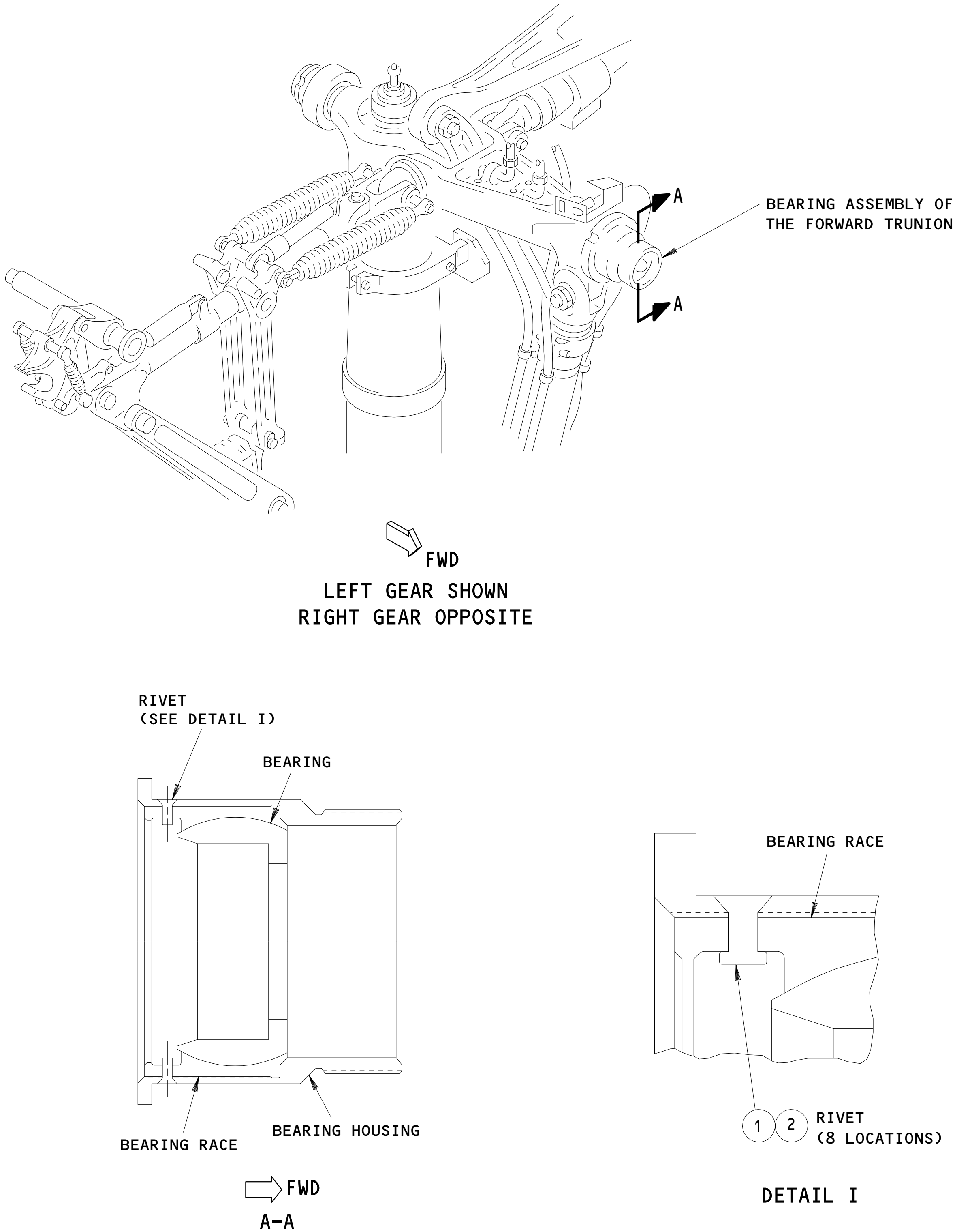
A. Clean and lightly lubricate all attachment bolts, pins, and bearing surfaces with grease immediately before installation. Apply BMS 3-28 antiseize compound to the external threads of the forward trunnion bearing assembly and the internal threads of the bearing support fitting.

WARNING: USE NITRILE GLOVES FOR SKIN PROTECTION AGAINST BMS 3-27 (MASTINOX 6856K). IF MASTINOX GETS ON YOUR SKIN, IMMEDIATELY REMOVE IT WITH WATER. IF THIS MATERIAL GETS IN YOUR EYES, IMMEDIATELY FLUSH YOUR EYES WITH WATER AND GET MEDICAL AID. THIS MATERIAL CONTAINS VERY POISONOUS AND FLAMMABLE AGENTS WHICH CAN CAUSE INJURIES TO PERSONS.

CAUTION: REMOVE UNWANTED MASTINOX FROM SURFACES TO BE LUBRICATED. IF YOU APPLY MASTINOX TO TURNABLE JOINTS, FAILURE OF THE LANDING GEAR TO EXTEND OR RETRACT CAN OCCUR.

(1) Parts not lubricated with grease after installation must be coated with Mastinox 6856K (AMM 12-21-11/201).
(2) Parts and bearing cavity lubricated with grease after installation must be lubricated and filled with Aero Shell 07 (AMM 12-21-11/201).

B. If bearing assembly was removed from trunnion link, proceed as follows:
(1) Lubricate bearing assembly and fasteners with grease immediately before installation.



Inspection - Forward Trunnion Bearing
Figure 401

(2) Place bearing assembly (3, Fig. 402) on end of trunnion.
(3) Install keywasher (1). Make sure keys on trunnion and washer are fully engaged.
(4) Install trunnion bearing bolt (7). Tighten bolt 5000 to 5500 pound-inches lube torque. Line up a hole in bearing bolt with tapped hole in keywasher (1).
(5) Install lockbolt (6) through head of bearing bolt and tighten to standard torque.
(6) Lockwire lockbolt to trunnion bolt.

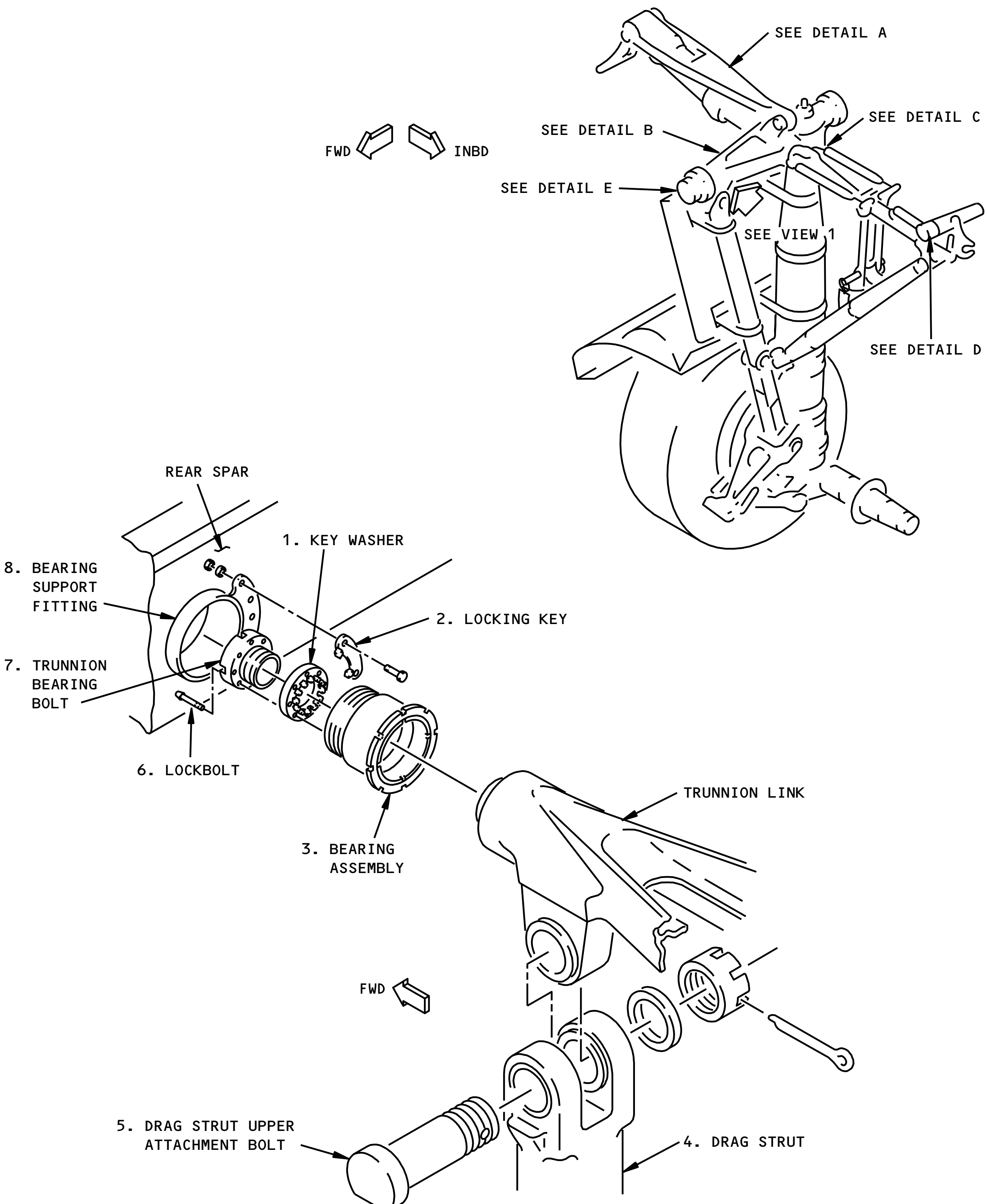
C. Install hydraulic swivel (23) on trunnion link (20).
D. Raise trunnion link into position with the large lug down.
E. With gear retracted 45 degrees with block and tackle, screw bearing assembly (3) into forward trunnion bearing support fitting (8).
F. Adjust position of gear and swing trunnion link (20) down to pass fork end over shock strut lugs (15).
G. Tap trunnion link down over lugs on shock strut until holes in link and lugs are aligned vertically.
H. Adjust lateral alignment of holes by screwing bearing assembly (3) in or out bearing support fitting (8) until trunnion link (20) and shock strut lug holes (15) are correctly aligned to provide a push fit for trunnion pin (22).
I. Place walking beam arm (13) in position between shock strut lugs (15) with curved lug facing inboard.
J. Install thread protector (21) on trunnion link pin (22). Insert pin through trunnion link (20), shock strut lugs (15) and beam arm (13) from outboard side.
K. Rotate pin (22) to align hole in pin locking lug with lockbolt (16) in trunnion link. Adjust the trunnion bearing so that you can insert the trunnion pin by hand. Remove the thread protector (21).
L. Install special washer (18A) and trunnion link pin nut (19). Tighten nut to run-on torque plus 1000-1200 pound-inches. Loosen the nut and tighten to 250-750 pound-inches.

CAUTION: MAKE SURE YOU USE THE SPECIAL UNDERSIZE NUT ON TRUNNION PINS WITH UNDERSIZE THREADS. CHECK FOR BLACK MARKING WITH A YELLOW BACKGROUND ON THE TRUNNION PIN. THIS IS AN INDICATION THAT THE THREADS HAVE BEEN REWORKED (UNDERSIZE). IF YOU USE A STANDARD NUT ON UNDERSIZE THREADS, THE NUT COULD COME OFF AND CAUSE STRUCTURAL DAMAGE TO THE LANDING GEAR.

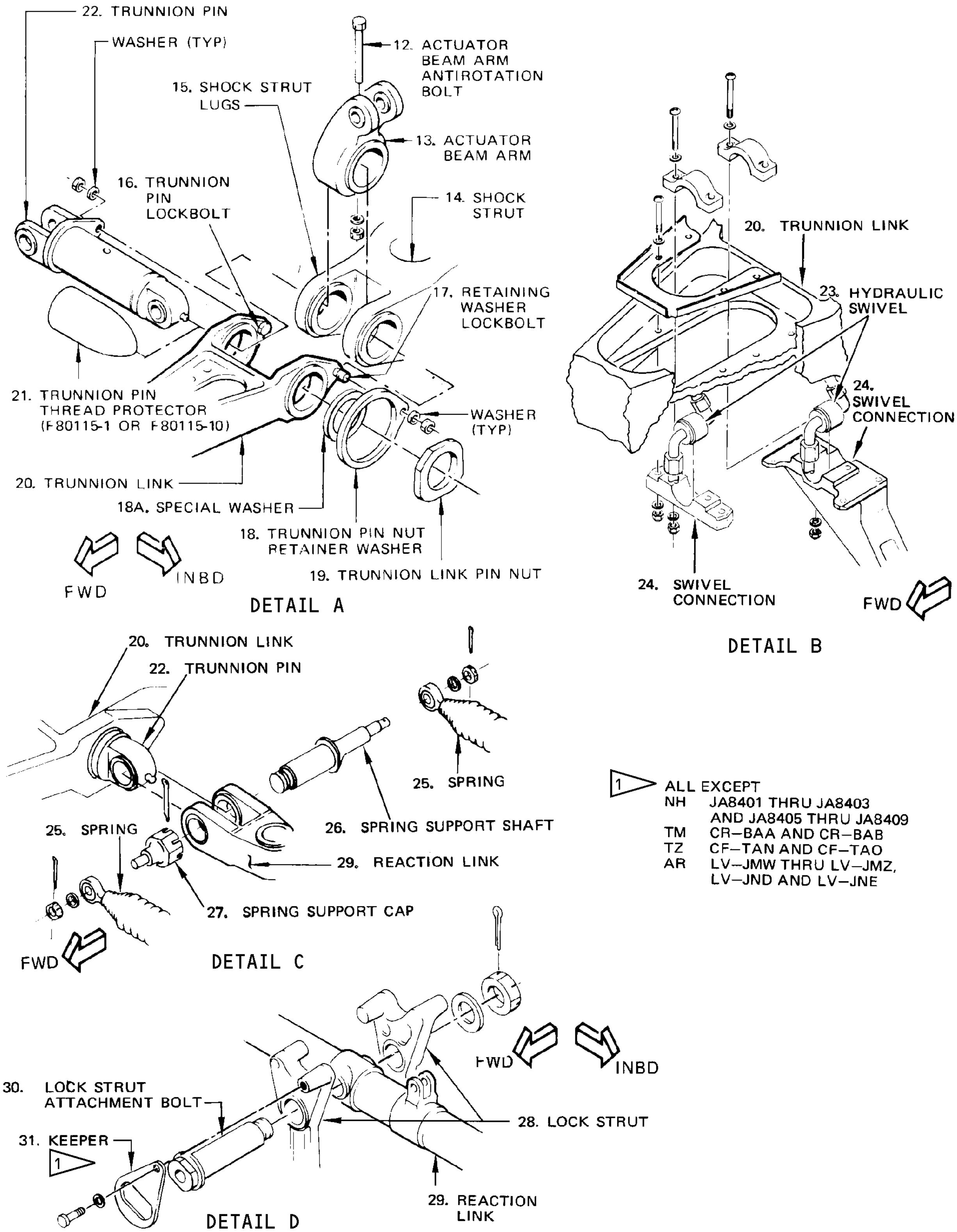
M. Add washer and nut to trunnion pin lockbolt (16). Tighten nut 100 to 150 pound-inches torque.
N. Install locking key (2).

NOTE: Locking key may be installed in either of two positions to align tabs with slots.

O. Position retainer washer (18) to align serrations of trunnion link pin nut (19) and lockbolt (17) on trunnion link (20).



Main Gear Trunnion Link Installation
Figure 402 (Sheet 1)



Main Gear Trunnion Link Installation
Figure 402 (Sheet 2)

P. Add washer and nut to lockbolt (17) and tighten nut 100 to 150 pound-inches lube torque.
Q. Insert actuator beam arm antirotation bolt (12) through beam arm (13) and trunnion pin (22). Add washer and nut.
R. Tighten nut 30 to 40 pound-inches torque.
S. Install main gear actuator and actuator walking beam (AMM 32-32-11/401).

NOTE: If the main landing gear stabilizing beam was reinstalled, it may be removed to facilitate the installation of the main landing gear actuator assembly.

T. Release and line up end of reaction link (29) with lug on trunnion pin (22).
U. Install thread protector on spring support shaft (26).
V. Insert shaft from aft side. Tap shaft hard down.

CAUTION: DO NOT TAP ON THREAD END OF HEAD. USE THICK WALL TUBE OVER THREADS FOR DRIFT.

W. Add spring support cap (27) on shaft (26).
X. Tighten spring support cap (27) 100 to 150 pound-inches torque.
Y. If necessary, slack cap back to align nearest slot with cotter pin hole. Lock cap with cotter pin.
Z. Connect lock strut (28) to reaction link (29).
   (1) Line up lock strut (28) with reaction link (29).
   (2) Insert bolt (30) from forward side of gear.
   (3) Add washer and nut.
   (4) On airplanes with bolt keeper (Fig. 402, for effectivity), install keeper (31) with washer and bolt.
   (5) Tighten nut on bolt (30) 100 to 150 pound-inches dry torque.
   (6) If necessary, slack off nut to align nearest castellation slot with cotter pin hole. Lock nut with cotter pin.
AA. Install downlock springs (25) (AMM 32-32-91/401).
AB. Align upper end of drag strut (4) with lug on trunnion link (20).
AC. Insert attachment bolt from inboard side. Add washer and nut.

CAUTION: ENSURE DRAG STRUT UPPER ATTACHMENT BOLT (5) IS SAME BOLT OR REPLACEMENT BOLT IS SAME PART NUMBER AS REMOVED IN STEP 4.F. DRAG STRUT UPPER ATTACHMENT BOLT (5) IS A STRUCTURAL FUSE AND MUST BE INSTALLED IN SAME LOCATION FROM WHICH REMOVED TO MAINTAIN STRUCTURAL INTEGRITY OF THE REAR SPAR.

AD. Tighten nut as tightly as possible by hand. If necessary, back off nut to line up nearest slot with cotter pin hole. Lock nut with cotter pin.
AE. Remove caps and plugs. Connect hydraulic lines.
AF. On right gear, connect ground spoiler interlock valve cable clamps to trunnion link.

AG. Pressurize hydraulic systems A and B and bleed brakes by operating brake pedals four to six times (AMM 29-11-0 and AMM 29-12-0/201).
   (1) Check hydraulic brake line connections for leaks and lines are not cross-connected.

AH. Pressurize B hydraulic system.

AI. Depressurize brake pedals and verify that only outboard brakes are actuated.

   NOTE: Actuation of one of the inboard brakes is an indication that hydraulic tubes are cross-connected.

AJ. Install hydraulic access panels.

AK. Service shock strut and lubricate points of disassembly (Chapter 12, Gaseous System Servicing and Landing Gear Component Lubrication).

AL. Jack airplane for retraction of main landing gear only (Chapter 7, Jacking Airplane).

AM. Remove ground lock assemblies (AMM 32-00-01) and perform retraction test on gear (AMM 32-32-0/501).

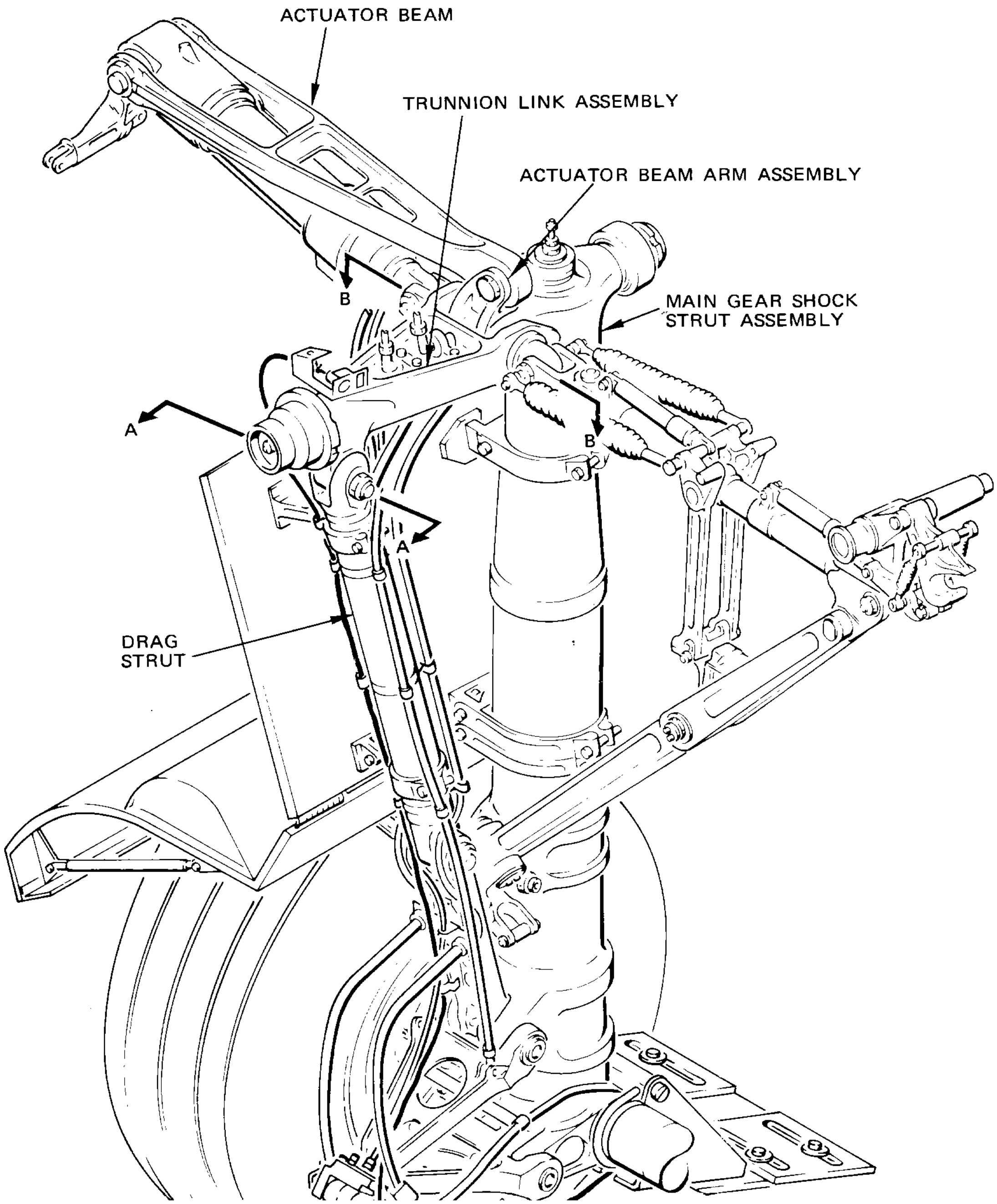
AN. Extend gear and install gear ground lockpins.

AO. Lower airplane and remove jacks (Chapter 7, Jacking Airplane).

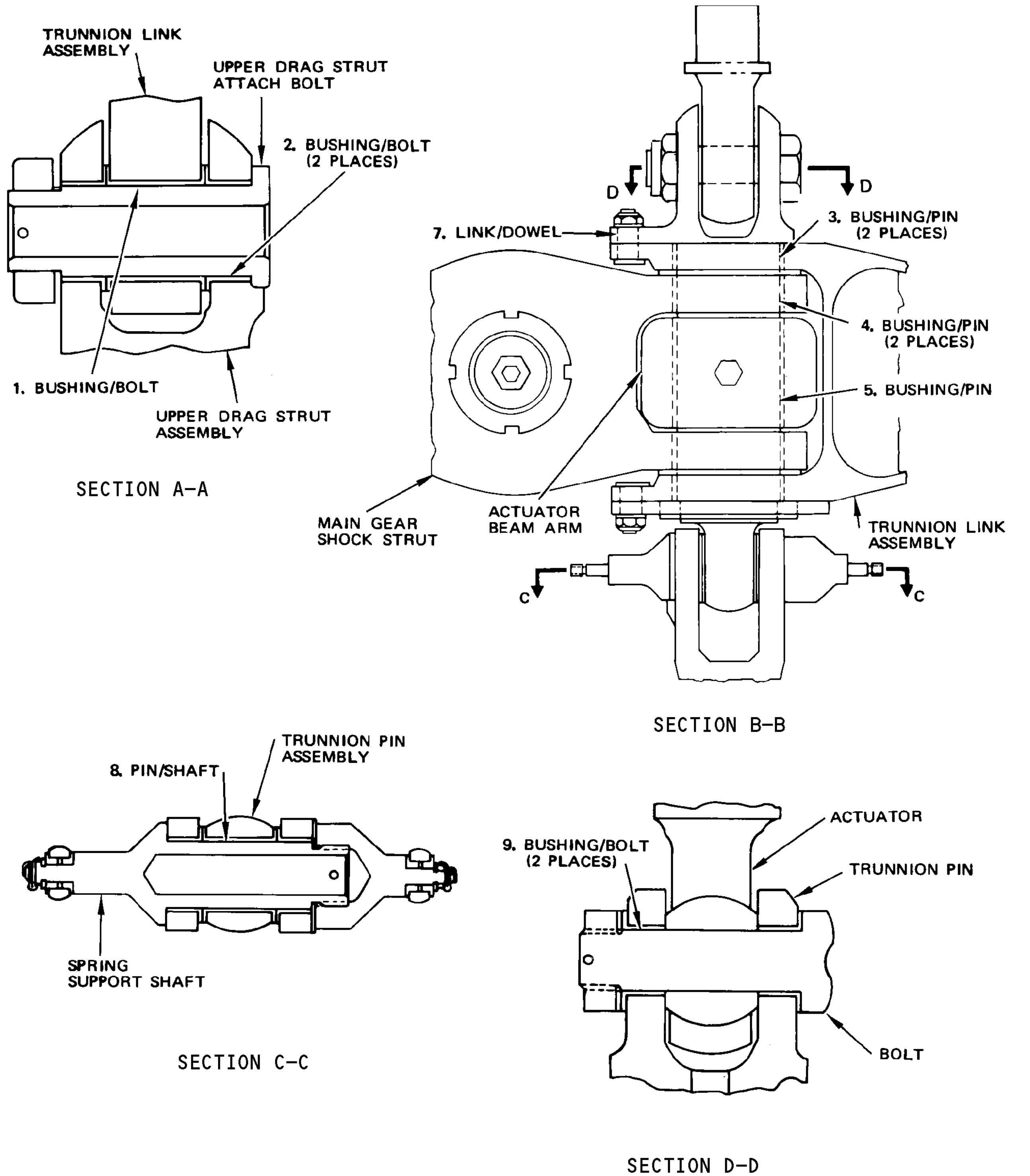
MAIN GEAR TRUNNION LINK ASSEMBLY - INSPECTION/CHECK

1. General
   A. These data consist of illustrations and wear limit charts. No procedure is given in this section for access to permit inspection. Refer to Main Gear Trunnion Link Assembly - R/I.
2. Main Gear Trunnion Link Assembly Wear Limits

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS DIAMETER MIN	DESIGN LIMITS DIAMETER MAX	WEAR LIMITS MAX WEAR DIM.	WEAR LIMITS MAX DIAM CLEAR-ANCE	REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR.
1	BUSHING	ID	1.500	1.501	1.502	0.005	X		
	BOLT	OD	1.498	1.499	1.497			X	
2	BUSHING	ID	1.500	1.501	1.502	0.005	X		
	BOLT	OD	1.498	1.499	1.497			X	
3	BUSHING	ID	2.625	2.627	2.628	0.006	X		
	PIN	OD	2.623	2.624	2.621			X	
4	BUSHING	ID	2.625	2.627	2.628	0.006	X		
	PIN	OD	2.623	2.624	2.621			X	
5	BUSHING	ID	2.625	2.627	2.628	0.006	X		
	PIN	OD	2.623	2.624	2.621			X	
6	BEARING	ID	3.250	3.251	3.254	0.005	X		
	LINK	OD	3.2385	3.2495	3.2405			X	
7	LINK	ID	0.4540	0.4545	0.456			X	
	DOWEL	OD	0.455	0.456			X		
8	PIN	ID	1.250	1.251	1.252	0.005		X	
	SHAFT	OD	1.248	1.249	1.247			X	
9	BUSHING	ID	1.0000	1.0010	1.003	0.005		X	
	BOLT	OD	0.9985	0.9990	0.997		X		



Main Gear Trunnion Assembly Wear Limits
Figure 601



Main Gear Trunnion Link Assembly Wear Limits
Figure 602

MAIN GEAR SHOCK STRUT - REMOVAL/INSTALLATION

1. Equipment and Materials
    A. Ground Lock Assemblies (Ref 32-00-01)
    B. Main Gear Oleo Lock Assembly
        (1) Preferred - F80234 - Applicable to all airplanes
        (2) Alternate - F80016-19 - Applicable to airplanes with anti-rotation bolt in torsion links
    C. Adapter Wrench Main Gear Trunnion Pin Nut - F80020-5
    D. Bullet Shaped Thread Protector - F80115-1 or F80115-10
    E. Bullet Shaped Thread Protector - F81105-2 or F80115-11
    F. Main Landing Gear Sling - ME65-73761 or polyester web sling 12 feet long, 3 inches wide, 2000 pound minimum rated capacity, eye and eye configuration. CWEEl-63, 12 feet long. Cambridge Wire Cloth Co., Cambridge, Maryland (Fig. 402)
    G. Main Gear Buildup Stand - FME65-73761
    H. Mobile crane
    I. Lead hammer
    J. Wheel chocks
    K. Container - suitable for hydraulic fluid, in which to drain brake lines
    L. Grease - BMS 3-33 (Preferred)
    M. Grease - MIL-PRF-23827 (Supercedes MIL-G-23827) (Alternate)
    N. Grease - MIL-G-21164 (Alternate)
    O. Corrosion preventative compound MIL-C-11796, Class 3 (Ref 20-30-21)
2. Prepare to Remove Main Gear Shock Strut
    A. Check that ground lock assemblies (Ref 32-00-01) are installed in all gear.
    B. Depressurize hydraulic systems A and B.
    C. Operate brakes eight times to depressurize brake accumulator.
    D. Open all landing gear circuit breakers on panel P6.
    E. Remove hydraulic access panel 8401 on left or 8501 on right from underside of wing.
    F. Remove main gear shock strut doors. Refer to 32-13-11.
    G. Deflate and compress shock strut by removing dust cap from charging valve and loosening release valve one or two turns. (Fig. 401.)

    WARNING: DO NOT LOOSEN VALVE BODY UNLESS SHOCK STRUT IS COMPLETELY DEFLATED. AIR PRESSURE CAN BLOW VALVE BODY OUT, CAUSING INJURY TO PERSONNEL. ENSURE PERSONNEL AND EQUIPMENT ARE CLEAR OF AIRPLANE AS IT DESCENDS.

    H. Install main gear oleo lock assembly to keep shock strut compressed. (Fig. 401.)

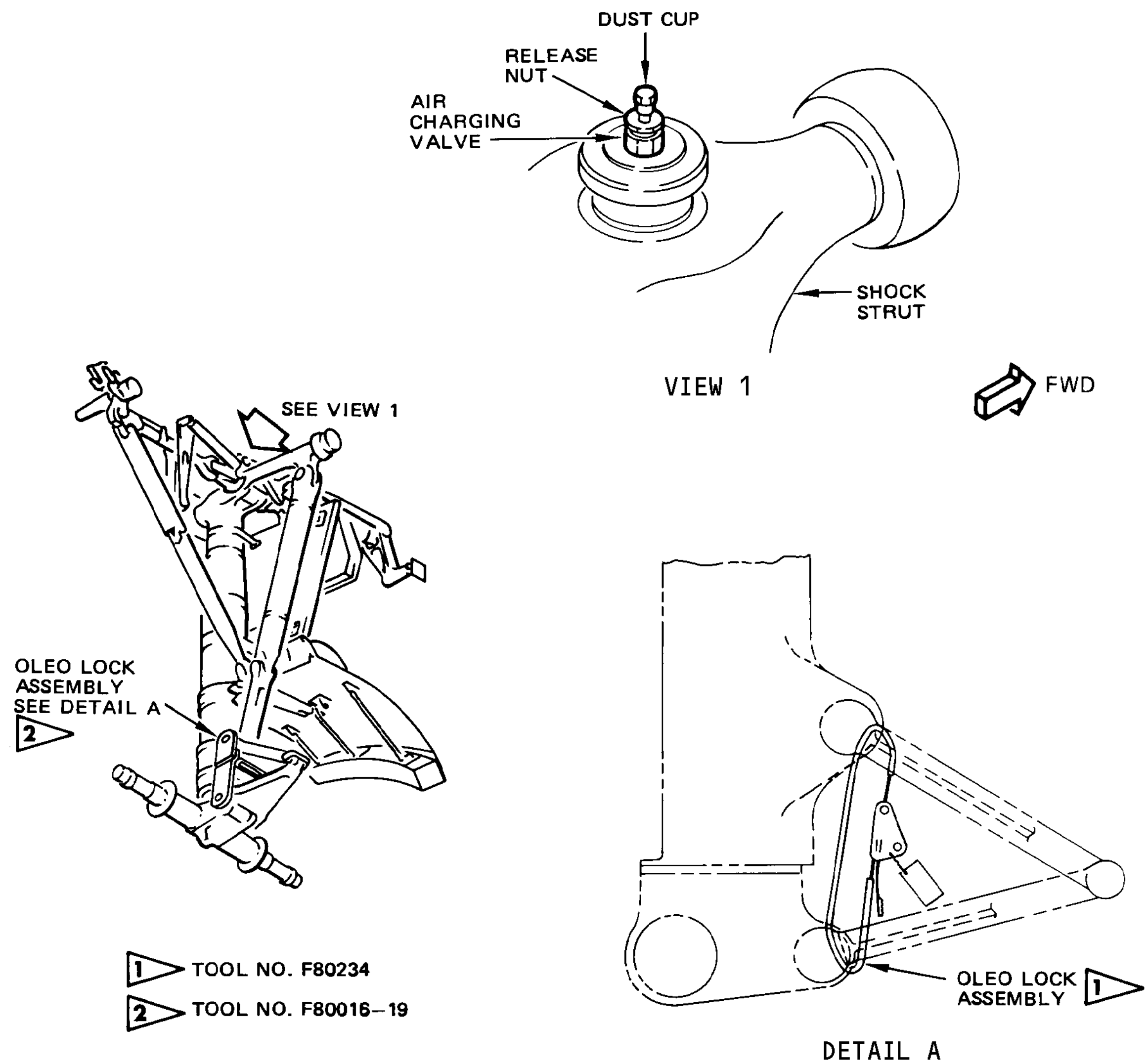
I. Place a container under shock strut, remove drain plug or check valve and drain oil from strut. When strut is empty, install drain plug or check valve.

NOTE: Arrow on check valve points up when check valve is installed.

J. Jack airplane until tires are making just sufficient contact to prevent wheels rotating. Jacking height will be about 4 inches. Refer to Chapter 7, Airplane Jacking.
K. Mark tire footprint on ground by drawing line around tire contact area.

3. Remove Main Gear Shock Strut
A. Proceed with main landing gear removal per 32-11-0, paragraph 4.
B. Roll gear clear of airplane and attach main landing gear sling. (Fig. 402.)
C. Hook sling onto crane and hoist gear onto buildup stand. (Fig. 403.)
D. Remove wheels per 32-45-11.
E. Remove brakes per 32-41-41.
F. Strip shock strut of hydraulic lines and electrical cables. (Fig. 404.)
G. Remove drag strut upper and lower segments. Refer to 32-11-31 and 32-11-41.
H. Remove torsion links. Refer to 32-11-51.
I. Remove main gear trunnion link. Refer to 32-11-11.

4. Install Main Gear Shock Strut
A. Secure main landing gear sling to shock strut assembly (Fig. 402).
B. Hook crane onto sling, hoist shock strut and clamp in position on landing gear buildup stand (Fig. 403).
C. Connect trunnion link, assemble drag strut segments and torsion links (Ref 32-11-0).
D. Install brakes and wheels (Ref 32-45-11).
E. Add hydraulic lines and electrical wiring to shock strut (Fig. 404).
F. Install main gear oleo lock assembly (Fig. 401).
G. Hoist assembly out of buildup stand.
H. Set gear down and lower trunnion-link-drag strut apex onto wood block on hydraulic floor jack.
I. Install main landing gear per 32-11-0, par. 5.



Shock Strut Air Charging Valve and Oleo Lock Assembly Installation
Figure 401

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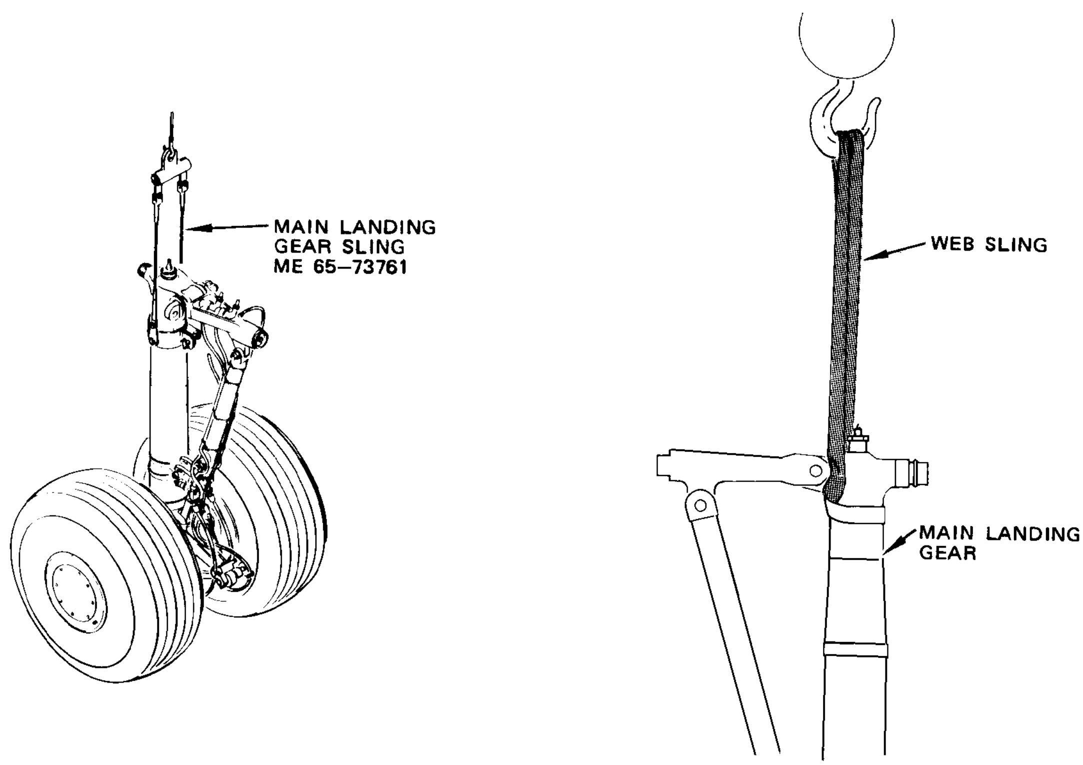
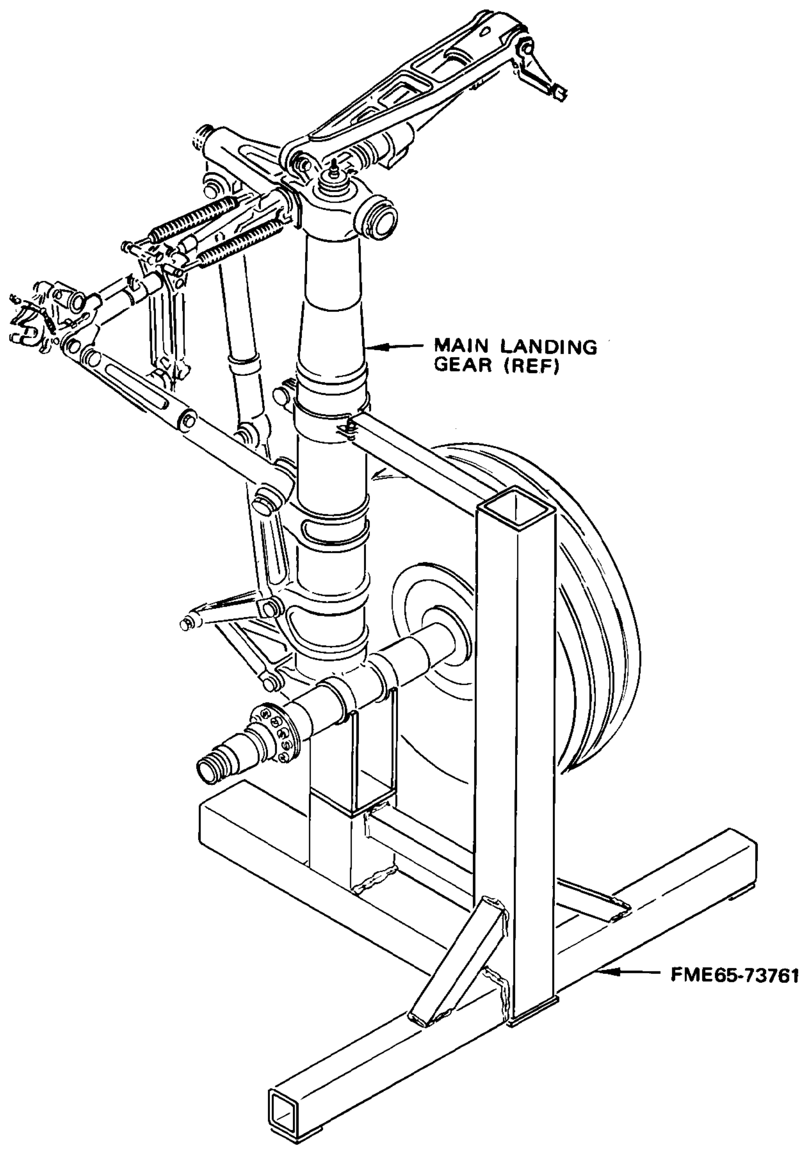
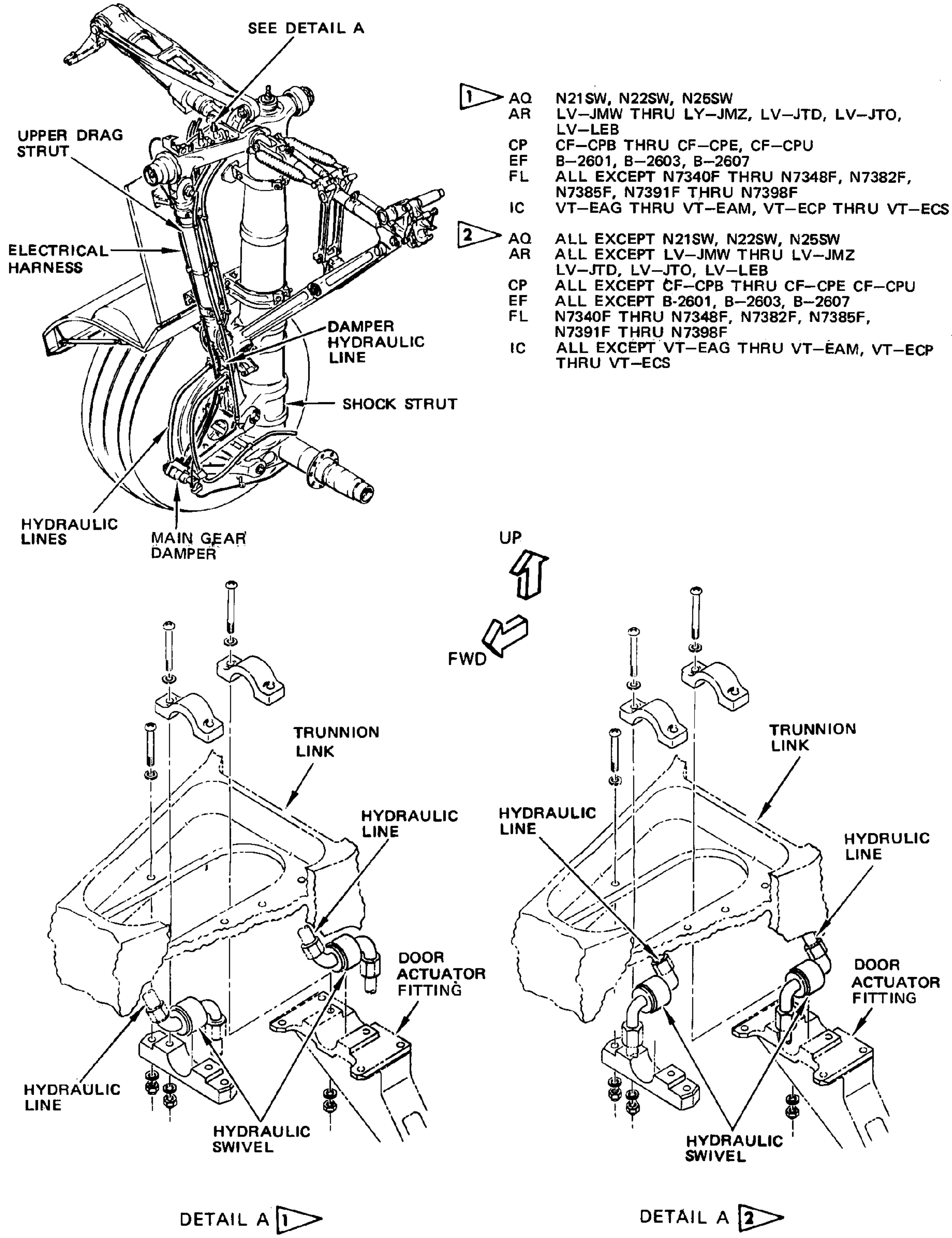


Main Landing Gear Sling
Figure 402



Main Gear Build Up Stand
Figure 403



Main Gear Hydraulic Lines and Electrical Cables
Figure 404

Main Gear Hydraulic Lines and Electrical Cables
Figure 404

MAIN GEAR SHOCK STRUT - APPROVED REPAIRS

1. General
   A. Spare seals are carried in grooves in the shock strut lower bearing.
      (1) There are two O-rings for dynamic seals in one groove.
      (2) There are two O-rings for the static seal in the other groove.
   B. The spare seals permit active seals to be replaced without removing the shock strut inner cylinder every time a seal replacement is necessary.
      (1) When either the spare static seal O-ring or the last spare dynamic seal O-ring is used, the next replacement of that respective O-ring will require disassembly of the shock strut.
   C. There is a procedure below for replacing active inner cylinder seals with spare seals and another procedure for replacing active inner cylinder seals and installing spare seals.
   D. A split ring cam seal must be used with a spare dynamic seal O-ring to replace a faulty channel seal.
   E. Backup rings are split and can be replaced without removing inner cylinder.
2. Replace Active Inner Cylinder Seals with Spare Seals (Fig. 801)
   A. Equipment and Materials
      (1) Hydraulic Oil - MIL-H-6083 or MIL-H-5606
      (2) Dry air or nitrogen bottle capable of 2500 psi for servicing shock strut
      (3) Ground Lock Assemblies - F72735 (Ref 32-00-01)
      (4) Gland nut wrench - F80033-1
      (5) Plastic tool for removing O-rings
      (6) G01912 Lockwire - Monel (0.032 In. Dia.) (NASM20995NC32 QQ-N-281)
      (7) Thin strip of metal to be used as backup when cutting seals
      (8) Petrolatum - VV-P-236
      (9) Split ring cam seal
      (10) Drip tray.
      (11) Clean pieces of white cloth, new or laundered, containing less than 0.75% oil (carbon tetrachloride extraction) and free of silicone.
      (12) Cloth padding for protection of gland nut damage to shock strut, when unscrewed.
      (13) Corrosion Preventive Compound MIL-C-11796, Class 3 (Ref 20-30-21)
      (14) Corrosion Preventive Compound - BMS 3-27 (Mastinox 6856K)
   B. Prepare for Seal Replacement
      (1) Check that ground lock assemblies are installed on nose and main landing gears (Ref 32-00-01).
      (2) Depressurize hydraulic systems.
      (3) Operate brakes eight times to depressurize brake accumulator.
      (4) Open all landing gear circuit breakers on panel P6.

(5) Deflate shock strut (Ref 12-15-31), by removing valve cap from charging valve at top of shock strut. Loosen outer hexnut two turns maximum.

<u>WARNING</u>: DO NOT LOOSEN VALVE BODY UNLESS SHOCK STRUT IS COMPLETELY DEFLATED. AIR PRESSURE CAN BLOW VALVE BODY OUT, CAUSING INJURY TO PERSONNEL.
CHARGING VALVE MUST REMAIN OPEN. INTERNAL PRESSURE CAN BLOW OUT LOOSENED GLAND NUT AND INJURE PERSONNEL.

(6) Place a container under shock strut, remove drain plug or check valve and drain oil from strut. When shock strut is empty, install drain plug or check valve, as applicable.

<u>NOTE</u>: Arrow on check valve points up when check valve is installed.

C. Replace Seals with Spare Seals

(1) Measure and record the distance the gland nut (12) extends below the outer cylinder (17) for use in subsequent step (Fig. 802, Detail B).
(2) Place cloth padding around shock strut inner cylinder below gland nut (12) to prevent sharp edge of hole in gland nut from damaging inner cylinder if gland nut is accidentally allowed to slide down inner cylinder when unscrewed from outer cylinder.
(3) Place drip tray to catch hydraulic fluid when gland nut is removed.

<u>CAUTION</u>: CLEAN ANY HYDRAULIC FLUID FROM TIRES IMMEDIATELY, SHOULD ANY SPLASH ON THEM, TO AVOID DETERIORATION.

(4) Remove gland nut lock plate (1) on aft side of shock strut.
(5) Use gland nut wrench to unscrew gland nut and slide nut to bottom of inner cylinder.
(6) Jack airplane and slide scraper adapter (11) and scraper ring (10) down inner cylinder onto removed gland nut.
(7) Continue jacking and work out lower bearing (7), washer (6), and seal adapter (4).
    (a) Examine outside diameter of lower bearing. If corrosion is present or coating is damaged, remove shock strut (Ref Removal/Installation) and replace bearing.
(8) Cut active static seal O-ring (3) and backup rings (15) from outer groove in seal adapter (4). Use a plastic tool to prevent damage to adapter.

(9) Cut active dynamic seal (21), cut channel seal (5) or remove backup rings (5) from inner cylinder.

CAUTION: EXTREME CARE MUST BE EXERCISED AS ANY NICKS OR SCRATCHES ON INNER CYLINDER, BESIDES DAMAGE TO THE INNER CYLINDER ITSELF, WILL DAMAGE THE SEAL ADAPTER AS THEY SLIDE OVER THE DAMAGED SURFACE OF THE INNER CYLINDER.

NOTE: When cutting active seal or channel seal; use backup metal strip between seal and surface of material which seal contacts.

(10) Slip spare static seal O-ring (9) from lower spare seal recess in lower bearing (7) and apply a coat of MIL-H-6083 hydraulic oil and a light coat of petrolatum prior to installation.
(11) Carefully stretch lubricated spare static seal O-ring only enough to install O-ring in groove of seal adapter (4, Fig. 801) and install a new backup ring on each side of O-ring.

NOTE: O-rings must have no twists when installed.

(12) Slip a spare dynamic seal O-ring or seal assembly (8) from upper spare seal recess in lower bearing (7) and apply a coat of MIL-H-6083 hydraulic oil and a light coat of petrolatum prior to installation.
(13) Coat a cam seal if installed with petrolatum.
(14) Slide spare dynamic seal O-ring or seal assembly up inner cylinder into recess in seal adapter. Position cam seal immediately below dynamic seal O-ring, if installed.
(15) Slide lower bearing (7) against newly positioned cam seal, if installed, to hold seal and newly installed O-ring or seal assembly in place and slide bearing and seal adapter as a unit into outer cylinder.
(16) Slide scraper adapter (11) with scraper ring (10) into position against lower bearing.

(17) Slide gland nut (12) into position to screw into outer cylinder.

CAUTION: GLAND NUT AND OUTER CYLINDER THREADS MAY HAVE BEEN REWORKED (OVERSIZE). IF SO, GLAND NUT AND OUTER CYLINDER SHOULD BE IDENTIFIED ACCORDINGLY AND KEPT AS A SET.

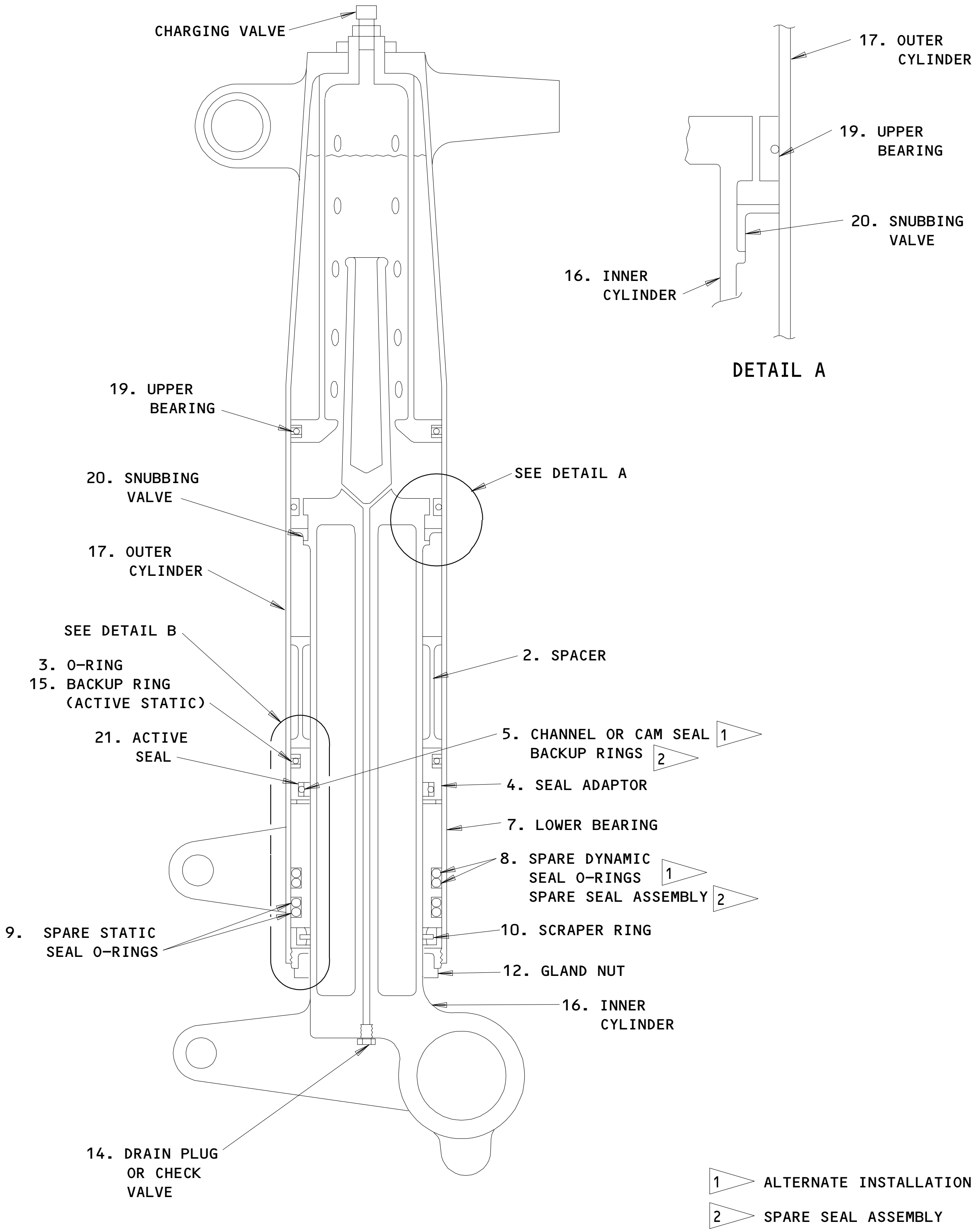
NOTE: If trouble is experienced in moving lower bearing into outer cylinder, align inner cylinder and place a wooden block of equal dimensions on each side of inner cylinder below gland nut and jack inner cylinder until nut reaches outer cylinder.

(18) ON AIRPLANES WITH GLAND NUT THAT HAS LUBE FITTINGS: apply MIL-C-11796, Class 3, corrosion preventive compound to the threads of the gland nut (12) and the outer cylinder (17). ON AIRPLANES WITH GLAND NUT THAT HAS PLUGS: apply BMS 3-27 (Mastinox 6856K) corrosion preventive compound to the threads of the gland nut (12) and the outer cylinder (17).
(19) Install the gland nut (12) on the outer cylinder (17). Tighten the gland nut (12) 50 to 400 pound-feet lube torque.
  (a) Turn the gland nut (12) to the nearest slot to allow the installation of the lockplate (1).
(20) Measure the distance the gland nut (12) extends below the outer cylinder (17). The dimension must equal the dimension you recorded in step 2.C.(1), within 0.01 inch.
(21) Measure the full stroke of the inner cylinder (16) by manually compressing and extending it.

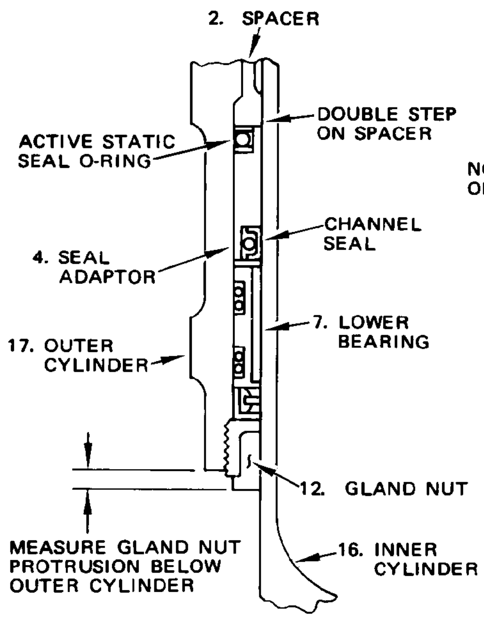
NOTE: The full stroke dimension should fall within the range given in Fig. 801. If not, do the step that follows.

  (a) Disassemble the shock strut and look for missing parts or parts that are not installed correctly.
(22) Install gland nut lock plate (1).

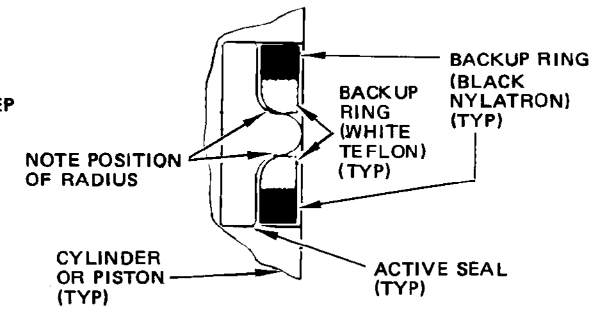
D. Restore Airplane to Normal Configuration
(1) Lower airplane (Ref Chapter 7, Jacking Airplane).
(2) Wipe exposed inner cylinder with hydraulic fluid.
(3) Service shock strut (Ref Chapter 12, Main Landing Gear Shock Strut Servicing).
(4) Check for leaks at gland nut.
(5) Remove airplane jacks.
(6) Tag strut to show status of spare seals, either, "static spare seal used," or, "both dynamic seals used."
(7) Close all landing gear circuit breakers on P6 panel.



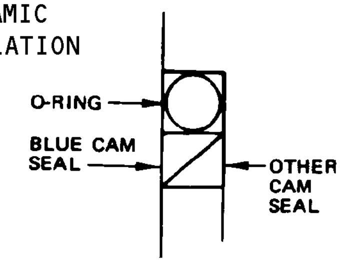
Main Gear Shock Strut Seal Replacement
Figure 801 (Sheet 1)



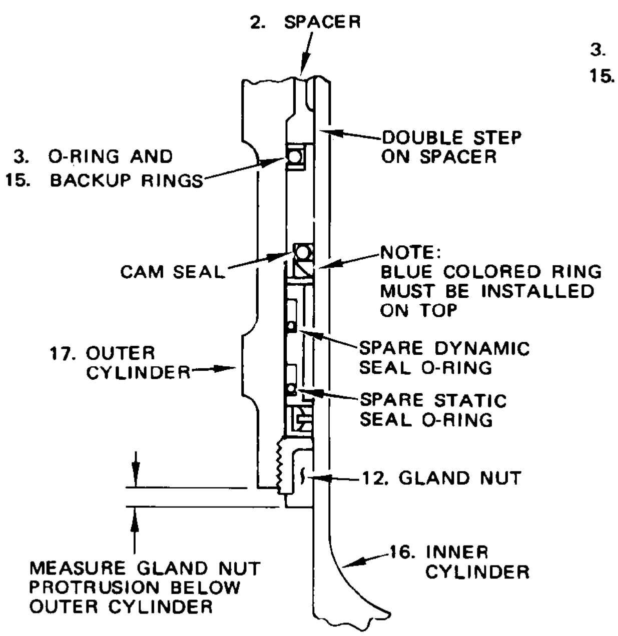
BEFORE REPLACEMENT OF CHANNEL SEAL ACTIVE DYNAMIC SEAL AND STATIC SEAL O-RING (ALTERNATE INSTALLATION)



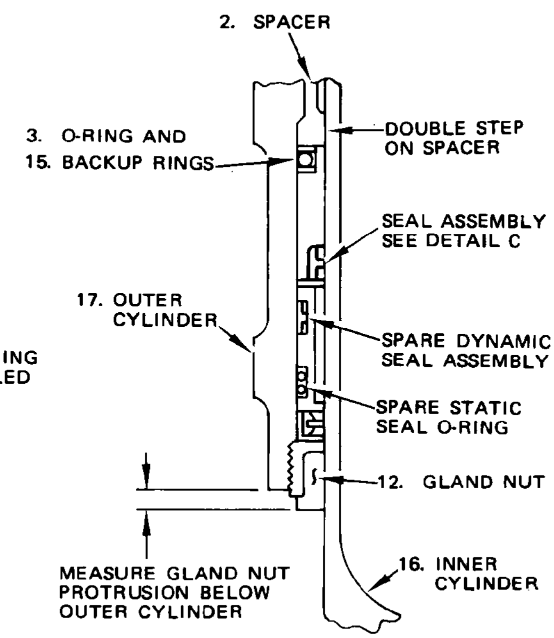
TYPICAL ACTIVE DYNAMIC SEAL ASSEMBLY INSTALLATION
DETAIL C



TYPICAL O-RING AND SPLIT CAM SEAL INSTALLATION



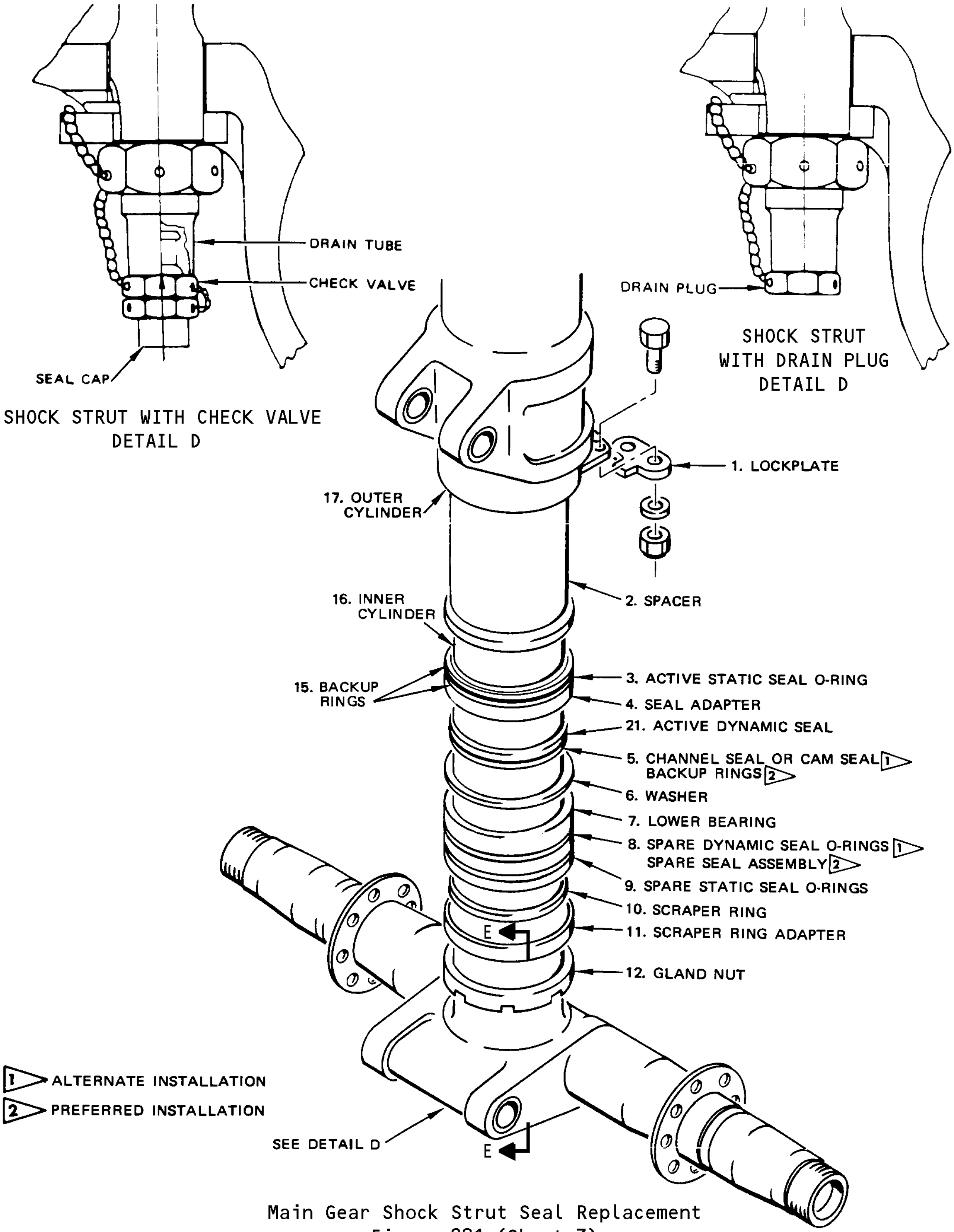
AFTER REPLACEMENT OF CHANNEL SEAL WITH O-RING AND SPLIT CAM SEAL AND REPLACEMENT OF THE ACTIVE STATIC SEAL O-RING (ALTERNATE INSTALLATION)



PREFERRED SEAL INSTALLATION

DETAIL B

Main Gear Shock Strut Seal Replacement
Figure 801 (Sheet 2)



Main Gear Shock Strut Seal Replacement
Figure 801 (Sheet 3)

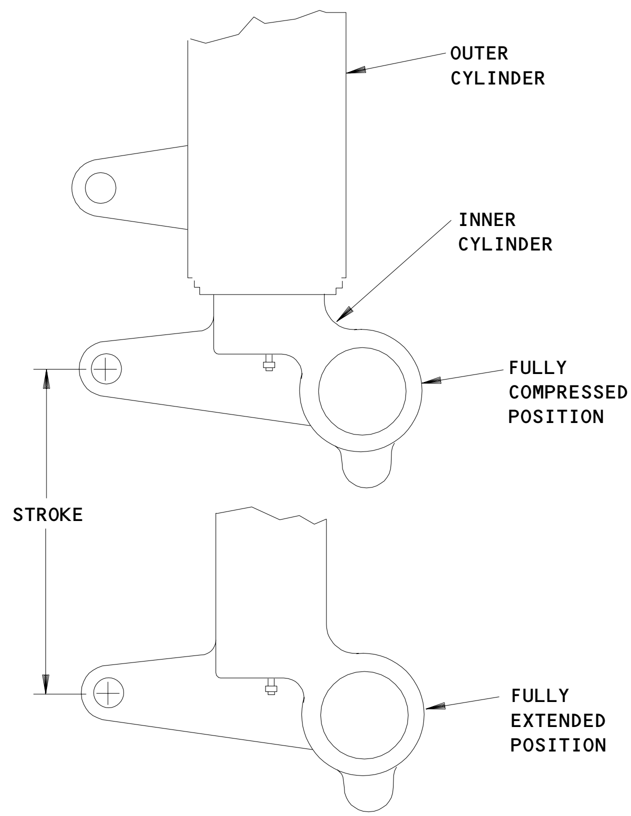
3. Replace Active Inner Cylinder Seals and Install Spare Seals
   A. Equipment and Materials
      (1) Hydraulic Oil - MIL-H-6083 or MIL-H-5606
      (2) Dry air or nitrogen bottle capable of 2500 psi for servicing shock strut
      (3) Ground Lock Assemblies (AMM 32-00-01)
      (4) Gland nut wrench - F80033-1
      (5) Plastic tool for removing O-rings
      (6) G01912 Lockwire - Monel (0.032 In. Dia.) (NASM20995NC32 QQ-N-281)
      (7) Thin strip of metal to be used as backup when cutting seals
      (8) Petrolatum - VV-P-236
   B. Prepare Shock Strut for Seal Replacement
      (1) Check that ground lock assemblies are installed on nose and main landing gears (AMM 32-00-01).
      (2) Depressurize hydraulic systems.
      (3) Operate brakes eight times to depressurize brake accumulator.
      (4) Open all landing gear circuit breakers on panel P6.
      (5) Deflate shock strut (AMM 12-15-31) by removing valve cap from charging valve at top of shock strut.
      (6) Loosen outer hexnut two turns maximum.

          WARNING: DO NOT LOOSEN VALVE BODY UNLESS SHOCK STRUT IS COMPLETELY DEFLATED. AIR PRESSURE CAN BLOW VALVE BODY OUT, CAUSING INJURY TO PERSONNEL. CHARGING VALVE MUST REMAIN OPEN. INTERNAL PRESSURE CAN BLOW OUT GLAND NUT AND INJURE PERSONNEL.

      (7) When shock strut is deflated, remove charging valve.

          CAUTION: MAKE SURE SHOCK STRUT IS COMPLETELY DEFLATED BEFORE REMOVING CHARGING VALVE. VALVE CAN BLOW OUT AND INJURE PERSONNEL.

      (8) Jack airplane until weight is off gear (Ref Chapter 7, Jacking Airplane).
   C. Remove Inner Cylinder Seals
      (1) Remove gland nut lockplate (1). Measure and record the distance the gland nut (12) extends below the outer cylinder (17) for use in subsequent step (Fig. 802, Detail B).
      (2) Disconnect torsion links at apex (Ref 32-11-51 R/I).
      (3) Disconnect hydraulic lines at brakes.
      (4) Disconnect electrical cables at axle.
      (5) Turn inner cylinder (16) until axle is parallel to trunnion link.
      (6) Place cloth padding around shock strut inner cylinder below gland nut (12, Fig. 802) to prevent sharp edges from damaging inner cylinder if nut should accidently be dropped allowing nut to slide down inner cylinder.



STROKE, INCHES
13.856-13.983

E-E

Main Landing Gear Shock Strut Seal Replacement
Figure 801 (Sheet 4)

(7) Place drip tray to catch hydraulic fluid when gland nut is removed.

CAUTION: CLEAN ANY HYDRAULIC FLUID FROM TIRES IMMEDIATELY TO AVOID DETERIORATION.

(8) Remove gland nut lockplate (1) on aft side of shock strut. Use gland nut wrench to unscrew gland nut and slide nut to bottom of inner cylinder.

(9) Slide scraper ring and adapter (10) and (11) down onto nut.

NOTE: Coating of outside diameter of lower bearing should be examined at this time. If coating shows evidence of deterioration, replace bearing or repair coating per instructions in overhaul manual.

(10) Remove ground lock assemblies (Ref 32-00-01). Manually release downlock.

(11) Slowly roll gear inboard until inner cylinder can be removed.

CAUTION: HAVE EQUIPMENT OR MANPOWER READY TO SUPPORT WEIGHT OF INNER CYLINDER AS CYLINDER COMES OUT.

(12) On airplanes listed in sheet 1, Fig. 802, take out retainer ring (18) and remove upper bearing assembly (19).

(13) Remove snubbing valve (20), spacer (2), and seal adapter (4) from inner cylinder.

(14) Remove active static seal O-ring (3) and backup rings (15) from outer groove in seal adapter (4). Use plastic tool to prevent damage to cam.

(15) Remove active dynamic seal (21) and channel seal, cam seals or backup rings (5) from around inner cylinder.

CAUTION: EXTREME CARE MUST BE EXERCISED AS ANY NICKS OR SCRATCHES ON INNER CYLINDER, BESIDES DAMAGE TO INNER CYLINDER, WILL DAMAGE CENTERING CAM AND SEALS AS THEY SLIDE OVER DAMAGED SURFACE OF INNER CYLINDER.

(16) Coat one each of static seal and active seal and channel seal, cam seal or backup rings with hydraulic fluid and a light coat of petrolatum.

(17) If installed, slip lubricated channel seal (5) over and down inner cylinder to position around inner cylinder between lower bearing (6) and lower centering cam.

(18) Carefully stretch and slip new lubricated active dynamic seal (21) over and down inner cylinder and seal adapter to position in channel seal, if installed, or install backup rings or cam seal (sheet 2, Fig. 802).

(19) Carefully stretch static seal (9) and spare O-rings or seal assembly, (8) necessary to replace missing spares, and slip over and down inner cylinder, seal adapter, and lower bearing into respective recesses in lower bearings.

(20) Carefully stretch new lubricated active static seal O-ring (9) only enough to slip over and down inner cylinder into outer groove of seal adapter (4) and install a new backup ring (15) on each side of O-ring (Fig. 802).
(21) Slide seal adapter over the inner cylinder and down on to washer.
(22) Slide spacer (2) over inner cylinder with double stepped side down.
(23) Install snubbing valve (20) with flange up. Add upper bearing (19).
(24) Check to ensure there is no twist in any of the seals.
(25) Swing outer cylinder into position to admit insertion of inner cylinder.
(26) Slowly roll gear outboard until inner cylinder is inserted.
(27) Engage main gear downlock and insert ground lock assemblies (Ref 32-00-01).
(28) Slide lower bearing against newly installed seal and slide bearing and seal adapter as a unit into outer cylinder.
(29) Slide scraper adapter (11) with scraper ring (10) into position against lower bearing and install gland nut (12).
(30) Slide gland nut (12) into position to screw into outer cylinder.

CAUTION: GLAND NUT AND OUTER CYLINDER THREADS MAY HAVE BEEN REWORKED (OVERSIZE). IF SO, GLAND NUT AND OUTER CYLINDER SHOULD BE IDENTIFIED ACCORDINGLY AND KEPT AS A SET.

(31) ON AIRPLANES WITH GLAND NUT THAT HAS LUBE FITTINGS: apply MIL-C-11796, Class 3, corrosion preventive compound to the threads of the gland nut (12) and the outer cylinder (17). ON AIRPLANES WITH GLAND NUT THAT HAS PLUGS: apply BMS 3-27 (Mastinox 6856K) corrosion preventive compound to the threads of the gland nut (12) and the outer cylinder (17).
(32) Turn inner cylinder until torsion links line up.
(33) Connect torsion links at apex (Ref 32-11-51, R/I).
(34) Install the gland nut (12) on the outer cylinder (17). Tighten the gland nut (12) 50 to 400 pound-feet lube torque.
    (a) Turn the gland nut (12) to the nearest slot to allow the installation of the lockplate (1).
(35) Measure the distance the gland nut (12) extends below the outer cylinder (17). The dimension must equal the dimension you recorded in step 3.C. (1), within 0.01 inch.
(36) Measure the full stroke of the inner cylinder (16) by manually compressing and extending it.

NOTE: The full stroke dimension should fall within the range given in Fig. 801. If not, do the step that follows.

    (a) Disassemble the shock strut and look for missing parts or parts that are not installed correctly.
(37) Install lockplate (1).

D. Restore Airplane to Normal
(1) Connect hydraulic lines and electrical cable.
(2) Wipe exposed inner cylinder with hydraulic fluid.

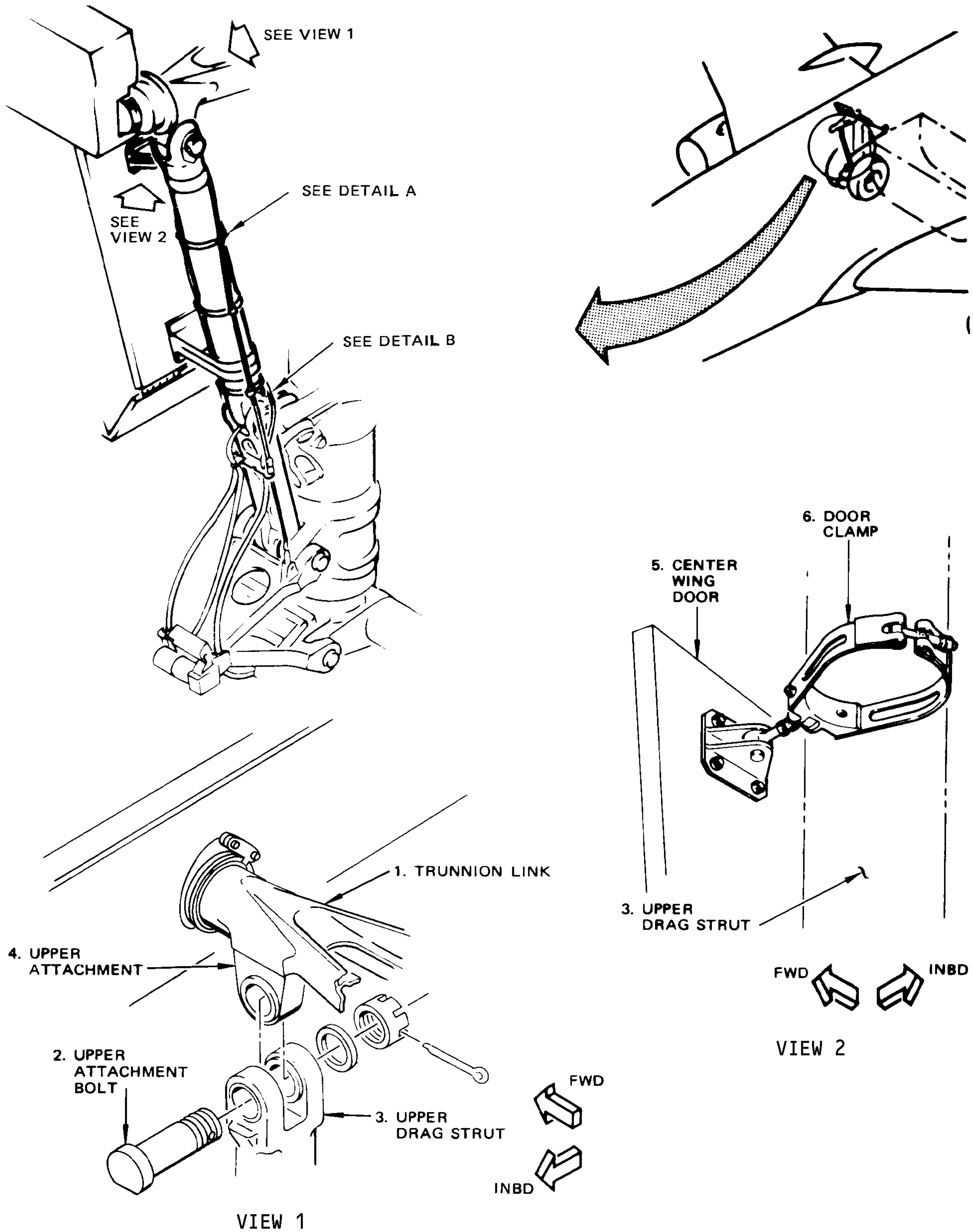
(3) Service shock strut (Ref Chapter 12, Main Landing Gear Shock Strut Servicing).
(4) Remove tag identifying shock strut, SPARE SEALS USED.
(5) Pressurize hydraulic system and apply brakes (Ref 29-11-0, MP and to 29-12-0, MP).
(6) Check hydraulic brake connections for leaks.
(7) Bleed brakes.
(8) Lower airplane and check for leaks at gland nut (Ref Chapter 7, Jacking Airplane).
(9) Remove airplane jacks.
(10) Close all landing gear circuit breakers on P6 panel.

MAIN GEAR UPPER DRAG STRUT - REMOVAL/INSTALLATION

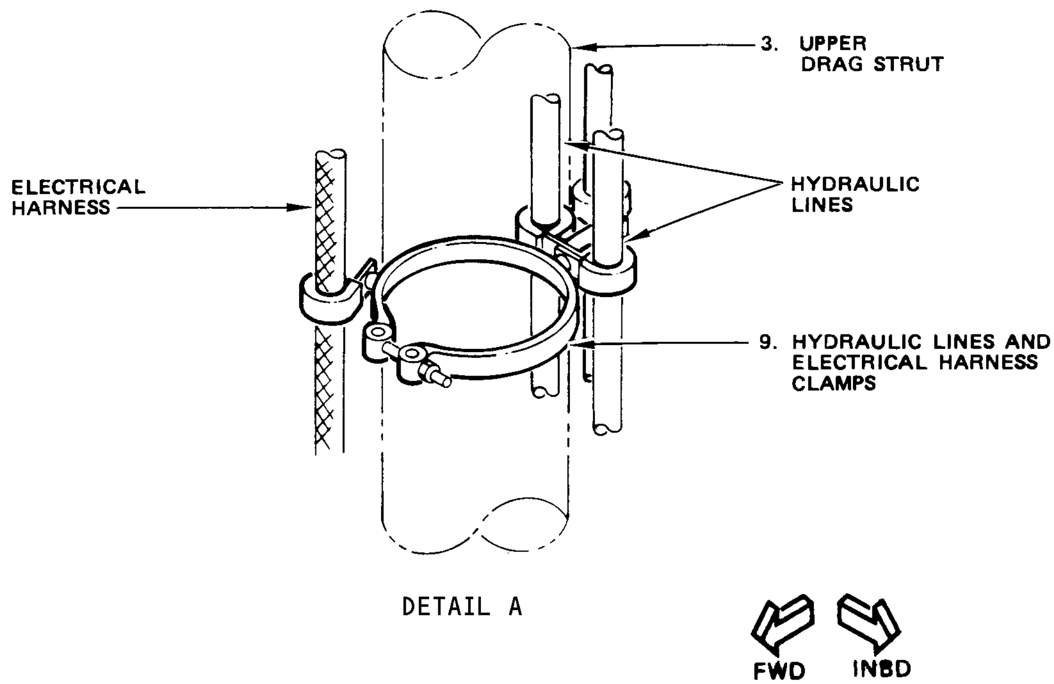
1. Equipment and Materials
   A. Ground Lock Assemblies - F72735 (AMM 32-00-01)
   B. Grease - BMS 3-33 (Preferred)
   C. Grease - MIL-PRF-23827 (Supercedes MIL-G-23827) (Alternate)
   D. Grease - MIL-G-21164 (Alternate)
2. Prepare to Remove Upper Drag Strut
   A. Check that all ground lock assemblies (AMM 32-00-01) are installed.
   B. Jack airplane until wheels just clear ground (Chapter 7, Airplane Jacking).
3. Remove Upper Drag Strut
   A. Release clamps (6, Fig. 401) securing center wing door (5) to upper drag strut (3).
   B. Release clamps (9) securing hydraulic lines and electrical harness to upper drag strut (3).
   C. Remove lower attachment bolt (13) and allow drag strut to hang from upper attachment (4).
   D. Support drag strut, remove attachment bolt (2), and remove upper drag strut from airplane.
      (1) Mark and retain drag strut upper attachment bolt (2) for installation in same location. On some airplanes, bolt is identified by a yellow head.
4. Install Upper Drag Strut
   A. Check mating surfaces for allowable wear (Inspection/Check).
   B. Clean and lightly lubricate all bolts, washers, and bushings with grease, immediately before assembly.
   C. Place upper drag strut (3, Fig. 401) in position over upper attachment (4) with locking flat inboard.
   D. Insert upper attachment bolt (2) with head inboard. Add washer and nut.

      CAUTION: ENSURE THAT DRAG STRUT UPPER ATTACHMENT BOLT (2) IS SAME BOLT OR REPLACEMENT BOLT IS SAME PART NUMBER AS THAT WHICH WAS REMOVED IN STEP 3.D. DRAG STRUT UPPER ATTACHMENT BOLT (2) IS A STRUCTURAL FUSE AND MUST BE INSTALLED IN SAME LOCATION FROM WHICH REMOVED TO MAINTAIN STRUCTURAL INTEGRITY OF THE REAR SPAR.

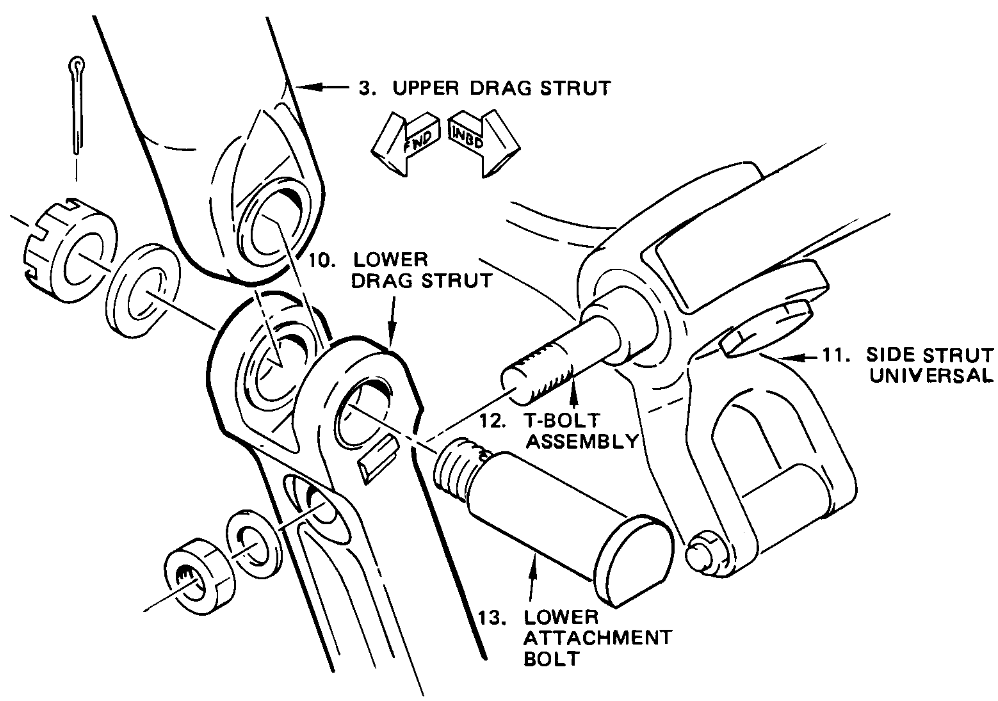
   E. Tighten nut as tightly as possible by hand. If necessary, back off nut to align nearest castellation with cotter pin hole in bolt. Lock nut with cotter pin.
   F. Swing upper drag strut (3) into position in lower drag strut fork (10).
   G. Align holes and insert bolt with head end left. Add washer and nut.
   H. Tighten nut to 100-150 pound-inches lube torque. If necessary, back off nut to align nearest slot and install cotter pin.
   I. Connect clamps (6) securing center wing door (5) to drag strut (3).
   J. Connect clamps (9) securing hydraulic lines and electrical harness to drag strut (3).



Main Gear Upper Drag Strut Installation
Figure 401 (Sheet 1)



DETAIL A



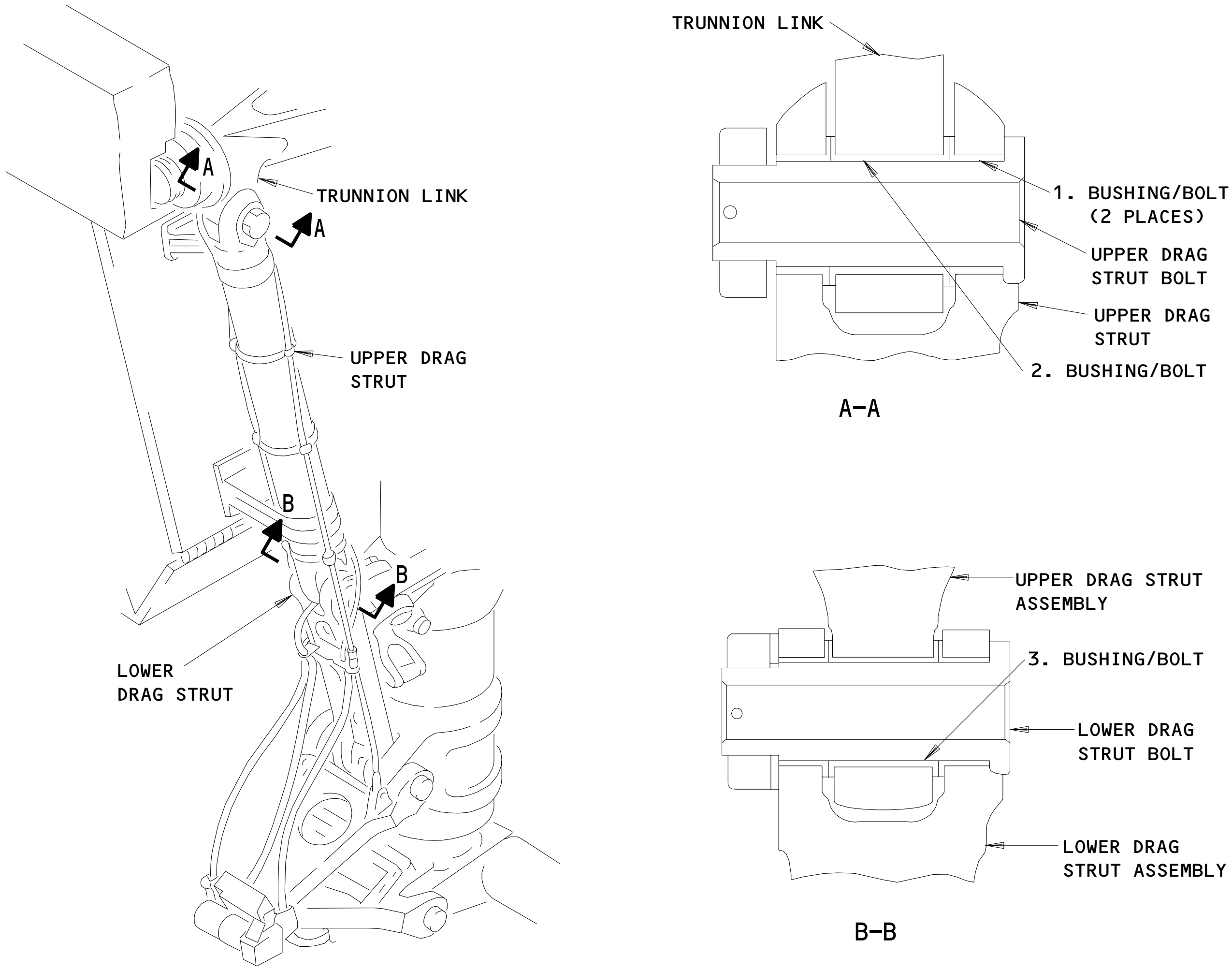
DETAIL B

Main Gear Upper Drag Strut Installation
Figure 401 (Sheet 2)

K. Perform a retraction test of main landing gear only per AMM 32-32-0/501.
L. Check hydraulic line connections for leaks.
M. Lower airplane and remove jacks (Chapter 7, Jacking Airplane).

MAIN GEAR UPPER DRAG STRUT - INSPECTION/CHECK

1. General
   A. These data consist of illustrations and wear limit charts. No procedure is given in this section for access to permit inspection. Refer to Main Gear Upper Drag Strut - Removal/Installation.
2. Main Gear Upper Drag Strut Wear Limits



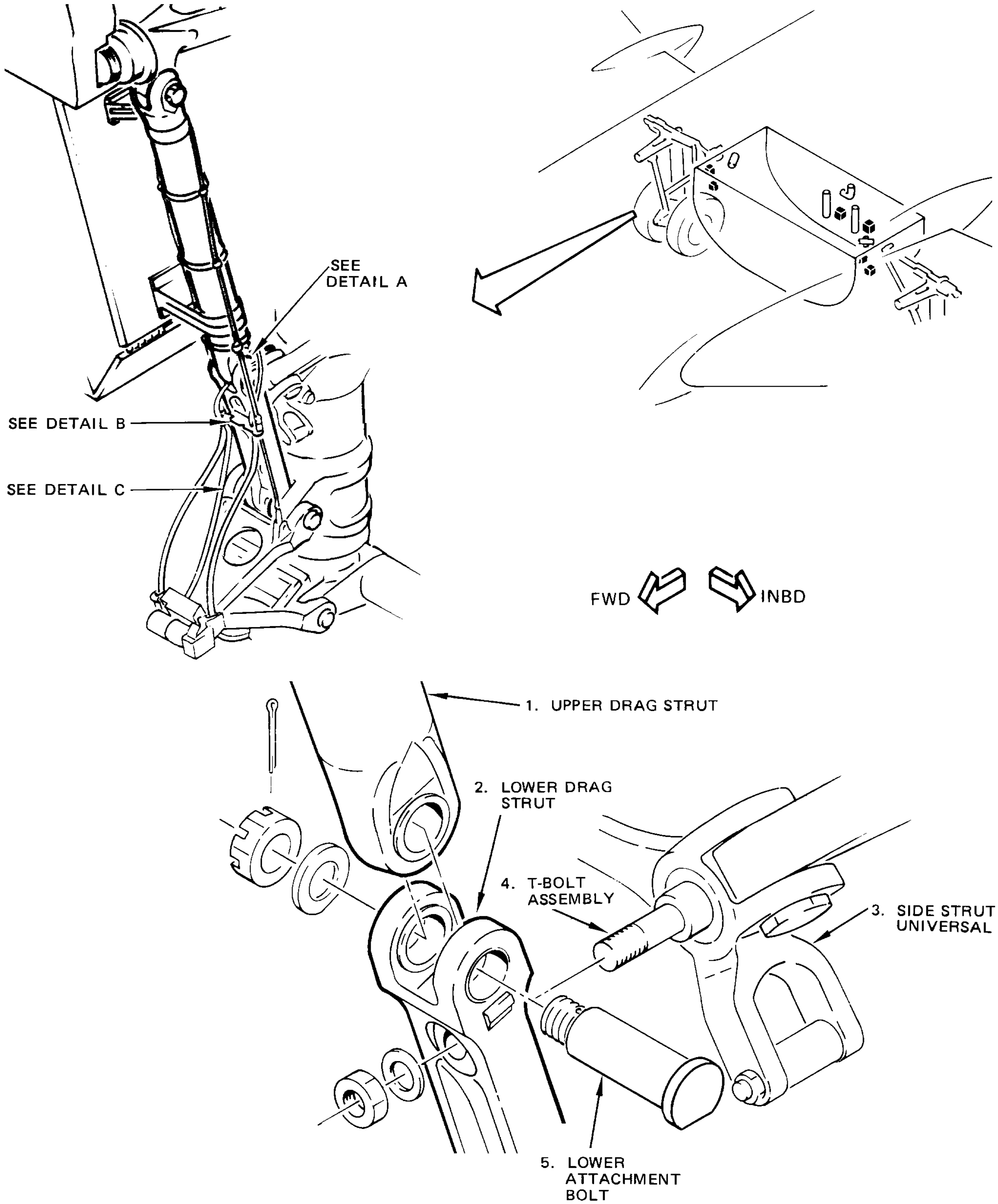
INDEX NO.	PART NAME	DIM.	DESIGN LIMITS DIAMETER MIN	DESIGN LIMITS DIAMETER MAX	WEAR LIMITS MAX WEAR DIM.	WEAR LIMITS MAX DIAM CLEAR- ANCE	REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR.
1	BUSHING	ID	1.500	1.501	1.502	0.005	X		
	BOLT	OD	1.498	1.499	1.497			X	*[1]
2	BUSHING	ID	1.500	1.501	1.502	0.005	X		
	BOLT	OD	1.498	1.499	1.497			X	*[1]
3	BUSHING	ID	1.500	1.501	1.502	0.005	X		
	BOLT	OD	1.498	1.499	1.497			X	*[1]

*[1] WORN PART OR ASSEMBLY IS REPAIRABLE. REFER TO OVERHAUL MANUAL

Main Gear Upper Drag Strut Wear Limits
Figure 601

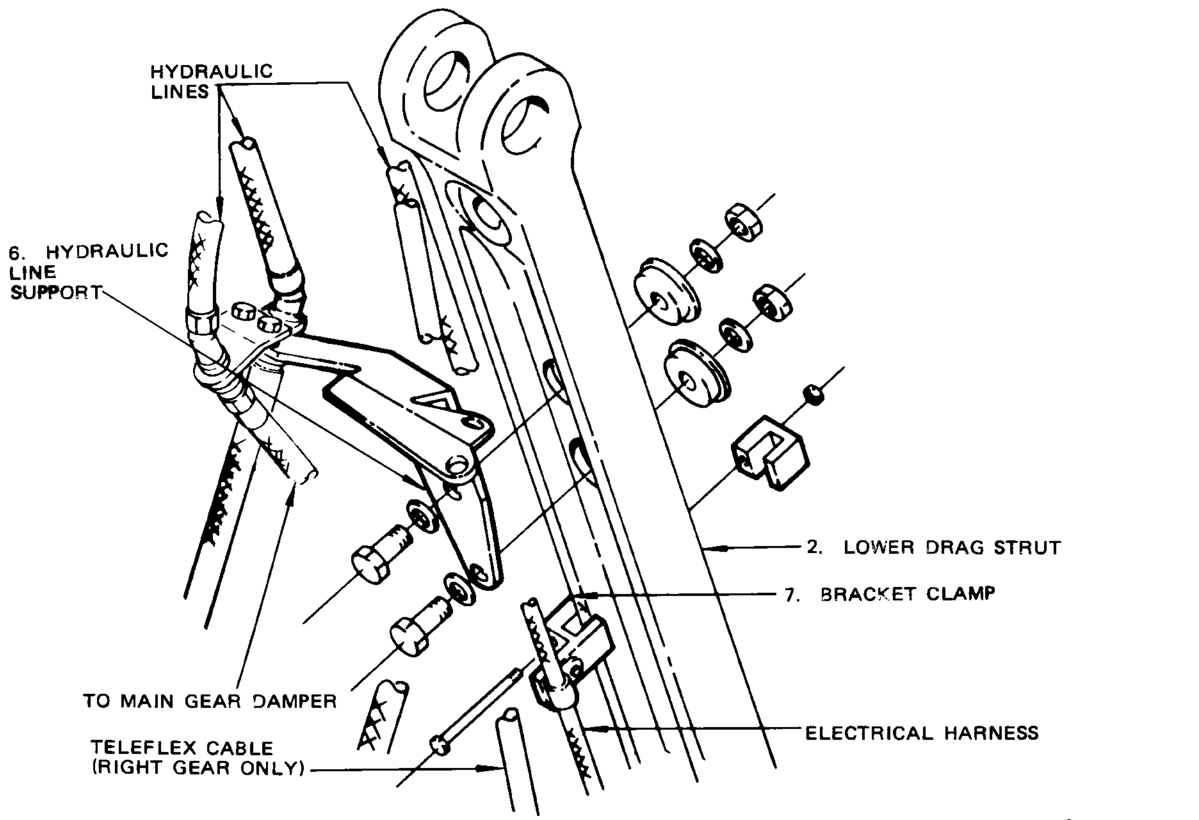
MAIN GEAR LOWER DRAG STRUT - REMOVAL/INSTALLATION

1. Equipment and Materials
   A. Ground Lock Assemblies (AMM 32-00-01)
   B. Grease - BMS 3-33 (Preferred)
   C. Grease - MIL-PRF-23827 (Supercedes MIL-G-23827) (Alternate)
   D. Grease - MIL-G-21164 (Alternate)
2. Prepare to Remove Lower Drag Strut
   A. Check that all ground lock assemblies are installed (AMM 32-00-01).
   B. Jack airplane until wheels are just clear of ground (Chapter 7, Airplane Jacking).
3. Remove Lower Drag Strut
   A. Disconnect hydraulic line support (6, Fig. 401) from lower drag strut (2).
   B. Release bracket clamp (7) for electrical harness from lower drag strut (2).
   C. Secure lower end of upper drag strut to prevent it swinging forward. Remove lower attachment bolt (5).
   D. Remove nut and washer from T-bolt assembly (4).
   E. Support strut and upper torsion link (9).
   F. Remove lower drag strut (2) from airplane.
4. Install Lower Drag Strut
   A. Clean and lightly lubricate all bolts, washers, and bushings with grease immediately before assembly.
   B. Place lower drag strut (2, Fig. 401) in position to line up with upper torsion link (9) and shock strut lugs (8).
   C. Insert upper torsion link bolt with head inboard and install washer and nut.
   D. Tighten nut to 100 to 180 pound-feet and install cotter pin.
   E. Swing lower drag strut (2) up over T-bolt assembly (4). Add washer and nut.
   F. Tighten nut to within range of 1200 to 1500 pound-inches lube torque.
   G. Position upper drag strut (1) in lower drag strut fork (2).
   H. Align holes and insert bolt with head end left. Add washer and nut.
   I. Tighten nut 100 to 150 pound-inches lube torque. If necessary, back off nut to line up nearest slot with cotter pin hole. Lock nut with cotter pin.
   J. Connect bracket clamp (7) for electrical harness.
   K. Connect hydraulic line support (6) to lower drag strut (2).
   L. Perform a retraction test of main landing gear only (AMM 32-32-0/501).
   M. Check hydraulic line connections for leaks.
   N. Lower airplane and remove jacks (Chapter 7, Jacking Airplane).

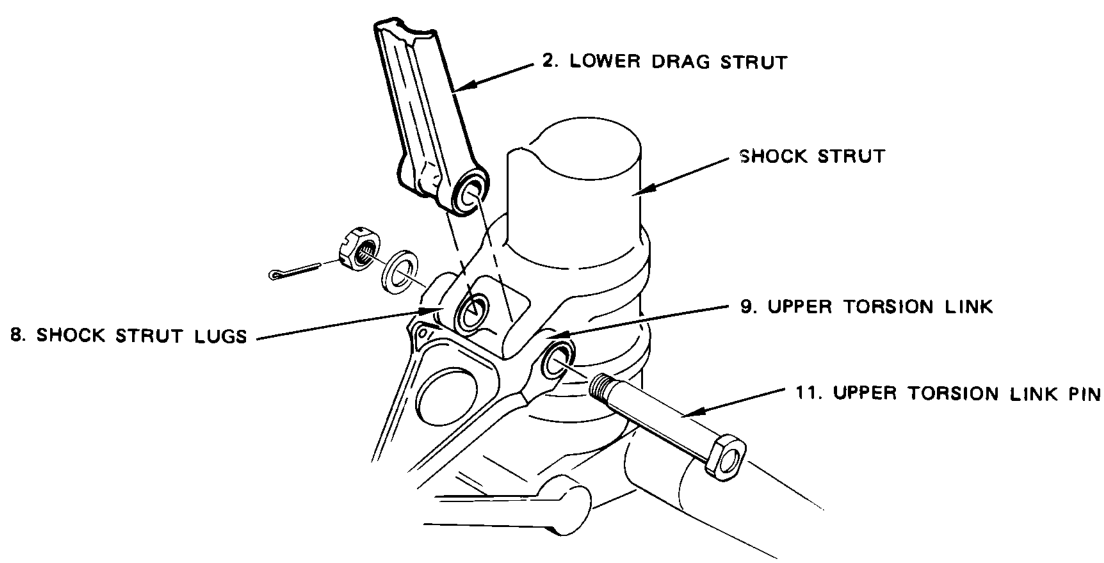


DETAIL A

Main Gear Lower Drag Strut Installation
Figure 401 (Sheet 1)



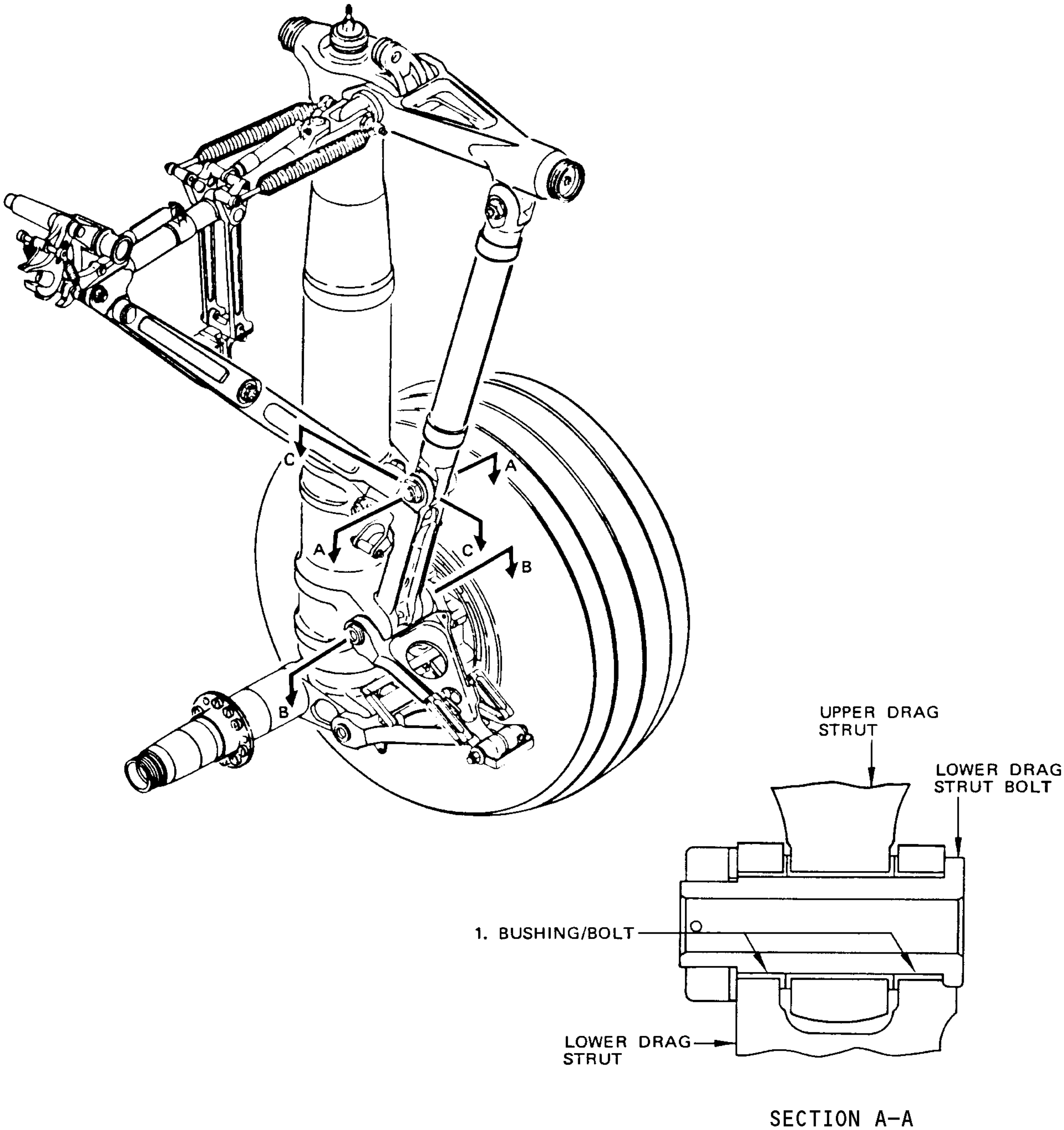
DETAIL B



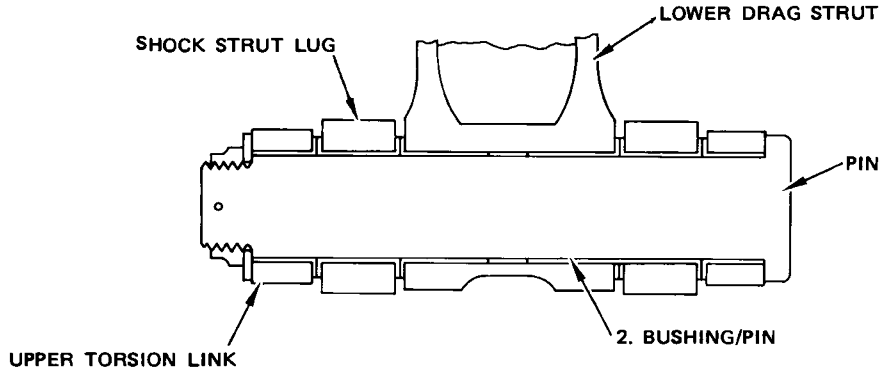
Main Gear Lower Drag Strut Installation
Figure 401 (Sheet 2)

MAIN GEAR LOWER DRAG STRUT - INSPECTION/CHECK

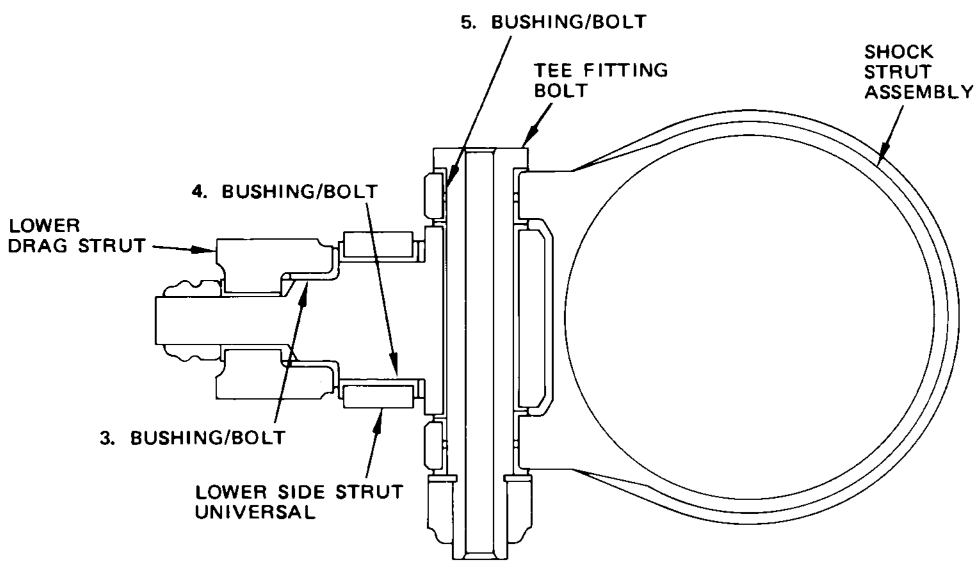
1. General
   A. These data consist of illustrations and wear limit charts. No procedure is given in this section for access to permit inspection. Refer to Main Gear Lower Drag Strut - Removal/Installation.
2. Main Gear Lower Drag Strut Wear Limits



Main Gear Lower Drag Strut Wear Limits
Figure 601 (Sheet 1)



SECTION B-B



SECTION C-C

Main Gear Lower Drag Strut Wear Limits
Figure 601 (Sheet 2)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS DIAMETER MIN	DESIGN LIMITS DIAMETER MAX	WEAR LIMITS ALLOWED WEAR DIM.	WEAR LIMITS MAX DIAM CLEAR- ANCE	REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR.
1	BUSHING	ID	0.500	1.501	1.502	0.005	X		
	BOLT	OD	1.498	1.499	1.497			X	*[1]
2	BUSHING	ID	1.750	1.752	1.7525	0.005	X		
	PIN	OD	1.7495	1.7500	1.7475			X	*[1]
3	BUSHING	ID	1.500	1.501	1.502	0.005	X		
	BOLT	OD	1.499	1.500	1.498			X	*[1]
4	BUSHING	ID	2.257	2.258	2.259	0.009	X		
	BOLT	OD	2.251	2.252	2.250			X	*[1]
5	BUSHING	ID	1.375	1.376	1.377	0.005	X		
	BOLT	OD	1.373	1.374	1.372			X	*[1]

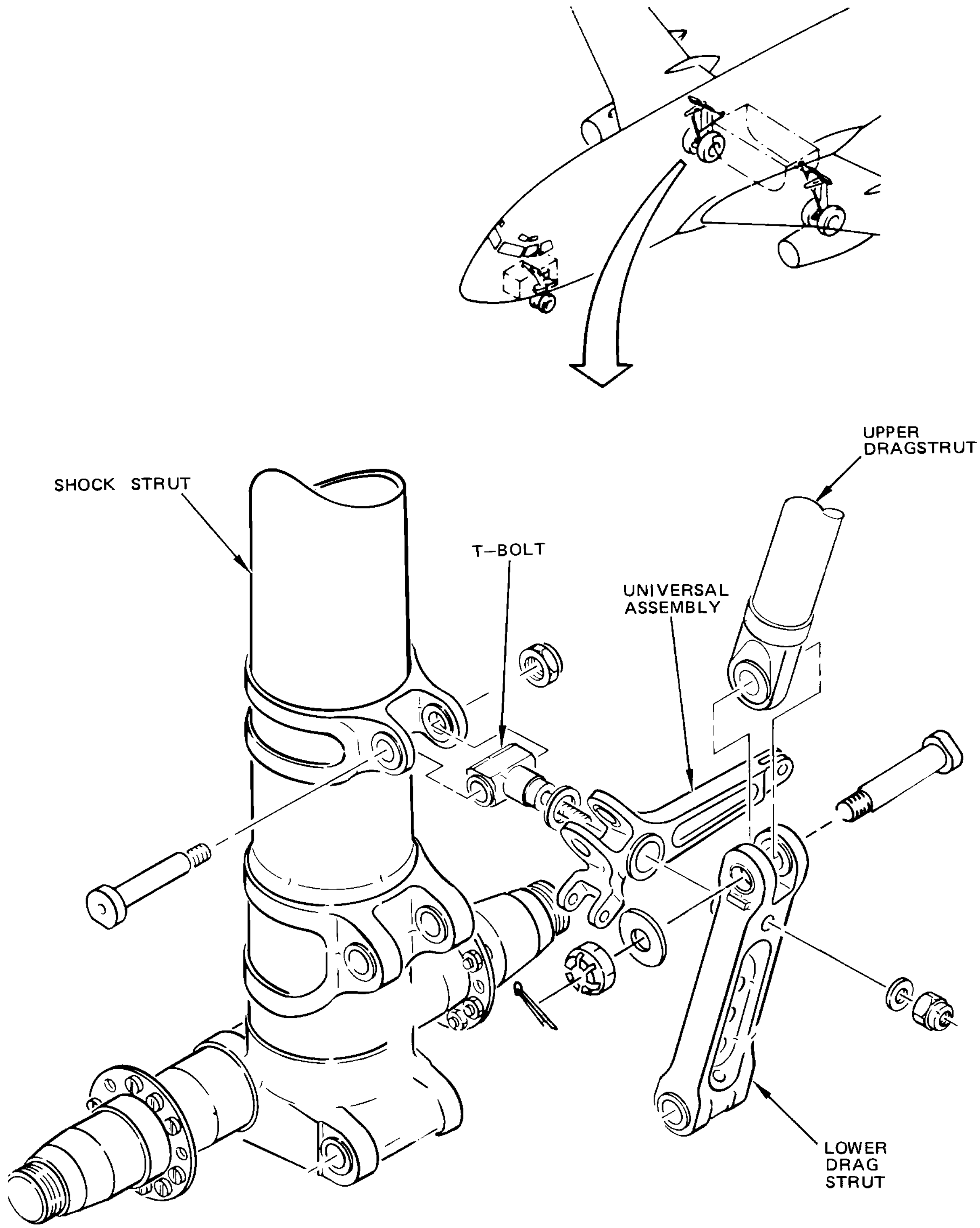
*[1] REFER TO OVERHAUL MANUAL FOR REPAIR INFORMATION

Main Gear Lower Drag Strut Wear Limits
Figure 601 (Sheet 3)

MAIN GEAR T-BOLT ASSEMBLY - REMOVAL/INSTALLATION

1. Equipment and Materials
   A. Ground Lock Assemblies
   B. Grease - BMS 3-33 (Preferred)
   C. Grease - MIL-PRF-23827 (Supercedes MIL-G-23827) (Alternate)
   D. Grease - MIL-G-21164 (Alternate)
2. Prepare to remove T-bolt assembly
   A. Check that all ground lock assemblies (Ref 32-00-01) are installed.
   B. Depressurize hydraulic system A (Ref 29-11-0)
3. Remove T-bolt assembly
   A. Remove hydraulic line support from lower drag strut.
   B. Release electrical harness bracket clamp from lower drag strut.
   C. Support shock strut inner door and disconnect control rod assembly. Support shock strut door clear of work area.
   D. Jack airplane approximately 3 inches (Ref Chapter 7, Airplane Jacking).
   E. Lift wheels as required using axle jack.
   F. Remove side strut lower attachment bolt from universal assembly.
   G. Secure lower end of upper drag strut to prevent it swinging forward.
   H. Remove upper attachment bolt from lower drag strut.
   I. Remove nut and washer from T-bolt assembly.
   J. Remove nut from bolt thru T-bolt assembly and shock strut and remove bolts
   K. Swing lower drag strut, with T-bolt assembly, forward to reset on upper torsion link.
   L. Remove T-bolt and universal assembly.
4. Install T-bolt assembly
   A. Apply liberal amount of lubricant to T-bolt bearing surfaces.
   B. Position thrust washer on T-bolt and insert T-bolt thru universal assembly.
   C. Insert T-bolt into lower drag strut.
   D. Swing drag strut upward to align T-bolt with shock strut fitting.
   E. Apply liberal amount of lubricant to washer, bolt shank and threads.
   F. Insert bolt, with head inboard, thru shock strut fitting and T-bolt.
   G. Position support rod fitting from shock strut door support on bolt. Add nut.
   H. Tighten nut to driving torque plus 400 pound-inches lube torque.
   I. Install washer on T-bolt against lower drag strut. Add nut and tighten to 1200-1500 pound-inches, lube torque.
   J. Position upper drag strut in lower drag strut fork.
   K. Align holes and insert bolt with head end inboard. Add washer and nut.
   L. Tighten nut to 100-150 pound-inches lube torque. If necessary, back off nut to align nearest slot and install cotter pin.
   M. Connect lower side strut to universal assembly.
      (1) Place lower side strut into clevis on universal assembly.
      (2) Insert attachment bolt with head end aft. Add washer and nut.
      (3) Tighten nut to driving torque plus 400 pound-inches lube torque.
   N. Position shock strut inner door and connect control rod assembly.

O. Install bracket clamp for electrical harness onto lower drag strut.
P. Install hydraulic line support on lower drag strut.
Q. Lower airplane and remove jacks (Ref Chap. 7, Airplane Jacking).



Main Gear T-Bolt Installation
Figure 401

MAIN GEAR TORSION LINKS - REMOVAL/INSTALLATION

1. General
   A. The main gear torsion links are removed after damage, or when bushings are worn beyond service limits. Removal of upper torsion link also disconnects bottom end of lower drag strut. On the right gear, the upper torsion link is connected to a spoiler lockout mechanism. The main tires should be removed and the shock strut partially extended to provide clearance for the upper torsion link pin when replacing the upper torsion link. The main gear brakes also should be removed to provide clearance for the lower torsion link pin when replacing the lower torsion link.
2. Equipment and Materials
   A. Gear Ground Lockpins - F72735 (AMM 32-00-01)
   B. Grease - BMS 3-33 (Preferred)
   C. Grease - MIL-PRF-23827 (Supercedes MIL-G-23827) (Alternate)
   D. Grease - MIL-G-21164 (Alternate)
3. Remove Main Gear Torsion Links
   A. Check that all landing gear ground lockpins are installed.
   B. If replacing upper torsion link, remove main gear wheels (AMM 32-45-11/401) and partially extend shock strut by raising airplane (Chapter 7, Jacking Airplane).
   C. If replacing lower torsion link or upper and lower torsion links, remove main gear wheels (AMM 32-45-11/401) and main gear brakes (AMM 32-41-41/401).
   D. Remove pins connecting hydraulic line support brackets (24, Fig. 401) to lower torsion link.
   E. Disconnect hydraulic line guides (16) from main gear damper (17). Secure lines clear of torsion links.
   F. Disconnect link (21) connecting electrical harness to lower torsion link (23). Observe spacer (19) and bushing (20).
   G. Release electrical harness support bracket (9) from damper.

      NOTE: When removing right gear torsion link, disconnect spoiler lockout teleflex cable from right gear upper torsion link (5).

   H. Remove bolt securing electrical harness support bracket (9) to damper (17) and move bracket clear of torsion links. Observe washer and flange bushing (8).
   I. Remove checknut (10), lockbolt (13), and lockwasher (11).
   J. Unscrew apex nut (12). Remove thrust washer (14).
   K. Support torsion links, remove damper attachment bolts (7) and damper bracket (6).
   L. Pull out damper (17), raise upper torsion link (5) and remove apex thrust washer (15).
   M. Remove nut and washer from upper torsion link pin (4A).
   N. Support drag strut (1) and upper torsion link (5).
   O. Remove upper torsion link pin (4A). Remove upper torsion link (5).

P. Remove nut and washer from lower torsion link pin (22).
Q. Support lower torsion link (23), remove lower torsion link pin (22). Remove lower torsion link (23).

4. Install Main Gear Torsion Links
   A. Check for allowable wear. Clean and lightly lubricate all attachment bolts, pins and bearing surfaces with grease, immediately before installation (Inspection/Check).
   B. Place a lower torsion link (23) in position to line up with holes in shock strut lugs.
   C. Insert lower torsion link pin (22) with head inboard.
   D. Add washer and nut.
      (1) Tighten nut 100 to 180 pound-feet. Install the cotterpin.

      NOTE: If necessary, you can loosen the nut to the nearest castellation (zero torque is permitted).

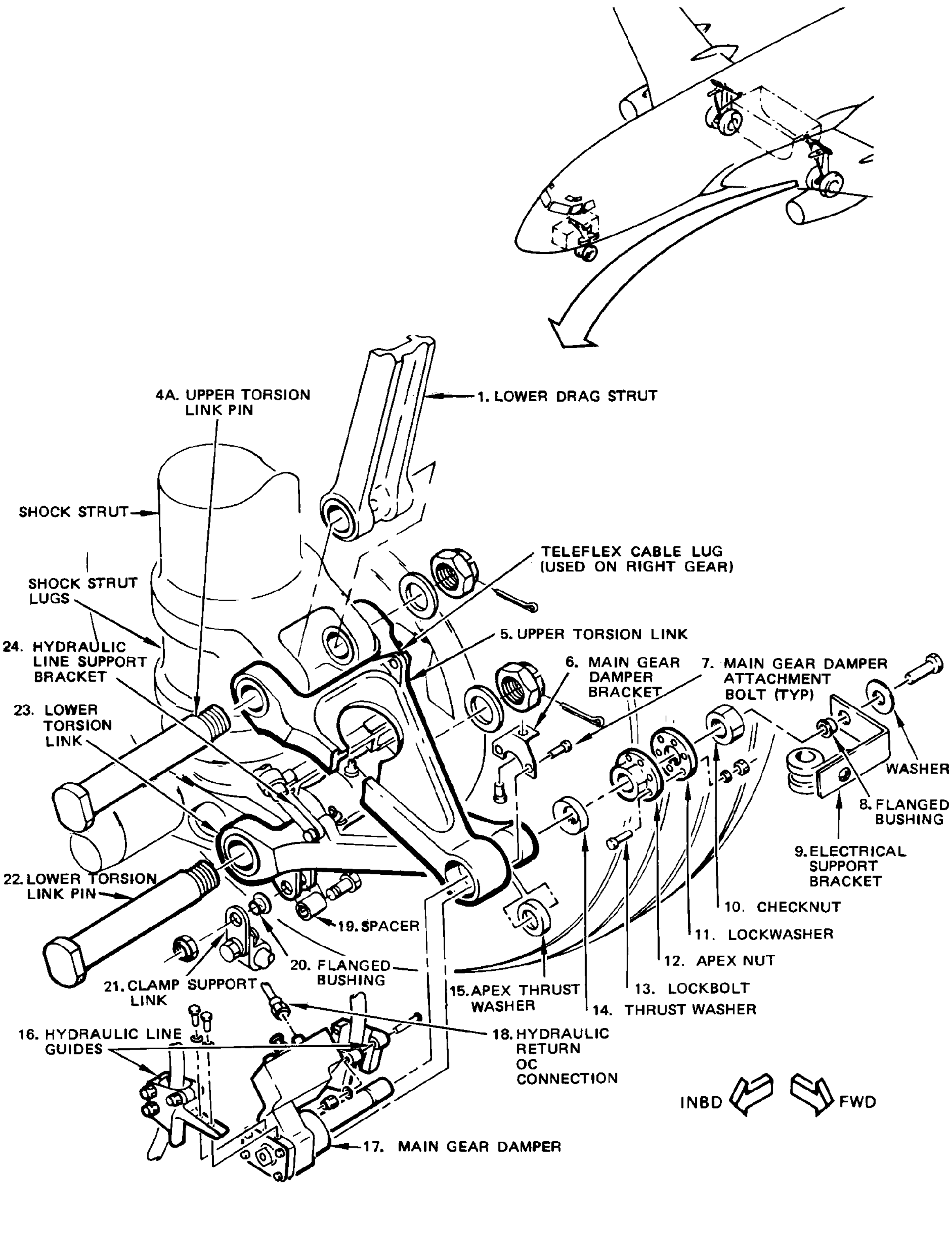
   E. Position upper torsion link (5) to line up with holes in lower end of drag strut (1) and shock strut lugs.
   F. Insert upper torsion link pin (4) with head inboard.
   G. Add washer and nut.
      (1) Tighten nut to 100-180 pound-feet.
      (2) Install the cotter pin.

      NOTE: If necessary, you can loosen the nut to thenearest castellation (zero torque is permitted).

   H. Place apex thrust washer (15) between torsion links.
   I. Check that damper (17) is full of hydraulic fluid.
   J. Line up ends of torsion links and insert damper in upper torsion link (5) with shaft through apex thrust washer (15) and lower torsion link (23). Verify that apex thrust washer (15) is properly seated on shaft.
   K. Install damper bracket (6) and all damper attachment bolts (7).
   L. Tighten all bolts. Lockwire all bolts together.

   CAUTION: CARE MUST BE TAKEN NOT TO TRAP LOCKWIRE BETWEEN TORSION LINK AND APEX THRUST WASHER.

   M. Place thrust washer (14) on damper shaft with concave side against torsion link. Note key in washer engages slot in shaft.
   N. Screw apex nut (12) a few turns on damper shaft with hexagon side towards thrust washer.
   O. Adjust torsion link for proper damper piston adjustment (AMM 32-11-81/501).
   P. Place lockwasher (11) on damper shaft. Verify key in washer engages slot in shaft and washer is properly seated against torsion link.
   Q. Tighten apex nut (12) 400 to 500 pound-inches torque.



Left Main Gear Torsion Links Attachment
Figure 401

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R. Loosen apex nut to zero torque then retighten nut finger-tight. Tighten nut until next available hole in apex nut aligns with a hole in lockwasher (11).
S. Install checknut (10) and tighten to within 50 to 150 pound-inches torque.
T. Install lockbolt (13), tighten to standard torque and lockwire to checknut (10).
U. Insert flanged bushing (8) in electrical harness support bracket (9). Place washer on attachment bolt and install support bracket (9) on end of damper shaft. Tighten bolt to standard torque.
V. Connect clamp support link (21) to underside of lower torsion link (23). Check that spacer (19) is installed between attachment lugs on torsion link (23), and that flanged bushing (20) is in position in upper end of clamp support link (21).
W. Connect hydraulic line support bracket (24) to lugs on upper side of lower torsion link (23).

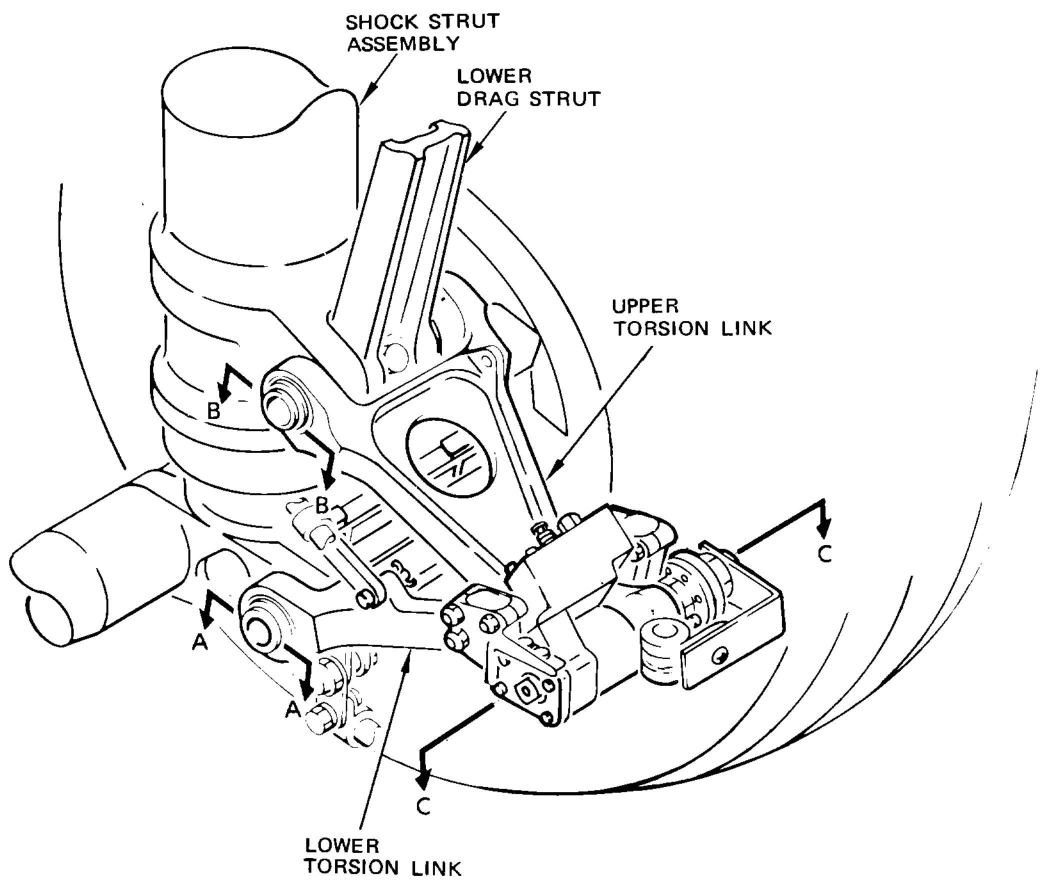
NOTE: Support bracket (24) is connected to torsion link with flat head pins secured by washer and cotter pin.

CAUTION: DO NOT USE BOLTS. BRACKET MUST PIVOT FREELY ON TORSION LINK.

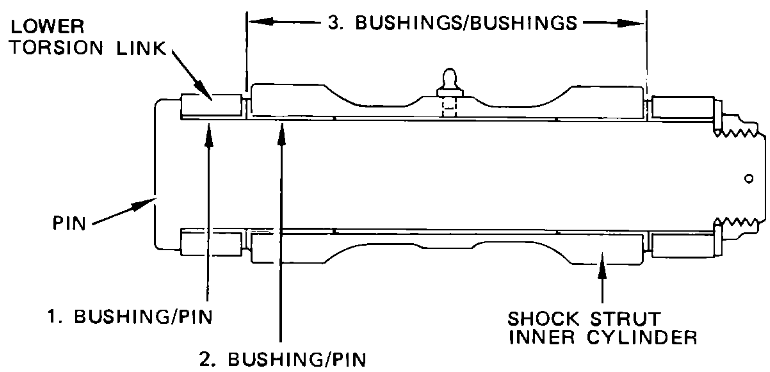
X. Place hydraulic lines in position on each side of main gear damper. Connect hydraulic line guides (16) to damper. Tighten bolts to standard torque.
Y. On right gear, connect spoiler lockout teleflex cable to upper torsion link.
Z. Lubricate torsion links (Chapter 12, Landing Gear Component Lubrication).
AA. Install main gear brakes if removed (AMM 32-41-41/401) and main gear wheels (AMM 32-45-11/401).
AB. Pressurize hydraulic system and remove and install damper bleed plugs one at a time. Finally open filler valve. In each case, allow fluid to flow until clear of air before replacing plugs and closing valve.
AC. Check damper hydraulic return line connection for leaks.
AD. Lower airplane if airplane was raised and remove jacks (Chapter 7, Jacking Airplane).

MAIN GEAR TORSION LINKS - INSPECTION/CHECK

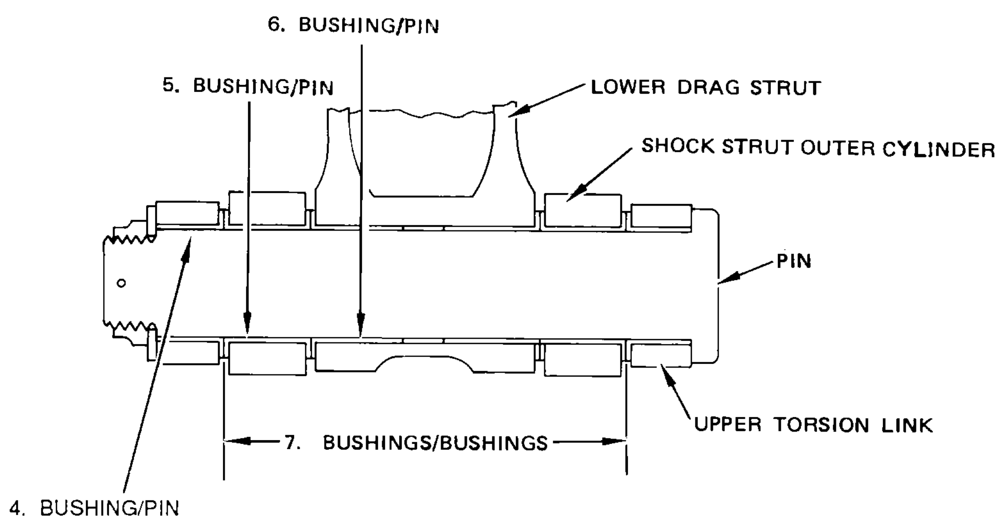
1. General
    A. These data consist of illustrations and wear limit charts. No procedure is given in this section for access to permit inspection. Refer to Main Gear Torsion Links - R/I for removal procedure.
2. Main Gear Torsion Links Wear Limits



Main Gear Torsion Links Wear Limits
Figure 601 (Sheet 1)



SECTION A-A



SECTION B-B

Main Gear Torsion Links Wear Limits
Figure 601 (Sheet 2)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS DIAMETER MIN	DESIGN LIMITS DIAMETER MAX	WEAR LIMITS ALLOWED WEAR DIM.	WEAR LIMITS MAX DIAM CLEAR-ANCE	REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR.
1	BUSHING	ID	1.7510	1.7520	1.7535	0.0050	X		
	PIN	OD	1.7495	1.7500	1.7485			X	[1]
2	BUSHING	ID	1.7500	1.7520	1.7535	0.0050	X		
	PIN	OD	1.7495	1.7500	1.7485			X	[1]
3	BUSHING	[4]	6.377	6.378	6.382	0.0110	X	[10]	
	BUSHING	[5]	6.374	6.376	6.371		X	[10]	
4	BUSHING	ID	1.7510	1.7520	1.7535	0.0050	X		
	PIN	OD	1.7495	1.7500	1.7485			X	[1]
5	BUSHING	ID	1.7505	1.7515	1.7535	0.0050	X		
	PIN	OD	1.7495	1.7500	1.7485			X	[1]
6	BUSHING [3]	ID	1.7505	1.7515	1.7535	0.0050	X		
	PIN	OD	1.7495	1.7500	1.7485			X	[1]
	BUSHING [2]	ID	1.7500	1.7520	1.7535	0.0050	X		
	PIN	OD	1.7495	1.7500	1.7485			X	[1]
7	BUSHING	[6]	6.377	6.378	6.382	0.0110	X	[10]	
	BUSHING [8]	[7]	6.375	6.376	6.371		X	[10]	
	BUSHING	[6]	6.377	6.378	6.382	0.0110	X	[10]	
	BUSHING [9]	[7]	6.374	6.376	6.371		X	[10]	
8	WASHER/WASHER	[11]	-	-	2.700MIN	-	[12]		

Main Gear Torsion Links Wear Limits
Figure 601 (Sheet 3)

1 WORN PART OR ASSEMBLY IS REPAIRABLE. REFER TO OVERHAUL MANUAL FOR REPAIR INFORMATION.

2 BUSHING ON 65-46104 LOWER DRAG STRUT ASSEMBLY.

3 BUSHING ON 65-60579 LOWER DRAG STRUT ASSEMBLY.

4 DISTANCE BETWEEN FLANGE FACES OF BUSHINGS IN LOWER TORSION LINK.

5 WIDTH OVER FLANGES OF BUSHINGS IN INNER CYLINDER.

6 DISTANCE BETWEEN FLANGE FACES OF BUSHINGS IN UPPER TORSION LINK.

7 WIDTH OVER FLANGES OF BUSHINGS IN OUTER CYLINDER.

8 BUSHING ON 65-61740 OUTER CYLINDER ASSEMBLY.

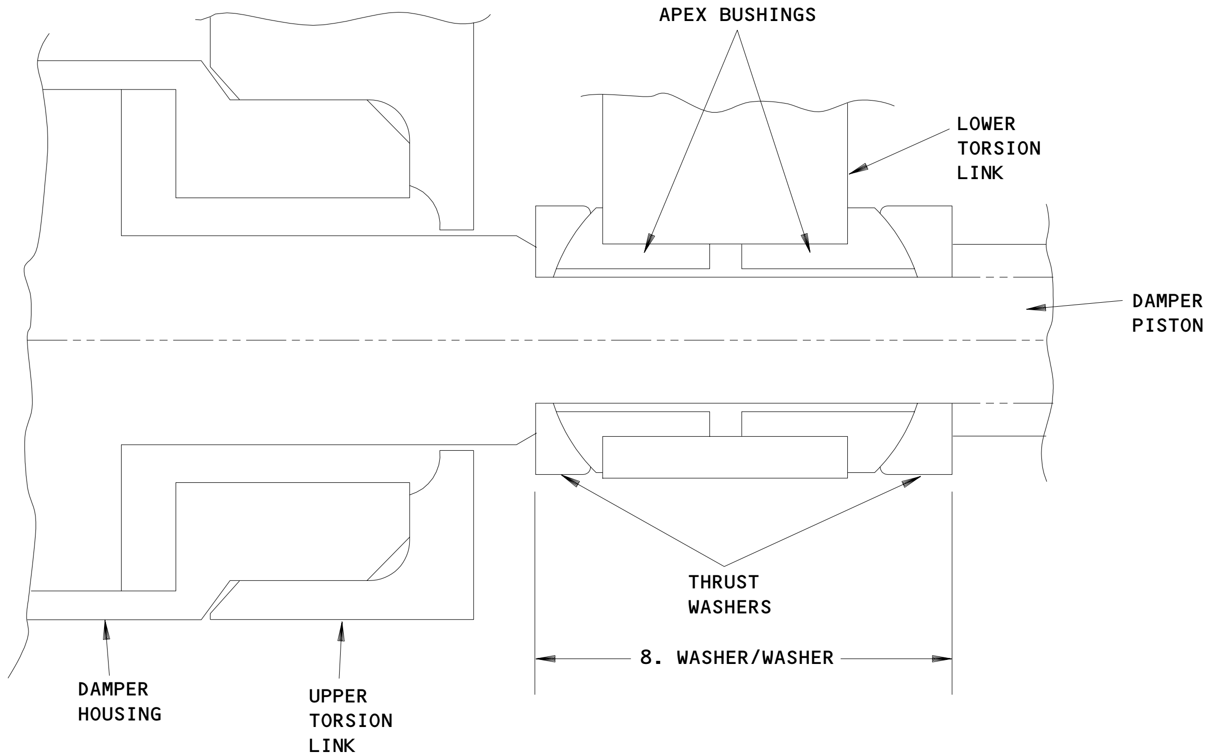
9 BUSHING ON 65-46110 OUTER CYLINDER ASSEMBLY.

10 FOR IN-SERVICE REPAIR, INSTALL SPECIAL SHIM PER FIG. 801 (REF 32-11-51, APPROVED REPAIRS). PREFERRED OVERHAUL REWORK IS TO RESTORE PART TO DESIGN LIMITS USING NEW BUSHINGS.

11 MINIMUM DISTANCE BETWEEN THRUST WASHER FACES AS SHOWN IN FIGURE 601, VIEW C-C.

NOTE: THE MEASUREMENT MUST BE TAKEN AFTER THE SHIMMY DAMPER HAS BEEN ADJUSTED AND THE APEX NUT TIGHTENED TO THE SPECIFIED TORQUE (REF 32-11-81/501).

12 REPLACE BOTH THRUST WASHERS AND LOWER TORSION LINK APEX BUSHINGS, IF DISTANCE IS BELOW THE MINIMUM.

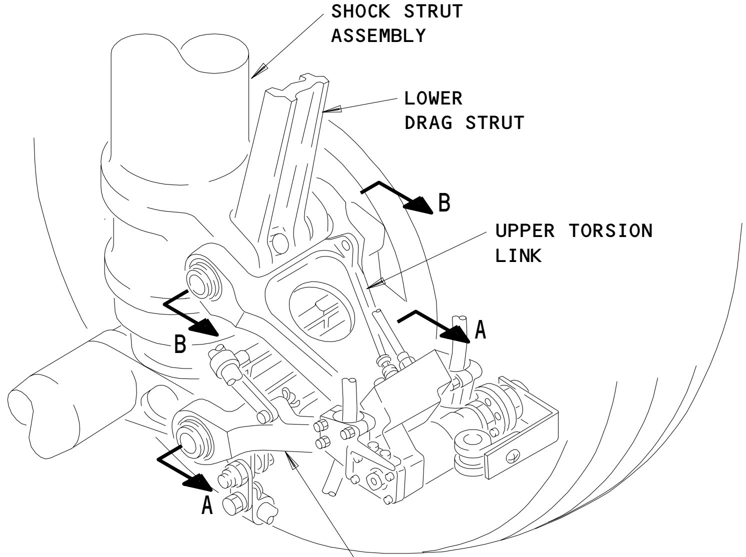


C-C

Main Gear Torsion Links Wear Limits
Figure 601 (Sheet 4)

MAIN LANDING GEAR TORSION LINKS - APPROVED REPAIRS

1. General
    A. This procedure contains a task that will let you correct the axial clearance that is too large. You can correct the axial clearance with shims at specified landing gear components' locations.
    B. This procedure is for temporary repairs only. The recommended overhaul rework is to put the part back to the initial limits with the new bushings.
2. Main Landing Gear Torsion Link Axial Clearance Correction (Fig. 801)
    A. References
        (1) 32-11-51/401, Torsion links - Removal/Installation
        (2) 32-11-51/601, Torsion Links - Inspection/Check
    B. Procedure
        (1) Remove the torsion link (Ref 32-11-51/401).
        (2) Do a check of the parts (Ref 32-11-51/601).
        (3) Make the shims if it is necessary, refer to Fig. 801.
        (4) Install the torsion link with the shims between the bushing flanges, refer to Fig. 801 (Ref 32-11-51/401).



MAXIMUM AXIAL CLEARANCE [3] = $C_T = C_1 + C_2$

SHIM INSIDE DIAMETER = $W_I = P_o + 0.002\ (+0.005/-0.000)$

SHIM OUTSIDE DIAMETER = $W_o = F_o + 0.005\ (+0.030/-0.000)$

MINIMUM IN-SERVICE BUSHING FLANGE THICKNESS = F_T = .030

[1] SHIM TO INCLUDE NO. 32 FINISH AND MAKE FLAT WITHIN 0.002 INCH

MATERIAL: 1. CRES (W_T = 0.015 MINIMUM)

[2] ADJACENT BUSHING FLANGES MUST BE FLAT WITHIN 0.005 INCH.
IF F_T IS WITHIN LIMITS, INSTALL SHIM WASHERS AS FOLLOWS TO PUT THE AXIAL CLEARANCE BACK TO THE DESIGN LIMITS:

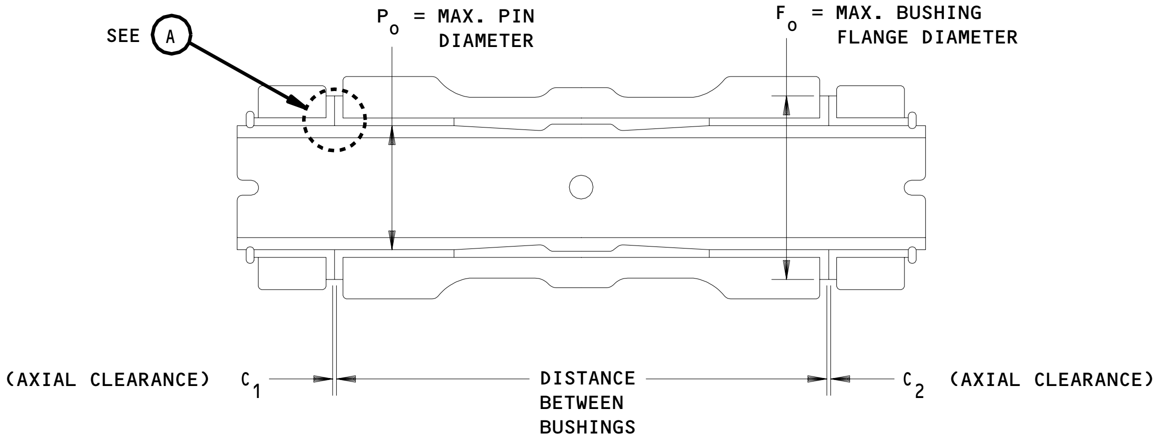
A. IF C_T IS NOT LARGER THAN 0.030,
INSTALL ONE SHIM WASHER AT C_1 OR C_2 ADJACENT TO THINNEST FLANGE.

B. IF C_T IS LARGER THAN 0.030,
INSTALL SHIM WASHERS OF EQUAL THICKNESS (APPROXIMATELY) AT C_1 AND C_2.

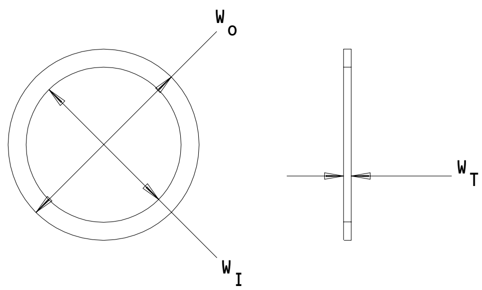
[3] SEE INSPECTION/CHECK SECTION AT PARTICULAR JOINT TO FIND THE MAXIMUM ALLOWABLE SERVICE CLEARANCE.

<u>NOTE</u>: THE RECOMMENDED AXIAL CLEARANCE IS 0.001/0.004 AFTER YOU INSTALL THE SHIM WASHERS.

Special Repairs - Shim Axial Clearance
Figure 801 (Sheet 1)

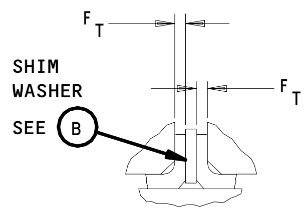


A-A

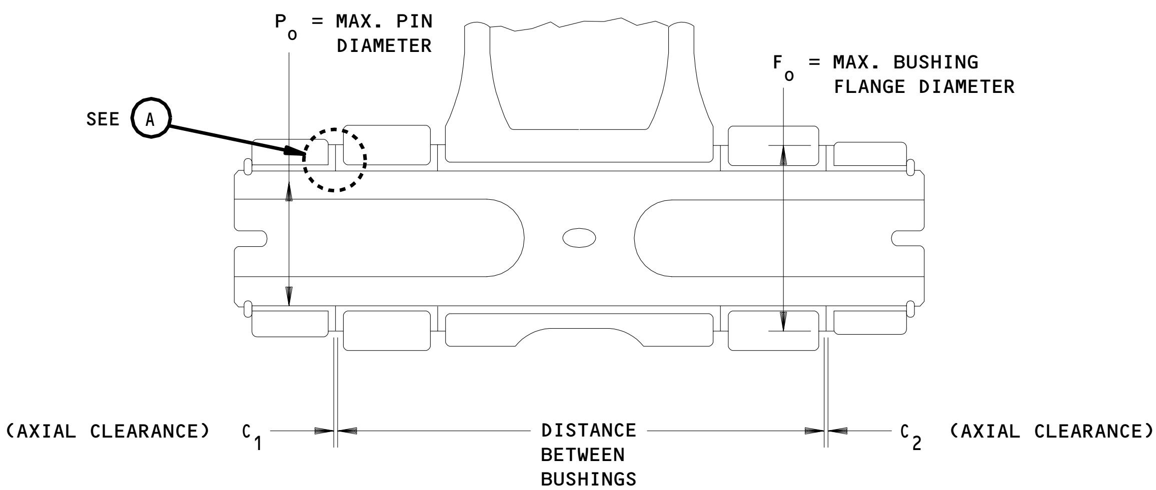


SHIM WASHER

B 1



A 2



B-B

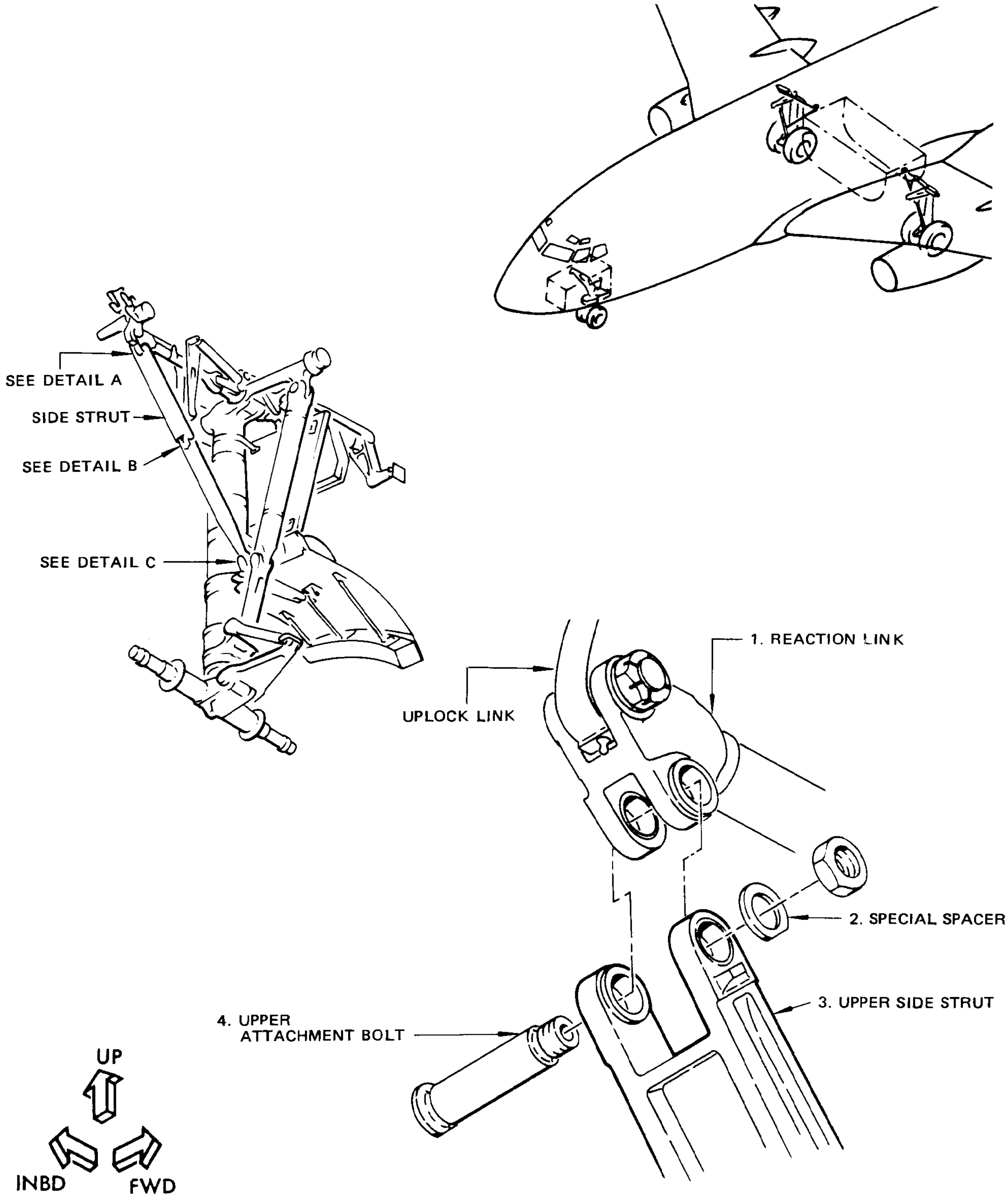
Special Repairs - Shim Axial Clearance
Figure 801 (Sheet 2)

MAIN GEAR SIDE STRUT - REMOVAL/INSTALLATION

1. Equipment and Materials
   A. Gear Ground Lockpins - F72735 (AMM 32-00-01)
   B. Airplane jacks
   C. Grease - BMS 3-33 (Preferred)
   D. Grease - MIL-PRF-23827 (Supercedes MIL-G-23827) (Alternate)
   E. Grease - MIL-G-21164 (Alternate)
2. Prepare to Remove Main Gear Side Strut
   A. Check that all gear ground lock assemblies (AMM 32-00-01) are installed.
   B. Depressurize hydraulic system.
   C. Jack airplane to take weight off gear (Chapter 7).
3. Remove Main Gear Side Strut
   A. Disconnect main gear downlock sensor (5, Fig. 401). Release all cable connections from side strut, slip cable through slot in sensor bracket, coil cables and tape switch clear of side strut (AMM 32-61-31).
   B. Support the inboard wing door and the side strut. Disconnect the upper side strut (3) from the upper attachment.
   C. Remove the lock strut lower attachment bolt (9) and remove upper half of side strut (3).
   D. Remove side strut lower attachment bolt (11) and remove lower half of side strut (8) from universal fitting (10).
4. Install Main Gear Side Strut
   A. Clean and lightly lubricate all bolts, washers and bushings with grease immediately before assembly.
   B. Connect lower half of side strut (8) with universal fitting (10) (Fig. 401).
      (1) Place lower half of side strut (8) in position in universal fitting (10).
      (2) Insert attachment bolt (11) head end outboard, add washer and nut.
      (3) Tighten nut to driving torque plus 400 pound-inches lube torque.
   C. Connect upper side strut (3) to lower side strut (8) and downlock lower link (6).
      (1) Bring upper and lower side struts together over downlock link (6). Align holes and insert attachment bolt (9) head end aft.

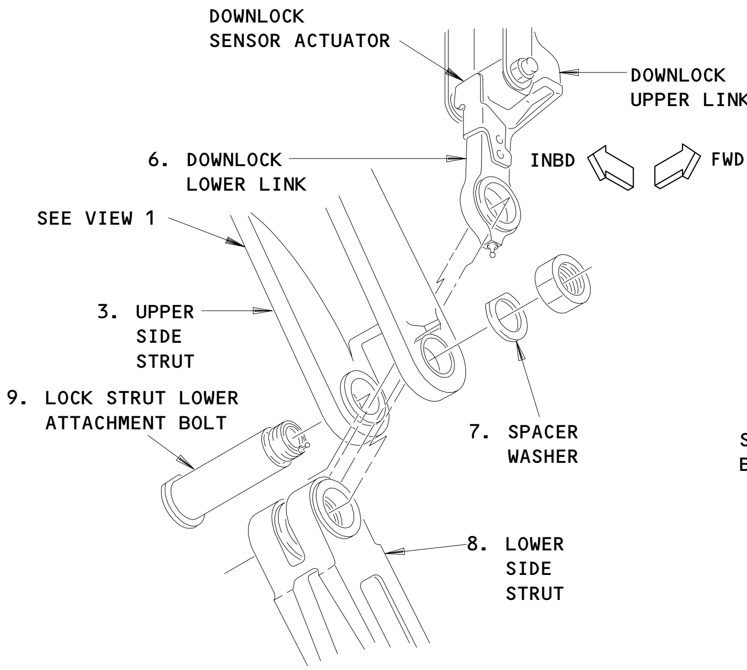
         CAUTION: CHECK THAT BOLT (9) IS INSERTED WITH HEAD END AFT. IF INSERTED INCORRECTLY, BOLT WILL DAMAGE SHOCK STRUT ON RETRACTION.

      (2) Add spacer washer (7) and nut.
      (3) Tighten nut to 1000-1500 pound-inches lube torque.
   D. Connect main gear downlock sensor and cables to side strut (AMM 32-61-31/401).
   E. Connect upper half of side strut (3) to reaction link (1).
      (1) Place upper half of side strut (3) in position over lugs on reaction link (1) and insert upper attachment bolt (4) head end aft.
      (2) Add special spacer (2) and nut.

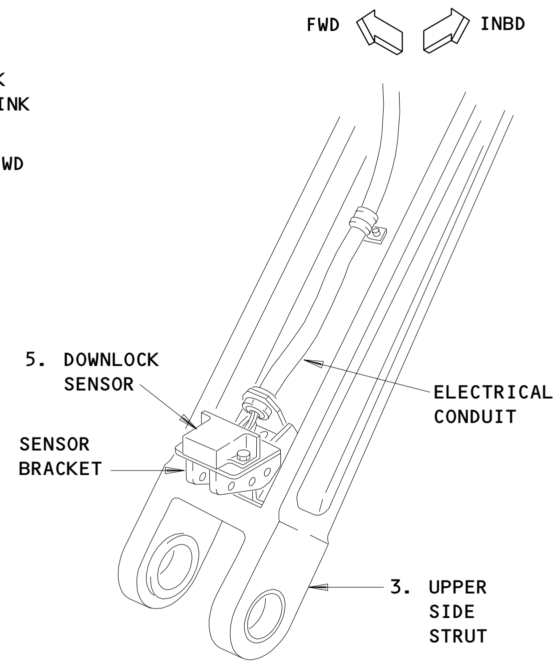


SIDE STRUT UPPER ATTACHMENT
DETAIL A

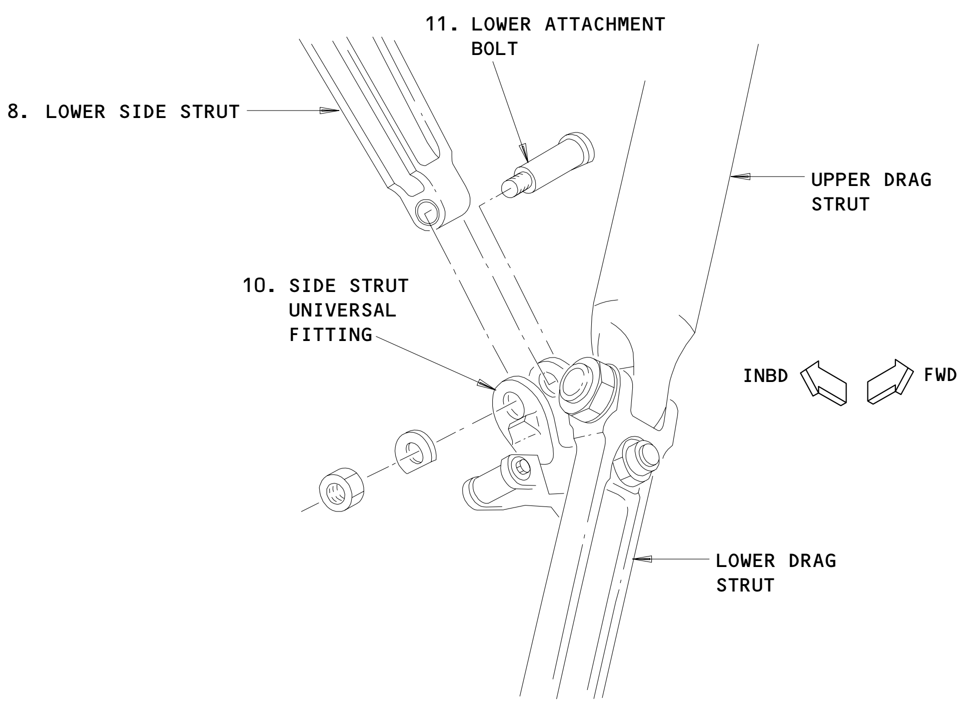
Main Gear Side Strut Installation
Figure 401 (Sheet 1)
Main Gear Side Strut Installation
Figure 401 (Sheet 1)



SIDE STRUT CENTER ATTACHMENT
DETAIL B



VIEW 1



SIDE STRUT LOWER ATTACHMENT
DETAIL C

Main Gear Side Strut Installation
Figure 401 (Sheet 2)

(3) Tighten nut to 500-800 pound-inches lube torque.

F. Lubricate side strut per Chapter 12.

G. Pressurize hydraulic system (AMM 29-11-0/201). Remove ground lockpin from affected gear.

H. Jack airplane for gear retraction (Chapter 7, Jacking Airplane).

I. Retract and extend affected gear. Check operation of downlock.

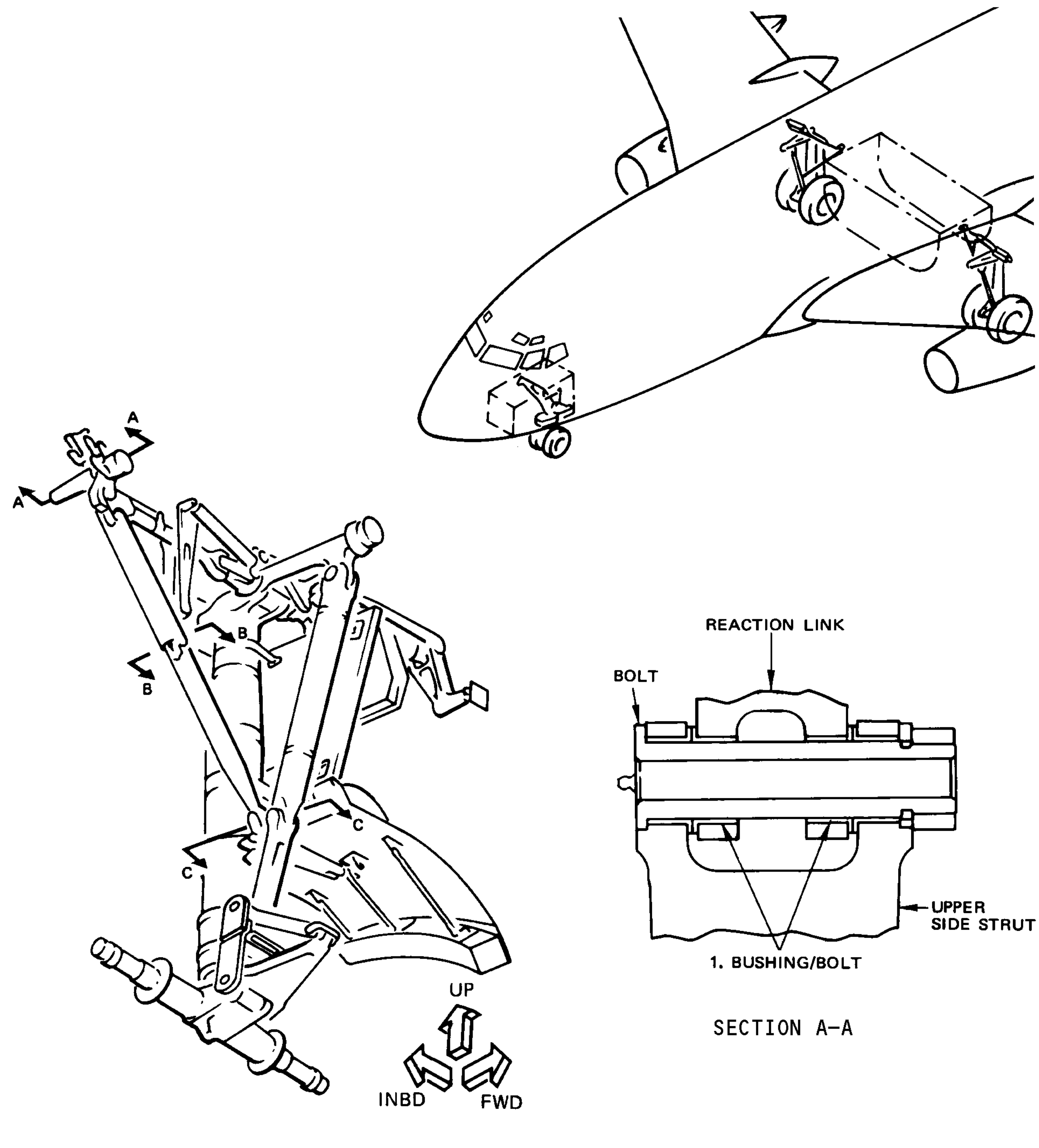
(1) With gear down and locked, check that red paint stripes on downlock strut lower link (6) and lower side strut (8) align.

<u>NOTE</u>: If existing stripes do not align, refer to SB 32-1101 for painting instructions.

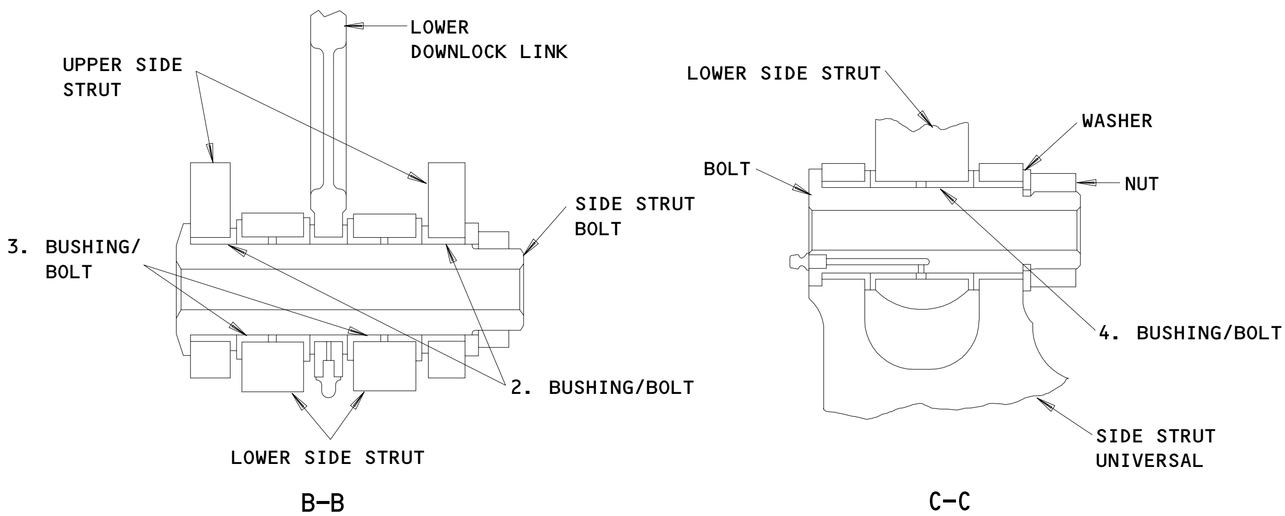
J. Install ground lock assemblies (AMM 32-00-01), lower airplane and remove jacks.

MAIN GEAR SIDE STRUT - INSPECTION/CHECK

1. General
   A. These data consist of illustrations and wear limit charts. No procedure is given in this section for access to permit inspection. Refer to Main Gear Side Strut - Removal/Installation.
2. Main Gear Side Strut Wear Limits



Main Gear Side Strut Wear Limits
Figure 601 (Sheet 1)



INDEX NO.	PART NAME	DIM.	DESIGN LIMITS DIAMETER MIN	MAX	WEAR LIMITS MAX WEAR DIM.	MAX DIAM CLEAR- ANCE	REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR.
1	BUSHING	ID	1.375	1.376	1.377	0.005	X		
	BOLT	OD	1.373	1.374	1.372			X	*[1]
2	BUSHING	ID	1.500	1.501	1.502	0.005	X		
	BOLT	OD	1.498	1.499	1.497			X	*[1]
3	BUSHING	ID	1.500	1.501	1.502	0.005	X		
	BOLT	OD	1.498	1.499	1.497			X	*[1]
4	BUSHING	ID	1.375	1.376	1.377	0.005	X		
	BOLT	OD	1.373	1.374	1.372			X	*[1]

*[1] REFER TO OVERHAUL MANUAL FOR REPAIR INFORMATION

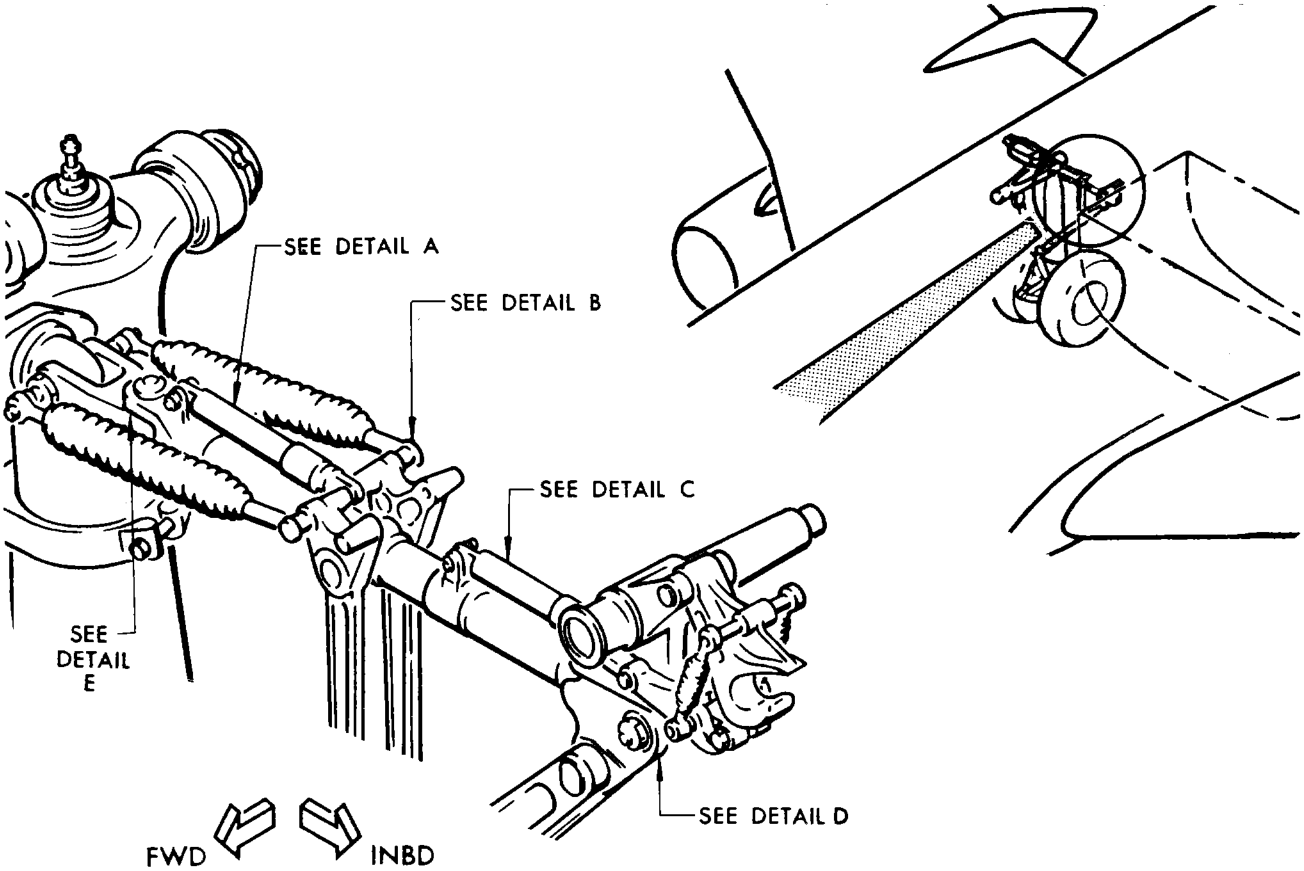
Main Gear Side Strut Wear Limits
Figure 601 (Sheet 2)

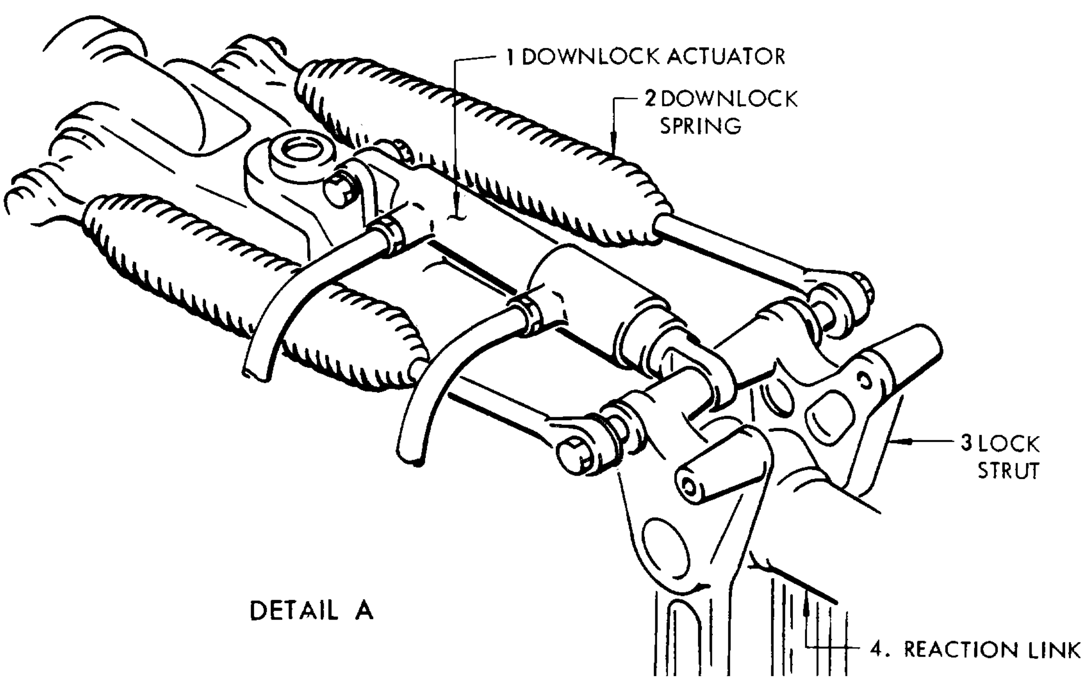
MAIN GEAR REACTION LINK - REMOVAL/INSTALLATION

1. Equipment and Materials
   A. Ground Lock Assemblies - F72735 (Ref 32-00-01)
   B. Bullet Nosed Thread Protector - F80115-4 or F80115-13
   C. Bullet Nosed Thread Protector - F80115-3 or F80115-12
   D. Grease - BMS 3-33 (Preferred)
   E. Grease - MIL-PRF-23827 (Supercedes MIL-G-23827) (Alternate)
   F. Grease - MIL-G-21164 (Alternate)
   G. Corrosion Preventative Compound - BMS 3-27 (Mastinox 6856K)
2. Remove Main Gear Reaction Link
   A. Check that ground lock assemblies (Ref 32-00-01) are installed in all gear.
   B. Jack airplane until wheels are just touching ground (Ref Chapter 7, Jacking Airplane).
   C. Remove downlock springs (2, Fig. 402) (Ref 32-32-91, R/I).
   D. Disconnect head ends of lock actuators (1) and (6) from reaction link.
   E. On airplanes with bolt keeper, remove bolt keeper (14) retaining bolt (5).
   F. Remove bolt (5) securing lock strut (3) to reaction link.
   G. Support side strut (10) and remove top attachment bolt (9).
   H. Support inboard end of reaction link and remove bolt (8) connecting uplock crank (7) to reaction link.
   I. Remove bolt (13) connecting reaction link to universal (12).
   J. Remove reaction link from airplane.
3. Install Main Gear Reaction Link

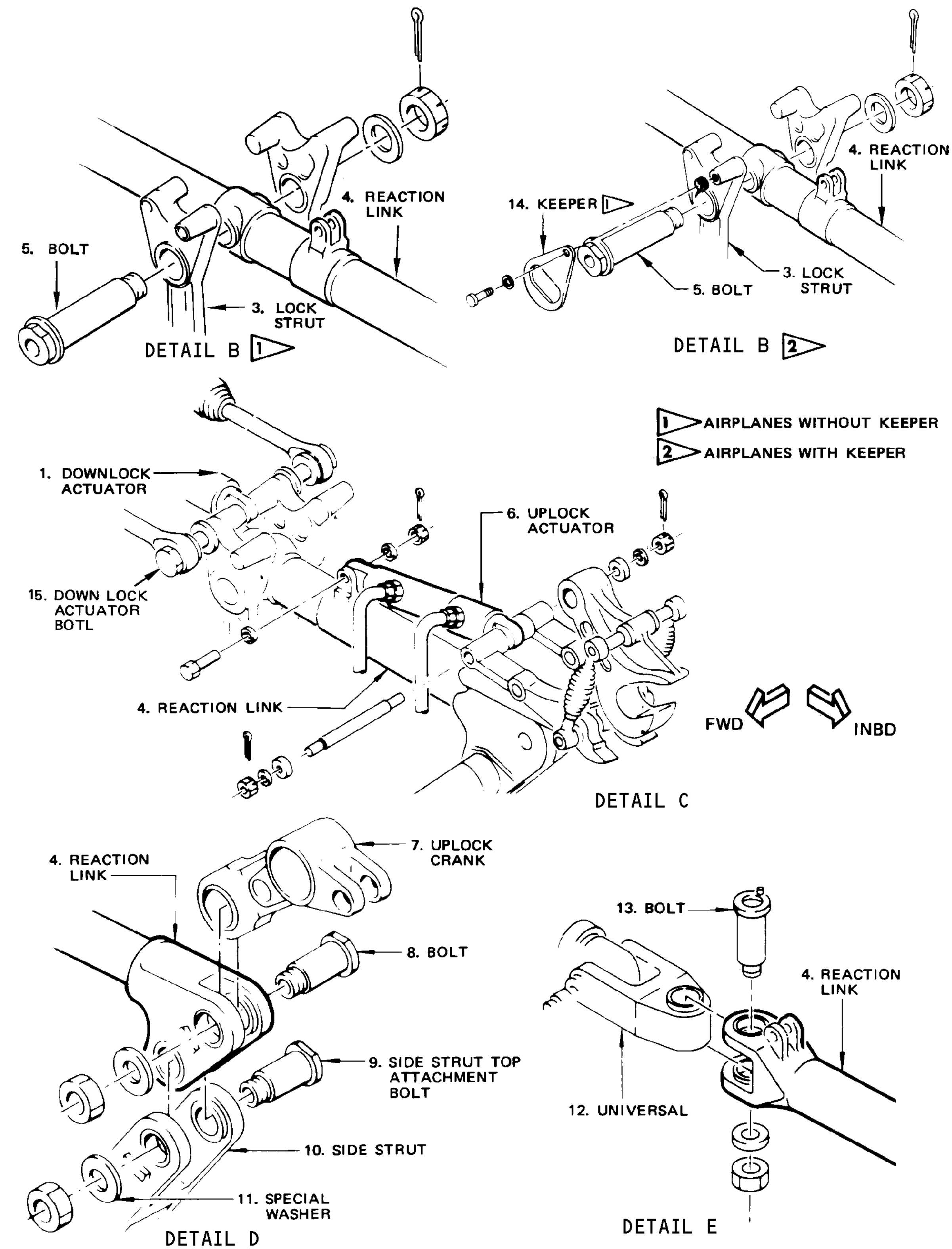
WARNING: USE NITRILE GLOVES FOR SKIN PROTECTION AGAINST BMS 3-27 (MASTINOX 6856K). IF MASTINOX GETS ON YOUR SKIN, IMMEDIATELY REMOVE IT WITH WATER. IF THIS MATERIAL GETS IN YOUR EYES, IMMEDIATELY FLUSH YOUR EYES WITH WATER AND GET MEDICAL AID. THIS MATERIAL CONTAINS VERY POISONOUS AND FLAMMABLE AGENTS WHICH CAN CAUSE INJURIES TO PERSONS.

CAUTION: REMOVE UNWANTED MASTINOX FROM THE SURFACES WHICH WILL BE LUBRICATED WITH A GREASE NIPPLE. IF YOU APPLY MASTINOX TO JOINTS THAT TURN, FAILURE OF THE LANDING GEAR TO EXTEND OR RETRACT COULD OCCUR.





Main Gear Reaction Link Installation
Figure 401



Main Gear Reaction Installation
Figure 402

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A. Clean and lubricate with grease, all bolts, shafts, washers, and bushings except lock strut/reaction link bolt (5, Fig. 402).

CAUTION: BOLT (5) RUNS IN TEFLON BUSHINGS THAT ARE INCOMPATIBLE WITH GREASE.

B. On airplanes with bolt keeper clean and lubricate with grease, all bolts, shafts, washers and bushings.

C. Connect reaction link to universal (12).
   (1) Place reaction link in position in universal (12) with lock actuator lugs up.
   (2) Install thread protector on reaction link to universal attachment bolt (13).
   (3) Insert bolt (13) with head end up. Remove thread protector.
   (4) Add washer and nut. Tighten nut to within range of driving torque plus 400 pound-inches lube torque.

D. Connect reaction link (4) to uplock crank (7).
   (1) Apply BMS 3-27 (Mastinox 6856K) corrosion preventive compound to the bellcrank attach bolt, reaction link, and nut.
   (2) Insert bolt (8) so that bolthead is retained by lug on reaction lug. Add washer and nut.
      (a) Do a check for the self-locking torque of the nut.
      (b) Measure and record the self-locking torque of the nut.

      NOTE: The self-locking torque must be 90 to 800 pound-inches.

      (c) Add the self-locking torque you measured in step (a) to 250-300 pound-inches to get the installation torque range.
   (3) Tighten the nut in the installation torque range you measured in step (c).

E. Insert downlock actuator bolt (15). Butter lubricate washer surface, shank, threads and thread relief groove with grease. Install nut and washers on bolt (18). Tighten nut hand tight and slack off, if necessary, to the nearest castellation to install cotter pins.

F. Install uplock actuator (Ref 32-32-41)

G. Connect side strut (10) to reaction link.
   (1) Align side strut with lugs on reaction link.
   (2) Install thread protector on side strut top attachment bolt (9).
   (3) Insert bolt from aft side. Remove thread protector. Add special washer (11) and nut.
   (4) Tighten nut to 500-800 pound-inches lube torque.

H. Connect lock strut (3) to reaction link.
   (1) Align lock strut with reaction link.
   (2) On airplanes without bolt keeper (14) installed, insert bolt (5) from forward side of gear.
   (3) On airplanes with bolt keeper (14 installed, insert bolt (5) from keeper side of lock strut.
   (4) Add washer and nut.
   (5) On airplanes with bolt keeper (Fig. 402, for effectivity) install keeper (14) with washer and bolt.
   (6) Tighten nut hand tight.

(7) If necessary, slack off nut to align nearest castellation slot with cotter pin hole. Lock nut with cotter pin.

I. Install downlock springs (2) (Ref 32-32-91 R/I).

J. Lubricate landing gear (Ref Chapter 12, Main Landing Gear Lubrication).

K. Jack airplane for gear retraction (Ref Chapter 7, Jacking Airplane)

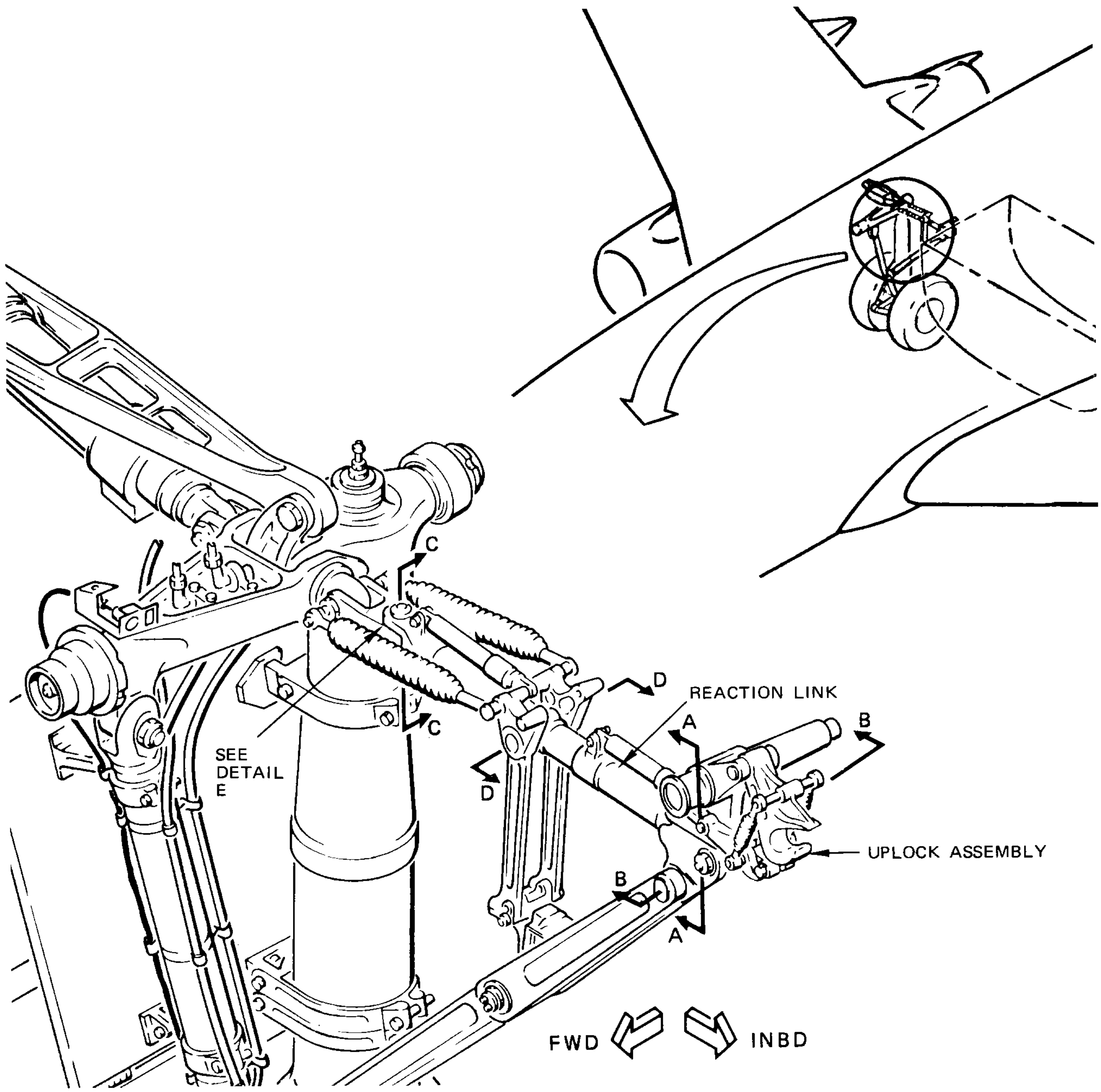
L. Remove ground lock assemblies (Ref 32-00-01) and pressurize hydraulic system (Ref 29-11-0 MP).

M. Retract and extend gear, install ground lock assemblies (Ref 32-00-01) and examine reaction link and associated parts to assure that all affected parts function correctly.

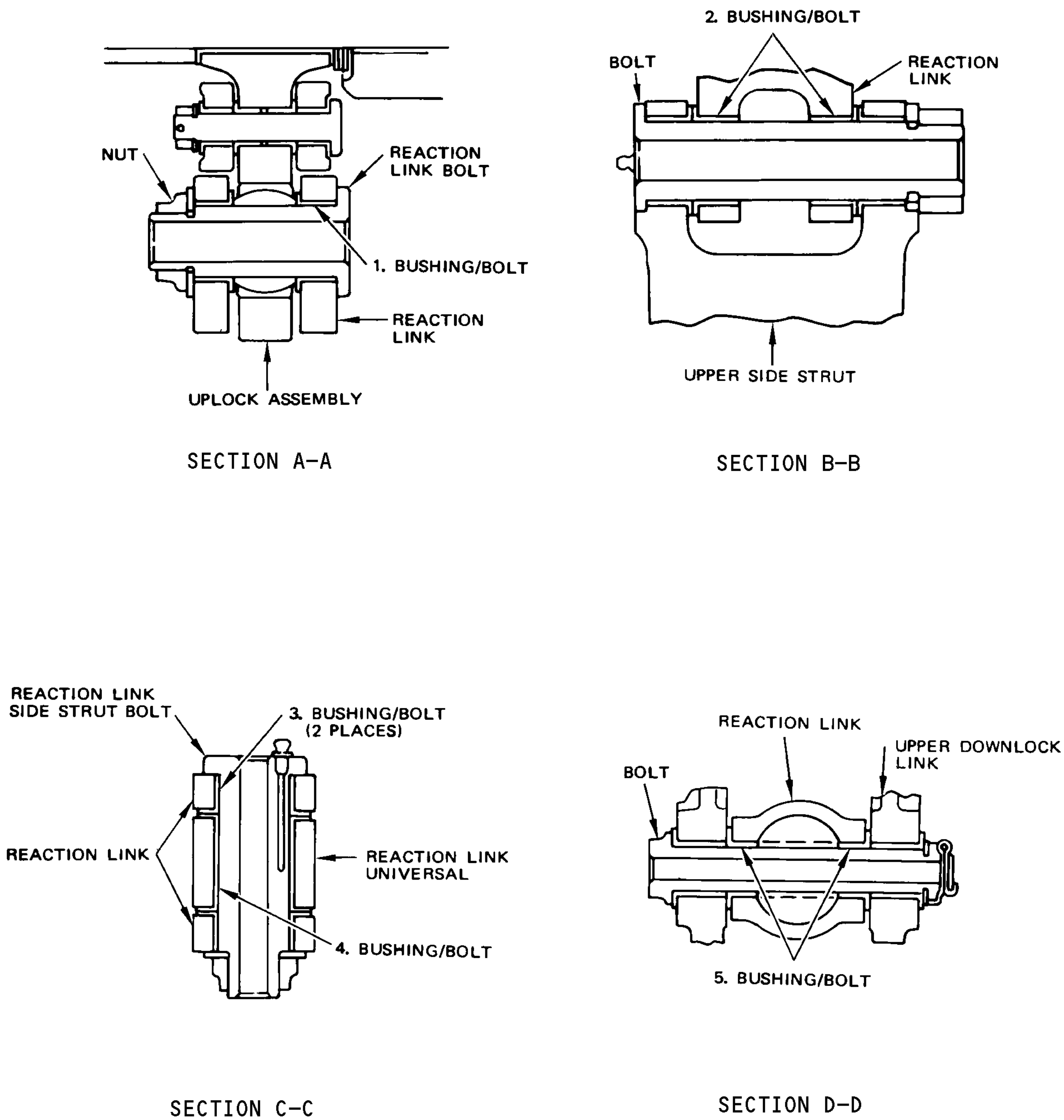
N. Lower airplane and remove jacks.

MAIN GEAR REACTION LINK - INSPECTION/CHECK

1. General
   A. These data consist of illustrations and wear limit charts. No procedure is given in this section for access to permit inspection. Refer to Main Gear Reaction Link - R/I.
2. Main Gear Reaction Link Wear Limits



Main Gear Reaction Link Wear Limits
Figure 601 (Sheet 1)



Main Gear Reaction Link Wear Limits
Figure 601 (Sheet 2)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS DIAMETER MIN	DESIGN LIMITS DIAMETER MAX	WEAR LIMITS ALLOWED WEAR DIM.	WEAR LIMITS MAX DIAM CLEAR-ANCE	REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR.
1	BUSHING	ID	1.250	1.251	1.252	0.005	X		
	BOLT	OD	1.248	1.249	1.247			X	*[1]
2	BUSHING	ID	1.375	1.376	1.377	0.005	X		
	BOLT	OD	1.373	1.374	1.372			X	*[1]
3	BUSHING	ID	1.250	1.251	1.252	0.005	X		
	BOLT	OD	1.248	1.249	1.247			X	*[1]
4	BUSHING	ID	1.251	1.251	1.252	0.005	X		
	BOLT	OD	1.248	1.249	1.247			X	*[1]
5	BUSHING	ID	0.752	0.753	0.754	0.005	X		
	BOLT	OD	0.749	0.750	0.748			X	*[1]

*[1] REFER TO OVERHAUL MANUAL FOR REPAIR INFORMATION

Main Gear Reaction Link Wear Limits
Figure 601 (Sheet 3)

MAIN GEAR DAMPER - REMOVAL/INSTALLATION

1. Equipment and Materials
   A. Ground Lock Assemblies (Ref 32-00-01)
   B. Grease - BMS 3-33 (Preferred)
   C. Grease - MIL-PRF-23827 (Supercedes MIL-G-23827) (Alternate)
   D. Grease - MIL-G-21164 (Alternate)
   E. Primer - BMS 10-11, Type I
2. Prepare to Remove Main Gear Damper
   A. Check that all ground lock assemblies (Ref 32-00-01) are installed.
   B. Depressurize hydraulic system A including hydraulic reservoir.
   C. Disconnect hydraulic line from damper, plug line, and cap damper.
3. Remove Main Gear Damper
   A. Remove bolt securing electrical harness support bracket (5, Fig. 401) to main gear damper (13). Observe washer and flanged bushing (4).
   B. Remove checknut (6), lockbolt (9), and lock washer (7).
   C. Disconnect hydraulic line guides (12) from damper and secure hydraulic lines clear of torsion link.
   D. Unscrew apex nut (8). Remove thrust washer (10).
   E. Jack main gear with axle jack to raise tires clear of ground (Ref Chapter 7, Jacking Airplane).
   F. Spread ends of torsion links to allow for removal of damper bolts by applying torsional load to inner cylinder.

      NOTE: Torsion links may be spread by applying a counterclockwise pull on a 2 X 4 inch wood beam placed between the shock strut and wheel (Ref 32-11-0, page 604).

   G. Remove damper attachment bolts (3).
   H. Pull out damper (13), raise upper torsion link, and remove apex thrust washer (11).
4. Install Main Gear Damper
   A. Place apex thrust washer (11, Fig. 401) between torsion links. Install washer on end of lower torsion link (15) with concave side against link.
   B. Check that damper (13) is filled with hydraulic fluid.
      (1) Remove the bleed plugs (17), (18) and the filler and bleed valve (16) from the manifold (19).
      (2) Add fluid to the manifold (19) open ports (16), (17), and (18) until they are all full.

(3) Install filler and bleed valve (16) and bleed plugs (17), (18) in the manifold (19) ports.

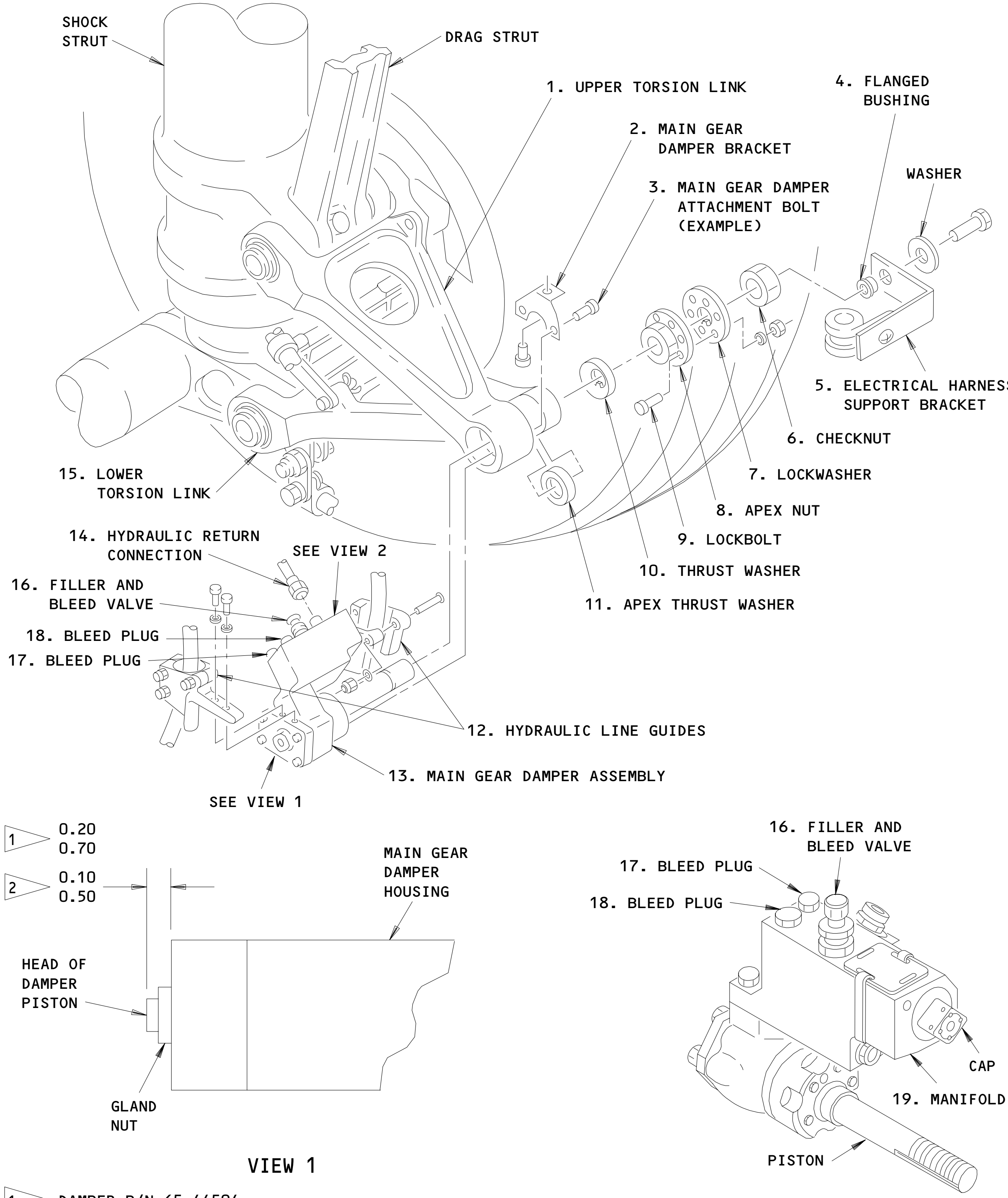
WARNING: DO NOT GET HYDRAULIC FLUID ON YOU. HYDRAULIC FLUID, BMS 3-11, CAN CAUSE INJURY TO PERSONS. IF YOU GET THE HYDRAULIC FLUID ON YOUR SKIN, FLUSH YOUR SKIN WITH WATER. IF YOU GET THE HYDRAULIC FLUID IN YOUR EYES, FLUSH YOUR EYES WITH WATER AND GET MEDICAL AID. IF YOU EAT OR DRINK THE HYDRAULIC FLUID, GET MEDICAL AID.

CAUTION: USE CLEAN HYDRAULIC FLUID AND CLEAN EQUIPMENT WHEN YOU FILL THE DAMPER. DIRT CAN CAUSE DAMAGE TO THE HYDRAULIC SYSTEM. DO THIS PRE-FILL STEP. AIR CAN BE TRAPPED IN THE DAMPER IF IT IS NOT FULL OF HYDRAULIC FLUID. THE DAMPER WILL NOT WORK PROPERLY IF AIR IS TRAPPED IN IT.

C. Turn inner cylinder by applying forward and aft force to wheels to spread torsion links, line up ends of torsion links, and insert damper in upper torsion link (1) with shaft through apex thrust washer (11) and lower torsion link (15). Verify that apex thrust washer (11) is properly seated on shaft.
D. Install damper bracket (2).
   (1) Apply wet primer to all areas of holes in damper bracket (2) and matching threaded holes in main gear damper (13).
   (2) Install damper attachment bolts (3) into holes with wet primer. Tighten bolts finger-tight.
E. Lower main gear and remove axle jack.
F. Tighten all bolts. Lockwire all bolts together.

CAUTION: CARE MUST BE TAKEN NOT TO TRAP LOCKWIRE BETWEEN TORSION LINK AND APEX THRUST WASHER.

G. Place thrust washer (10) on damper shaft with concave side against torsion link. Verify key in washer engages slot in shaft and washer is properly seated against torsion link.
H. Screw apex nut (8) on damper shaft with hexagon side towards thrust washer.
I. Check damper piston head protrusion. If protrusion is not within limits, rotate lower torsion link as required to achieve correct dimension.
J. Tighten apex nut 200 to 300 pound-inches torque.
K. Loosen apex nut and place lockwasher (7) on damper shaft. Note key in washer engages slot in shaft.
L. Tighten apex nut (8) 400 to 500 pound-inches torque. Loosen apex nut to 0 torque then retighten nut finger-tight. Tighten nut until next available hole in nut aligns with a hole in lockwasher.



1 DAMPER P/N 65-44504

2 DAMPER P/N 65-44771

Main Gear Damper Installation
Figure 401

444790

M. Install lockbolt (9), washer and nut in apex nut and lockwasher.
N. Install checknut (6). Tighten checknut 50 to 150 pound-inches torque.
O. Do these steps to install the electrical harness: 1) Insert flanged bushing (4) in electrical harness support bracket (5). Place washer on attachment bolt and install support bracket (5) on end of damper shaft. 2) Make sure the electrical harness is installed correctly on the clamp of the electrical support bracket (Ref 32-11-21, Fig. 401). 3) Place hydraulic lines in position on each side of main gear damper. Connect hydraulic line guides (12) to damper.
P. Lockwire checknut (6) to lockbolt (9).
Q. Remove plug and cap and connect hydraulic return line (14) to damper.
R. Pressurize hydraulic system A and check hydraulic connection to damper for leaks (Ref 29-11-0 MP).
S. Open the filler and bleed valve (16) approximately one turn.

CAUTION: PROTECT TIRES, GEAR STRUCTURE, AND SURROUNDING AREA FROM ACCIDENTAL HYDRAULIC FLUID SPILLAGE. HYDRAULIC FLUID CAN CAUSE DAMAGE TO EQUIPMENT.

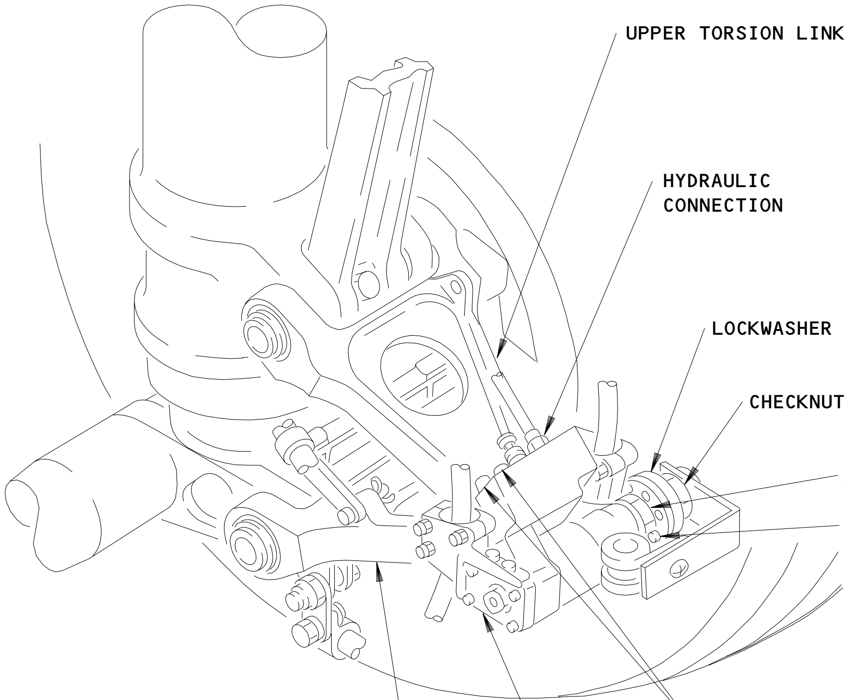
T. Cycle landing gear control lever from DN to UP then DN to charge shimming damper compensator, making fluid available for bleeding of damper.

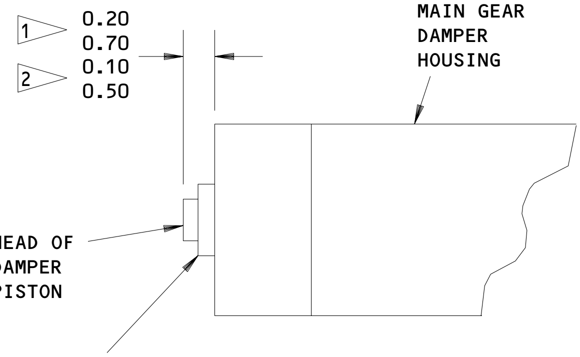
WARNING: MAKE SURE THAT THE GROUND LOCKPINS ARE INSTALLED IN ALL THE LANDING GEAR TO PREVENT THE ACCIDENTAL OPERATION OF THE GEAR. INJURY TO PERSONS AND/OR DAMAGE TO EQUIPMENT COULD OCCUR IF THE GEAR RETRACTS.

U. Allow fluid to flow until clear of air before tightening. Close the filler and bleed valve (16). It may be necessary to cycle control lever several times during bleeding of damper to ensure adequate fluid.
V. Lockwire hydraulic return line, bleed plugs and filler bleed valve.
W. Do a check of the hydraulic system fluid reservoir level (Ref 29-15-00 MP).
X. Determine if there is further need for hydraulic power; if not, shut down source.

MAIN GEAR DAMPER - ADJUSTMENT/TEST

1. Main Gear Damper Adjustment
   A. General
      (1) Head of damper piston must protrude outside of damper housing before tightening apex nut. If the piston head is flush with housing, raise main gear on axle jack, or use a length of timber to pivot wheels around until piston head protrudes.
   B. Adjust Main Gear Damper
      (1) Measure distance that damper piston head protrudes from end face of gland nut on housing (Fig. 501). If head of damper piston is not within these dimensions the damper piston may be bottomed out. Rotate lower torsion link until piston head protrusion is within the above dimensions.
      (2) Remove lockwire from checknut to lockbolt.
      (3) Remove lockbolt and tighten torsion link apex nut 400 to 500 pound-inches torque.
      (4) Loosen apex nut to 0 torque then retighten nut finger-tight. Tighten nut until next available hole in nut aligns with a hole in lockwasher.
      (5) Install lockbolt, washer and nut in apex nut and lockwasher.
      (6) Tighten checknut 50 to 150 pound-inches.
      (7) Lockwire checknut to lockbolt.
2. Main Gear Damper Test
   A. Test Main Gear Damper
      (1) Visually check unit for leakage at bleeder plugs, filler valve, hydraulic line connection, and piston rod seals.
      (2) Set gear per par. 1.A.
      (3) Push thrust washer up against lower torsion link.
      (4) Measure gap between thrust washer and apex nut. If gap does not exceed 0.005 inch maximum, no further adjustment is required. If gap exceeds 0.005 inch, check apex thrust washers and lower torsion link bushings for excessive wear and proceed with adjustment per par. 1.B.





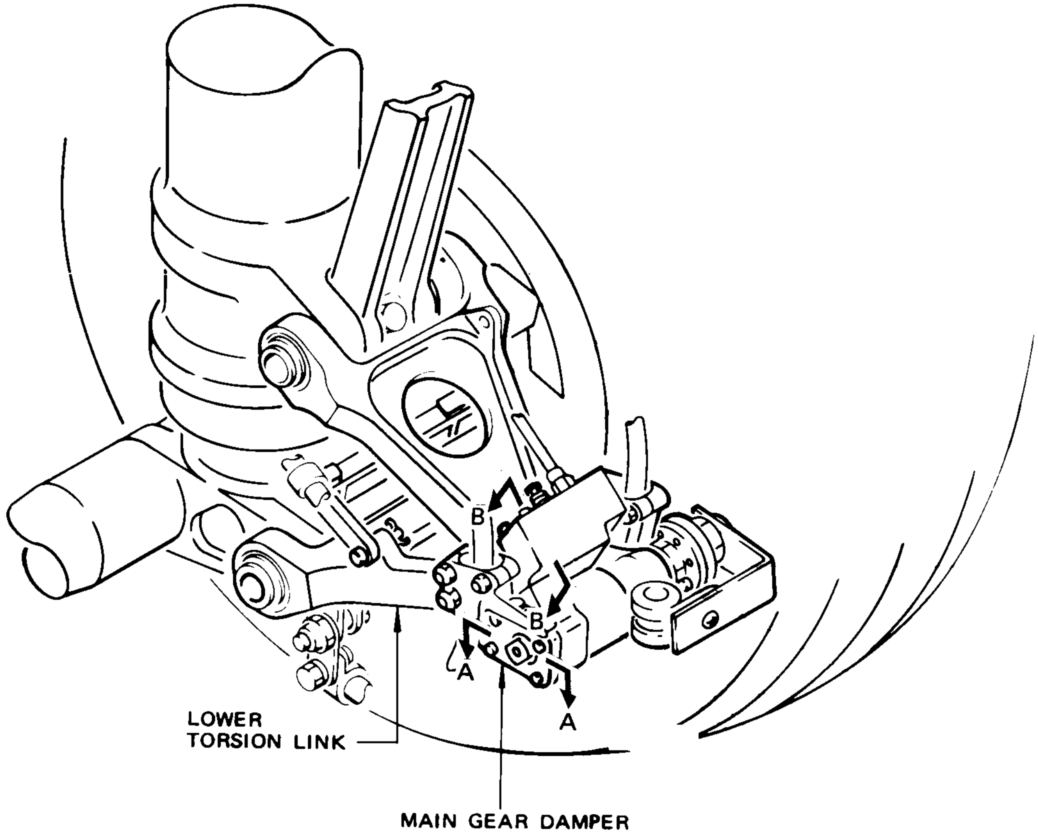
VIEW 1

1 DAMPER P/N 65-44504
2 DAMPER P/N 65-44771

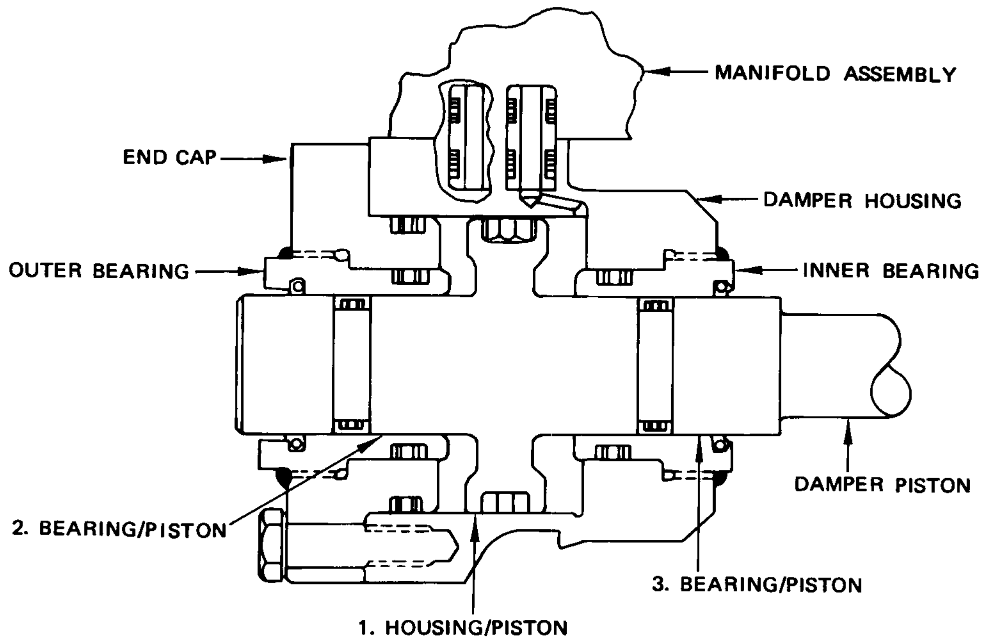
Main Gear Damper Adjustment
Figure 501

MAIN GEAR DAMPER - INSPECTION/CHECK

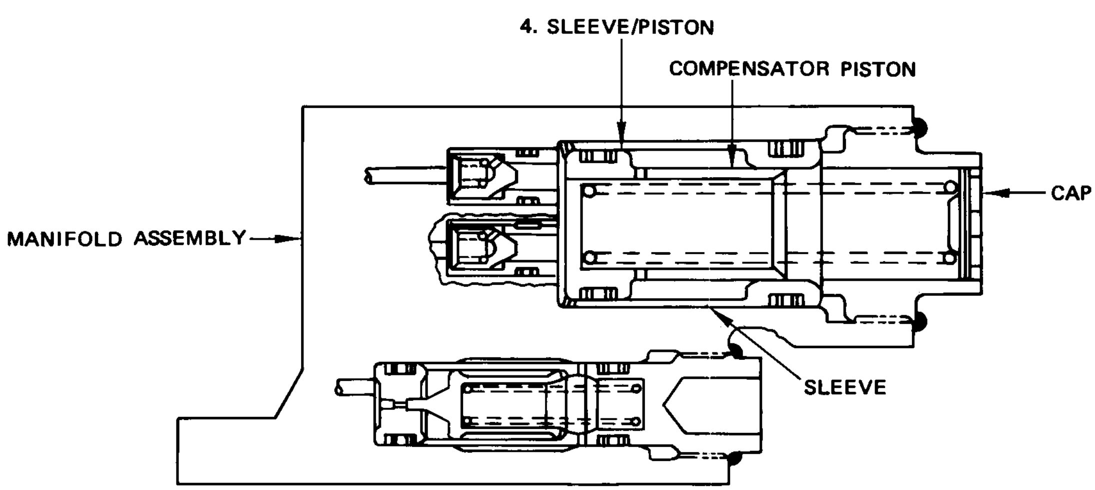
1. General
   A. These data consists of illustrations and wear limit charts. No procedure is given in this section for access to permit inspection. Refer to Main Gear Damper - Removal/Installation for removal procedure.
2. Main Gear Damper Wear Limits



Main Gear Damper Wear Limits
Figure 601 (Sheet 1)



SECTION A-A



SECTION B-B

Main Gear Damper Wear Limits
Figure 601 (Sheet 2)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS DIAMETER MIN	DESIGN LIMITS DIAMETER MAX	WEAR LIMITS ALLOWED WEAR DIM.	WEAR LIMITS MAX DIAM CLEAR- ANCE	REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR.
1	HOUSING *[2]	ID	2.620	2.622	2.626	0.009	X		
	PISTON *[3]	OD	2.615	2.617	2.611			X	*[1]
2	BEARING *[4]	ID	1.241	1.243	1.247	0.008	X		
	PISTON *[3]	OD	1.237	1.239	1.233			X	*[1]
3	BEARING *[5]	ID	1.241	1.243	1.247	0.008	X		
	PISTON *[3]	OD	1.237	1.239	1.233			X	*[1]
4	SLEEVE	ID	1.366	1.368	1.372	0.008	X		
	PISTON	OD	1.362	1.364	1.358			X	*[1]

*[1] WORN PART IS REPAIRABLE. REFER TO OVERHAUL MANUAL
*[2] P/N 65-44577-1
*[3] P/N 65-44576-2
*[4] P/N 69-35842-1
*[5] P/N 69-35889-1

Main Gear Damper Wear Limits
Figure 601 (Sheet 3)

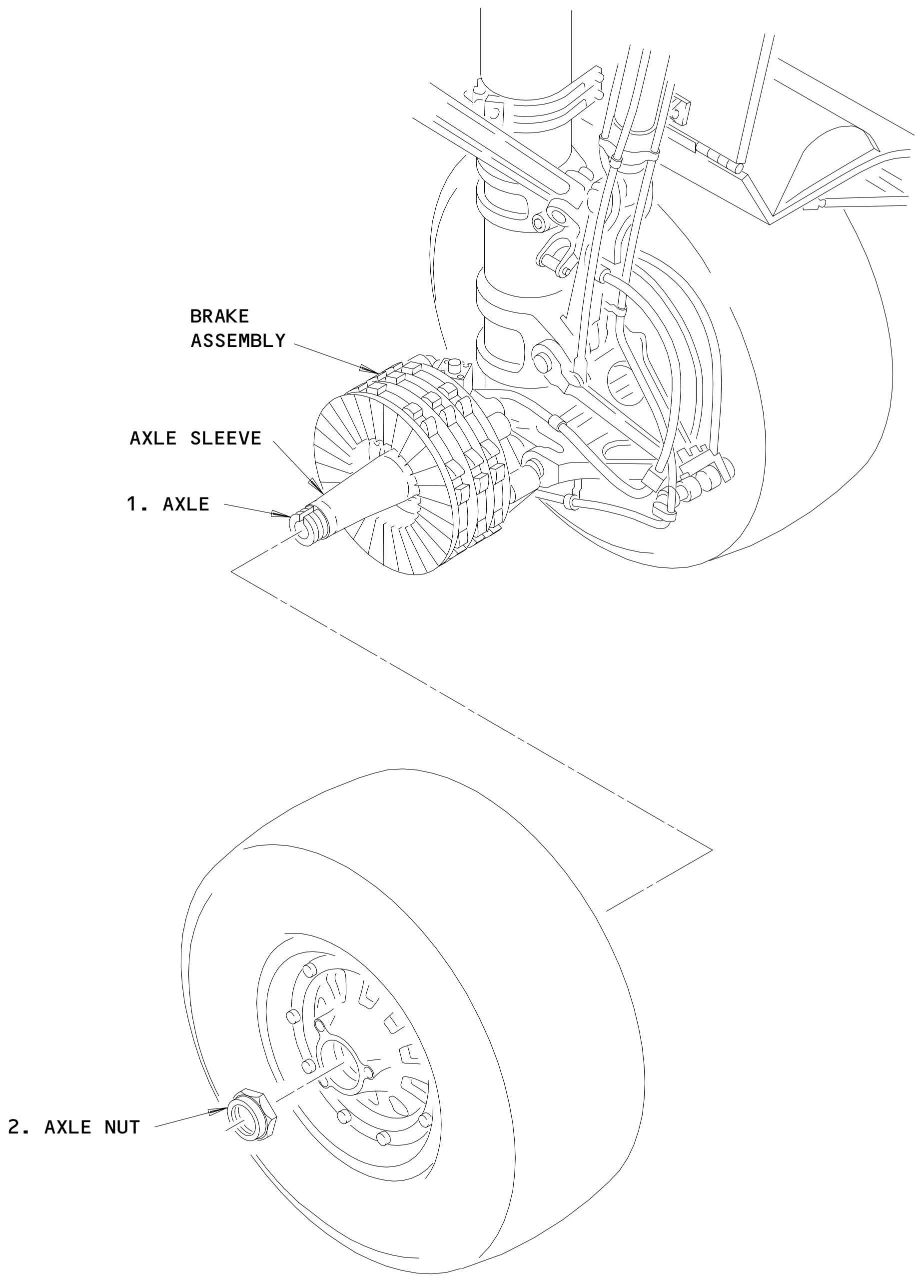
MAIN GEAR AXLE THREAD AND AXLE NUT - INSPECTION/CHECK

1. General
   A. This data has illustrations and a wear limit chart. No procedure is given in this piece that permits access for inspection. For this data, refer to Main Gear Wheel and Tire - Removal/Installation.
2. Main Gear Axle Thread and Axle Nut Inspection/Check
   A. Special Tools and Equipment
      (1) Axle Thread NO-GO Gage Tool for pitch diameter.
         (a) Precise Tool NG2.8750-16 PTG THREADSNAP, used to examine the pitch diameter of the axle thread with undersized configuration.
         (b) Precise Tool NG2.9375-16 PTG THREADSNAP, used to examine the pitch diameter of the axle thread with original configuration.
      (2) Micrometer of appropriate size and accuracy, used to measure the major diameter of the axle thread.
      (3) Axle Nut NO-GO Gage Tool for minor diameter.
         (a) Plug Gage, Landing Gear Nut, F80198-12, used to examine the minor diameter of the axle nut with original configuration or equivalent vendor tool Class X, 2.8697 Go/2.8774 NoGo with handle.
         (b) Plug Gage, Landing Gear Nut, F80198-13, used to examine the minor diameter of the axle nut with undersized configuration or equivalent vendor tool Class X, 2.8141 Go/2.8163 NoGo with handle.
      (4) Axle Nut NO-GO Gage Tool for pitch diameter.
         (a) NO-GO Gage, 2-15/16-16 UNS 3B NoGo member only with handle, pitch diameter 2.9024, used to examine the pitch diameter of the axle nut with original configuration.
         (b) NO-GO Gage, 2-7/8-16 UNS 3B NoGo member only with handle, pitch diameter 2.8379, used to examine the pitch diameter of the axle nut with undersized configuration.
      (5) GJ-5/PD-MD -- Axle nut internal thread gage tool, Johnson Gage Co., (V74979) (Optional).

      NOTE: All the NO-GO gage tools, except for the F80198-XX, can be purchased from PRECISE TOOL and GAGE CO. INC., 13300 S.E. 30th St., Suite #201, Bellevue, WA 98005 USA, Tel. No. (206) 746-1234/623-1120, Fax No. (206)747-8131.

B. Do a check on the main gear axle thread and axle nut wear limits (Fig. 601).

<u>CAUTION</u>: ON AIRPLANES WITH REWORKED AXLES, MAKE SURE THERE IS A MARKING WHICH READS "CAUTION - SPECIAL AXLE NUT REQUIRED" ALONG THE UPPER OUTER END OF THE AXLE SLEEVE. THE MARKING WILL CONSIST OF BLACK LETTERS ON A YELLOW BACKGROUND. IF MARKING IS NOT ON THE AXLE, THE INCORRECT AXLE NUT MAY BE INSTALLED. IF THE INCORRECT AXLE NUT IS INSTALLED, THE WHEEL MAY FALL OFF DURING TAKEOFF OR LANDING.



Main Gear Axle Wear Limits
Figure 601 (Sheet 1)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS DIAMETER MIN	DESIGN LIMITS DIAMETER MAX	WEAR LIMITS PER-MITTED WEAR DIM.	WEAR LIMITS MAX DIA CLEAR-ANCE	REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR.
1 [5]	AXLE	[1]	2.9187	2.9281	2.914			X	[4]
		[2]	2.8925	2.8969	2.884			X	[4]
1 [6]	AXLE	[1]	2.8660	2.8690	2.861		X		
		[2]	2.8314	2.8344	2.821		X		
2 [5]	NUT [8]	[2]	2.8969	2.9009	2.902		X		
		[3]	2.8698	2.8728	2.877		X		
2 [7]	NUT [9]	[2]	2.8344	2.8364	2.837		X		
		[3]	2.8142	2.8162	2.816		X		

[1] MAJOR DIAMETER
[2] PITCH DIAMETER
[3] MINOR DIAMETER
[4] REWORK THE ORIGINAL AXLE PER THE OHM
[5] ORIGINAL CONFIGURATION
[6] UNDERSIZED CONFIGURATION
[7] NUT FOR UNDERSIZED AXLE
[8] 2.9375-16 UNS 3B THREAD
[9] 2.8750-16 UNS 3B THREAD

Main Gear Axle Wear Limits
Figure 601 (Sheet 2)

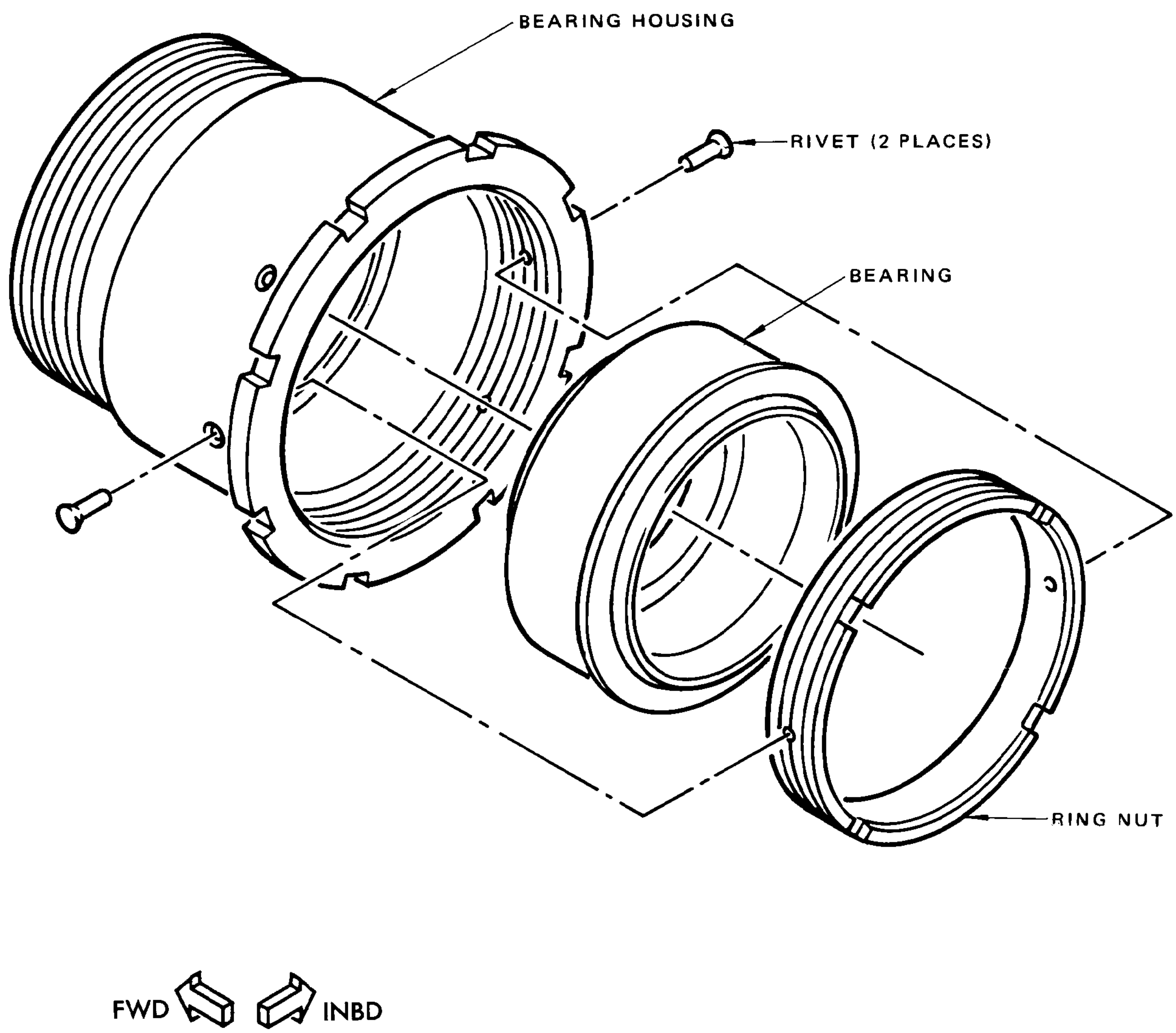
MAIN GEAR FORWARD TRUNNION BEARING - REMOVAL/INSTALLATION

1. General
   A. The main gear forward trunnion bearing must be replaced if damaged or worn beyond limits specified in 32-11-0.
   B. The bearing is an interference fit and the complete bearing assembly must be removed before the bearing can be installed by shrinking.
2. Equipment and Materials
   A. Holding Fixture - Main Gear Forward Trunnion Bearing - F80096 or equivalent
   B. Spanner Wrench - Main Gear Forward Trunnion Bearing Nut - F80018-1 or equivalent
   C. Mandrel, Installation Bearing - ST918 or equivalent
   D. Equipment for containing and handling liquid nitrogen
   E. Corrosion Preventive Compound - MIL-C-16173, Grade 2 or MIL-C-11796, Class 3
   F. Rivets MS20427 M4-10
3. Remove Main Gear Forward Trunnion Bearing
   A. Remove main gear trunnion link and remove trunnion link bearing assembly per 32-11-11.
   B. Remove rivets locking ring nut to bearing housing (Fig. 401).
   C. Position bearing assembly in holding fixture and unscrew ring nut.
   D. Press or drive out bearing from bearing housing using mandrel. Check bearing housing for damage or distortion.
   E. If bearing housing is undamaged, clean and degrease for reuse.
4. Install Main Gear Forward Trunnion Bearing
   A. Coat inside diameter of bearing housing with corrosion preventative compound (Fig. 401).
   B. Prepare container with liquid nitrogen.
   C. Immerse bearing in liquid nitrogen for sufficient time to allow even and thorough cooling.

      WARNING: TEMPERATURE OF LIQUID NITROGEN IS -320°F. SAFETY PRECAUTIONS MUST BE TAKEN WHEN HANDLING CHILLED BEARINGS AND TOOLS.

   D. Remove bearing from coolant and immediately install in bearing housing. There should be no metal to metal interference during insertion.
   E. Push bearing down into position with mandrel.
   F. Check that installed bearing is in correct alignment in bearing housing.
   G. Allow bearing assembly to attain room temperature.
   H. Remove all excess corrosion preventative compound with dry, clean cloth.
   I. Install ring nut.
   J. Support bearing assembly in holding fixture. Use spanner wrench to tighten ring nut 50 to 100 pound-feet.
   K. Check that ball in bearing can be rotated by hand.

L. Drill 0.127 (+0.005/-0.000) inch diameter holes through ring nut from the two diametrically opposite holes in bearing housing that are best aligned between slots in ring nut.
M. Install rivets to lockring nut to bearing housing.
N. Install bearing assembly on trunnion link, and install trunnion link per 32-11-11.



Main Gear Forward Trunnion Bearing Installation
Figure 401

MAIN GEAR FORWARD TRUNNION BEARING - INSPECTION/CHECK

1. General
   A. The main gear forward trunnion bearing should be examined for excessive diametral clearance whenever main gear shimmy problems exists. The bearing, bearing support, and bearing housing should be examined for wear per Fig. 601 when the bearing assembly or main gear is removed.
2. Main Gear Forward Trunnion Bearing Inspection
   A. General
      (1) This procedure provides a method to measure vertical and horizontal diametral clearance of the bearing. The diametral clearance of the forward trunnion bearing assembly (between trunnion link and bearing housing) must not exceed 0.030 inch for shrink fit bearing assemblies, or 0.050 inch for threaded bearing assemblies in any direction. If the clearance exceeds this limit, the bearing and wing fitting sleeve must be removed for examination and replacement as necessary.
   B. Equipment and Materials
      (1) Dial indicator gage
      (2) Wood 2 x 4 inches approximately 8 feet long
      (3) Axle jack
   C. Prepare for Examination
      (1) Jack airplane until main gear is clear of ground (Ref Chapter 7, Jacking Airplane).
      (2) Deflate main gear shock strut by removing dust cap from air charging valve and loosening air valve a maximum of two turns. Leave air valve open.

      WARNING: DO NOT LOOSEN VALVE BODY UNLESS SHOCK STRUT IS COMPLETELY DEFLATED. AIR PRESSURE CAN BLOW VALVE BODY OUT, CAUSING INJURY TO PERSONNEL.

   D. Examine Main Gear Forward Trunnion Bearing
      (1) Examine vertical clearance of main gear forward trunnion bearing.
         (a) Clamp dial indicator to rear spar structure near forward trunnion bearing in a position to measure vertical clearance.
         (b) Push landing gear forward as far as it will go by applying force at wheels.
         (c) Set dial indicator in contact with trunnion as close as possible to forward trunnion bearing.
         (d) Adjust dial indicator to read zero.
         (e) Rock landing gear forward and aft by pushing and pulling at wheels.

(f) Read bearing clearance on dial indicator. If clearance is greater than 0.030 inch for shrink fit bearing assemblies, or 0.050 inch for threaded bearing assemblies, check wear limits per Fig. 601 and replace parts as necessary.

(2) Examine horizontal clearance of main gear forward trunnion bearing.

(a) Clamp dial indicator to rear spar structure near forward trunnion bearing in a position to measure horizontal clearance.

(b) Raise main gear inner cylinder with axle jack until shock strut is approximately 1 inch from fully compressed.

(c) Insert wood 2 x 4 between wheel and shock strut in a horizontal position.

(d) Twist gear to take up all clearance in one direction. Set dial indicator in contact with trunnion as near as possible to forward trunnion bearing.

(e) Set dial indicator to zero.

(f) Rock gear torsionally by levering 2 x 4.

(g) Read bearing clearance on dial indicator. If clearance is greater than 0.030 inch for shrink fit bearing assemblies, or 0.050 inch for threaded bearing assemblies, check wear limits per Fig. 601 and replace parts as necessary.

E. Restore Airplane to Normal

(1) Remove dial indicator setup.

(2) Remove wood 2 x 4.

(3) Remove axle jack.

(4) Lower airplane and remove jacks.

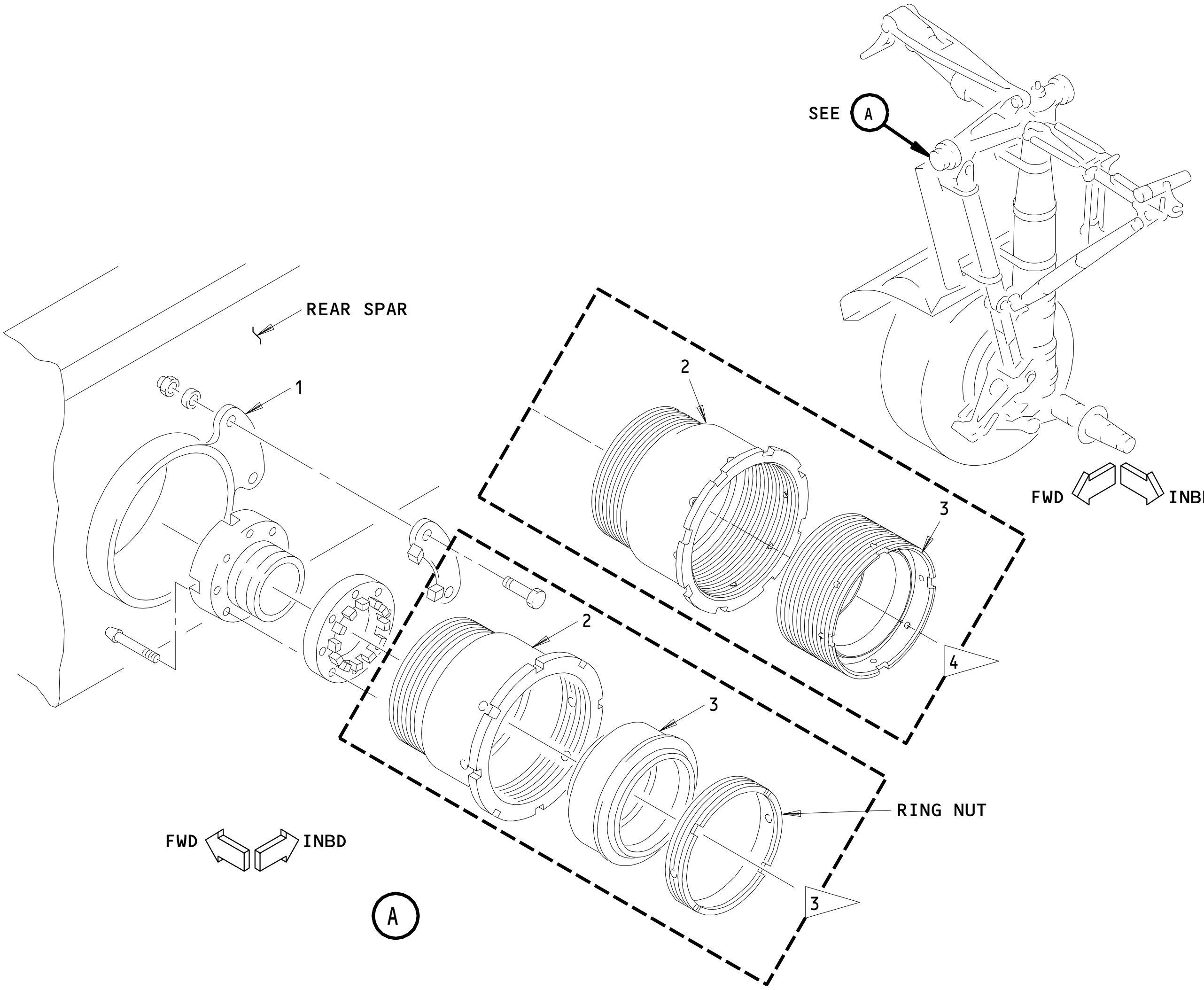
(5) Service shock strut. Refer to Main Landing Gear Shock Strut Servicing, Chapter 12.

3. <u>Main Gear Forward Trunnion Bearing Assembly Wear Limits</u>

A. General

(1) The following data consists of an illustration and a wear limit chart. There will be no procedure given in the section for gaining access to, or removing and installing the component after inspection for wear. Refer to the specific component removal/installation for this information.

B. Main Gear Forward Trunnion Bearing Assembly Wear Limits (See figure 601.)



INDEX NO.	PART NAME	DIM.	DESIGN LIMITS DIAMETER MIN	DESIGN LIMITS DIAMETER MAX	WEAR LIMITS MAX WEAR DIM.	WEAR LIMITS MAX DIA CLEAR- ANCE	REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR.
1	BEARING SUPPORT	ID	4.753	4.754	4.784	0.030	X		1
2	BEARING HOUSING	OD	4.751	4.754	4.727		X		1
3	BEARING			4.125		0.015 2	X		

1 INSPECT THREADS FOR CONDITION

2 BETWEEN INNER BALL AND OUTER RACE

3 FORWARD TRUNNION BEARING ASSEMBLY WITH RING NUT

4 FORWARD TRUNNION BEARING ASSEMBLY WITHOUT RING NUT (ON SOME AIRPLANES)

Main Gear Forward Trunnion Bearing Assembly Wear Limits
Figure 601

MAIN GEAR AXLE - APPROVED REPAIRS

1. General
   A. On airplanes on which heavy braking has generated enough heat to melt the cadmium plating on the axle brake flanges, the cadmium plating may be removed to inspect base metal for heat damage. If the damage falls within given limits, the flanges may be reworked and given an inorganic protective coating.
   B. Repairs to axle sleeves consists of blending out scratches, scoring and galling within limits given below. Rework on axle sleeves must be given an anticorrosive treatment. Alodine or Primer.
2. Equipment and Materials
   A. Fluorescent magnetic inspection equipment
   B. Abrasive Paper or Cloth-Aluminum Oxide 150-Finer or Silicon Carbide 180-Finer
   C. Grease - MIL-G-25760
   D. Axle Sleeve Puller - F80126-9
3. Repair Main Gear Axle
   A. Remove lock bolt, retaining sleeve and axle (Fig. 802).
   B. Remove sleeve from axle with axle sleeve puller - F80126-9. If necessary, sleeve may be heated up to approximately 200°F.
   C. Remove the Ti-Cad plating by hand sanding or by filing. Do not use power tools.

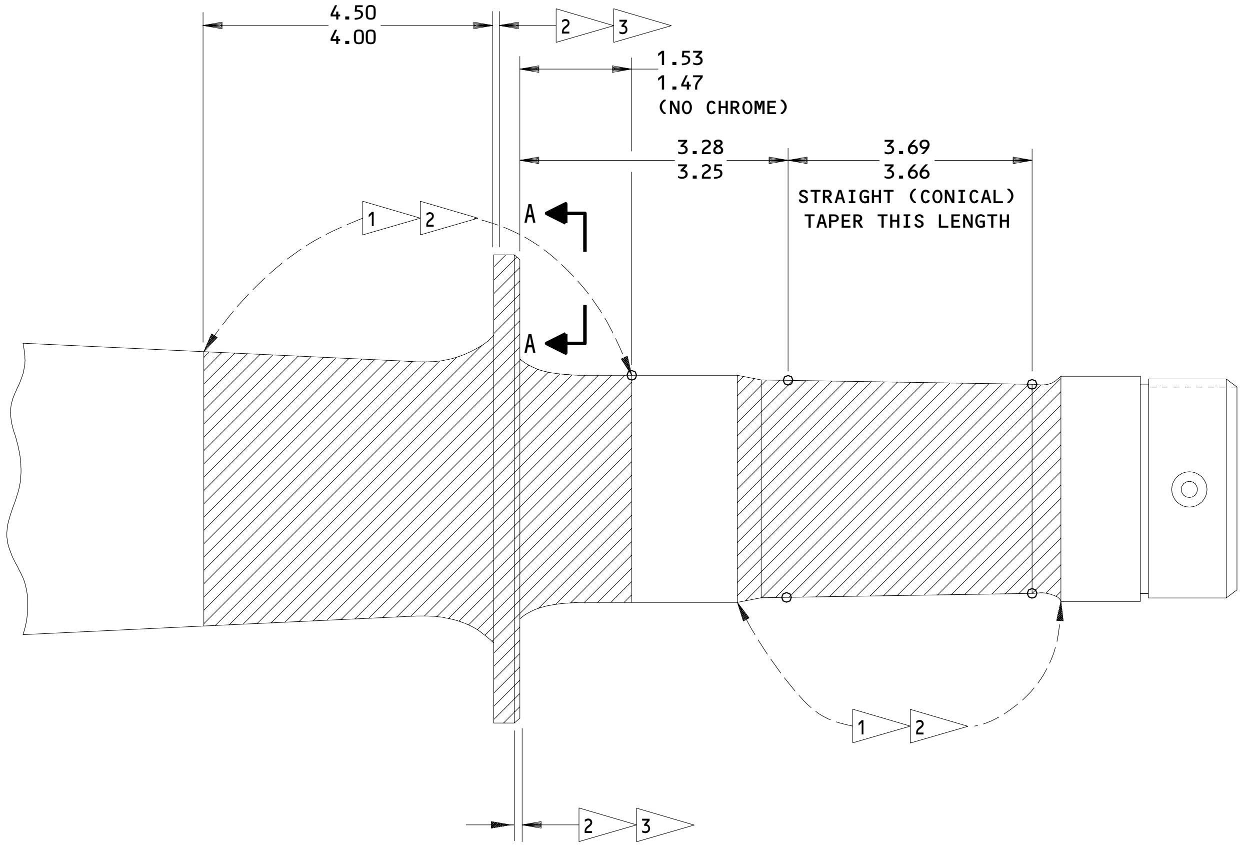
      NOTE: Maximum mismatch is 0.003 inch.

   D. Check flanges for evidence of cadmium embrittlement cracks by fluorescent magnetic examination technique.
   E. If cracks are found, remove shock strut and repair the axle.
   F. Apply inorganic protective coating (Sermetal 249, BMS14-4, Type 2) to brake flange machined surfaces and holes, and adjacent axle surfaces.
   G. Apply a generous coating of grease on axle lands and install sleeve by chilling axle and heating sleeve (Ref 737 Overhaul Manual).

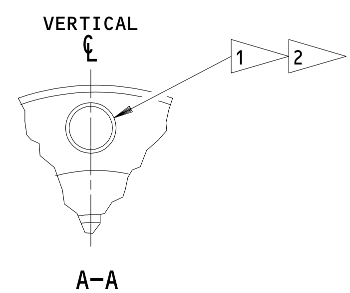
      NOTE: Do not remove excessive grease from inside diameter of axle sleeve after installation.

H. Align bolt holes in axle and sleeve and install lockbolt (Fig. 802).

I. Check diameter of bearing supports after sleeve installation. The outer diameter of small bearing support must not exceed 3.2813 inches, and outer diameter of large bearing support must not exceed 3.375 inches (Fig. 802).



NOTE: ALL DIMENSIONS ARE IN INCHES.

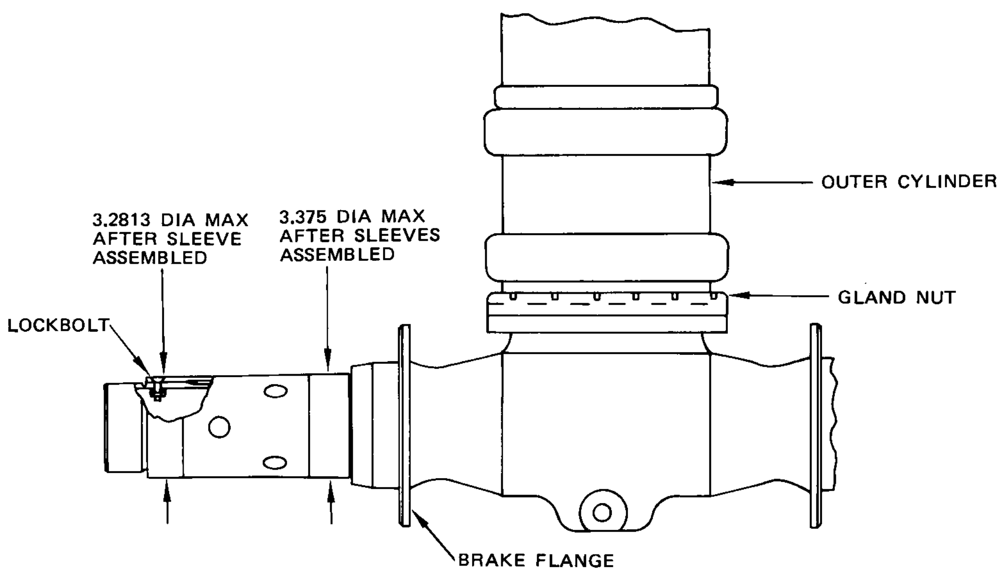


1 NO CAD-TI PLATE, PRIMER, OR ENAMEL.

2 APPLY SERMETEL 249 (BMS 14-4, TYPE 2) PROTECTIVE COATING.

3 THE SUM OF MATERIAL REMOVALS FROM THE TWO FLANGE FACES IS 0.033 MAXIMUM. YOU CAN REMOVE UP TO 0.030 FROM THE INNER FACE OR THE OUTER FACE, BUT IF YOU DO, YOU CAN REMOVE ONLY 0.003 FROM THE OTHER FACE. BECAUSE MOST REPAIRS NECESSARY ARE TO THE OUTER FACE, WE RECOMMEND YOU REPAIR THE INNER FACE ONLY WITH LOCAL BLENDS, TO LET YOU USE THE FULL AMOUNT OF PERMITTED MATERIAL REMOVAL ON THE OUTER FACE.

Application Areas for Sermetel 249
Figure 801



Axle Sleeves Installation
Figure 802

444808

MAIN GEAR ELECTRICAL HARNESS - REMOVAL/INSTALLATION

1. Remove Electrical Harness (Fig. 401)
   A. On airplanes installed with gravel protection shield, remove clamp from shield. Remove shield.
   B. Remove antiskid transducer (32-42-11, Removal/Installation) to gain access to connectors.
   C. Pull electric connectors out of axle and disconnect wires.
   D. Remove fittings (l, 2), washer(s) (4) and expandable fitting (3) from hole in axle (Detail C, Fig. 401).

      NOTE: Note number of washers to facilitate reassembly.

   E. Remove hose clamps.

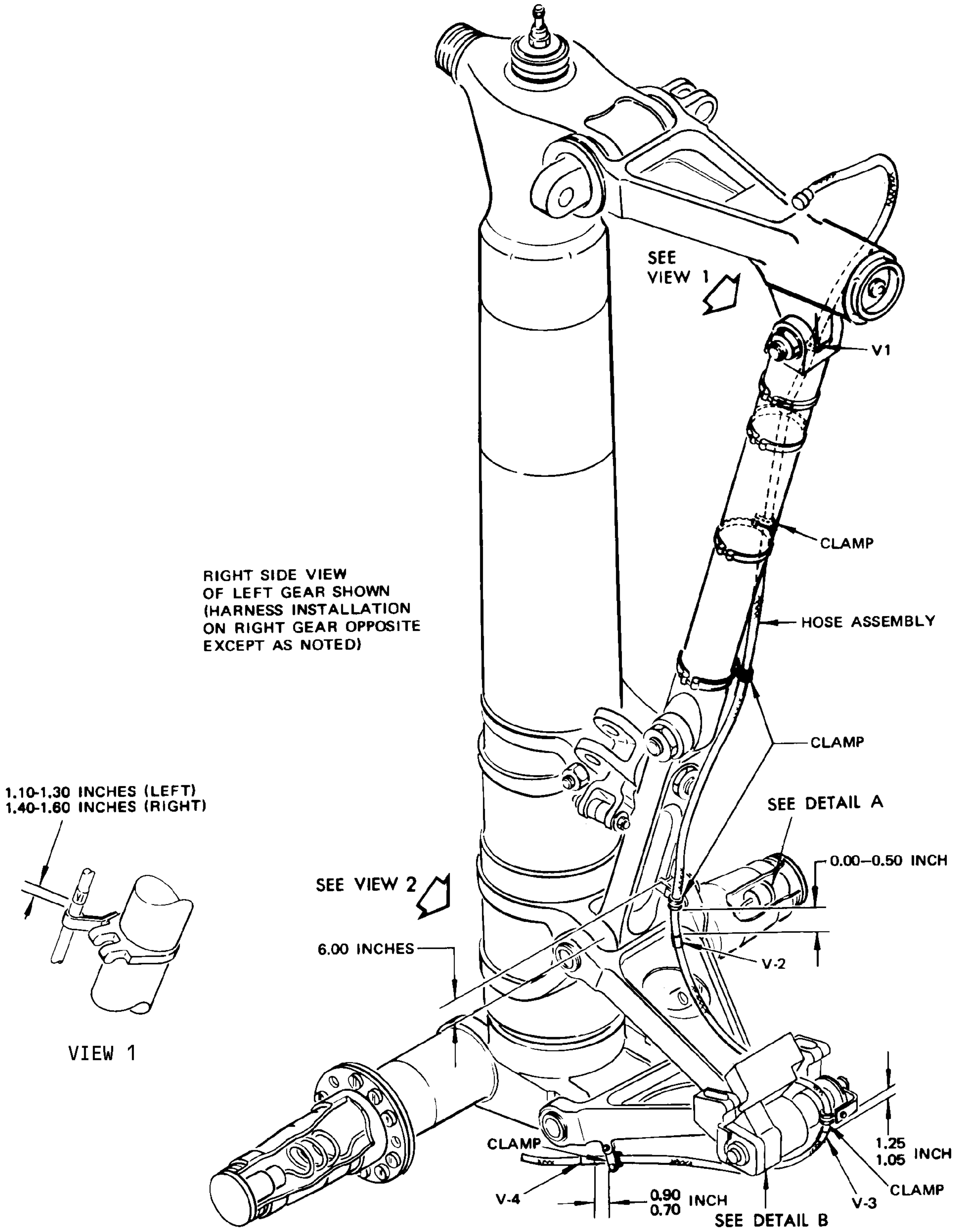
      NOTE: Do not remove ratchet clamps and tape from hose unless replacement is necessary.

   F. Remove hose assembly.
2. Install Electrical Harness (Fig. 401)
   A. Position hose assembly on main gear and secure with clamps. Take care that markers V-1 thru V-4 on hose are located correctly in respect to clamp as shown in Fig. 401.

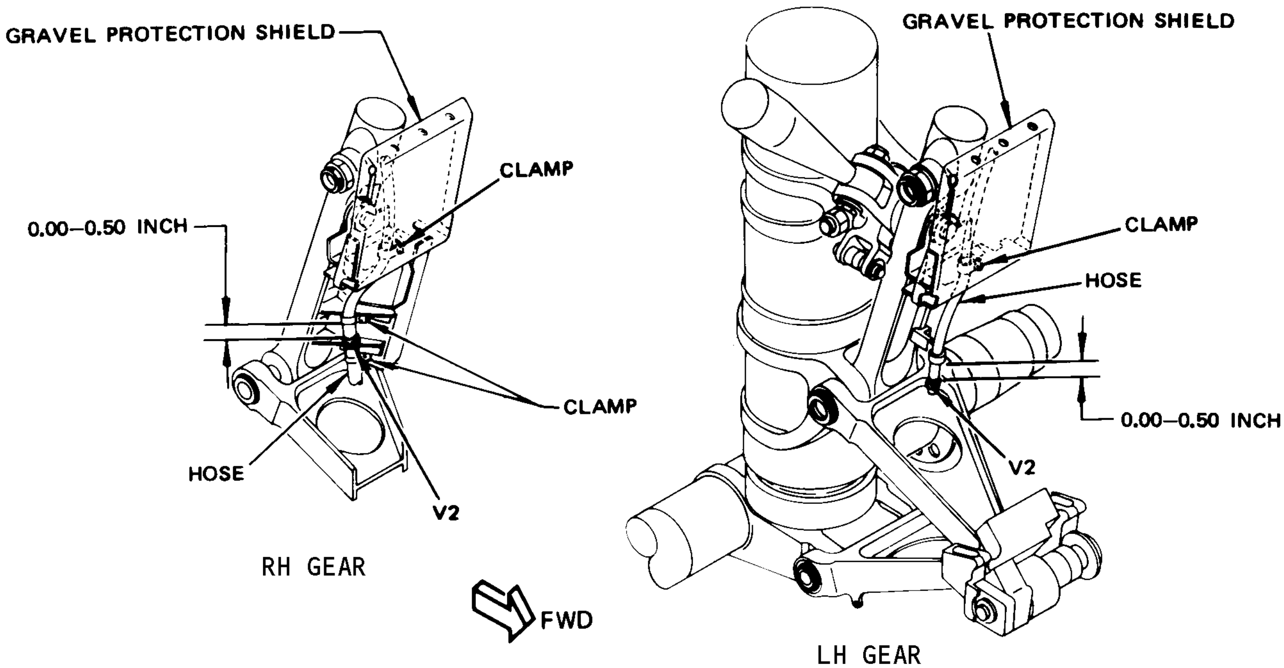
      NOTE: Special care must be exercised during installation of this hose to assure a minimum clearance of 1.00 inch with adjacent control cables.

   B. If tape needs replacement, wrap two layers of new tape around hose per BAC5801 and to dimensions shown (Detail B, Fig. 401). Overlap wraps by approximately 0.25 inch. Secure ends of taped areas with ratchet clamps. Keep the ratchet portion turned away from gear structure to prevent galling.
   C. Slide washer or washers (4) on expandable fitting (3). Position expandable fitting in bore of main gear axle. Insert fitting (2) in expandable fitting with tapered end showing forward. Hold expandable fitting stationary. Screw fitting (l) into expandable fitting and tighten. Check for snug fit of expandable fitting in axle bore. If still loose, add washers.
   D. Feed pigtail ends of hose assembly through fittings (l and 2) and through expandable fitting (3) into bore of axle. Pull pigtails out of axle ends and crimp on connector (Detail A, Fig. 401) (Ref Chapter 20). Use sleeves if required to make clamp fit tight.
   E. Screw elbow of hose assembly on fitting (l), and tighten. Lockwire fitting to expandable fitting.
   F. Reinstall antiskid transducer (Ref 32-42-11, Removal/Installation).

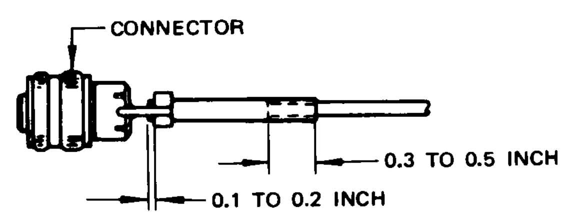
G. On airplane installed with gravel protection shield, install shield. Install clamp on shield.

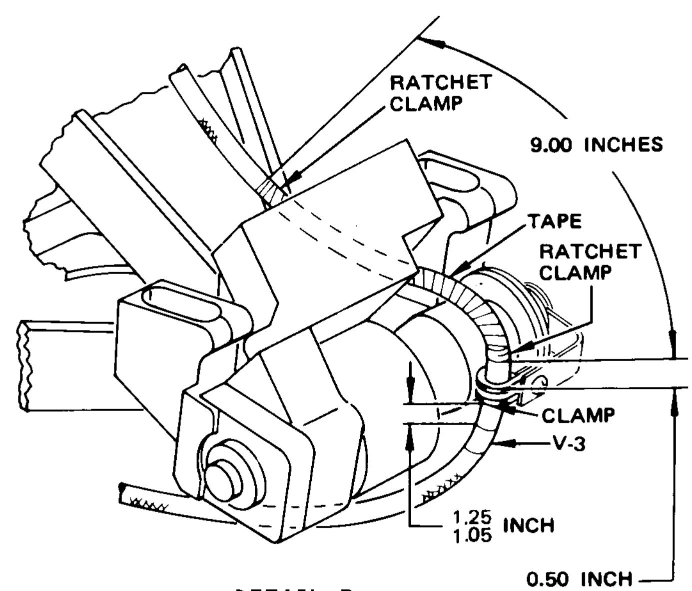


Main Gear Electrical Harness Installation
Figure 401 (Sheet 1)

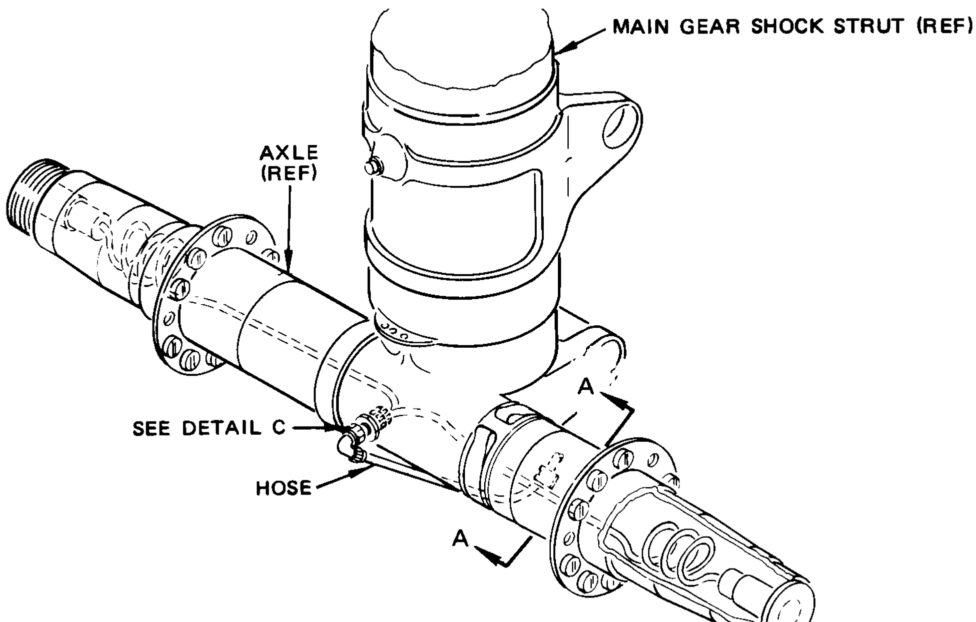


REROUTING OF HARNESS ON AIRPLANES
INSTALLED WITH GRAVEL PROTECTION SHIELD

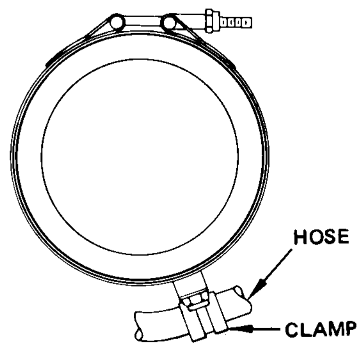




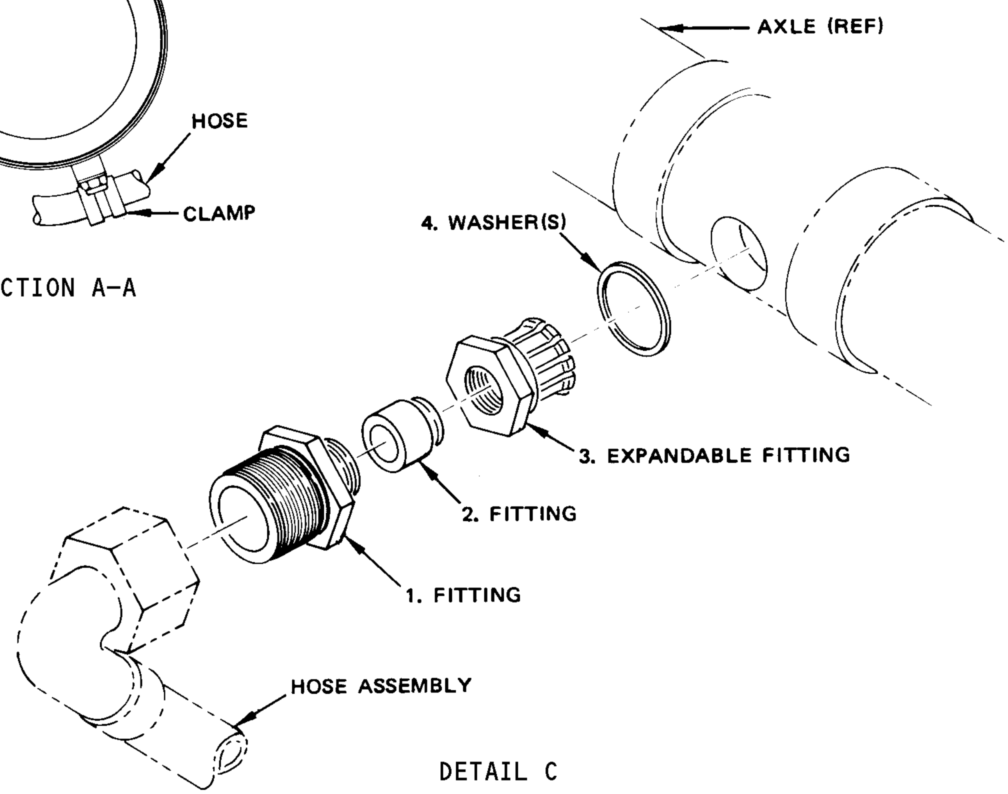
Main Gear Electrical Harness Installation
Figure 401 (Sheet 2)



VIEW 2



SECTION A-A



DETAIL C

Main Gear Electrical Harness Installation
Figure 401 (Sheet 3)

MAIN GEAR DOWNLOCK STRUT - REMOVAL/INSTALLATION

1. Equipment and Materials
   A. Ground Lock Assemblies - (Ref 32-00-01)
   B. Bullet Nosed Thread Protector - F80115-4 or F80115-13
   C. Bullet Nosed Thread Protector - F80115-3 or F80115-12
   D. Grease - BMS 3-33 (Preferred)
   E. Grease - MIL-PRF-23827 (Supercedes MIL-G-23827) (Alternate)
   F. Grease - MIL-G-21164 (Alternate)
2. Remove Main Gear Downlock Strut
   A. Check that ground lock assemblies (Ref 32-00-01) are installed in all gear.
   B. Jack airplane until wheels are just touching ground (Ref Chapter 7, Jacking Airplane).
   C. Remove downlock springs (2, Fig. 401) (Ref 32-32-91 R/I).
   D. Disconnect head end of downlock actuator (1) from reaction link.
   E. On airplanes with bolt keeper, remove bolt keeper (6) retaining bolt (5).
   F. Remove bolt (5) securing downlock strut (3) to reaction link.
   G. Remove lock strut lower attachment bolt (10) and remove downlock strut (3).
3. Install Main Gear Downlock Strut
   A. Clean and lubricate with grease, all bolts, shafts, washers, and bushings except downlock strut/reaction link bolt (5, Fig. 401).

      CAUTION: BOLT (5) RUNS IN TEFLON BUSHINGS THAT ARE INCOMPATIBLE WITH GREASE.

   B. On airplanes with bolt keeper, clean and lubricate with grease, all bolts, shafts, washers and bushings.
   C. Connect downlock actuator (1) to lugs on reaction link (4).
   D. Tighten each nut 160 to 190 pound-inches lube torque. Interchange nuts and/or add AN960D washer if necessary to align castellation with cotter pin hole within torque limits. Lock nuts with cotter pins.
   E. Connect downlock strut (3) to reaction link (4).
      (1) Align downlock strut with reaction link.
      (2) On airplanes without bolt keeper (6), insert bolt (5) from forward side of gear.
      (3) On airplanes with bolt keeper, install bolt (5) from keeper side.
      (4) Add washer and nut. Install keeper if used.
      (5) Tighten nut on bolt 100 to 150 pound-inches dry torque.
      (6) If necessary, slack off nut to align nearest castellation slot with cotter pin hole. Lock nut with cotter pin.
   F. Install bolt (10) from aft side. Tighten nut 1000 to 1500 pound-inches lube torque.
   G. Install downlock springs (2) (Ref 32-32-91 R/I).
   H. Lubricate landing gear (Ref Chapter 12, Main Landing Gear Lubrication).
   I. Jack airplane for gear retraction (Ref Chapter 7, Jacking Airplane).

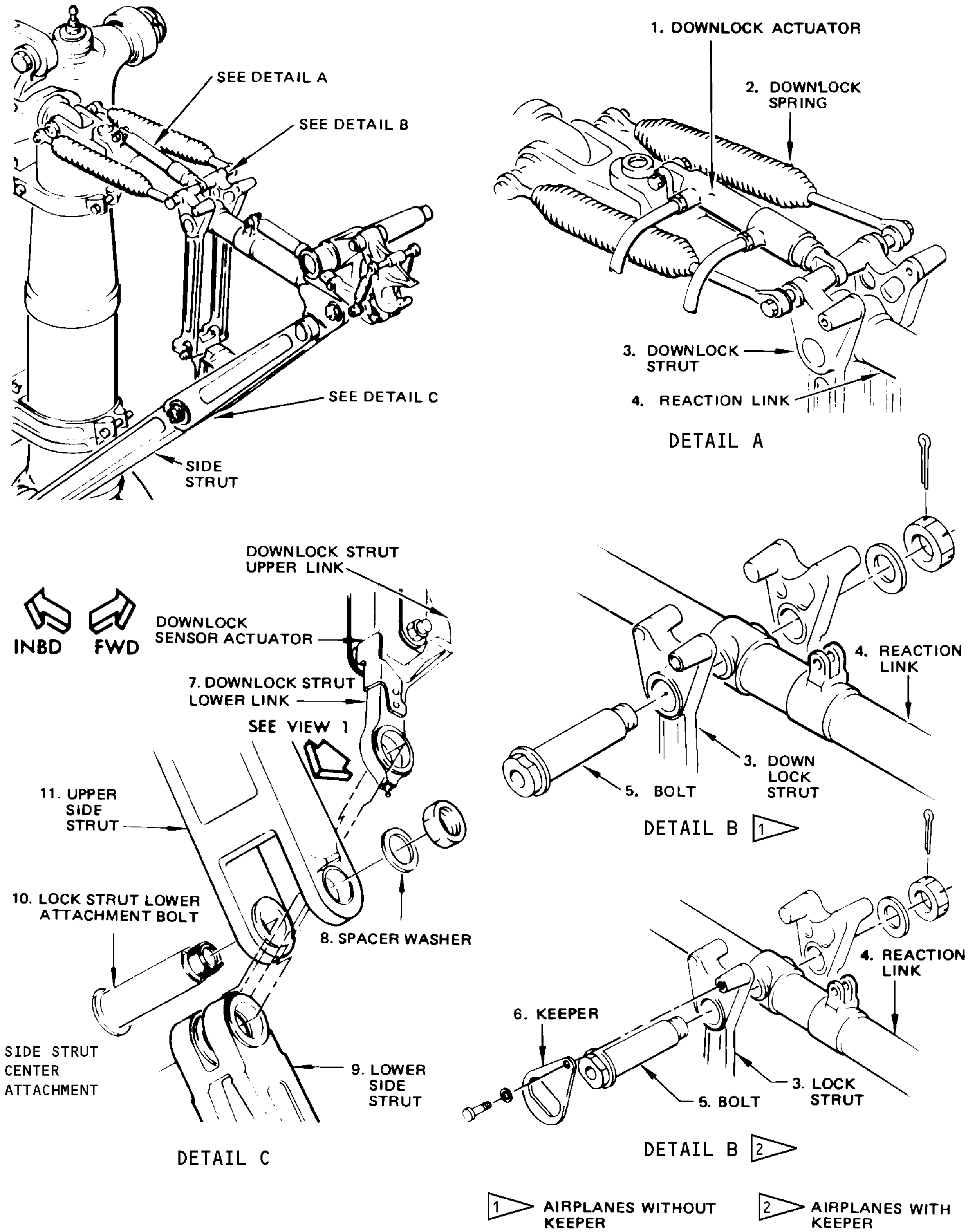
J. Remove ground lock assemblies (Ref 32-00-01) and pressurize hydraulic system (Ref 29-11-0 MP).

K. Retract and extend gear and examine reaction link and associated parts to assure that all affected parts function correctly.

L. With gear down and locked, check that red paint stripes on downlock strut lower link (7) and lower side strut (9) align.

NOTE: If existing stripes do not align, refer to SB 32-1101 for painting instructions.

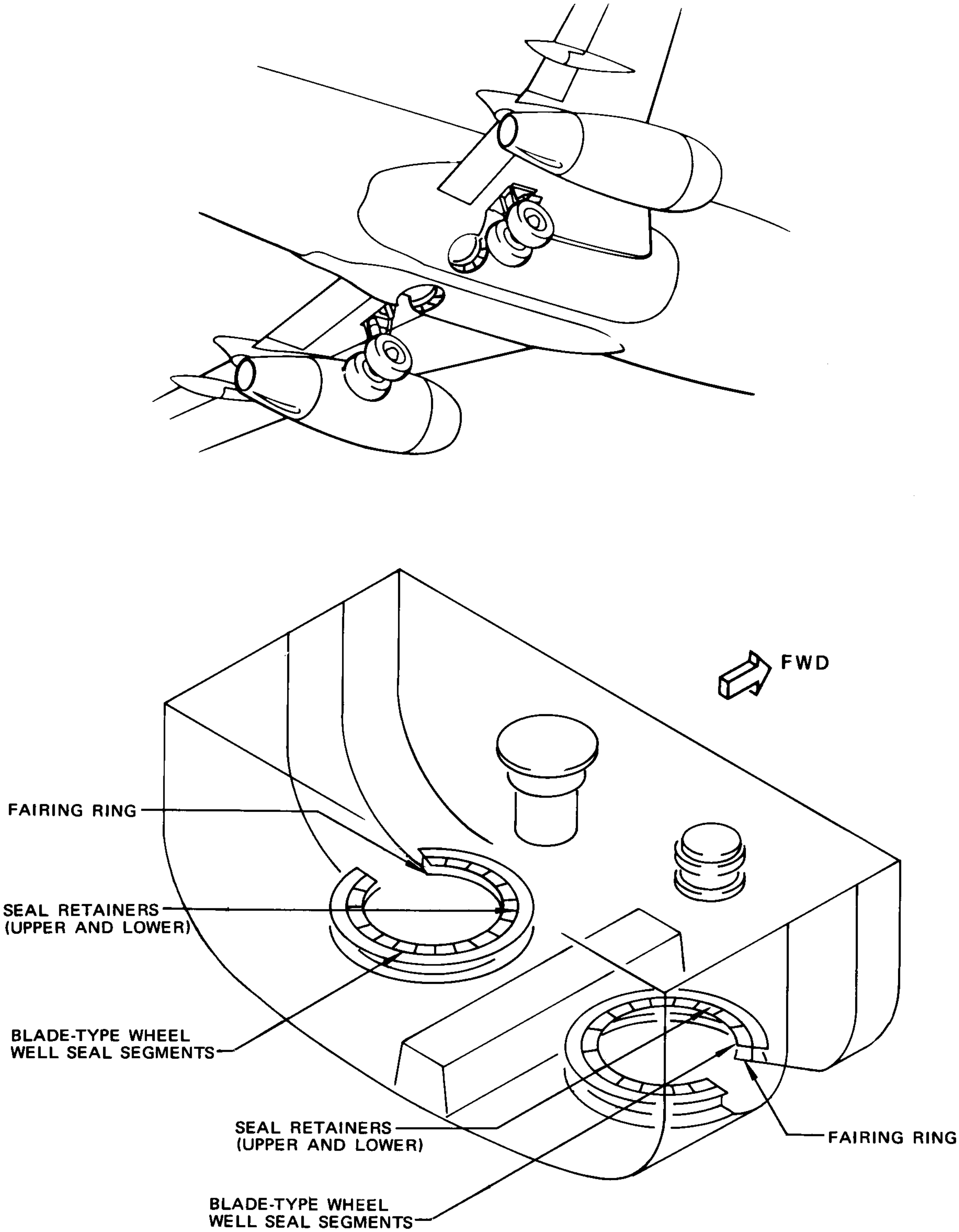
M. Install ground lock assemblies (Ref 32-00-01), lower airplane, and remove jacks.



Main Gear Downlock Strut Installation
Figure 401

MAIN GEAR WHEEL WELL SEAL SYSTEM - DESCRIPTION AND OPERATION

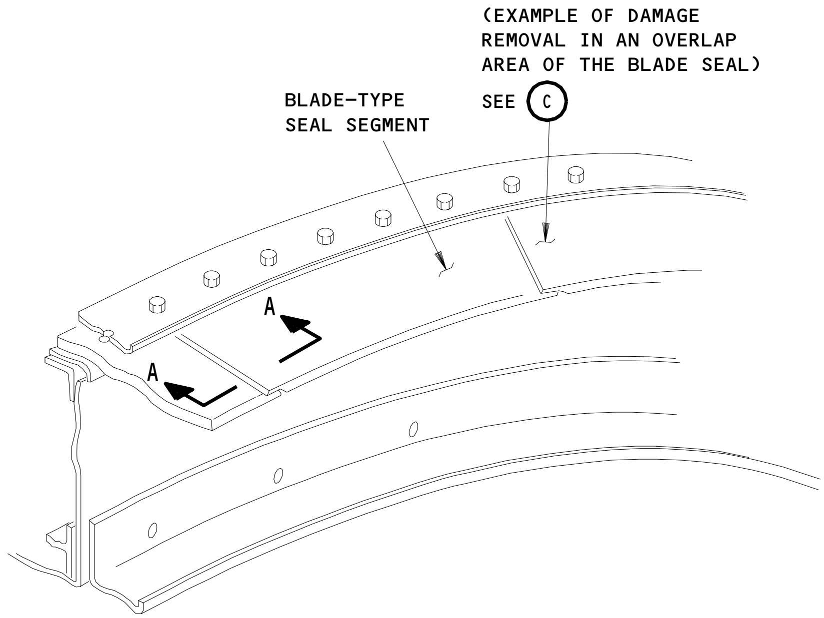
1. General
   A. When the airplane is in flight and the landing gear retracted, the main gear wheel well seal system eliminates noise and reduces drag by preventing air from flowing in and out of the wheel well. With landing gear retracted, the wheel well opening is faired to the body by the tire and a special hubcap installed on the outboard wheel and by a fairing ring installed at the lower edge of the wheel well opening. The circular cross section of the tire leaves a space between the tire and outer edge of the wheel well, this space is closed by the seals as the gear is fully retracted. (See figure 1.)
   B. Each wheel well seal consists of a series of flexible blade-type segments around the periphery of the wheel well, except at the openings on the outboard edge where the strut must pass through. Seal segments are held in place by a series of seal retainers on the upper and lower surface of the segments at the outer edge of the segments. The seal segments are secured between the seal retainer segments with bolts.



Main Gear Wheel Well Seal Component Location
Figure 1

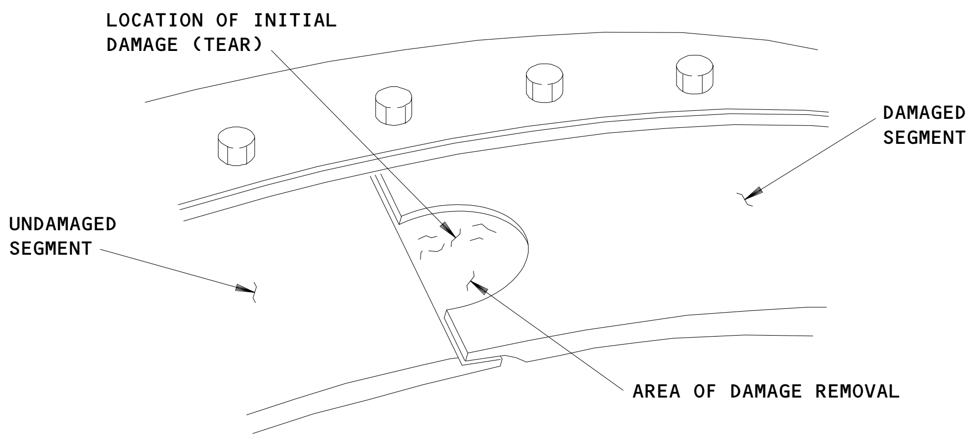
MAIN GEAR WHEEL WELL BLADE-TYPE SEAL - REMOVAL/INSTALLATION

1. General
   A. The seal segments may be replaced singly, in groups, or all may be replaced at one time. If all segments are being replaced, exercise care to reinstall seal retainer segments in the same position from which were removed. Each seal segment and each seal retainer segment was designed to fit at a designated area.
2. Equipment and Material
   A. Ground Lock Assemblies - F72735 (Ref 32-00-01)
3. Remove Main Gear Wheel Well Blade-Type Seal
   A. Check that landing gear is down and locked and ground lock assemblies (Ref 32-00-01) are installed.
   B. Remove bolts from upper and lower seal retainer segment which secure seal segment (or segments) being removed (Fig 401).
   C. Loosen several bolts adjacent to segment (or segments) being removed so that upper and lower seal retainers may be spread apart, thus facilitating removal of seal segment.
   D. Spread upper and lower seal retainers apart slightly and remove seal segment (or segments).
4. Install Main Gear Wheel Well Blade-Type Seal
   A. Position seal segment (or segments) between upper and lower seal retainers, matching fastener holes in seal segment with fastener holes in seal retainers (Fig 401).
   B. Install bolts securing seal segment (or segments) between upper and lower seal retainers.
   C. Tighten bolts adjacent to seal segment (or segments) which were loosened to facilitate removal of worn seal segment.



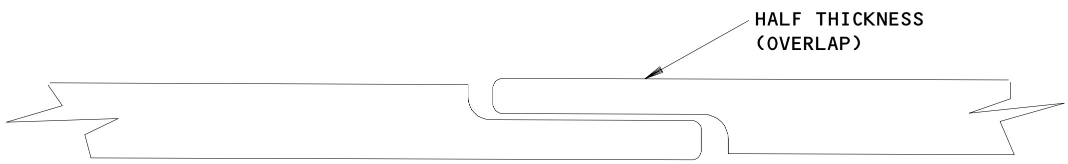
BLADE-TYPE WHEEL WELL BLADE SEAL SEGMENT

B



(EXAMPLE OF DAMAGE REMOVAL IN AN OVERLAP
AREA OF A WHEEL WELL BLADE SEAL)

C



(EXAMPLE)
A-A

Main Gear Wheel Well Blade - Type Seal Installation
Figure 401

444847

MAIN GEAR WHEEL WELL BLADE-TYPE SEAL - INSPECTION/CHECK

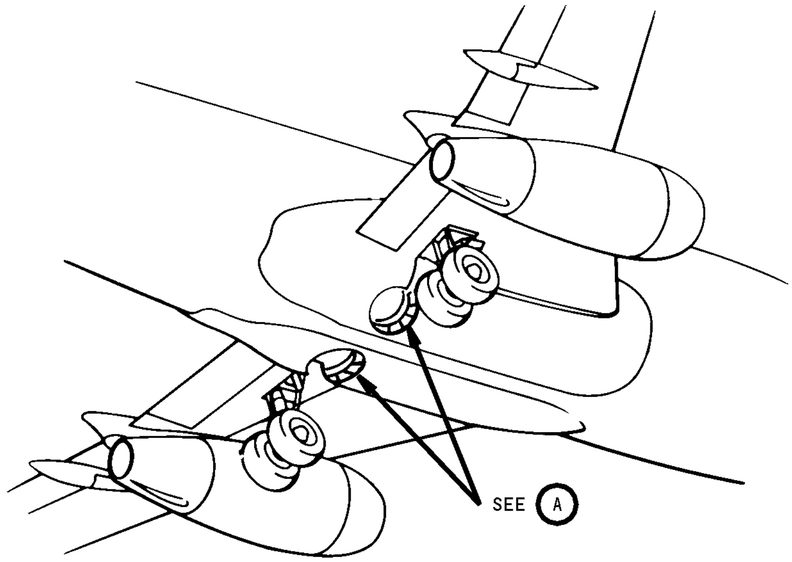
1. Main Gear Wheel Well Blade-Type Seal Segment Inspection
   A. Examine the blade seal segments for tears in the half - thickness (overlap) areas (Fig. 602).
      (1) If you find a tear in the overlap area of a blade seal segment, do the steps that follow:

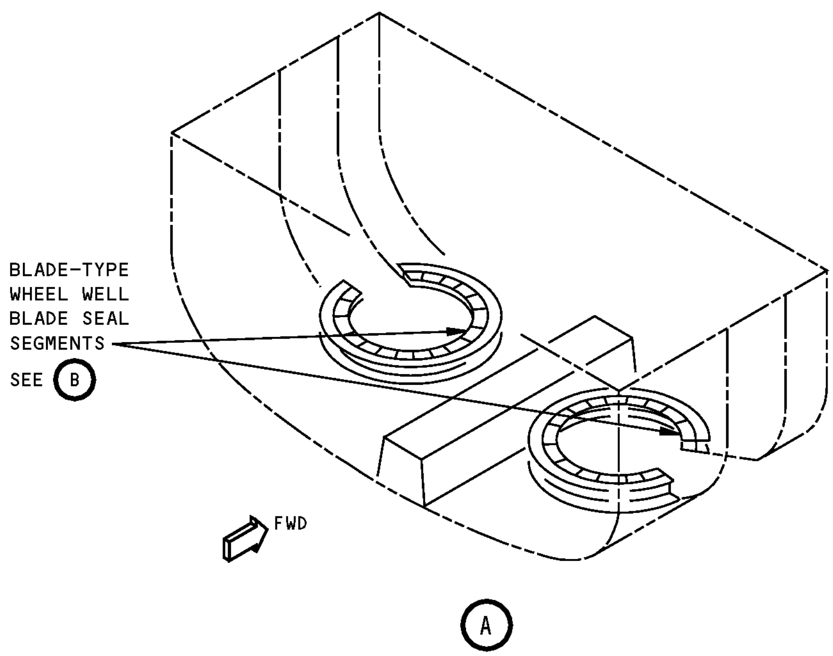
      NOTE: It is not necessary to apply sealant to the cut edge of the blade seal.

      (a) Cut a sufficient area from the overlap to fully remove the tear. Use scissors or a utility blade.
      (b) The area of damage removal must be over or under an undamaged area of the adjacent blade seal segment.
         1) If the area of damage removal is over or under an undamaged area of the adjacent blade seal segment, then no further action is necessary for the overlap area.
         2) If the area of damage removal is over or under a damaged area of the adjacent blade seal segment, then replace one or both of the adjacent blade seal segments.

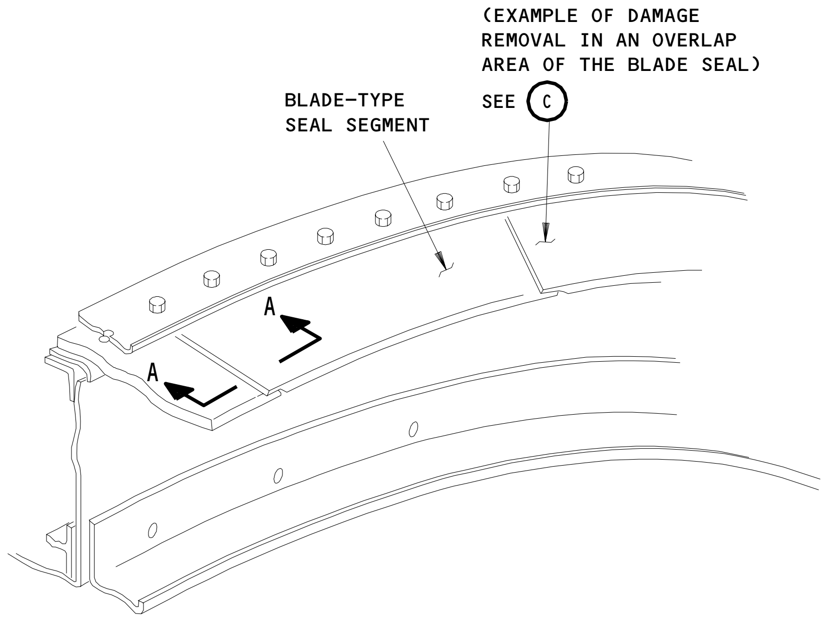
         NOTE: The replacement of only one blade seal segment will satisfy the requirements of step (b) 1) above.

   B. Examine the blade seal segments for tears in the full - thickness area.
      (1) If you find a tear in a blade seal segment, replace the segment per AMM 32-12-12/401.
   C. Examine the seal segments for damage possibly caused by a spinning tire entering the wheel well.
      (1) If you find damage to the blade seals that appear to have been caused by spinning tires, do the steps that do a check of the adjustment of the landing gear lever "UP" switch per AMM 32-42-51/501.



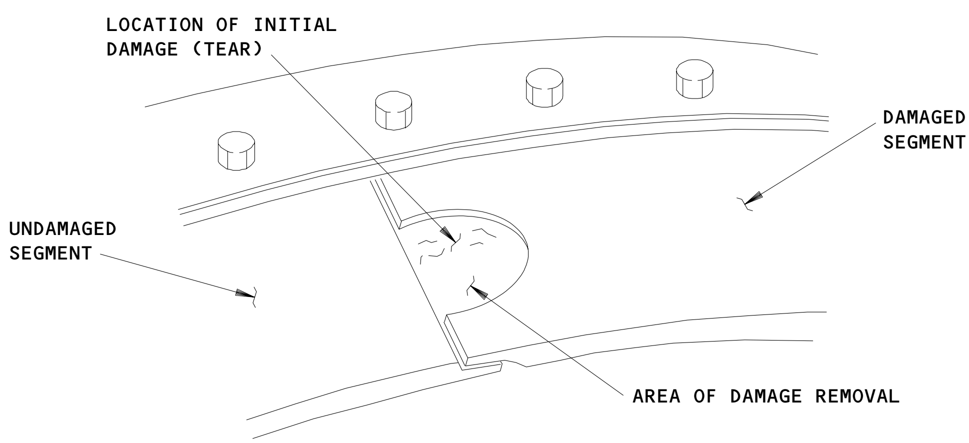


Main Landing Gear Wheel Well Blade Seal - Inspection/Check
Figure 601



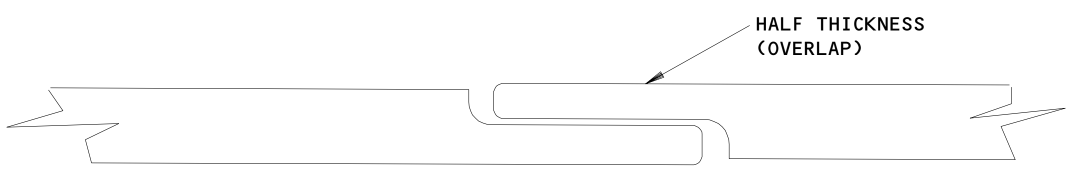
BLADE-TYPE WHEEL WELL BLADE SEAL SEGMENT

B



(EXAMPLE OF DAMAGE REMOVAL IN AN OVERLAP
AREA OF A WHEEL WELL BLADE SEAL)

C

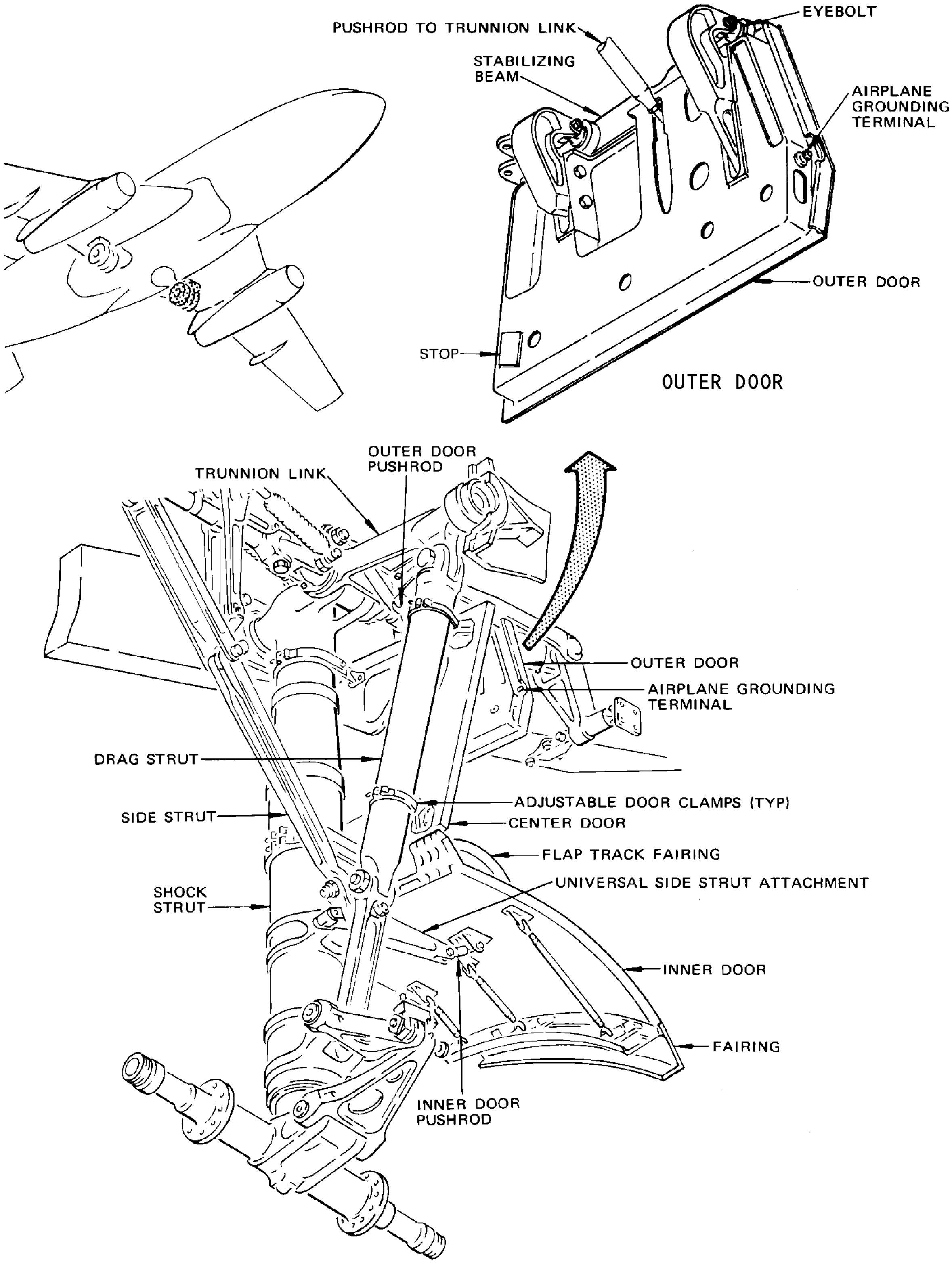


(EXAMPLE)
A-A

Main Gear Wheel Well Blade - Type Seal Installation
Figure 602

MAIN GEAR SHOCK STRUT DOORS - DESCRIPTION AND OPERATION

1. General
   A. The main gear shock strut doors close over the opening in the wing for shock strut and drag strut when the gear is retracted. (See figure 1.) The installation consists of three doors. A center door is attached to the shock strut and the drag strut. An outer door is hinged to the wing, and an inner door is hinged to the inboard edge of the center door. Linkage from the trunnion link and the universal side strut attachment operate during extension and retraction to open and close the doors. Shock strut doors remain open when the gear is extended. A support rod attached to the lowest shock strut clamp, prevents center and inner doors from moving out of adjustment under vibration or heavy air loads.
2. Center Door
   A. The center door is built up from a frame, inner and outer skins, and a honeycomb core. Reinforced points support attachment fittings, and the lower edge carries a hinge half for the inner door. Clamps to the shock strut and the drag strut secure the door. Adjustable fittings between the door and clamps are provided to fair the door with the surface of wing. A bulb type seal is mounted along the outboard edge of door. A rub strip on the aft edge and an angle riveted on the forward edge contact seals along the respective edges of the opening in wing when the door is closed.
3. Outer Door
   A. The outer door is machined from an aluminum casting. Two hinge fittings are bolted between webs on the inner side. An airplane grounding terminal is located on the forward flange near the edge of door. The door hinges pivot on the heads of two eyebolts, used to connect the ends of a small stabilizing beam, located between the landing gear beam and the rear wing spar. A bulb section rubber seal around the door opening in the wing provides an airtight joint when the door is closed. A pushrod connects the door to a bracket on the underside of the trunnion link. Trunnion link rotation during extension and retraction operates the door.
4. Inner Door
   A. The inner door is built up from a frame, ribs and a honeycomb core. A hinge half on the outer edge picks up on the center door. The door is contoured to fair with the body when closed. A light fairing is attached to the outer skin to line up with the flap track fairing. A deep flange on the inner edge carries a portion of fairing to close the gap between wheel and door when the gear is retracted. The flange is braced by three struts running from the upper edge of the flange to a point opposite the flap track fairing support stringer. A pushrod connects the door to the universal side strut attachment.



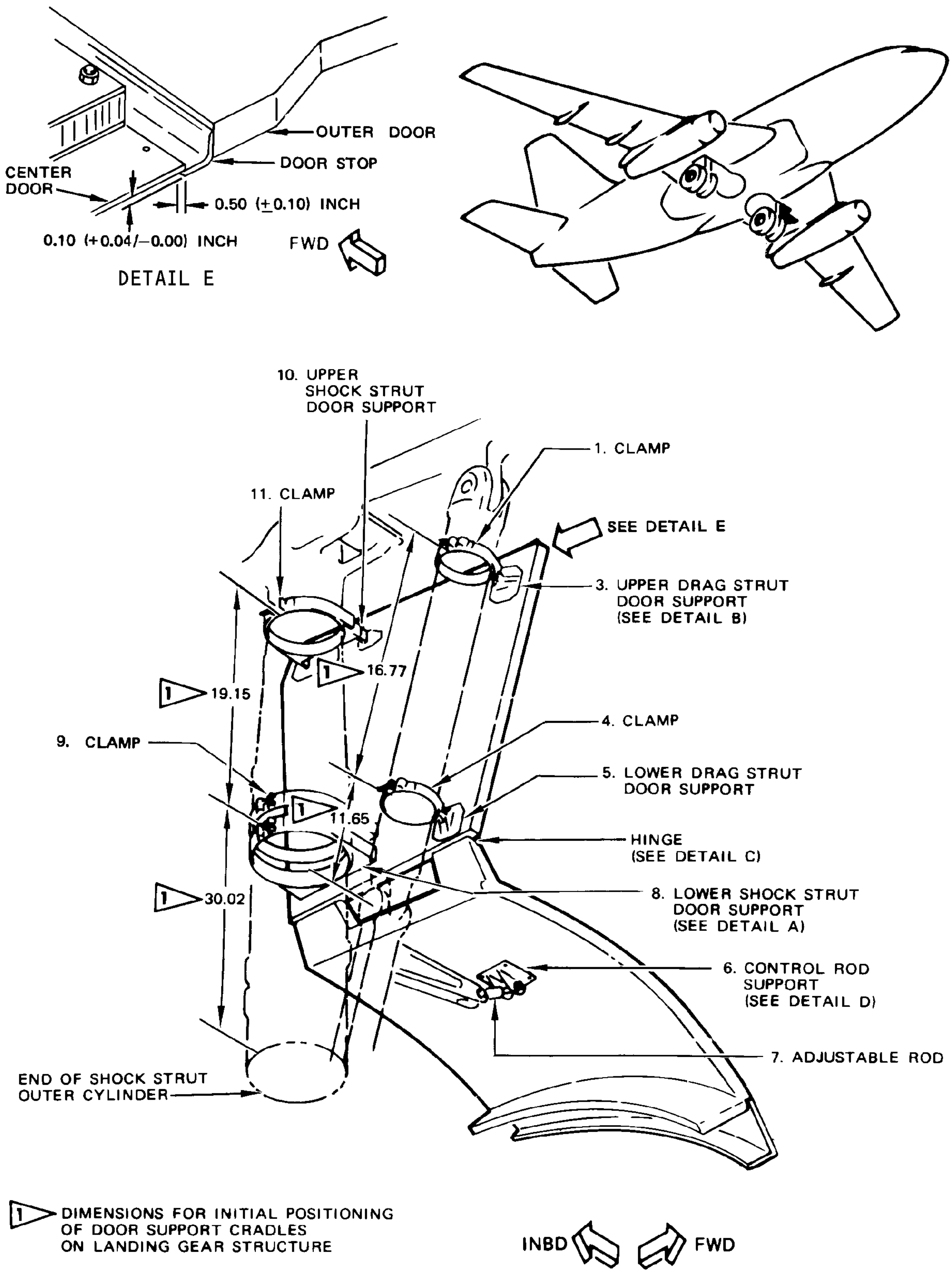
Main Gear Shock Strut Doors
Figure 1

MAIN GEAR SHOCK STRUT DOORS - REMOVAL/INSTALLATION

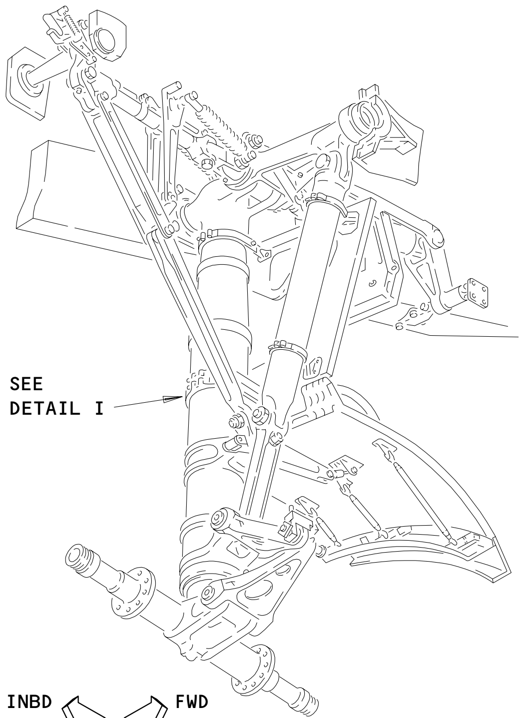
1. General
   A. The shock strut doors consist of a center door and an inner door joined by hinges.
   B. The shock strut doors may be removed and installed as an assembly or the inner door may be removed and installed separately. To remove the center door it is necessary to remove the inner door as well.
2. Equipment and Materials
   A. Ground Lock Assemblies - (Ref 32-00-01)
   B. Hydraulic test bench capable of delivering 20 gpm at 3000 psi
   C. Grease - BMS 3-24
   D. Paint - BMS 10-60, Type 1, BAC701, Color: Black
   E. 7355 Mylar Tape, Mystic Tape, Division of Borden Chemical Co., 60 Happ Road, Northfield, Illinois 60093 (Preferred)
   F. Y8412 Mylar Tape, 3M Company, Industrial Tape Division, 3M Center, St. Paul Minnesota 55101 (Optional)
3. Shock Strut Door Assembly - Removal/Installation
   A. Remove Shock Strut Door Assembly
      (1) Check that ground lock assemblies (Ref 32-00-01) are installed in all gear.
      (2) Disconnect inner door control rod assembly (7, Fig. 401) by removing attachment bolts.
      (3) Disconnect upper (3) and lower (5) drag strut door supports by removing attachment bolts.
      (4) Support strut door assembly and remove mounting screws from upper (10) and lower (8) shock strut door supports. Note position and number of shims.
      (5) Remove door assembly from airplane.
   B. Install Shock Strut Door Assembly
      (1) Position door in place on landing gear strut (Fig. 401).
      (2) Install shims and mounting screws in upper (10) and lower (8) shock strut door supports.
      (3) Connect upper (3) and lower (5) drag strut door supports.
      (4) Disconnect outboard wing door control rod.
      (5) Jack airplane until all tires are clear of ground (Ref Chapter 7, Jacking Airplane).
      (6) Check that electrical power is available.
      (7) Connect external hydraulic test bench. Do not pressurize hydraulic system A.
      (8) Remove ground lock assemblies (Ref 32-00-01) on landing gear being repaired.
      (9) Set landing gear control lever in UP position.
      (10) Operate test bench to slowly retract gear.

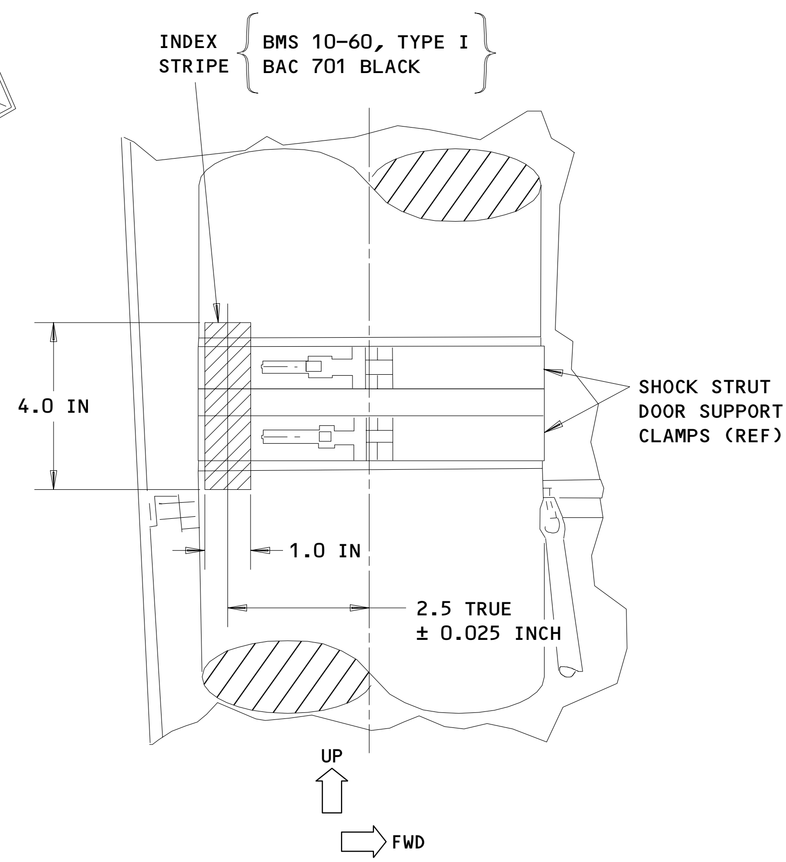
      CAUTION: MAKE SURE THAT STRUT DOORS CLEAR WING PANELS BEFORE RETRACTING GEAR COMPLETELY.

      (11) Loosen the four strut door support clamps (1, 4, 9, 11).



Main Gear Shock Strut Door Installation
Figure 401

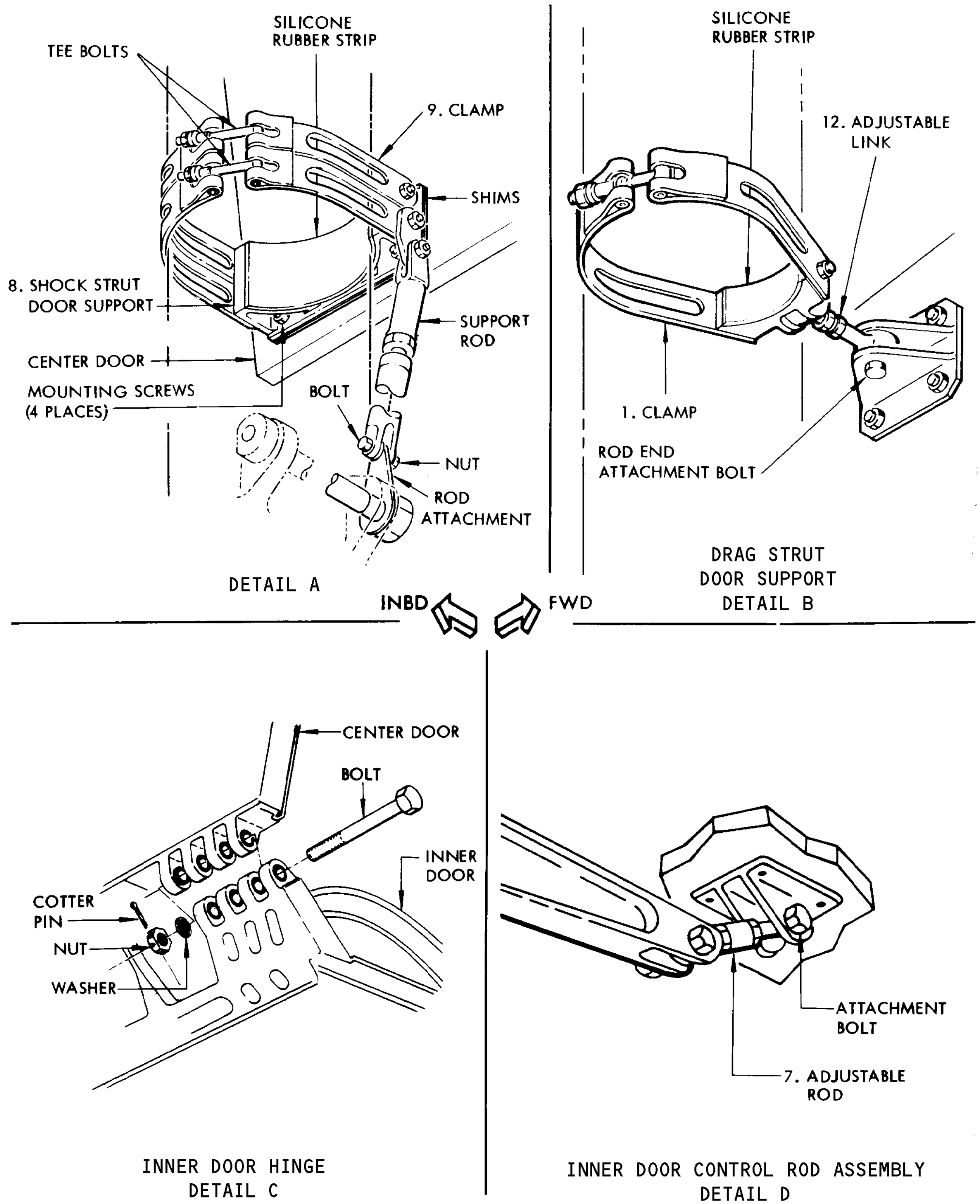




DETAIL I

MAIN LANDING GEAR DOOR INDEX STRIPE
L/H MLG ASSY SHOWN
R/H MLG ASSY OPPOSITE

Main Gear Shock Door Installation
Figure 402



Main Gear Shock Strut Door Installation
Figure 403

(12) Hold outer door in place and adjust center door so that outer door overlaps center door 0.50 + 0.10 inch and there is a gap of 0.20 + 0.15/-0.05 inch between center door and aft wing skin panels.

NOTE: When installing a new door assembly, the center and inner doors may require edge-trimming to meet the gap requirements. If drag and shock strut door support clamps (1, 4, 9, 11) were moved during door removal, place clamps at distances shown in Fig. 401. If not installed, you can apply mylar tape between the clamps and the shock strut/drag strut. Trim the edges to match the outer side of the clamps.

(13) Tighten strut door support clamps.
  (a) Mark index stripe on clamp (9) and shock strut outer cylinder per Fig. 401 (Sheet 2A).
(14) Shim shock strut supports (8 and 10) and adjust drag strut door support link until center door fairs with wing profile within ± 0.06 inch.
(15) Extend gear and connect outer and inner door control rods.
(16) Retract the gear and put the landing gear control lever to the OFF position. Check fit of inner and outer doors. Outer door should fair with wing profile within + 0.06 inch. Inner door should fair with body fairing within + 0.06 inch.
(17) Put the landing gear control lever to the DN position and extend the gear.

NOTE: When performing step (18), refer to 32-13-21 to check adjustment of wing door.

(18) Adjust inner (7) and wing door control rods as necessary to meet conditions of step (16).
(19) Repeat steps (16) thru (18) until tolerances are met.
(20) Determine whether there is further need for electrical and hydraulic power on the airplane; if not, shut down sources.
(21) Install ground lock assemblies (Ref. 32-00-01) on gear.
(22) Lower airplane and remove jacks.

4. Shock Strut Inner Door - Removal/Installation

A. Remove Shock Strut Inner Door
  (1) Ensure ground lock assemblies (Ref. 32-00-01) are installed.
  (2) Disconnect inner door control rod assembly (7, Fig. 401).
  (3) Support inner door and remove hinge bolts.

B. Install Shock Strut Inner Door
  (1) Place door in mounting position (Fig. 401).
  (2) Apply a film of grease to hinge bolts and install hinge bolts, washers, nuts, and cotter pins.

(3) Connect inner door control rod assembly (7).

NOTE: Omit the remaining steps of this procedure if the following conditions have been met: You are using the same hardware that was removed, the center door was not removed or adjusted and there is no evidence of wear, rod ends and jam nuts are not lose and the safety wire was not broken.

(4) Jack airplane until all tires are clear of ground (Ref Chapter 7, Jacking).
(5) Check that electrical power is available.
(6) Connect external hydraulic test bench. Do not pressurize hydraulic system A.
(7) Remove ground lock assemblies (Ref 32-00-01) on landing gear being repaired.
(8) Set landing gear control lever to UP position.
(9) Operate test bench to regulate hydraulic pressure and flow to slowly retract gear.
(10) Check fit of inner door.

NOTE: When installing a new inner door, the door may require edge-trimming to meet the gap requirements.

(a) Door should fair with body fairing within + 0.06 inch.
(b) Gap between forward edge of door and body fairing should be 0.20 +0.05/-0.14 inch.
(c) Gap between aft edge of door and body fairing should be 0.35 +0.15/-0.05 inch.

(11) Rig inner door with forward inboard corner 0.17 +0.03/-0.00 inch inside body contour. This will allow door to fair when wing is deflected in flight.

NOTE: Door must be rigged with landing gear control lever in neutral and with flaps up.

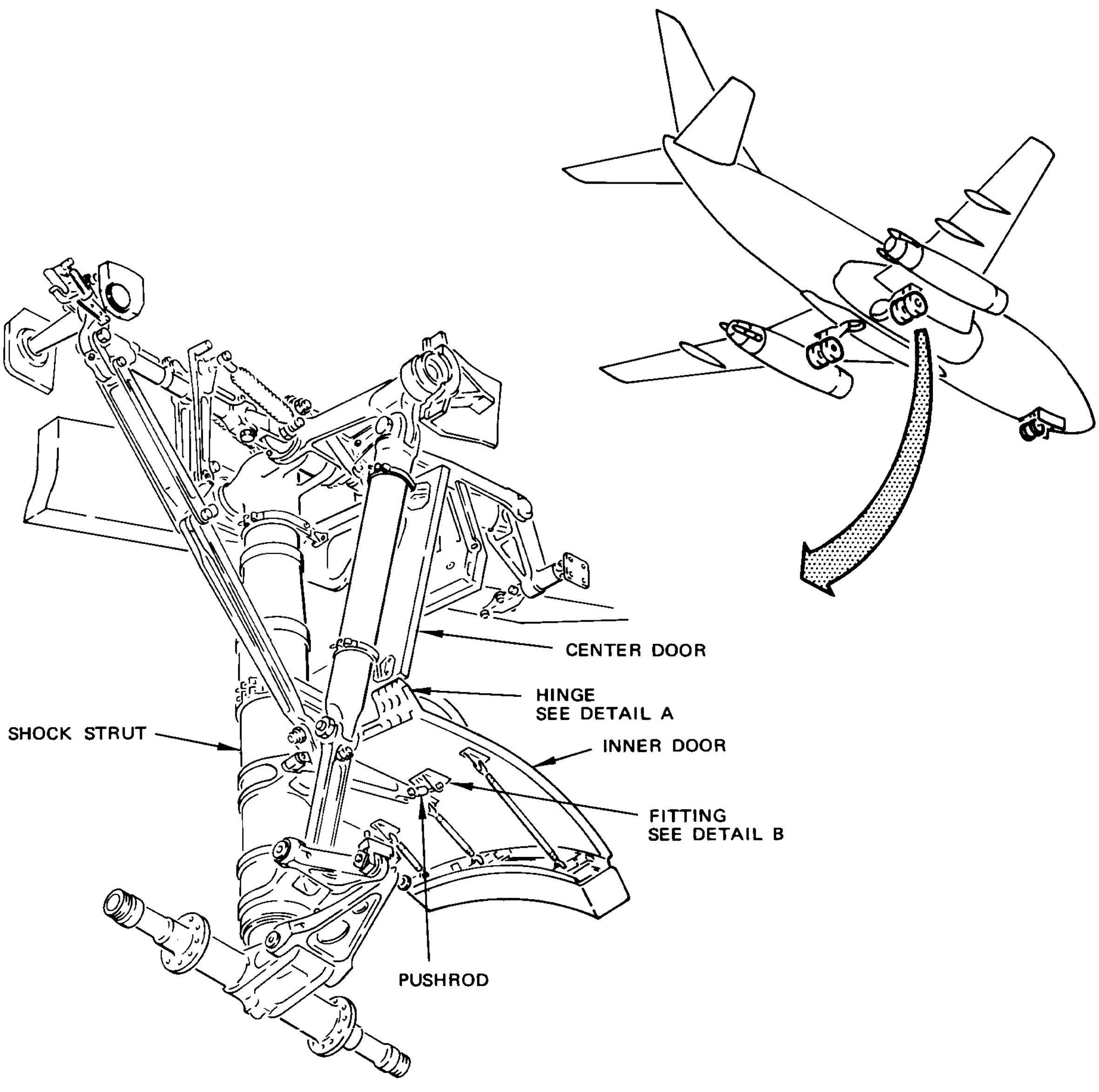
(12) Extend gear and adjust inner door control rod (7).
(13) Repeat steps (9) thru (12) until tolerances are met.
(14) Determine whether there is further need for electrical and hydraulic power on airplane; if not, shut down sources.
(15) Install ground lock assemblies (Ref 32-00-01).
(16) Lower airplane and remove jacks.

MAIN GEAR SHOCK STRUT DOORS - INSPECTION/CHECK

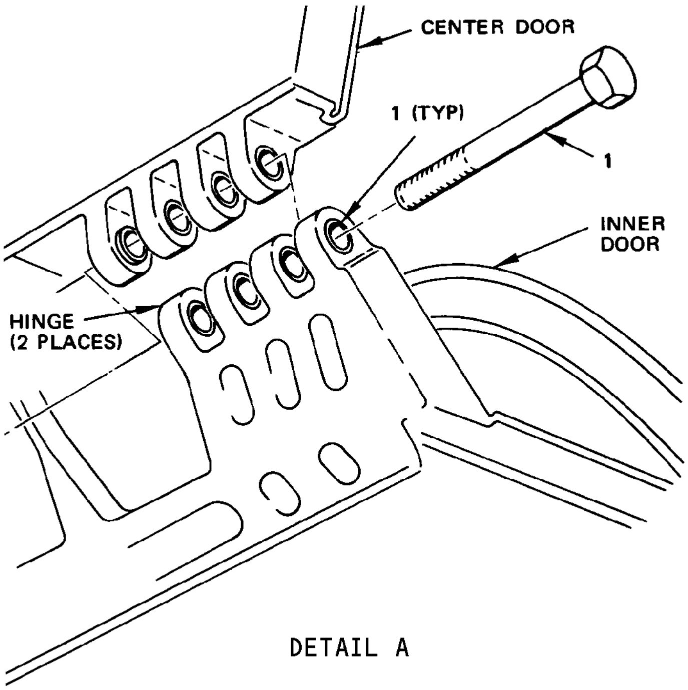
1. General
   A. This data consists of illustrations and wear limit charts. No procedure is given in this section for access to permit inspection. Refer to Main Gear Shock Strut Doors - Removal/Installation for record procedure.

   NOTE: The shock strut doors may be removed and installed as an assembly or the inner door may be removed and installed separately.

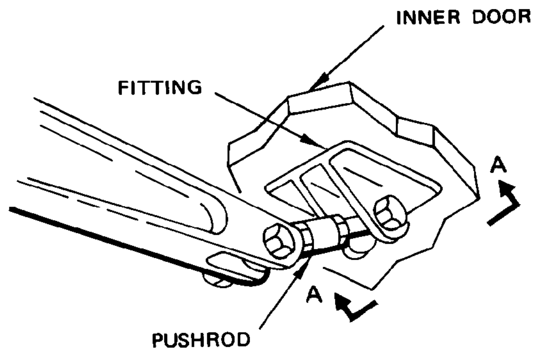
   B. Main Gear Shock Strut Door Wear Limits



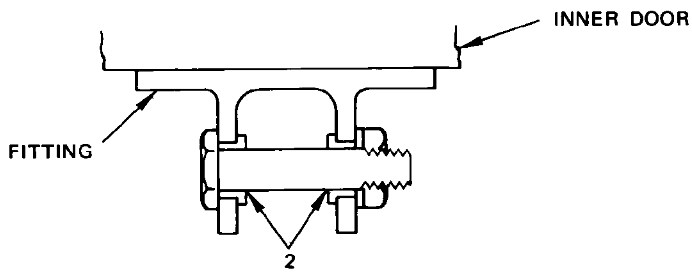
Main Gear Shock Door Wear Limits
Figure 601



DETAIL A



DETAIL B



SECTION A-A

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR.
			DIAMETER		MAX WEAR DIM.	MAX DIAM CLEAR-ANCE			
			MIN	MAX					
1	BUSHING	ID	0.1895	0.1905		0.0040	X		
	BOLT	OD	0.1885	0.1895	0.1875		X		
2	BUSHING	ID	0.4370	0.4380		0.0040	X		
	BOLT	OD	0.4360	0.4370	0.4330		X		

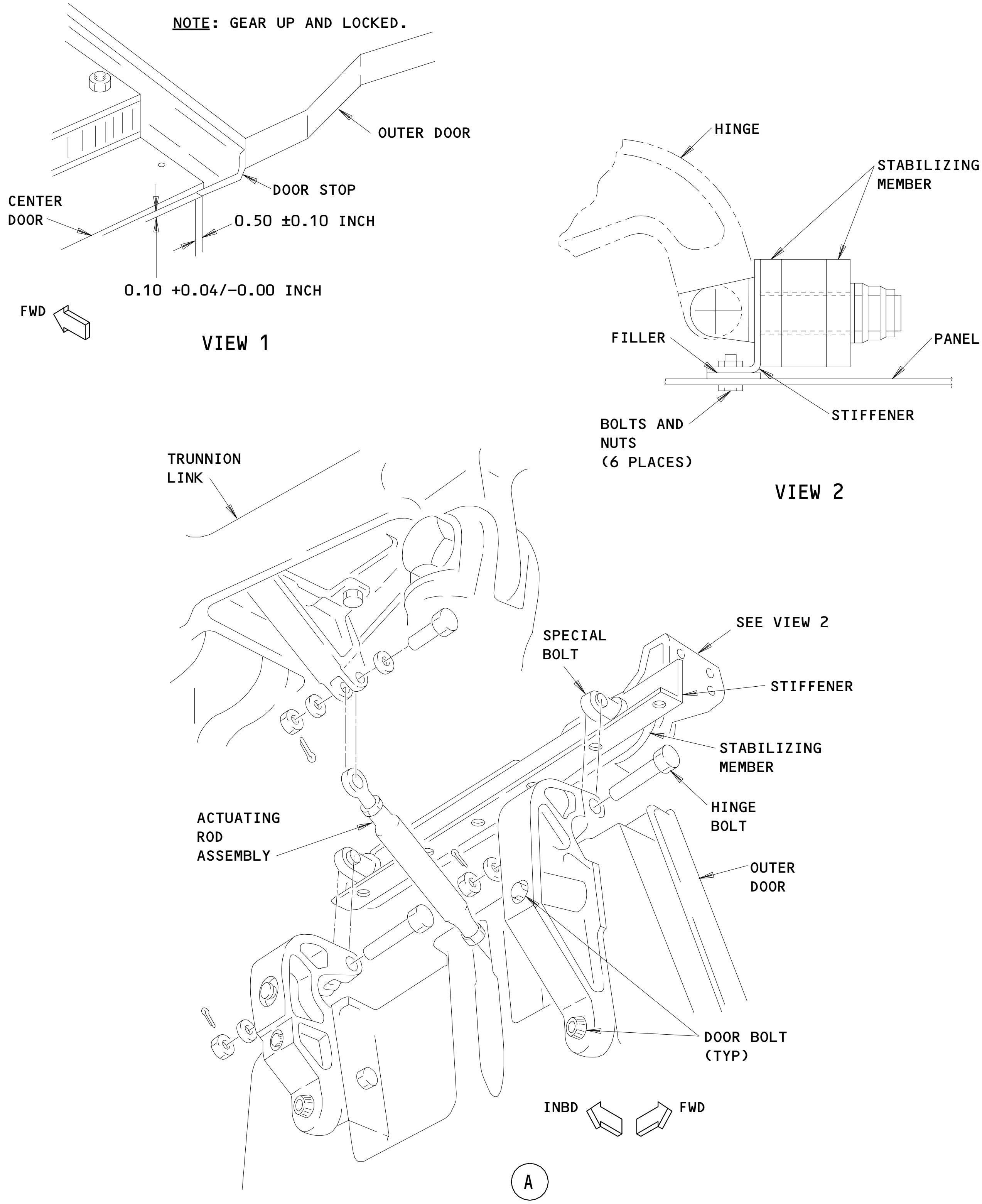
Main Gear Shock Strut Door Wear Limits
Figure 602

MAIN GEAR WING DOOR - REMOVAL/INSTALLATION

1. Equipment and Materials
   A. Ground Lock Assemblies - F72735 (Ref 32-00-01)
   B. Hydraulic Test Bench, for Hydraulic Fluid, Fire Resistant BMS 3-11, 0 to 3000 psi, 20 gallons per minute
   C. Mandrel, Bearing Press Fitting - ST918D
   D. Chemical and Solvent Resistant Primer - BMS 10-11, Type 1
2. Remove Wing Door
   A. Check that ground lock assemblies (Ref 32-00-01) are installed in all gear.
   B. Disconnect actuating rod assembly from trunnion link (Fig. 401).
   C. Disconnect bonding jumper assembly from structure.
   D. Support door and remove door bolts.
3. Install Wing Door
   A. Install original wing door.
      (1) Place door in position and install bolts, washers, and nuts. Tighten 130 to 180 pound-inches and install cotter pin (Fig. 401).
      (2) If a new actuating rod is installed, adjust actuating rod assembly to a nominal 7.60 inches measured between centers of end attachment bolts.
      (3) Connect actuating rod assembly. Tighten nut 450 to 500 pound-inches and install cotter pin.
      (4) Connect bonding jumper.
      (5) If a new actuating rod is installed, adjust main gear wing door. (Ref Main Gear Wing Door - Adjustment/Test)
   B. Install replacement wing door.
      (1) Remove special bolts and install undrilled replacement bolts, part number 69-54970, in stabilizer beam.
      (2) Mark bolts and stabilizer beam to ensure bolts will be oriented correctly in the same holes when reinstalled.
      (3) Place door in position and adjust to fair with wing profile.
      (4) Hold door and mark holes from door hinges onto special bolt.
      (5) Remove bolts and drill 0.5622 (+0.0007/-0.0000)-inch diameter holes in marked positions. Break sharp edges 0.02 (+ 0.01) inch.

      CAUTION: AFTER DRILLING, THE MINIMUM DISTANCE FROM EDGE OF LUG TO CENTER OF HOLE MUST BE 0.50 INCH.

      (6) Install two BACB28X7B11 flanged bushings in special bolts. Coat outside of bushing with BMS 10-11 primer and press in with mandrel.
      (7) Place an MS20002C12 washer on each bolt with countersink against bolt head.
      (8) Coat bolt shank with BMS 10-11 primer. Keep primer off threads.
      (9) Place stabilizer beam in position between fittings on structure.
      (10) Insert bolts through fittings and beam with bolt head inboard.



Main Gear Wing Door Installation
Figure 401

(11) Add washers and nuts on special bolts.
(12) Place door in position and install door bolts.
(13) Add washers and nuts on hinge bolts. Tighten nuts 130 to 180 pound-inches and lock with cotter pin.
(14) Hold special bolts to prevent turning and tighten nuts on special bolts 360 to 640 pound-inches.
(15) Adjust actuating rod assembly to a nominal 7.60 inches, measured between centers of rod end attachments.
(16) Connect actuating rod to wing door. Tighten nut 450 to 500 pound-inches. Lock nut with cotter pin.
(17) Connect bonding jumper.
(18) Install wing lower trailing edge access panel.
(19) Adjust main gear wing door (Ref Main Gear Wing Door - Adjustment/Test).

MAIN GEAR WING DOOR - ADJUSTMENT/TEST

1. Main Gear Wing Door Adjustment
    A. Equipment and Materials
        (1) Hydraulic Test Bench for Hydraulic Fluid - Fire Resistant BMS 3-11, 0 to 3000 psi, 20 gallons per minute
        (2) Ground Lock Assemblies (Ref 32-00-01)
    B. Prepare for Adjustment
        (1) Jack airplane for gear retraction (Ref Chapter 7, Jacking Airplane).
        (2) Ensure electrical power is available.
        (3) Connect external hydraulic test bench.
        (4) Pressurize hydraulic system B (Ref 29-12-0 MP).
        (5) Remove ground lock assemblies (Ref 32-00-01) from landing gear being repaired.
    C. Adjust Main Gear Wing Door
        (1) Operate test bench and regulate hydraulic pressure and flow to slowly retract gear.
        (2) Move landing gear control lever to UP position and retract gear.
        (3) Move landing gear control lever to OFF position.
        (4) Apply a preload of 50 to 100 pounds at center of inboard edge of door.

            NOTE: Apply preload using 1.00-inch wide minimum loading clips. Keep preload to a minimum value, if possible. The loading clip is a customer fabricated clip made from 0.06 inch thick by 1.0 inch wide (minimum) material capable of transferring loads of approximately 110 pounds.

            (a) Ensure preload breaks contact between stops and door.
            (b) Ensure gap at preload does not exceed 0.10 inch.
        (5) Check fair of wing door with preload applied. The wing door must fair with wing profile within + 0.10 inch of wing profile.

            NOTE: Landing gear control lever must be in OFF position each time fair is checked to ensure proper results.

        (6) If wing door does not fair with wing profile, extend gear and adjust actuating rod assembly to obtain proper fair.

            NOTE: Change in adjustment of wing door may affect adjustment of shock strut doors. Refer to 32-13-11 to check adjustment of shock strut doors.

(7) Repeat steps (2) thru (4) until tolerances are met.

NOTE: If finer adjustment is required, shims may be added between special bolt head and stabilizing beam. Equal thickness of shim must be installed under each bolt head.

D. Restore Airplane to Normal

(1) Determine whether there is further need for electrical and hydraulic power on airplane; if not, shut down sources.

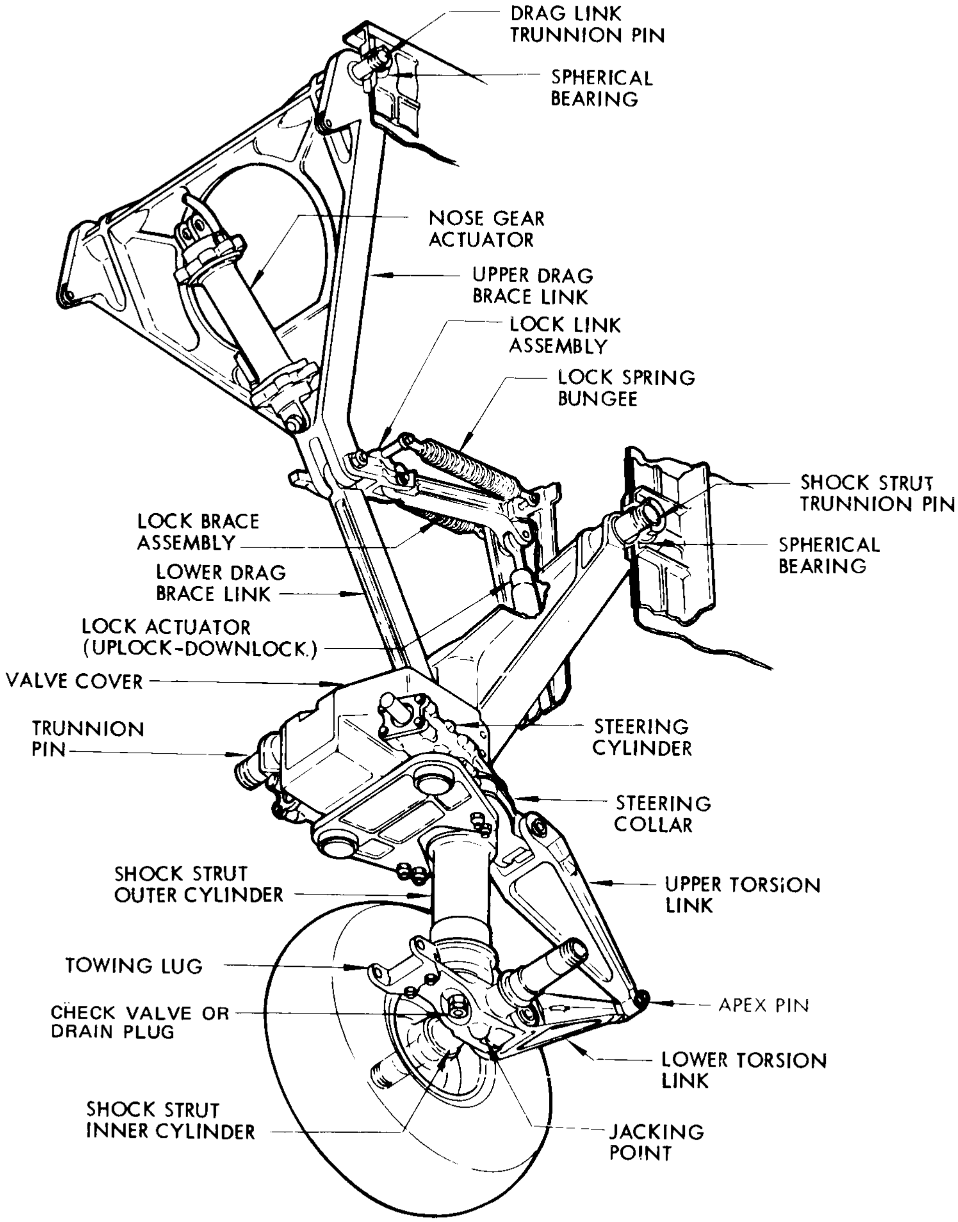
(2) Lower airplane and remove jacks.

NOSE GEAR - DESCRIPTION AND OPERATION

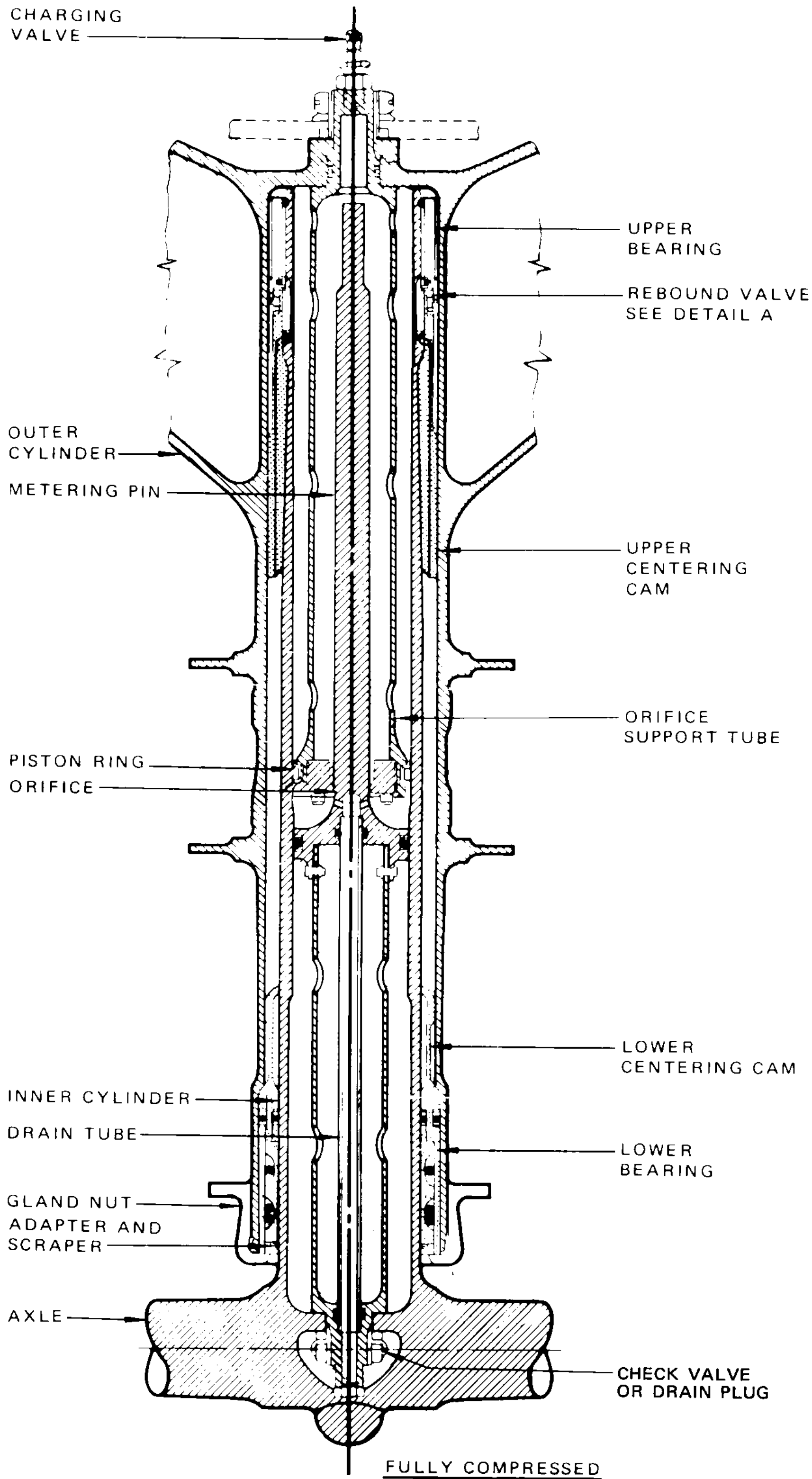
1. General
   A. The nose gear supports the forward end of the fuselage and provides directional control while the airplane is on the ground. (See figure 1.) It includes a drag brace, shock strut, and torsion links, and is hydraulically actuated to retract forward and up into a wheel well recessed into the lower nose section of the airplane. The shock strut consists of inner and outer cylinders. The upper part of the outer cylinder is "Y" shaped with arms extending to the sidewalls of the wheel well. Trunnion pins connect the gear to airplane structure. The "Y' arms and pins provide lateral stability. The gear rotates about the trunnion pins during extension and retraction. Refer to 32-33-0 for information on nose gear extension and retraction. Shocks and bumps during taxi, takeoff, and landing are absorbed by the shock strut which contains oil and is charged with compressed air or nitrogen. Longitudinal stability is provided by a hinged drag brace which folds upward and aft during gear retraction. (See figure 3.) For steering, the shock strut inner cylinder turns within the out cylinder. Torsion links connected at their upper end to a steering collar and at their lower end to the shock strut inner cylinder transmit a turning moment supplied by hydraulically actuated steering cylinders.
2. Nose Gear Shock Strut
   A. The nose gear shock strut is the main supporting member of the nose gear. The shock strut includes an inner cylinder and an outer cylinder, metering pin assembly, upper and lower orifice assemblies, and upper and lower cam assemblies (See figure 2.) The shock strut is attached to the nose wheel well structure by trunnions which are a part of the outer cylinder. Pins are inserted through the trunnion ends into bearings attached to the wheel well structure. A steering collar clamped around the outer cylinder is connected to the upper torsion link and the upper torsion link is connected to the lower torsion link by an apex pin.
   B. The inner cylinder and nose wheel axles are machined from a single forging. The fixed centering cam attached to the top of the inner cylinder mates with a similar cam in the outer cylinder when the inner cylinder extends. As these cams engage the nose wheels will attain a straight forward position to ensure proper fit in the wheel well on retraction. This also ensures the nose wheels to be straight forward when landing. Upper and lower bearings provide sliding surfaces for movement of the inner cylinder in and out the outer cylinder. Annular grooves in the lower bearing provide space for the storage of two sets of spare O-ring seals. These spare seals are replacements for like seals installed between the inner cylinder and the lower centering cam, and between the lower centering cam and the outer cylinder.

C. The outer cylinder has a trunnion on each side near the top. Trunnion pins are inserted from inside outward extending into nose gear support brackets, which are mounted on each side of the wheel well. Upon retraction and extension the trunnion pins rotate in spherical bearings in the nose gear mounting brackets. Double lugs, to which the lower drag brace is attached, are near the top on the forward side of the outer cylinder. A steering collar encircles the outer cylinder and is bolted to hold it in an annular recess. The upper torsion link is bolted to a lug on the steering collar. The lower centering cam is in the outer cylinder to mate with the one at the top of the inner cylinder on inner cylinder extension. This centering cam has an annular groove in which the rebound valve piston ring is located. An upper orifice support tube is connected to the outer cylinder. The rebound valve piston ring, in the groove around the upper centering cam, is moved against the top of its annular groove as the inner cylinder extends. The fluid, which is compressed by the diminishing cavity between the upper and lower centering cams, is restricted to escape only through the two small holes in a lip on the piston ring. A small portion of fluid will also escape through the piston rings working gap. The escaped fluid enters a cavity between the upper bearing spacer and the outer cylinder wall. The fluid is then forced through twelve holes, lengthwise in the upper bearing, into the cavity above the inner cylinder. This restricted flow of fluid acts as a snubber to slow the inner cylinder during extension.

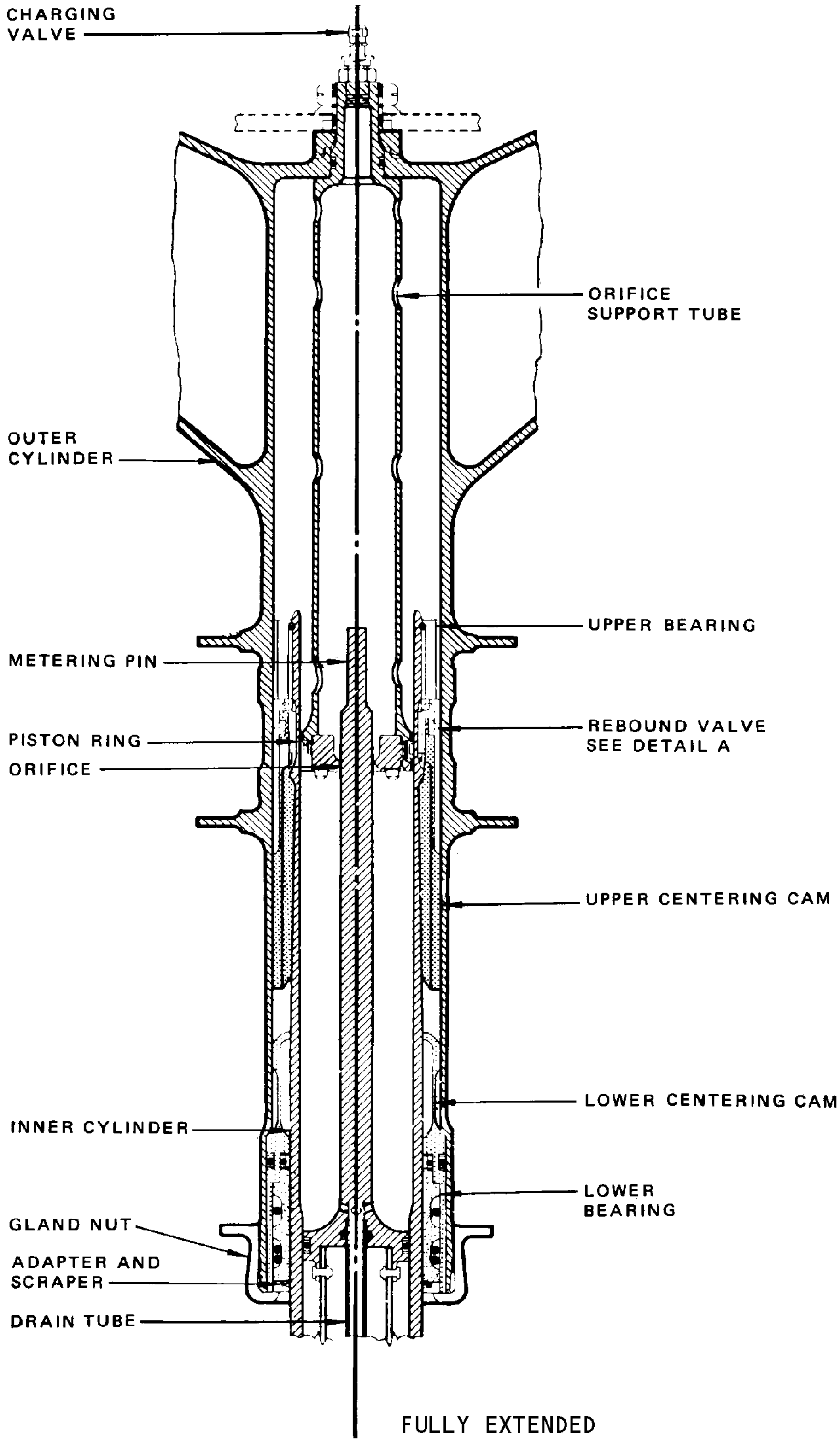
D. Shocks to the nose gear shock strut are absorbed by the restricted flow of hydraulic fluid through the annular space between the orifice and the tapered metering pin and by the restricted flow of fluid through the rebound valve piston ring. (See paragraph C) When the inner cylinder is being compressed, the tapered metering pin, which is attached to the lower support tube in the inner cylinder, moves through the orifice in the upper support tube. This movement of the metering pin progressively reduces the area of the annular space between the orifice and metering pin. The reduction in area results in a diminishing rate of hydraulic fluid flow from the inner cylinder chamber to the upper side of the piston which produces increasing resistance to compression of the shock strut. Landing shocks and shocks incurred while taxiing are absorbed by the increasing volume of hydraulic fluid above the piston which further compresses the volume of compressed air or nitrogen in the upper end of the outer cylinder.



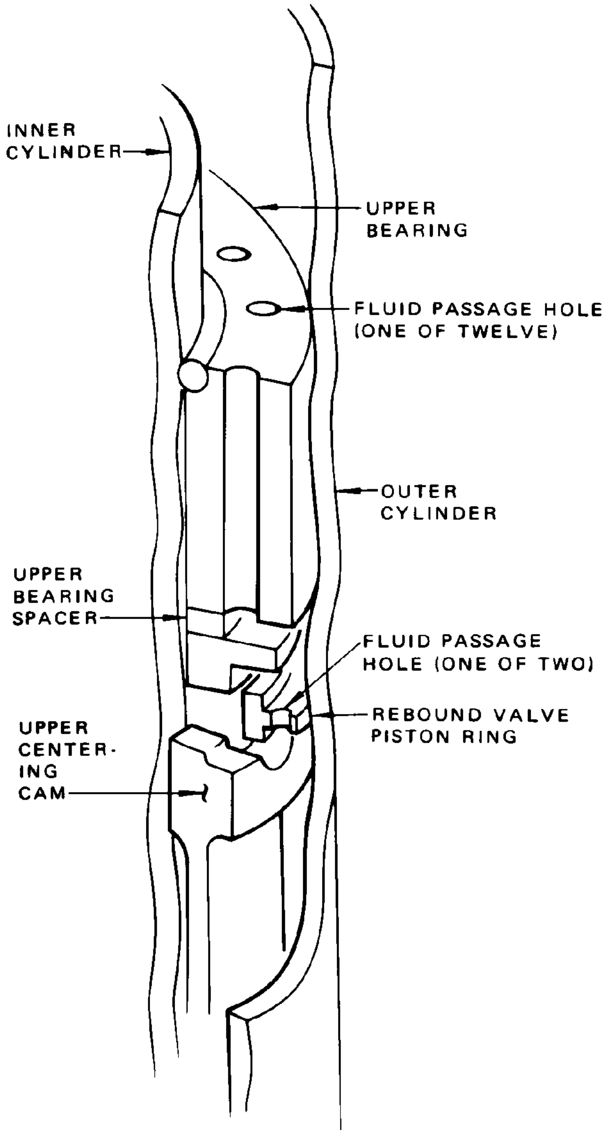
Nose Gear Component Location
Figure 1



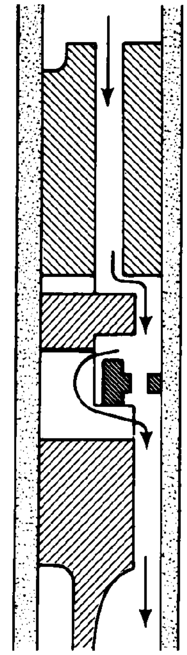
Nose Gear Shock Strut Schematic
Figure 2 (Sheet 1)



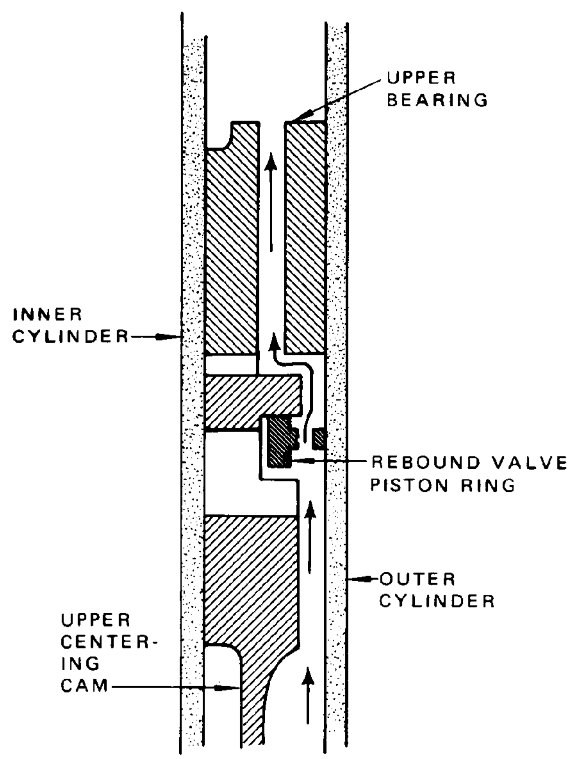
Nose Gear Shock Strut Schematic
Figure 2 (Sheet 2)



STATIC POSITION OF
REBOUND VALVE PISTON RING



FLUID FLOW DURING
COMPRESSION

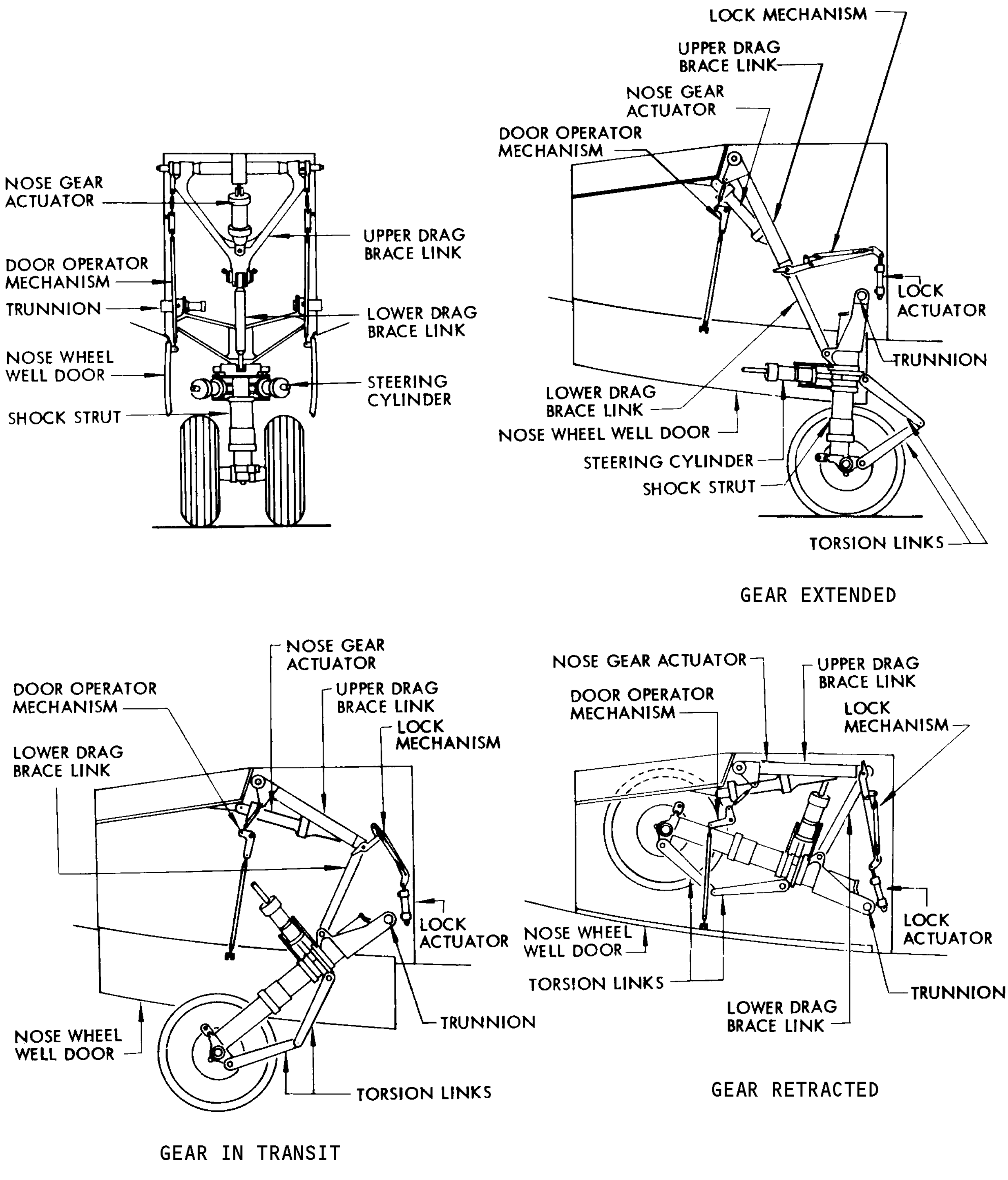


FLUID FLOW DURING
EXTENSION

DETAIL A

Nose Gear Shock Strut Schematic
Figure 2 (Sheet 3)

3. Nose Gear Steering Collar
   A. The nose gear steering collar is at the top of the outer cylinder (Fig. 1). It is held clamped around the outer cylinder, by a bolt, in an annular recess immediately below the trunnions. Both of the two steering cylinders are connected to the steering collar and the upper end of the upper torsion link is also connected to the steering collar. When force is applied to the steering collar, by either steering cylinder, the collar transfers the force through the torsion links to turn the inner cylinder to the right or left respectively, to which cylinder force is applied to give steering action to the nose wheels.
4. Nose Gear Torsion Links
   A. The nose gear torsion links allow rotation between the inner and outer shock strut cylinders only when moved by the steering collar or when disconnected at their aft ends. The upper link is connected to the steering collar, and the lower link is connected to a lug on the inner cylinder (Fig. 1). The upper and lower torsion links are joined together by an apex pin at their aft ends; this locks the nose wheels in the position assumed by the steering collar without affecting strut action. Steering forces applied to the steering collar by the nose gear steering system are transmitted to the inner cylinder by the torsion links.
5. Nose Gear Drag Brace
   A. The nose gear drag brace, in conjunction with the nose gear lock link assembly, holds the nose gear in the up or down, locked position (Fig. 3). The drag brace consists of an upper and lower link. A projecting lug which is integral to the upper drag brace link is the attach point for the door operator mechanism. The upper end of the upper link pivots on pins through support fittings attached to the wheel well sidewalls. During gear retraction, the upper link rotates upward and aft. The lower end of the lower link pivots about a pin, which attaches it to double lugs on the outer cylinder. These lugs are located just above the steering collar. During gear retraction, the lower link also rotates upward and aft relative to its pivot point. The upper and lower links are bolted together forming a hinge.
   B. A fitting located near the lower end of the upper drag link, containing a spherical bearing, is the attachment point for the nose gear actuator. During gear retraction the upper drag link is forced to rotate upward and aft by the nose gear actuator. This motion is transmitted to the shock strut through the lower drag link to raise the gear to the up position.



Nose Gear Drag Brace
Figure 3

NOSE LANDING GEAR - REMOVAL/INSTALLATION

1. Equipment and Materials
   A. Shock Strut Restrainer - 6ME65-73762, or F70263-1
   B. Gear Ground Lockpin - F72735 for each landing gear
   C. Nose Gear Sling - F80182-1 or polyester web slings 12 feet long, 3 inches wide, 2000 pound minimum rated capacity, eye and eye configuration. CWEEl-63, 12 feet long. Cambridge Wire Cloth Co., Cambridge, Maryland (Fig . 402) . Use to transport nose gear.
   D. Spanner Wrench - AN8514-7
   E. Trunnion Pin and Bearing Puller Set - F80158-1
   F. Grease - BMS 3-33 (Preferred)
   G. Grease - MIL-PRF-23827 (Supercedes MIL-G-23827) (Alternate)
   H. Grease - MIL-G-21164 (Alternate)
   I. Solvent - Naphtha TT-N-97C
   J. Solvent - MIL-PRF-680C (Supercedes P-D-680 Solvent)
   K. Corrosion Preventive Compound - MIL-C-11796, Class 3
2. Prepare for Removal
   A. Depressurize hydraulic system A (Ref Chapter 29).
   B. Install nose and main gear ground lockpins (34, Fig. 401) (View 3).
   C. Remove nose gear wheel well doors (Ref 32-22-11, Removal/Installation).
   D. Remove aft access panel from left nose wheel well bulkhead to gain access to nose wheel steering (NWSA, NWSB) and nose gear piston position cable (NGPPA, NGPPB) turnbuckles and left trunnion pin jamnut (12) (view 1).
   E. Loosen steering and piston position cables at their respective turnbuckles outside the wheel well left bulkhead.
   F. Disconnect nose wheel steering cables (view 2).
      (1) Remove lockwire (30) from spring pins (32) at NWSA and NWSB cable terminal ends which lie in a groove in the steering collar (33) (view 2).
      (2) Remove spring pins (32).
      (3) Remove NWSA and NWSB cable terminals from groove in steering collar.
   G. Disconnect nose gear piston position cables (NGPPA, NGPPB) (view 4).
      (1) Remove cotter pins at ends of cable terminals (38) on each side of the piston position cable quadrant (37).

         NOTE: Terminal (38) is shown removed from its groove in quadrant (37) as cable turnbuckles have been loosened. Removal is typical on each side of quadrant.

      (2) Remove cable pulley bolts (35, 36), remove pulleys and detach cable ends from quadrant.
   H. Remove lockwire from cap screw (22) on inboard left trunnion pin nut lock (21). Remove cap screw and nut lock (view 1).
   I. Remove left trunnion pin nut (19) using face spanner lug wrench adapter (view 1.)

J. Pull pressure seal (24) and ring (25) inboard from inboard end of left trunnion pin (view 1).

NOTE: The eye of the eyebolt (26) which holds pressure seal segments together may be used to pull seal from trunnion pin.

K. Remove eyebolt (26) to remove pressure seal retainers (27, 28) from pressure seal segments and separate segments from around piston position and steering cables (view 1).

L. Pull cables through left trunnion pin and coil outside wheel well left bulkhead.
   (1) Remove NWSA, NWSB, NGPPA and NGPPB cable guards outside of wheel well left bulkhead, so cables can be pulled through pulley bracket.
   (2) Pull cables through nut (19), ring (25), trunnion pin (20) and coil cables outside of wheel well left bulkhead.

M. Disconnect and plug hydraulic lines from each swivel (3) on swivel bracket (1) (Detail A).

NOTE: Tag and identify swivel ports and tubes in matched pairs to prevent crossing tubes during installation.

N. Remove aft access panel from right nose wheel well bulkhead to gain access to right trunnion pin jamnut (12).

O. Actuate TAXI light toggle switch on P6 panel in control cabin to OFF.

P. Remove lockwire from nose gear taxi light electrical connection on inboard side of right nose gear wheel well bulkhead above trunnion (4) and disconnect electrical plug.

3. Remove Nose Landing Gear (Fig. 401)

A. Remove lockwires from jamnut and lockwasher (11) on left and right trunnion pins.

B. Remove jamnut and lockwasher from outboard end of left and right trunnion pin (View 1).

C. Deflate nose gear shock strut through air valve at top of shock strut by removing cap and loosening nut below 2 turns maximum until shock strut restrainer can be installed on torsion links.
   (1) Clear equipment and personnel from beneath airplane.

   WARNING: DO NOT LOOSEN VALVE BODY UNLESS SHOCK STRUT IS COMPLETELY DEFLATED. AIR PRESSURE CAN BLOW VALVE BODY OUT, CAUSING INJURY TO PERSONNEL. CHECK THAT NO PERSONNEL OR EQUIPMENT ARE UNDER AIRPLANE BEFORE SHOCK STRUT IS DEFLATED. FAILURE TO COMPLY MAY RESULT IN INJURY TO PERSONNEL OR DAMAGE TO AIRPLANE.

D. Install shock strut restrainer (10)(Detail C).

NOTE: Restrainer will prevent inner cylinder from extending when airplane is jacked.

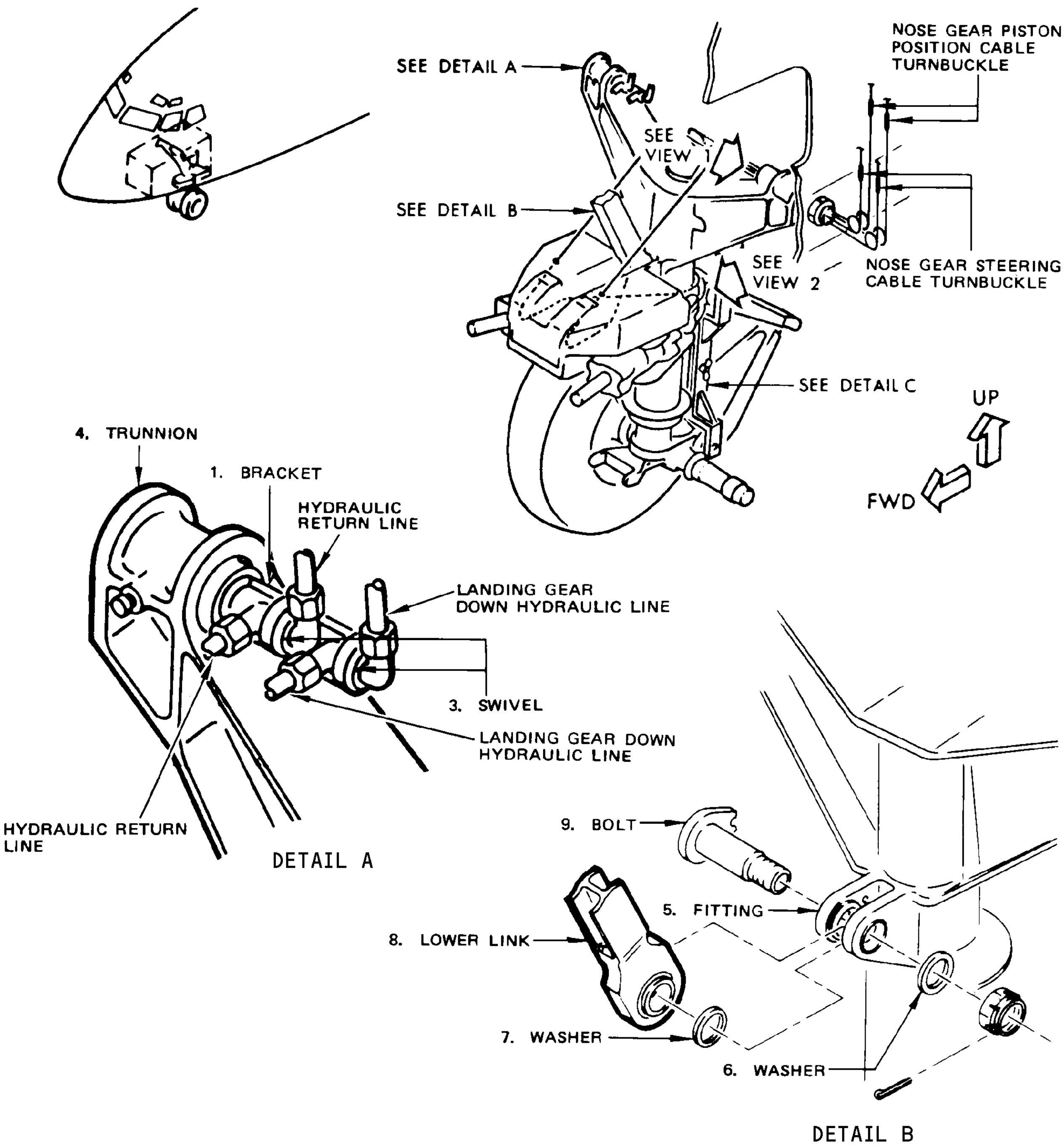
E. Jack airplane nose until nose gear clears ground (Ref Chapter 7, Jacking Airplane). Lower tail support jack as nose is raised.
F. Disconnect nose gear drag brace lower link (8) from shock strut fitting (5) at bottom of drag brace assembly and let drag brace hang (Detail B).
G. Remove lockwires from spring pins (14), which retain trunnion pin lockpins (15) on each side of each trunnion pin (View 1).
H. Remove trunnion pin lockpin from each side of each trunnion pin.
I. Jack nose gear with axle jack as necessary to remove weight of nose gear for trunnion pin removal.
J. Support nose gear and remove trunnion pins with trunnion pin puller.
K. Lower axle jack and roll gear from area. If gear requires hoisting for transport, install sling per Fig. 404.
L. Remove shock strut restrainer (10) from nose gear (detail C).

4. Prepare to Install Nose Landing Gear
A. Check distance between nose gear trunnion bearings in wheel well structure. (Ref 32-21-51 R/I).
B. Check that trunnion pins, coated with corrosion preventive compound, are partially inserted in respective trunnions (4 and 16) but not protruding beyond outboard edge of trunnion on gear.
C. Ascertain that piston position cable pulley bracket is installed.
D. Install shock strut restrainer (10).
E. Mark a reference line through center of each trunnion pin lockpin hole to inboard end of each trunnion pin (20).
F. Position nose gear in vertical position for installation to be jacked and trunnion pins inserted.

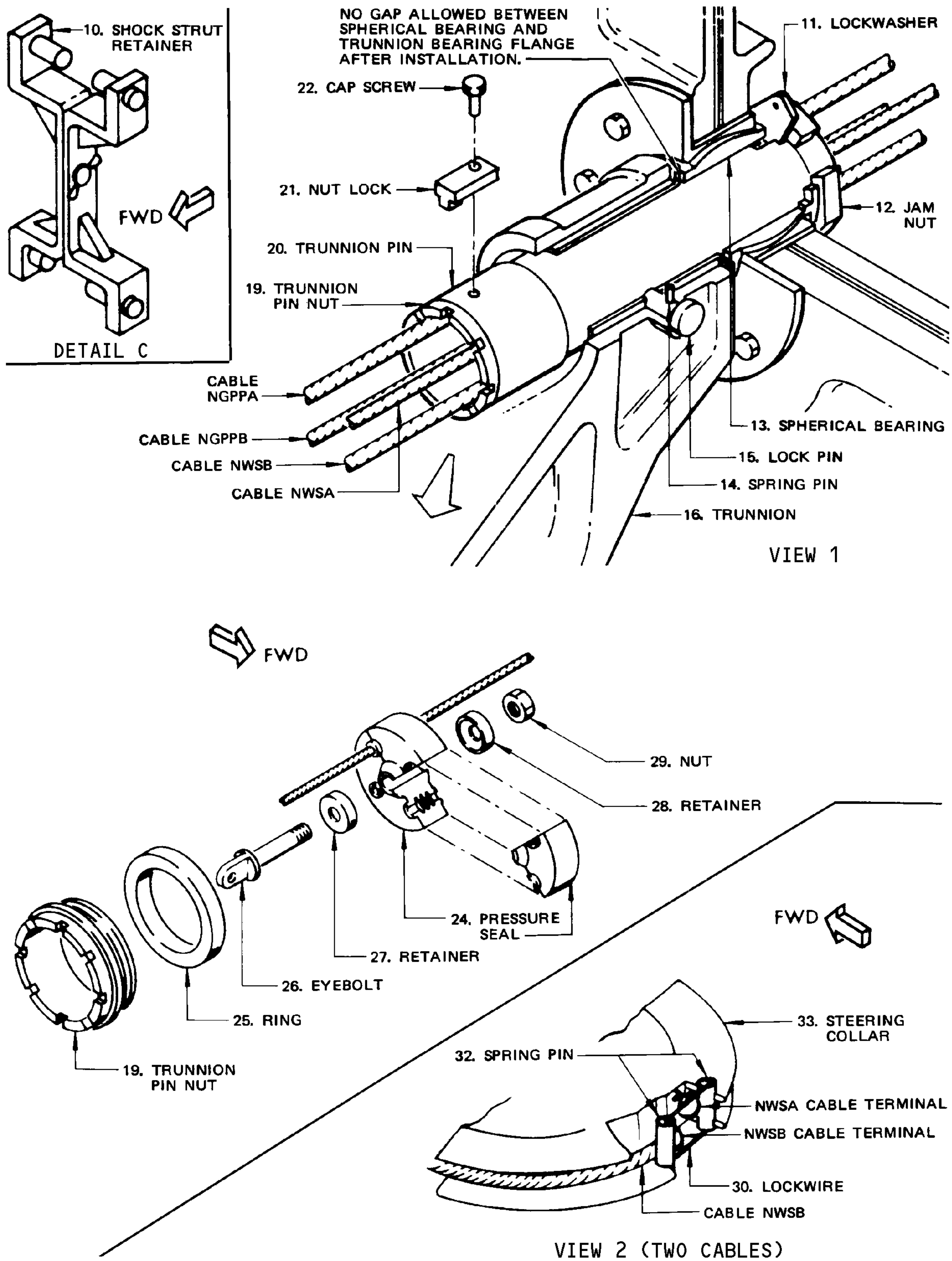
5. Install Nose Landing Gear (Fig. 401)
A. Support gear and jack with axle jack to insert trunnion pins in respective spherical bearings (13) on each side of nose gear wheel well.
B. Jack gear to proper height and tap trunnion pin into place in each trunnion and trunnion support spherical bearing (13) then remove axle jack.

NOTE: Nose gear must be lifted into position with gear trunnion axis parallel to trunnion bearing axis.

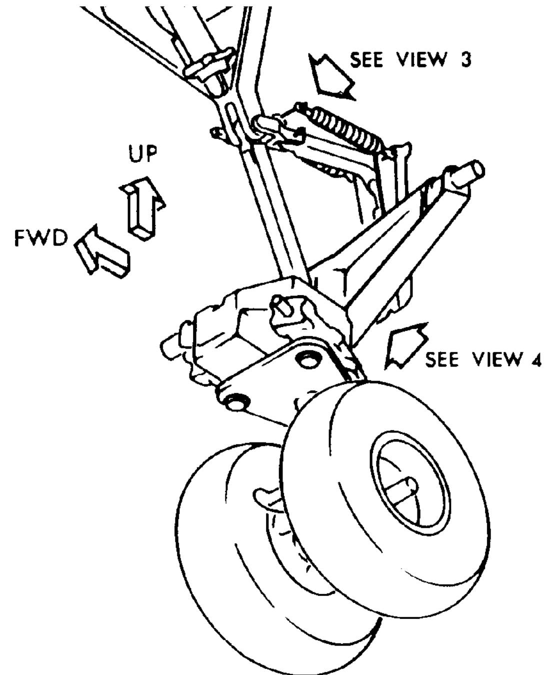
C. Ascertain that trunnion pin lockpin holes are in alignment with mating holes in each trunnion.
D. Install trunnion pin lockpins.
(1) Clean trunnion pin lockpins with naphtha.
(2) Apply corrosion preventive compound to each trunnion pin lockpin (15).

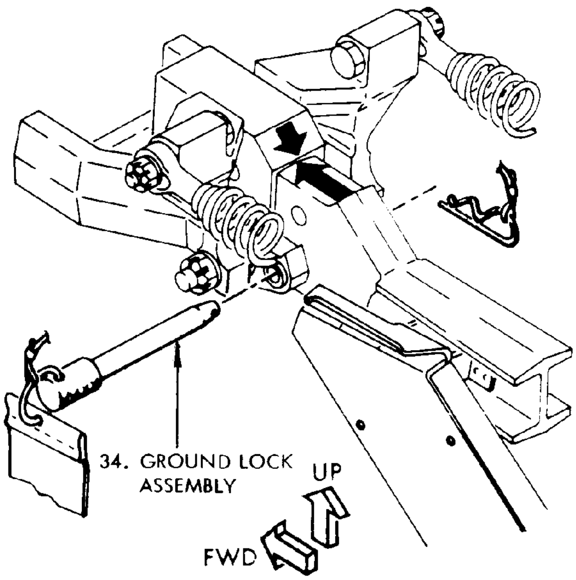


Nose Gear Installation
Figure 401

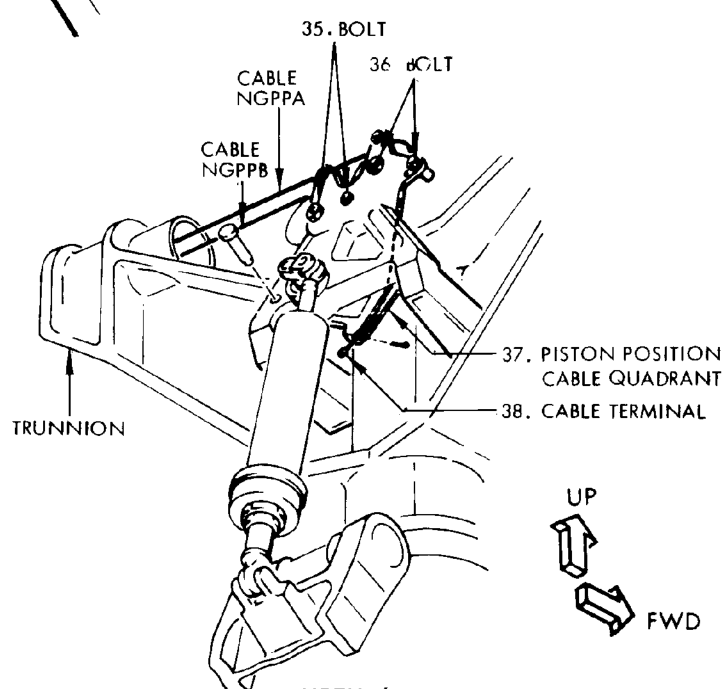


Nose Landing Gear Installation
Figure 402



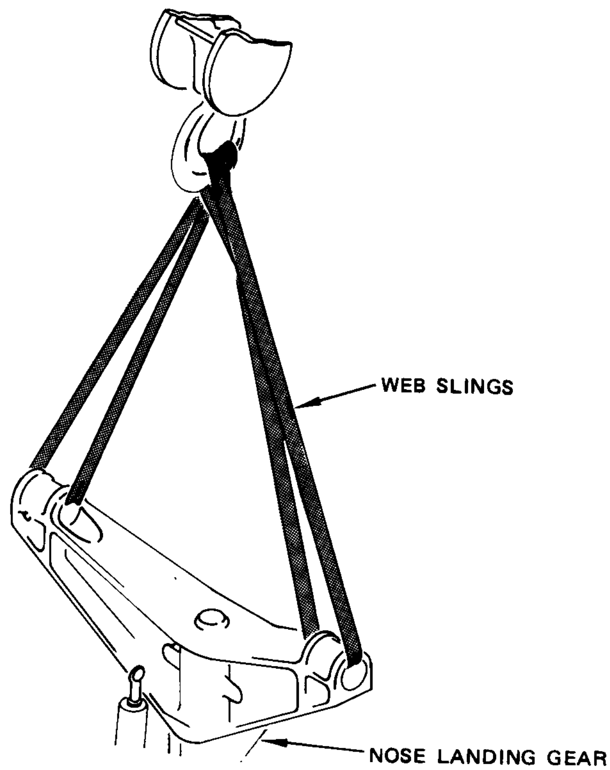


VIEW 3



VIEW 4

Nose Gear Installation
Figure 403



Nose Gear Sling
Figure 404

(3) Install a trunnion pin lockpin (15) in both sides of left and right trunnion pins.

E. Install spring pin (14) in each trunnion pin lockpin.

F. Lockwire each spring pin.

G. Apply grease to threads of each trunnion pin (20) and to faces of lockwashers (11). Install lockwashers and jamnuts.

H. Tighten jamnuts (12) on each trunnion pin 500 to 600 pound-inches lube torque. After tightening jamnuts (12), check that there is no gap between spherical bearing and trunnion bearing flange (view 1).

I. Lockwire lockwashers (11) and jamnuts (12) together.

J. Connect nose gear piston position cables (NGPPA, NGPPB).

(1) Feed piston position cables through left trunnion pin, pressure seal retainer ring (25), inboard left trunnion pin nut (19), and through respective cable pulley brackets to piston position cable quadrant on aft side of shock strut.

(2) Install cable guards or pulleys, which were removed when cables were disconnected.

(3) Insert cable terminals in respective recesses in quadrant and install terminal retaining cotter pins in holes at end of recesses.

(4) Connect piston position cables to respective turnbuckles and adjust cable tension. (Ref 32-51-0 A/T).

(5) Install locking clips in turnbuckles.

K. Connect nose wheel steering cables.

(1) Feed steering cables (NWSA, NWSB) through left trunnion pin, pressure seal retainer ring (25), inboard left trunnion pin nut (19), and through respective cable pulley brackets to steering collar (33).

(2) Install cable guards or pulleys, which were removed when cables were disconnected. Adjust cable guard to clear pulley by 0.015 to 0.045 inch.

(3) Insert steering cable terminals (NWSA, NWSB) in their respective recesses in grooves on aft side of steering collar (33).

(4) Install spring pins (32) in holes provided in steering collar.

(5) Lockwire spring pins with NC20 lockwire (30).

(6) Connect steering cables to their respective turnbuckles and adjust cable tensions, refer to 32-51-0.

(7) Install locking clips in turnbuckles.

L. Assemble pressure seal (24) segments around nose gear piston position cables (NGPPA, NGPPB) and nose wheel steering cables (NWSA, NWSB) at inboard end of left trunnion pin (20).

M. Position each half of pressure seal retainer (27, 28) and install eyebolt (26) with nut (29). Tighten nut sufficiently only to clamp the seal segments then loosen approximately 1/4 turn until eyebolt can be rotated with fingers.

N. Slide assembled pressure seal on cables in end of trunnion pin. Insert and push assembled seal, with ring (25), into trunnion pin (20) until seal hits a stop.
O. Install nut (19) in inboard end of left trunnion pin.
P. Tighten nut 100 to 150 pound-inches lube torque then back off as required to suit vernier of lock holes.
Q. Install nut lock (21) on left inboard trunnion pin nut and install cap screw (22) to retain nut.
R. Lockwire cap screw by double-twist method with NC32 lockwire.
S. Check that seal assembly rotates freely from gear extended cable position to a simulated gear retracted cable position to ensure cables will not become twisted when gear is retracted.
T. Connect nose gear drag brace lower link (8) at fitting (5) on shock strut.
   (1) Lubricate outside of drag brace lower bolt (9) with grease.
   (2) Install nylon washer (7) on bearing in drag brace lower link (8) and slide link into fitting (5) on shock strut.
   (3) Install drag brace lower bolt (9).
   (4) Install flat washer (6) and nut.
   (5) Tighten nut to 550-700 pound-inches lube torque.
   (6) Install cotter pin.

6. <u>Restore Airplane to Normal Configuration</u>
A. Install aft access panel on nose wheel well left and right bulkheads, connect nose gear taxi light electrical plug at connection on inboard side of right nose gear wheel well bulkhead and lockwire plug with NC32 lockwire.
B. Remove caps and connect hydraulic lines (2) to swivel (3) on swivel bracket (1) on right trunnion (4).
C. Install nose gear wheel well doors (Ref 32-22-11 R/I).
D. Remove nose gear ground lock assembly (34) from nose gear.
E. Remove shock strut restrainer (10).
F. Pressurize shock strut (Ref Chapter 12, Nose Landing Gear Shock Strut - Servicing).
G. Pressurize hydraulic system A and check for leaks at swivels (3) (Ref 29-11-0 MP).
H. Perform extension and retraction test of nose landing gear (Ref 32-33-0 A/T).
I. Perform a manual extension system test of the nose landing gear (Ref 32-35-00 A/T).
J. Install ground lock assembly (34).
K. Depressurize hydraulic system A (Ref 29-11-0 MP).

L. Perform steering test of nose wheel.
   (1) Jack nose of airplane until nose gear tires clear ground (Ref Chapter 7, Jacking Airplane).

   CAUTION: TAKE CARE NOT TO OPERATE STEERING WHEEL WITH SHOCK STRUT FULLY EXTENDED AND TORSION LINKS CONNECTED OR DAMAGE TO SHOCK STRUT CENTERING CAMS MAY RESULT. CHECK THAT SHOCK STRUT IS COMPRESSED 2.10 INCHES OR MORE BEFORE OPERATING STEERING SYSTEM. DISTANCE BETWEEN BOTTOM SURFACE OF LOWER STEERING PLATE AND TOP SURFACE OF TOWING LUG MUST BE LESS THAN 21.90 INCHES.

   (2) Position greased turning plates under nose gear tires and lower airplane so that weight of airplane is supported by landing gear.
   (3) Pressurize hydraulic system A (Ref 29-11-0 MP).
   (4) Check that nose gear does not attempt to steer when hydraulic system A is pressurized.
   (5) Check that steering wheel is in neutral (centered) position.
   (6) Check that rudder pedals are in neutral position.
   (7) Rotate steering wheel counterclockwise to left stop position and hold.
       (a) Check that nose gear steers to left approximately 78 degrees.
   (8) Rotate steering wheel clockwise to right stop position and hold.
       (a) Check that nose gear steers to right approximately 78 degrees.
   (9) Release steering wheel.
       (a) Check that steering wheel returns to neutral position.
       (b) Check that nose gear returns to centered position.
   (10) Push left rudder pedal forward until rudder quadrant stop is contacted. Check that nose gear steers left approximately 7 degrees.
   (11) Release rudder pedal. Check that rudder pedals return to neutral position and that nose gear returns to center position.
   (12) Repeat steps (10) and (11) using right rudder pedal.
   (13) Jack nose of airplane until nose gear tires clear ground (Ref Chapter 7, Jacking Airplanes) and remove grease turning plates.
M. Lower airplane jacks (Ref Chapter 7, Jacking Airplane).
N. Remove jacks from under airplane.
O. Remove system A hydraulic power (Ref 29-11-0 MP) if no longer required.

NOSE LANDING GEAR - INSPECTION/CHECK

1. General
   A. Periodic inspection of the nose landing gear is described in par. 2. For special inspections, refer to Chapter 5.
2. Nose Landing Gear Inspection
   A. Equipment and Materials
      (1) Gear Ground Lockpins - F72735, or equivalent for nose and main landing gears
   B. Examine Nose Landing Gear
      (1) Ensure a ground lockpin is installed on each landing gear.
      (2) Ensure strut air valve vent and strut for hydraulic leaks.

         NOTE: Continued leaking from vent indicates necessity for internal seal replacement.

      (3) Check strut outer cylinder lug welds and seams for cracks.
      (4) Check exterior surface of strut inner cylinder for dirt, scratches, and galling.
      (5) Check strut for correct hydraulic fluid level and for correct inflation pressure (Chapter 12, Nose Landing Gear Shock Strut Servicing).
      (6) Check for cracks in sealant fillet around shock strut gland nut and evidence of leaks.
      (7) Check torsion links, steering collar, and steering cylinder support plate attachment lugs for cracks and loose mounting bolts.
      (8) Check steering collar bearing for dirt and wear.
      (9) Check wheels for cracks, corrosion, and flaked paint.
      (10) Check drag brace links for cracks and wear at attach points.
      (11) Check drag link and shock strut trunnion pins for wear and looseness.
      (12) Check nose gear and nose gear lock actuators for loose mounting bolts and evidence of fluid leakage.
      (13) Check lock link spring assembly attach points for wear and looseness.
   C. Nose Landing Gear Torsion Free Play Inspection
      (1) Equipment and Materials
         (a) Dial indicator gage - 0- to 0.25-inch minimum
         (b) Wooden 2 x 6 - Approximately 7 feet long
         (c) Sturdy box or platform - Approximately 15 inches high with suitable mounting for dial indicator gage
         (d) Spring scale - 0- to 50-pound capacity
         (e) Nose Gear Steering Actuator Rod Clamp - F80162-1
         (f) Axle jack

(2) Prepare for Examination
   (a) Check that hydraulic systems A and B are depressurized (AMM 29-11-0 and AMM 29-12-0).
   (b) Jack nose of airplane until nose gear shock strut is fully extended (Chapter 7, Jacking).
   (c) Deflate shock strut by slowly opening air valve at top of strut. Care should be taken to ensure no loss of fluid through air valve.

   WARNING: DO NOT LOOSEN VALVE BODY UNLESS SHOCK STRUT IS COMPLETELY DEFLATED. AIR PRESSURE CAN BLOW VALVE BODY OUT, CAUSING INJURY TO PERSONNEL.

   (d) Use axle jack to jack nose gear inner cylinder until approximately 4 inches of chrome surface is visible on inner cylinder.
   (e) Install nose gear steering actuator rod clamps on both steering actuator rods. Position clamps tightly against actuator end plates to prevent any movement of actuator rod.
   (f) Set up dial indicator gage on platform to read fore and aft motion of right wheel rim. Gage should be located on forward side of wheel on axle centerline (Fig. 601).
   (g) Insert wooden 2 x 6 between wheels.

(3) Measure Torsional Free Play
   (a) With the aid of a spring scale, apply a clockwise pull of 30 pounds on wooden 2 x 6 at a 60-inch arm measured from shock strut centerline. Set the dial indicator gage to zero and relax load.
   (b) Apply a counterclockwise pull on wooden 2 x 6 as in step (3)(a). Record reading on dial indicator and relax load.
   (c) Repeat steps (3)(a) and (3)(b) for a total of five cycles.
   (d) Determine average free play for five cycles.
   (e) Average value determined in step (3)(e) should be less than 0.092 inch.

   NOTE: 0.092-inch free play corresponds to 0.0082 radian.

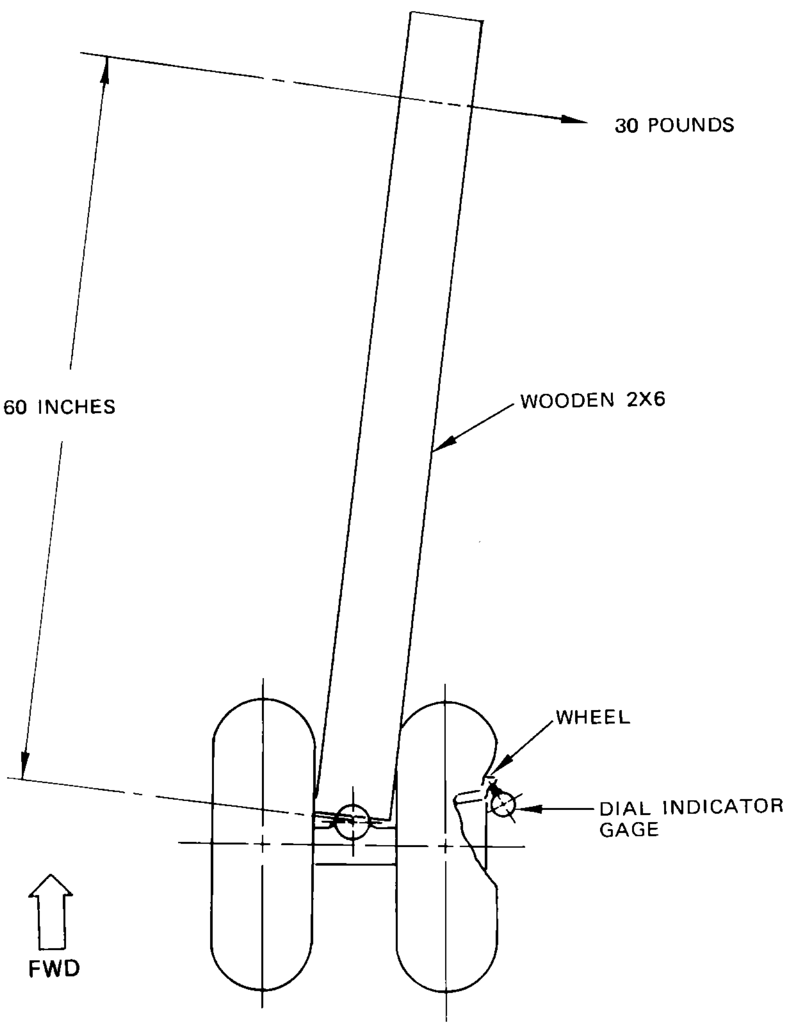
   (f) If the average value is greater than the maximum allowable, repeat step (3)(a).
   (g) Use feeler gages to measure the gaps between the bushing flanges at the upper, lower and apex joints of the torsion links.

(h) If the free play exceeds 0.004 inch, assemble stainless steel shim washers to put back the gaps to 0.001 inch.

NOTE: The shim washer profile should match the profile of the mating bushing flange.

(i) If the diameters of the pin or bushing bore are more than their wear limits, replace these parts.
(j) After the installation of the torsion link pins, do another check for the torsional free play.
(k) If the torsional free play is satisfactory, return the airplane to normal.
(l) If the torsional free play is still more than the maximum allowance, remove the nose gear steering collar (AMM 32-51-61/401).
(m) Do a check on all the interface dimensions that are common to the steering collar, steering collar bearing, and the bushing and bolts of the rod end attachment of the steering cylinder.
(n) Replace any of the parts, which show signs of wear.
(o) After installation of the steering collar components, do another check for torsional free play.
(p) If the check is satisfactory, return the airplane to normal.
(q) If the torsional free play still exceeds the maximum allowance, remove the nose gear shock strut assembly (AMM 32-21-0/401).
(r) Do a check on all the interface dimensions that are common to the trunnion pins, trunnion bearings and the outer cylinder.
(s) Replace the parts, which show signs of wear.
(t) If it is necessary, replace the bushings in the shock strut inner cylinder and the steering collar, which are common to the inner cylinder.

(4) Restore Airplane to Normal
(a) Remove wooden 2 x 6 and dial indicator platform.
(b) Remove nose gear steering actuator rod clamps.
(c) Remove axle jack and inflate shock strut to 237 psi with shock strut fully extended.
(d) Lower airplane and remove jacks.



Nose Landing Gear Torsional Free Play Inspection
Figure 601

NZ

NOSE GEAR SHOCK STRUT - APPROVED REPAIRS

1. General

2. General

A. Spare seals are carried in grooves in the shock strut lower bearing. Two O-rings for dynamic seals in one groove and one O-ring for the static seal in the other groove. The spare seals permit active seals to be replaced without removing the shock strut inner cylinder every time a seal replacement is necessary. When either the spare static seal O-ring or the last spare dynamic seal O-ring is used the next replacement of that respective O-ring will require disassembly of the shock strut. A procedure for replacing active inner cylinder seals with spare seals and another procedure for replacing active inner cylinder seals and installing spare seals are given in paragraphs 2 and 3 respectively. Prepare shock strut for either seal replacement procedure per paragraph 2B.

B. A split ring cam seal must be used with a spare dynamic seal O-ring to replace a faulty channel seal.

C. Backup rings are split and can be replaced without removing inner cylinder.

3. Replace Active Inner Cylinder Seals with Spare Seals (See figure 801.)

A. Equipment and Materials

(1) Hydraulic Oil - MIL-H-5606 or MIL-H-6083 for servicing nose gear shock strut
(2) Dry air or nitrogen bottle capable of 1800 psi for servicing nose gear shock strut
(3) Gear Ground Lockpin - F72735, or equivalent, for each landing gear
(4) Pin Spanner Adapter Assembly - F80013-1, or equivalent
(5) Plastic tool for removing O-rings
(6) G01912 Lockwire - Monel (0.032 In. Dia.) (NASM20995NC32 QQ-N-281)
(7) Thin strip of metal to be used as backup when cutting seals
(8) Petrolatum - VV-P-236, or equivalent
(9) Split Ring Cam Seal S13068-339
(10) Drip tray
(11) Torque wrench, one-half inch drive, calibrated in pound-feet
(12) Solvent - TT-T-528 (Toluene) (Ref 20-30-31)
(13) Primer - Dow Corning RTV 1200 (Ref 20-30-11)
(14) Semco sealant gun
(15) Solvent - TT-I-735, Isopropyl Alcohol (15% to 20% solution) (Ref 20-30-31)
(16) Propyethylene squirt bottle for dispensing alcohol-distilled water solution
(17) Sealant - Dow Corning QC-7063, GE RTV-174 or GE RTV-1502 (Ref 20-30-11)
(18) Wooden or plastic spatula for removing old and applying new sealant

(19) Two wooden blocks of equal dimensions for jacking lower bearing into outer cylinder
(20) Small brush for applying primer
(21) Clean pieces of white cloth, new or laundered, containing less than 0.75% oil (carbon tetrachloride extraction) and free of silicone
(22) Cloth padding for protection of gland nut damage to shock strut, when unscrewed
(23) Crow - foot wrench
(24) Corrosion Preventive Compound MIL-C-11796, Class 3 (Ref 20-30-21)

B. Prepare for Seal Replacement
(1) Check that ground lock assemblies are installed on all landing gear (Ref 32-00-01).
(2) Jack nose of airplane until shock strut is extended about ten inches.
(Ref. Chapter 7 Jacking)
(3) Deflate shock strut (Ref 12-15-31) by removing valve cap from charging valve at top of shock strut. Loosen outer hexnut two turns maximum.

<u>WARNING</u>: DO NOT LOOSEN VALVE BODY UNLESS SHOCK STRUT IS COMPLETELY DEFLATED. AIR PRESSURE CAN BLOW VALVE BODY OUT, CAUSING BODILY INJURY TO PERSONNEL.
CHARGING VALVE MUST REMAIN OPEN. INTERNAL PRESSURE CAN BLOW OUT LOOSENED GLAND NUT AND INJURE PERSONNEL.

(4) Remove fillet of sealant from top of gland nut and outer cylinder with toluene, to soften sealant, and a plastic or wooden spatula. Old sealant must be removed prior to priming and the application of new sealant when gland nut is reinstalled.
(5) Deleted.
(6) On airplanes with nose gear taxi light, disconnect wiring harness plug from light and tape to upper torsion link.

C. Replace Seals with Spare Seals
(1) Jack under nose gear axle jacking point until shock strut extension is reduced to three or four inches.
(2) Place cloth padding around shock strut inner cylinder below gland nut (8, Fig. 801) to prevent sharp edge of hole in gland nut from damaging inner cylinder in the event gland nut is accidentally allowed to slide down inner cylinder when unscrewed from outer cylinder.
(3) Deleted.
(4) Place drip tray to catch hydraulic fluid when gland nut is removed.

<u>CAUTION</u>: CLEAN ANY HYDRAULIC FLUID FROM TIRES IMMEDIATELY, SHOULD ANY SPLASH ON THEM, TO AVOID DETERIORIZATION.

(5) Remove gland nut lock (18) on aft side of nose gear shock strut.
(6) Use pin spanner adapter assembly to unscrew gland nut and slide nut to bottom of inner cylinder.
(7) Slide scraper adapter (15) and rod wiper (7) down inner cylinder into removed gland nut.
(8) Lower jack under nose gear axle slowly to extend inner cylinder until the lower bearing (6) and lower centering cam (2) is extended from the outer cylinder sufficiently to expose seals for replacement.

CAUTION: DO NOT ALLOW INNER CYLINDER TO EXTEND BEYOND MINIMUM POINT OF EXTENSION NECESSARY TO COMPLETE STEPS (9) AND ON. PISTON TUBE MAY BE PULLED FROM INSIDE INNER CYLINDER ALLOWING PISTON TUBE STEEL RING TO EXPAND AGAINST WALLS OF OUTER CYLINDER MAKING IT IMPOSSIBLE TO REINSERT INNER CYLINDER WITHOUT FIRST REMOVING PISTON TUBE. REFER TO PARAGRAPH 3.

NOTE: If difficulty is encountered in disassembly, pressurize shock strut with pneumatic pressure, not to exceed 100 psi, to force parts from shock strut for seal replacement.

WARNING: DO NOT PRESSURIZE SHOCK STRUT IN EXCESS OF 100 PSI OR PERSONNEL CAN BE INJURED AND MATERIAL DAMAGED.

(9) Cut active static seal O-ring (17) and backup rings (1) from outer groove in lower centering cam. Use a plastic tool to prevent damage to cam.
(10) Cut active seal (16), cut channel seal (3) or remove backup rings (3) from inner cylinder.

CAUTION: EXTREME CARE MUST BE EXERCISED AS ANY NICKS OR SCRATCHES ON INNER CYLINDER, BESIDES DAMAGE TO THE INNER CYLINDER ITSELF, WILL DAMAGE THE CENTERING CAM AND SEALS AS THEY SLIDE OVER THE DAMAGED SURFACE OF THE INNER CYLINDER.

NOTE: When cutting active seal or channel seal; use backup metal strip between seal and surface of material which seal contacts.

(11) Slip spare static seal O-ring (4) from upper spare seal recess in lower bearing (6) and apply a coat of hydraulic oil and a light coat of petrolatum prior to installation.

(12) Carefully stretch lubricated spare static seal O-ring only enough to install it in groove of lower centering cam (2) and install a new backup ring on each side of O-ring (Fig. 802).

NOTE: O-rings must have no twists when installed.

(13) Slip a spare dynamic seal O-ring or seal assembly (5) from lower spare seal recess in lower bearing (6) and apply a coat of hydraulic oil and a light coat of petrolatum prior to installation.
(14) Coat a cam seal, if installed, with petrolatum.
(15) Slide spare dynamic seal O-ring or seal assembly up inner cylinder into offset in lower centering cam. Position cam seal immediately below dynamic seal O-ring, if installed (Fig. 802).
(16) Slide lower bearing (6) against newly positioned cam seal, if installed, to hold it and the newly installed O-ring or seal assembly in place and slide bearing and centering cam as a unit into outer cylinder.

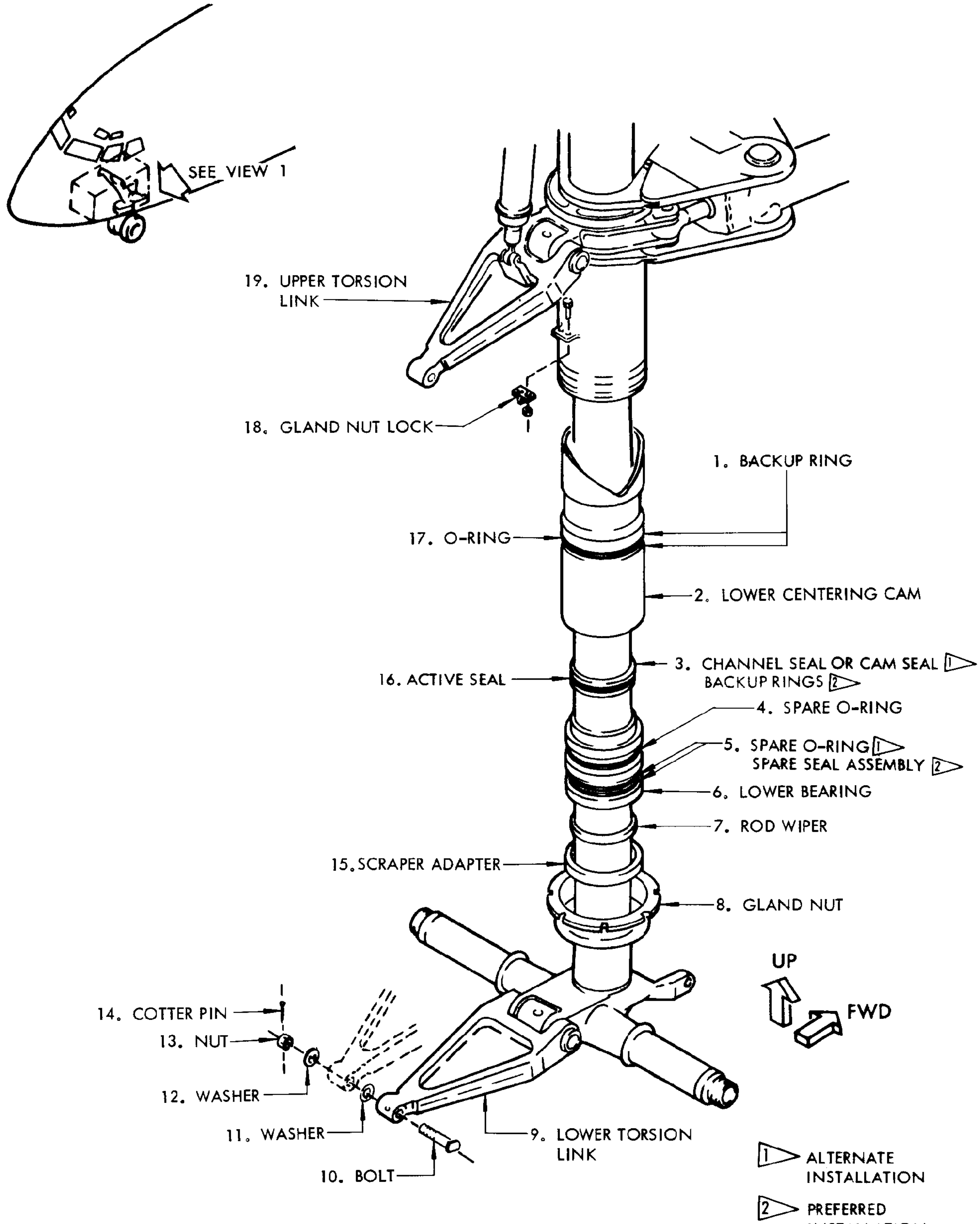
CAUTION: TABS ON LOWER CAM MUST BE PROPERLY MATED WITH NOTCHES ON OUTER CYLINDER OR DAMAGE WILL OCCUR.

NOTE: Lower centering cam should protrude 0.03 to 0.06 inch below lower end of outer cylinder. Check that upper centering cam and lower centering cam are aligned so that notched valley of lower cam is in line with lobe of upper cam. If centering cams are not properly aligned, conditions of step (22) cannot be met.

(17) Slide scraper adapter (15) with rod wiper (7) into position against lower bearing.
(18) Slide gland nut (8) into position to screw onto outer cylinder.

NOTE: If trouble is experienced in moving lower bearing into outer cylinder, align inner cylinder and place a wooden block of equal dimensions on each side of inner cylinder, below gland nut, and jack inner cylinder until gland nut reaches outer cylinder.

(19) Apply corrosion preventive compound to thread area on gland nut and outer cylinder.
(20) Screw shock strut gland nut on outer cylinder and tighten to 75-100 pound-feet torque then back off nut to align nearest slot for lock.
(21) Install gland nut lock.
(22) Check that torsion link lugs on inner cylinder are opposite outer cylinder drag brace lug.



Nose Gear Shock Strut Seal Replacement
Figure 801

(23) Check that the length of the fully extended gear is 24.0 inches as indicated on nose gear servicing chart (Ref 12-15-41, Servicing).
(24) Clean area for new sealant fillet using a new or laundered white cloth and toluene.
(25) Apply thin brush coat of primer to seal area of gland nut and allow a minimum of 1/2-hour drying time before applying sealant.
(26) Apply sealant fillet.
(a) Apply bead of sealant around shock strut outer cylinder and gland nut with sealant gun.
(b) Work fillet onto surface with spatula or sealant gun tip. Minimize air bubbles as much as possible when forming fillet.

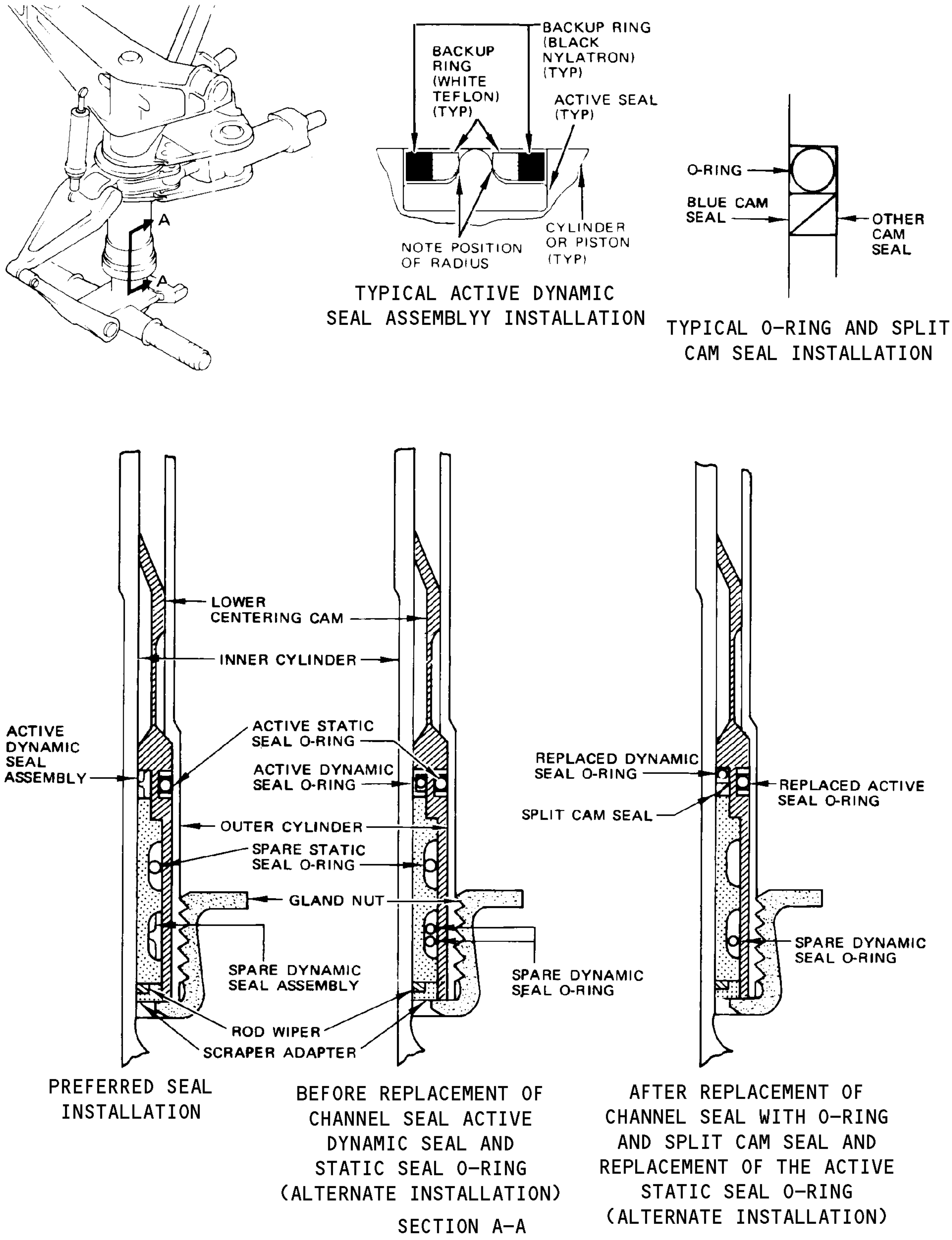
NOTE: A solution of 15 to 20% isopropyl alcohol in distilled water may be applied to the tool, used to form fillet, to prevent sealant from sticking to the tool. The water alcohol solution is to be kept free of contamination by dispensing it from polyethylene squirt bottles.

(c) Form fillet a minimum of 0.08 inch thick at the junction of gland nut and shock strut surfaces extending 1/8 to 1/4 inch out on gland nut surface and up shock strut surface.

NOTE: A surface skin forms on the sealant a few minutes after it is exposed so forming of fillet must be done immediately after sealant is applied.

D. Restore Airplane to Normal Configuration.
(1) Lower jack under nose gear axle and remove jack.
(2) On airplanes with nose gear taxi light, connect taxi light electrical harness and lockwire the plug with lockwire using double twist method and install clamps on wiring harness at points where disconnected.
(3) Wipe exposed inner cylinder with hydraulic fluid.
(4) Service shock strut first with hydraulic fluid then dry air or nitrogen per decal on nose gear shock strut (Ref Chapter 12).
(5) Lower nose of airplane and check for leaks at gland nut.
(6) Remove airplane jacks.
(7) Tag strut to show status of spare seals, either, "static spare seal used," or, "both dynamic seals used."

4. Replace Active Inner Cylinder Seals and Install Spare Seals
A. Equipment and Materials
(1) Same as that listed in par. 2.A. except add the following:
(a) Orifice Tube Extension Tool - F80160-1 or SE32-1102
(b) Hard wood strip (1 x 3 - 19-1/8 inches)
(c) Clamp - Nose steering and piston position cables, F80161-1 or F80161-10 (2)



Shock Strut Seal Arrangement
Figure 802

(d) Ring Compressor - C32002-1

B. Prepare for Seal Replacement
   (1) Perform steps in par. 2.B.
   (2) Remove nose gear wheel well doors (Ref 32-22-11).

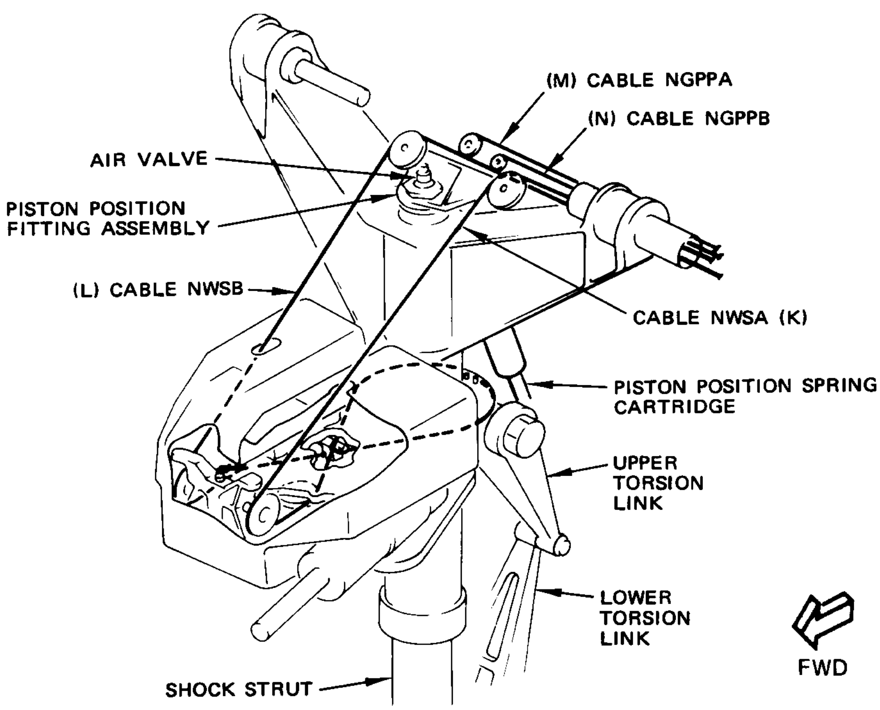
C. Replace Active Seals and Install Spare Seals
   (1) Remove lockwire between jamnut on orifice support tube extension and air valve and between the same jamnut and adjacent bolt which holds piston position pulley mount (Fig. 803).
   (2) Remove air valve from orifice support tube extension.

WARNING: CHECK THAT SHOCK STRUT IS COMPLETELY DEFLATED BEFORE BEGINNING TO REMOVE VALVE. FAILURE TO COMPLY CAN CAUSE BODILY INJURY TO PERSONNEL AND DAMAGE TO MATERIAL.

   (3) Remove jamnut and special washer from orifice support tube extension.
   (4) Install nose gear steering and piston position cable clamps. Clamp cables firmly against face of trunnion outlet nut.
   (5) Disconnect piston position spring cartridge. Remove piston position fitting assembly, and support with cables on pulleys out of path of interference of follow on operations.
   (6) Remove special nut and lockwasher from orifice support tube extension.
   (7) Install orifice support tube extension tool in orifice support tube extension.
   (8) Remove ground lock assembly (Ref 32-00-01).
   (9) Move landing gear control handle to OFF position to release hydraulic pressure from nose gear lock actuator.
   (10) Unlock lock link assembly.
      (a) Wedge a wooden strip, of proper length and sufficient strength, between top of lower drag brace attach lug on shock strut and bottom of lock brace assembly arm with top end of strip as far aft on arm as possible.

      NOTE: Forward end of lock brace arm is lower than aft end. When top of wooden strip is tapped forward, strip will raise the hinge point of the lock brace assembly to an overcenter position to unlock the assembly.

      (b) Tap top end of wooden strip forward to unlock lock brace assembly.
   (11) Place cloth padding around shock strut inner cylinder below gland nut (8, Fig. 801) to prevent sharp edges from damaging inner cylinder if nut should accidentally be dropped allowing nut to slide down inner cylinder.



Nose Gear Assembly
Figure 803

(12) Place drip tray to catch hydraulic fluid when gland nut is removed.

CAUTION: CLEAN ANY HYDRAULIC FLUID FROM TIRES IMMEDIATELY TO AVOID DETERIORIZATION.

(13) Remove gland nut lock (18) on aft side of shock strut. Use pin spanner adapter assembly to unscrew gland nut and slide nut to bottom of inner cylinder.
(14) Remove bolt (10) to disconnect upper and lower torsion links.
(15) Roll nose gear wheels forward and support inner cylinder until upper orifice support tube is completely withdrawn from outer cylinder. If orifice support tube extension tool installed in step C.(7) does not move down as wheels begin to roll, gently tap projecting end of tool to start movement of support tube.
(16) Remove existing O-ring and backup rings from the upper orifice support tube extension.
(17) Coat new O-ring and backup rings with VV-P-236 petrolatum prior to installation on upper orifice support tube extension.
(18) Install new lubricated O-ring and backup rings in seal recess on support tube extension.
(19) Remove retainer rings, upper cam, upper bearing, snubber valve, and key from inner cylinder.
(20) Remove active static seal O-ring (17) and backup rings (1) from outer groove in lower centering cam (2). Use plastic tool to prevent damage to cam.
(21) Remove active seal (16) and channel seal, cam seals or backup rings (3) from around inner cylinder.

CAUTION: EXTREME CARE MUST BE EXERCISED AS ANY NICKS OR SCRATCHES ON INNER CYLINDER, BESIDES DAMAGE TO INNER CYLINDER, WILL DAMAGE CENTERING CAM AND SEALS AS THEY SLIDE OVER DAMAGED SURFACE OF INNER CYLINDER.

(22) Coat one each of static seal and active seal and channel seal, cam seal or backup rings with hydraulic fluid and a light coat of petrolatum.
(23) If installed, slip lubricated channel seal (3) over and down inner cylinder to position around inner cylinder between lower bearing (6) and lower centering cam.
(24) Carefully stretch and slip new lubricated active seal (16) over and down inner cylinder and lower centering cam to position in channel seal, if installed, or install backup rings or cam seal (Fig. 802).
(25) Carefully stretch static seal (4) and spare O-rings or seal assembly, (5) necessary to replace missing spares, and slip over and down inner cylinder, lower centering cam, and lower bearing into respective recesses in lower bearings.

(26) Carefully stretch new lubricated static seal O-ring (4) only enough to slip over and down inner cylinder into outer groove of lower centering cam (2) and install a new backup ring (1) on each side of O-ring (Fig. 801).

(27) Assemble upper cam, upper bearing, snubber valve, key, and retainer rings to inner cylinder.

NOTE: Use feeler gage to determine that gap between upper cam and spacer does not exceed 0.005 inch after retainer rings have been installed. If gap is greater than 0.005 inch, refer to Overhaul Manual.

NOTE: Key may be punch marked to provide a snug fit.

(28) Assemble shock strut: (Fig. 804)
   (a) Measure and record dimension t + 0.001 inch.
   (b) Measure and record dimension T + 0.001 inch.
   (c) Use ring compressor to compress ring and install upper orifice support tube into inner cylinder.
   (d) Insert inner cylinder in outer cylinder using upper orifice support tube extension tool as guide.

(29) Check that torsion link lugs on inner cylinder are opposite outer cylinder drag brace lug.

(30) Slide lower bearing against newly installed channel seal and slide bearing and lower centering cam as a unit into outer cylinder.

NOTE: Lower centering cam should protrude 0.03 to 0.06 inch below lower end of outer cylinder. Check that upper centering cam and lower centering cam are aligned so that notched valley of lower cam is in line with lobe of upper cam.

(31) Slide scraper adapter (15) with rod wiper (7) into position against lower bearing.

(32) Slide gland nut (8) into position to screw onto outer cylinder.

NOTE: If trouble is experienced in moving lower bearing into outer cylinder, align inner cylinder and place a wooden block of equal dimensions on each side of inner cylinder below gland nut. Jack inner cylinder until nut reaches outer cylinder.

(33) Apply corrosion preventive compound to thread area on gland nut and outer cylinder.

(34) Screw shock strut gland nut (8) on outer cylinder and tighten nut 75 to 100 pound-feet torque then back off nut to align nearest slot for lock.

(35) Install gland nut lock (18).
(36) Remove orifice support tube extension tool from orifice tube extension (Ref Fig. 804).
  (a) Measure distance support tube extends through outer cylinder. Dimension D measured must equal dimension T (step 28b) minus distance t (step 28a) within + 0.002 in. If not, this is an indication that orifice support tube is not seated properly against inner surface of outer cylinder. Disassemble and reassemble parts accordingly.
(37) Install lockwasher.

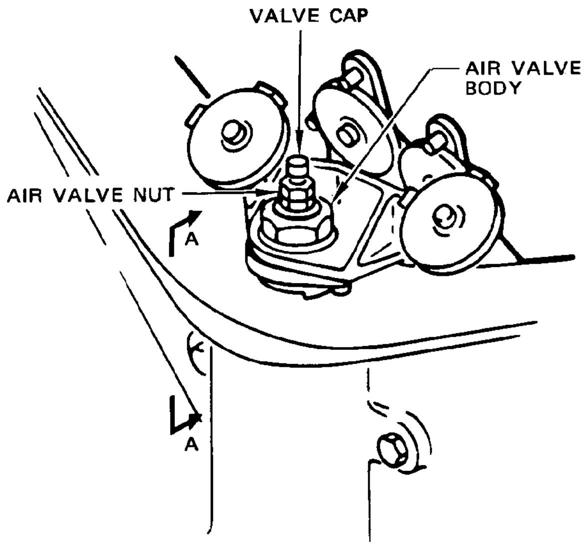
CAUTION: INSTALL THE LOCKWASHER CORRECTLY ON THE UPPER ORIFICE SUPPORT TUBE. MAKE SURE THE MATING SURFACES OF THE LOCKWASHERS AND THE OUTER CYLINDER ARE FLUSH WITH NO CLEARANCE. IF YOU DO NOT INSTALL THE LOCKWASHER CORRECTLY, IT CAN CAUSE DAMAGE TO THE THREAD OF THE SUPPORT TUBE.

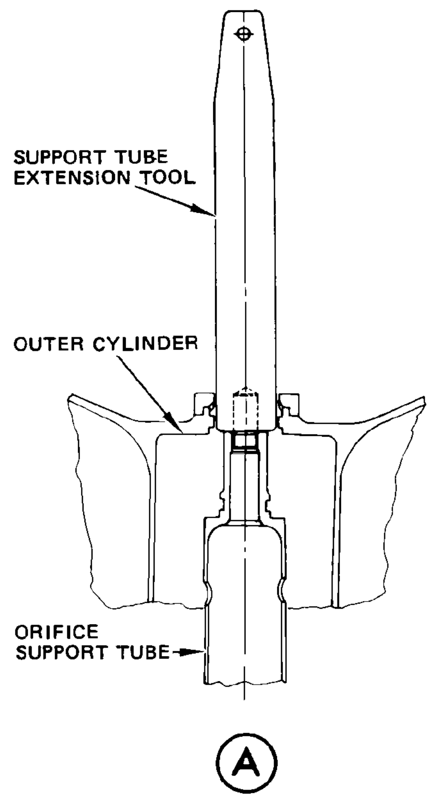
NOTE: The lockwasher key does not fully mate with the bottom of the groove after normal assembly.

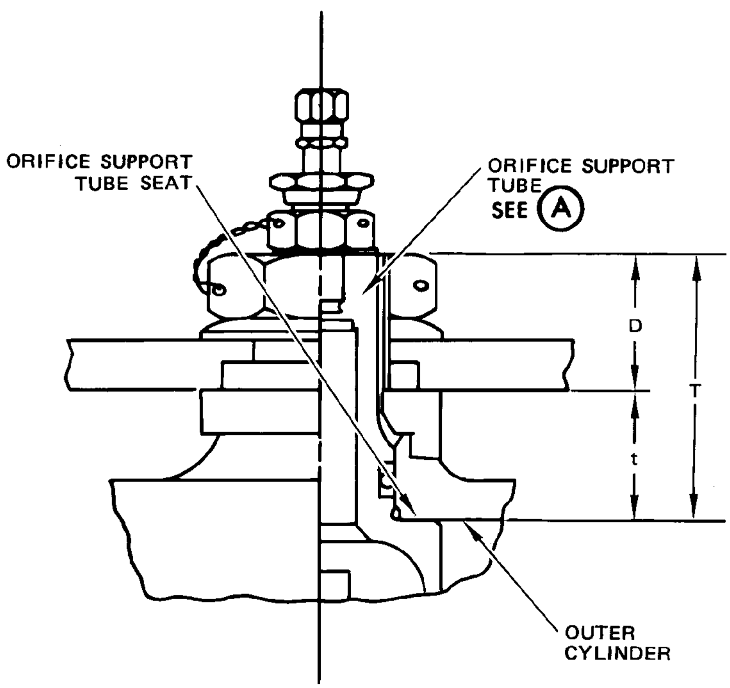
  (a) Install the special nut in the orifice support tube extension.
  (b) Tighten the nut to 500-700 pound-inches.
(38) Install piston position fitting assembly and connect piston position spring cartridge.
(39) Install special washer, screw jamnut onto orifice support tube extension and tighten jamnut 1500 to 2000 pound-inches. Install lockwire between jamnut and adjacent bolt which holds position piston pulley mount.

NOTE: Jamnut must be only finger-tight until piston position fitting assembly is installed.

(40) Install air valve in orifice support tube extension and instal1 lockwire between air valve and jamnut installed on orifice tube extension.
(41) Disconnect cable clamps from steering and piston position cables.
(42) Roll wheels aft until lock brace assembly locks.
(43) Install ground lock assembly (Ref 32-00-01).
(44) Check that torsion link lugs on inner cylinder are opposite outer cylinder drag brace lug.
(45) Check that length of fully extended gear is 24.0 inches as indicated on nose gear servicing chart (Ref 12-15-41, Servicing).
(46) Clean area for new sealant fillet using a new or laundered white cloth and toluene.







SECTION A-A

Shock Strut Support Tube Installation
Figure 804

(47) Apply thin coat brush of primer to seal area of gland nut and allow a minimum of 1/2-hour drying time before applying sealant.

(48) Apply sealant fillet.

(a) Apply bead of sealant around shock outer cylinder and gland nut with sealant gun.

(b) Work fillet onto surface with spatula or gun tip. Minimize air bubbles as much as possible when forming fillet.

NOTE: A solution of 15 to 20% isopropyl alcohol in distilled water may be applied to tool, used to form fillet, to prevent sealant from sticking to tool. Water alcohol solution is to be kept free of contamination by dispensing from polyethylene squirt bottles.

(c) Form fillet a minimum of 0.08 inch thick at junction of gland nut and shock strut surfaces extending 1/8 to 1/4 inch out on gland nut surface and up shock strut surface.

NOTE: A surface skin will form on sealant a few minutes after exposure. Forming of fillet should be done immediately after sealant is applied.

(49) Install bolt (10) to connect upper and lower torsion links.

D. Restore Airplane to Normal Configuration

(1) On airplanes with nose gear taxi light, connect taxi light electrical harness wiring at the light and lockwire plug.
(2) On airplanes with taxi light, install clamps on electrical wiring at points from which removed.
(3) Wipe exposed portion of inner cylinder with hydraulic fluid.
(4) Service shock strut first with hydraulic oil then dry air or nitrogen per decal on nose gear shock strut (Ref Chapter 12).
(5) Lower airplane nose and check for leaks at gland nut.
(6) Remove airplane jacks.
(7) Remove tag showing seal status from shock strut.
(8) Install nose gear wheel well doors (Ref 32-22-11 R/I).
(9) Adjust nose wheel steering system (Ref 32-51-0 A/T).

NOSE GEAR DRAG BRACE - REMOVAL/INSTALLATION

1. Equipment and Materials
   A. Ground Lock Assemblies - F72735 (AMM 32-00-01)
   B. Corrosion Preventive Compound - MIL-C-11796, Class 3
   C. Grease - BMS 3-33 (Preferred)
   D. Grease - MIL-PRF-23827 (Supercedes MIL-G-23827) (Alternate)
   E. Grease - MIL-G-21164 (Alternate)
   F. Solvent - Naphtha TT-N-97C
   G. Solvent - MIL-PRF-680C (Supercedes P-D-680 solvent)
2. Remove Nose Gear Drag Brace Assembly (Fig. 401)
   A. Install ground lock assemblies (AMM 32-00-01).
   B. Jack nose of airplane until nose gear wheels are off the ground (Chapter 7, Airplane Jacking). Do not deflate shock strut.

      WARNING: THE NOSE GEAR SHOCK STRUT MUST BE FULLY EXTENDED BEFORE DRAG BRACE IS DISCONNECTED AS UNEXPECTED MOVEMENT OF A PARTIALLY COMPRESSED SHOCK STRUT COULD INJURE PERSONNEL.

   C. Disconnect drag brace from door mechanism link (16) on each drag brace trunnion arm (17).
   D. Remove bolt to disconnect nose gear actuator (1) from upper drag brace link (2).
   E. Remove bolt (11) to disconnect drag brace and lock link assembly (8) and remove spacer bushing (7, 9) from each lock link (8) fork arm.
   F. Remove drag brace pin (6) to separate upper and lower links.
   G. Remove bolt at lower end of drag brace lower link to detach lower link from shock strut (Fig. 401).
   H. Remove aft access panel on right and left bulkheads of nose gear wheel well.
   I. Remove cotter pin and loosen nut (20) on each drag brace (21) pin outboard the right and left wheel well bulkheads.

      NOTE: Loosen each nut on each drag brace pin and leave each loosened nut on pin as an aid for removing pin.

   J. Remove drag brace pin antirotation bolt (18) from each drag brace pin.
   K. Pull bottom of gear forward to relieve gear weight from drag brace pins to make pin removal less difficult.
   L. Support drag brace and remove pins by pulling them outboard.

      NOTE: The partially removed nut is to be used for removal of each pin to avoid damage to pin threads.

   M. Lower drag brace to clear lower end of actuator and remove from area.
3. Prepare to Install Nose Gear Drag Brace
   A. Check distance between nose gear drag brace bearings in wheel well structure (AMM 32-21-61/401, Nose Gear Drag Brace Bearing).

4. Install Nose Gear Drag Brace Assembly
   A. Clean drag brace pins, washers, and nuts with naphtha and lubricate pin threads and washer faces with grease.
   B. Mark a reference line through center of each drag brace pin antirotation bolt (18) hole to threaded end of each pin (21).
   C. Connect Actuator to Drag Brace
      (1) Position drag brace upper link (2) for installation by sliding upper link into forked terminal on lower end of actuator (1) (Fig. 401).
      (2) Slide a nylon hydraulic washer (5, 13) on each side of swivel (14) between swivel and actuator forked terminal.
      (3) Slide high strength countersunk washer (4) onto bolt (3) with countersink towards bolthead.
      (4) Insert bolt through actuator forked terminal, drag brace swivel, and nylon washers.
      (5) Install plain washer (15) on bolt (3) and install nut.
      (6) Tighten nut 1500 to 1800 pound-inches.
      (7) Install cotter pin.

      NOTE: If cotter pin holes do not line up within specified torque range, try another nut or add a plain washer beneath countersunk washer. Use both methods if necessary.

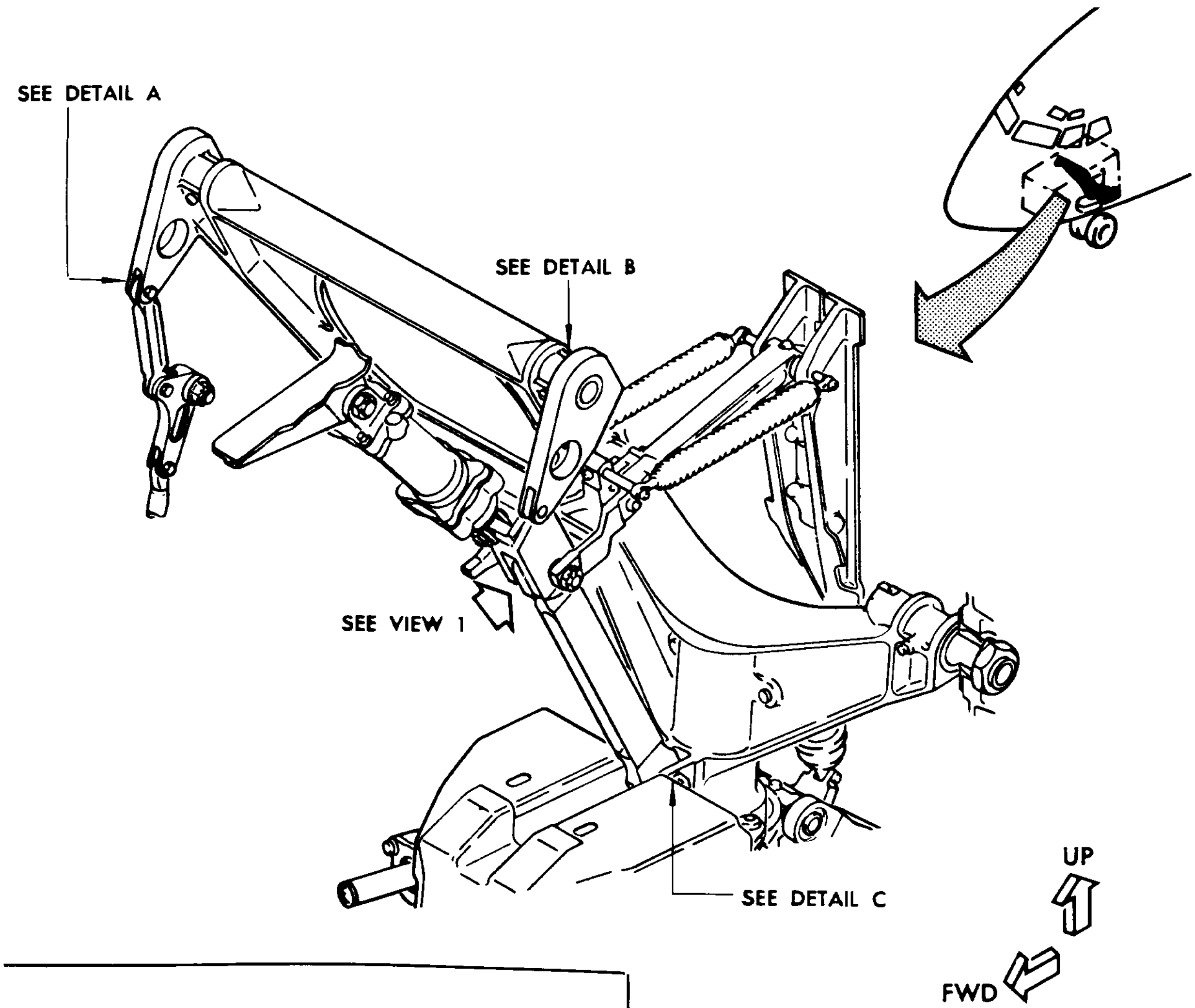
   D. Check that bearing (19) is properly paired with upper drag brace.
   E. Position upper drag brace and insert each pin (21) through trunnion (24) of upper link (2) into bearing (19) on each wheel well bulkhead.

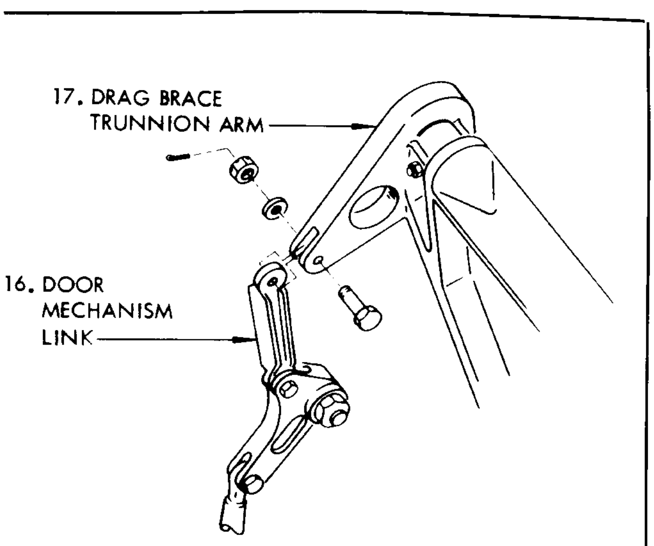
   NOTE: Keep reference line in alignment with center of drag brace pin antirotation bolthole as closely as possible to reduce difficulty of bolt installation.

   F. Clean drag brace pin antirotation bolts with naphtha and give each bolt a thin coat of corrosion preventive compound.
   G. Install compound coated antirotation bolt (18) in each drag brace pin (21).
   H. Insert key of lubricated keyed washer (23) in keyway on pin and insert two lugs on face of washer into respective slots on end of spherical bearing (19).
   I. Install lubricated flat washer (22) on each pin back of each keyed washer.
   J. Install nut (20) on each drag brace pin and tighten nut finger tight then advance nut to align cotter pin holes.

   NOTE: A gap between spherical bearing (19) and trunnion is allowable, after installation of nut (20) (Fig. 401).

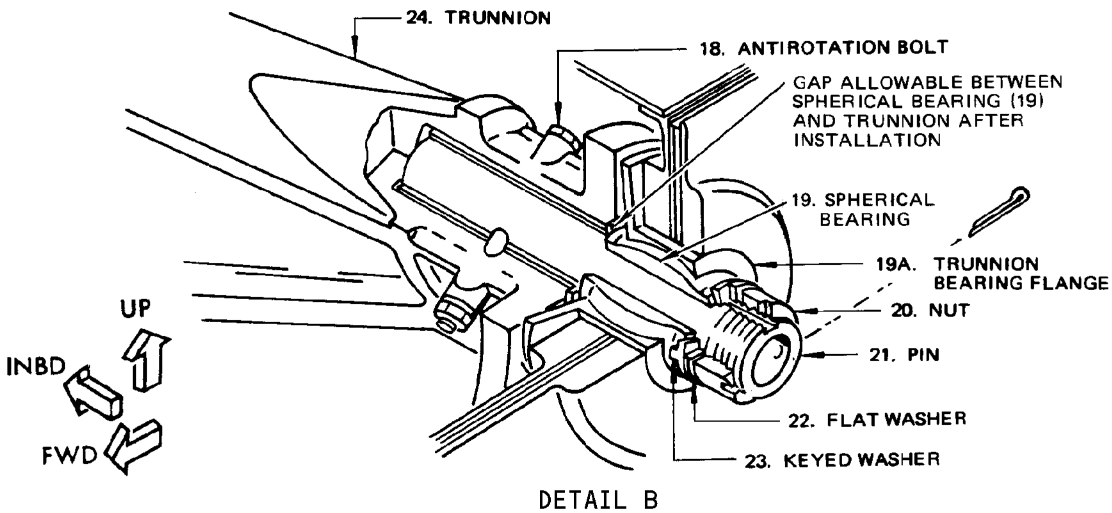
K. Install cotter pin in each drag brace pin.
L. Clean drag brace pin (6), each spacer bushing (7, 9), and inner surface of bushings in each lock link (8) fork arm with naphtha and lubricate outside of drag brace pin, inside of fork arm bushings, and all surfaces of spacer bushings with grease.
M. Install drag brace pin (6).
  (1) Slide drag brace lower link (10) into fork of drag brace upper link (2).
  (2) Insert drag brace pin, from left to right, with flat edge of pinhead matching recess in upper link.
  (3) Install drag brace center washer (12), with raised portion matching recess in upper link.
N. Insert lubricated spacer bushings (7) and (9) in fork arms of lock link (8).
O. Clean bolt with naphtha, apply thin coat of corrosion preventive compound and install bolt (11) through drag brace pin to connect lock link assembly.
P. Install washer, nut, and tighten nut 300 to 400 pound-inches torque.
Q. Install cotter pin in bolt.
R. Connect each upper drag brace trunnion arm (17) to door mechanism link (16) with bolt, washer, and nut. Install cotter key.
S. Connect lower end of drag brace lower link (10) to fitting (26) on shock strut.
  (1) Lubricate shank and threads of lower link bolt (28).
  (2) Position lower end of drag brace lower link in fork of fitting (26) on shock strut, with nylon washer (27) over left protruding end of bearing in lower end of lower link.
  (3) Insert lower link bolt from right to left with indent on tang of bolt head over antirotation pin in right lug of fitting (26).
  (4) Install flat washer and nut on bolt end.
  (5) Tighten nut 550 to 700 pound-inches lube torque.
  (6) Install cotter pin.
T. Remove nose gear ground lock assembly and perform a nose gear retraction test to check operation of nose gear and drag brace (AMM 32-33-0/501).
U. Install nose gear ground lock assembly (AMM 32-00-01).
V. Lower airplane nose (Chapter 7, Jacking Airplane).



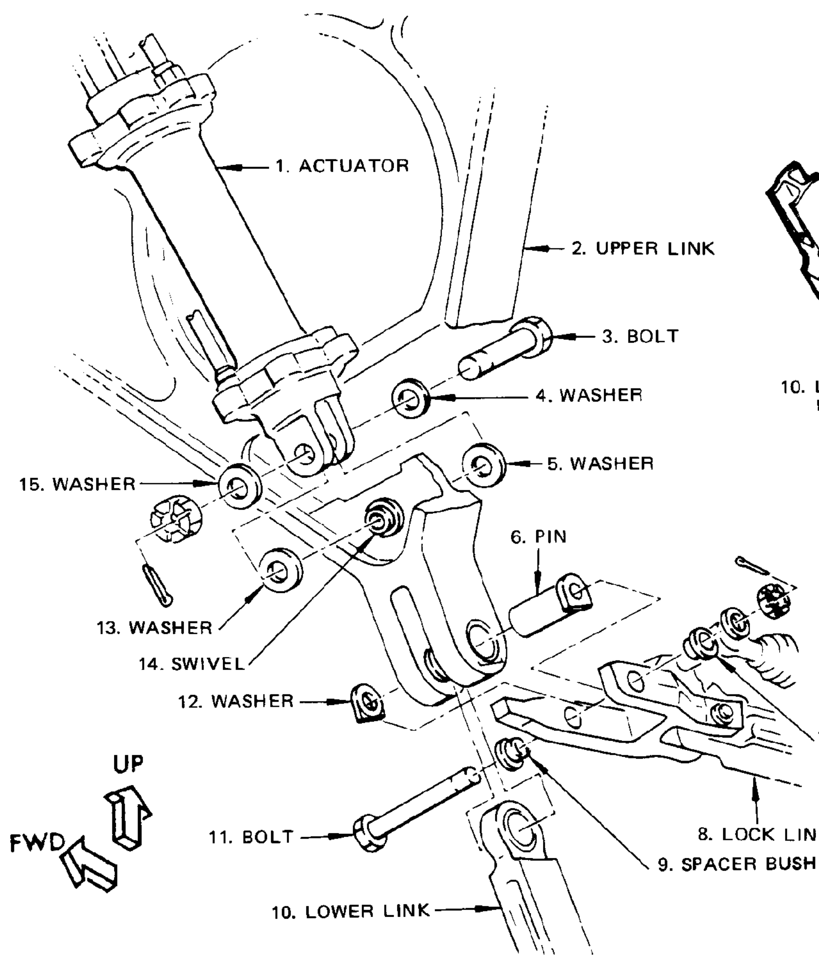


DETAIL A

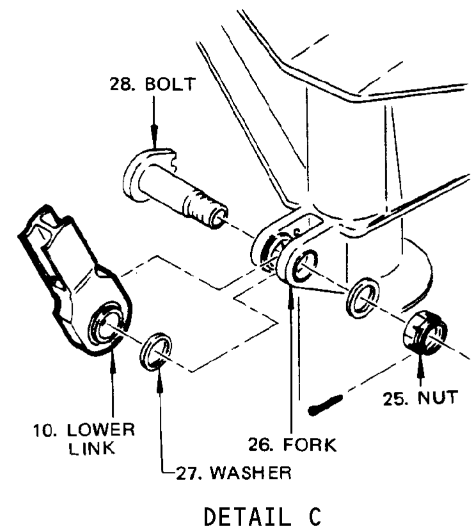
Nose Gear Drag Brace Installation
Figure 401 (Sheet 1)



DETAIL B



VIEW 1

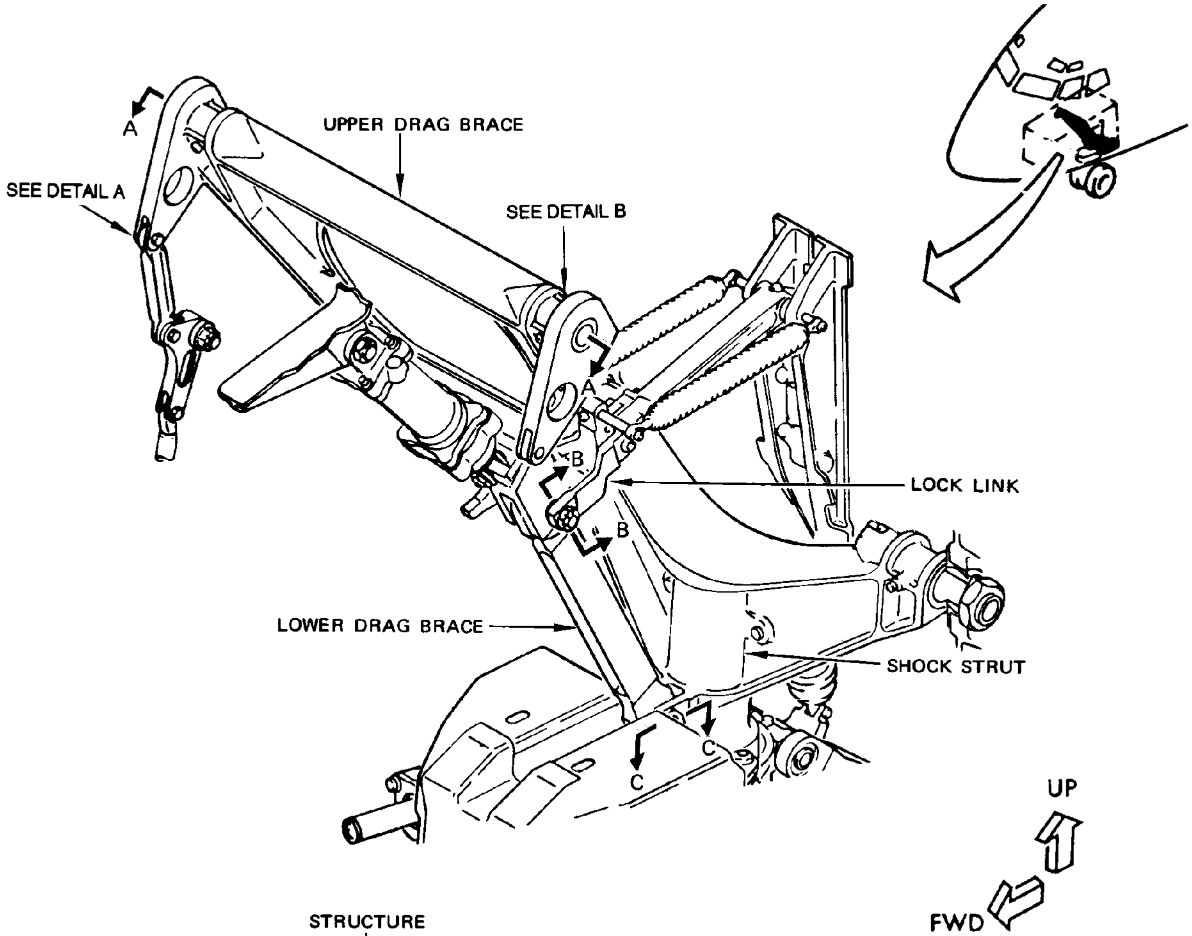


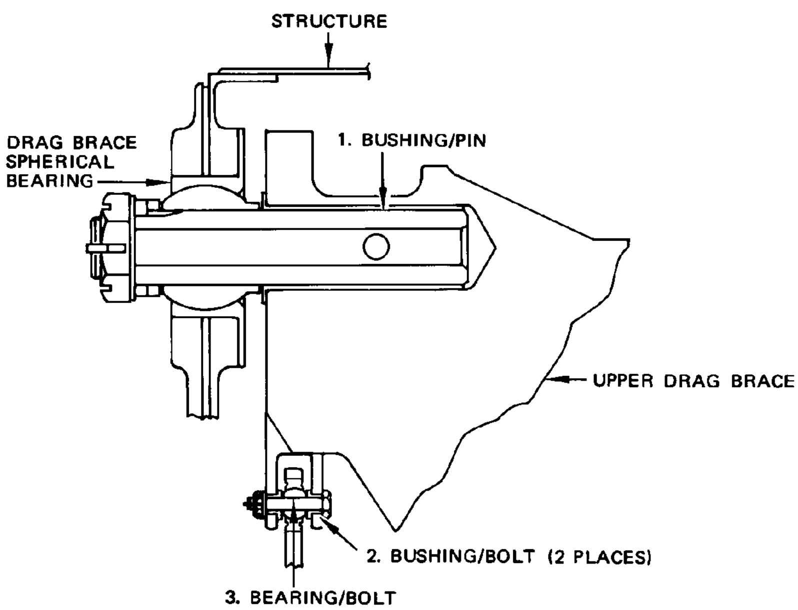
DETAIL C

Nose Gear Drag Brace Installation
Figure 401 (Sheet 2)

NOSE GEAR DRAG BRACE - INSPECTION/CHECK

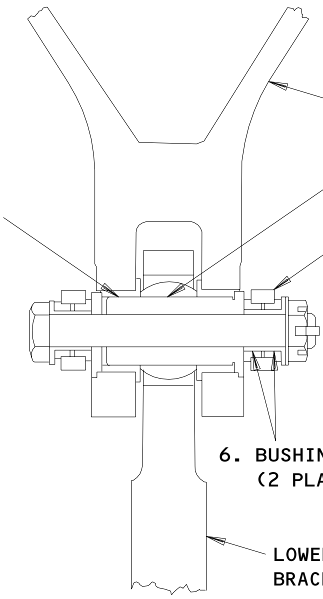
1. General
   A. This data consists of illustrations and wear limit charts. No procedure is given in this section for access to permit inspection. Refer to Nose Gear Drag Brace - Removal/Installation for removal procedures.
2. Equipment and Materials
   A. Corrosion Preventive Compound - (MIL-C-11796), class 3
   B. Primer - BMS 10-11, Type 1
   C. Grease - BMS 3-33 (Preferred)
   D. Grease - MIL-PRF-23827 (Supercedes MIL-G-23827) (Alternate)
   E. Grease - MIL-G-21164 (Alternate)
3. Nose Gear Drag Brace Wear Limits



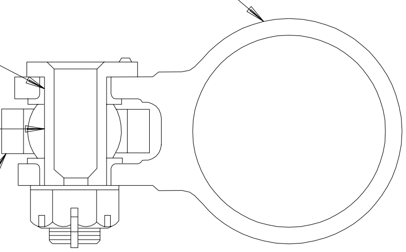


SECTION A-A

Nose Gear Drag Brace Wear Limits
Figure 601 (Sheet 1)



SECTION B-B



SECTION C-C

Nose Gear Drag Brace Wear Limits
Figure 601 (Sheet 2)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS DIAMETER MIN	DESIGN LIMITS DIAMETER MAX	WEAR LIMITS ALLOWED WEAR DIM.	WEAR LIMITS MAX DIAM CLEARANCE	REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR.
1 8	BUSHING	ID	1.3742	1.3752	1.3785	0.005	X		
	PIN	OD	1.3735	1.3740	1.3690			X	1
1 9	BUSHING	ID	1.4892	1.4902	1.4935	0.005	X		
	PIN	OD	1.4885	1.4890	1.484			X	1
2	BUSHING	ID	0.3120	0.3125	0.3175	0.005	X		2
	BOLT	OD	0.3115	0.3120	0.3100		X		
3	BEARING	ID	0.3120	0.3125	0.3175	0.005	3		
	BOLT	OD	0.3115	0.3120	0.3100		X		
4	BUSHING	ID	1.2495	1.2500	1.254	0.005	X		4
	PIN	OD	1.2490	1.2494	1.245		X		
5	BEARING	ID	1.2495	1.2500	1.2510	0.005	X		2
	PIN	OD	1.2485	1.2490	1.245		X		
6	BUSHING	ID	0.8125	0.8134	0.8184	0.010	X		5
	BUSHING	OD	0.8116	0.8123	0.8030		X		
7	BEARING	ID	1.2495	1.2500	1.2510	0.005	X		6
	BOLT	OD	1.2485	1.2490	1.2445			X	1
8	BUSHING	ID	1.2495	1.2505	1.254	0.005	X		7
	BOLT	OD	1.2485	1.2490	1.2445			X	1

Nose Gear Drag Brace Wear Limits
Figure 601 (Sheet 3)

*[1] Worn part or assembly repairable. Refer to Overhaul Manual for repair instructions.
*[2] Install bushings with corrosion preventive compound on faying surfaces and with interference fit of 0.0003 to 0.0016 inch. Machine bushings to design limits with 32-microinch finish. Maximum oversize bushing and hole in fitting is 0.4980 inch, if required.
*[3] Replace link.
*[4] Install bushings with primer on mating surfaces and with interference fit of 0.0005 to 0.0023 inch. Machine bushing to design limits with 32-microinch finish. Dimension between flange faces to be 1.091 to 1.093 inch with 0.060-inch minimum flange thickness.
*[5] Install bushings with grease on faying surfaces and with interference fit of 0.0005 to 0.0023 inch. Machine bushings to design limits with 32-microinch finish. Dimension between flange faces on inside of clevis to be 2.860 to 2.862 inches. Dimension over flange faces of bushing on each clevis is 0.640 to 0.642 inch. Maximum oversize bushing and hole in fitting is 1.000 inch.
*[6] Replace lower drag brace.
*[7] Install bushings with grease on faying surfaces and with interference fit of 0.0005 to 0.0023 inch. Machine bushings to design limits with 32-microinch finish in bushing bore. Dimension between bushing flange faces is to be 1.094 to 1.096 inches and parallel within 0.005 inch with a 63-microinch finish. Maximum oversize bushing and hole in strut is 1.4980 inches.
*[8] Used with upper drag brace part number 65-46232-1
*[9] Used with upper drag brace part number 65-46232-3

NOSE GEAR TORSION LINKS - REMOVAL/INSTALLATION

1. Equipment and Materials
   A. Ground Lock Assemblies - F72735 (AMM 32-00-01)
   B. Grease - BMS 3-33 (Preferred)
   C. Grease - MIL-PRF-23827 (Supercedes MIL-G-23827) (Alternate)
   D. Grease - MIL-G-21164 (Alternate)
   E. Solvent - Naphtha TT-N-97C
   F. Solvent - MIL-PRF-680C (Supercedes P-D-680 Solvent)
   G. Corrosion Preventive Compound - MIL-C-11796, Class 3
   H. G02436 Lockwire - Monel (0.040 In. Dia.) (NASM20995NC40)
2. Remove Torsion Links (Fig. 401)
   A. Install ground lock assemblies (AMM 32-00-01).
   B. Jack airplane nose until nose gear wheels clear the ground (Chapter 7, Jacking). Lower tail support jack as nose is raised.
   C. Disconnect wire harness (22) from torsion links (3) and (8).
   D. Remove both nose gear wheels (AMM 32-45-21/401).
      (1) Remove two block clamps (19) and (20) to free harness from lower torsion link (8) and wire clamp from position piston spring cartridge (14).
      (2) Disconnect lower rod end (17) of position piston spring cartridge from upper torsion link (3).

         NOTE: A wire clamp (23) will become detached from the upper torsion link when lower rod end of the cartridge is disconnected.

      (3) Tape loosened harness (22) to shock strut while removing torsion links.
   E. Jack nose gear axle to relieve any strain on torsion links.
   F. AR LV-JMW thru LV-JMZ, LV-JND and LV-JNE;
      TM CR-BAA and CR-BAB;
      Remove torsion link apex bolt (12) to disconnect torsion links.
      (1) Remove spring pin from nut on bolt at apex of torsion links.
      (2) Remove nut, keyed washer (13), and torsion link apex bolt.

         NOTE: A special thin washer (11) between torsion links will be free for removal when bolt is pulled.

      (3) Remove special thin washer (11).
   G. AR ALL EXCEPT LV-JMW thru LV-JMZ, LV-JND and LV-JNE;
      TM ALL EXCEPT CR-BAA and CR-BAB;
      Remove torsion link bolt (12) to disconnect torsion links.
      (1) Remove spring pin from nut on bolt at apex of torsion links.
      (2) Remove nut, thrust bearing (13), bushing (13A) and torsion link apex bolt (12).

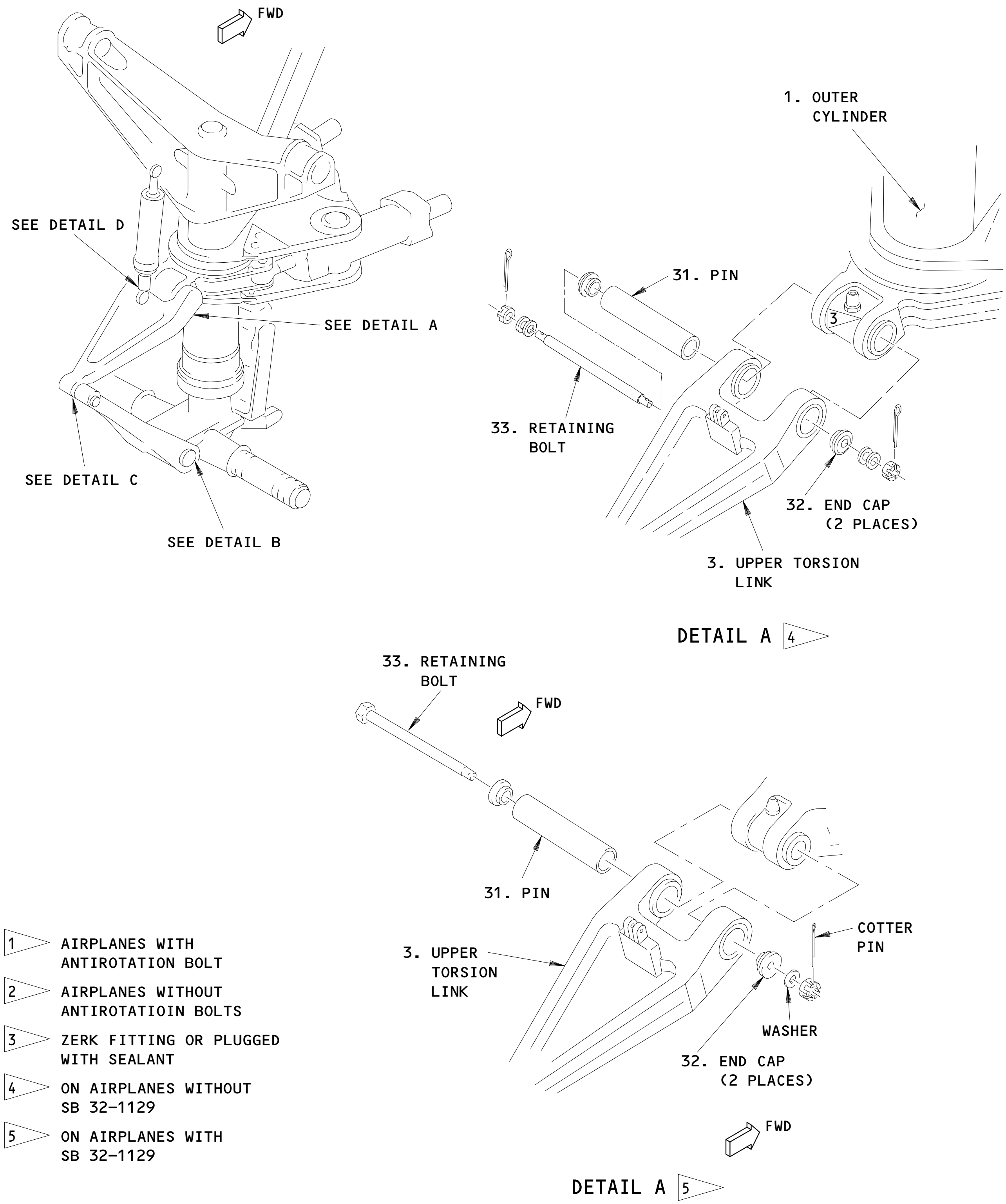
         NOTE: A special thin washer (11) between torsion links will be free for removal when bolt is pulled.

      (3) Remove special thin washer (11).

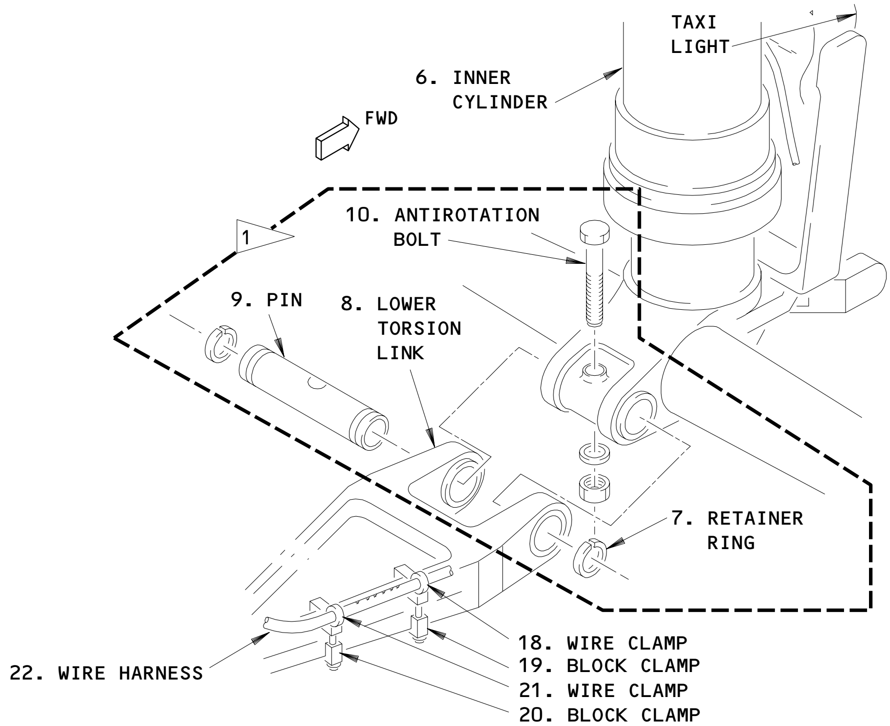
H. Remove antirotation bolt (5), if installed, from upper torsion link pin (4).
I. Remove pin retainer ring (2) from each end of upper torsion link pin (4). On airplanes without antirotation bolt, remove nut, washer and end caps (32).
J. Support upper torsion link and remove pin.
K. Remove upper torsion link.
L. Remove antirotation bolt (10) if installed, from lower torsion link pin (9).
M. Remove pin retainer ring (7) from each end of lower torsion link pin. On airplanes without antirotation bolts, remove nut, washer and end caps (32).
N. Support lower torsion link and remove pin.
O. Remove lower torsion link.
P. On airplanes with SB 32-1129, do the steps below:
   (1) Remove the cotter pin, the nut, the washer, and the end caps (32) from retaining bolt (33).
   (2) Hold the upper torsion link (3).
   (3) Remove the retaining bolt (33) from the upper torsion link (3).
   (4) Remove the pin (31) and disconnect the upper torsion link (3) from the outer cylinder (1).
   (5) Remove the cotter pin, the nut, the washer, and the end caps (32) from retaining bolt (33A).
   (6) Hold the lower torsion link (10).
   (7) Remove the retaining bolt (33A) from the lower torsion link (10).
   (8) Remove the pin (31) and disconnect the lower torsion link (10) from the inner cylinder (6).

3. <u>Install Torsion Links</u>
   A. Clean all bolts, pins, nuts, washers, and mating surfaces and check for allowable wear (Ref Inspection/Check). Use naphtha or an equivalent solvent.
   B. Coat washers, and faces of nuts with thin coat of grease.
   C. Position lower torsion link (8, Fig. 401) for installation on inner cylinder and insert pin.
   D. On airplanes with antirotation bolt, apply coat of corrosion preventive compound to link pin antirotation bolt (10) and install bolt in lower torsion link pin (9). On airplanes without antirotation bolt,
      (1) Place end caps (32) on each end of link pin (31).
      (2) Insert retaining bolt (33) through link pin and end caps. Add washer, nut and lock with cotter pin.
   E. Install a link pin retainer ring (7) in lower torsion link at each end of torsion link pin (4).
   F. Position upper torsion link (3) for installation on outer cylinder (1) and install pin.

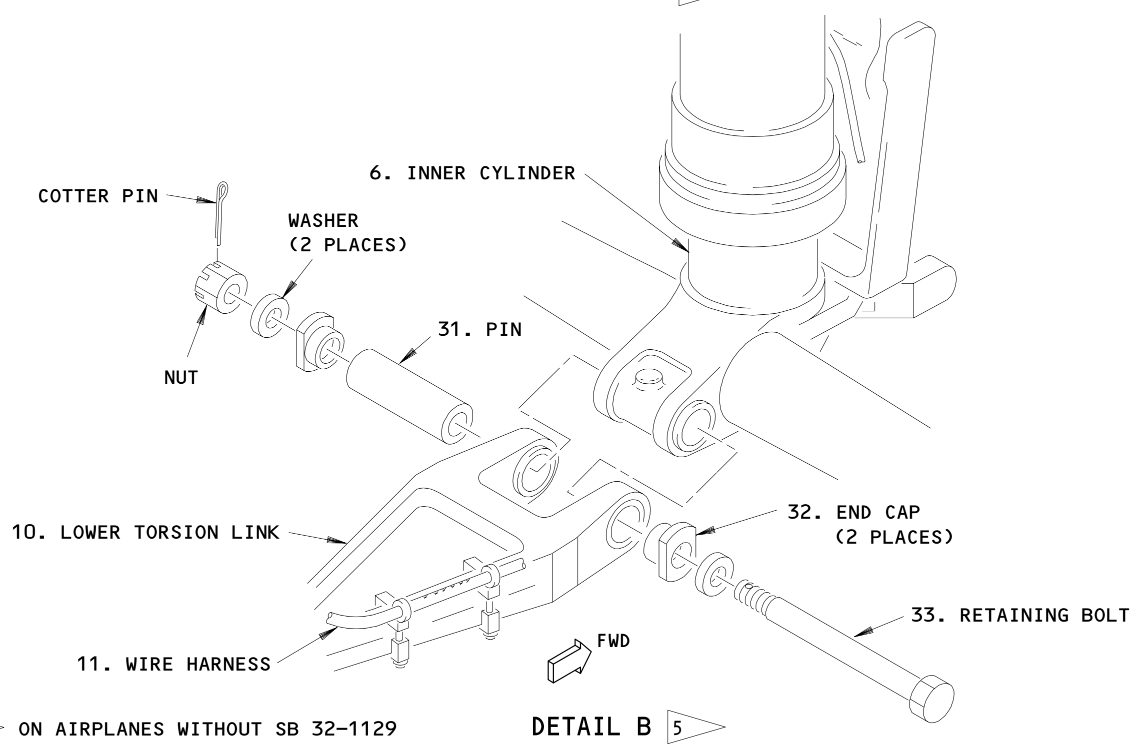
G. On airplanes with antirotation bolt, apply coat of corrosion preventive compound to link pin antirotation bolt (5) and install bolt in upper torsion link pin. On airplanes without antirotation bolt,
   (1) Place end caps (32) on each end of link pin (31).
   (2) Insert retaining bolt (33) through link pin and end caps. Add washer, nut and lock with cotter pin.
H. On airplanes with SB 32-1129, do the steps below:
   (1) Align the holes on the lower torsion link (10) to the holes on the inner cylinder (6).
   (2) Install the pin (31) to connect the lower torsion link (10) to the inner cylinder (6).
   (3) Put the end cap (32) on each end of the pin (31).
   (4) Insert the retaining bolt (33) thru the pin (31) and the end cap (32).
   (5) Add the washer and the nut on one end of the retaining bolt (33).
   (6) Tighten the nut 90 to 125 pound-inches.
   (7) Align the hole in the bolt with the nut castellation and lock with the cotter pin on one end of the retaining bolt (33).
   (8) Align the holes on the upper torsion link (3) to the holes on the outer cylinder (1).
   (9) Install the pin (31) to connect the upper torsion link (3) to the outer cylinder (1).
   (10) Put the end cap (32) on each end of the pin (31).
   (11) Insert the retaining bolt (33) thru the pin (31) and the end cap (32).
   (12) Add the washer and the nut on one end of the retaining bolt (33).
   (13) Tighten the nut 90 to 125 pound-inches.
   (14) Align the hole in the bolt with the nut castellation and lock with the cotter pin on one end of retaining bolt (33).
I. Connect piston position spring cartridge (27) to upper torsion link (3).
   (1) Position the spring cartridge lower rod end (17) in lower torsion link for installation of bolt (16).
   (2) Slide thick washer (15) on bolt and insert bolt from left to right through torsion link and spring cartridge rod end.
   (3) Install wire clip (24) on bolt (16) before installing washer and nut on bolt (16). Install wire clamp (23) on wire clip to fasten wire harness (22).
   (4) Install washer and nut on bolt.
   (5) Install cotter pin in bolt.
J. Connect upper and lower torsion links.
   (1) Jack nose gear axle to suitable position to connect ends of upper (3) and lower (8) torsion links.
   (2) Position special thin washer (11) between the ends of the upper and lower torsion links for torsion link apex bolt (12) installation.
   (3) Install bolt.



Nose Gear Torsion Links Installation
Figure 401 (Sheet 1)



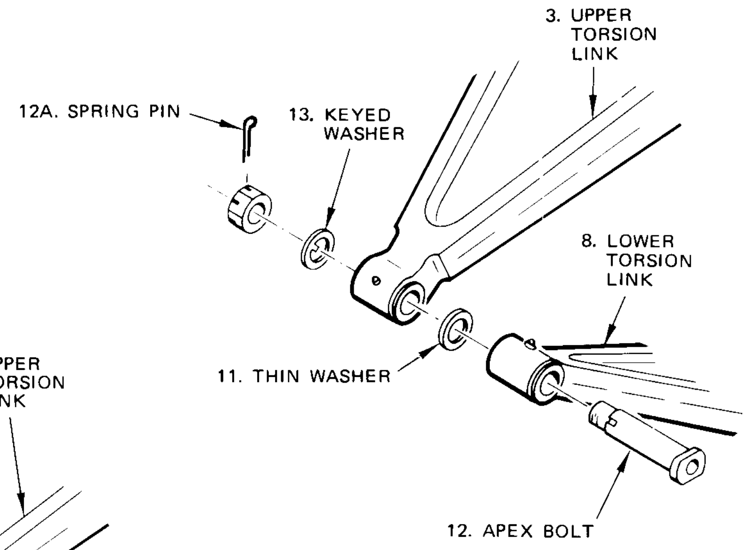
DETAIL B 4



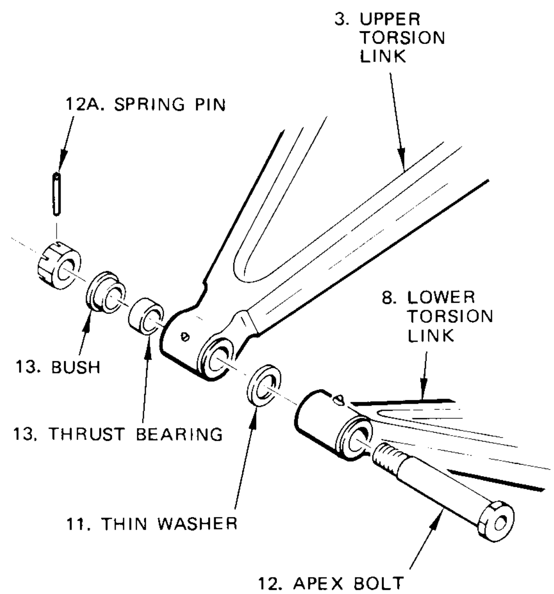
DETAIL B 5

4 ON AIRPLANES WITHOUT SB 32-1129
5 ON AIRPLANES WITH SB 32-1129

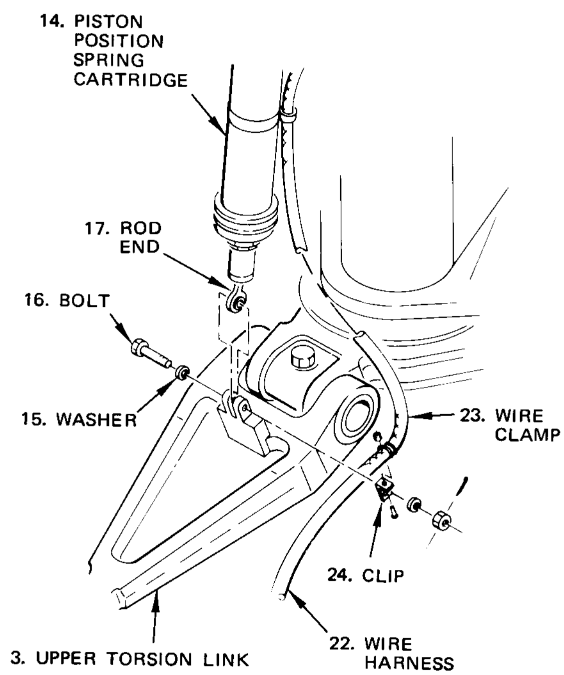
Nose Gear Torsion Links Installation
Figure 401 (Sheet 2)



DETAIL C [1]



DETAIL C [2]



DETAIL D

[1] On airplanes:
AR LV-MJW thru LV-JMZ, LV-JND and LV-JNE
NH JA8401 thru JA8413
ML 9M-AOU thru 9M-AOW, 9V-BBC, 9V-BBE and 9V-BCR
JR EP-IRF and EP-IRG
TM CR-BAA and CR-BAB

[2] On airplanes:
All except [1]

Nose Gear Torsion Link Installation
Figure 401 (Sheet 3)

(4) AR LV-JMW thru LV-JMZ, LV-JND and LV-JNE;
Insert key of keyed washer (13) in keyway in apex bolt (12) and slide washer onto bolt end.

(5) ALL EXCEPT: AR LV-JMW thru LV-JMZ, LV-JND and LV-JNE; Install thrust bearing (13) with seal facing nut and bushing (13A) onto apex bolt (12) end.

(6) Install nut on bolt. Tighten nut 225 to 250 pound-inches lube torque then back off nut and tighten finger-tight. Additional backing off is limited for only spring pin installation.

(7) Install spring pin (12A) in bolt cotter pin hole and lockwire.

K. Connect electrical wire harness (22) to lower torsion link (8).

(1) Loosen wire harness, from where it is taped to shock strut, for installation of clamps.

(2) Install wire harness clamp on position piston spring cartridge (14) and block clamps (19) and (20), with their respective wire clamps (18) and (21), on lower torsion link (8).

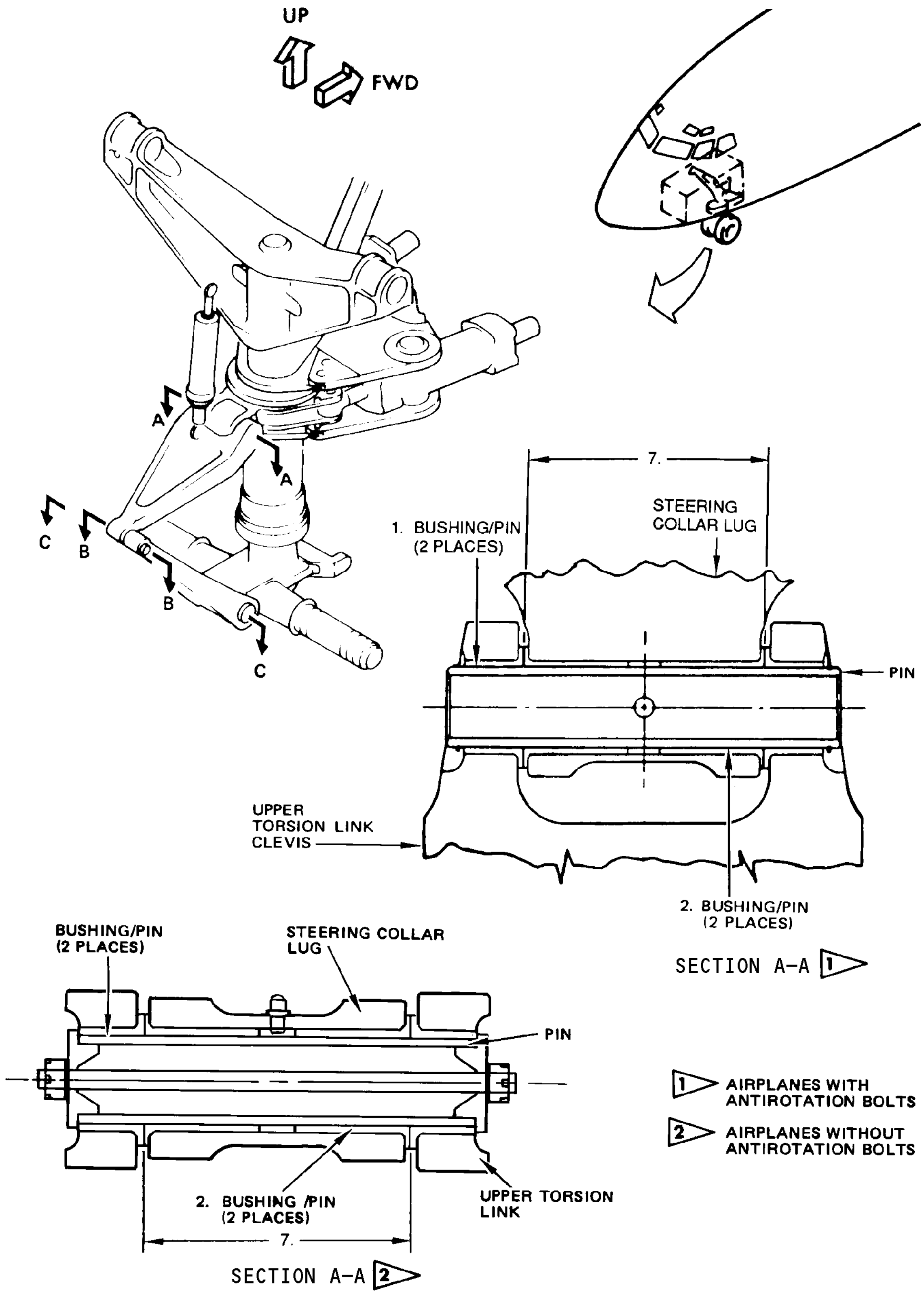
L. Install nose wheels (AMM 32-45-21/401).

M. Remove jack from nose gear axle.

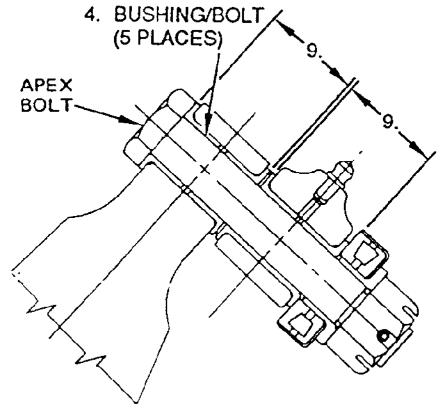
N. Lower airplane nose and remove jacks (Chapter 7, Jacking Airplane).

NOSE GEAR TORSION LINKS - INSPECTION/CHECK

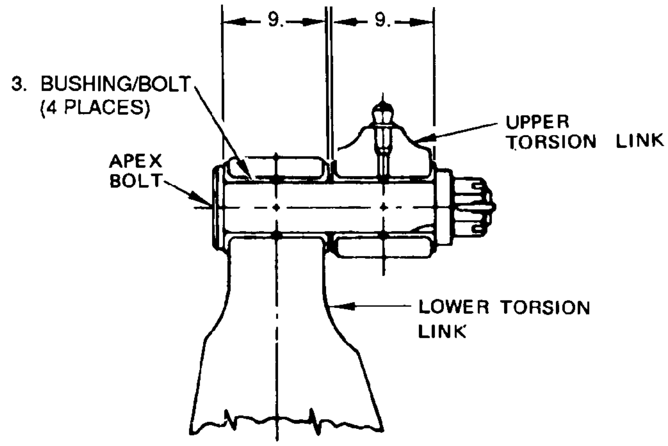
1. General
   A. These data consists of illustrations and wear limit charts. No procedure is given in this section for access to permit inspection. Refer to Nose Gear Torsion Links - Removal/Installation for removal procedures.
2. Nose Gear Torsion Links Wear Limits



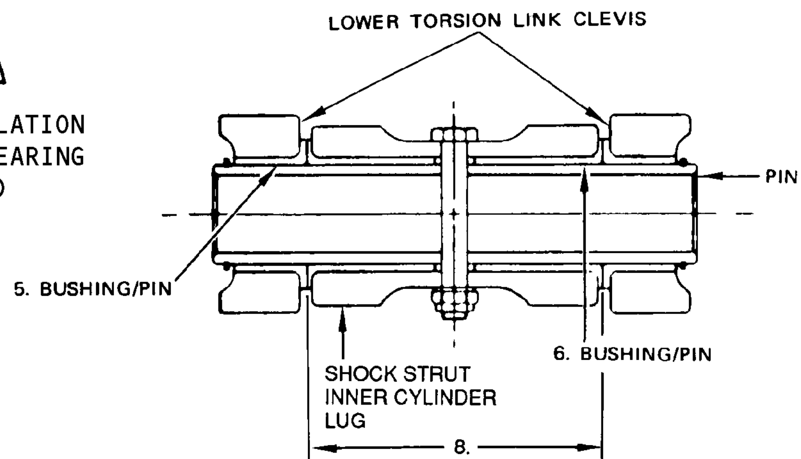
Nose Gear Torsion Links Wear Limits
Figure 601 (Sheet 1)



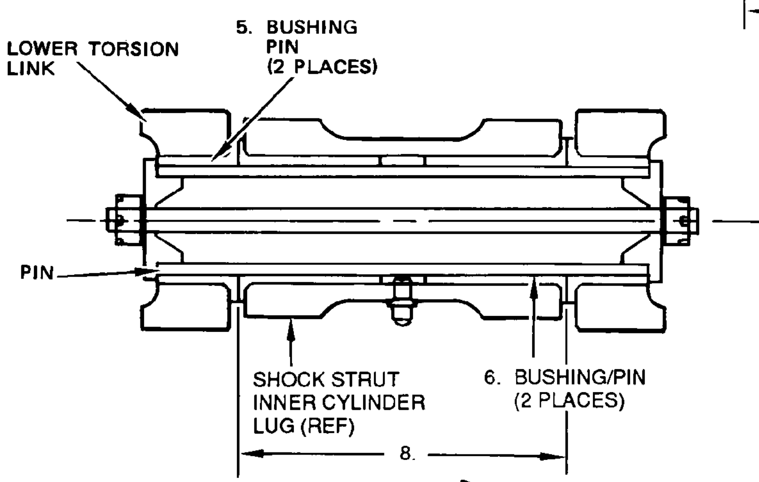
(APEX BOLT INSTALLATION
WITH THRUST BEARING
SECTION B-B



APEX BOLT INSTALLATION
WITHOUT THRUST BEARING
SECTION B-B)



SECTION C-C 1



SECTION C-C 2

Nose Gear Torsion Links Wear Limits
Figure 601 (Sheet 2)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS DIAMETER MIN	DESIGN LIMITS DIAMETER MAX	WEAR LIMITS ALLOWED WEAR DIM.	WEAR LIMITS MAX DIAM CLEAR-ANCE	REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR.
1	BUSHING	ID	1.2500	1.2510	1.260	0.010	X		
	PIN	OD	1.2490	1.2498	1.245			X	1
2	BUSHING	ID	1.2500	1.2510	1.260	0.010	X		
	PIN	OD	1.2490	1.2498	1.245			X	1
3	BUSHING	ID	0.6250	0.6259	0.634	0.010	X		
	BOLT	OD	0.6242	0.6248	0.6190			X	1
4	BUSHING	ID	0.6250	0.6259	0.634	0.010	X		
	BOLT	OD	0.6230	0.6240	0.6190			X	1
5	BUSHING	ID	1.2500	1.2510	1.260	0.010	X		
	PIN	OD	1.2490	1.2498	1.245			X	1
6	BUSHING	ID	1.2500	1.2510	1.260	0.010	X		
	PIN	OD	1.2490	1.2498	1.245			X	1
7	TORSION LINK BUSHING	2	3.750	3.752	3.760	0.016 AXIAL	X	6	
	STEERING COLLAR BUSHING	3	3.747	3.749	3.744		X	6	
8	TORSION LINK BUSHING	4	3.750	3.752	3.760	0.016 AXIAL	X	6	
	SHOCK STRUT INNER CYLINDER LUG BUSHING	5	3.747	3.749	3.744		X	6	
9	UPPER TORSION LINK BUSHING	2	1.320	1.325	1.305	0.016 AXIAL	X	6	
	LOWER TORSION LINK BUSHING	4	1.320	1.325	1.305		X	6	

1 WORN PART REPAIRABLE.

2 DISTANCE BETWEEN BUSHING FACES ON FLANGES OF UPPER TORSION LINK.

3 DISTANCE BETWEEN BUSHING FACES ON STEERING COLLAR LUG.

4 DISTANCE BETWEEN BUSHING FACES ON FLANGES OF LOWER TORSION LINK.

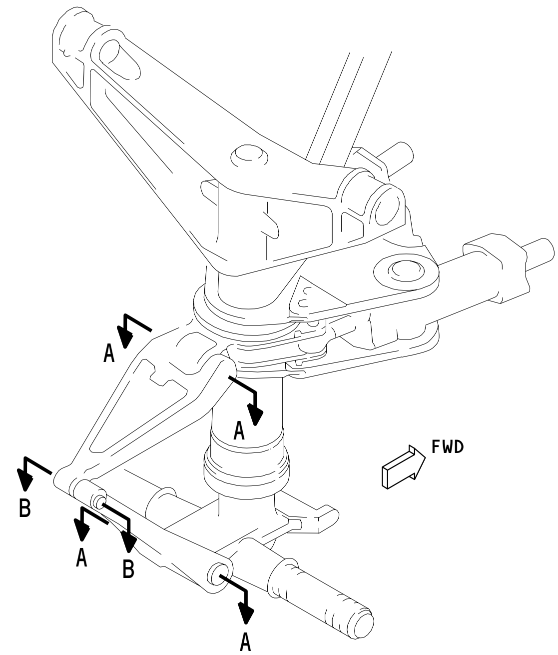
5 DISTANCE BETWEEN BUSHING FACES ON SHOCK STRUT INNER CYLINDER.

6 FOR IN-SERVICE REPAIR, INSTALL SPECIAL SHIM PER FIG. 801 (AMM 32-21-31, APPROVED REPAIRS). PREFERRED OVERHAUL REWORK IS TO RESTORE PART TO DESIGN LIMITS USING NEW BUSHINGS.

Nose Gear Torsion Links
Figure 602

NOSE LANDING GEAR TORSION LINKS - APPROVED REPAIRS

1. General
   A. This procedure contains a task that will let you correct the axial clearance that is too large. You can correct the axial clearance with shims at specified landing gear components locations.
   B. This procedure is for temporary repairs only. The recommended overhaul rework is to put the part back to the initial limits with the new bushings.
2. Nose Landing Gear Torsion Link Axial Clearance Correction (Fig. 801)
   A. References
      (1) 32-21-31/401, Torsion links - Removal/Installation
      (2) 32-21-31/601, Torsion Links - Inspection/Check
   B. Procedure
      (1) Remove the torsion link (Ref 32-21-31/401).
      (2) Do a check of the parts (Ref 32-21-31/601).
      (3) Make the shims if it is necessary, refer to Fig. 801.
      (4) Install the torsion link with the shims between the bushing flanges, refer to Fig. 801.
          (Ref 32-21-31/401)



MAXIMUM AXIAL CLEARANCE [3]

FOR VIEW A-A, $C_T = C_1 + C_2$

FOR VIEW B-B, $C_T = C_3 + C_4 + C_5$ (APEX WITHOUT THRUST BEARING)

$C_T = C_3 + C_4 + C_5 + C_6$ (APEX WITH THRUST BEARING)

SHIM INSIDE DIAMETER = $W_I = P_o + 0.002$ (+0.005/-0.000)

SHIM OUTSIDE DIAMETER = $W_o = F_o + 0.005$ (+0.030/-0.000)

MINIMUM IN-SERVICE BUSHING FLANGE THICKNESS = F_T = .030

[1] SHIM TO INCLUDE NO. 32 FINISH AND MAKE FLAT WITHIN 0.002 INCH

MATERIAL: 1. CRES (W_T = 0.015 MINIMUM)

[2] ADJACENT BUSHING FLANGES MUST BE FLAT WITHIN 0.005 INCH.
IF F_T IS WITHIN LIMITS, INSTALL THE SHIMS FOR VIEW A-A AS FOLLOWS TO PUT THE AXIAL CLEARANCE BACK TO THE DESIGN LIMITS:

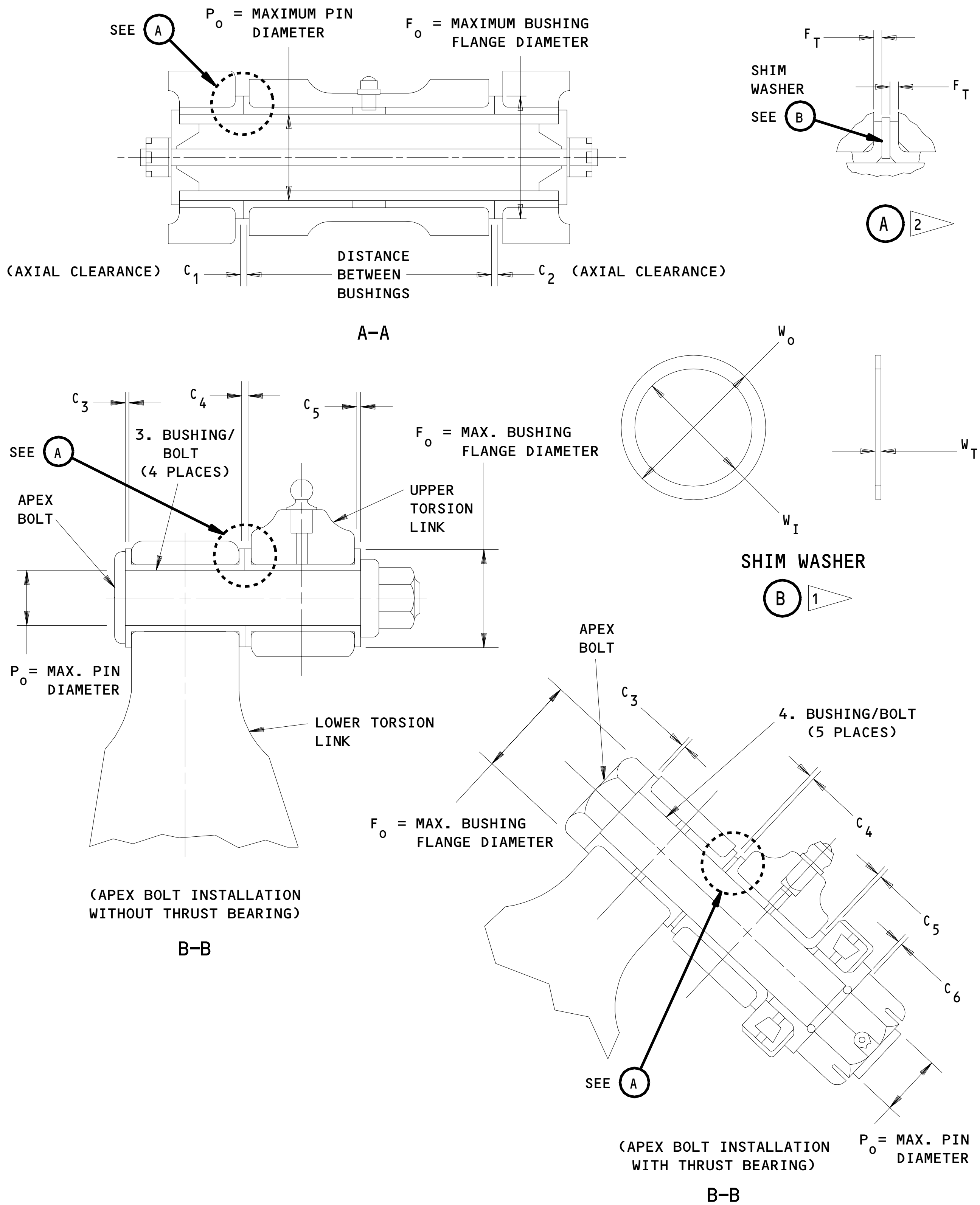
A. IF C_T IS NOT LARGER THAN 0.030,
INSTALL ONE SHIM WASHER AT C_1 OR C_2 ADJACENT TO THINNEST FLANGE.

B. IF C_T IS LARGER THAN 0.030,
INSTALL WASHERS OF EQUAL THICKNESS (APPROXIMATELY) AT C_1 AND C_2.

INSTALL THE SHIMS FOR VIEW B-B AT C_2.

[3] SEE INSPECTION/CHECK SECTION AT PARTICULAR JOINT TO FIND THE MAXIMUM ALLOWABLE SERVICE CLEARANCE.
FOR VIEW A-A, THE RECOMMENDED AXIAL CLEARANCE IS 0.001/0.004 AFTER YOU INSTALL THE SHIMS.
FOR VIEW B-B, MAKE A SHIM WASHER THAT IS EQUIVALENT TO THE TOTAL THICKNESS CLEARANCE AND INSTALL BETWEEN THE TORSION LINKS.

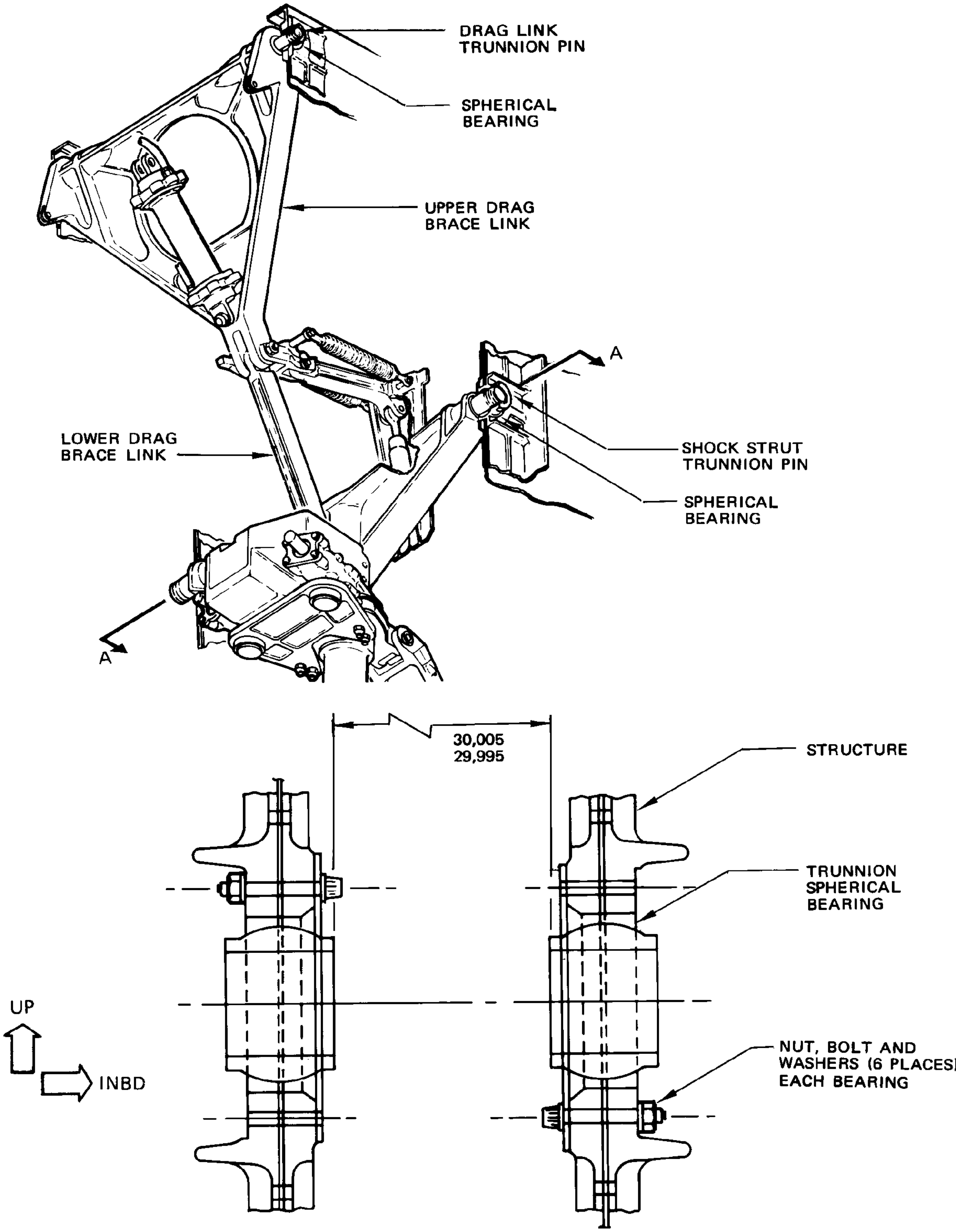
Special Repairs - Shim Axial Clearance
Figure 801 (Sheet 1)



Special Repairs - Shim Axial Clearance
Figure 801 (Sheet 2)

NOSE GEAR TRUNNION BEARING - REMOVAL/INSTALLATION

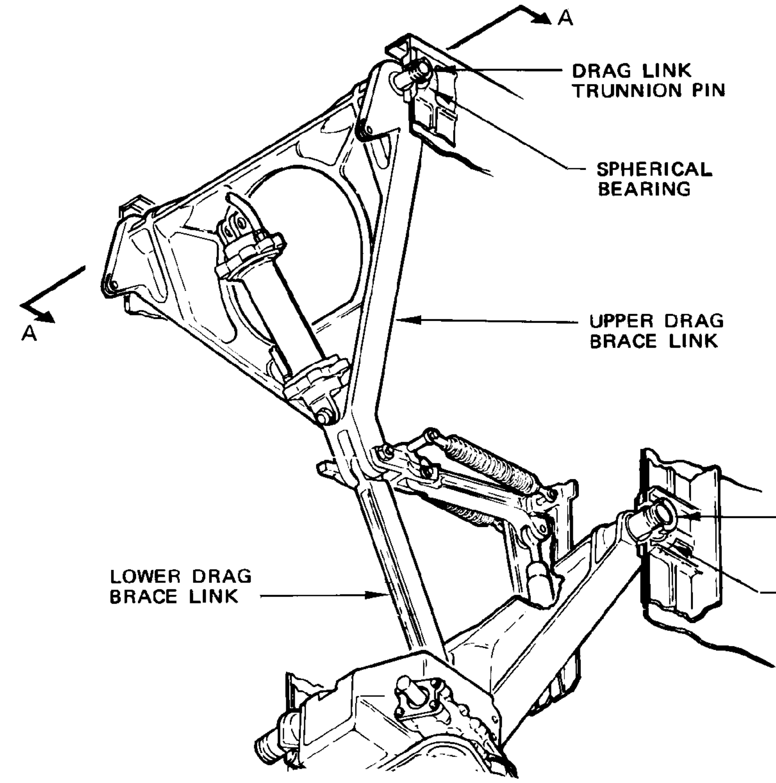
1. General
   A. The trunnion bearing is removed after damage or excessive wear. The nose gear must be removed first to obtain access to the trunnion bearing.
2. Equipment and Materials
   A. Ground Lock Assemblies - F72735 (Ref 32-00-01)
   B. Chemical and Solvent Resistant Finish - BMS 10-11, Type I
   C. Trunnion Pin and Bearing Puller Set - F80158-1
   D. Grease - BMS 3-33 (Preferred)
   E. Grease - MIL-PRF-23827 (Supercedes MIL-G-23827) (Alternate)
   F. Grease - MIL-G-21164 (Alternate)
3. Remove Nose Gear Trunnion Bearing
   A. Remove nose landing gear (Ref 32-21-0, Removal/Installation).
   B. Remove nuts, washers, and bolts retaining bearing.
   C. Remove bearing with trunnion bearing puller.
   D. Remove shims from structure.
4. Install Nose Gear Trunnion Bearing
   A. Clean bearing housings in structure.
   B. Clean and lightly lubricate all surfaces of bearing.
   C. Install bearing in housing.
   D. Check dimension between inside faces of spherical bearing and determine dimension of shims required to achieve 30.005- to 29.995-inch dimension (Fig. 401).
   E. Remove trunnion bearing.
   F. Remove 0.003-inch laminations as required from shims to achieve required thickness for each bearing, and coat each delaminated surface with primer.
   G. Install bearings and shims in structure. Maximum shim thickness to be installed with each bearing is 0.066 inch.
   H. Install bolts, washers and nuts (6 places) to retain bearing.
   I. Check distance between bearings. If necessary, adjust shims per steps E through H.
   J. Install nose gear. Refer to 32-21-0, Nose Landing Gear - Removal/Installation.

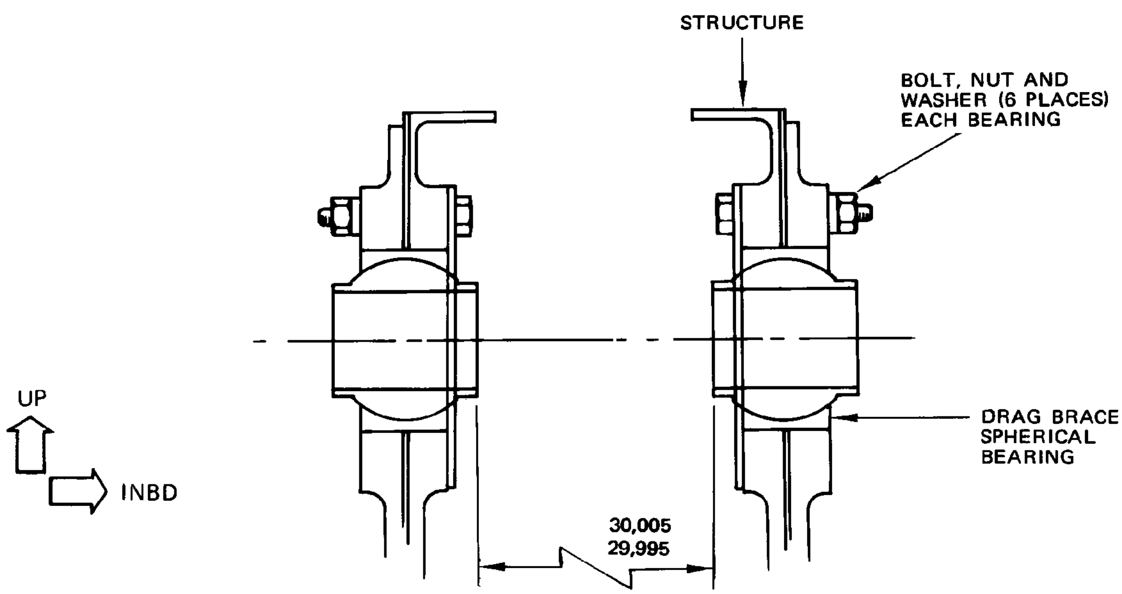


Nose Gear Trunnion Bearing Installation
Figure 401

NOSE GEAR DRAG BRACE BEARING - REMOVAL/INSTALLATION

1. General
   A. The drag brace bearing is removed after damage or excessive wear. The nose gear drag brace must be removed first to obtain access to the drag brace bearing.
2. Equipment and Materials
   A. Ground Lock Assemblies - F72735 (Ref 32-00-01)
   B. Epoxy Primer - BMS 10-11, Type I
   C. Grease - BMS 3-33 (Preferred)
   D. Grease - MIL-PRF-23827 (Supercedes MIL-G-23827) (Alternate)
   E. Grease - MIL-G-21164 (Alternate)
3. Remove Nose Gear Drag Brace Bearing
   A. Remove nose gear drag brace (Ref 32-21-21, Removal/Installation).
   B. Remove nuts, washers and bolts retaining bearing.
   C. Remove bearing and shims from structure.
4. Install Nose Gear Drag Brace Bearing
   A. Clean bearing housings in structure.
   B. Clean and lightly lubricate all surfaces of bearing.
   C. Install bearing in housing.
   D. Check dimension between inside faces of spherical bearing and determine dimension of shims required to achieve 30.005- to 29.995-inch dimension. (See figure 401.)
   E. Remove drag brace bearing.
   F. Remove 0.003-inch laminations as required from shims to achieve required thickness for each bearing, and coat each delaminated surface with primer.
   G. Install bearings with shims in structure. Maximum shim thickness to be installed with each bearing is 0.066 inch.
   H. Install bolts, washers and nuts (6 places) to retain bearing.
   I. Check distance between bearings. If necessary, adjust shims per step E through H.
   J. Install nose gear drag brace. Refer to 32-21-21, Nose Gear Drag Brace - Removal/Installation.





SHOWN WITHOUT UPPER
DRAG BRACE LINK INSTALLED
SECTION A-A

Nose Gear Drag Brace Bearing Installation
Figure 401

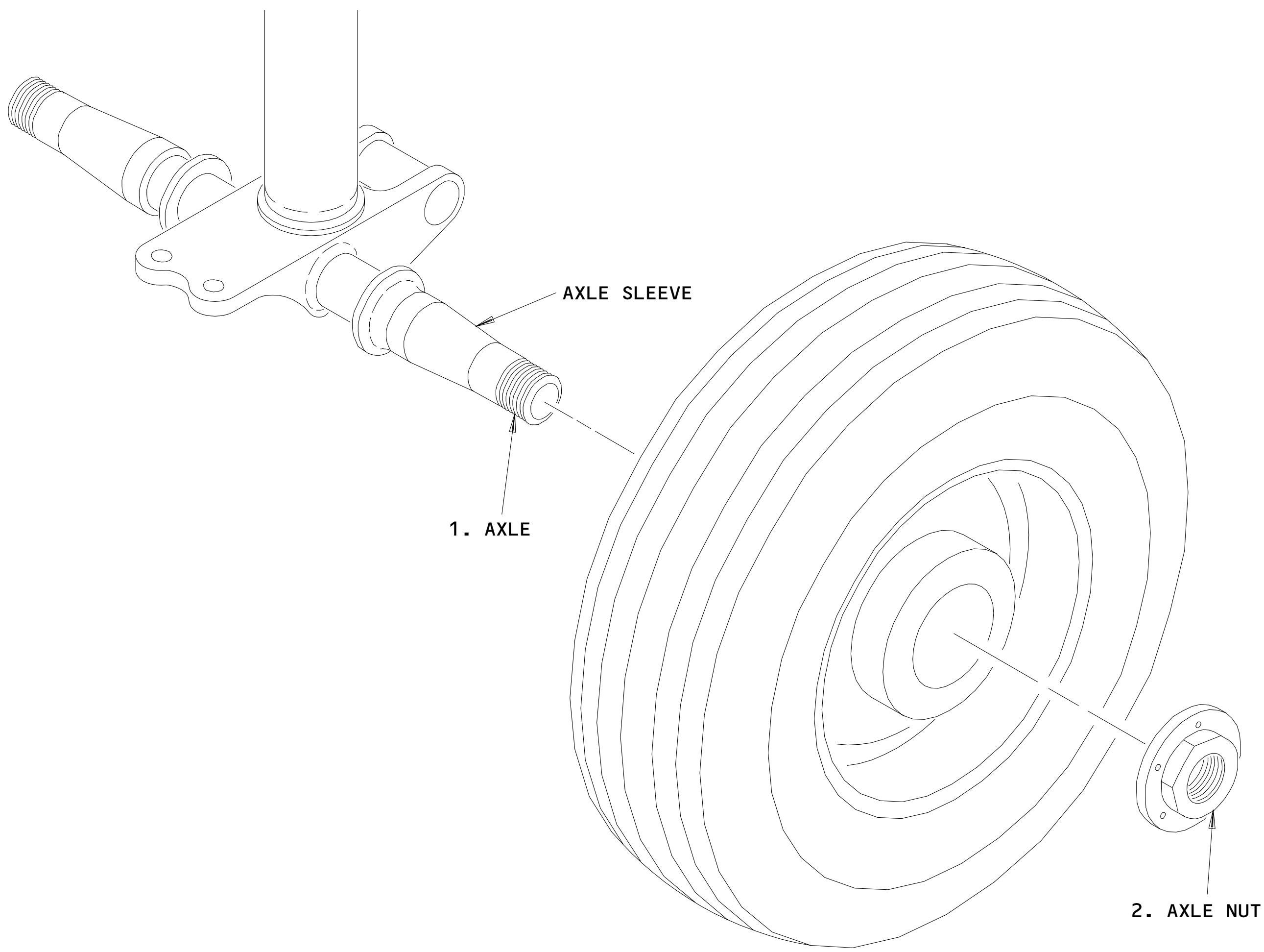
NOSE GEAR AXLE THREAD AND AXLE NUT - INSPECTION/CHECK

1. General
   A. This data has illustrations and a wear limit chart. No procedure is given in this piece that permits access for inspection. For this data, refer to Nose Gear Wheel and Tire - Removal/Installation.
2. Nose Gear Axle Thread and Axle Nut Inspection/Check
   A. Special Tools and Equipment
      (1) Axle Thread NO-GO Gage Tool for pitch diameter.
         (a) Precise Tool NG2.0000-16 PTG THREADSNAP, used to examine the pitch diameter of the axle thread with undersized configuration.
         (b) Precise Tool NG2.0625-16 PTG THREADSNAP, used to examine the pitch diameter of the axle thread with original configuration.
      (2) Micrometer of appropriate size and accuracy, used to measure the major diameter of the axle thread.
      (3) Axle Nut NO-GO Gage Tool for minor diameter.
         (a) Plug Gage, Landing Gear Nut, F80198-14, used to examine the minor diameter of the axle nut with original configuration or equivalent vendor tool Class X, 1.9949 Go/2.0034 No-Go with handle.
         (b) Plug Gage, Landing Gear Nut, F80198-15, used to examine the minor diameter of the axle nut with undersized configuration or equivalent vendor tool Class X, 1.9391 Go/1.9477 No-Go with handle.
      (4) Axle Nut NO-GO Gage Tool for pitch diameter.
         (a) NO-GO Gage, 2-1/16-16 UNS 3B No-Go member only with handle, pitch diameter 2.0272, used to examine the pitch diameter of the axle nut with original configuration.
         (b) NO-GO Gage, 2-16 UNS 3B No-Go member only with handle, pitch diameter 1.9647, used to examine the pitch diameter of the axle nut with undersized configuration.
      (5) CHF/PD -- Axle external thread gage tool, Johnson Gage Co., Inc. (V74979)(Optional)

      NOTE: All the NO-GO gage tools, except for the F80198-XX, can be purchased from PRECISE TOOL and GAGE CO. INC., 13300 S.E. 30th St., Suite #201, Bellevue, WA 98005 USA, Tel. No. (206) 746-1234/623-1120, Fax No. (206) 747-8131.

B. Do a check on the nose gear axle thread and axle nut wear limits (Fig. 601).

CAUTION: ON AIRPLANES WITH REWORKED AXLES, MAKE SURE THERE IS A MARKING WHICH READS "CAUTION - SPECIAL AXLE NUT REQUIRED" ALONG THE UPPER OUTER ENDS OF THE AXLE SLEEVE. THE MARKING WILL CONSIST OF BLACK LETTERS ON A YELLOW BACKGROUND. IF MARKING IS NOT ON THE AXLE, THE INCORRECT AXLE NUT MAY BE INSTALLED. IF THE INCORRECT AXLE NUT IS INSTALLED, THE WHEEL MAY FALL OFF DURING TAKEOFF OR LANDING.



Nose Gear Axle Wear Limits
Figure 601 (Sheet 1)

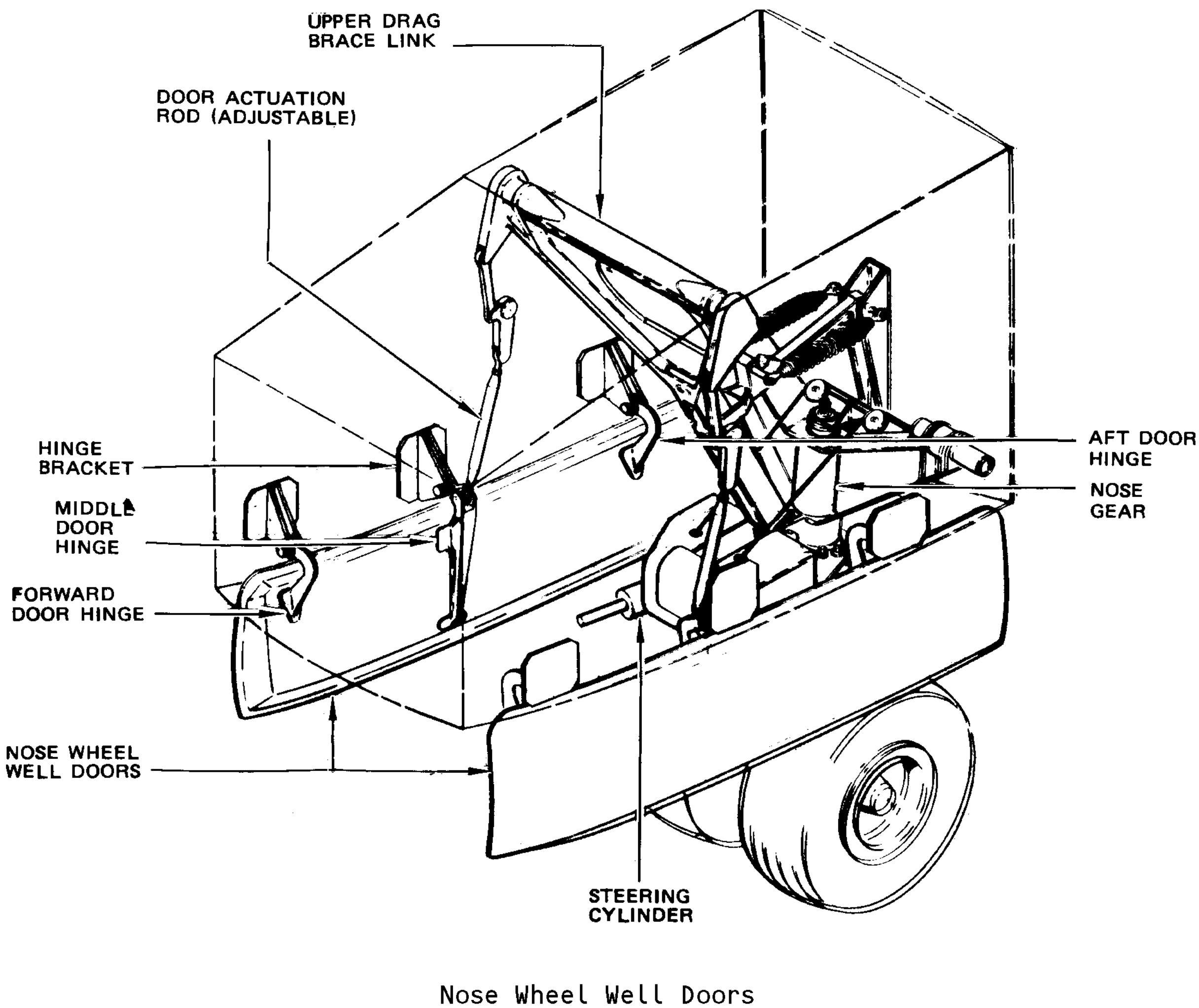
INDEX NO.	PART NAME	DIM.	DESIGN LIMITS DIAMETER MIN	DESIGN LIMITS DIAMETER MAX	WEAR LIMITS PERMITTED WEAR DIM.	WEAR LIMITS MAX DIA CLEARANCE	REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR
1 [7]	AXLE	[1]	2.0595 [4]	2.0625	2.048			X	[6]
		[2]	2.0189 [5]	2.0219	2.009			X	[6]
1 [8]	AXLE	[1]	1.9910	1.9940	1.986		X		
		[2]	1.9564	1.9594	1.946		X		
2 [7]	NUT [10]	[2]	2.0219	2.0239	2.027		X		
		[3]	1.9950	1.9970	2.003		X		
2 [9]	NUT [11]	[2]	1.9594	1.9614	1.964		X		
		[3]	1.9392	1.9412	1.947		X		

[1] MAJOR DIAMETER
[2] PITCH DIAMETER
[3] MINOR DIAMETER
[4] 2.0531 INCHES MAJOR DIAMETER FOR SOME AIRPLANES
[5] 2.0179 INCHES PITCH DIAMETER FOR SOME AIRPLANES
[6] REWORK THE AXLE PER OHM
[7] ORIGINAL CONFIGURATION
[8] UNDERSIZED CONFIGURATION
[9] NUT FOR UNDERSIZED AXLE
[10] 2.0625-16 UNS 3B THREAD
[11] 2.0000-16 UNS 3B THREAD

Nose Gear Axle Wear Limits
Figure 601 (Sheet 2)

NOSE GEAR DOORS - DESCRIPTION AND OPERATION

1. General
   A. The nose gear doors are clamshell type, and consist of two doors that fair with the fuselage contour when closed. (See figure 1.) The doors close over the nose wheel well in the lower nose section of the fuselage when the gear is retracted and open when the gear is extended. They remain open at all times when the nose gear is in the down position. Refer to 32-33-0 for information on nose gear door retraction.
2. Nose Wheel Well Doors
   A. The nose wheel well doors are of glass fabric reinforced epoxy laminate faced honeycomb construction. Three hinge arms extend to the side of each door to engage hinges at the outer edges of the wheel well. The lower end of a door actuation rod is connected to a raised lug on the middle hinge of each door. A link and crank assembly connected to an arm protruding from the upper drag brace work with the door actuation rods to open and close the doors for extension and retraction.



Nose Wheel Well Doors
Figure 1

NOSE GEAR WHEEL WELL DOORS - REMOVAL/INSTALLATION

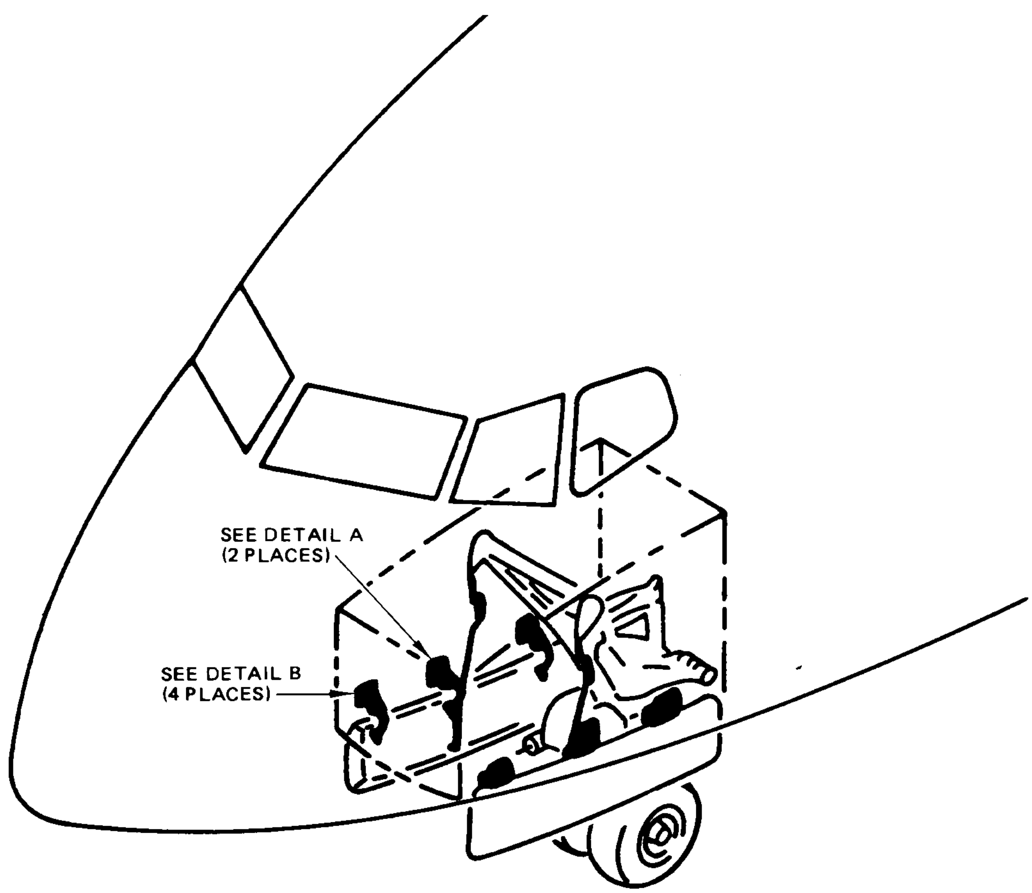
1. Equipment and Materials
   A. Ground Lock Assemblies - F72735 (Ref 32-00-01)
   B. Tail Support Jack
   C. Spring Scale - 0-100 pounds capacity
   D. Aluminum oxide closed coat cloth, 180 grit, Federal Specification P-C-451 or Garnet closed coat abrasive paper, 180 grit, Federal Specification P-P-121 (Ref 20-30-51)
   E. Epoxy Primer - BMS 10-11, Type I (Ref 20-30-41)
   F. Epoxy Enamel - BMS 10-11, Type II, Color BAC702 white (Ref 20-30-41)
   G. Lacquer Thinner - MIL-T-6094 (Ref 20-30-41)
   H. Cotton or Linen Cloth
   I. G01912 Lockwire - Monel (0.032 In. Dia.) (NASM20995NC32 QQ-N-281)
   J. Corrosion Preventive Compound - MIL-C-11796, Class 3 (Ref 20-30-21)
2. Remove Wheel Well Doors (Fig. 401).
   A. Install ground lock assemblies in nose and each main landing gear (Ref 32-00-01).
   B. Jack airplane nose until nose wheel clears. Lower tail support jack as nose is raised (Ref Chapter 7, Jacking).
   C. Detach door operator rod (1) from door center hinge (4) by removing bolt (5).
   D. Detach bonding jumper (19) from forward and aft door hinges (13).
   E. Support door and remove bolts (18, 6, 18) from forward (13), center (4), and aft (13), hinges respectively.
   F. Remove door.
3. Install Wheel Well Doors (Fig. 401)

   NOTE: A NLG door rigging check is not required if reinstalling the same NLG door that was removed and no changes to the adjustments to the door stops, door seals, door hinges, or door pushrods were made.

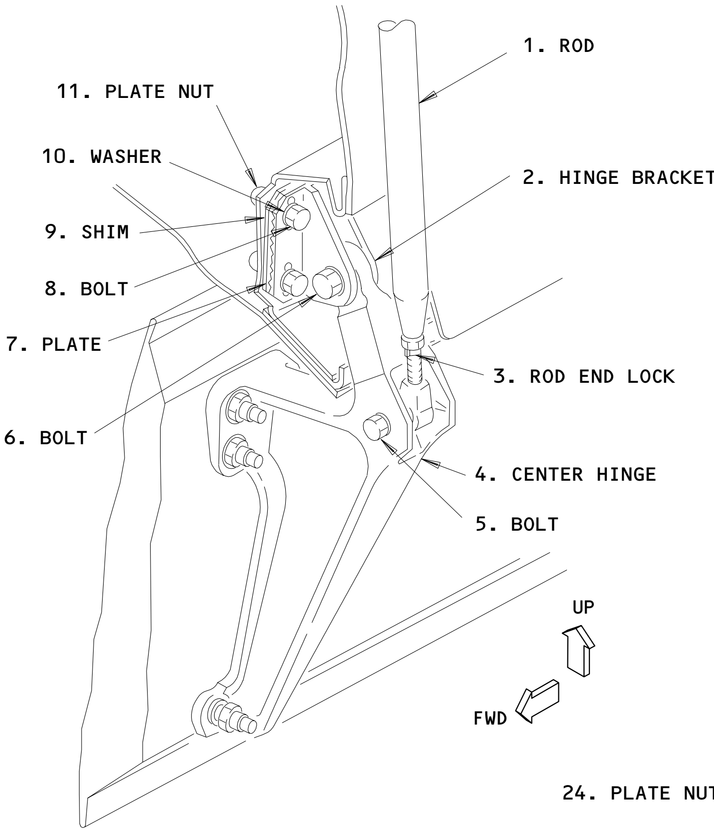
   A. Pressurize hydraulic System A (Ref 29-11-0 MP).

      WARNING: CHECK THAT GROUND LOCK ASSEMBLIES ARE INSTALLED IN MAIN LANDING GEAR TO PREVENT INADVERTENT OPERATION OF GEAR. INJURY TO PERSONNEL AND/OR EQUIPMENT COULD RESULT IF GEAR RETRACTS.

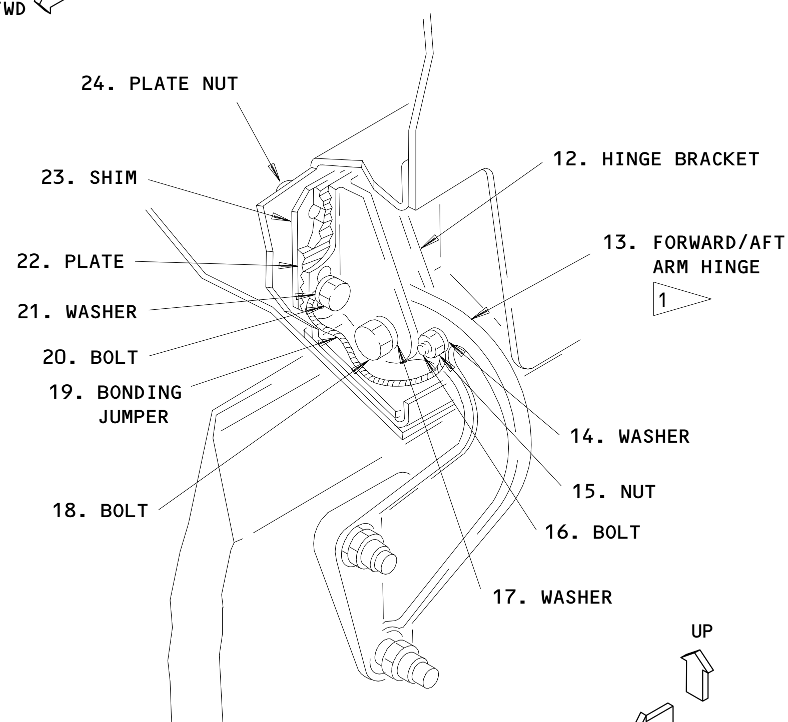
   B. Retract nose landing gear.
   C. Position door for installation and install close tolerance bolts (18) with thin anodized aluminum alloy washer (17) under head in forward and aft hinges.
   D. Install nut on each bolt with corrosion resistant steel cotter pin.
   E. Close door by hand and adjust forward and aft stops until forward and aft external surface edges of door fair with adjacent surfaces of fuselage skin within 0.03 inch when door fairs inside fuselage skin and 0.06 inch when it fairs outside, and external inboard edges of doors fair within 0.06 inch.



Nose Wheel Doors Installation
Figure 401 (Sheet 1)



DETAIL A



1 NOTE: THE FORWARD AND AFT HINGE ARMS ARE TWO DIFFERENT PARTS. DO NOT INTERCHANGE DURING INSTALLATION.

DETAIL B

Nose Wheel Doors Installation
Figure 401 (Sheet 2)

F. Adjust door for proper clearances.
   (1) Remove bolts (20) from forward hinge bracket (12).

      NOTE: Plate nuts (24) are on opposite side of bulkhead from hinge bracket (12) for the hinge bracket mounting bolts.

   (2) Remove existing shims or add proper thickness of laminated aluminum alloy shim or shims (23), as necessary, under the serrated forward hinge bracket plate (22) to adjust door for a clearance of 0.20 + 0.05/-0.02 inch between outboard edge of door and adjacent fuselage skin, with bolts installed and tightened moderately and doors closed by hand. Use this same adjustment procedure to adjust for a clearance of 0.10 + 0.10/-0.04 inch between inboard edges of the doors.

      NOTE: Peel laminated shim or shims, if necessary, for proper thickness to obtain correct adjustment.

   (3) Repeat steps (1) and (2) for aft hinge.
G. Fair external outboard surface of door with adjacent fuselage skin surface.
   (1) Loosen four bolts (20) in each of the forward and aft door hinge brackets (12) (detail B).
   (2) Move each hinge bracket so serrations, on back of hinge bracket come to the position, up or down, over mating serrations in hinge bracket plate (22) so the outboard external edge of door fairs with adjacent fuselage skin. A maximum of 0.06 inch mismatch adjacent to door hinges and door brackets respectively is allowable.
   (3) Tighten the four bolts (20) in each of the forward and aft hinge brackets (12).
H. Connect door center hinge (4) to center hinge bracket (2). Remove bolts (8) from center hinge bracket (2) (detail A).

   NOTE: Plate nuts (11) are on the opposite side of bulkhead from hinge bracket (2) for the hinge bracket mounting bolts (8). The hinge bracket must be removed and reinstalled, after it has been attached to the door center hinge, to ensure alignment with door center hinge.

   (1) Position hinge bracket (2) on center door hinge (4) and insert center hinge close tolerance bolt (6).
   (2) Position center hinge bracket plate (7, detail A) by mating proper serrations of the hinge bracket plate and those on back of hinge bracket (2) so holes align for installation of hinge bracket bolts (8).
   (3) Tape the hinge bracket plate in this position.

(4) Install aluminum alloy laminated shim or shims (9), as necessary, so that center hinge bolt (6) can be slid into center hinge bracket and on through center hinge of door and the hinge bracket by hand pressure.

NOTE: Peel laminated aluminum alloy shim or shims (9), that are to be installed, to obtain this adjustment.

(5) Install four close tolerance bolts (8) of proper length, with anodized aluminum alloy washers (10) under the heads, through the elongated holes in hinge bracket (2), hinge bracket plate (7), the laminated shim or shims (9), and each bolt screwed into the floating, self-sealing, self-locking plate nuts (11) which are mounted on outboard sides of wheel well side bulkheads.

NOTE: The center hinge bolt (6) should be free to move by hand pressure after the above bolts (8) are tightened.

(6) Install close tolerance center hinge bolt (6) with aluminum alloy, anodized, thin washer under bolt head with castellated nut and corrosion resistant steel cotter pin.

I. Clean areas on forward and aft hinges (13) of door which the corrosion protection washers (14) will contact when installed.

NOTE: The corrosion protection washers will be installed between the bonding jumper (19) terminal and the door hinge (13).

(1) Clean painted area by applying lacquer thinner using a clean cloth. Use an uncontaminated portion of cloth for each application, taking care to avoid overrun or spilling of thinner beyond limits of the area to be bonded.
(2) Spot area by hand application of abrasive material. If practical, use a circular or elliptical motion of the abrasive to provide a uniform smooth finish.

J. Connect bonding jumper (19) to forward and aft hinges (13) on door.
(1) Install close tolerance bolt (16) in forward and aft door hinges with aluminum alloy flat washer under head of each bolt.
(2) Slide thin aluminum alloy washer (14) on bolt for corrosion protection.
(3) Slide bonding jumper (19) terminal on bolt (16).
(4) Slide aluminum alloy flat washer on bolt.
(5) Slide lockwasher on bolt.
(6) Install 450 degree self-locking nut (15) on bolt to attach bonding jumper.

(7) Apply a coat of epoxy primer to stripped areas that are exposed outside the corrosion preventive washer.
(8) Apply a finish coat of epoxy enamel to primed areas to match adjacent areas.

K. Connect door operator rod (1) to door center hinge (4).
(1) Apply thin coat of corrosion preventive compound to short thread, close tolerance, corrosion resistant steel bolt (5).
(2) Position door operator rod (1) in fork of door center hinge (4) and insert compound coated bolt through hinge and door operator rod end.

NOTE: If rod was previously adjusted, the rod may need unlocking and extending to enable bolt insertion. Adjust and lock per par. L.

(3) Slide washer on bolt and install castellated shear nut with corrosion resistant cotter pin.

L. Adjust door operator rod.
(1) Remove lockwire from jamnut and rod end lock (3) on each end of door operator rod (1).
(2) Loosen jamnut on each rod end of rod (1).

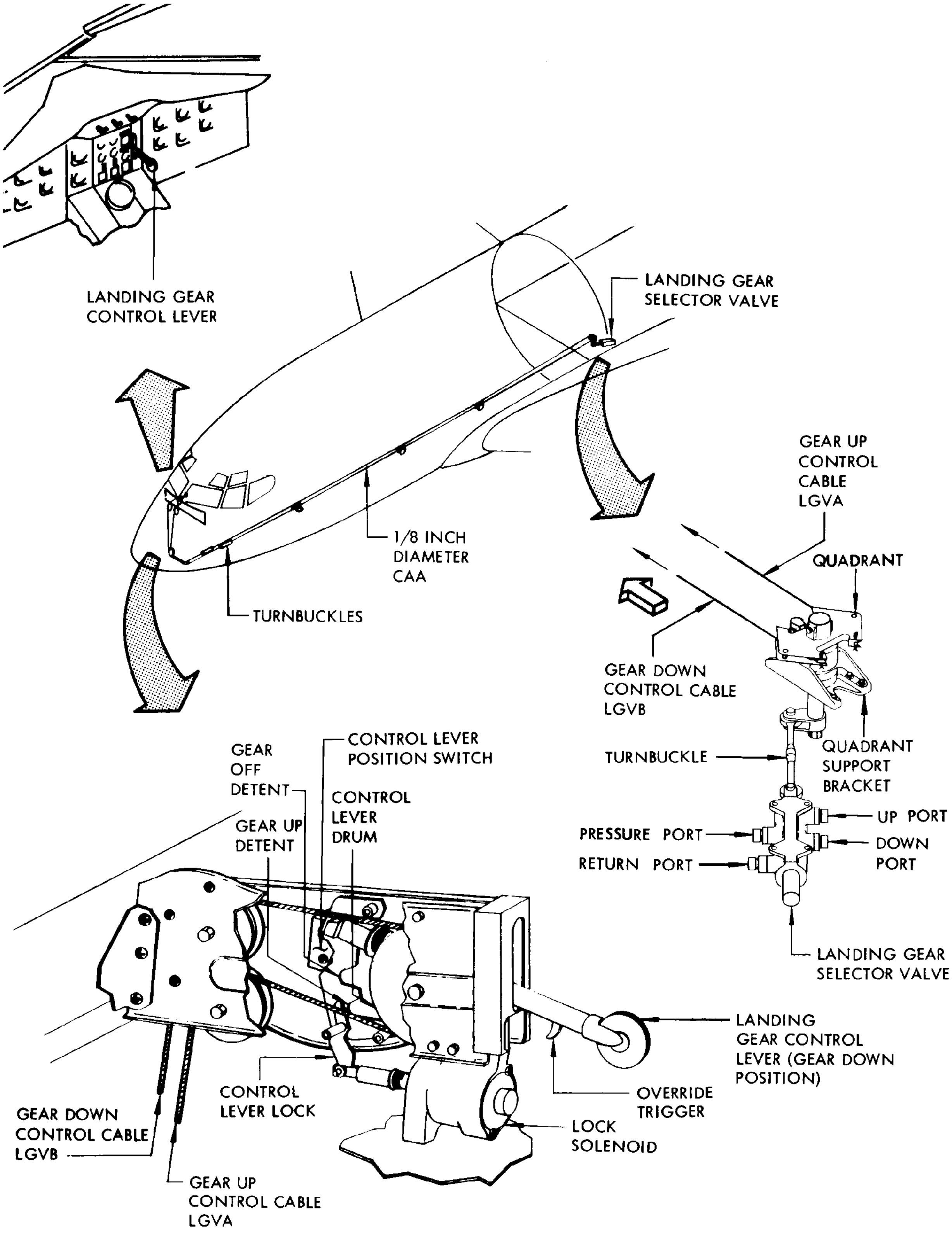
NOTE: Only loosen jamnut so operator rod can be turned for adjustment. Excessive loosening will disengage rod end (3) lock from end of operator rod barrel.

(3) While applying 70 + 10 pounds down load approximately 1.0 inch aft and 1.0 inch outboard of forward inboard corner or 85 + 10 pounds at forward stop fitting on each door, adjust each door operator rod until forward inboard corner on each door is 0.10 + 0.02 inch below body contour.
(4) Check for contour mismatch, as obtained in step 3.G.
(5) Remove weight from door.
(6) Tighten jamnut on each door operator rod end.
(7) Lockwire each jamnut and rod end lock (3) on each rod (1) end with NC32 Monel lockwire using double twist method.

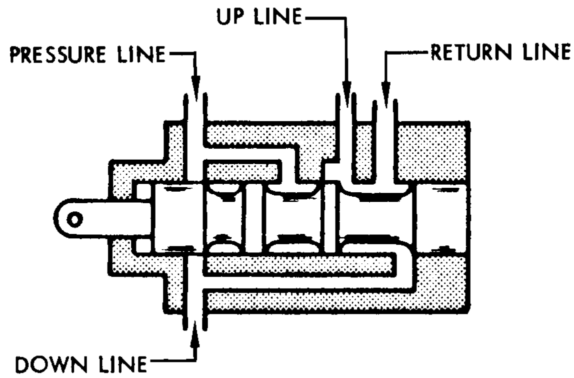
M. Check door operation.
(1) Pressurize Hydraulic System A (Ref 29-11-0 MP).
(2) Extend and retract gear and check for proper operation of doors. Refer to 32-33-0 for nose gear extension and retraction.
(3) Extend gear.
(4) Install ground lock assembly on nose gear (Ref 32-00-01).
(5) Remove jacks from airplane.

LANDING GEAR CONTROL SYSTEM - DESCRIPTION AND OPERATON

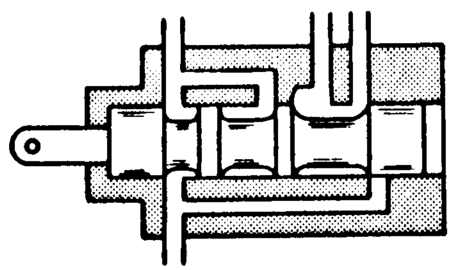
1. General
   A. The landing gear control system is operated by moving a control lever projecting from the pilots' instrument panel (Fig. 1). A cable system transmits the control lever movement to a selector valve in the left wheel well. When positioned by the control lever the selector valve directs hydraulic pressure to the actuators for gear retraction and extension. The control lever is provided with a lock, to prevent the lever from being moved into UP position when the airplane is supported on the gear. An override trigger in the control lever may be used to bypass the lock for testing or if the lock system should lose electrical power.
2. Landing Gear Selector Valve
   A. The landing gear selector valve directs hydraulic pressure to the landing gear up and down lines (Fig. 2). Return fluid from the landing gear system passes back through the selector valve and on to the system A reservoir. The selector valve is bolted to the ceiling of the left main wheel well. Linkage connects the selector valve to the control cable system. When the landing gear control handle is operated, motion from the handle is transferred through the cable system to a shaft passing through the wheel well ceiling. An arm on the end of shaft below the ceiling positions the selector valve through an adjustable link.
3. Landing Gear Control Cable System
   A. The landing gear control cable system transfers movement from the control lever to the landing gear selector valve (Fig. 1). The control cable system consists of four cables, two short and two long. The cables are 1/8 inch diameter 7X19 carbon steel. Short cables run forward and down from the control lever drum, then aft under the control cabin floor. Long cables run forward from the selector valve control drum to meet the control lever cables at a point under the control cabin floor where the cables are joined by turnbuckles.
4. Landing Gear Control Lever
   A. The landing gear control lever runs in a guide as the lever is moved up or down. The guide has detents to hold the control lever in any one of three positions, UP, OFF, or DN. To change the control lever position it is necessary to pull out the lever to release a roller on the inner end from the detent.



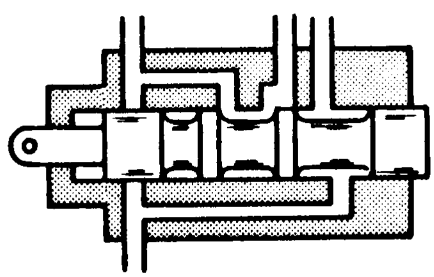
Landing Gear Control Components Location
Figure 1



OFF POSITION



GEAR DOWN



GEAR UP

Landing Gear Control System
Figure 2

B. The lock override mechanism enables the inner end of the control lever to be pulled clear of the lock stop when the control lever lock is engaged. The override feature is obtained by making the control lever shaft in two parts, one sliding inside the other. A trigger connected to the inner part, projects through a slot in the underside of the outer shaft. A compression spring between a flange on the inner shaft and the control handle quadrant holds the trigger against the bottom of the slot (Fig. 3). When the control lever is pulled, both the inner and outer shafts move together through the quadrant, until the inner end clears the detent. At this point a stop prevents further movement. To retract the inner end of the lever far enough to pass the lock stop the trigger must be operated. Pulling the trigger telescopes the inner shaft into the lever, the additional retraction of the control lever inner end thus obtained, allows the lever to clear the lock stop.

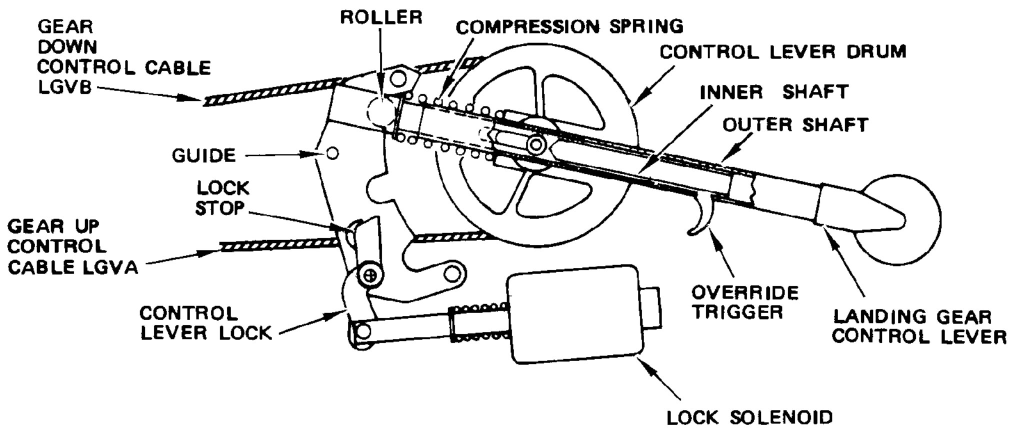
C. The control lever position switch is mounted in the control lever support channel behind the control lever. The switch is actuated by the inner end of the control lever as it drops into the detent. For more information on the switch, refer to 32-61-0, Gear Position Indicating System.

5. <u>Landing Gear Control Lever Lock System</u>

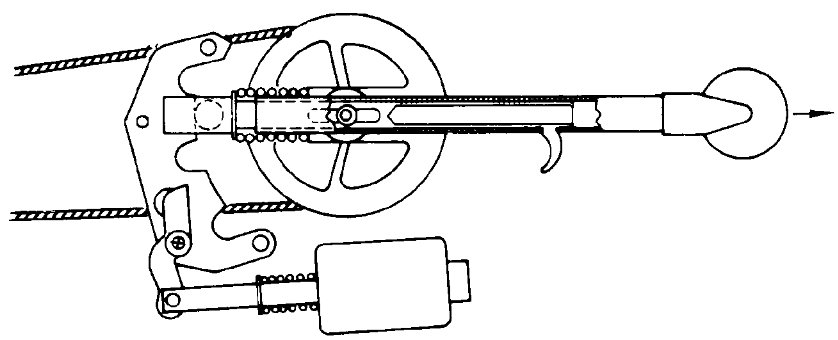
A. The landing gear control lever lock system prevents the control lever moving past OFF position from DN selection until airplane weight is off landing gear. The control lever lock control consists of a mechanical lock operated by a lock solenoid (Fig. 4). The lock solenoid is controlled by a safety relay operated by solid state circuits through the air safety sensor. The system operates on 28-volt dc power from a circuit breaker on panel P6. The control lever is normally released, only when the solenoid is energized.

B. The landing gear safety relay controls the power for the lock solenoid. The relay is installed in the landing gear electrical module, located in the electrical/electronic compartment. For more information on the relay, refer to 32-09-100.

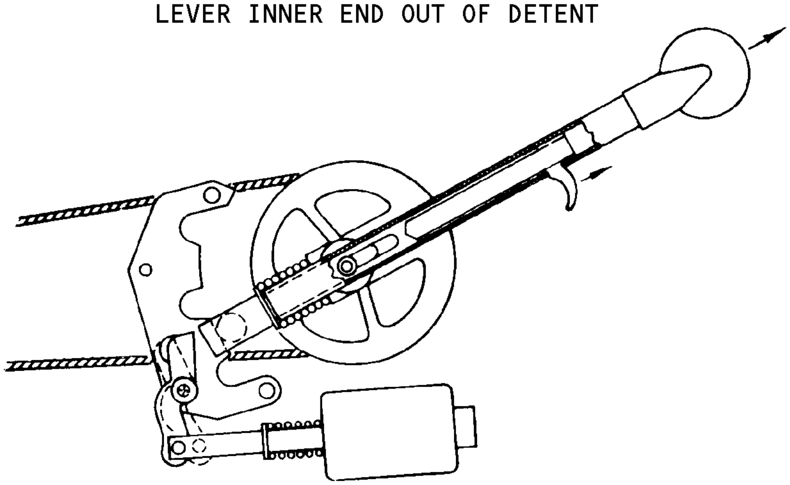
C. The landing gear air safety proximity switch controls the landing gear relay. When the airplane weight is on the landing gear, the sensor operates through solid state circuits to de-energize the relay. Spoiler linkage, driven by a teleflex cable from the extension and compression movement of the shock strut operates the switch. For more information on the switch, refer to 32-09-200.



LEVER IN DN POSITION



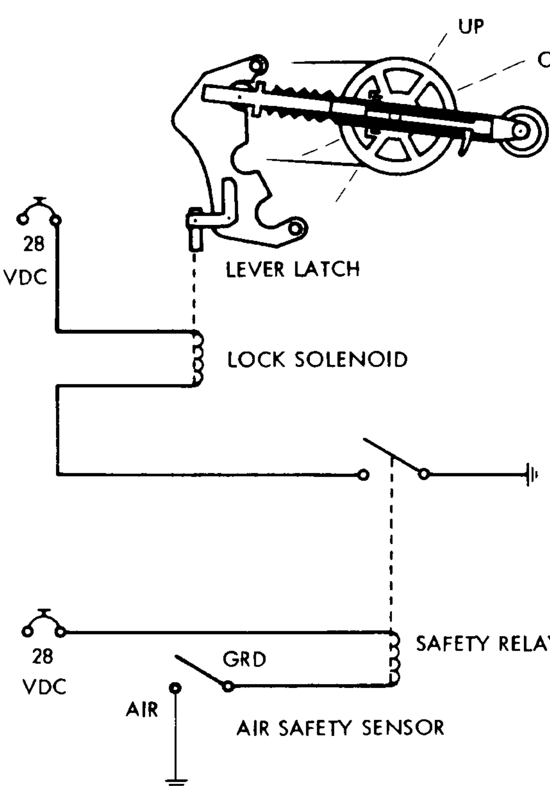
LEVER INNER END OUT OF DETENT



OVERRIDE TRIGGER PULLED TO ALLOW INNER
END OF LEVER TO CLEAR LOCK STOP

Landing Gear Control Lever Schematic
Figure 3

6. Operation
   A. When the control lever is pulled, the inner end is raised from a detent to free the lever for movement into another position. Moving the lever up or down rotates a cable drum to operate cables running from a quadrant above the left wheel well ceiling. As the quadrant rotates, it operates the landing gear selector valve on the underside of the ceiling, through a shaft, lever, and an adjustable link. Releasing the landing gear lever when the desired position has been selected, allows the lever end to drop into a detent and so hold the lever in position. In down position, the lever end operates a control lever position switch for the indicating and warning system.
   B. When the right main gear shock strut is compressed by airplane weight on the gear, a circuit opens to de-energize the landing gear safety relay. When de-energized, the relay opens contacts, cutting off power to the lock solenoid. The control lever lock then moves into locked position. When the shock strut extends, the proximity switch closes and the reverse sequence of operations energizes the lock solenoid to release the lock. The lock solenoid remains energized when gear is retracted, and electrical power is on airplane. An override trigger permits the lever to bypass the lock if a malfunction of the system causes the lock to engage.



Landing Gear Control Lever Lock Control Logic Flow Diagram
Figure 4

LANDING GEAR CONTROL SYSTEM - TROUBLE SHOOTING

1. General
   A. This procedure covers all landing gear control system components (control handle, control cable and selector valve) with exception of the control handle lock, which is covered in 32-31-21, Control Lever Lock System - Trouble Shooting.
   B. Trouble shooting is accomplished by performing an operation check of gear control handle and monitoring of hydraulic pressure at selector valve. Operate lock override mechanism (override trigger on handle) as required to clear lock stop when moving control handle. Airplane jacking or gear operation is not necessary in procedure.
2. Preparation for Trouble Shooting
   A. Check that landing gear control handle is in OFF position.
   B. Check that landing gear ground lock assemblies are installed (Ref 32-00-01).

      WARNING: CHECK THAT GROUND LOCK ASSEMBLIES ARE INSTALLED IN ALL LANDING GEAR TO PREVENT INADVERTENT OPERATION OF GEAR. INJURY TO PERSONNEL AND/OR DAMAGE TO EQUIPMENT COULD RESULT IF GEAR RETRACTS.

   C. Pressurize hydraulic system A (Ref 29-11-0).

3. Trouble Shooting Charts

No hydraulic pressure pulse is detected at selector valve DN port outlet hose when control handle is moved from OFF to DN position. Check control cable linkage to selector valve for proper adjustment. IF -

OK - Replace landing gear control selector valve per 32-31-51.	NOT OK - Adjust cable per 32-31-0.

No hydraulic pressure pulse is detected at selector valve UP port outlet hose when control handle is moved from OFF to UP position. Check control cable linkage to selector valve for proper adjustment. IF -

OK - Replace landing gear control selector valve per 32-31-51.	NOT OK - Adjust cable per 32-31-0.

Force required to move control handle through its angular travel is excessive (exceed 12 pounds). Check for jamming of cable by falling object or any other obstructions and repair as required.

Landing Gear Control System - Troubleshooting
Figure 101

LANDING GEAR CONTROL SYSTEM - ADJUSTMENT/TEST

1. General
   A. The landing gear control system is adjusted (rigged) when a component, or a cable is replaced or when the cable tension deviates more than + 15 pounds from the values given in Table I, Fig. 501.
2. Standard Tools and Equipment
   A. G32021 - Force Gage Equipment - Landing Gear Lever or Equivalent
3. Landing Gear Control System Adjustment
   A. Equipment and Materials
      (1) Rigging Pin MS20392-4 or equivalent 0.311 (-0.002/+0.000) inch diameter rod
      (2) Cable Tensiometer
      (3) Gear Ground Lock Assemblies - F72735 (Ref 32-00-01)
   B. Adjust (Rig) Landing Gear Control System
      (1) Check that landing gear ground lock assemblies are installed (Ref 32-00-01).
      (2) Disconnect link assembly between selector valve and bellcrank.
      (3) Place landing gear control handle in OFF position.
      (4) Install rigging pin in bellcrank (Fig 501)
      (5) Rig cables to the valve corresponding to ambient temperature as given in Table I, (Fig 501). Turnbuckles are accessible through access door 1103. Rig to free rigging pin.

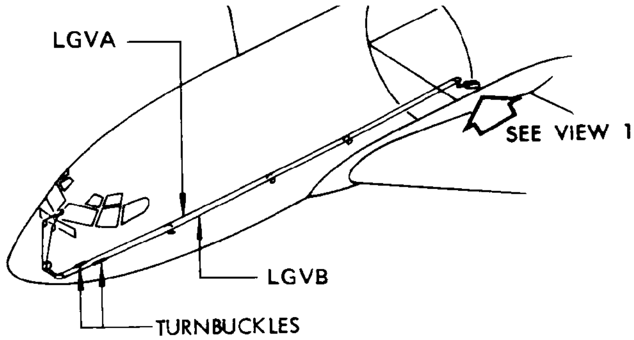
         NOTE: Temperature of airplane must be stabilized for one hour before adjusting cables.

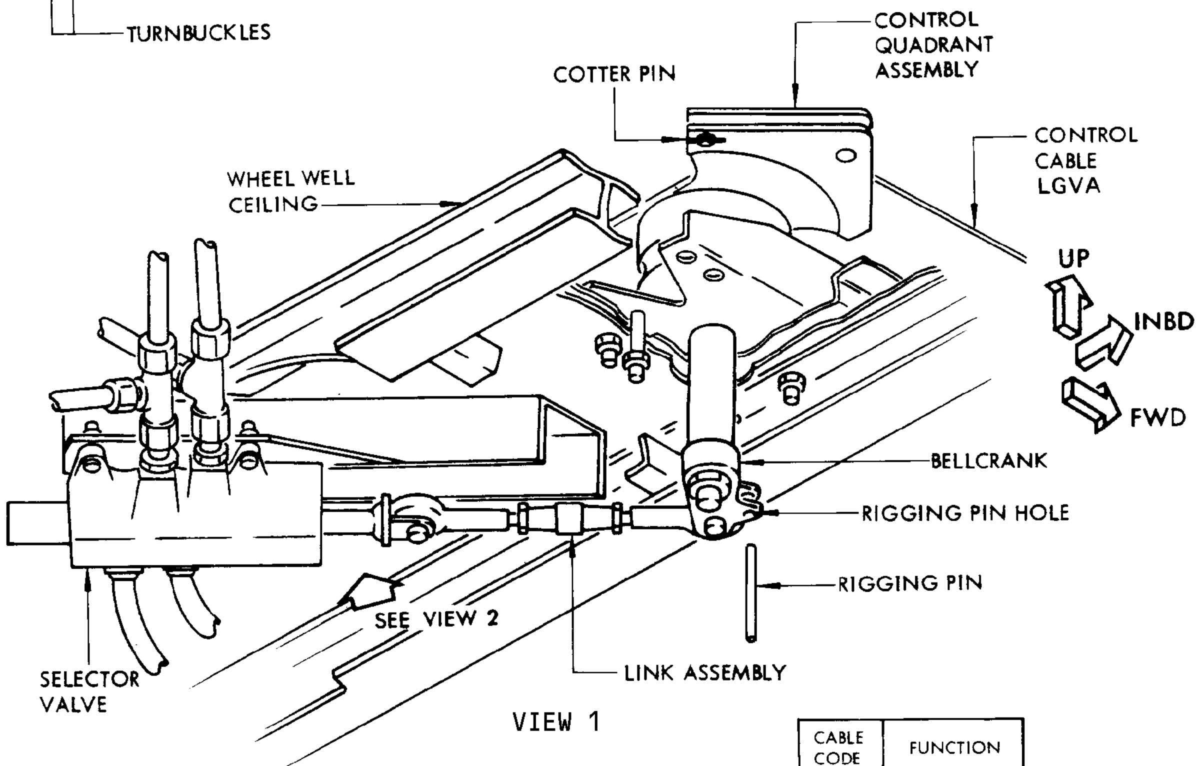
      (6) Remove rigging pin and cycle system for no load movement on either side of OFF position (full travel).
      (7) Reinstall rigging pin.
      (8) Recheck cable tension. Adjust as necessary.
      (9) Connect link assembly between selector valve and actuating bellcrank.

         NOTE: If components have been replaced or the length of actuating link assembly disturbed, set link to a nominal length of 7.3 (+ 0.02) inches between link end centers.

      (10) Check dimension between center of bolthole in valve slide and inboard machined face of selector valve (Fig. 501). Adjust link assembly so that the dimension is 1.875 (+ 0.020) inches when valve is in OFF position.
      (11) Lock all adjustments and remove rigging pin.
      (12) Test control system per paragraph 3.

4. Test Landing Gear Control System
   A. Check that all landing gear ground locks are installed and hydraulic systems depressurized.
   B. Set landing gear control handle in down position.
   C. Check that force required to move control handle through its angular travel does not exceed 12 pounds.
   D. Check that valve slide has extended a minimum of 0.70 inches from OFF position.
   E. Operate override trigger and move control handle to UP position.
   F. Check that force required to move control handle through its angular travel does not exceed 12 pounds.
   G. Check that valve slide has retracted a minimum of 0.70 inches from OFF position.
   H. Return control handle to OFF position.



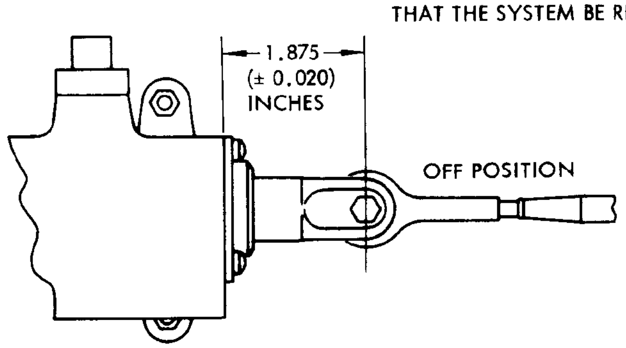


VIEW 1

CABLE CODE	FUNCTION
LGVA	LANDING GEAR UP
LGVB	LANDING GEAR DOWN

TABLE 1

1 AFTER INITIAL RIGGING, ANY DEVIATION OF ± 15 POUNDS AT 22°F OR ABOVE SHALL REQUIRE THAT THE SYSTEM BE RERIGGED.



VIEW 2

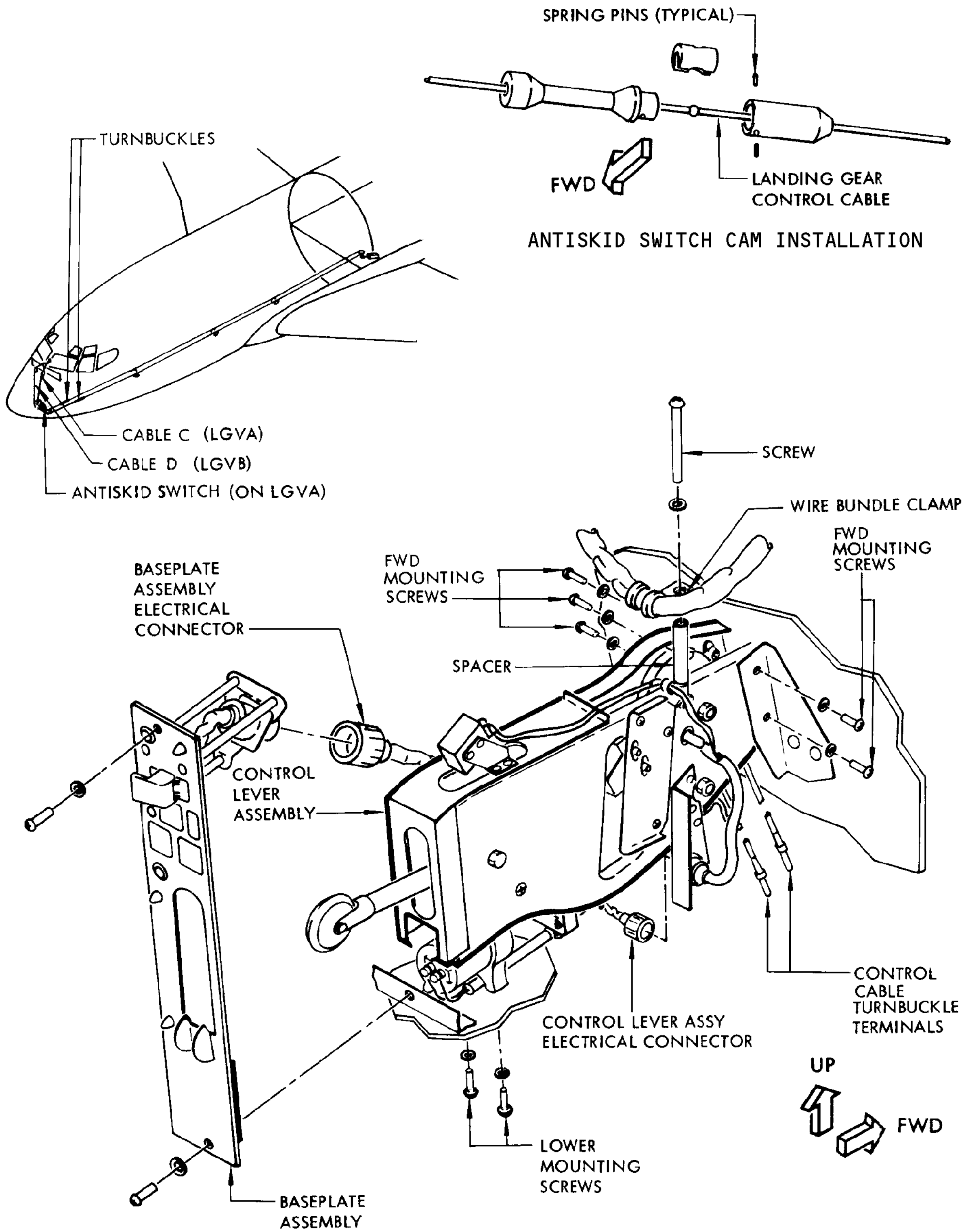
MLG CABLE TENSION CHART	
TEMP °F ± 5°	RIGGING LOAD LBS (+10/-0) 1
130	176
110	167
90	158
70	150
50	141
30	133
10	124
-10	115
-30	107
-40	102

Landing Gear Control System Adjustment
Figure 501

LANDING GEAR CONTROL LEVER ASSEMBLY - REMOVAL/INSTALLATION

1. Equipment and Materials
    A. Gear Ground Lock Assembly - F72735 (Ref 32-00-01)
    B. Ohmmeter
2. Remove Landing Gear Control Lever Assembly
    A. Check that gear ground locks assemblies are installed (Ref 32-00-01).
    B. Depressurize hydraulic system.
    C. Disconnect turnbuckles on landing gear control cables in forward nose compartment (Fig 401).
    D. Remove antiskid switch cam from forward of turnbuckles.
    E. Attach cords to cable terminals to facilitate stringing replacement cables.
    F. Remove that portion of the forward electronics panel directly beneath control lever.
    G. Release and lower center instrument panel and first officer's instrument panel.
    H. Remove baseplate assembly mounting screws.
    I. Disconnect baseplate assembly electrical connector and remove baseplate assembly.
    J. Disconnect control lever assembly electrical connector.
    K. Remove lower mounting screws.
    L. Remove screw and spacer supporting wire bundle clamp.
    M. Support control lever assembly and remove forward mounting screws.
    N. Remove control lever assembly, pulling cables out of pulleys and floor beams. Do not pull cords all the way out.
3. Prepare Landing Gear Control Lever Assembly for Installation
    A. Connect ohmmeter between pins 3 and 6 of control lever electrical connector.
    B. Place control lever in down position. Check that ohmmeter indicates continuity.
    C. Move control lever out of down position. Check that ohmmeter indicates no continuity as lever moves out of down detent.
    D. Disconnect ohmmeter.
4. Install Landing Gear Control Lever Assembly
    A. Place control lever assembly in place and install forward mounting screws (Fig. 401).
    B. Install lower mounting screws.
    C. String cables down over pulleys and through floor beams and connect turnbuckles.
    D. Assemble antiskid switch cam on cable.
    E. Secure wire bundle clamp with screw and spacer.
    F. Connect control lever assembly electrical connector.
    G. Install baseplate assembly.
    H. Connect baseplate assembly electrical connector.
    I. Adjust and test control system per 32-31-0.

J. Adjust and test antiskid switch. Refer to 32-42-51.
K. Close and fasten instrument panels.



Landing Gear Control Lever Installation
Figure 401

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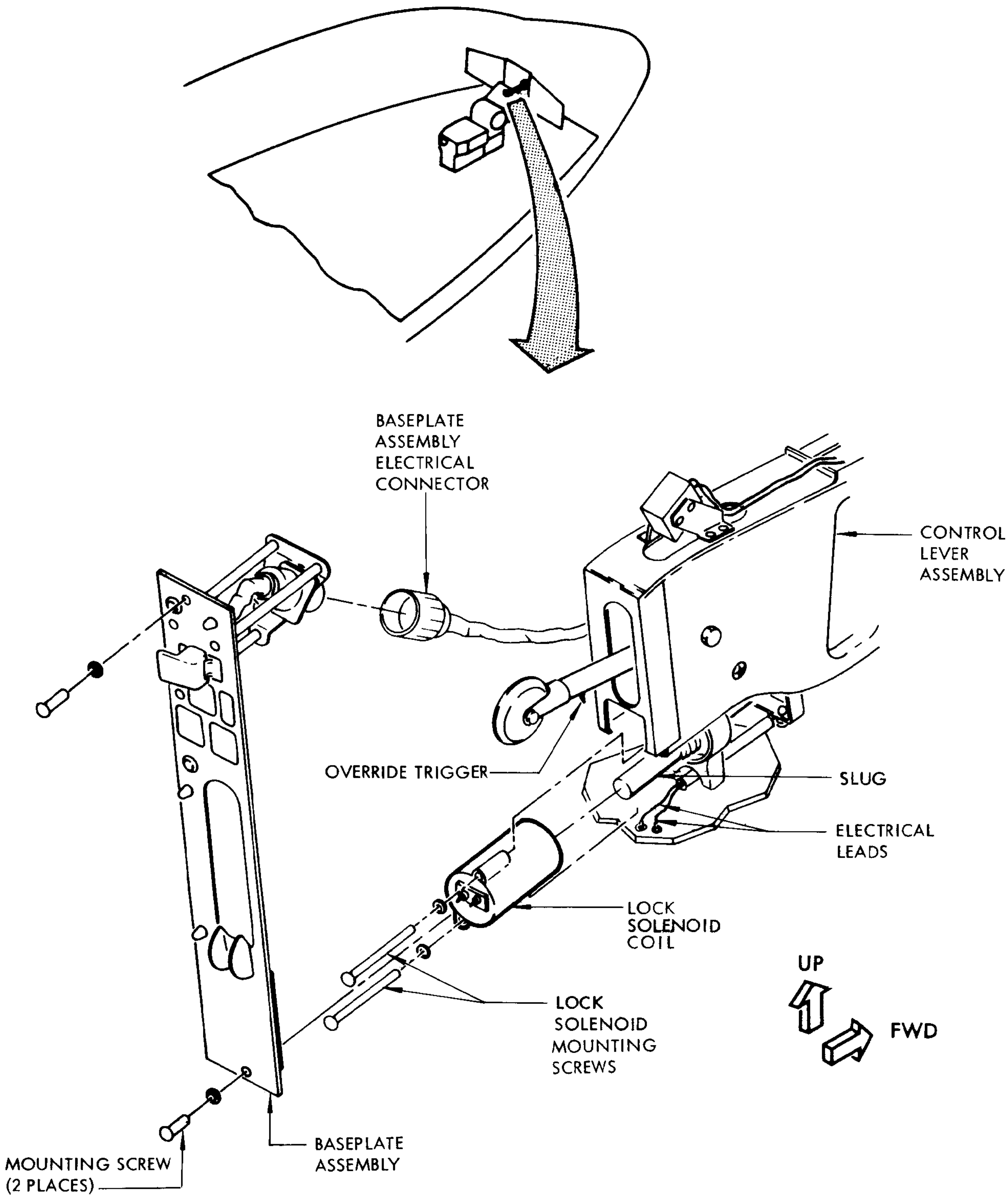
CONTROL LEVER LOCK SYSTEM - TROUBLESHOOTING

1. General
   A. If the control lever lock system failure condition can be duplicated on the ground, then trouble shooting the control lever lock system can be done without jacking airplane or operating gear. Sensor actuating linkages can be disconnected and sensors positioned to simulate gear operation. Refer to Wiring Diagram Manual for system circuits when performing continuity checks.
   B. If the control lever lock system failure condition can not be duplicated on the ground, or if electrical circuit and components and mechanical components check out OK, then Air Safety Sensor adjustment and testing must be performed (Ref 32-09-211).
   C. Gear actuation control system must be correctly rigged.
   D. Landing gear control lever will be left in OFF position. The following precheck items should be performed to simplify troubleshooting system.
2. Prepare to Troubleshoot Control Lever Lock System
   A. Check that landing gear control lever is in OFF position.
   B. Check that landing gear ground lock assemblies are installed (Ref 32-00-01).
   C. Depressurize hydraulic system A.
   D. Provide electric power to airplane. Close the LEVER LATCH & PRESS WARNING LIGHTS circuit breaker on panel P6.
   E. Disconnect sensor linkage at ground spoiler shutoff valve.
3. Troubleshoot Control Lever Lock System
   A. Troubleshooting the control lever lock system entails performing an operation check of the control lever into UP position with the safety switch sensor set to simulate shock strut extended. Then check for lock solenoid release by setting sensor to simulate shock strut compressed. Release of the lock solenoid prevents control lever from moving into UP position. Cause of malfunction may be determined by performing a continuity check of the system. Refer to Wiring Diagram Manual for circuit.
   B. If electrical circuit and components check out OK, examine for mechanical malfunction due to loose bolts, jammed or binding linkage, or solenoid.
   C. If mechanical components check out OK, perform Air Safety Sensor adjustment and testing (Ref 32-09-200).

LANDING GEAR CONTROL LEVER LOCK SOLENOID - REMOVAL/INSTALLATION

1. Equipment and Materials
   A. Gear Ground Lock Assembly - F72735 (Ref 32-00-01)
2. Remove Landing Gear Control Lever Lock Solenoid
   A. Check that landing gear ground lock assemblies are installed in all gear (Ref 32-00-01).
   B. Open LEVER LATCH & PRESS WARN circuit breaker on P6 panel.
   C. Depressurize hydraulic system.
   D. Release and lower the center and first officer's instrument panels.
   E. Remove baseplate assembly mounting screws (Fig. 401).
   F. Disconnect baseplate assembly electrical connector and remove baseplate assembly.
   G. Deleted
   H. Disconnect electrical leads from lock solenoid.
   I. Remove lock solenoid mounting screws and remove lock solenoid coil from slug.
3. Install Landing Gear Control Lever Lock Solenoid
   A. Position lock solenoid coil in place over slug and install mounting screws (Fig 401).
   B. Connect electrical leads to lock solenoid.
   C. Position baseplate assembly and connect baseplate assembly electrical connector.
   D. Install baseplate assembly mounting screws.
   E. Connect external power and close LEVER LATCH & PRESS WARN circuit breaker on P6 panel.
   F. Depressurize hydraulic system.
   G. Move landing gear control lever up. Check that lock solenoid prevents lever from moving past OFF position.
   H. Pull override trigger and check for free movement of control lever into UP position. Return lever to OFF.
   I. Disconnect teleflex cable at right main gear upper torsion link.
   J. Energize air safety sensor by moving landing gear air safety sensor actuator to cover sensor face.
   K. Operate control lever. Check that control lever is free to move into any position. Leave the control lever in the DN position.
   L. Close and fasten instrument panels.
   M. Connect teleflex cable at right main gear upper torsion link.



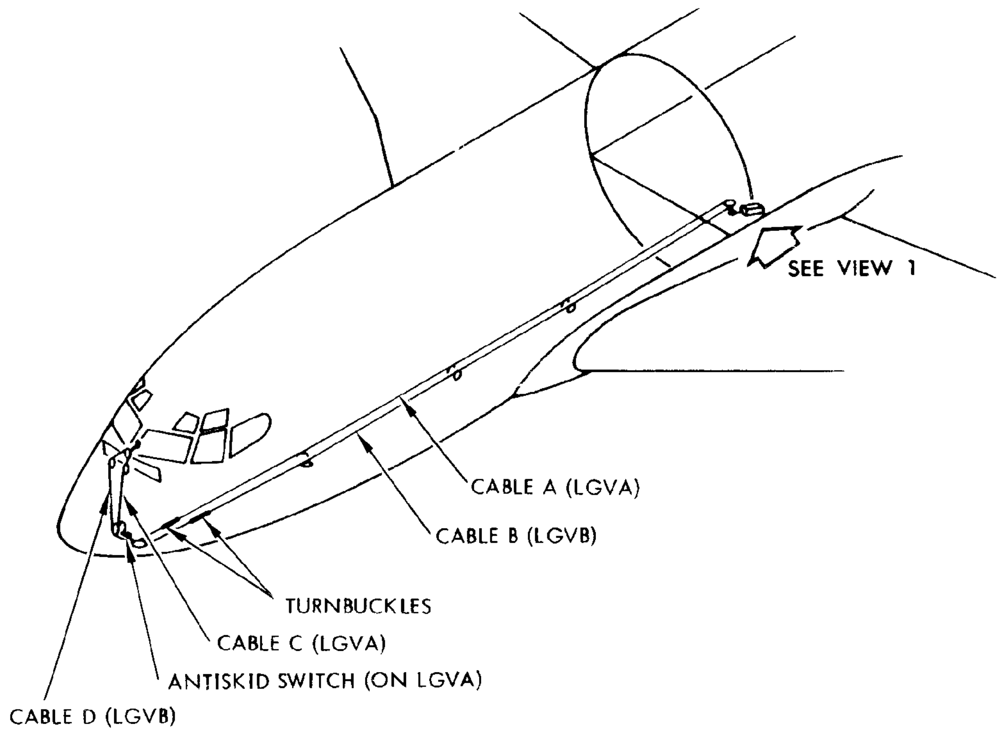
Landing Gear Control Lever Lock Solenoid Installation
Figure 401

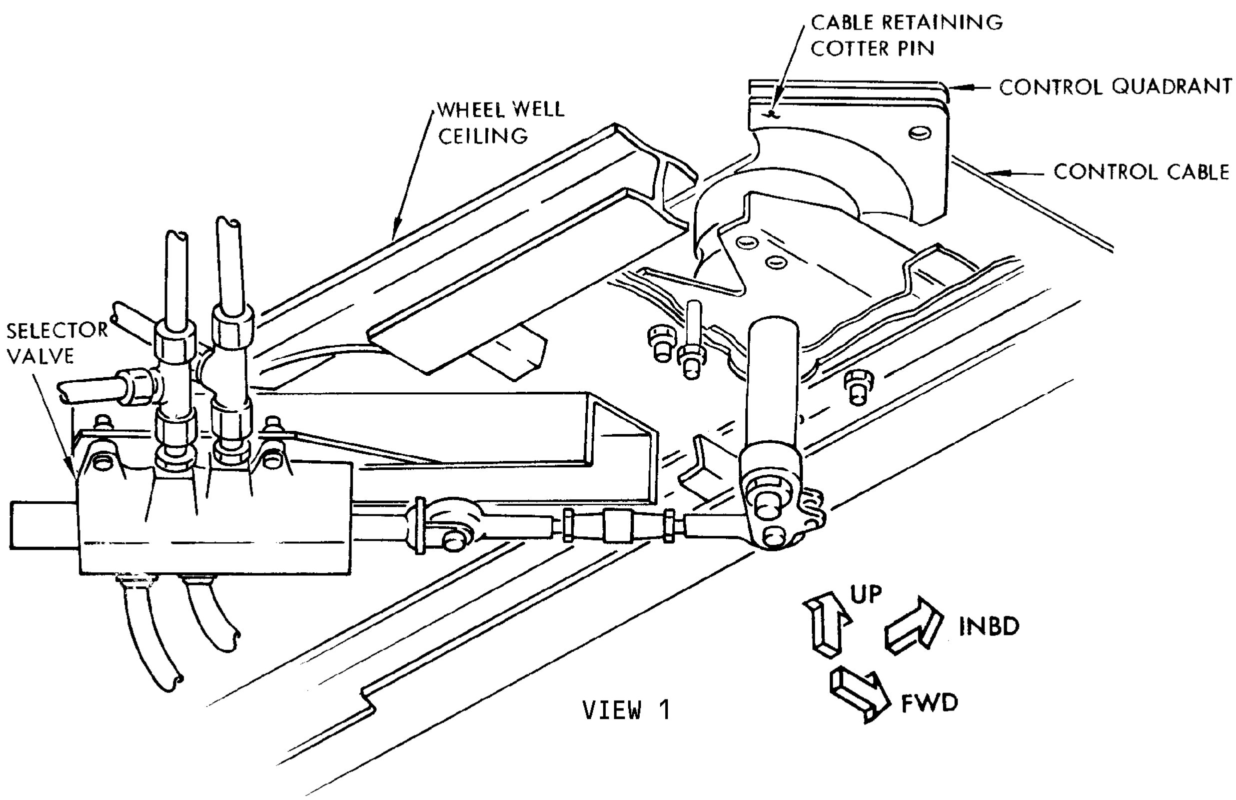
LANDING GEAR CONTROL CABLES - REMOVAL/INSTALLATION

1. General
   A. The forward segments of the control cables are removed by removing the control lever assembly. The antiskid switch cam must be removed from cable C before cables can be withdrawn (Ref 32-31-11). For cable reference, see Fig. 401.
   B. The aft segments of the control cables, cables A and B of table on Fig. 401 are replaced per the procedures in par. 3 and 4.
2. Equipment and Materials
   A. Gear Ground Lock Assembly - F72735 (Ref 32-00-01)
3. Remove Landing Gear Control Cables
   A. Check that landing ground gear lock assemblies are installed (32-00-01).
   B. Depressurize hydraulic system A.
   C. Remove passenger seats (Ref Chapter 25, Passenger Seats). Remove left inboard floor panel between station 663 and station 685.
   D. Disconnect turnbuckles (Fig. 401). Turnbuckles are accessible through hatch 1103 forward of nose wheel well.
   E. Take out cable retaining cotter pins and detach cables from quadrant assembly.
   F. Attach cords to cable terminals to facilitate stringing replacement cables.
   G. Pull cables from pulleys and floor beams. Do not pull cords all the way out.
4. Install Landing Gear Control Cables
   A. String replacement cables through floor beams and over pulleys.

      NOTE: For cable length and fittings see chart in Fig. 401.

   B. Attach cables to selector valve control quadrant and install cotter pins.
   C. Connect turnbuckles.
   D. Adjust control system (Ref 32-31-0 A/T).
   E. Install left inboard floor panel in cabin. Install passenger seats (Ref Chapter 25, Passenger Seats).





VIEW 1

Landing Gear Control Cable Installation
Figure 401 (Sheet 1)

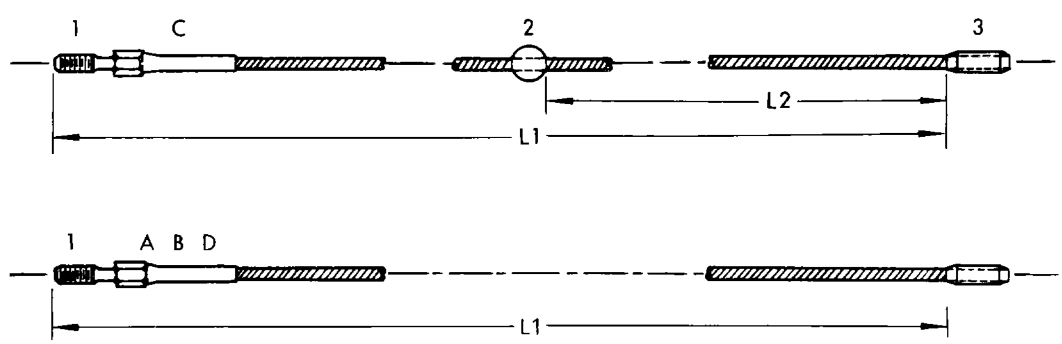
CABLE REF	FUNCTION VA-UP VB-DN	NO. REQ.	LENGTH (INCHES) L1	L2	CABLE SIZE	FITTINGS 1	2	3
A	LGVA	1	512.0		1/8 7 x 19	MS21260-L4RH		BACT14A4
B	LGVB	1	524.7		1/8 7 x 19	MS21260-L4RH		BACT14A4
C	LGVA	1	105.4	70.6	1/8 7 x 19	MS21260-L4LH	BACT14B4	BACT14A4
D	LGVB	1	99.6		1/8 7 x 19	MS21260-L4LH		BACT14A4

MATERIAL: CABLE PREFERRED – CARBON STEEL PER BMS 7–265, TYPE 1, COMP A

1ST ALTERNATE – CARBON STEEL PER MIL–W–83420, TYPE 1 COMPOSITION A

2ND ALTERNATE – CARBON STEEL PER MIL–W–1511

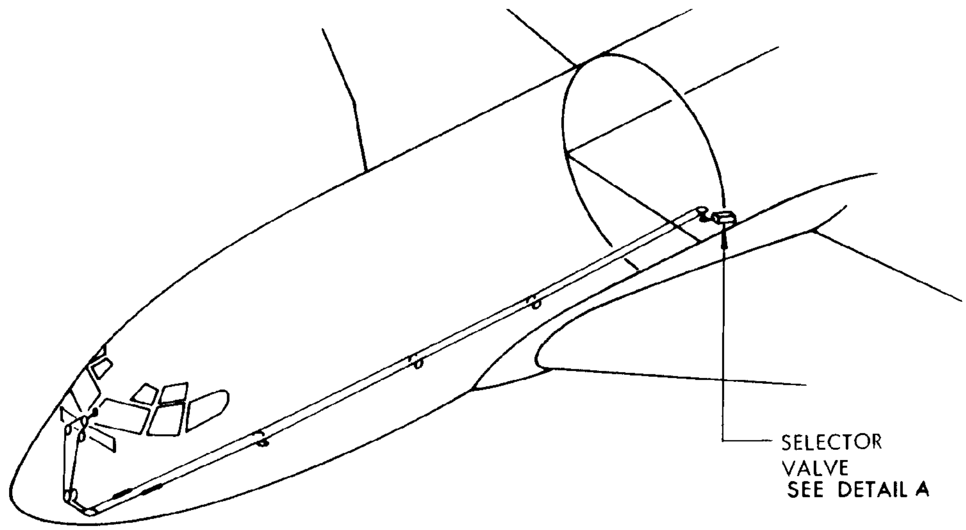
NOTE: DO NOT MIX TIN-ZINC (TZ) COVERED CABLES WITH OTHER TYPE CABLES ON THE SAME AIRPLANE BECAUSE TZ CABLES HAVE A DIFFERENT STRETCH RATE THAN OTHER CABLES.

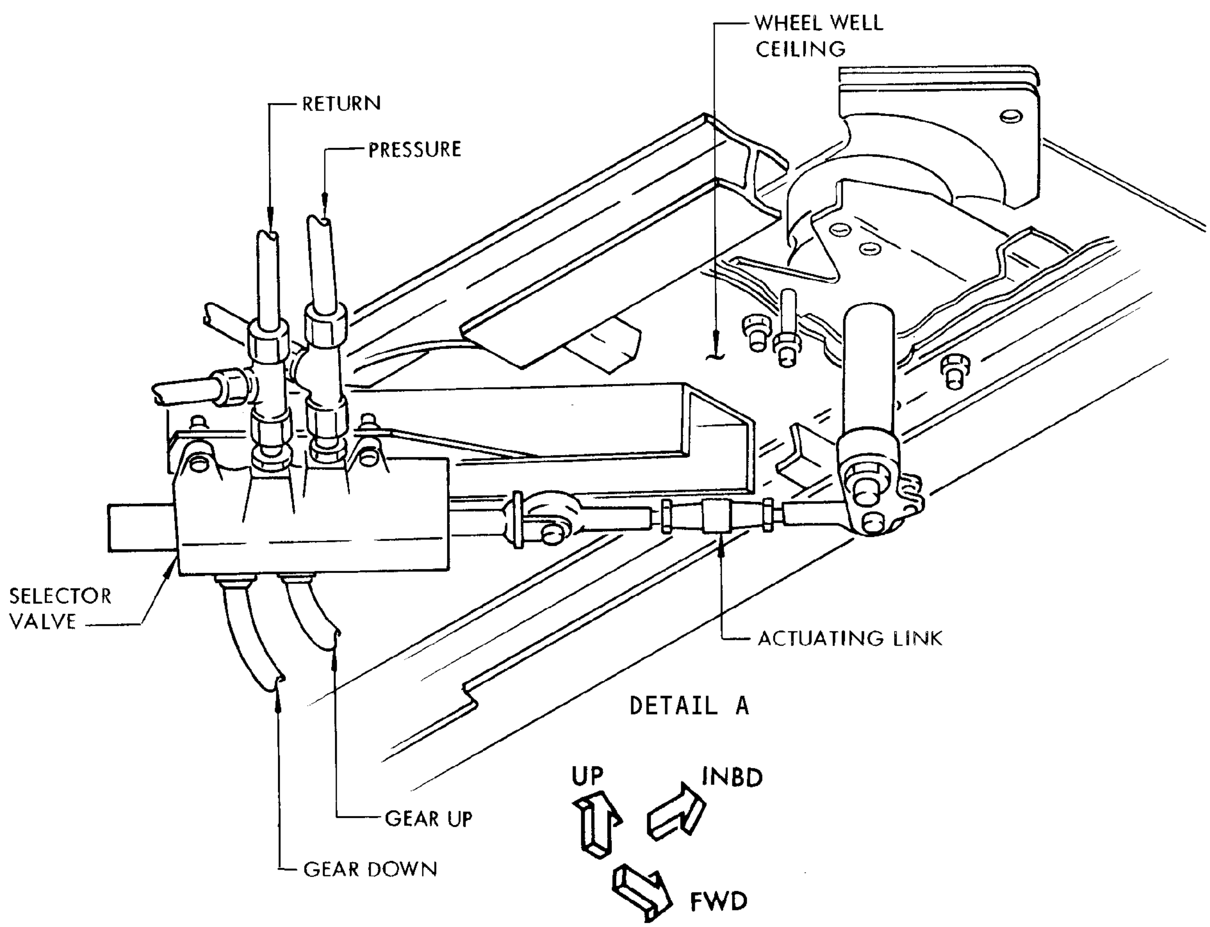


Landing Gear Control Cable Installation
Figure 401 (Sheet 2)

LANDING GEAR SELECTOR VALVE - REMOVAL/INSTALLATION

1. Equipment and Materials
   A. Gear Ground Lock Assemblies, F72735 (Ref 32-00-01)
   B. Hydraulic Fluid, Fire Resistant - BMS 3-11
2. Remove Landing Gear Selector Valve
   A. Check that landing gear ground lock assemblies (Ref 32-00-01) are installed.
   B. Depressurize hydraulic system A and air charge in hydraulic reservoir.
   C. Disconnect selector valve actuating link at selector valve (Fig. 401).
   D. Disconnect all hydraulic lines from selector valve. Cap all lines to prevent contamination.
   E. Remove bolts attaching selector valve to structure.
   F. Remove selector valve from airplane. Remove hydraulic fitting from valve, discard O-rings and cap ports.
3. Install Landing Gear Selector Valve
   A. Install hydraulic fittings and new O-rings lubricated with hydraulic fluid in selector valve.
   B. Fill valve with hydraulic fluid. Plug lines and cap ports of valve.
   C. Place selector valve in position and install mounting bolts.
   D. Attach actuating link to selector valve.
   E. Remove caps and plugs and connect hydraulic lines to valve.
   F. Test landing gear control system per 32-31-0, Adjustment/Test.
   G. Perform a retraction test on the main landing gear only (Ref 32-32-0, Adjustment/Test).
   H. Check hydraulic connections for leaks.

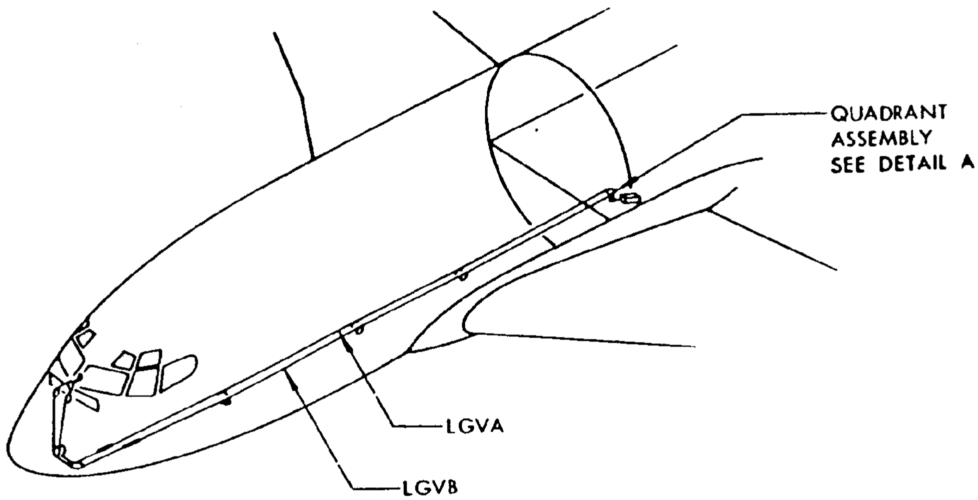


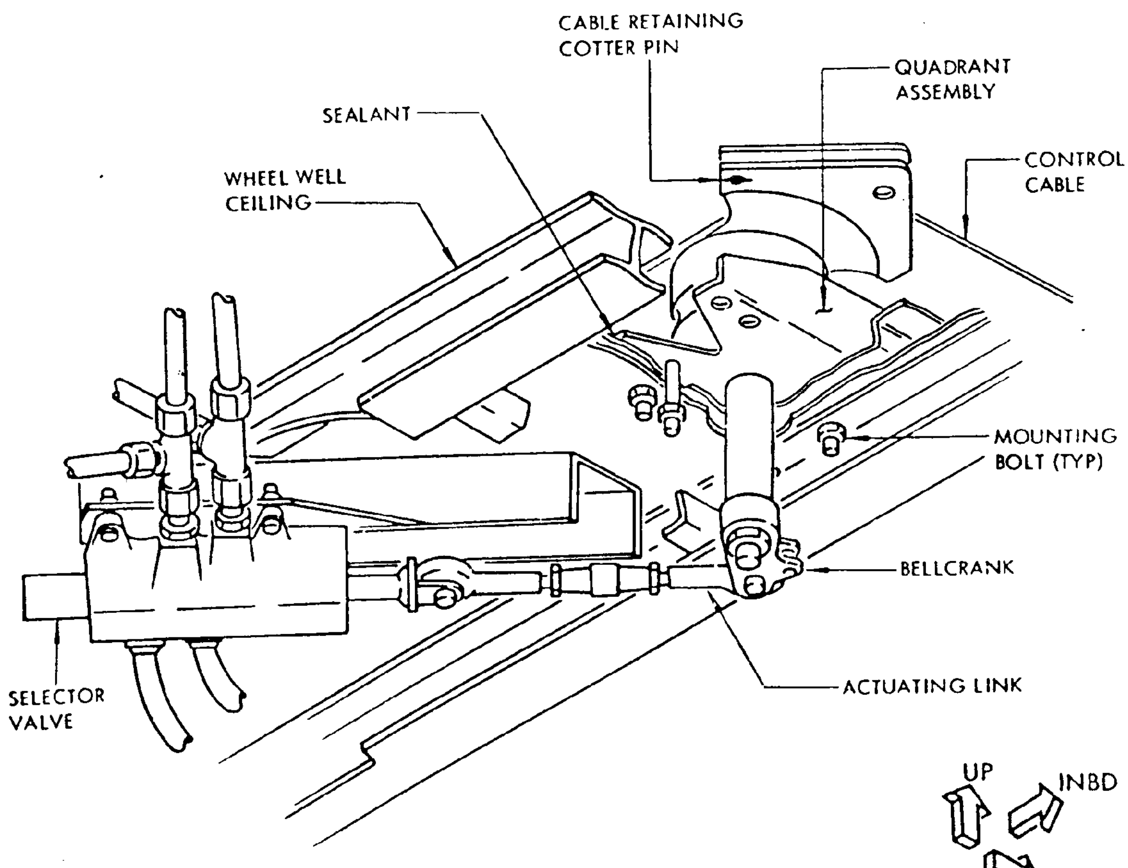


Landing Gear Selector Valve Installation
Figure 401

LANDING GEAR SELECTOR VALVE QUADRANT ASSEMBLY - REMOVAL/INSTALLATION

1. Equipment and Materials
   A. Gear Ground Lock Assemblies - F72735 (Ref 32-00-01)
2. Remove Landing Gear Selector Valve Quadrant Assembly
   A. Check that landing gear ground lock assemblies are installed (Ref 32-00-01).
   B. Depressurize hydraulic system.
   C. Remove seats per Chapter 25 and remove left inboard floor panel between station 663 and station 685 in passenger cabin.
   D. Loosen turnbuckles on cables LGVA and LGVB to relieve cable tension (Fig. 401).
   E. Remove cable retaining cotter pins and detach cables from quadrant.
   F. Disconnect selector valve actuating link from bellcrank.
   G. Remove bellcrank from quadrant shaft.
   H. Remove quadrant assembly mounting bolts and nuts.
   I. Remove quadrant assembly.
3. Install Landing Gear Selector Valve Quadrant Assembly
   A. Place quadrant assembly in place on upper side of wheel well ceiling (Fig. 401).
   B. Install mounting bolts and nuts.
   C. Apply a fillet seal around the bottom of the quadrant support housing (Ref Chapter 51, Sealing).
   D. Install bellcrank on quadrant shaft. Tighten nut to within 480 to 600 pound-inches torque.
   E. Connect selector valve actuation link assembly to bellcrank.
   F. Attach cables to quadrant and secure with cotter pin.
   G. Tension cables, rig and test control system (Ref 32-31-0, Adjustment/Test).
   H. Replace left inboard floor panel.
   I. Install seats.





DETAIL A

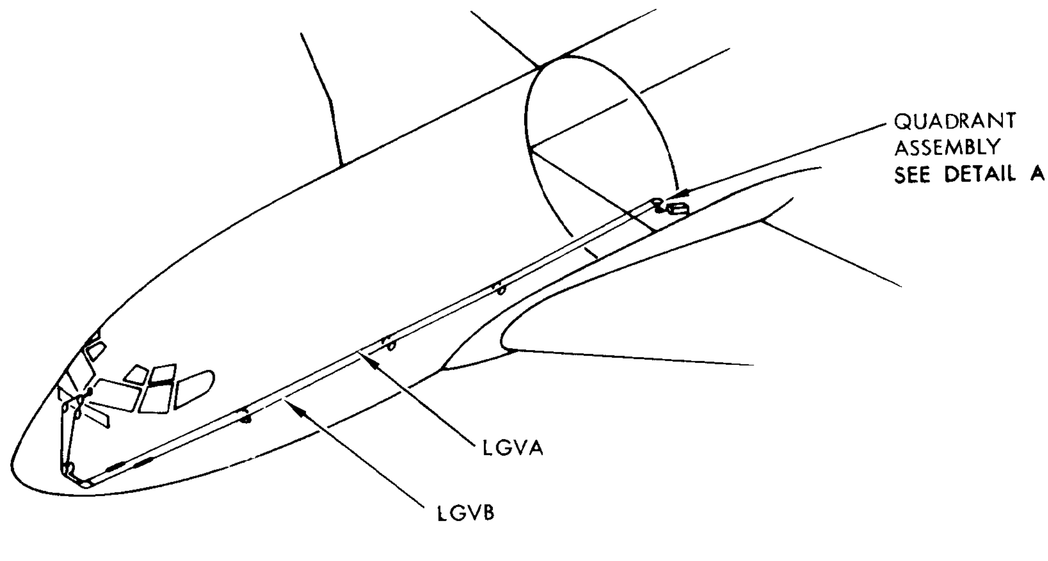
Landing Gear Selector Valve Control Quadrant Assembly
Figure 401

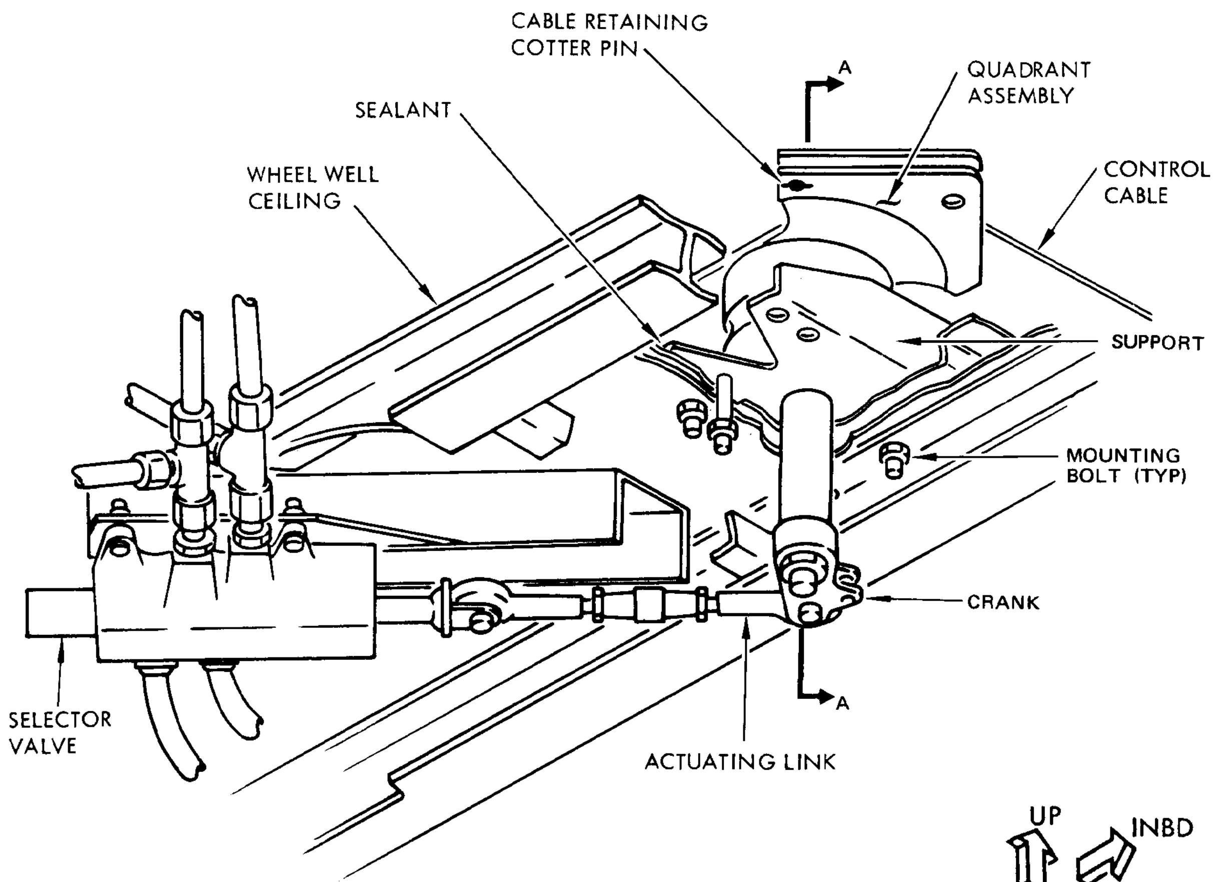
LANDING GEAR SELECTOR VALVE QUADRANT ASSEMBLY - INSPECTION/CHECK

1. General
   A. These data consist of illustrations and wear limit charts. No procedure is given in this section for access to permit inspection. Refer to Landing Gear Selector Valve Quadrant Assembly - Removal/Installation.
2. Landing Gear Selector Valve Quadrant Assembly Wear Limits

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR.
			DIAMETER		MAX WEAR DIM.	MAX DIAM CLEAR-ANCE			
			MIN	MAX					
1	BEARING	ID	0.9995	1.0000	1.0005	0.0005	X		
	SHAFT	OD	1.0001	1.0004	0.9999		X		
2	BEARING	ID	0.9995	1.0000	1.0015	0.002	X		
	SHAFT	OD	0.9992	0.9997	0.9985		X		
3	SUPPORT	ID	1.9997	2.0003	2.0010	0.002		X	*[1]
	BEARING	OD	1.9995	2.0000	1.9990		X		
4	SUPPORT	ID	1.9988	1.9993	2.0000	0.001		X	*[2]
	BEARING	OD	1.9995	2.0000	1.9990		X		
5	CRANK	ID				0.005 *[3]	X		
	SHAFT	OD					X		
6	CRANK	ID	0.250	0.254	0.261	0.0115		X	*[4]
	BOLT	OD	0.2485	0.2495	0.2475		X		
7	VALVE	ID	0.250	0.254	0.261	0.0115		X	*[4]
	BOLT	OD	0.2485	0.2495	0.2475		X		

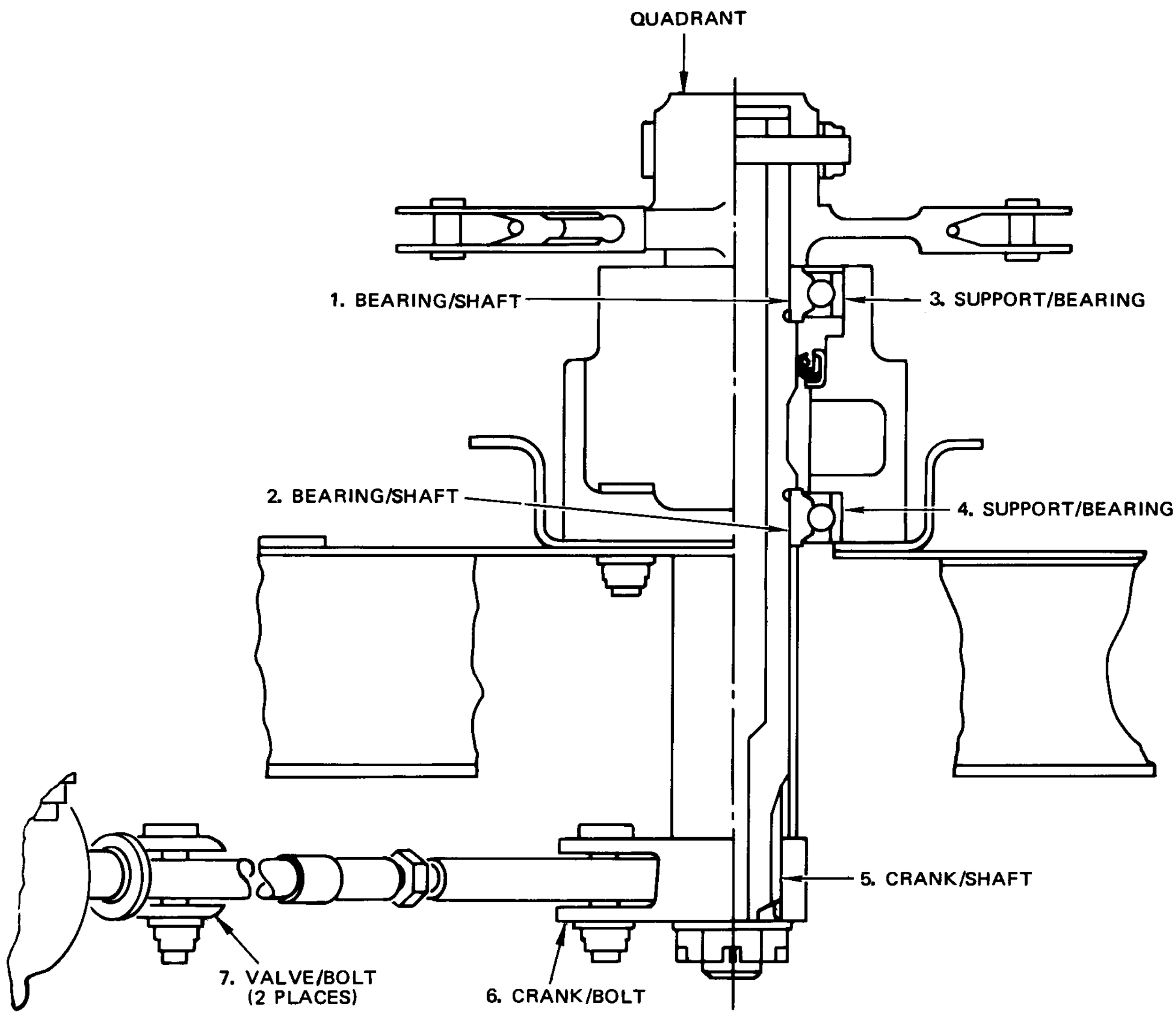
*[1] Install 0.060 wall steel bushing in 2.1212 maximum oversize hole. Bushing interference minimum, 0.0013; maximum, 0.0031.
*[2] Install NAS75-4 steel bushing or equivalent in 2.0093 maximum oversize hole. Bushing interference minimum, 0.0013; maximum, 0.0031.
*[3] Spline backlash measured at pitch diameter of spline.
*[4] Install NAS75-4 steel bushing or equivalent in 0.3754 maximum oversize hole. Bushing interference minimum, 0.0002; maximum, 0.0013.





DETAIL A

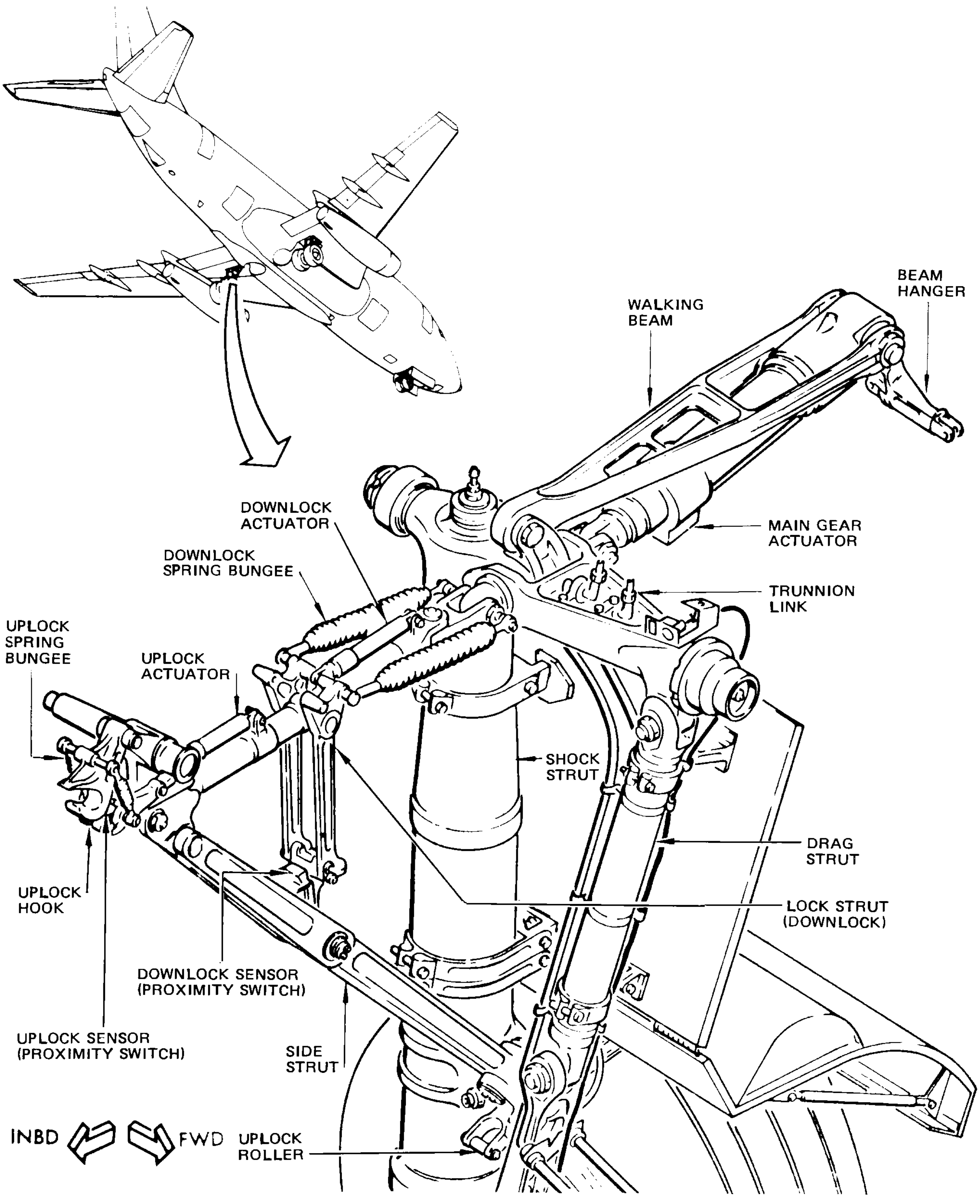
Landing Gear Selector Valve Control Quadrant Assembly Wear Limits
Figure 601 (Sheet 1)



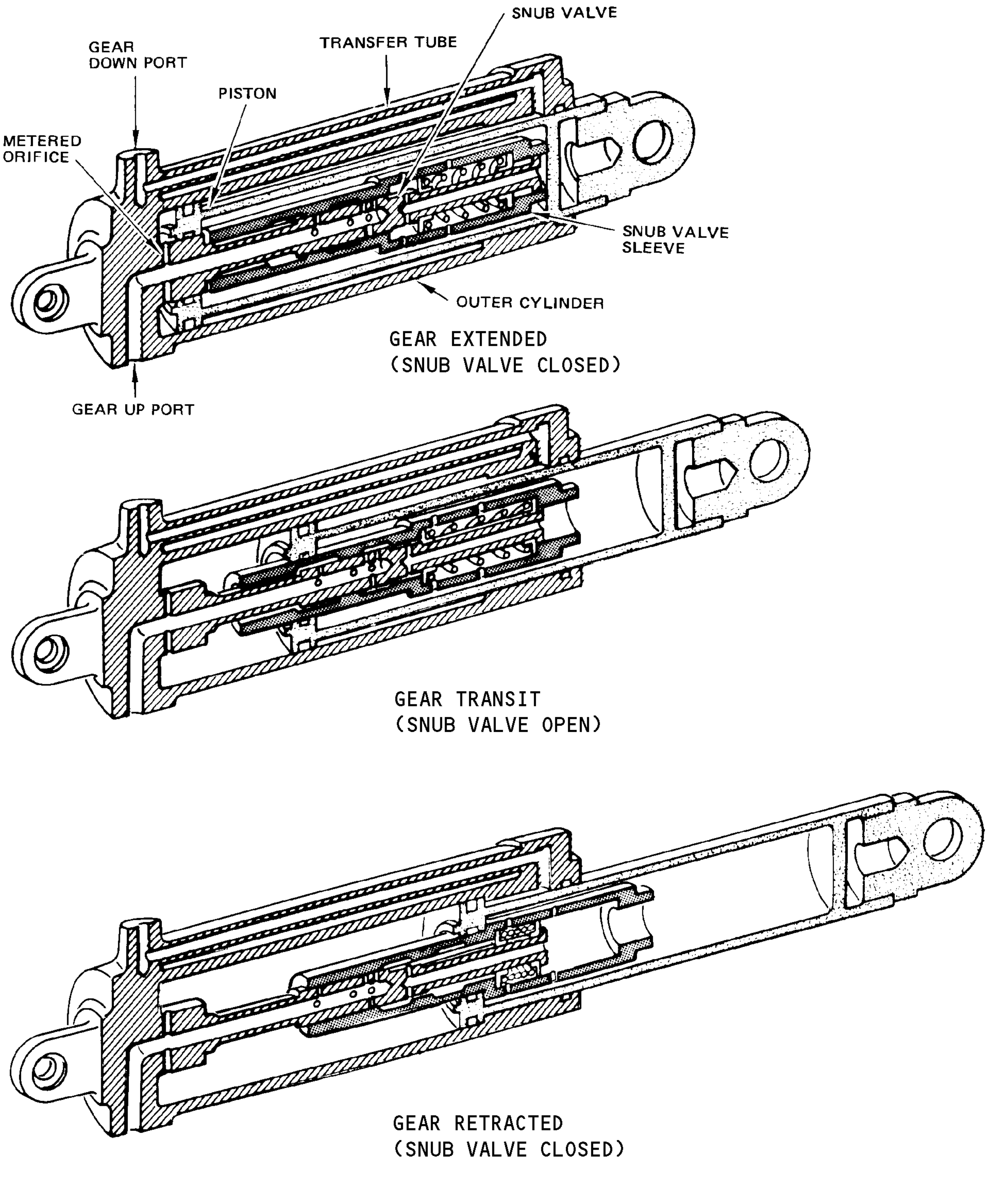
Landing Gear Selector Valve Control Quadrant Assembly Wear Limits
Figure 601 (Sheet 2)

MAIN GEAR EXTENSION AND RETRACTION - DESCRIPTION AND OPERATION

1. General
   A. The main gear extension system raises and lowers the main gear. The main gear retracts or extends simultaneously with the nose gear when the landing gear control handle is moved into the UP or DN detent. The retraction mechanism includes the following components. A main gear actuator applies the force required to raise and lower the gear. The actuator works in conjunction with a walking beam to apply force to the main gear shock strut and swing the gear inboard. Both the actuator and the walking beam are connected to lugs on the shock strut. The outboard ends of the actuator and the walking beam pivot on a beam hanger attached to the airplane structure (Fig. 1). A main gear lock mechanism locks the gear positively in the up or down positions. The lock mechanism is mounted on a reaction link located between the upper ends of the shock strut and side strut. A lock actuator to engage and disengage the uplock is mounted on the side strut end of the reaction link. The gear is locked down by a folding lock strut located between the center of the reaction link and the side strut center hinge. The lock strut is operated by the downlock actuator, mounted on the shock strut end of the reaction link. Spring bungees between the shock strut and lock strut serve to hold the lock strut in either the locked or unlocked positions.
   B. Isolation valves are provided for the main landing gear to shut off hydraulic pressure to each main gear. This enables work to be done on the landing gear without depressurizing the hydraulic system. The valves are located in the left wheel well.
2. Main Gear Actuator
   A. The main gear actuator converts hydraulic pressure into mechanical power for retraction and extension of the main landing gear. The actuator is a hydraulic piston type, with snubbing action to slow its movement when limits of travel are approached (Fig. 2). The cylinder head end of the actuator is attached to the beam hanger. The piston rod is attached to a lug on the shock strut. The actuator and the walking beam are located in the wing, outboard of the shock strut. Hydraulic fluid is directed to the head end of the actuator through two flexible hoses. Fluid from one hose flows into the cylinder head. A transfer tube built onto the actuator directs fluid from the second hose to the rod end of the cylinder.
   B. When the main gear actuator is pressurized to extend, opposing forces from actuator and walking beam act to rotate the gear. The gear swings inboard and up into the wheel well. When the actuator is pressurized to retract, the forces rotate the gear in the opposite direction to extend the gear.



Main Gear Extension and Retraction Components Locations
Figure 1



Main Gear Actuator Schematic
Figure 2

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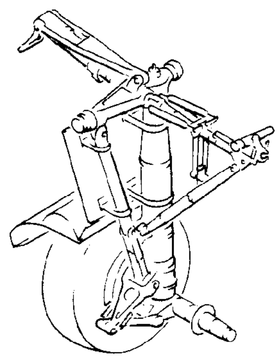
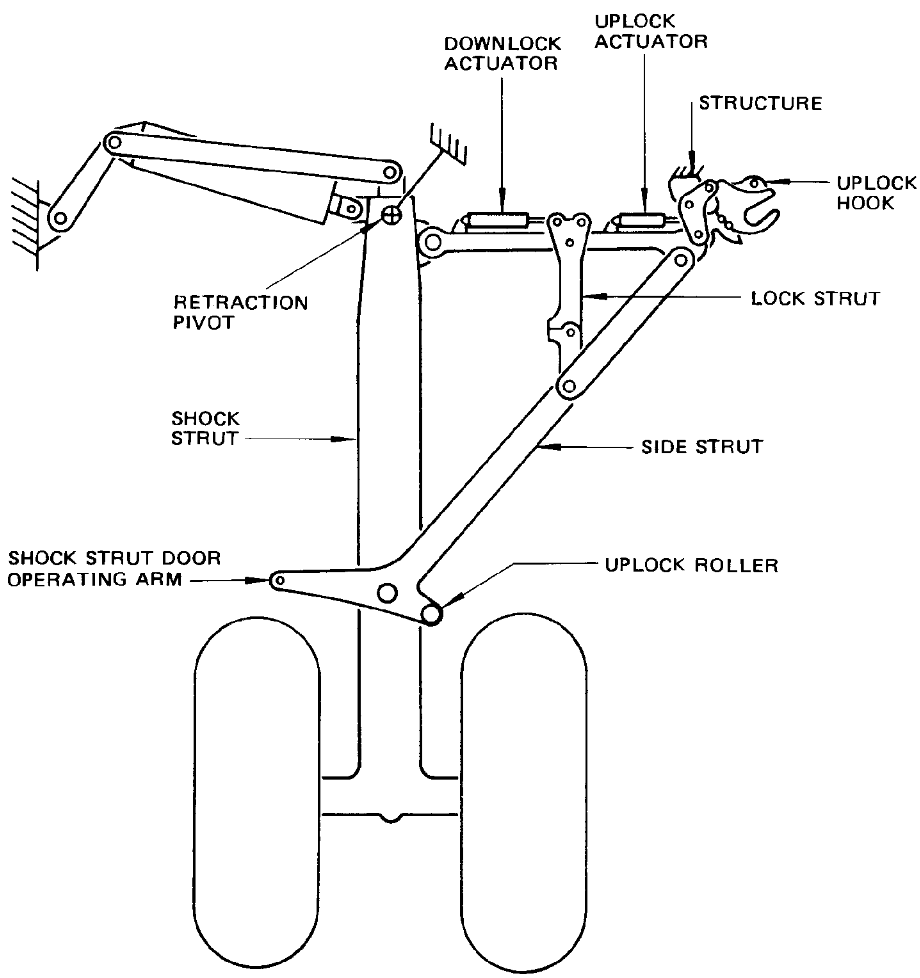
C. The main gear actuator restricts the rate of extension and retraction of the gear, just as it approaches the up or down position. The snubbing effect is obtained by the action of a spring-loaded sliding valve snubbing assembly. After the actuator has extended 1.10 inches, the snubbing valve opens and hydraulic flow is unrestricted. When the piston is 1.30 inches from fully extended, a snubber stop on the piston contacts the snubber valve sleeve. Further movement of the piston pulls the sleeve against a compression spring to close off ports. For the remainder of piston travel, hydraulic flow must pass through a diminishing number of holes. The increasing restriction to hydraulic flow steadily slows the actuator extension rate until the piston reaches the end of its travel. The sequence repeats in reverse, when the actuator retracts.

3. <u>Main Gear Actuator Walking Beam</u>

A. The main gear actuator walking beam works in conjunction with the main gear actuator to retract and lower the gear. The walking beam serves to reduce the reaction force going into airplane structure from the main gear actuator. Reaction force from the actuator is transmitted back to the shock strut through the walking beam. The inboard end of the beam is attached to a lug on the top of the shock strut (Fig. 3). The outboard end is attached to the walking beam hangar. The hangar pivots on a fitting mounted between the landing gear beam and the rear wing spar. The cylinder end of the actuator is connected to the walking beam. The actuator piston rod is attached to a lug on the side of the shock strut. On gear retraction, the outboard force from the actuator piston rod is applied directly to the gear. The inboard reaction force from the cylinder of the actuator reaches the shock strut through the actuator walking beam. Inboard and outboard forces combined provide a couple to raise the gear. The resulting reaction to the couple tends to rotate the actuator and walking beam combination about the gear retraction axis. Force generated by the attempted rotation is taken to structure through the beam hangar. With the walking beam as a third order lever arm, a much reduced force reaches structure. The piston rod shock strut moment arm increases as the gear moves up. The walking beam, shock strut moment arm, first increases then decreases during retraction.

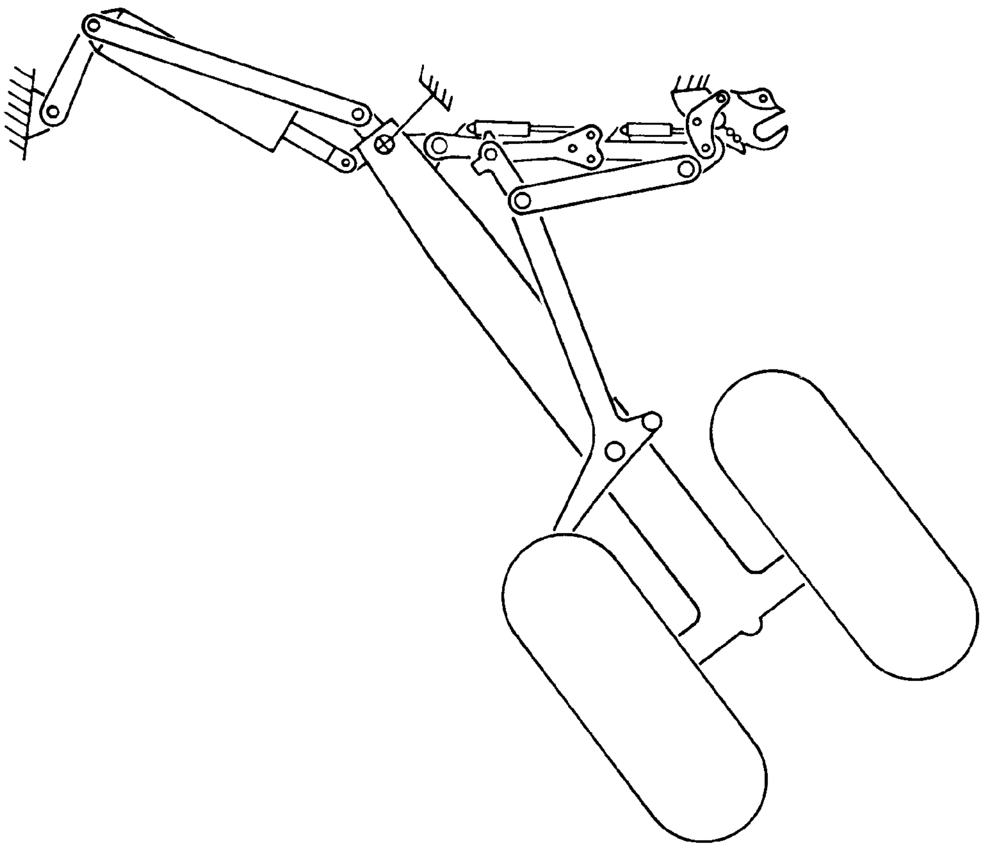
4. Main Gear Lock Mechanism
   A. The main gear lock mechanism positively locks the gear in retracted or extended position. The lock consists of a hook, two hydraulic actuators, spring bungees, a lock strut, and operating linkage (Fig. 5). In the retracted position the hook engages a roller mounted on the universal side strut fitting. In the down position, the lock strut assumes an overcenter position to prevent the side strut from folding. The uplock hook, and the lock strut, are connected to individual actuators. The actuators are mounted on the reaction link. Sensors for the position indicating and warning system proximity switches are located in two places. The downlock sensor is on the side strut, near the lower end of the lock strut. The uplock sensor is mounted between the uplock hook and the lower end of the uplock spring bungees.
   B. Normal operation of both up and down locks is by hydraulic pressure directed to the lock actuators. Provision is made to release the uplock in the absence of hydraulic pressure, by means of a manual extension system. Spring bungees provide a force to hold the locks in the locked or unlocked positions. When the gear is released by the manual extension system, the lock strut swings into locked position as the gear falls. On the final extension movement, the spring bungees pull the lock strut into overcenter position.
5. Main Gear Lock Actuator
   A. Main gear lock actuators operate the main gear lock mechanism, to permit retraction or normal extension of the landing gear (Fig. 6). Actuators are hydraulic piston type. Two actuators are mounted on the reaction link of each main gear. One on the inboard end to operate the uplock, and one on the outboard end to operate the downlock. The downlock actuator extends to push the lock strut across the overcenter position and to start the side strut folding. Retraction of the actuator pulls the lock strut into the overcenter locked position when gear extends. The uplock actuator extends to swing the uplock hook away from the uplock roller and release the gear. Uplock actuator retraction pushes the hook outboard, to fully engage the uplock roller.
6. Main Gear Lock Springs
   A. The main gear lock springs are arranged to apply a load to hold the locks in either engaged or disengaged positions. Lock springs consist of tension springs, with one end attached to a fixed pivot point, and the other end to the appropriate lock mechanism. When locks operate, the spring ends attached to lock mechanism swing through an arc, the highest point of which is in line with the spring fixed pivot point. Therefore, an overcenter effect keeps locks in position, fully open or closed.



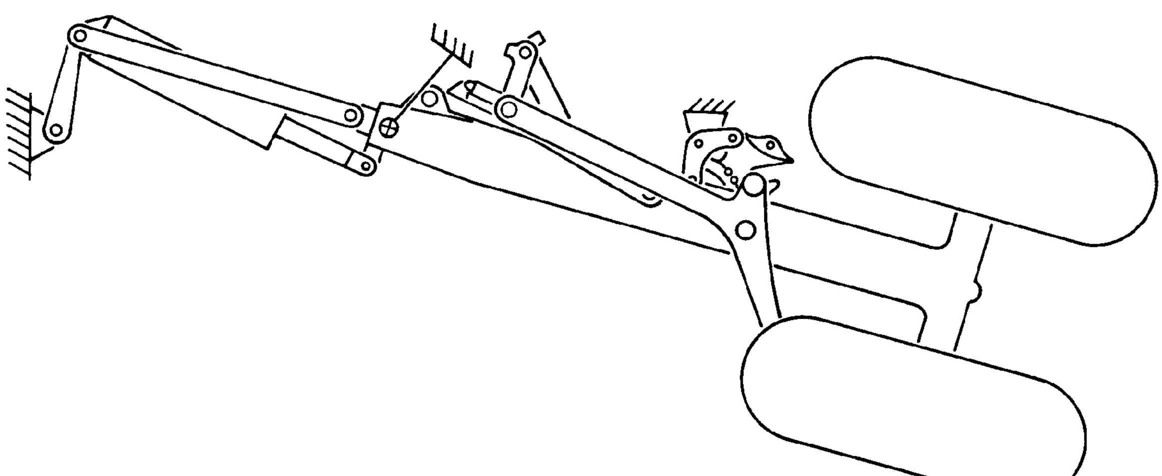


DOWN AND LOCKED

Main Gear Operating Sequence
Figure 3 (Sheet 1)

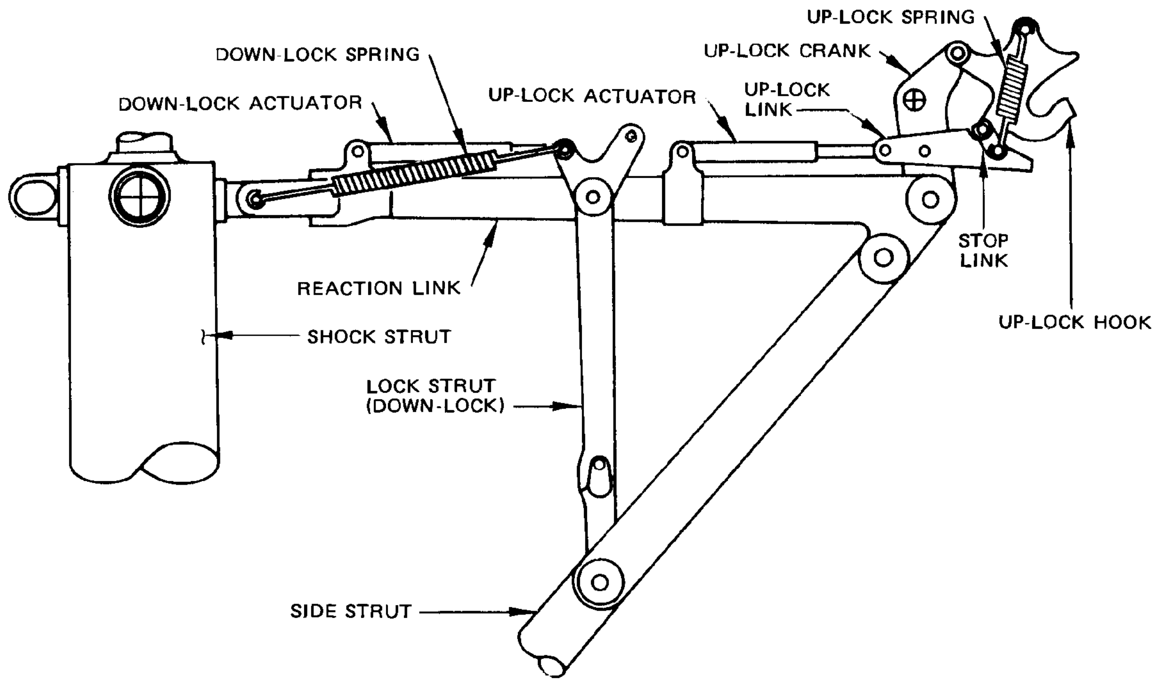


IN TRANSIT

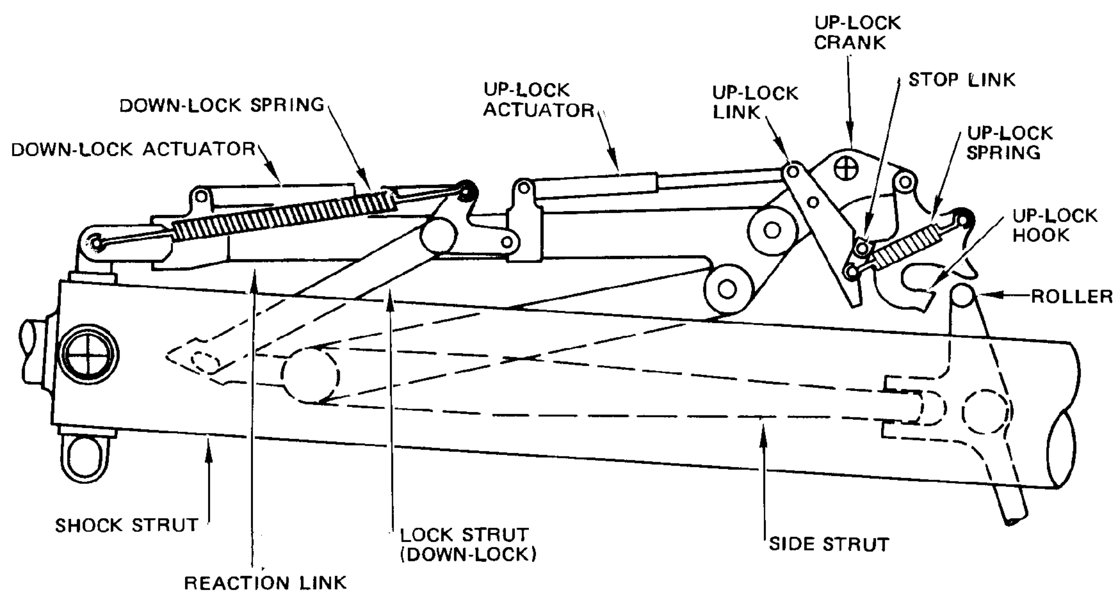


UP AND LOCKED

Main Gear Operating Sequence
Figure 3 (Sheet 2)

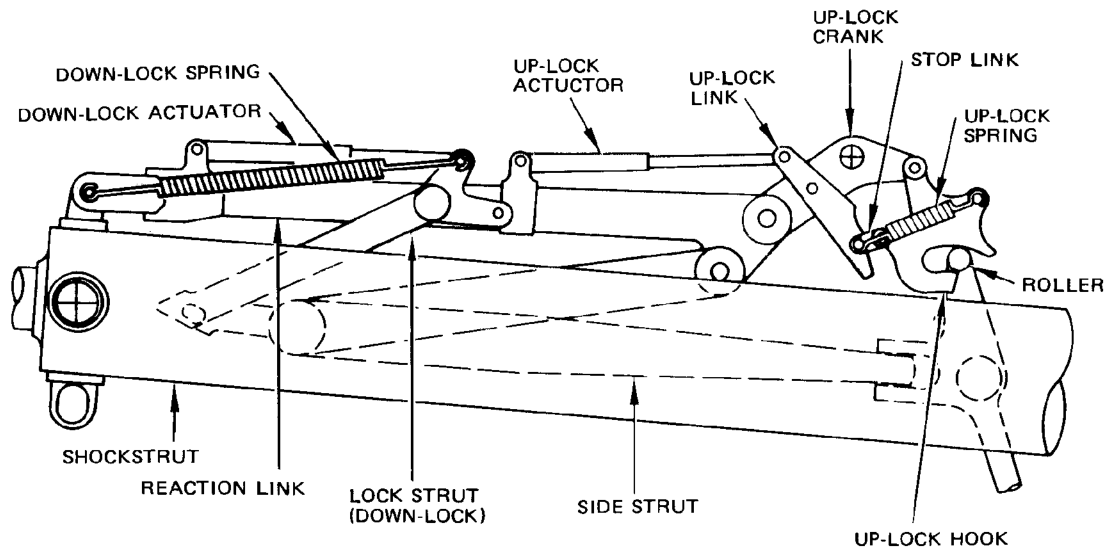


GEAR DOWN AND LOCKED

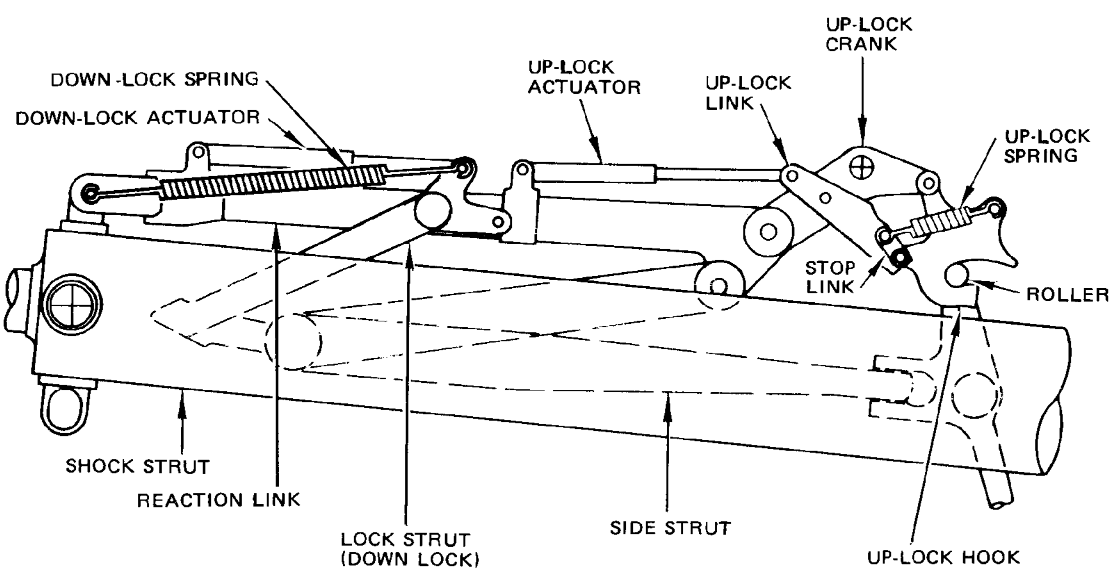


GEAR IN TRANSIT

Main Gear Mechanism Schematic
Figure 4



GEAR IN TRANSIT (UPLOCK HOOK TRIPPED)



GEAR UP AND LOCKED

Main Gear Lock Mechanism Schematic
Figure 5

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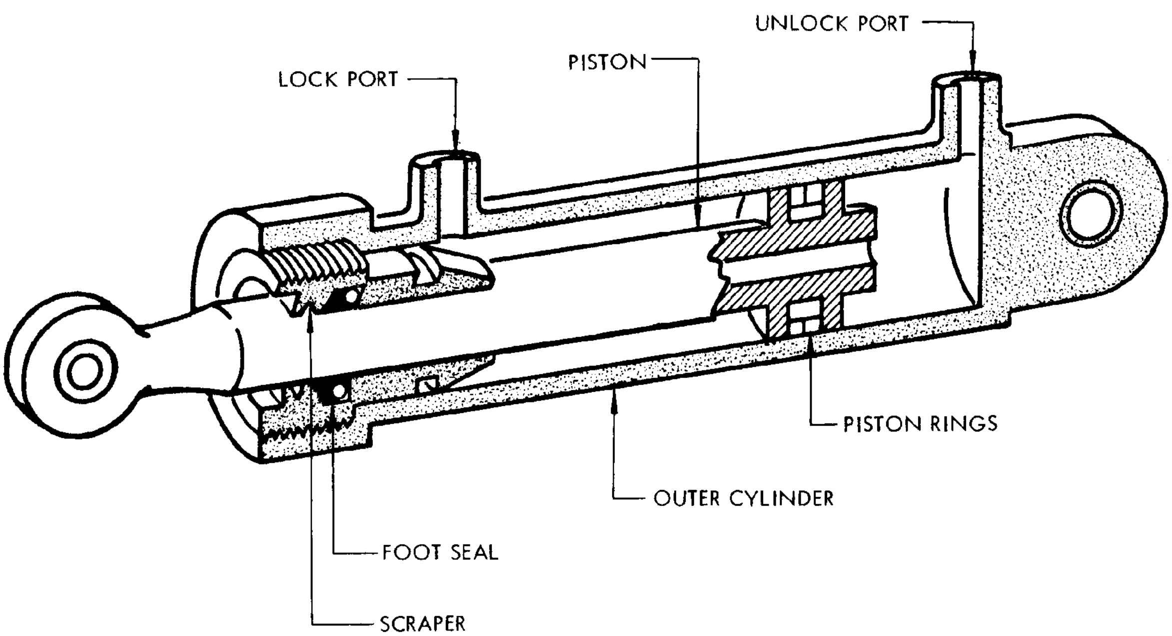
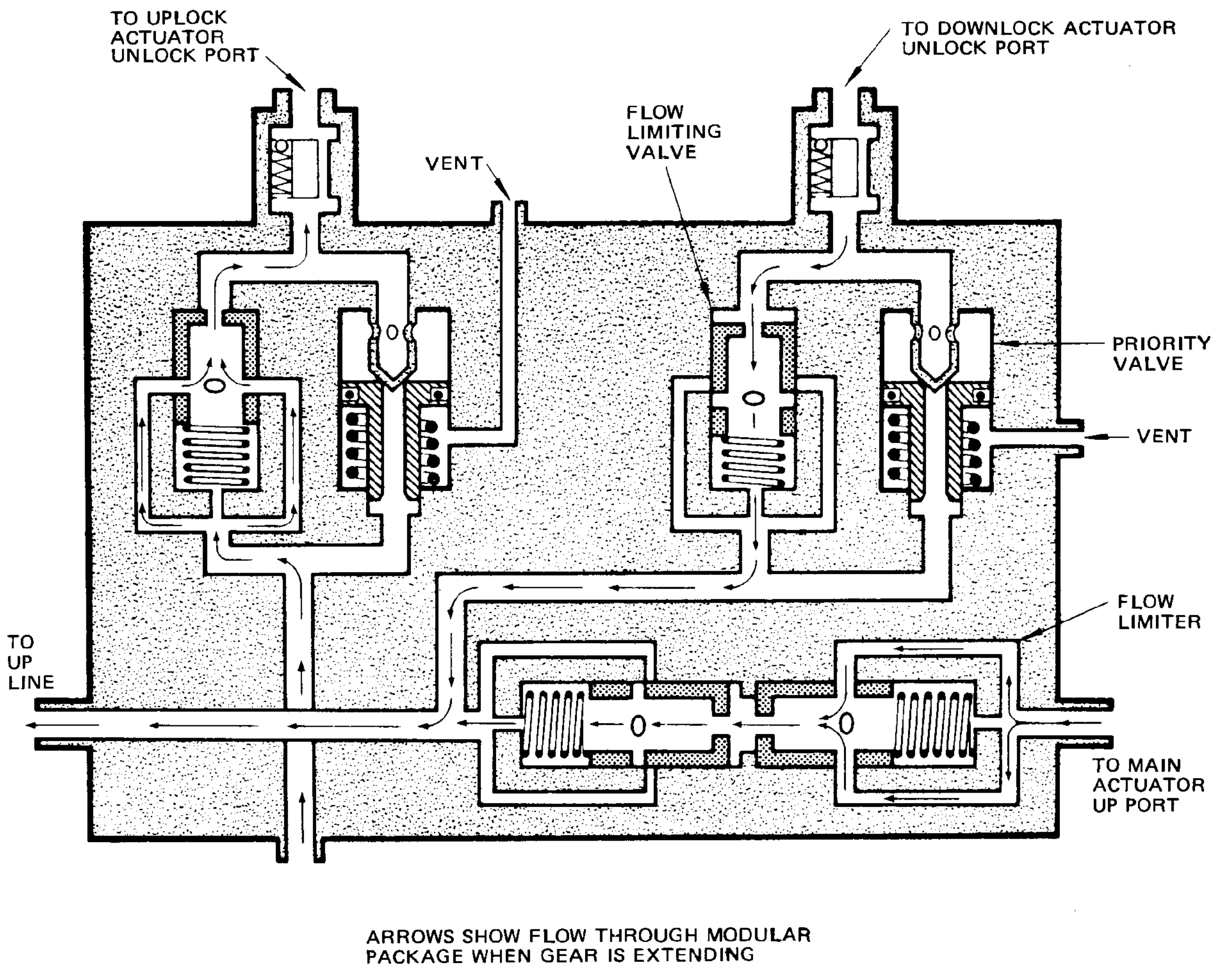
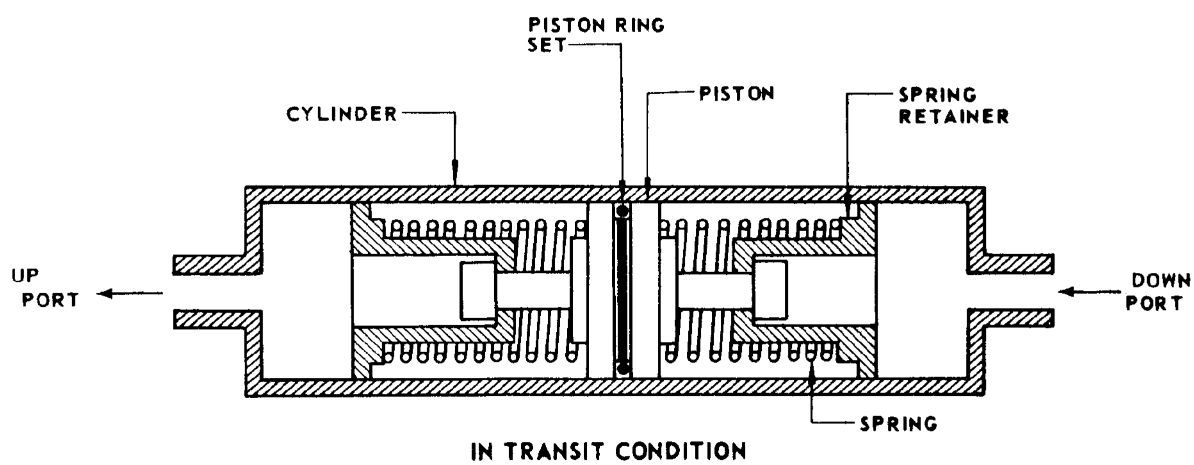
7. Main Gear Modular Package
   A. The main gear modular package contains all the valves required to modify hydraulic flow directed to the main gear retraction and lock actuators (Fig. 7). Two flow limiting valves in the main gear actuator up line are arranged to limit the rate of flow entering or leaving the up port of the actuator. A priority valve and a flow-limiting valve are installed in parallel in the downlock actuator up line. A second pair of identical valves are installed in the uplock actuator down line. Each pair of valves controls the hydraulic flow leaving the respective lock actuators when retracting. Any pressure surges exceeding 3500 psi, when actuators are retracting, are released by the priority valve. The net effect of all the valves in the modular package ensures smooth, even, synchronized movements, of gear retraction and extension. A modular package is locate d in the wing root above each main gear.
8. Main Gear Transfer Cylinder
   A. The main gear transfer cylinder momentarily equalizes hydraulic pressure on both sides of the main gear actuator piston. Pressure is equalized at the start of each extension cycle to relieve gear of actuator force until the uplock is released. The transfer cylinder contains a piston, two springs and two spring retainers (Fig. 8). One end of the cylinder is connected to the DOWN line. The other end is connected to the UP line of main gear actuator. At the end of gear retraction, the cylinder spring retainer is bottomed on the DOWN side of transfer cylinder. When the control handle is moved to DN for gear extension, pressure is directed to the down side of main gear actuator. Pressure also enters the down side of transfer cylinder and displaces the piston. Piston movement directs pressure from the up side of cylinder to the up side of actuator. A flow-l imiting valve in the main gear modular package delays the pressure loss to return. Therefore, momentarily, pressure exists on both sides of the actuator piston and actuator force is reversed. During the reversal period, the lock actuator unlocks the gear and starts the side strut folding. When the spring retainer bottoms, the counter pressure drops on the up side of the main gear actuator, and gear extension proceeds in the normal manner. After the spring retainer has bottomed and hydraulic pressure from a system is off the line, a further movement of the piston is available, acting against the spring tension. The extra piston movement is provided to damp out pressure surges generated in the system by landing impacts and so prevent pressure fluctuations from reaching the lock actuator and possibly unlocking the gear. The cylinder is symmetrical, with double springs, and may be installed either way in the system. The cylinder is mounted in the wing root on the main spar.



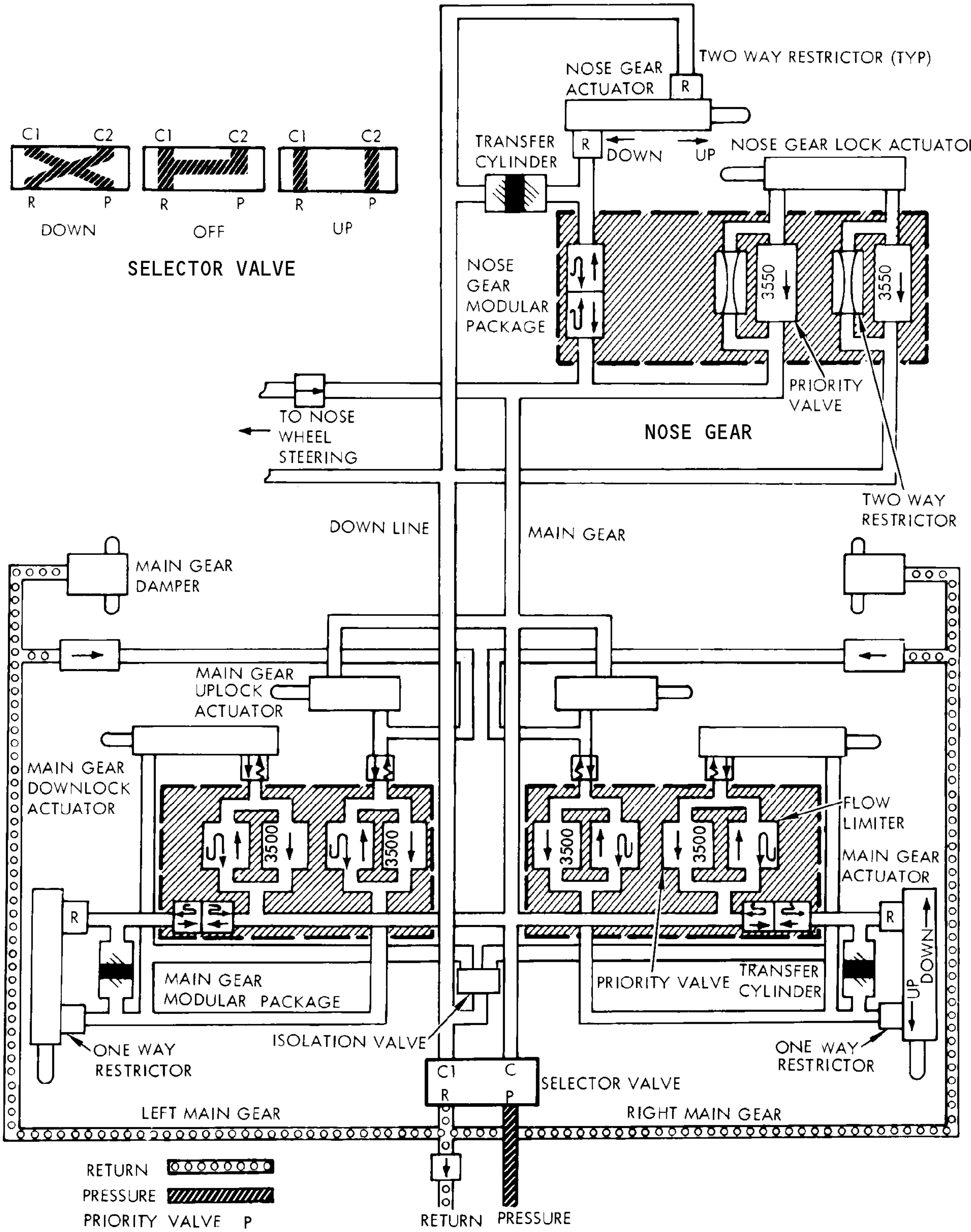
Main Gear Lock Actuator
Figure 6



Main Gear Modular Package Schematic
Figure 7

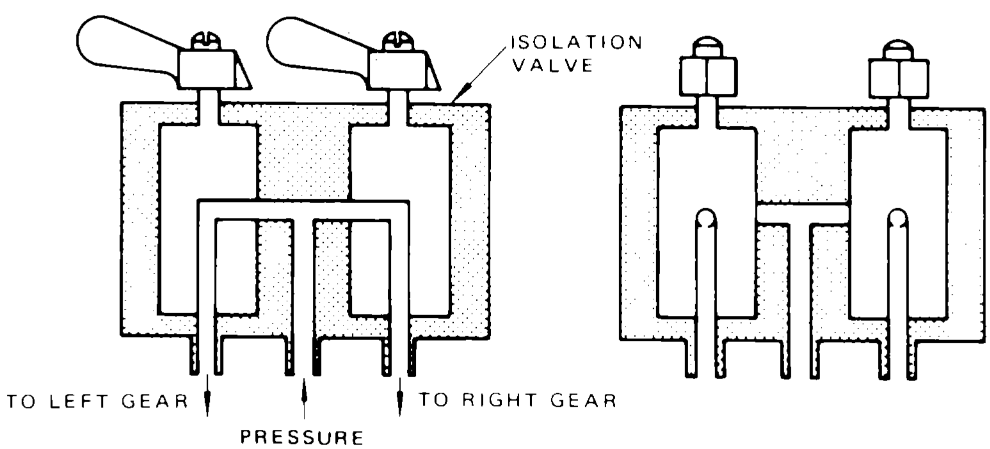


Main Gear Transfer Cylinder Schematic
Figure 8



Main Gear Hydraulic System Schematic
Figure 9

9. Main Gear Isolation Valves
   A. The main gear isolation valves are provided to enable maintenance to be carried out on the landing gear, and landing gear hydraulic components, without depressurizing the hydraulic system. The valve consists of a dual unit in a modular package (Fig. 10). The valves are normally lockwired in the open position. The isolation valve modular package is mounted in the left wheel well.
10. Operation
   A. Retraction
      (1) When the control lever is moved to UP position, hydraulic pressure is then directed to the modular package and to the uplock actuator. After passing through the modular package, pressure reaches the up port of the main actuator and the uplock port of the downlock actuator. Flow to the main actuator is controlled by flow limiting valves. Flow to the downlock actuator is restricted. Flow from the downlock actuator is unrestricted. Therefore, the downlock actuator quickly unlocks the gear and starts the side strut folding before full pressure builds up in the main actuator (Fig. 3). When the gear retracts, the uplock actuator has locking pressure, but stop links prevent the uplock hook from moving to locked position. On the final movement to ful1 retraction, the uplock roller strikes a projection on the uplock hook; this triggers stop links to flip over and release the hook. The pressurized lock actuator then snaps the hook into final locked position. In the same movement, the stop links engage in locking detents to hold the hook in position.
   B. Extension
      (1) When the control lever is moved to DN position, hydraulic pressure is directed to the main gear actuator, the lock port of the downlock actuator, and to the modular package. After passing through the modular package pressure reaches the unlock port of the uplock actuator. Pressure to the uplock actuator is restricted. Pressure from the uplock actuator is unrestricted. Therefore, the actuator moves quickly to unlock the gear. After retraction, as soon as retraction pressure leaves the main actuator, the full weight of the gear hangs on the uplock hook. To prevent the possibility of main actuator extension force further loading the hook and so causing noisy disengagement of the uplock, the transfer cylinder goes into action. On the first surge of pressure in the main actuator down line, the cylinder transfers pressure to the main actuator up line. Loss of transfer cylinder pressure from the up line is delayed by the flow limiting valve in the modular package. For a moment, pressure is equal on both ends of the main actuator, and the piston differential area creates an up force. The uplock actuator extends to unlock the hook during the up force period, and the gear extends. On extension, locking pressure on the downlock actuator pulls the lock strut into the overcenter locked position. Spring bungees apply a force to keep the strut in locked position.



Main Landing Gear Isolation Valve
Figure 10

MAIN LANDING GEAR EXTENSION AND RETRACTION - TROUBLESHOOTING

1. General
   A. Troubleshooting the main gear retraction mechanism requires the airplane to be jacked for gear retraction per Airplane Jacking, Chapter 7. External hydraulic power from a test bench capable of a varying flow rate, electrical power and, on airplanes with inflatable-type wheel well seals, pneumatic power for a wheel well seals must be provided. Three men are required. One stationed in the control cabin to operate the landing gear control lever, one stationed at the hydraulic test bench to vary retraction speed or stop the gear in an intermediate position, and one stationed at the wheel well to observe the gear action. The control cable system must be correctly rigged and hydraulic reservoirs filled to correct level. Close observation of the gear action should reveal the cause of the trouble.
2. Troubleshooting Charts

With aircraft jacked for gear retraction, and hydraulic and electrical power connected and systems pressurized, place landing gear control lever in UP position. After 30 seconds place landing gear control lever in DN position. IF -

ONE MAIN LANDING GEAR FAILS TO OPERATE.

Check that isolation valves are open. Check for ground lockpin in affected gear. IF -

OK - Check for hydraulic pressure reaching actuator. IF -

OK - Change affected actuator.

OK - Check for pressure reaching modular package. IF -

OK - Replace affected modular package.

NOT OK - Flush or replace hydraulic lines.

NOT OK - Check for kink or obstruction in lines to actuator. IF -

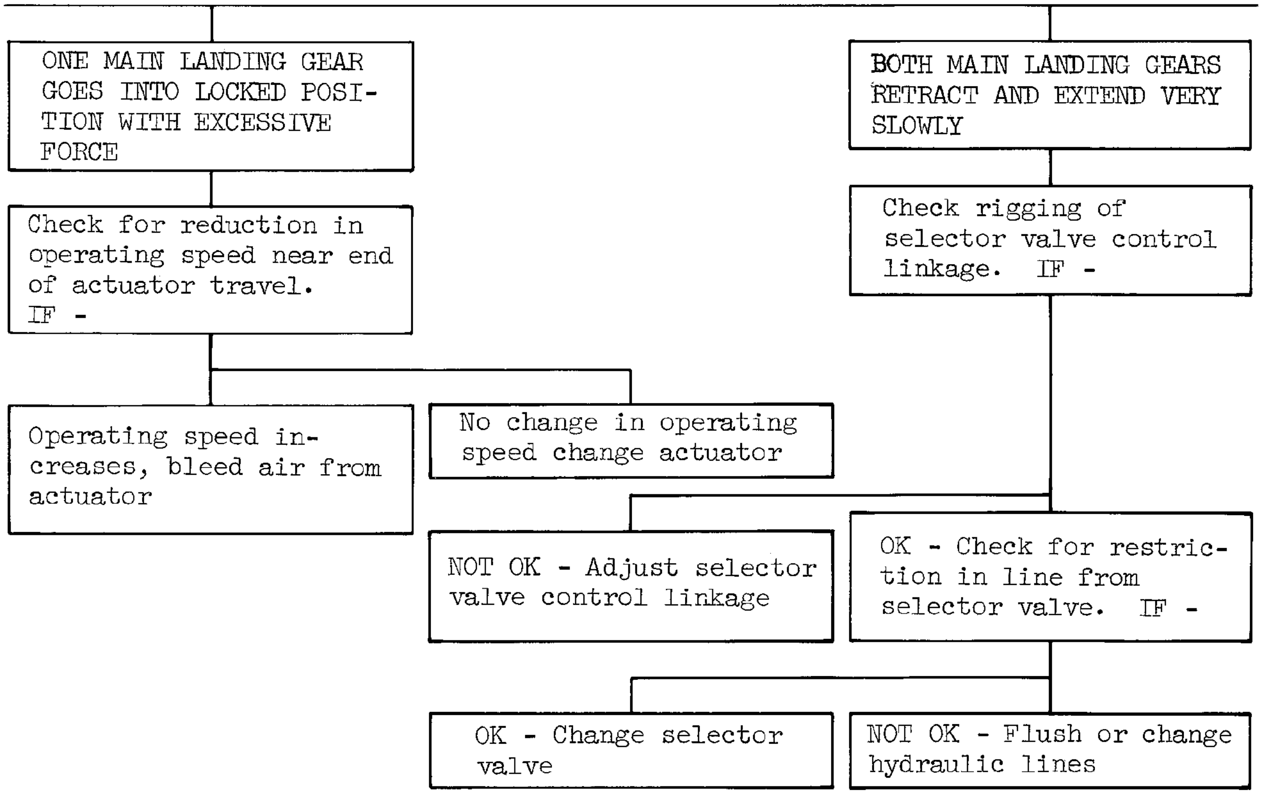
NOT OK - Remove ground lockpin.

ONE MAIN GEAR RETRACTS BUT DOES NOT EXTEND.

CHECK UPLOCK MECHANISM IS UNLOCKED. IF -

NOT OK - Replace check valve in line to MOD/PKG damper assessment.

Main Landing Gear Extension/Retraction - Troubleshooting
Figure 101 (Sheet 1)



Main Landing Gear Extension/Retraction - Troubleshooting
Figure 101 (Sheet 2)

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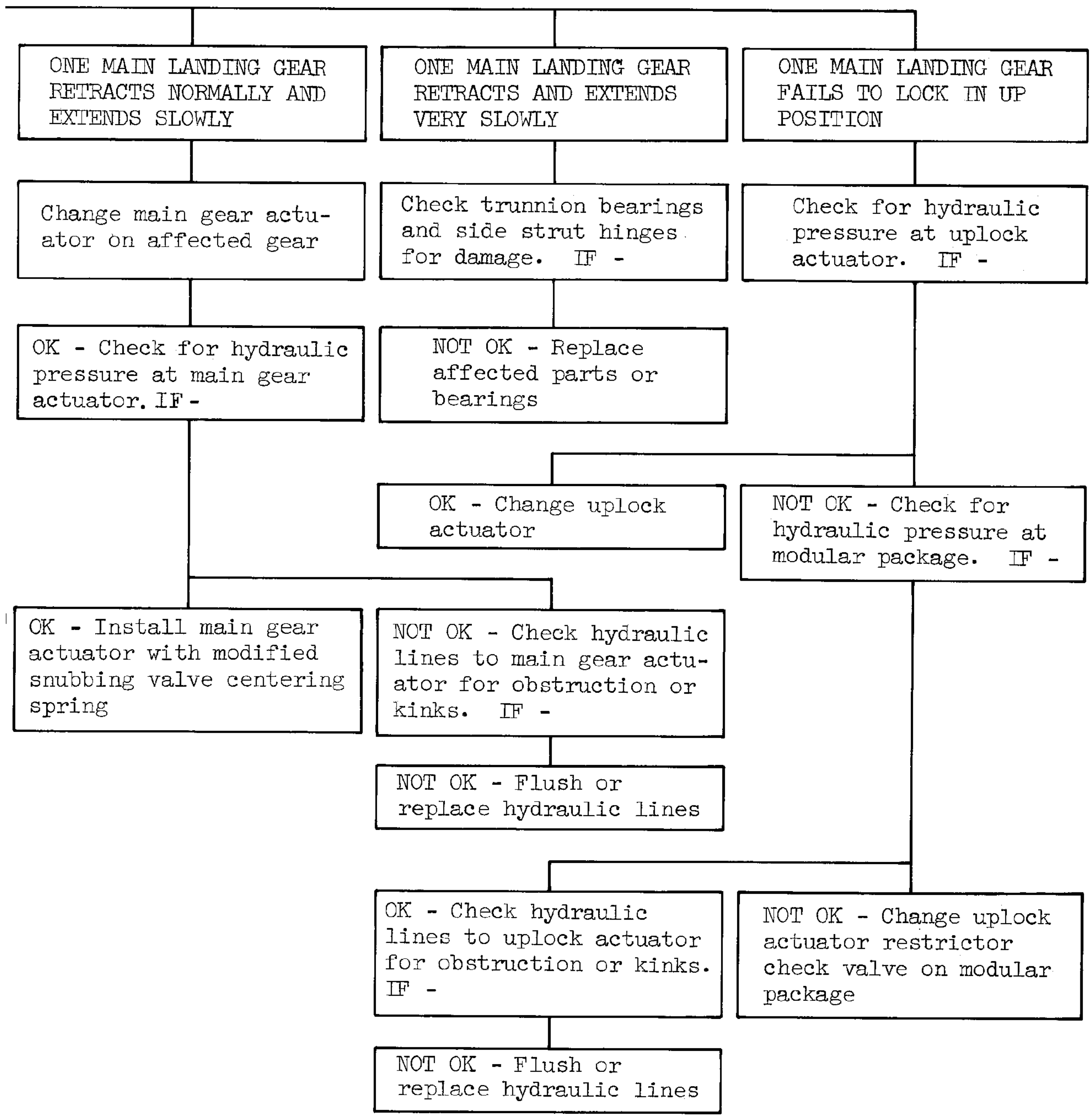


Main Landing Gear Extension/Retraction - Troubleshooting
Figure 101 (Sheet 3)

MAIN GEAR EXTENSION AND RETRACTION - ADJUSTMENT/TEST

1. General
   A. For all tests an hydraulic test bench may be connected to the ground service module. System A is pressurized by setting the parking brake and opening the interconnect valve (Ref Chapter 29, Hydraulic Power).
   B. The airplane system may be used for a straight retraction test after replacement of hydraulic components. Gear operating times will be normal if gears are retracted two at a time when the airplane hydraulic system B is used.
   C. Procedure is for main gear only. Nose gear extension/retraction is accomplished separately (AMM 32-33-0/501).
   D. The times for gear retraction in the operational test depend on the hydraulic flow rate. The retraction times given in this procedure are based on a minimum flowrate of 19 gpm at a hydraulic system pressure of 3000 ±150 psi. Hydraulic pressure can be supplied by a hydraulic test bench or the engine driven pumps to give this minimum flow rate.
   E. The electric motor driven pump (EMDP) can be used for the component replacement test. When you use the EMDP, operate only one landing gear at a time. The EMDP provides a hydraulic flow rate of approximately 6 gpm. This lower rate causes slower landing gear operation, especially if you operate more than one gear at the same time. Do not use the EMDP to measure extension/retraction times.
2. Equipment and Materials
   A. One variable volume test bench for hydraulic fluid. Capacity 20 gallons per minute at 3000 psi. Pressure adjustable from 0 to 3000 psi. Test bench filters must be capable of a nominal filtration of 5 micron and of 15 micron absolute.
   B. Stop watch
   C. Ground Lock Assemblies - F72735 (Ref 32-00-01)
3. Prepare to Test Extension and Retraction
   A. Jack airplane for gear retraction (Ref Chapter 7, Jacking Airplane).
   B. Ground the airplane (Ref 20-40-11, Static Grounding).
   C. Set trailing edge flap control valve out of null by opening both standby pump circuit breakers, setting flap master switch to ARM, and setting flap lever at the 30-detent position.
   D. Set the system A and B flight Control and spoiler shutoff valve switches to the OFF position.
   E. Connect external electrical power.
   F. Remove ground lock assemblies from main gear (Ref 32-00-01).
   G. Check that landing gear is fully extended and locked with control lever in OFF position.
   H. Open the hydraulic ground interconnect valve circuit breaker on P-18 panel and manually place hydraulic ground interconnect valve override lever to the open position.

      CAUTION: DO NOT TURN STEERING WHEEL WITH NOSE GEAR SHOCK STRUT FULLY EXTENDED. CENTERING CAMS IN SHOCK STRUT MAY BE DAMAGED.

   I. Pressurize hydraulic system A (Ref 29-11-0 MP).

J. Advance both throttles to a position greater than 17 degrees.

4. Test Main Landing Gear Extension and Retraction

A. Place landing gear control lever in UP position and note gear retraction time.

WARNING: RAPID ACTION OF GEAR AND DOORS MAY INJURE PERSONNEL OR DAMAGE EQUIPMENT.

B. Check that main gears are up and locked and doors closed within 8.5 seconds from time control handle enters UP detent until landing gear red warning lights go off.

C. Check that all gear lights are off.

D. Place control lever in OFF position for 15 seconds then move to DN position.

E. Check that main gear are fully extended and locked within 7.5 seconds from time the control lever enters DN detent until gear green indicator lights come on.

5. Restore Airplane To Normal

A. Depressurize hydraulic system A (Ref 29-11-0 MP).

B. Install main gear ground lock assemblies (Ref 32-00-01).

C. Return flap master arming switch to the OFF position.

D. Close both standby pumps circuit breakers on P-18 panel.

E. Close the hydraulic ground interconnect valve circuit breaker on P-18 panel.

F. Set the system A and B flight control valve switches to the ON position.

G. Set the spoiler shutoff valve switches to the ON position.

H. Move flap control lever to position corresponding with flap position indicator on forward instrument panel.

I. Determine if electrical power, hydraulic or pneumatic supply is still required. If not, disconnect source.

J. Lower airplane and remove jacks (Ref Chapter 7, Jacking Airplane).

K. Lock the spoiler shutoff valve and flap master arming switch guards in the closed position with copper wire.

MAIN GEAR ACTUATOR ASSEMBLY - REMOVAL/INSTALLATION

1. General
   A. The main gear actuator assembly includes actuator, actuator walking beam, and beam hanger. The entire assembly must be removed to change any individual component.
2. Equipment and Materials
   A. Ground Lock Assembly - F72735 (AMM 32-00-01)
   B. Grease - BMS 3-33 (Preferred)
   C. Grease - MIL-PRF-23827 (Supercedes MIL-G-23827) (Alternate)
   D. Grease - MIL-G-21164 (Alternate)
   E. Corrosion Inhibitor - Mastinox 6856K (AMM 20-30-21)
   F. Primer - BMS 10-11, Type I
3. Prepare to Remove Main Gear Actuator Assembly
   A. Check that landing gear ground lock assemblies are installed in all gear and depressurize hydraulic system (AMM 32-00-01).
   B. Remove hydraulic access panels 8401 left or 8501 right.
   C. Disconnect outer wing door pushrod (10, Fig. 401) from trunnion link (9).
   D. Disconnect bonding cable (11) from structure.
   E. Remove wing door hinge bolts securing stabilizing beam (2) to airplane and remove beam complete with outer wing door (12) from airplane.
4. Remove Main Gear Actuator Assembly
   A. Disconnect hydraulic lines (19, Fig. 401) from actuator. Plug lines.
   B. Disconnect hose guide (20) from hose clamp (21).
   C. Remove actuator inboard attachment bolt (16) and walking beam inboard attachment bolt (13).
   D. Remove antirotation bolt from walking beam arm (14) and rotate arm as required to permit removal of actuator and walking beam assembly.
   E. Support actuator assembly and remove bolts securing beam hanger shaft (8) to structure. Remove assembly from airplane.

      CAUTION: DO NOT LET BEAM HANGAR TOUCH ACTUATOR. DURING ACTUATOR ASSEMBLY REMOVAL, BEAM HANGAR CAN ROTATE ABOUT BOLT (7) AND TOUCH ACTUATOR. DAMAGE TO BEAM HANGAR CAN OCCUR IF BEAM HANGAR TOUCHES ACTUATOR.

   F. Remove actuator from assembly.
      (1) Remove actuator/walking beam attachment bolt (7) connecting actuator and walking beam to beam hanger (5).

         NOTE: Observe flanged steel bushings (4) in beam hanger, nylon spacers between actuator and beam hanger, and special washer under nut.

      (2) Remove hydraulic fitting (17) and one way restrictor (18) from actuator and discard O-ring packings.

5. Prepare to Install Actuator Assembly

A. Install hydraulic fitting (17, Fig. 401) in up port and one way restrictor (18) in down port of actuator with new O-ring packings.

NOTE: Install restrictor with hex away from port.

B. Clean and lightly lubricate all attachment bolts, pins, and bearing surfaces with grease immediately before assembly.

WARNING: USE NITRILE GLOVES FOR SKIN PROTECTION AGAINST BMS 3-27 (MASTINOX 6856K). IF MASTINOX GETS ON YOUR SKIN, IMMEDIATELY REMOVE IT WITH WATER. IF THIS MATERIAL GETS IN YOUR EYES, IMMEDIATELY FLUSH YOUR EYES WITH WATER AND GET MEDICAL AID. THIS MATERIAL CONTAINS VERY POISONOUS AND FLAMMABLE AGENTS WHICH CAN CAUSE INJURIES TO PERSONS.

CAUTION: UNWANTED MASTINOX MUST BE REMOVED FROM SURFACES WHICH WILL BE GREASED. APPLICATION OF MASTINOX TO JOINTS THAT TURN COULD CAUSE FAILURE OF THE LANDING GEAR TO EXTEND OR RETRACT.

NOTE: Parts, which are not lubricated after installation, must be coated with Mastinox 6856K.

Parts, which are lubricated after installation, must be lubricated with Aero Shell 07.

C. Place main gear actuator (6) in beam hanger (5) with ports down.

CAUTION: ON SOME AIRPLANES, BEAM HANGER SHAFT (8) IS NOT SYMMETRICAL. CHECK THAT SHORT FLAT SIDE OF LUG ON BEAM HANGER SHAFT (8) IS INSTALLED FACING DOWN. IF SHAFT IS NOT PROPERLY POSITIONED, DAMAGE TO AIRPLANE MAY OCCUR WHEN GEAR IS RETRACTED.

CAUTION: DO NOT LET BEAM HANGAR TOUCH ACTUATOR. DURING ASSEMBLY OF ACTUATOR ASSEMBLY, BEAM HANGAR CAN ROTATE ABOUT BOLT (7) AND TOUCH ACTUATOR. DAMAGE TO BEAM HANGAR CAN OCCUR IF BEAM HANGAR TOUCHES ACTUATOR.

D. Check that flanged steel bushings (4) are in position in beam hanger (5). Bushings must be installed with flanges on outer face of hanger.

E. Position nylon spacer on each side of actuator over actuator bearing with chamfered face of spacer toward beam hanger.

F. Align walking beam over hanger with cut-away cross rib nearest actuator.

NOTE: Parts which are not lubricated with grease nipple after installation must be coated with Mastinox 6856K (MM543-542).

Parts which are lubricated with grease nipple after installation must be coated with Aero Shell 07 (MM543-604).

NOTE: Long arm of hanger pivot must be forward when assembly is installed.

G. Insert actuator/walking beam attachment bolt (7) so that head will be aft when assembly is installed. Add special washer and nut.

CAUTION: MAKE SURE THE BOLT HEAD OF THE ACTUATOR/WALKING BEAM IS INSTALLED IN THE CORRECT ORIENTATION. INCORRECT INSTALLATION OF THE ACTUATOR/WALKING BEAM ATTACHMENT BOLT (7) CAN CAUSE DAMAGE TO THE WALKING BEAM.

H. Tighten nut 350-400 pound-inches lube torque. Lock nut with cotter pin.

6. Install Actuator Assembly

A. Raise assembly into position with beam hanger outboard.

CAUTION: DO NOT LET BEAM HANGAR TOUCH ACTUATOR. DURING ACTUATOR ASSEMBLY INSTALLATION, BEAM HANGAR CAN ROTATE ABOUT BOLT (7) AND TOUCH ACTUATOR. DAMAGE TO BEAM HANGAR CAN OCCUR IF BEAM HANGAR TOUCHES ACTUATOR.

B. Rest inboard ends of actuator and walking beam on shock strut.
C. Raise outboard end of assembly to align fork ends of beam hanger shaft (8, Fig. 401) over brackets on structure. Note that beam hanger shaft is oriented with longest clevis end installed adjacent to rear spar.
D. Place washer on each attachment bolt and insert bolts through fittings and hanger shaft with heads outboard. Add washer and nut.
E. Check clearance of beam hanger and shaft (AMM 32-32-101/401).
F. Tighten nuts 130 to 180 pound-inches.
G. Rotate walking beam arm (14) to align holes for insertion of antirotation bolt. Insert bolt from top, install washer, and tighten nut 30 to 40 pound-inches.
H. Align inboard end of actuator walking beam (3) with walking beam arm on shock strut.
I. Insert attachment bolt (13) with head forward. Install washer and nut.
   (1) With 65-46109-4 or -6 walking beam arm and 69-42199-1 attachment bolt, measure and record self-locking torque of nut. It should be 90 to 800 pound-inches. Add 250 to 300 pound-inches to the measured self-locking torque to determine the installation torque range. Torque the nut to within this range. Install cotter pin.

(2) With 65-46109-4 or -6 walking beam arm and 69-42199-2 attachment bolt, torque nut 600 to 1800 pound-inches lube torque. Make sure torque remains in this range while making adjustments, and install cotter pin.
(3) With 65-46109-( ) other than -4 or -6 and with BACB30LJ20 attachment bolt, torque nut 70 to 90 pound-feet. Back off and retorque 5 to 10 pound-feet. Back off to nearest locking position, and install cotter pin. Zero torque is acceptable.

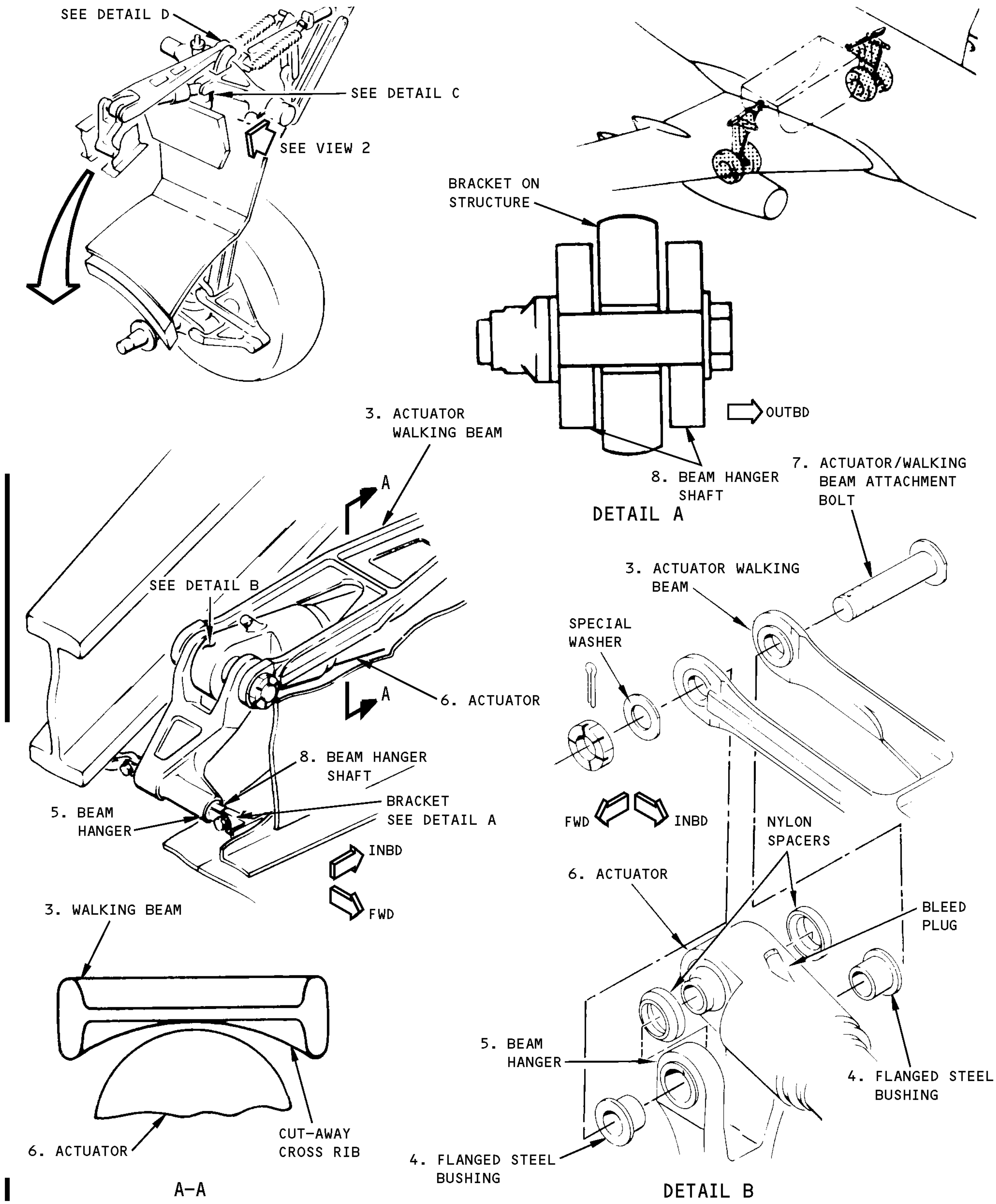
J. Line inboard end of actuator with trunnion link pin (15). Insert attachment bolt (16) with head forward. Add washer and nut.
K. Torque nut 70 to 90 pound-feet. Back off and retorque 5 to 10 pound-feet. Back off to nearest locking position, and install cotter pin. Zero torque is acceptable.
L. Remove plugs and caps from hydraulic lines and actuator. Connect hydraulic lines (19).
M. Connect hose guide (20) to hose clamp (21).
N. Coat wing door hinge bolts (1) with primer. Keep primer off threads.
O. Install stabilizing beam (2) and insert hinge bolts (1) complete with wing door from inboard side. Add washers and nuts.

NOTE: Install stabilizing beam (2) with concave surface up.

P. Tighten nuts 360 to 630 pound-inches.
Q. Connect outer wing door pushrod (10) to trunnion link (9).
(1) Insert bolt with head forward. Add washer and nut.
(2) Tighten nut 450 to 500 pound-inches. Back off nut to nearest locking position and install cotter key.

R. After completion of the installation, perform a close visual inspection of the Actuator Beam to ensure that finish damage has not occurred during installation. If damage is discovered, touch-up finishes using primer and enamel as specified in CMM 32-16-31 prior to returning component to service. If base metal damage has occurred, more extensive repair will be required, including local blending, shotpeening, and stylus cad plating. Perform in accordance with SOPM instructions.

7. Bleed Main Gear Actuator (Airplane On Jacks)
A. Jack airplane for gear retraction (Chapter 7, Jacking Airplane).



Main Gear Actuator Assembly Installation
Figure 401 (Sheet 1)

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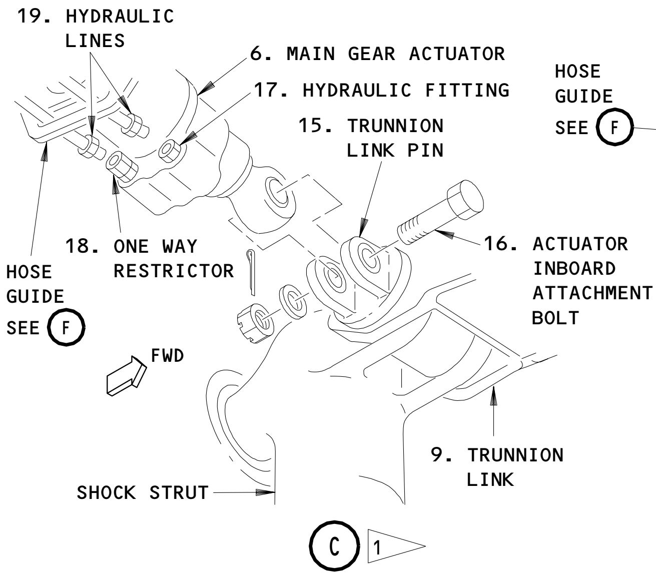
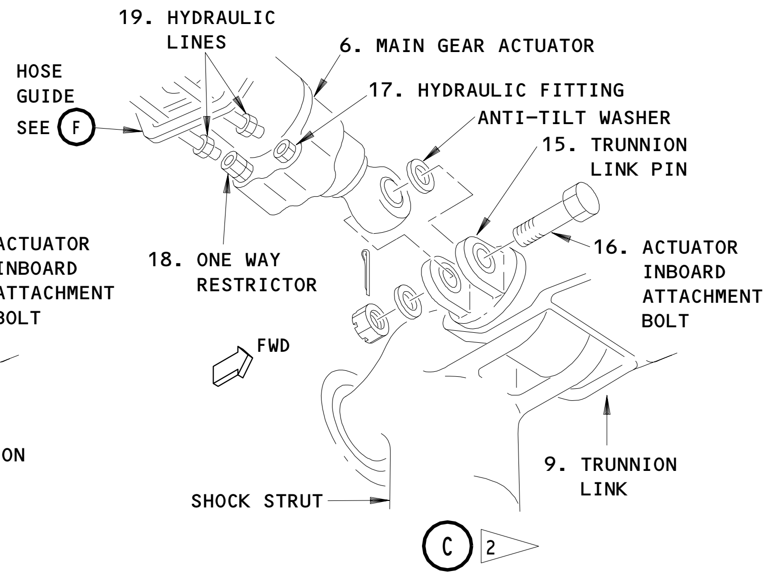
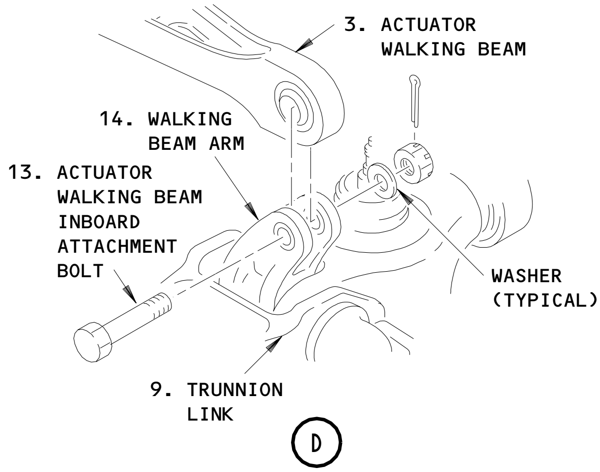
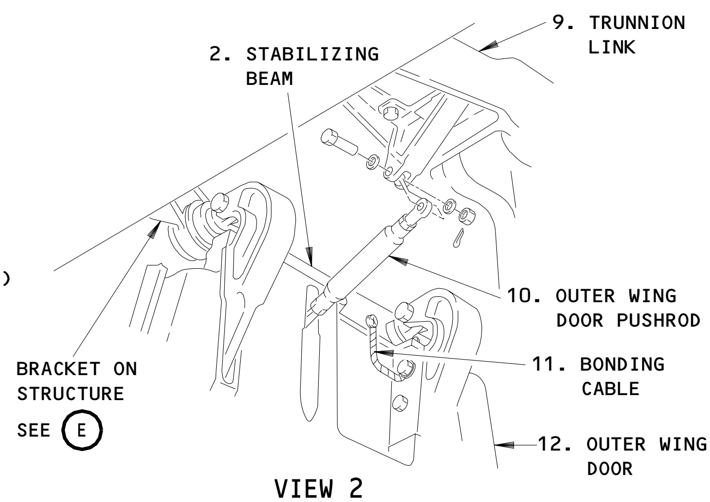
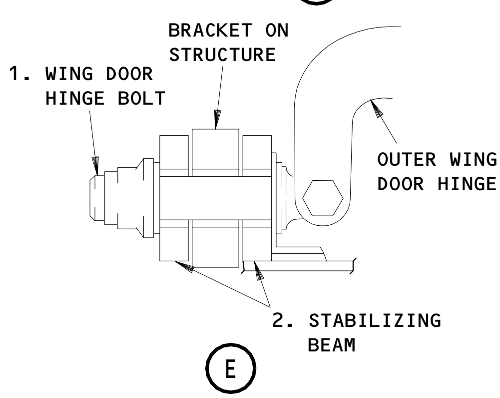
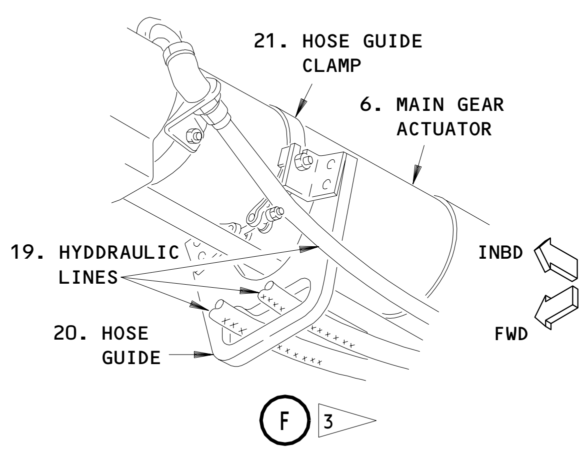












1 AIRPLANES PRE-SB 32-1198

2 AIRPLANES POST-SB 32-1198

3 ONLY FOR AIRPLANES WITH HEAVY DUTY BRAKES INSTALLED

Main Gear Actuator Assembly Installation
Figure 401 (Sheet 2)

B. Make sure the landing gear ground lock assemblies are installed and main landing gear (AMM 32-00-01/201).
C. Pressurize hydraulic system. Place gear control lever in UP then DN positions. Check hydraulic connections for leaks (AMM 29-11-0/201).

WARNING: MAKE SURE GROUND LOCK ASSEMBLIES ARE INSTALLED IN ALL LANDING GEAR TO PREVENT INADVERTENT OPERATION OF THE GEAR. INJURY TO PERSONNEL AND/OR DAMAGE TO EQUIPMENT COULD RESULT IF THE GEAR RETRACTS.

D. Correct any leakage.
E. Place control lever in UP position, carefully loosen bleed plug in head end of actuator (on upper side of cylinder), and bleed actuator.
F. Tighten plug to standard torque. Lockwire plug.
G. Return control lever to DN position.
H. Depressurize hydraulic system (AMM 29-11-0/201).
I. Remove ground lock assemblies from the main landing gear (AMM 32-00-01/201).
J. Lubricate attachment points per Chapter 12, Main Gear Lubrication.
K. Perform a retraction test of main landing gear only (AMM 32-32-0/501).
L. Cycle gear several times to bleed air from piston rod end of actuator.

WARNING: MAKE CERTAIN PERSONNEL AND EQUIPMENT ARE CLEAR OF LANDING GEAR PATH.

M. Extend main landing gear.
N. Depressurize hydraulic system (AMM 29-11-0/201).
O. Install ground lock assemblies in the main landing gear (AMM 32-00-01/201).
P. Lower airplane and remove jacks.
Q. Install hydraulic access panel.

8. Bleed Main Gear Actuator (Airplane On Ground)
   A. General
      (1) If jacking the airplane is not possible, the following procedure may be used as an alternate procedure to that above.
   B. Procedure
      (1) Make sure the actuator is serviceable.
      (2) Make sure the landing gear ground lock assemblies are installed in the nose and main landing gear (AMM 32-00-01).

      WARNING: MAKE SURE GROUND LOCK ASSEMBLIES ARE INSTALLED IN ALL LANDING GEAR TO PREVENT INADVERTENT OPERATION OF THE GEAR. INJURY TO PERSONNEL AND/OR DAMAGE TO EQUIPMENT COULD RESULT IF THE GEAR RETRACTS.

      (3) Make sure the hoses are correctly routed through the hose guides and are not twisted.
      (4) Pressurize hydraulic system A to 3000 psi (AMM 29-11-00/201).

(5) Using the manual override, move the landing gear selector handle from DOWN to UP several times. When you move the landing gear selector handle, leave the handle in each position at least three seconds before you move it to the next position.

(6) Move the landing gear selector handle to DOWN.

(7) Watch the rod end of either main landing gear retract actuator while moving the landing gear selector handle to OFF. Make sure the rod end attempts to extend when the selector handle is moved from DOWN to OFF.

(8) Move the landing gear selector handle to DOWN.

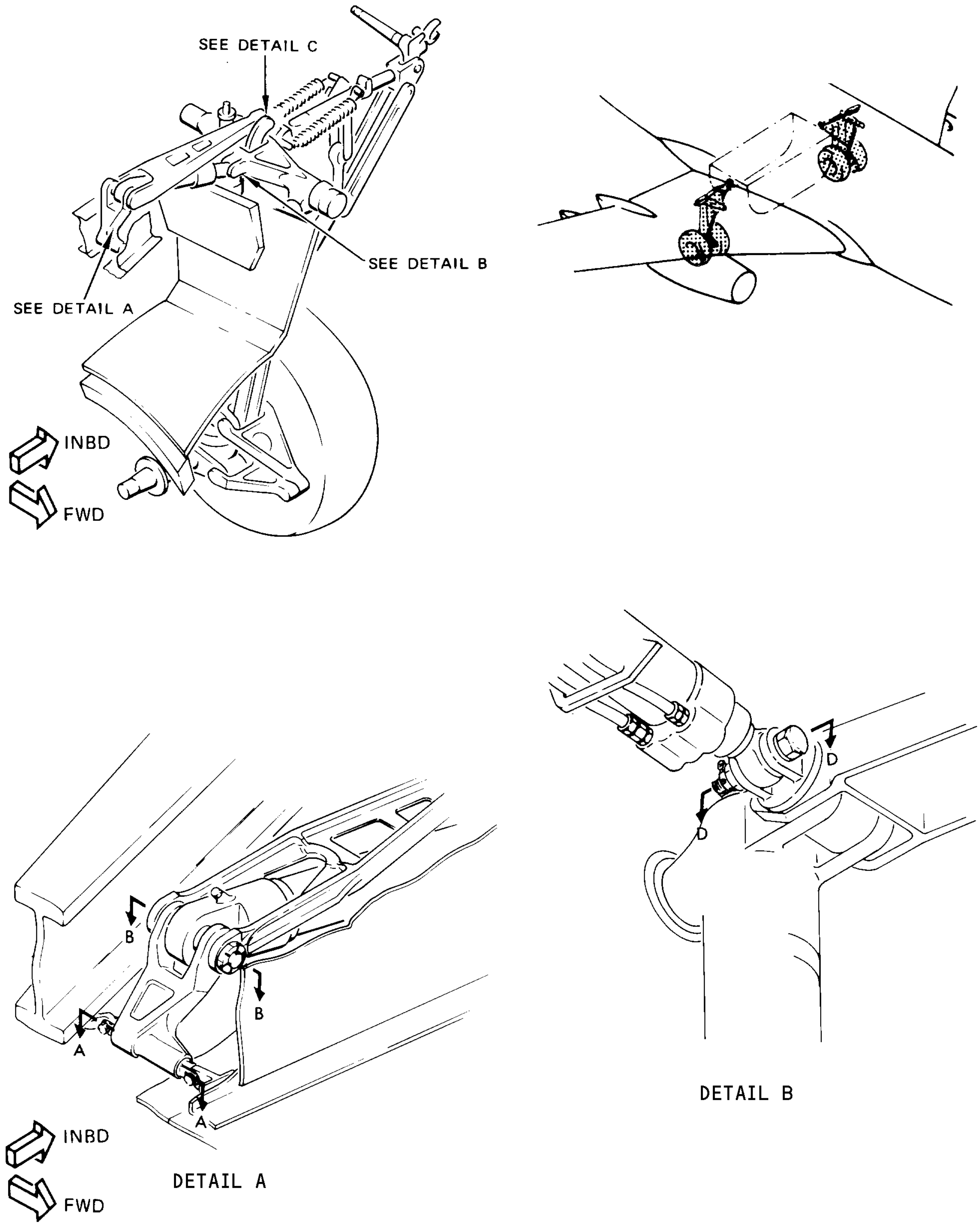
(9) Check the hydraulic connections for leaks.

(10) Add hydraulic fluid to the reservoir as necessary (Chapter 12, Hydraulic Servicing).

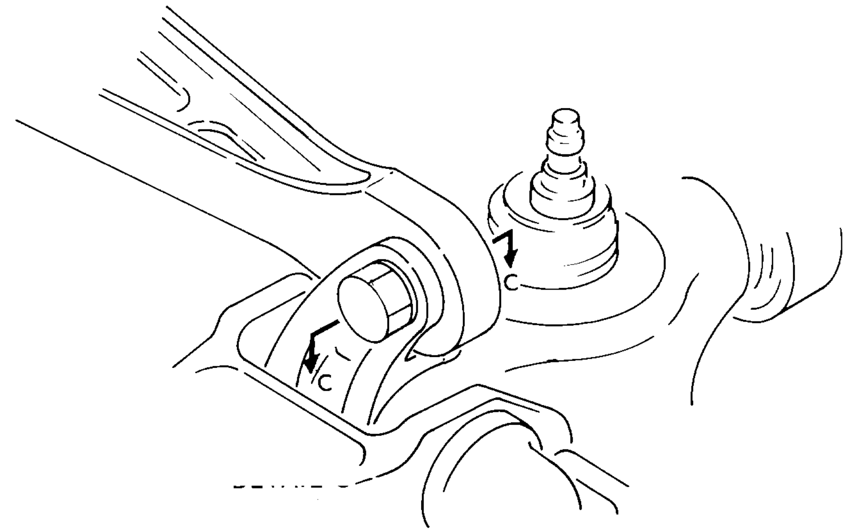
(11) Restore the airplane to normal.

MAIN GEAR ACTUATOR ASSEMBLY - INSPECTION/CHECK

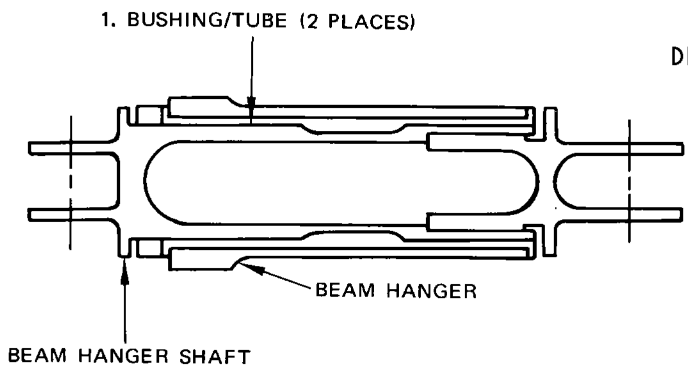
1. General
   A. This data consists of illustrations and wear limit charts. No procedure is given in this section for access to permit inspection. Refer to Main Gear Actuator Assembly - Removal/Installation for removal procedures.
2. Main Gear Actuator Assembly Wear Limits (Fig. 601)
   A. 737-200 only:
      Examine the rubstrip on the aft side of the actuator beam. If it is damaged, remove and replace the rubstrip as specified in OHM 20-15-12, type 70.



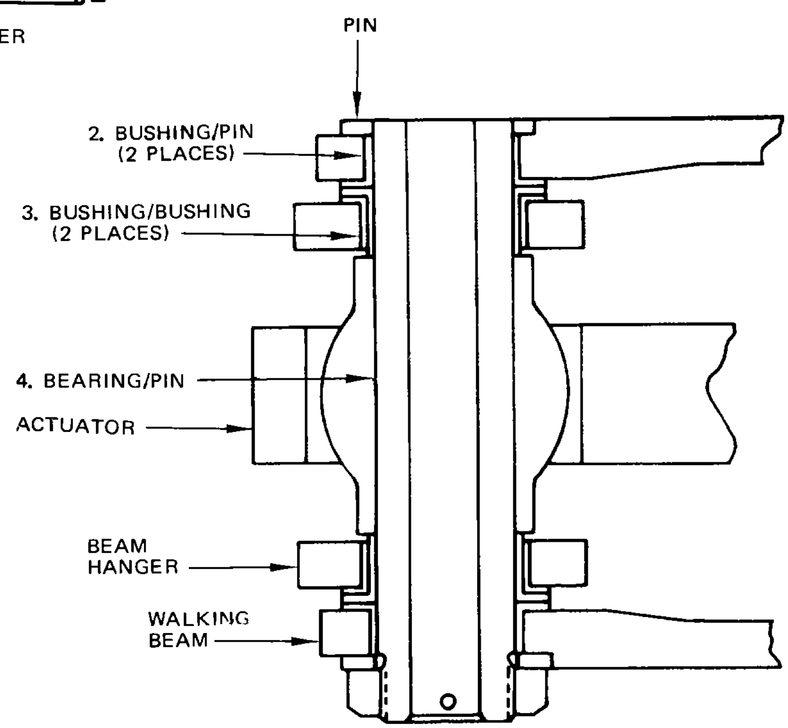
Main Gear Actuator Assembly Wear Limits
Figure 601 (Sheet 1)



DETAIL C

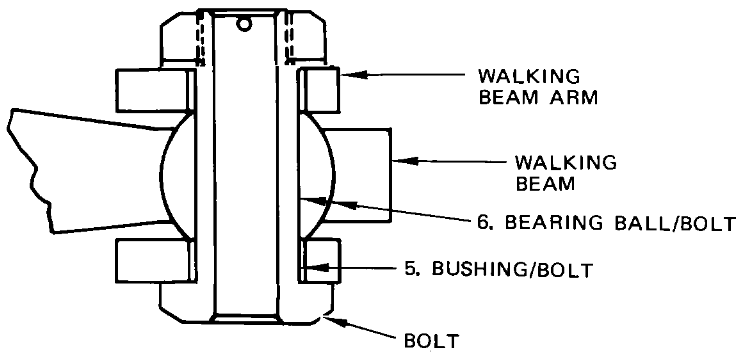


SECTION A-A

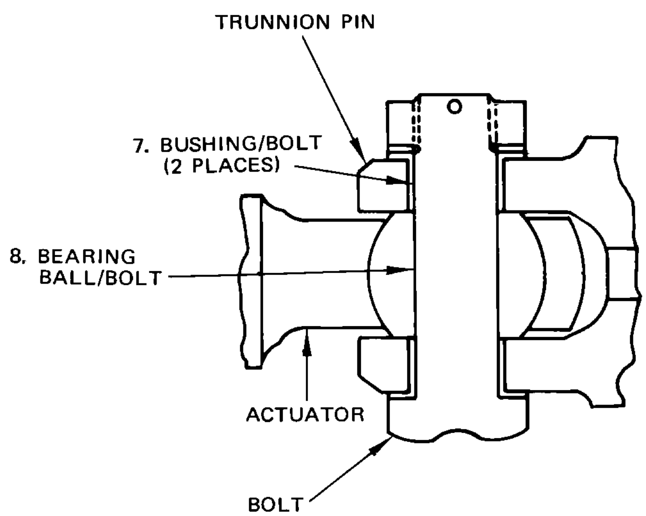


SECTION B-B

Main Gear Actuator Assembly Wear Limits
Figure 601 (Sheet 2)



SECTION C-C



SECTION D-D

Main Gear Actuator Assembly Wear Limits
Figure 601 (Sheet 3)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS DIAMETER MIN	DESIGN LIMITS DIAMETER MAX	WEAR LIMITS MAX WEAR DIM.	WEAR LIMITS MAX DIAM CLEAR- ANCE	REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR.
1	BUSHING	ID	1.3000	1.3010	1.3025	0.005	X		*[1]
	TUBE	OD	1.2985	1.3000	1.2975			X	*[2]
2	BUSHING	ID	1.5000	1.5010	1.5030	0.005	X		
	PIN	OD	1.4970	1.4990	1.4960			X	
3	BUSHING	ID	1.6880	1.6890	1.691	0.010	X		
	BUSHING	OD	1.6840	1.6860	1.683		X		
4	BEARING	ID	1.4995	1.5000			X		*[4]
	PIN	OD	1.4970	1.4990			X		*[4]
5	BUSHING	ID	1.2500	1.2510	1.252	0.005	X		
	BOLT	OD	1.2480	1.2490	1.247			X	*[2]
6	BRG BALL	ID	1.2495	1.2500	1.2520	0.005	X		*[3]
	BOLT	OD	1.2480	1.2490	1.2470			X	
7	BUSHING	ID	1.0000	1.0010	1.003	0.005		X	*[5]
	BOLT	OD	0.9985	0.9990	0.997		X		
8	BRG BALL	ID	0.9995	1.0000	1.002	0.005	X		
	BOLT	OD	0.9985	0.9990	0.997			X	

*[1] Install bushings with corrosion preventive compound on faying surfaces and with interference fit of 0.0005 to 0.0023 inch.
*[2] Chrome plate to maximum thickness of 0.010. Machine to design limits with 32 micorinch finish.
*[3] Clearance determined by subtracting Teflon ball bearing from steel housing. Replace the Teflon bearing when the wear exceeds 0.0005.
*[4] Refer to overhaul manual for replacement instructions.
*[5] Drill oversize hole 1.186 maximum in-pin. Manufacture oversize bushing having 0.0005 to 0.0025 interference fit and press in place.

MAIN GEAR UPLOCK MECHANISM - REMOVAL/INSTALLATION

1. General
   A. Complete removal of main gear lock mechanism is extremely unlikely. The following instructions describe complete removal and installation of lock mechanism. When only part removal is required, follow directions under appropriate headings. The uplock springs, hook and the link assembly must be removed before the uplock crank can be removed. The uplock crank must be installed before the link assembly, hook and the springs.
2. Prepare to Remove Main Gear Lock Mechanism
   A. Check that landing gear ground lockpins are installed in all gear.
   B. Depressurize hydraulic system A.
   C. Open all landing gear circuit breakers on panel P-6.
   D. Jack airplane until weight is supported on jacks (Chapter 7, Jacking Airplane).
   E. Except for spring removal, remove uplock sensor and mounting bracket (AMM 32-61-21) from uplock hook. Tie sensor out of way.
3. Removal/Installation Main Gear Lock Mechanism
   A. Remove Uplock Hook
      (1) Remove lockwire, drive out spring pins (16, Fig. 401) securing uplock springs (14) to upper spring shaft (19).
      (2) Tap out shaft (19) from hook to release springs (14). Preserve spacers (18) that drop free when shaft comes out.
      (3) Remove bolt (21) securing hook (15) to stop link (20).
      (4) Remove hook to uplock crank attachment bolt (13) and remove hook (15) from airplane.
      (5) Remove nut from uplock support shaft (5).
      (6) Tap out shaft (5). Retrieve crank retaining collar (3) as shaft comes out.

         NOTE: Position, number, and size of shims (6) installed under shaft head and between uplock crank (4) and uplock support fitting (8) should be tagged for use during assembly.

      (7) Remove uplock mechanism (4) from airplane.

B. Install Main Gear Uplock Mechanism (Fig. 401)

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CAUTION: UNWANTED MASTINOX MUST BE REMOVED FROM SURFACES WHICH WILL BE GREASED. APPLICATION OF MASTINOX TO JOINTS THAT TURN COULD CAUSE FAILURE OF THE LANDING GEAR TO EXTEND OR RETRACT.

NOTE: Parts which are not lubricated after installation must be coated with Mastinox 6856K.

Parts which are lubricated after installation must be lubricated with Aero Shell 07.

(1) Place uplock mechanism in position in reaction link (24).
(2) Install attachment bolt (23) with head to antirotation lug on reaction link.
(3) Add washer and nut.
(4) Turn the nut on the bolt until the self-locking threads are fully engaged but the nut is not seated.
(5) Measure the torque and make sure that the torque is 90-800 pound-inches (this is the run-on torque).
(6) Tighten the nut to the run-on torque plus 250-300 pound-inches.
(7) Install uplock support shaft (5) through side strut support frame (7).

NOTE: Position, number, and size of shims should be installed as tagged on disassembly. If new shims are installed, assemble three thick (0.06-inch) shims (6) between uplock crank (4) and side strut support frame (7). Shim with chamfer must be installed with chamfer against head of pin.

(8) Pass shaft through uplock crank (4), place uplock crank retaining collar (3) on shaft, and insert narrow end of shaft (5) through support fitting (8).
(a) Align collar slot with bellcrank rib and engage rib into slot.
(9) Install collar bolt (2) through crank retaining collar (3) and shaft (5). Insert bolt from side with counter bore.
(10) Position shims on either side of side strut support frame (7) to center uplock hook on uplock roller within ± 0.10 inch. Do a check on the clearance between the shims (6), and the support frame (7) on each side of the support frame (7). Add the clearance that you get on each side of the support frame (7).

NOTE: The total clearance must be between 0.002 - 0.020 inch.

(11) Add special large diameter washer (1) and nut.
(12) Tighten nut with hand. If necessary, back off nut to line up nearest castellation with hole in shaft. Lock nut with cotter pin.
(13) Add washer and nut to collar bolt (2). Tighten nut 30 to 40 pound-inches torque.
(14) Place uplock actuator (17) in position and insert actuator pin (12) through link assembly (10) and rod end of actuator.
(15) Install bearing (9), washer, and nut to each end of actuator pin (12).
(16) Tighten actuator pin nuts 4 to 6 pound-feet.

4. Removal/Installation Uplock Spring

A. Remove Uplock Spring
(1) Remove lockwire and drive out spring pin (16, Fig. 401) securing uplock spring (14) to upper spring shaft (19).
(2) Remove lockwire and drive out spring pin (16, Fig. 401) securing uplock spring (14) to lower spring shaft (22) and remove washers.

CAUTION: SPRING TENSION IS APPROXIMATELY 25 POUNDS.

(3) Remove the uplock spring (14) from both, the upper spring shaft (19) and the lower spring shaft (22).

B. Install Uplock Spring
  (1) Install end of uplock spring (14) on both, the lower spring shaft (22) and the upper spring shaft (19). Secure each end of the uplock spring (14) to the respective shafts (22) and (19) with spring pins (16).
  (2) Pass lockwire through spring pins (16) and lock with double-twist method.

5. Removal/Installation Uplock Hook

A. Remove Uplock Hook
  (1) Remove lockwire and drive out spring pins (16, Fig. 401) securing uplock springs (14) to upper spring shaft (19).
  (2) Remove lockwire and drive out spring pins (16, Fig. 401) securing uplock springs (14) to lower spring shaft (22) and remove washers.

      CAUTION: SPRING TENSION IS APPROXIMATELY 25 POUNDS.

  (3) Tap out shaft (19) from hook to release springs (14). Retain spacers (18) that drop free when shaft comes out.
  (4) Remove bolt (21) securing hook (15) to stop link (20).
  (5) Remove hook to uplock crank attachment bolt (13) and remove hook (15) from airplane.

B. Install Uplock Hook

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CAUTION: UNWANTED MASTINOX MUST BE REMOVED FROM SURFACES WHICH WILL BE GREASED. APPLICATION OF MASTINOX TO JOINTS THAT TURN COULD CAUSE FAILURE OF THE LANDING GEAR TO EXTEND OR RETRACT.

NOTE: Parts which are not lubricated after installation must be coated with Mastinox 6856K.

Parts which are lubricated after installation must be lubricated with Aero Shell 07.

(1) Place uplock hook (15, Fig. 401) in uplock crank (4) and insert hook attachment bolt (13) from forward side.
(2) Add washer and nut. Tighten nut to standard torque, and lock with cotter pin (Chapter 20, Standard Torque Values).
(3) Connect hook (15) to stop link (20). Insert bolt (21) from aft side. Add washer and nut.
(4) Tighten nut to standard torque and lock with cotter pin (Chapter 20, Standard Torque Values).
(5) Insert lower spring shaft (22) through link assembly (10), stop link (20), and hook (15).
(6) Install ends of uplock springs (14) on lower spring shaft (22). Secure with spring pins (16).
(7) Pass lockwire through spring pins and lock with double-twist method.

6. Removal/Installation Link Assembly

A. Remove Link Assembly

(1) Remove lockwire and drive out spring pins (16, Fig. 401) and lower spring shaft (22) to release uplock springs (14) from link assembly (10).
(2) Disconnect uplock actuator (17) from upper end of link assembly (10). Observe bearings (9) on ends of actuator pin (12).
(3) Remove link attachment bolt (11) and remove link assembly from airplane.

B. Install Link Assembly

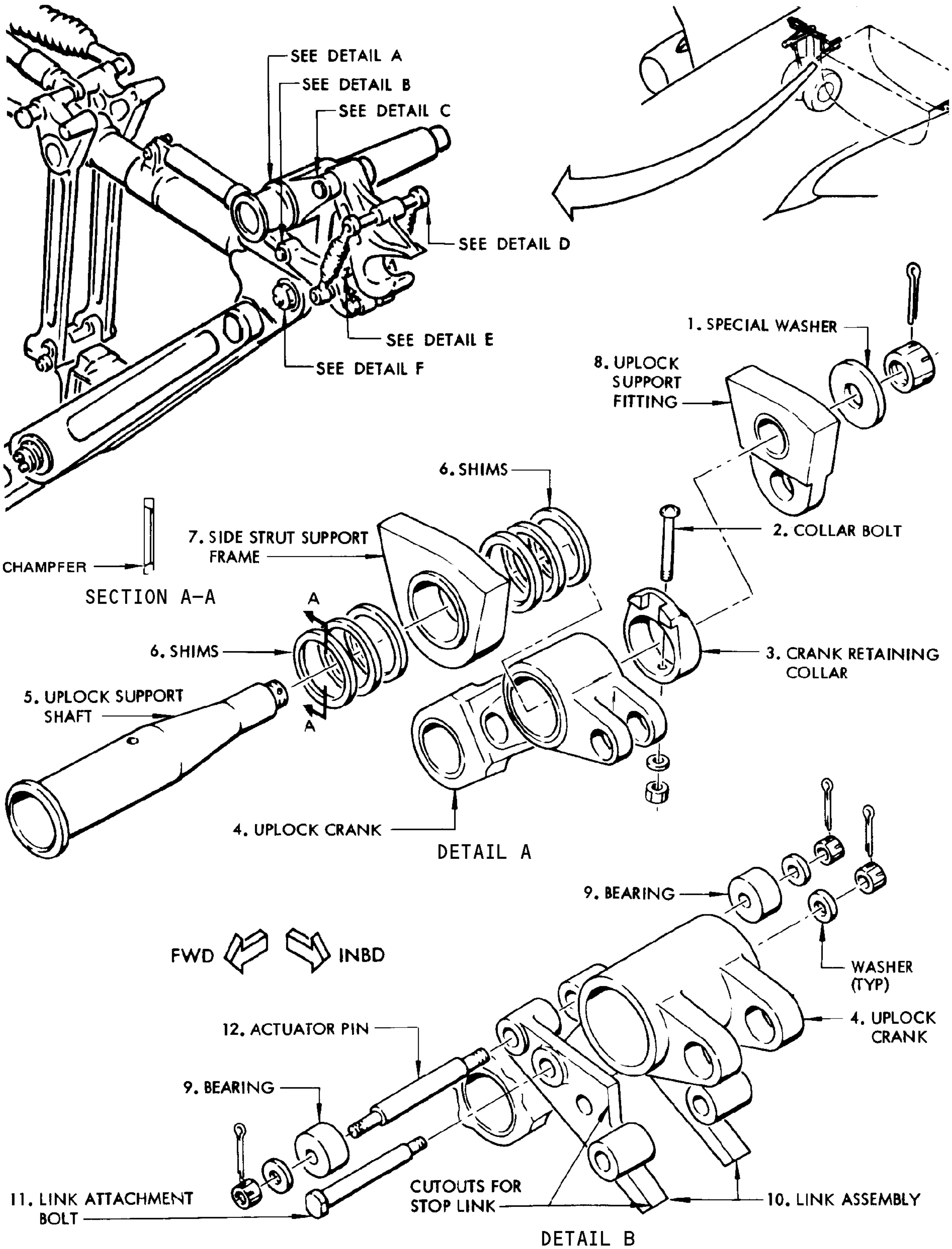
(1) Place link assembly (10, Fig. 401) in position on uplock crank (4) with cutouts for stop link facing hook.
(2) Put the bolt (11) through the stop link with head forward.

NOTE: Butter lubricate threads with MIL-PRF-23827.

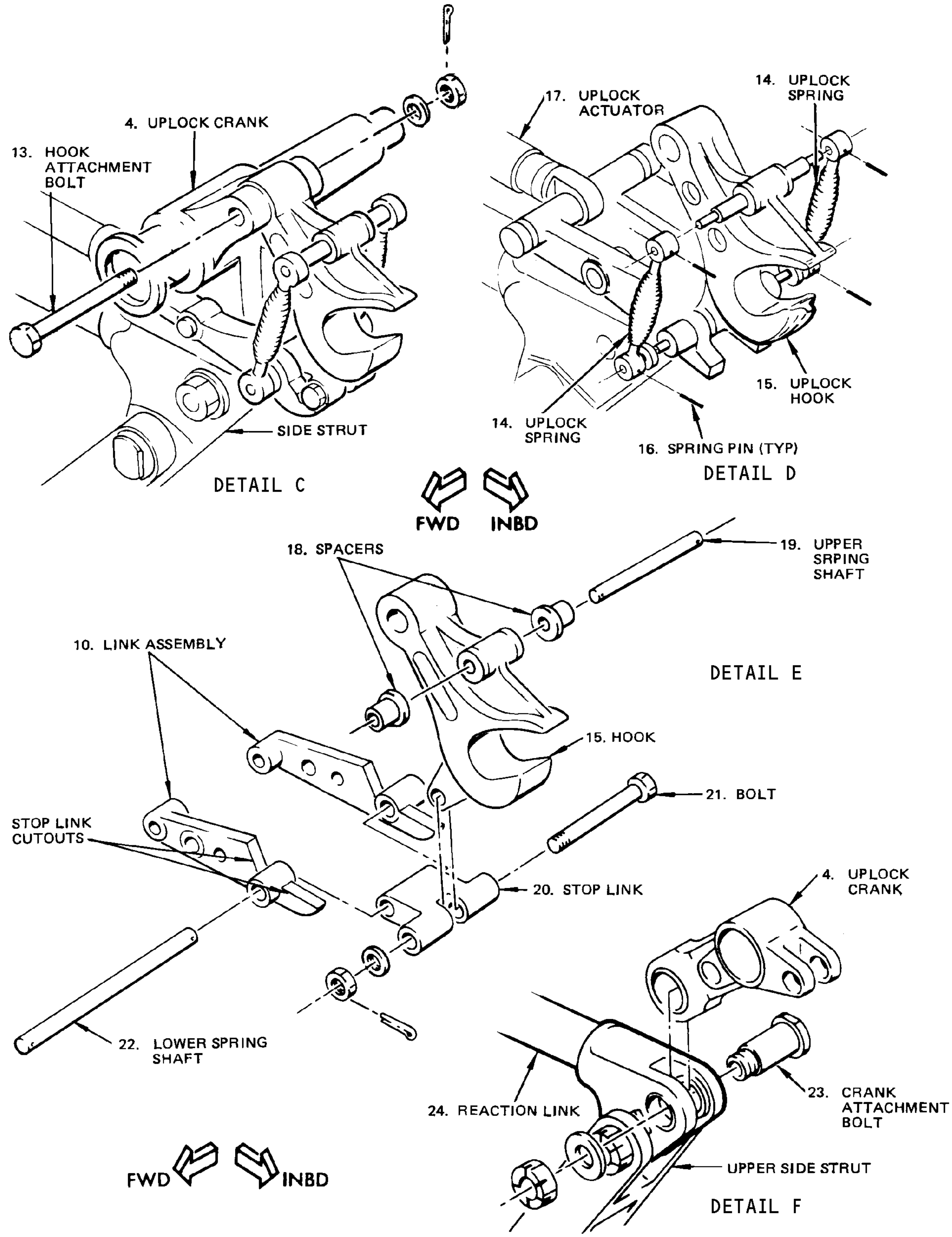
(3) Install washer, nut, and tighten nut to 125 inch-pounds (14.1 newton-meters) over run-on torque.

NOTE: If necessary, back off nut to nearest possible locking position and install cotter pin. A zero torque condition is acceptable.

(4) Connect stop link (20) to link assembly by inserting lower spring shaft (22) through links (10), stop link (20), and hook (15).
(5) Add a washer on each end of lower spring shaft (22).



Main Gear Uplock Mechanism Installation
Figure 401 (Sheet 1)



Main Gear Uplock Mechanism Installation
Figure 401 (Sheet 2)

(6) Install ends of uplock springs (14) on lower spring shaft (22). Secure uplock springs with spring pins (16).
(7) Pass lockwire through spring pins and lock with double-twist method.
(8) Connect uplock actuator (17) to link assembly (10).
 (a) Insert actuator pin (12) through link assembly (10).
 (b) Add bearing (9), washer and nut to each end of pin (12).
 (c) Tighten nuts 4 to 6 pound-feet.

7. Removal/Installation Uplock Crank
A. General
 (1) Uplock hook (15, Fig. 401) and link assembly (10) must be removed before uplock crank (4) can be removed.
B. Remove Uplock Crank
 (1) Remove crank attachment bolt (23, Fig. 401).
 (2) Remove bolt (2) securing crank retaining collar (3).
 (3) Remove nut from uplock support shaft (5).
 (4) Tap out shaft (5). Retrieve crank retaining collar (3) as shaft comes out.

 NOTE: Position, number, and size of shims (6) installed under shaft head and between uplock crank (4) and uplock support fitting (8) should be tagged for use during assembly.

 (5) Remove uplock crank (4) from airplane.
C. Install Uplock Crank

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CAUTION: UNWANTED MASTINOX MUST BE REMOVED FROM SURFACES WHICH WILL BE GREASED. APPLICATION OF MASTINOX TO JOINTS THAT TURN COULD CAUSE FAILURE OF THE LANDING GEAR TO EXTEND OR RETRACT.

NOTE: Parts, which are not lubricated after installation, must be coated with Mastinox 6856K.

Parts, which are lubricated after installation, must be lubricated with Aero Shell 07.

(1) Place crank (4, Fig. 401) in position in reaction link (24).
(2) Install attachment bolt (23) with head to antirotation lug on reaction link.
(3) Add washer and nut.
(4) Turn the nut on the bolt until the self-locking threads are fully engaged but the nut is not seated.
(5) Measure the torque and make sure that the torque is 90-800 pound-inches (this is the run-on torque).
(6) Tighten the nut to the run-on torque plus 250-300 pound-inches.
(7) Install uplock support shaft (5) through side strut support frame (7).

NOTE: Shim with chamfer to be installed with inside diameter chamfer against fillet radius at base of support shaft head. Position, number, and size of shims should be installed as tagged on disassembly. If new shims are installed assemble three thick (0.06-inch) shims (6) between uplock crank (4) and side strut support frame (7).

(8) Pass shaft through uplock crank (4), place uplock crank retaining collar (3) on shaft, and insert narrow end of shaft (5) through support fitting (8).
    (a) Align collar slot with bellcrank rib and engage rib into slot.
(9) Install collar bolt (2) through crank retaining collar (3) and shaft
    (a) Insert bolt from side with counter bore.
(10) Do a check on the clearance between the shims (6), and the support frame (7) on each side of the support frame (7). Add the clearance that you get on each side of the support frame (7). Add or adjust shims as necessary to achieve this clearance so that centerline of uplock hook (15) lines up with centerline of uplock roller within ± 0.10 inch.

NOTE: The total clearance must be between 0.002 - 0.020 inch.

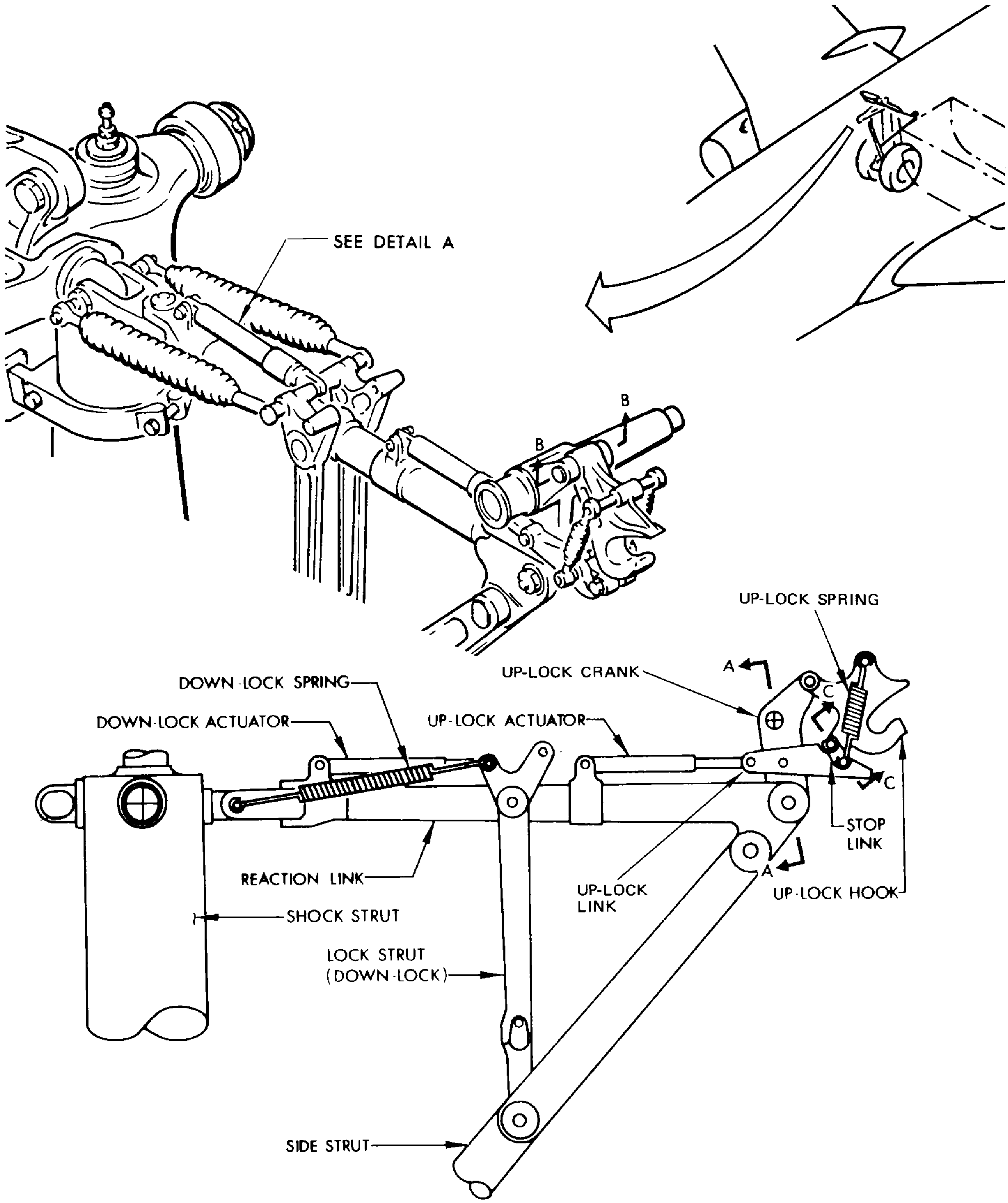
(11) Add special large diameter washer (1) and nut.
(12) Tighten nut with hand. If necessary, back off nut to line up nearest castellation with hole in shaft. Lock nut with cotter pin.
(13) Add washer and nut to collar bolt (2). Tighten nut 30 to 40 pound-inches torque.
(14) Install uplock sensor and mounting bracket on uplock hook. Adjust as necessary (AMM 32-61-21).

8. Restore Airplane to Normal Configuration
   A. Lubricate gear (Chapter 12, Main Landing Gear Lubrication).

B. Jack airplane for retraction of main landing gear (Chapter 7, Jacking Airplane).
C. Remove ground lock assemblies (AMM 32-00-01). Retract and extend gear to test operation of lock (AMM 32-32-0/501).
D. Lower airplane and remove jacks.

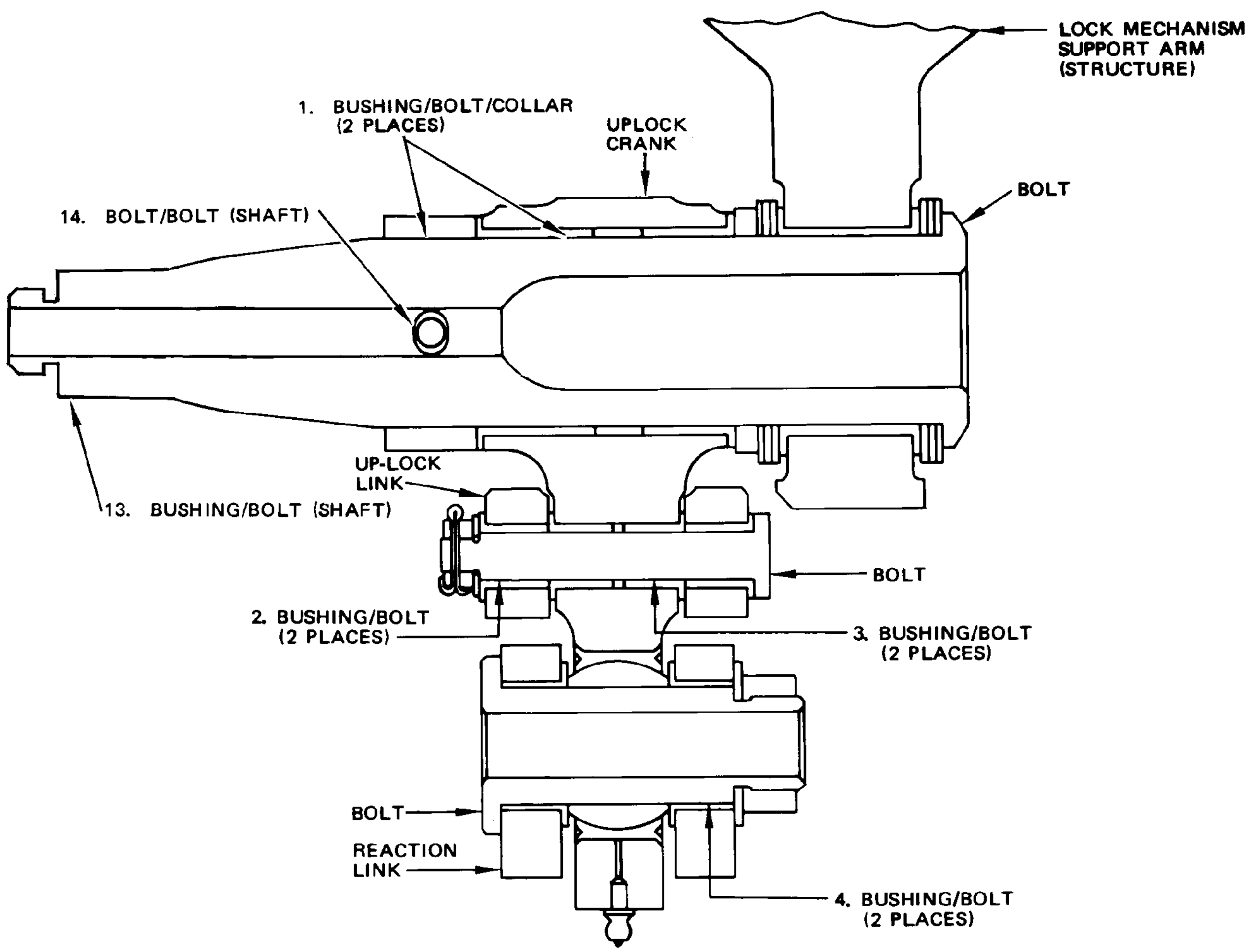
MAIN GEAR UPLOCK MECHANISM - INSPECTION/CHECK

1. General
   A. This data consists of illustrations and wear limit charts. No procedure is given in this section for access to permit inspection. Refer to Main Gear Lock Mechanism - Removal/Installation for removal procedures.
2. Main Gear Lock Mechanism Wear Limits

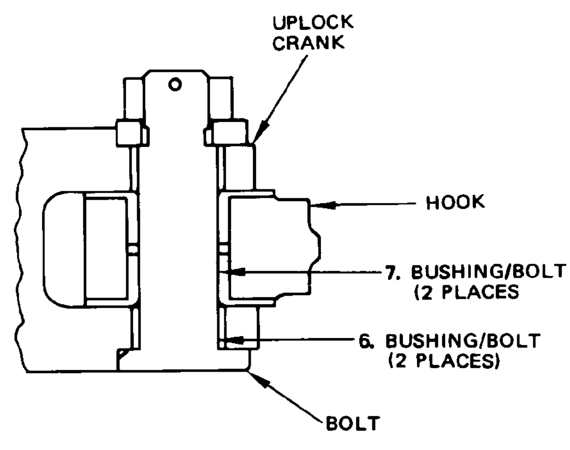


GEAR DOWN AND LOCKED

Main Gear Uplock Mechanism Wear Limits
Figure 601 (Sheet 1)

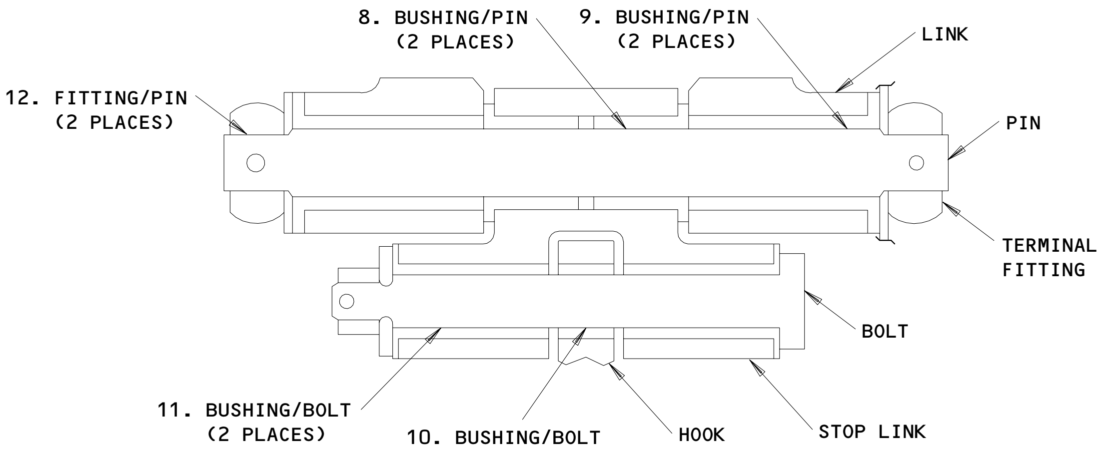


SECTION A-A



SECTION B-B

Main Gear Uplock Mechanism Wear Limits
Figure 601 (Sheet 2)



C-C

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS DIAMETER MIN	DESIGN LIMITS DIAMETER MAX	WEAR LIMITS MAX WEAR DIM.	WEAR LIMITS MAX DIAM CLEARANCE	REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR.
1	BUSHING	ID	2.000	2.001	2.002	0.005	X		
	BOLT	OD	1.997	1.998	1.996			X	*[1]
2	BUSHING	ID	0.5630	0.5640	0.5650	0.005	X		
	BOLT	OD	0.5605	0.5615	0.5591			X	*[1]
3	BUSHING	ID	0.5630	0.5640	0.5650	0.005	X		
	BOLT	OD	0.5605	0.5615	0.5595			X	*[1]
4	BUSHING	ID	1.250	1.251	1.252	0.005	X		
	BOLT	OD	1.248	1.249	1.247			X	*[1]
5	BEARING	ID	1.2495	1.2500	1.2532	0.005	X		
	BOLT	OD	1.2480	1.2490	1.2470			X	*[1]

Main Gear Uplock Mechanism Wear Limits
Figure 601 (Sheet 3)

MAIN GEAR UPLOCK ACTUATOR - REMOVAL/INSTALLATION

1. Equipment and Materials
    A. Gear Ground Assembly (Ref 32-00-01)
    B. Hydraulic Fluid, Fire Resistant - BMS 3-11
    C. Grease - BMS 3-33 (Preferred)
    D. Grease - MIL-PRF-23827 (Supercedes MIL-G-23827) (Alternate)
    E. Grease - MIL-G-21164 (Alternate)
2. Remove Main Gear Uplock Actuator
    A. Check that landing gear ground lock assemblies are installed (Ref 32-00-01).
    B. Depressurize hydraulic system A (Ref 29-11-0 MP).
    C. Tag hydraulic lines to show position and disconnect from uplock actuator. Plug hydraulic lines.
    D. Remove nuts washers and bearings from inboard actuator attachment.
    E. Remove shaft.
    F. Remove attachment bolt from outboard end of actuator and remove actuator from airplane.
    G. Remove hydraulic fittings from actuator. Discard O-ring packings and plug ports.
3. Install Main Gear Uplock Actuator
    A. Install hydraulic fittings and O-ring packings lubricated with hydraulic fluid, in actuator.
    B. Retract actuator. Fill actuator with hydraulic fluid and cap ports.
    C. Place uplock actuator in position with piston end inboard and ports facing forward (Fig. 401).
    D. Install outboard attachment bolt, washer, and nut. Lightly lubricate bolt shank with grease prior to installation.
    E. Install inboard attachment shaft.
    F. Tighten outboard attachment nut 75 to 100 pound-inches. If cotter pin cannot be installed within specified torque limits, compliance with torque requirements shall be obtained by interchanging nuts or by adding one washer or both.
    G. Install bearings, washers, and nuts on shaft. Tighten nut 50 to 70 pound-inches lube torque.
    H. Install cotter pins in uplock attachment nuts.
    I. Remove plugs and caps and connect hydraulic lines to actuator.

J. Bleed the downlock actuator (airplane on jacks) as follows:
   (1) Perform retraction test of main landing gear only (Ref 32-32-0, A/T).
   (2) Cycle gear several times to bleed air from actuator lines.
   (3) Check hydraulic connections for leaks.

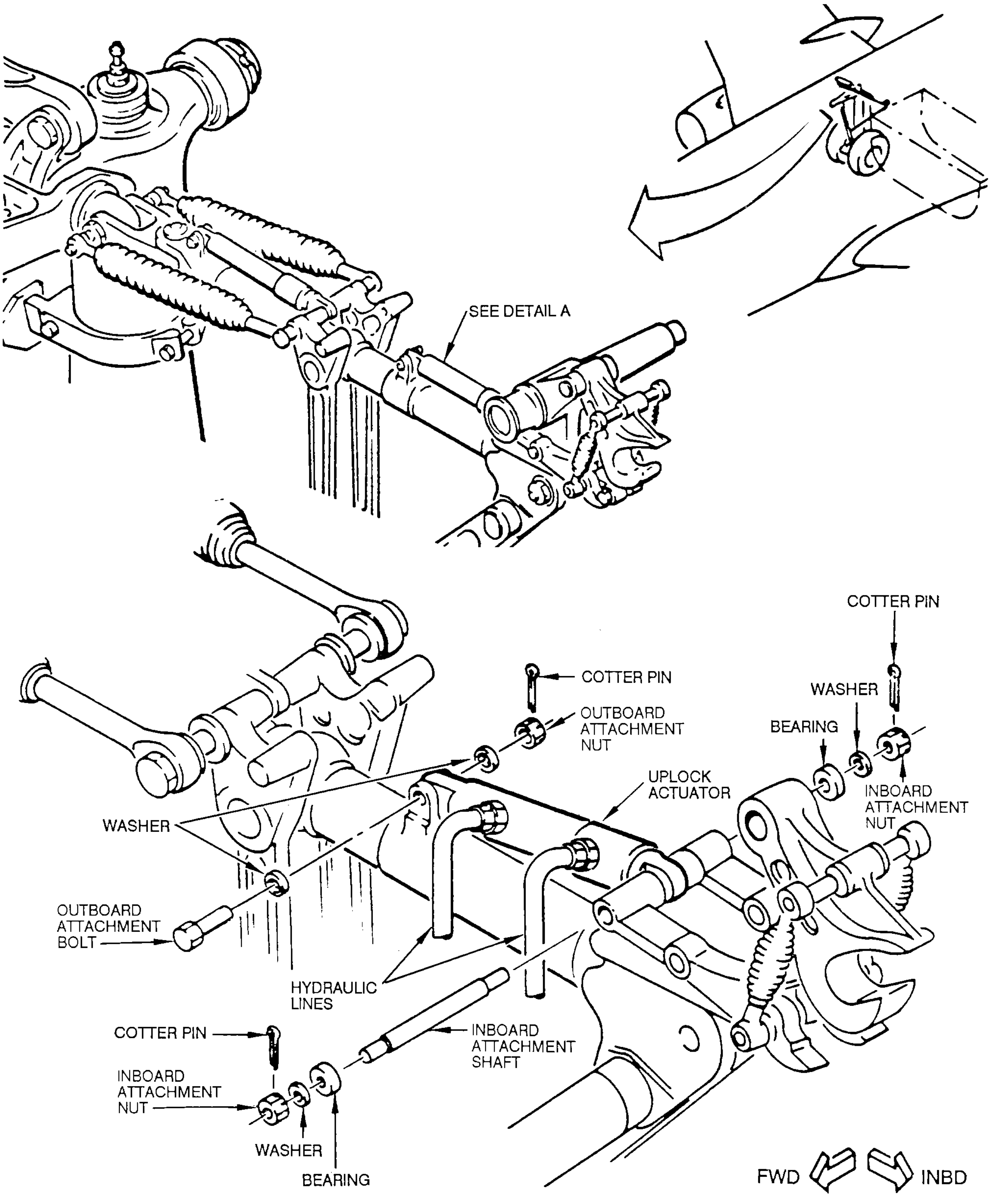
K. If the airplane jacks are not available, bleed the downlock actuator as follows:

WARNING: MAKE SURE YOU INSTALL THE GROUND LOCK ASSEMBLIES IN THE MAIN LANDING GEAR TO PREVENT ACCIDENTAL OPERATION OF GEAR. THE LANDING GEAR CAN RETRACT. IT CAN ALSO CAUSE INJURY TO PERSONS AND STRUCTRAL DAMAGE.

   (1) Pressurize the hydraulic system A.
   (2) Use the override trigger.
   (3) Move the landing gear lever from the DN position to the UP position and move back three times.

      NOTE: Hold the landing gear lever in each position for three seconds before you move the lever to the subsequent position.

   (4) Move the landing gear lever to the DN position.
   (5) Make sure the rod end of the downlock actuator tries to retract when you move the landing gear lever from the OFF position to the DN position.
   (6) Make sure there are no leaks in the hydraulic connections.
   (7) Decrease the pressure from the hydraulic system A.



DETAIL A

Main Gear Uplock Actuator Installation
Figure 401

445158

MAIN GEAR DOWNLOCK ACTUATOR - REMOVAL/INSTALLATION

1. Equipment and Materials
   A. Gear Ground Lock Assembly (Ref 32-00-01)
   B. Hydraulic Fluid, Fire Resistant - BMS 3-11
   C. Grease - BMS 3-33 (Preferred)
   D. Grease - MIL-PRF-23827 (Supercedes MIL-G-23827) (Alternate)
   E. Grease - MIL-G-21164 (Alternate)
2. Remove Main Gear Downlock Actuator
   A. Check that landing gear ground lock assemblies are installed (Ref 32-00-01).
   B. Depressurize hydraulic system (Ref 29-11-0 MP).
   C. Tag hydraulic lines to show position and disconnect from downlock actuator. Plug hydraulic lines (Fig. 401).
   D. Remove downlock springs (Ref 32-32-91 R/I).
   E. Remove outboard actuator attachment bolt and remove actuator from airplane.
   F. Remove hydraulic fittings from actuator. Discard O-ring packings and plug ports.
3. Install Main Gear Downlock Actuator
   A. Install hydraulic fittings and O-ring packings lubricated with hydraulic fluid in actuator.
   B. Retract actuator. Fill actuator with hydraulic fluid and cap ports.
   C. Place downlock actuator in position with piston end inboard and ports facing forward (Fig. 401).
   D. Install outboard attachment bolt, washer, and nut. Lightly lubricate bolt shank with grease prior to installation.
   E. Install downlock springs (Ref 32-32-91 R/I).
   F. Tighten outboard attachment nut 75 to 110 pound-inches. If cotter pin cannot be installed within specified torque limits, compliance with torque requirements shall be obtained by interchanging nuts or by adding one washer or both.
   G. Remove plugs and caps and connect hydraulic lines to actuator.
   H. Bleed the downlock actuator (airplane on jacks) as follows:
      (1) Perform retraction test of the main landing gear only (Ref 32-32-0 A/T).
      (2) Cycle gear several times to bleed air from actuator.
      (3) Check hydraulic connections for leaks.

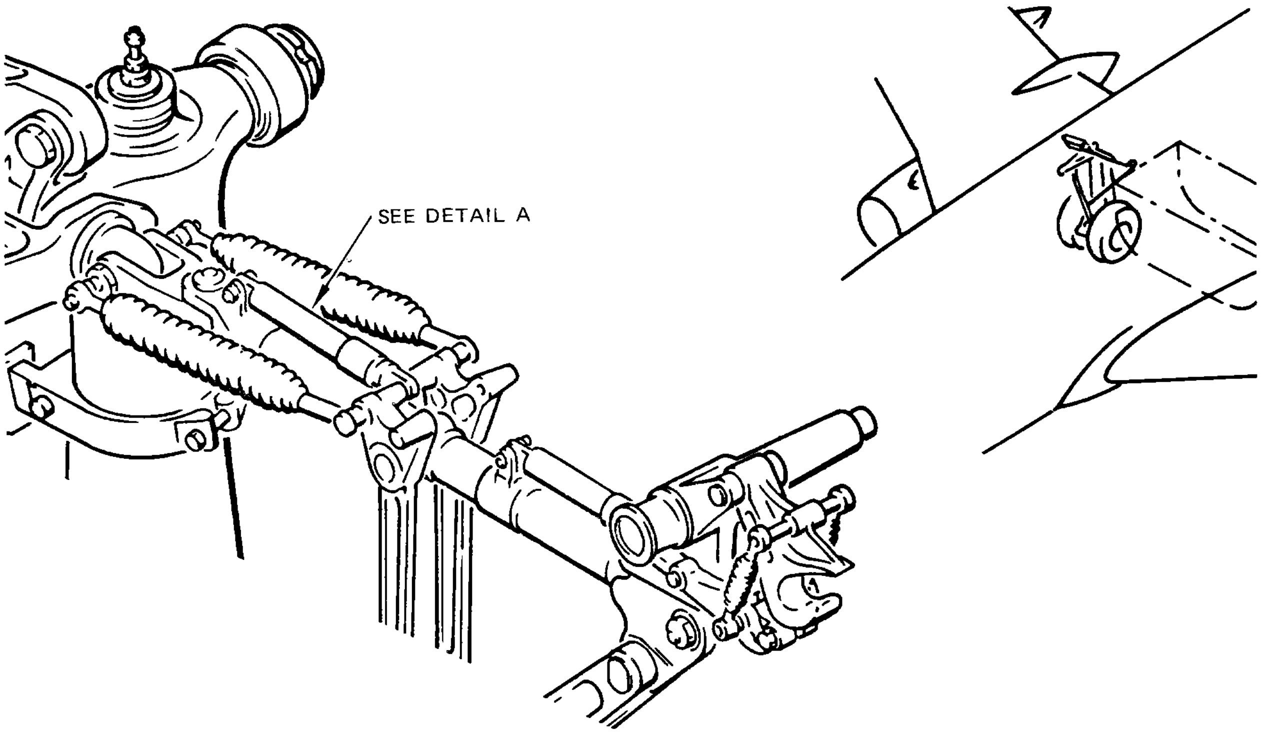
I. If the airplane jacks are not available, bleed the downlock actuator as follows:

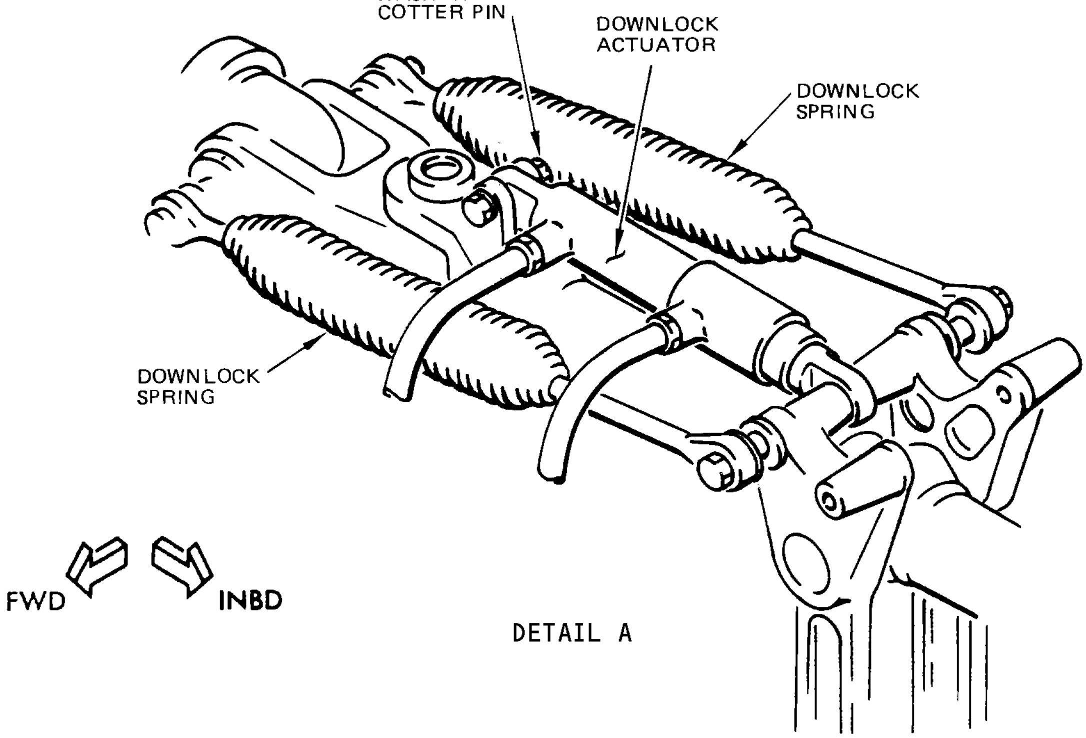
WARNING: MAKE SURE YOU INSTALL THE GROUND LOCK ASSEMBLIES IN THE MAIN LANDING GEAR TO PREVENT ACCIDENTAL OPERATION OF GEAR. THE LANDING GEAR CAN RETRACT. IT CAN CAUSE INJURY TO PERSONS AND STRUCTURAL DAMAGE.

(1) Pressurize the hydraulic system A.
(2) Use the override trigger.
(3) Move the landing gear lever from the DN position to the UP position and move back three times.

NOTE: Hold the landing gear lever in each position for three seconds before you move the lever to the subsequent position.

(4) Move the landing gear lever to the DN position.
(5) Make sure the rod end of the downlock actuator tries to retract when you move thelanding gear lever from the OFF position to the DN position.
(6) Make sure there are no leaks in the hydraulic connections.
(7) Decrease the pressure from the hydraulic system A.





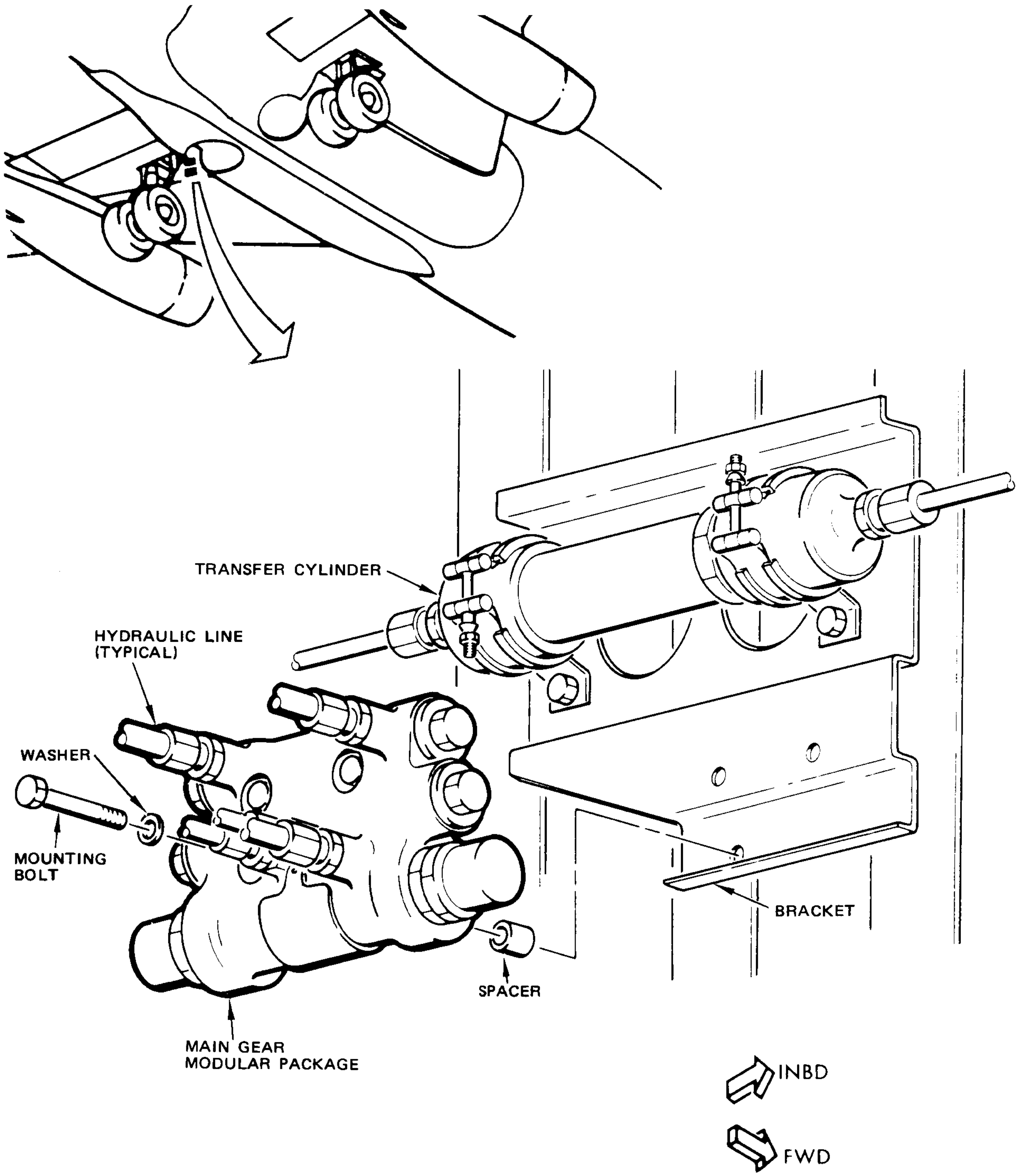
Main Gear Downlock Actuator Installation
Figure 401

MAIN GEAR MODULAR PACKAGE - REMOVAL/INSTALLATION

1. Equipment and Materials
   A. Ground Lock Assembly - F72735 (Ref 32-00-01)
   B. Hydraulic Fluid, Fire Resistant - BMS 3-11
2. Remove Main Gear Modular Package
   A. Check that landing gear ground lock assemblies are installed in all gear (Ref 32-20-01).
   B. Depressurize hydraulic system A (Ref Chapter 29).
   C. Disconnect and plug hydraulic lines (Fig. 401).
   D. Remove bolts and washers securing package to structure. Remove package from airplane. Note spacer on lower bolt.
   E. Remove hydraulic unions from package and discard O-ring packings. Plug ports.
3. Install Main Gear Modular Package
   A. Install hydraulic unions in package with new O-ring packings.
   B. Fill package with hydraulic fluid and cap ports.
   C. Place modular package in position with two hydraulic fittings up (Fig. 401).
   D. Install a washer on each mounting bolt. Insert bolts through package, add spacer to lower bolt, and screw bolts into bracket.
   E. Tighten bolts to standard torque.
   F. Remove caps and plugs. Connect hydraulic lines to package.
   G. Jack airplane for retraction of main gear only (Ref Chapter 7, Jacking Airplane).
   H. Remove ground lock assemblies and perform an operation test of main gear only (Ref 32-32-0, Adjustment/Test). Cycle gear retraction several times to bleed air from package and lines.

      WARNING: CLEAR ALL WHEEL WELL AREAS OF EQUIPMENT AND PERSONNEL BEFORE OPERATING GEAR.

   I. Check package hydraulic connections for leaks.
   J. Extend gear and install ground assemblies (Ref 32-00-01).
   K. Lower airplane and remove jacks.



Main Gear Modular Package Installation
Figure 401

MAIN GEAR TRANSFER CYLINDER - REMOVAL/INSTALLATION

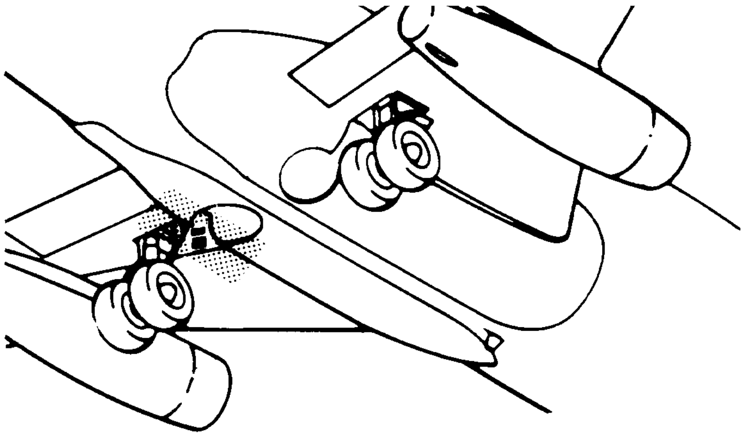
1. Equipment and Materials
   A. BMS 3-23 Corrosion Inhibiting Compound
   B. Ground Lock Assembly - F72735 (Ref 32-00-01)
2. Remove Main Gear Transfer Cylinder
   A. Check that landing gear ground lock assemblies are installed in all gear (Ref 32-00-01).
   B. Depressurize hydraulic system A (Ref Chapter 29).
   C. Disconnect and plug hydraulic lines attached to cylinder (Fig. 401).
   D. Loosen clamp bolts until transfer cylinder can be removed. Remove cylinder from airplane.
   E. Remove hydraulic unions and discard O-ring packings. Plug ports.
3. Install Main Gear Transfer Cylinder
   A. Remove plugs and install hydraulic unions in transfer cylinder with new O-ring packings.
   B. Apply BMS 3-23 to main gear transfer cylinder clamp cutouts.
   C. Fill transfer cylinder from both ends with BMS 3-11 hydraulic fluid. Cap unions.
   D. Position transfer cylinder in clamps. Adjust position of cylinder until hydraulic lines are aligned (Fig. 401).

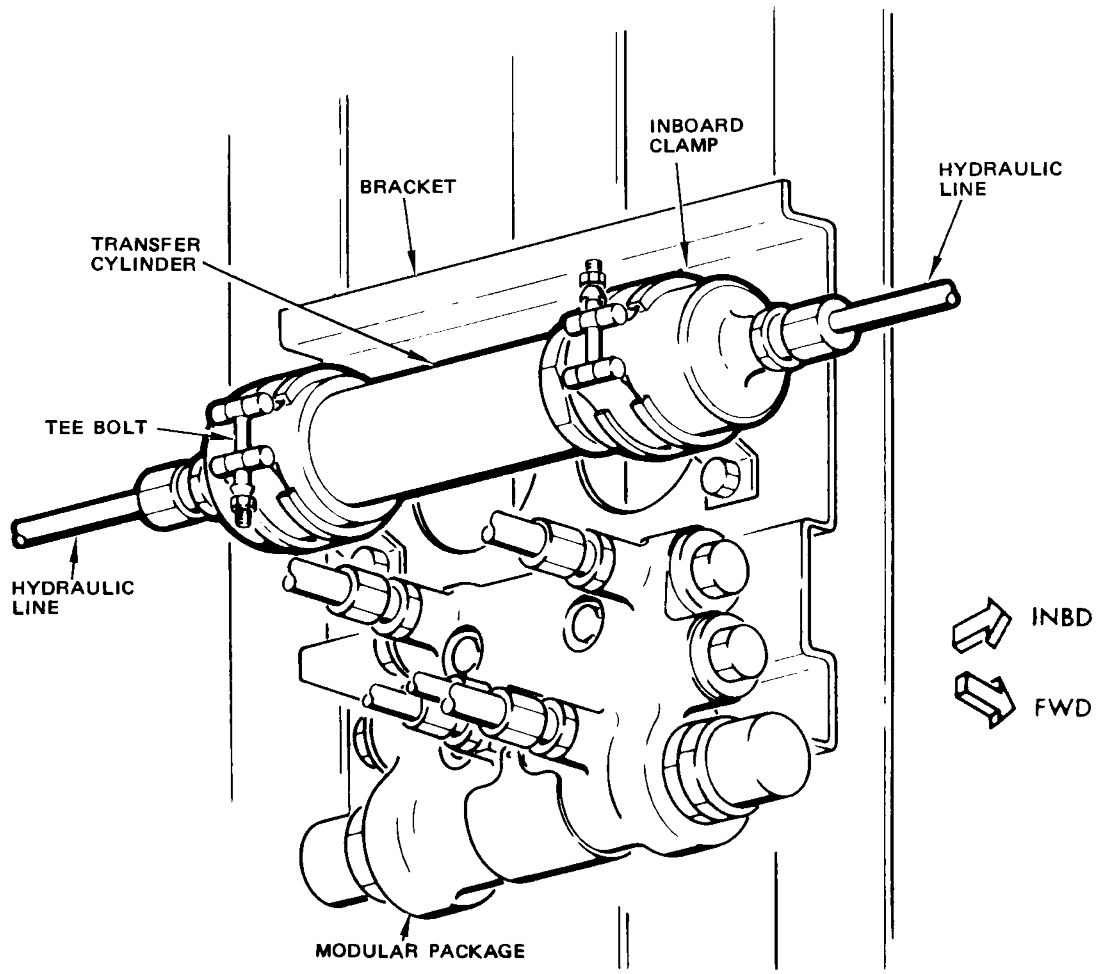
      NOTE: If clamp tee bolts have been removed, the inboard tee bolt must be installed nut up.

   E. Remove caps, plugs and connect hydraulic lines finger-tight.
   F. Tighten clamp bolts and then hydraulic connections.
   G. Jack airplane for gear retraction (Ref Chapter 7, Airplane Jacking).
   H. Pressurize hydraulic system A (Ref 29-11-0, Maintenance Practices).
   I. Tape forward outboard section of wheel well seal in deflated position (if installed).
   J. Remove main gear ground lock assemblies (Ref 32-00-01) and cycle gear retraction several times to bleed air from cylinder and lines.

      WARNING: CLEAR ALL WHEEL WELL AREAS OF EQUIPMENT AND PERSONNEL BEFORE OPERATING GEAR.

   K. Extend gear and install ground lock assemblies (Ref 32-00-01).
   L. Check hydraulic connections for leaks.
   M. Lower airplane and remove jacks.

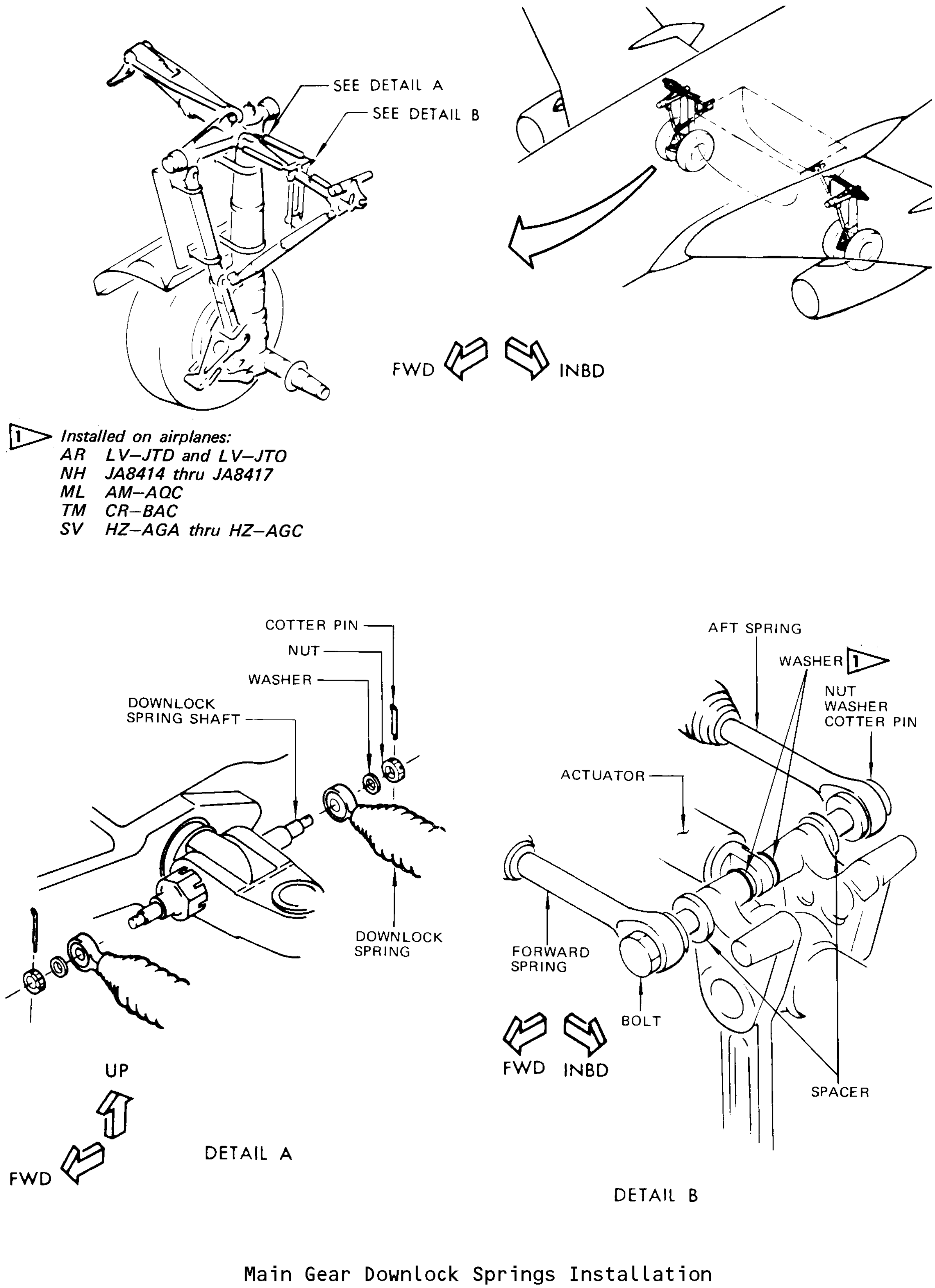




Main Gear Transfer Cylinder Installation
Figure 401

MAIN GEAR DOWNLOCK SPRING ASSEMBLY - REMOVAL/INSTALLATION

1. Equipment and Materials
   A. Ground Lock Assembly - F72735 (Ref 32-00-01)
   B. Spring Expander Set - F80169-1
   C. Grease - BMS 3-33 (Preferred)
   D. Grease - MIL-PRF-23827 (Supercedes MIL-G-23827) (Alternate)
   E. Grease - MIL-G-21164 (Alternate)
2. Remove Main Gear Downlock Springs
   A. Ensure landing gear ground lock assemblies are installed (Ref 32-00-01).
   B. Depressurize hydraulic system A.
   C. Remove cotter pins, nuts, and washers from aft downlock spring attachment (Fig. 401).
   D. Install spring expander on aft downlock spring and relieve spring tension.
   E. Disconnect inboard end of aft downlock spring and remove spring and spacer from airplane.
   F. Install spring expander on forward downlock spring and relieve spring tension.
   G. Disconnect outboard end of forward downlock spring.
   H. Remove inboard attachment bolt, forward spring, and spacer.
   I. On airplanes with washers (Fig. 401 for effectivity), remove inboard attachment bolt, forward spring, washers, and spacer.
3. Install Main Gear Downlock Springs
   A. Place forward downlock spring in position with long shaft end inboard (Fig. 401).
   B. Install inboard attachment bolt and spacers.
   C. On airplanes with washers (Fig. 401 for effectivity), install inboard attachment bolt, washers, and spacers.
   D. Install spring expander on forward downlock spring and stretch spring to fit.
   E. Connect spring to outboard attachment.
   F. Install nut and washer.
   G. Place aft downlock spring in position with long shaft end inboard.
   H. Connect outboard end of spring and install nut and washer.
   I. Install spring expander on aft downlock spring and stretch spring to fit.
   J. Connect inboard end of spring.
   K. Tighten outboard nut 100 to 150 pound-inches and install cotter pins to attachments.
   L. Butter lubricate washer surface, shank, threads and thread relief groove with grease. Install nut and washers on inboard attachment bolt. Tighten nut hand tight and slack off, if necessary, to the nearest castellation to install cotter pin.



Main Gear Downlock Springs Installation
Figure 401

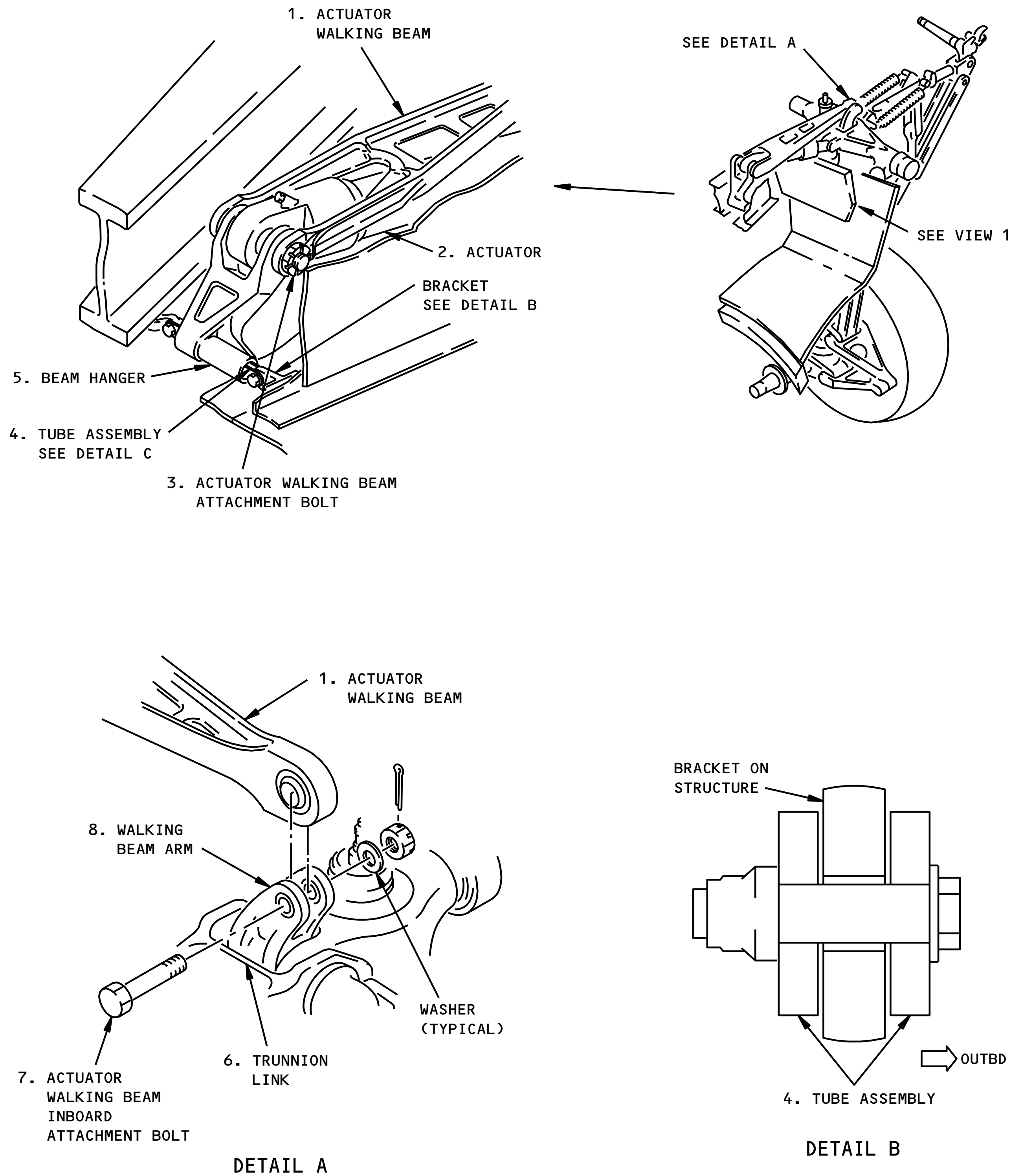
MAIN GEAR BEAM HANGER SHAFT - REMOVAL/INSTALLATION

1. Equipment and Materials
   A. Ground Lock Assembly - F72735 (Ref 32-00-01)
   B. Grease - BMS 3-33 (Preferred)
   C. Grease - MIL-PRF-23827 (Supercedes MIL-G-23827) (Alternate)
   D. Grease - MIL-G-21164 (Alternate)
   E. Primer - BMS 10-11, Type I
2. Prepare for Removal
   A. Check that landing gear ground lock assemblies (Ref 32-00-01) are installed in all gear and depressurize hydraulic system.
   B. Remove hydraulic access panels 8401 left or 8501 right.
   C. Disconnect outer wing door pushrod (12, Fig. 401) from trunnion link (11).
   D. Disconnect bonding cable (13) from structure.
   E. Remove wing door hinge bolts (9) complete with outer wing door (14) then remove stabilizing beam (10) from airplane.
   F. Disconnect inboard end of actuator walking beam (1) from walking beam arm (8).
3. Remove Main Gear Beam Hanger Shaft
   A. Support actuator assembly and remove bolts securing tube assembly (4, Fig. 401) to structure.
   B. Lower outboard end of actuator assembly to obtain access to tube assembly (4).
   C. Take particular note of the number and position of spacers (16) at each end of the tube assembly (4).
   D. Unscrew stud assembly (18) from forward end of tube assembly (4) and remove tube.
4. Install Main Gear Beam Hanger Shaft
   A. Clean and lubricate tube assembly (4) and stud assembly (18) with grease.

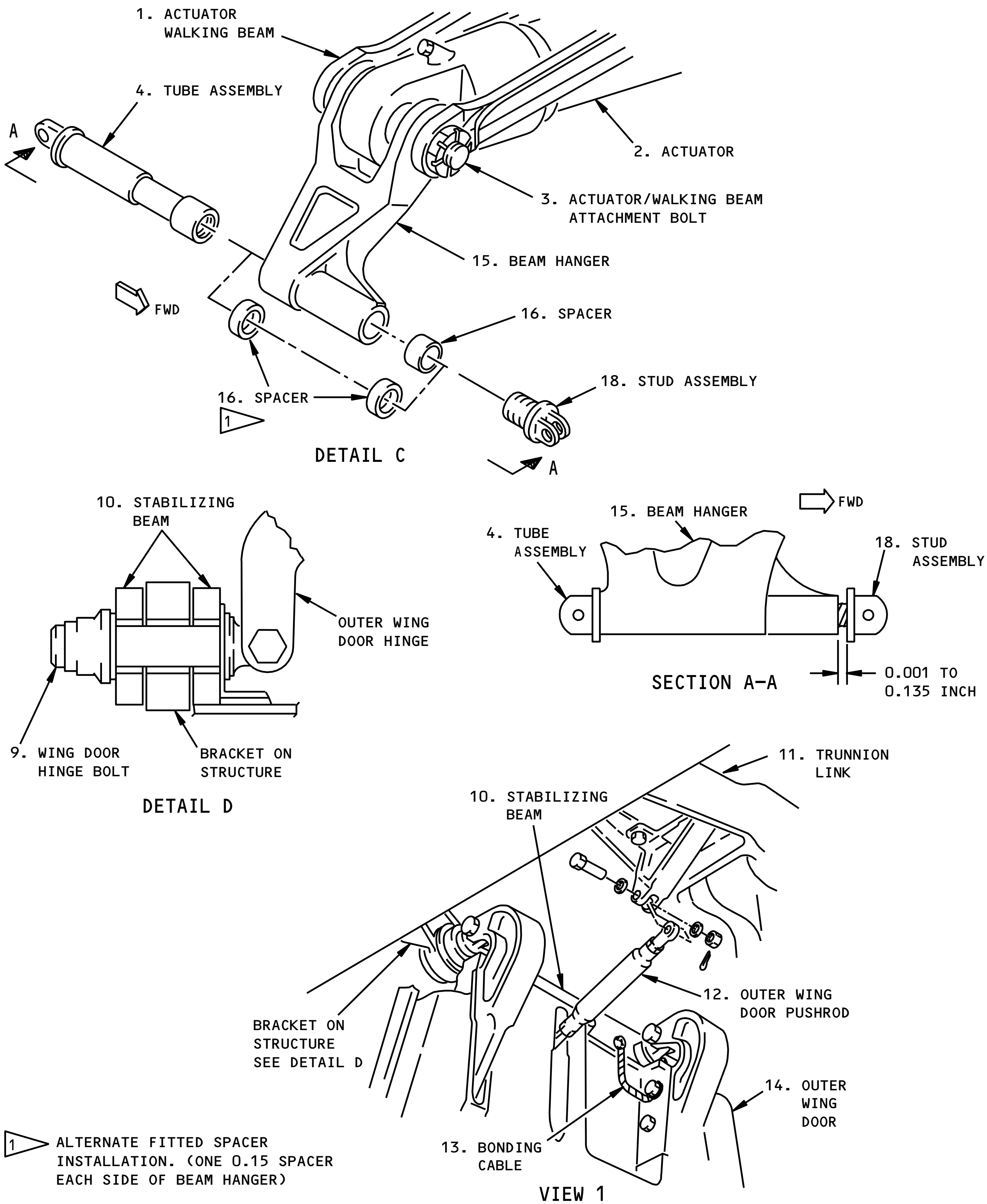
      WARNING: USE NITRILE GLOVES FOR SKIN PROTECTION AGAINST BMS 3-27 (MASTINOX 6856K). IF MASTINOX GETS ON YOUR SKIN, IMMEDIATELY REMOVE IT WITH WATER. IF THIS MATERIAL GETS IN YOUR EYES, IMMEDIATELY FLUSH YOUR EYES WITH WATER AND GET MEDICAL AID. THIS MATERIAL CONTAINS VERY POISONOUS AND FLAMMABLE AGENTS WHICH CAN CAUSE INJURIES TO PERSONS.

      CAUTION: UNWANTED MASTINOX MUST BE REMOVED FROM SURFACES TO BE GREASED. APPLICATION OF MASTINOX TO TURNABLE JOINTS COULD CAUSE FAILURE OF THE LANDING GEAR TO EXTEND OR RETRACT.

      NOTE: 1. Parts not lubricated after installation must be coated with Mastinox
      856K.



Main Gear Beam Hanger Shaft Installation
Figure 401 (Sheet 1)



Main Gear Beam Hanger Shaft Installation
Figure 401 (Sheet 2)

5. Parts lubricated after installation must be lubricated with Aero Shell 07.
   A. Assemble tube assembly (4), spacer(s) (16), and stud assembly (18) as shown in detail C. Tighten stud assembly finger-tight.
   B. Make sure the head of the actuator/walking beam attachment bolt (3) will be aft when the assembly is installed.
   C. Place tube assembly (4) in brackets on structure leaving attachment bolts finger-tight.

      NOTE: On some airplanes, short flat face of lug on tube assembly must be facing downwards.

   D. Swing beam hanger (15) up and outboard to simulate gear retraction. Ensure actuator/walking beam attachment bolt (3) clears landing gear beam by 0.05 inch.
   E. If clearance between actuator/walking beam attachment bolt (3) and beam is insufficient, add spacers (16) to aft end of beam hanger shaft.

      CAUTION: DO NOT REDUCE CLEARANCE BETWEEN FORWARD SIDE OF BEAM HANGER AND AILERON CABLES TO LESS THAN 0.160 INCH. CABLE DAMAGE MAY RESULT.

   F. Check for proper end play of beam hanger by moving hanger fully aft on tube. Ensure clearance between beam hanger (15) and stud assembly (18) is 0.001 to 0.135 inch. If necessary, remove stud assembly (18) from shaft and add spacers (16) to obtain correct end play.
   G. When end play and clearance of two preceding steps is correct, secure tube assembly
      (4) to brackets on structure.

      CAUTION: ON SOME AIRPLANES, BEAM HANGER SHAFT IS NOT SYMMETRICAL. ENSURE SHORT FLAT SIDE OF LUG ON BEAM HANGER SHAFT (4) IS INSTALLED FACING DOWN. IF SHAFT IS NOT PROPERLY POSITIONED, DAMAGE TO AIRPLANE MAY OCCUR WHEN GEAR IS RETRACTED.

   H. Place washer on each attachment bolt and insert bolt through brackets on structure and tube assembly (4) with heads outboard. Add washer and nut.
   I. Tighten nuts 130 to 180 pound-inches.
   J. Coat nuts, bolts, and spacers with grease.
   K. Align inboard end of actuator walking beam (1) with walking beam arm on shock strut.
   L. Insert actuator walking beam inboard attachment bolt (7) with head forward. Add washer and nut.

M. Insert attachment bolt (13) with head forward. Install washer and nut (1) With 65-46109-4 or -6 walking beam arm and 69-42199-1 attachment bolt, measure and record self-locking torque of nut. It should be 90 to 800 pound-inches. Add 250 to 300 pound-inches to the measured self-locking torque to determine the installation torque range. Torque the nut to within this range. Install cotter pin.
   (1) With 65-46109-4 or -6 walking beam arm and 69-42199-2 attachment bolt, torque nut 600 to 1800 pound-inches lube torque. Make sure torque remains in this range while making adjustments, and install cotter pin.
   (2) With 65-46109-( ) other than -4 or -6 and with BACB30LJ20 attachment bolt, torque nut 70 to 90 pound-feet. Back off and retorque 5 to 10 pound-feet. Back off to nearest locking position, and install cotter pin. Zero torque is acceptable.

N. Coat wing door hinge bolts (9) with primer. Keep primer off threads.

O. Install stabilizing beam (10) and insert wing door hinge bolts (9) complete with outer wing door
   (14) from inboard side. Add washers and nuts.

P. Tighten nuts 360-630 pound-inches.

Q. Connect outer wing door pushrod (12) to trunnion link (11).
   (1) Insert bolt with head forward.
   (2) Tighten nut 100-140 pound-inches. Lock nut with cotter pin.
   (3) Connect bonding cable (13).

R. Jack airplane for gear retraction (Ref Chapter 7, Jacking Airplane).

S. Perform a retraction test of affected main gear only (Ref 32-32-0 A/T).

   WARNING: MAKE CERTAIN PERSONNEL AND EQUIPMENT ARE CLEAR OF LANDING GEAR RETRACTION PATH.

T. Extend gear and install ground lock assemblies (Ref 32-00-01).

U. Lower airplane and remove jacks.

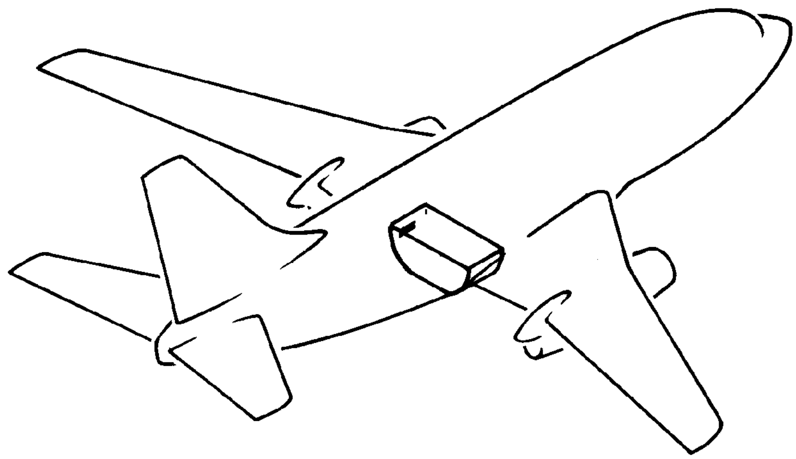
V. Install hydraulic access panel.

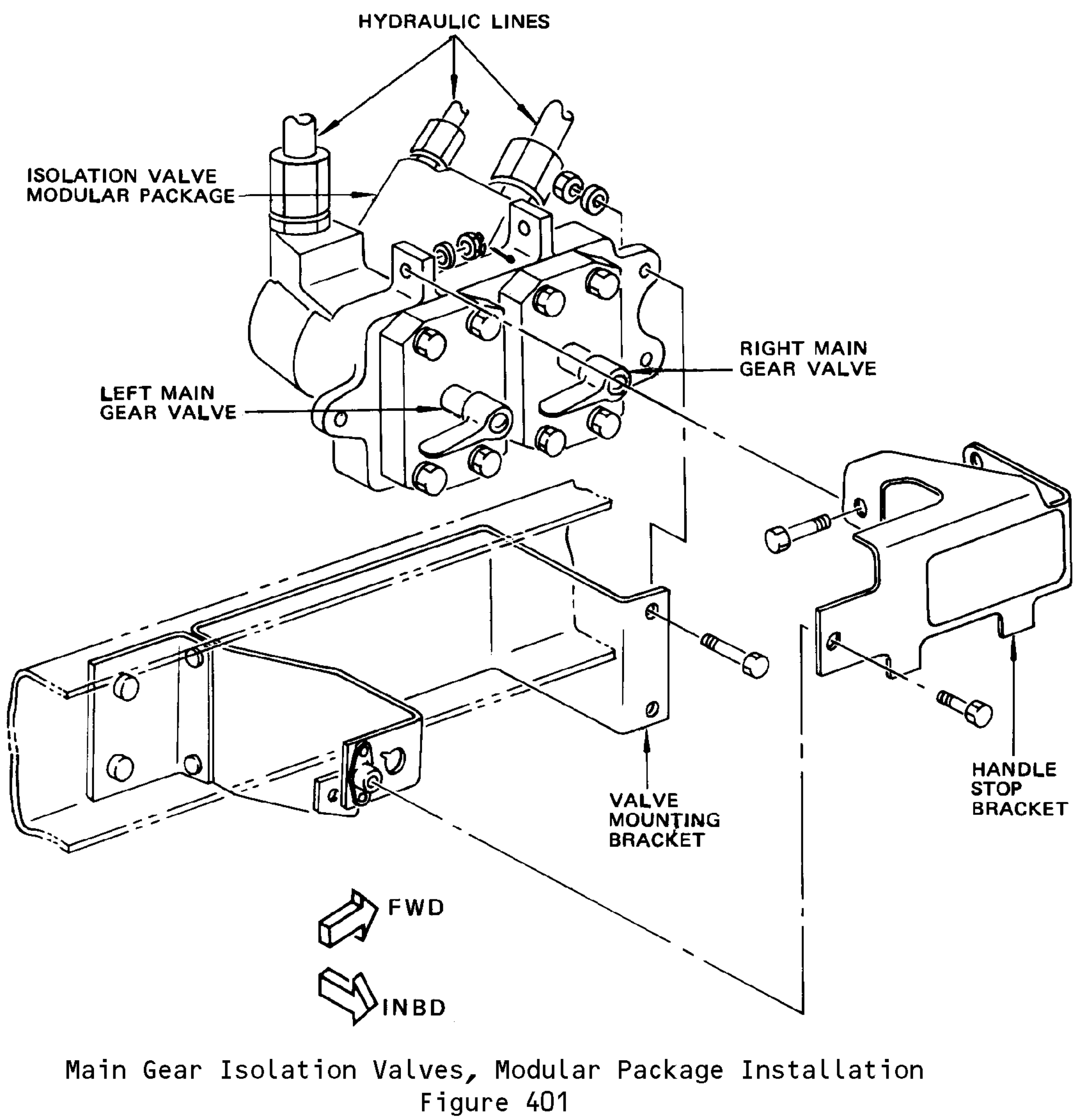
MAIN GEAR ISOLATION VALVE MODULAR PACKAGE - REMOVAL/INSTALLATION

1. General
   A. The main gear isolation valve modular package is located in the left main gear wheel well.
2. Equipment and Materials
   A. Ground Lock Assemblies (Ref 32-00-01)
3. Remove Isolation Valve Modular Package (Fig. 401)
   A. Check that landing gear ground lock assemblies are installed in all gear (Ref 32-00-01).
   B. Depressurize hydraulic system.
   C. Disconnect and plug hydraulic lines.
   D. Remove handle stop bracket.
   E. Remove isolation valve modular package.
   F. Remove hydraulic unions and discard O-rings. Plug ports.
4. Install Isolation Valve Modular Package (Fig. 401)
   A. Remove plugs and install hydraulic unions in isolation valve modular package with new O-rings.
   B. Position modular package in mounting bracket and install attachment bolts.
   C. Remove plugs and connect hydraulic lines.
   D. Pressurize hydraulic system A (Ref Chapter 29, Hydraulic Power).
   E. Open and close valve and check for hydraulic leaks.
   F. Check that ground lock assemblies are installed in main and nose gear (Ref 32-00-01).
   G. Close isolation valves.
   H. Feel down line hoses from main gear uplock and downlock actuators.
   I. Move landing gear control lever to OFF.
   J. Check that there are no pressure pulses in down line hoses.
   K. Move landing gear control lever to DOWN.
   L. Check that there are no pressure pulses in down line hoses.
   M. Open valves and lockwire handles in open position.

      CAUTION: VERIFY VALVE HANDLE IS IN POSITION AS SHOWN IN FIG. 401 WITH VALVE OPEN. IF DIFFERENT, INCORRECT VALVE HANDLE ASSEMBLY MUST BE REPLACED. GEAR WILL NOT RETRACT WITH VALVE IN CLOSED POSITION.

   N. Install handle stop bracket. Tighten nuts finger-tight and install cotter pins.
   O. Depressurize hydraulic system A.





Main Gear Isolation Valves, Modular Package Installation
Figure 401

MAIN GEAR ISOLATION VALVE - REMOVAL/INSTALLATION

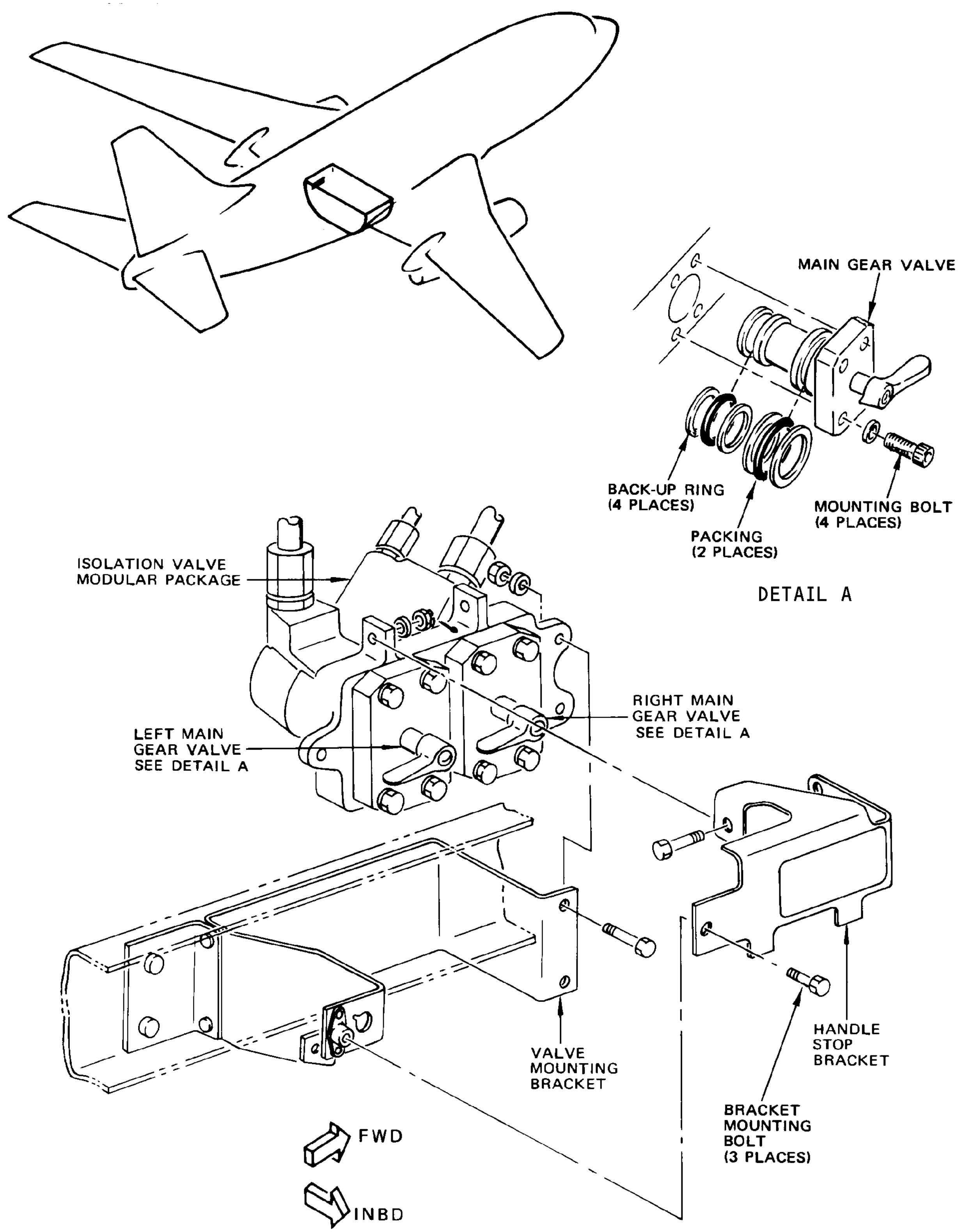
1. General
   A. Two main gear isolation valves are located in the left main gear wheel well in the main gear isolation valve modular package. The valves are identical. The following procedure provides removal and installation instructions for either valve.
2. Equipment and Materials
   A. Ground Lock Assembly - F72735 (Ref 32-00-01)
   B. Skydrol Assembly Lube MCS 352B or Hydraulic Fluid, Fire-Resistant, BMS 3-11
3. Remove Main Gear Isolation Valve
   A. Check that landing gear ground lock assemblies are installed in all gear (Ref 32-00-01).
   B. Depressurize hydraulic system A.
   C. Remove handle stop bracket (Fig. 401).
   D. Remove mounting bolts and isolation valve.
   E. Plug valve ports in modular package.
4. Install Main Gear Isolation Valve

   NOTE: Do not interchange Ronson and Whittaker valve handles. If these valve handles are interchanged on a valve, the handle position will not correspond with valve position. Loss of hydraulic power will occur.

   A. Lubricate packings lightly with assembly lube or hydraulic fluid, and install on valve (Fig. 401).
   B. Remove plug in isolation valve modular package.
   C. Position valve in modular package and install mounting bolts.
   D. Pressurize hydraulic system A (Ref Chapter 29, Hydraulic Power).
   E. Open and close valve and check for hydraulic leaks.
   F. Check that ground lock assemblies are installed in main and nose gear (Ref 32-00-01).
   G. Close isolation valves.
   H. Feel down line hoses from main gear uplock and downlock actuators.
   I. Move landing gear control lever to OFF.
   J. Check that there are no pressure pulses in down line hoses.
   K. Move landing gear control lever to DOWN.
   L. Check that there are no pressure pulses in down line hoses.
   M. Open valves and lockwire handles in open position.

      CAUTION: VERIFY VALVE HANDLE IS IN POSITION AS SHOWN IN FIG. 401 WITH VALVE OPEN. IF DIFFERENT, INCORRECT VALVE HANDLE ASSEMBLY MUST BE REPLACED. GEAR WILL NOT RETRACT WITH VALVE IN CLOSED POSITION.

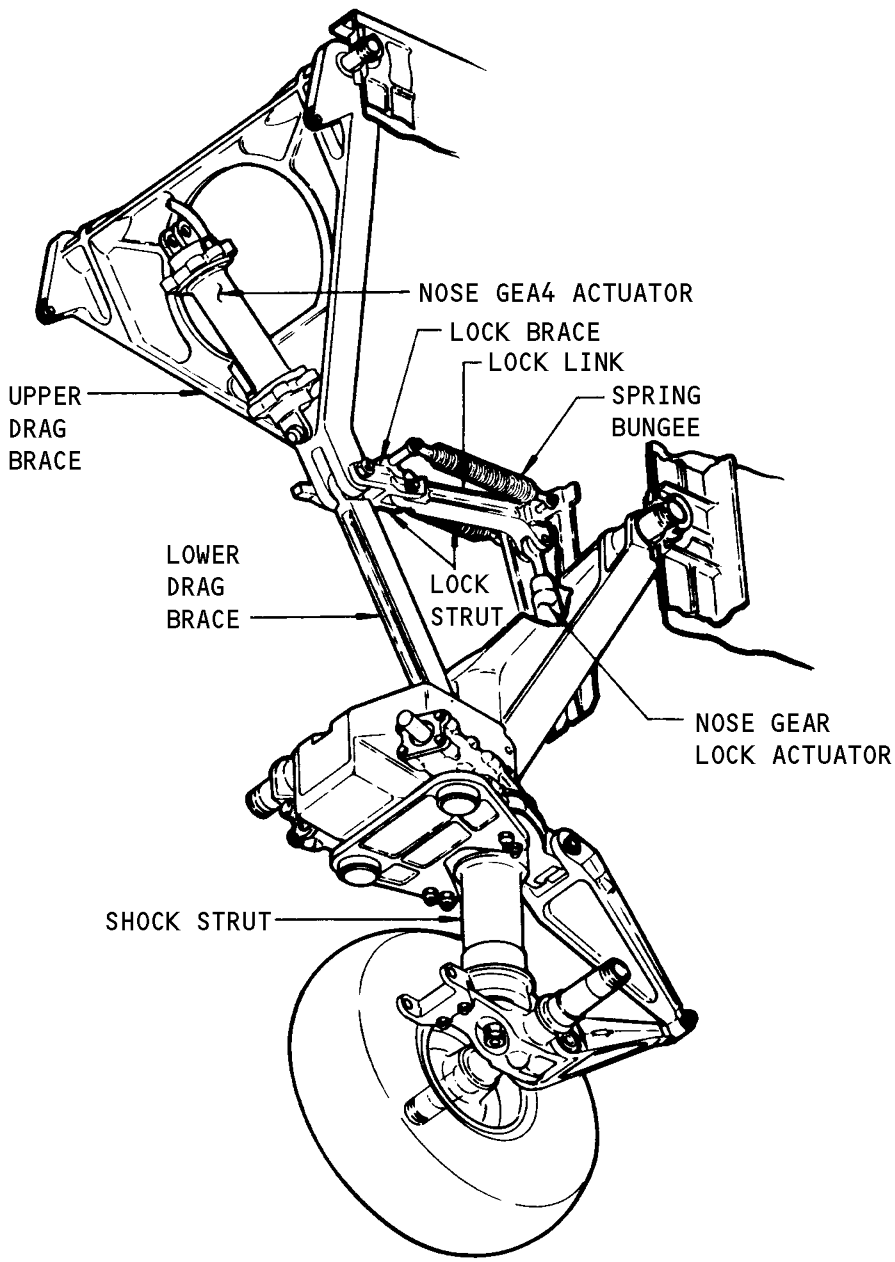
N. Install handle stop bracket. Tighten nuts finger-tight and install cotter pins.
O. Depressurize hydraulic system A.



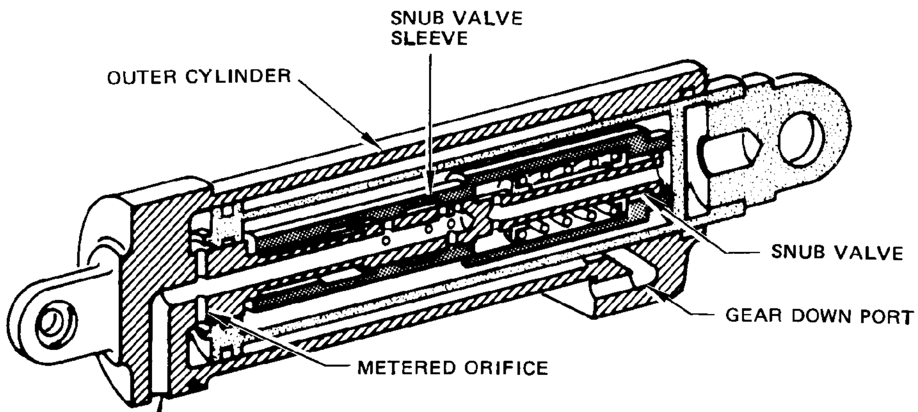
Main Gear Isolation Valves Installation
Figure 401

NOSE GEAR EXTENSION AND RETRACTION - DESCRIPTION AND OPERATION

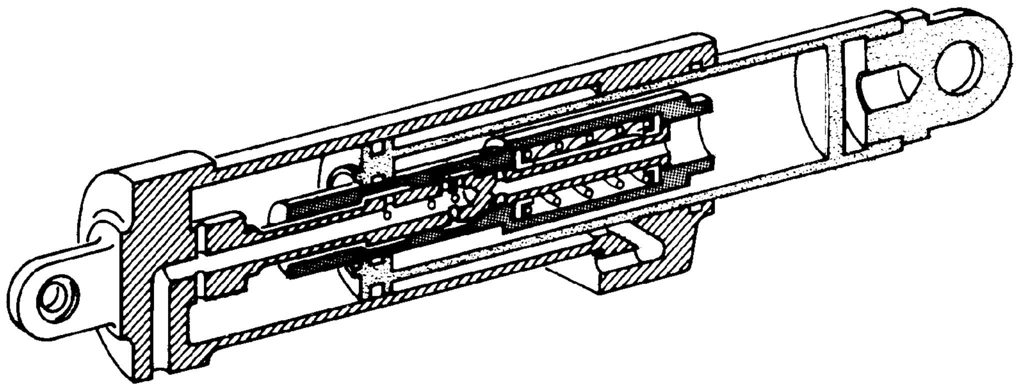
1. General
   A. The nose gear retraction and extension system raises and lowers the nose landing gear. (See figure 1.) The gear retracts or extends simultaneously with the main gear when the landing gear control handle is moved into the UP or DN detent. The retraction mechanism includes the following components. A nose gear actuator applies the force necessary to raise or lower the gear. The nose gear actuator is attached to airplane structure forward and above the gear, and to the lower end of the upper drag brace. A nose gear lock strut assembly, driven by an actuator and held in position by spring bungees, positively locks the gear in up or down position. The lock strut consists of a lock link and lock brace assembly located between the aft bulkhead and the upper drag brace. The lock actuator is mounted on the aft bulkhead between structure and an extension on the aft end of the lock brace. The spring bungees consist of two tension springs, one on each side of the lock brace. Bungees are connected to lugs on the lock link and at the lock brace pivot point on structure.
2. Nose Gear Actuator
   A. The nose gear actuator converts hydraulic pressure to the mechanical force required to raise or lower the nose gear. The actuator is a hydraulic piston type with snubbing action to slow its movement when limits of travel are approached. (See figure 2.) The cylinder head of the actuator is attached to a heavy bracket in the wheel well ceiling. The piston rod is attached to the upper drag brace. Hydraulic fluid is directed to both ends of the hydraulic cylinder through flexible hoses.
   B. The nose gear actuator restricts the rate of extension and retraction of the gear, just as it approaches the up or the down position. Snubbing effect is obtained by the action of a spring-loaded sliding valve snubbing assembly. After the actuator has extended 0.65 inches, the snubbing valve opens and hydraulic flow is unrestricted. When the piston is one inch from the fully extended position, a stop on the piston contacts the snubber valve sleeve. Further movement of the piston pulls the sleeve against a compression spring to close ports. During remainder of piston travel, hydraulic flow must pass through a diminishing number of holes. The increasing restriction to hydraulic flow steadily slows the actuator extension rate until the piston reaches the end of its travel. The sequence repeats in reverse when the actuator retracts.



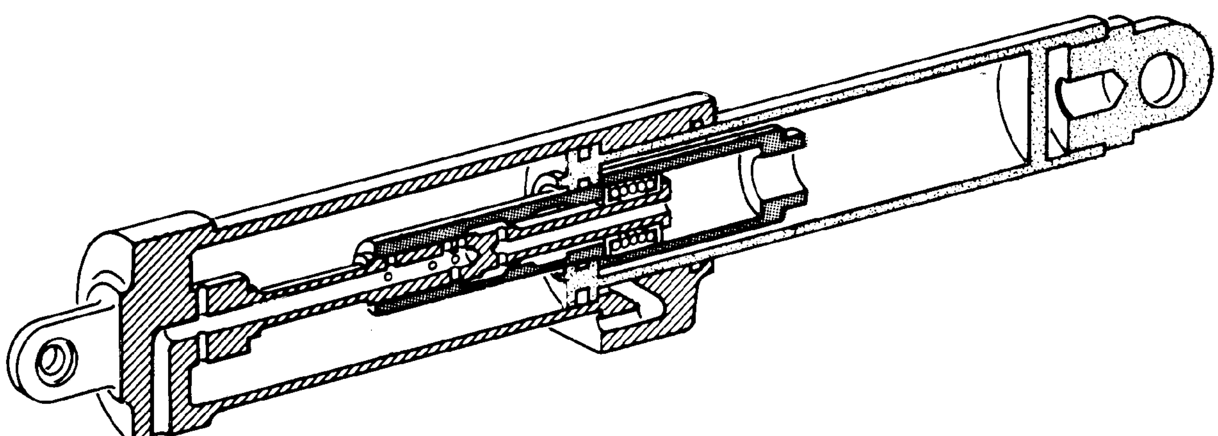
Nose Gear Extension and Retraction Components Location
Figure 1



NOSE GEAR EXTENDE
(SNUB VAVLE CLOSED)



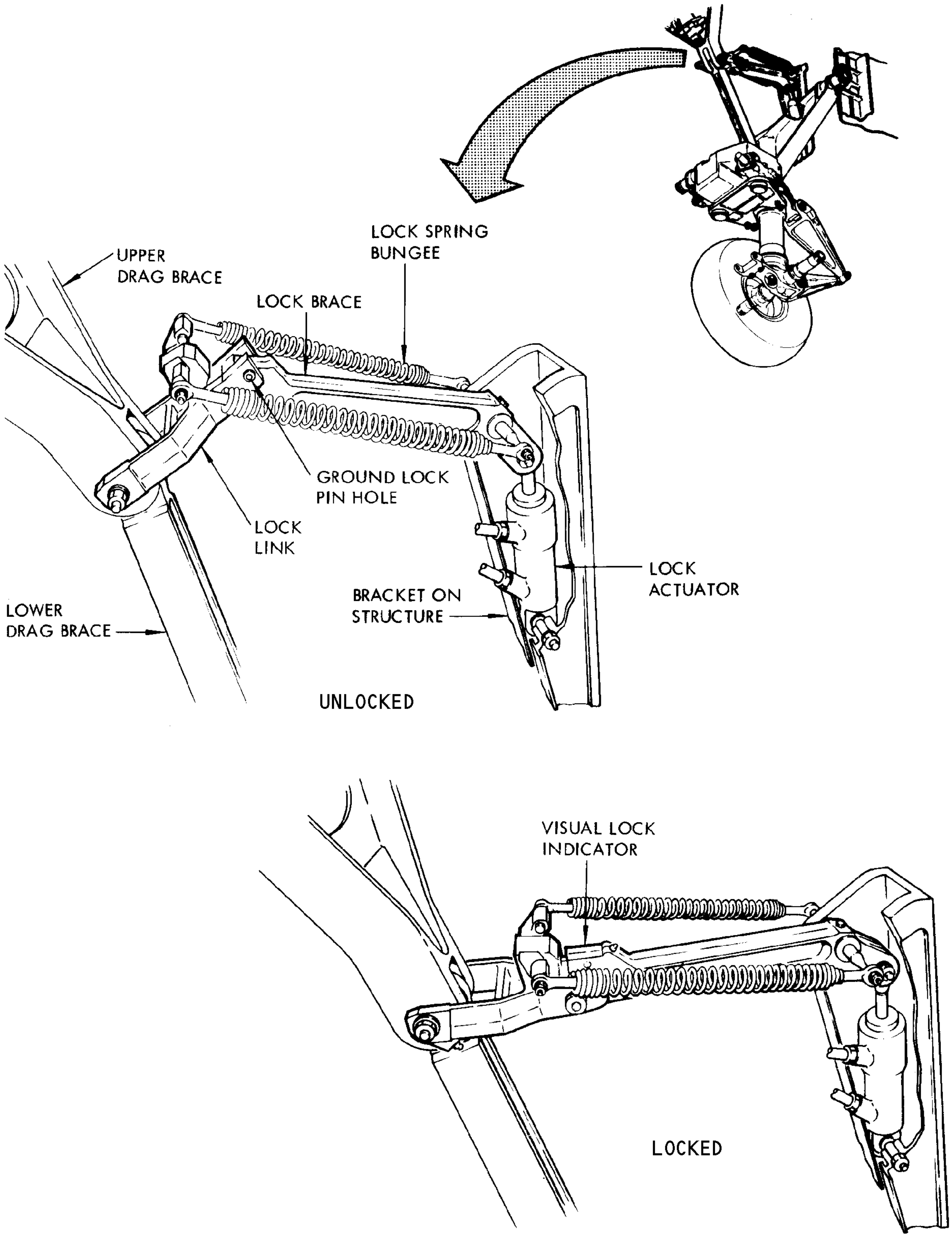
NOSE GEAR IN TRANSIT
(SNUB VALVE OPEN)



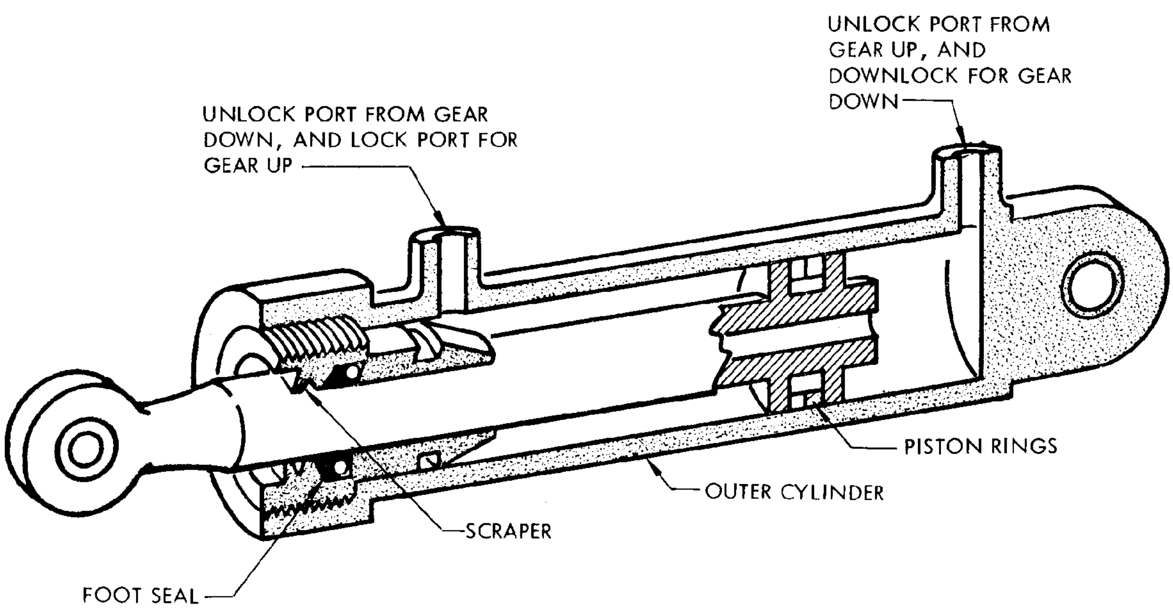
NOSE GEAR RETRACTED
(SNUB VALVE CLOSED)

Nose Gear Actuator
Figure 2

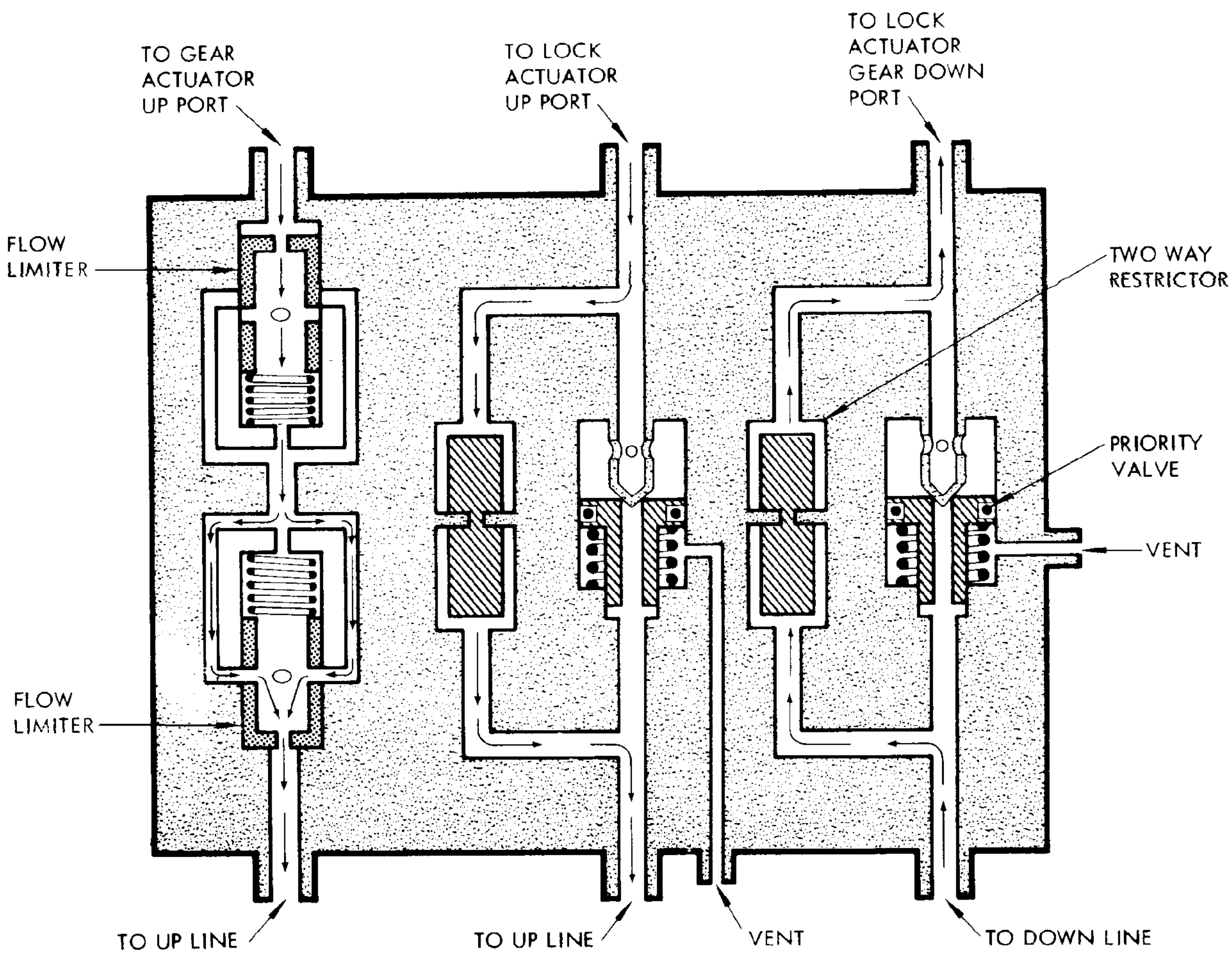
3. Nose Gear Lock Mechanism
   A. The nose gear lock mechanism locks the gear in the gear up and the gear down positions. The mechanism also releases the lock just before gear retraction or extension. The mechanism includes a lock actuator, lock spring bungees and a lock strut consisting of a lock link and a lock brace assembly (Fig. 3). The lock strut is between structure and the drag brace. When the gear is extended the lock strut prevents the drag strut from folding when forces tending to retract the gear are applied. When the gear is retracted the lock strut and the upper drag brace form a pair of shear legs from which the gear hangs by the lower drag brace. In up or down positions, the hinge of the lock strut is over center to lock the gear in position. The lock actuator moves the lock strut across the overcenter position to release the gear. The bungee springs are under tension when the lock strut is in locked position, holding the hinge overcenter even when the lock actuator is depressurized. A pin inserted through holes drilled through the lock strut hinge provides a ground lock to prevent inadvertent gear retraction during ground operations.
4. Nose Gear Lock Actuator
   A. The nose gear lock actuator locks and unlocks the nose gear, in either up or down position (Fig. 4). The actuator is a hydraulic piston type, and is mounted on the forward face of the aft bulkhead in the wheel well. The actuator retracts to move the lock strut over center, start the drag brace folding, and so begin the retraction cycle. For gear extension the lock actuator extends to unlock the gears. At the end of gear retraction or extension, the actuator forces the lock strut into the overcenter locked position, against the tension of the lock spring bungees.
5. Nose Gear Lock Spring Bungee
   A. The nose gear lock spring bungees are arranged to apply a load to hold the lock strut in overcenter position. Bungees consist of tension springs, with one end attached to the lock brace pivot on structure, and the other end to a lock link lug, beyond the lock strut hinge. Bungees are tensioned to keep gear locked when hydraulic pressure is off the actuators
6. Nose Gear Modular Package
   A. The nose gear modular package contains all the valves required to modify hydraulic flow directed to the nose gear retraction and lock actuators (Fig. 5). Two flow limiting valves in the upline to the nose gear actuator are arranged to limit the rate-of-flow entering or leaving the up port of the actuator. The flow limiting valves prevent pressure surges in the system from varying the rate of actuator movement between snubbing points. A priority valve and a two-way restrictor are installed in parallel in both the up and the down lines to the nose gear lock actuator. Fluid entering the lock actuator ports, either up or down, passes through a two-way restrictor valve unrestricted. Fluid leaving the ports is blocked off by a priority valve, and must pass through a restrictor. Any pressure surges over 3500 psi are released by the priority valve. The valves in the modular package ensure smooth and accurate movement, when raising or lowering the gear. The modular package is mounted in the left upper aft corner in the nose wheel well.



Nose Gear Lock Mechanism
Figure 3



Nose Gear Lock Actuator Schematic
Figure 4



ARROWS SHOW FLOW THROUGH MODULAR PACKAGE WHEN GEAR IS EXTENDING

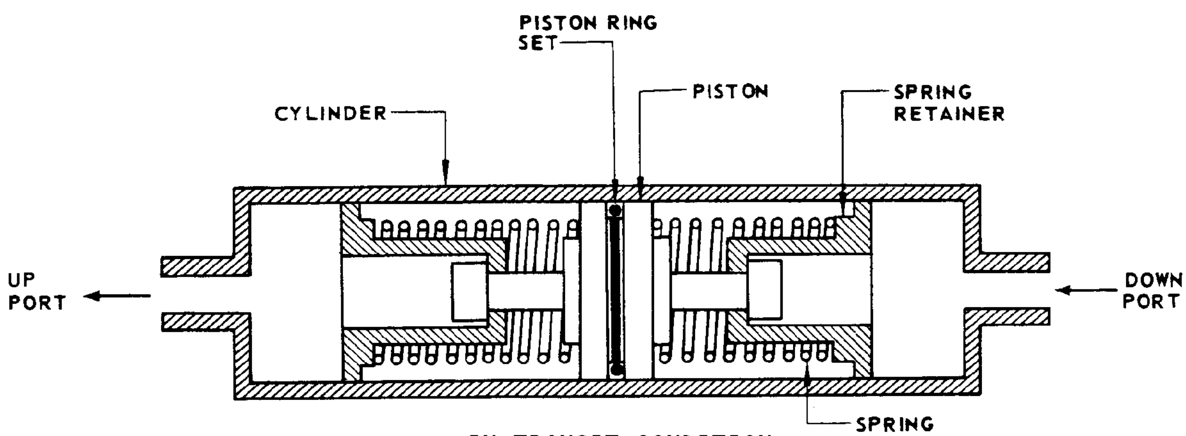
Nose Gear Modular Package Schematic
Figure 5

7. Transfer Cylinder

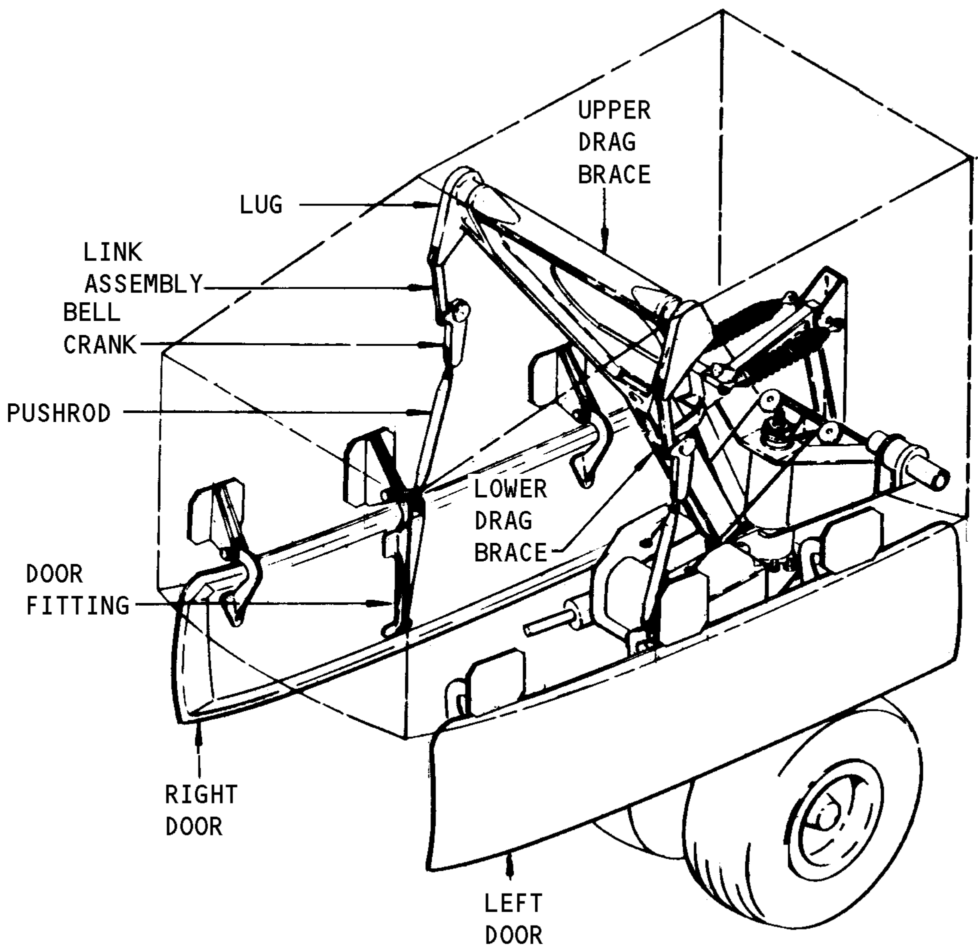
A. The transfer cylinder momentarily equalizes hydraulic pressure on either side of the nose gear actuator piston at the start of each extension or retraction cycle to relieve the gear of the actuator force until the lock is released. The cylinder contains a piston, two springs and two spring retainers (Fig. 6). One end of the cylinder is connected to the DOWN line. The other end is connected to the UP line of the nose gear actuator. At the end of the gear retraction, or extension the cylinder spring retainer is bottomed on either side of the cylinder. When the control handle is moved to UP or DN for gear operation, pressure is directed to one side of the nose gear actuator. Pressure also enters the transfer cylinder and displaces the piston. Piston movement directs pressure from the opposite side of the cylinder to the actuator. Therefore, momentarily, system pressure exists on both sides of the actuator piston and actuator force is neutralized. During the neutral force period, the lock actuator unlocks the gear and starts the lock brace assembly folding. When the spring retainer bottoms, the counter pressure drops on the return side of the nose gear actuator and gear extension or retraction proceeds in the normal manner. After the spring retainer has bottomed and hydraulic pressure from A system is off the line, a further movement of the piston is available, acting against the spring tension. The extra piston movement is provided to damp out pressure surges generated in the system and so prevent pressure fluctuations from reaching the lock actuator and possibly unlocking the gear. The cylinder is symmetrical, with double springs, and may be installed either way in the system. The cylinder is mounted on the forward bulkhead in the wheel well.

8. Nose Gear Door Linkage

A. The nose gear door linkage transfers motion from the nose gear to open and close the nose gear wheel well doors. (Fig. 7) Doors are open when gear is extended and close as the gear retracts. A link assembly connects a lug on the upper drag brace with the short arm of a bell crank. A pushrod between a long arm on the crank and a fitting on the door completes the linkage. The lugs on the drag brace and the arms on the crank are so positioned that they are passing over an overcenter position for 80 percent of the gear travel. Therefore, except for a very slight further opening, the doors barely move during gear retraction. When the gear is moving over the last few inches of retraction, the long arm on the crank is almost at right angles to the pushrod connected to door. The doors then rapidly close as gear fully retracts. On gear extension the initial extension movement opens the doors wide. At this point lugs and cranks reach overcenter position and the doors remain open for the rest of the extension cycle.



Transfer Cylinder Schematic
Figure 6



Nose Gear Door Linkage
Figure 7

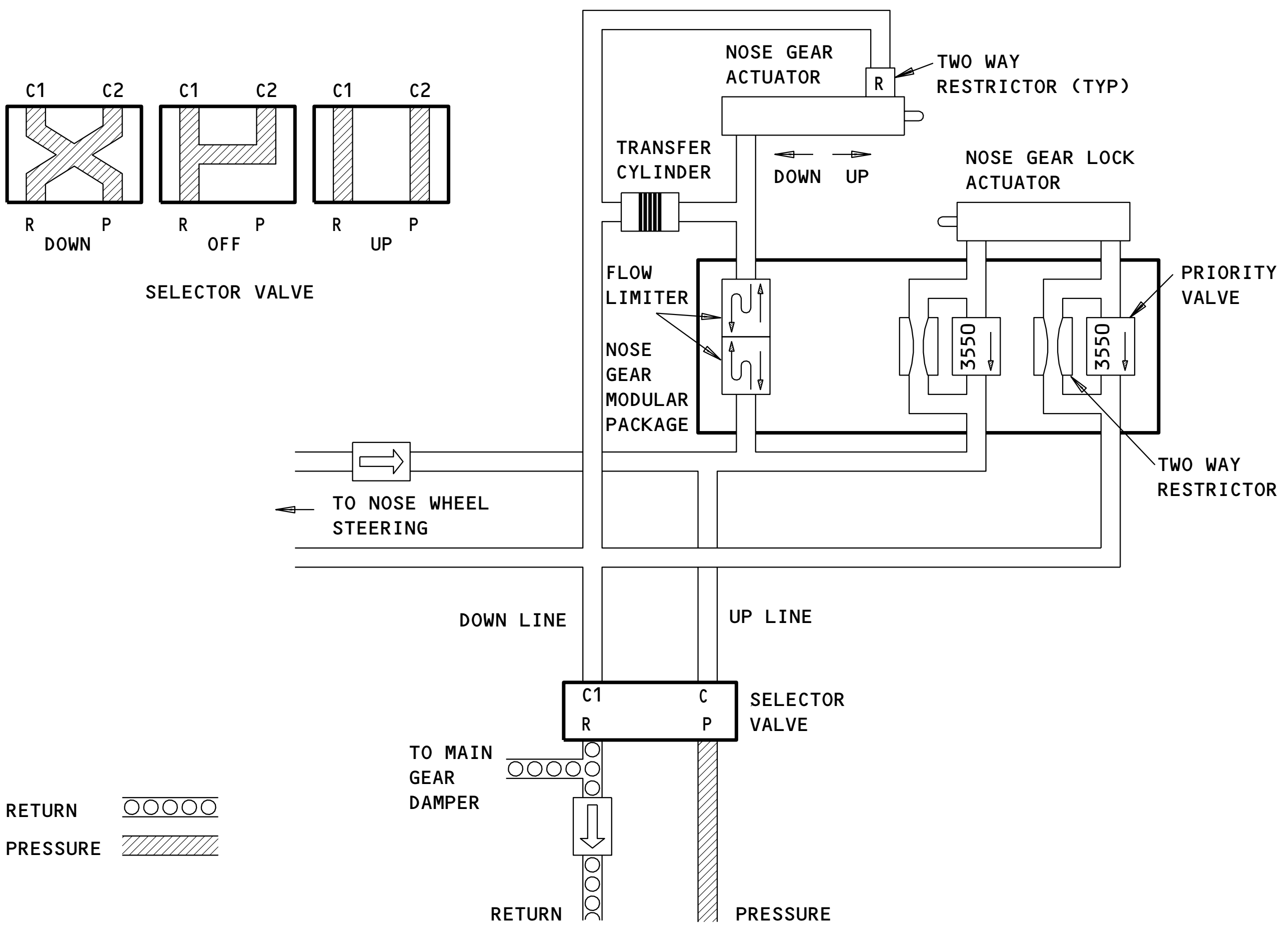
9. Operation

A. Retraction

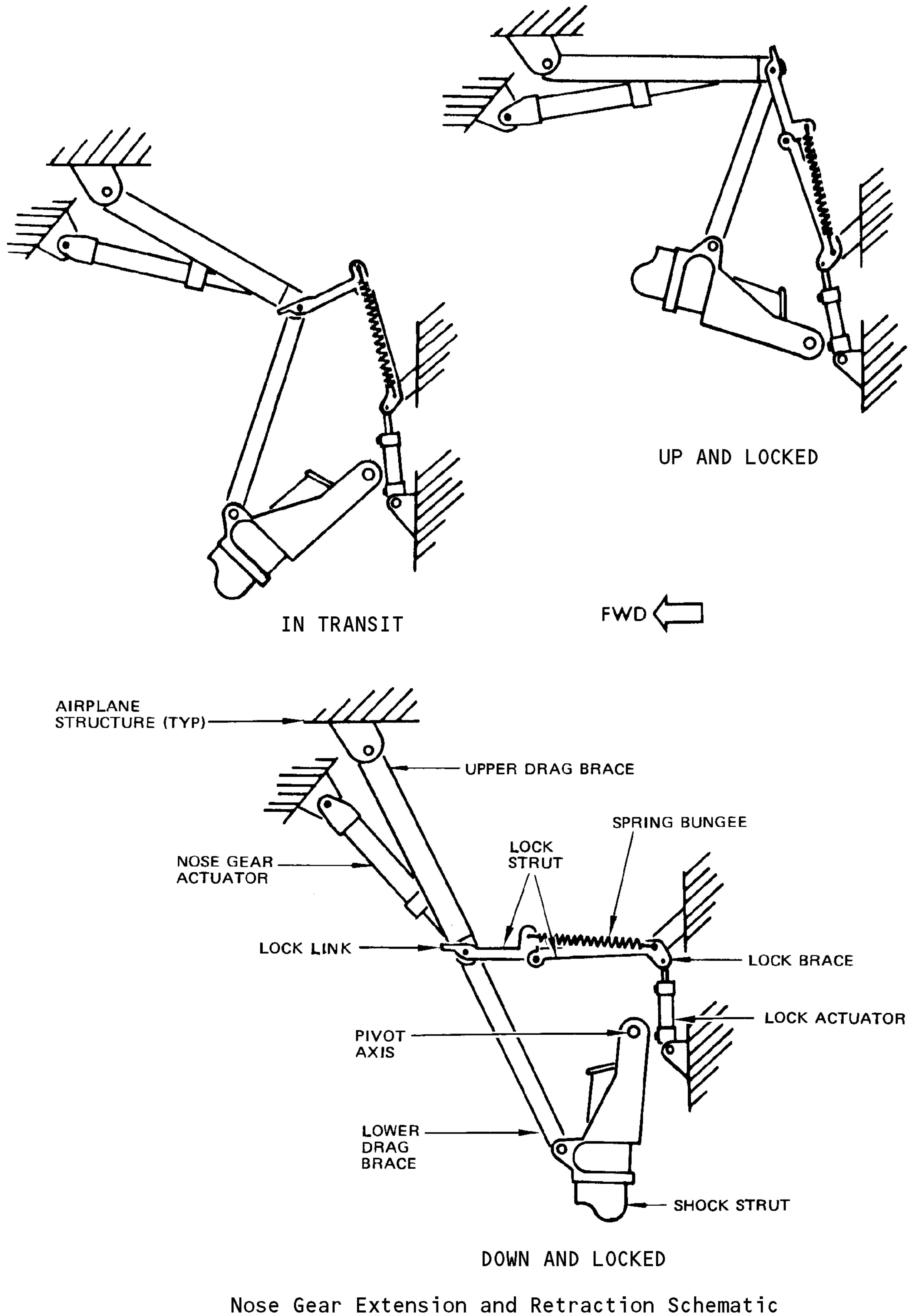
(1) When the landing gear control lever is moved to UP postion for gear retraction, hydraulic pressure is directed through the selector valve and the nose gear modular package to the gear and the lock actuators. Flow to the gear actuator is controlled by a flow limiting valve. Flow leaving the lock actuator is controlled by a restrictor. (See figure 8.) The lock actuator starts retracting to apply a downward force to an extension on the lock link. The downward force pulls the lock link over center and starts both the lock strut and drag brace folding. As gear retraction proceeds, the lock link assembly swings through 90 degrees from horizontal to vertical position. In so doing the lock link extension passes across an over center position with respect to the lock actuator. From this point the lock actuator retracting force is opposed to lock link movement until the gear is almost retracted. During the opposition period the larger main gear actuator overpowers the lock actuator. The unlock force provided by the lock actuator when the gear is down, becomes the locking force when gear is up. The change over being caused by the lock link extension moving from the aft to the forward side of the lock link pivot. (See figure 9.)

B. Extension

(1) When the landing gear control lever is moved to DN position, hydraulic pressure is directed to the gear and lock actuators in the opposite direction to gear retraction, and a similar course of events would apply. However, with the gear up and locked the weight of the gear applies a high compression load on the lock strut. The gear load on the lock strut, plus the force applied by the pressurized nose gear actuator tends to make lock release noisy and stiff. Therefore, the transfer cylinder is used to direct down line pressure to the up side o f the nose gear actuator and so equalize pressure on both sides of the piston. The pressure impulse from the transfer cylinder is supported momentarily by the flow control valves in the modular package. By this means the main actuator extension force is reversed during the lock strut unlocking and the initial hinging of the drag brace. After unlocking, the extension cycle is opposite to retraction.



Nose Gear Hydraulic System Schematic
Figure 8



Nose Gear Extension and Retraction Schematic
Figure 9

NOSE GEAR EXTENSION AND RETRACTION - TROUBLESHOOTING

1. General
   A. Troubleshooting the nose gear retraction mechanism requires the airplane to be jacked for nose gear retraction per Airplane Jacking, Chapter 7. Hydraulic power from a variable flow hydraulic bench, or from the airplane hydraulic system may be used. With the airplane system in use, gear operation times and hydraulic pressure will be near normal.

      WARNING: CHECK THAT GROUND LOCK ASSEMBLIES ARE INSTALLED IN MAIN LANDING GEAR TO PREVENT INADVERTENT OPERATION OF GEAR. INJURY TO PERSONNEL AND/OR DAMAGE TO EQUIPMENT COULD RESULT IF GEAR RETRACTS.

   B. Three men are required. One stationed in control cabin to operate the landing gear control lever, one to operate the hydraulic test bench (if used) and one stationed near the nose wheel well to observe gear action. Main gear ground lock assemblies must be installed (AMM 32-00-01), control cables correctly rigged, and hydraulic reservoirs filled to correct level.

      NOTE: Do not jack the airplane for a second fault isolation task.

   C. Do the steps that follow:
      (1) Stop all maintenance and loading activities causing the airplane to bounce, shake, or move.

         WARNING: MOVEMENT OF THE AIRPLANE CAN CAUSE THE INADVERTENT RETRACTION OF THE NOSE LANDING GEAR IF IT IS NOT IN THE LOCKED POSITION AND THE GROUND LOCK MECHANISM IS NOT INSTALLED.

      (2) Make sure the configuration of the hydraulic systems is not changed.

         NOTE: If hydraulic power is supplied, leave it on. If the hydraulic power is not supplied, leave it off.

With airplane jacked for nose gear retraction, and hydraulic power connected and system pressurized, place landing gear control lever in up position. IF -

NOSE LANDING GEAR FAILS TO OPERATE.

Check for ground lock-assemblies (Ref 32-00-01) installed. IF -

OK - Check rigging of landing gear selector valve control system.
IF -

NOT OK - Remove ground lock-assembly (Ref 32-00-01).

OK - Check flow to nose gear lock actuator as follows: Close MLG isolation valves, check ground lock-assemblies (Ref 32-00-01) installed, disconnect hydraulic line from actuator rod end. With landing gear control lever in UP position, check flow to fill 4/5 of a quart container in 70 seconds. Connect hydraulic line and check flow to head end of actuator in a similar manner with control lever in DN position. Hydraulic flow should fill 4/5 of quart container in 27 seconds. IF -

NOT OK - Rig landing gear selector valve control system.

NOSE LANDING GEAR ENTERS LOCKED POSITION WITH EXCESSIVE FORCE.

Check for reduction in operating speed near end of actuator travel. IF -

No change in operating speed, replace actuator.

Operating speed increases, bleed air from actuator.

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Nose Gear Extension/Retraction - Troubleshooting
Figure 101 (Sheet 1)

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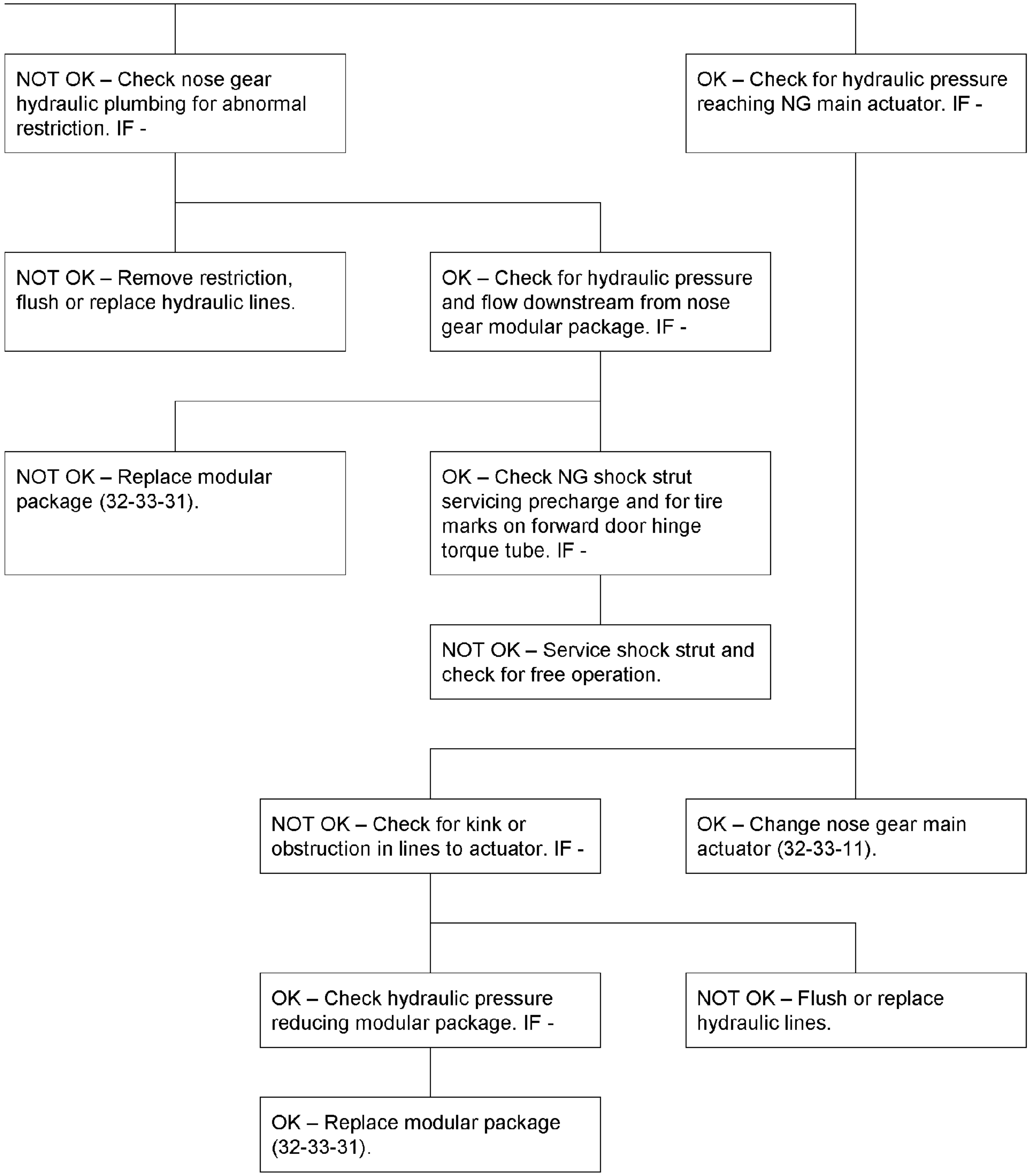


Testing and Fault Isolation
Figure 101 (Sheet 2)

(3) Make sure the parking brake is set.
(4) Make sure chocks are secured against the front and back of at least one set of main gear tires.
(5) Make sure the main landing gear lock assemblies are installed (AMM 32-00-01/201).
(6) Use ropes or a long pole to put a chock in front of the nose landing gear tires, if chocks are not already installed.

WARNING: DO NOT LET YOURSELF OR ANOTHER PERSON BE UNDER THE AIRPLANE WHEN YOU PUT THE CHOCK IN FRONT OF THE NOSE LANDING GEAR TIRE. IF THE NOSE LANDING GEAR RETRACTS, INJURY OR DEATH TO PERSONS AND DAMAGE TO EQUIPMENT CAN RESULT.

NOTE: Do not put a chock behind the nose landing gear. It will not help prevent an inadvertent retraction of the nose landing gear.

(7) Look through the nose landing gear viewing port to see if the visual lock indicator arrows on the lock mechanism indicate the lock mechanism is locked.

NOTE: You can also look through the viewing part to see if the nose landing gear ground lock assembly is installed in the lock mechanism. If you can clearly see it and you are sure it is installed, then the lock mechanism is in the locked position.

Do the visual indicator arrows indicate the lock mechanism is in the locked position. IF -

Yes

Do the Landing Gear Position Indicating and Warning System – Adj/Test procedure (AMM 32-61-0/501). IF -

NOT OK – Do the Landing Gear Position Indicating and Warning System – Trouble Shooting procedure (AMM 32-61-0/101).

No/Not Sure

Do steps that follow:

WARNING: DO NOT LET YOURSELF OR OTHERS UNDER THE AIRPLANE WHEN INSTALLING THE JACKPAD. IF THE NOSE LANDING GEAR RETRACTS, INJURY OR DEATH TO PERSONS AND/OR DAMAGE TO EQUIPMENT CAN RESULT.

(1) Put a jack under the NLG body jackpad so the jack supports some of the weight of the airplane, but does not lift the nose landing gear tire off the ground (AMM 07-11-21/201).

(2) If hydraulic power is supplied, remove the power from the hydraulic system (AMM 07-11-21/201).

(3) Lift the nose of the airplane until the nose gear is clear of the ground (AMM 07-11-21/201).

Do the Nose Landing Gear Extension and Retraction – Adj/Test procedure (AMM 32-33-0/501).

Can you now install the nose landing gear ground lock assembly? IF -

No

Replace the Nose Gear Lock Mechanism (AMM 32-33-51/401).

NOTE: You cannot do lock mechanism adjustment with the lock mechanism installed on the airplane.

Can you now install the nose landing gear ground lock assembly? IF -

No

Do the Nose Gear Extension and Retraction – Trouble Shooting procedure “NOSE LANDING GEAR FAILS TO OPERATE” (AMM 32-33-0/101).

Testing and Fault Isolation
Figure 102

NOSE GEAR EXTENSION AND RETRACTION - ADJUSTMENT/TEST

1. General
   A. The nose landing gear can be tested alone by jacking airplane nose only, and making certain lock assemblies are installed in main gear (Ref 32-00-01). System A is pressurized by setting the parking brake and opening the interconnect valve (Ref Chapter 29).
   B. The airplane system may be used for a straight retraction test after replacement of hydraulic components. Gear operating times and hydraulic pressure will be near normal when the airplane hydraulic system is used.
2. Equipment and Materials
   A. Hydraulic Test Bench, Skydrol 500 Hydraulic Fluid, capable of delivering 10 gpm at 3000 psi
   B. Gear Ground Lock Assemblies F72735 (Ref 32-00-01)
   C. Stop Watch
3. Prepare to Test Extension and Retraction
   A. Check shutoff valves for open position.
   B. Jack airplane for nose gear retraction test (Ref Chapter 7, Jacking)
   C. Ground airplane from vicinity of main gear.
   D. Connect electrical power.
   E. Remove gear ground lock assembly from nose gear (Ref 32-00-01).

   WARNING: CHECK THAT GROUND LOCK ASSEMBLIES ARE INSTALLED IN MAIN LANDING GEAR TO PREVENT INADVERTENT OPERATION OF GEAR. INJURY TO PERSONNEL AND/OR EQUIPMENT COULD RESULT IF GEAR RETRACTS.

   F. Check that nose gear is fully extended and locked, with control lever in OFF position.
   G. If it is desired to operate nose gear using external hydraulic power, connect hydraulic test bench to airplane and pressurize hydraulic system (Ref Chapter 29).

   CAUTION: DO NOT TURN STEERING WHEEL WITH NOSE GEAR SHOCK STRUT FULLY EXTENDED, BECAUSE OF POSSIBLE DAMAGE TO CENTERING CAMS IN SHOCK STRUT.

   H. If it is desired to operate nose gear using airplane hydraulic system, proceed as follows:
      (1) Close A and B flight control and spoiler shutoff valves.
      (2) Open hydraulic interconnect valve circuit breaker.
      (3) Manually open hydraulic interconnect valve.
      (4) Turn on both B system hydraulic pumps.

      CAUTION: PUMPS MAY BE DAMAGED IF ATTEMPTS ARE MADE TO VARY RETRACTION SPEED WHEN AIRPLANE SYSTEM IS IN USE FOR TEST.

I. Advance both throttles to a position greater than 17 degrees.

4. Test Landing Gear

WARNING: CLEAR NOSE WHEEL WELL AREA OF EQUIPMENT AND PERSONNEL BEFORE OPERATING GEAR.

A. Operate override trigger and move control lever to UP position and note gear retraction time.

NOTE: Check that all red warning lights are on during gear transit.

B. Check that nose gear is up and locked and wheel well doors are closed within 6 seconds from the time control lever enters UP detent.

NOTE: Gear retraction time is defined as the time period between when control handle is placed in UP position and when red warning lights go off.

C. Check that red warning lights are off.
D. Place control lever in OFF position for approximately 15 seconds.
E. Make sure that the warning light remains off and that the landing gear remains locked.
F. Place the control lever in the down position.
G. Check that nose gear extension time does not exceed 6 seconds.

NOTE: Gear extension time is defined as the time period between when control handle is placed in DN position and when green indicator lights come on.

H. Ensure all green indicator lights are on.
I. Close interconnect valve.
J. Install nose gear ground lock assembly (Ref 32-00-01).
K. Determine if electrical or hydraulic power is still required on airplane. If not, disconnect sources.
L. Lower airplane and remove jacks (Ref Chapter 7, Jacking Airplane).

NOSE GEAR ACTUATOR - REMOVAL/INSTALLATION

1. Equipment and Materials
    A. Gear Ground Lockpins (Ref 32-00-01)
    B. Tail Support Jack
    C. Grease - BMS 3-33 (Preferred)
    D. Grease - MIL-PRF-23827 (Supercedes MIL-G-23827) (Alternate)
    E. Grease - MIL-G-21164 (Alternate)
    F. Solvent - Napthta, Aliphatic TT-N-95C
    G. Solvent - MIL-PRF-680C (Supercedes P-D-680 Solvent)
    H. Skydrol 500
    I. Lockwire - Monel (0.032 In. Dia.) (NASM20995NC32 QQ-N-281)
    J. Variable volume test bench for Skydrol 500 hydraulic fluid capable of delivering 10 gpm at 3000 psi
2. Remove Nose Gear Actuator (Fig. 401)
    A. Install gear ground lockpin on nose and each main landing gear (Ref 32-00-01).
    B. Depressurize hydraulic system A (Ref Chapter 29).
    C. If installed, remove bolt holding hydraulic down-line clamp (7) around nose gear actuator (8).
    D. Unscrew tubing nuts from union (6) and restrictor (19).
    E. Remove bolt (4) from terminal fitting (2) at top of actuator.
    F. Remove bolt (10) from actuating rod end (9) at bottom of actuator.
    G. Slide actuator down until ends of hydraulic lines (5) and (20) are clear of their respective fittings (6) and (19).
    H. Pull top of actuator forward, moving swivel bearing (14) in drag brace upper link (13) until actuator terminal fitting (2) clears the connective fitting (24) in top of wheel well.
    I. Remove actuator by pulling up, sliding rod end (9) from swivel bearing in drag brace upper link.
    J. Plug hydraulic lines.
    K. Remove union (6) and restrictor (19) from actuator.
    L. Remove and discard O-rings from union and restrictor.
3. Install Nose Gear Actuator
    A. Clean and apply thin coat of grease to bolt shanks and all mating surfaces of actuator and parts used to install nose gear actuator (8).
    B. Install new O-rings in union (6) and restrictor (19). Install union in actuator upper port and restrictor in bottom port of actuator.
    C. Fill actuator with Skydrol 500 hydraulic fluid.
        (1) With actuator piston (18) extended, fill through restrictor (19) until piston is fully retracted.
        (2) Cap union and restrictor.
    D. Position actuator in clamp (7), if installed, with actuating rod end (9) down, with restrictor (19) on the right, and sliding hydraulic lines (5) and (20) into respective union and restrictor at top and bottom of actuator.
        (1) NOTE: Do steps D and E simultaneously.
    E. Slide actuating rod end onto swivel bearing (14) in the drag brace upper link (13).

F. Insert nylon washers (12) and (15) between actuator rod end and swivel bearing on each side of swivel bearing.
G. Install lubricated close tolerance, short thread bolt (10) with countersunk, high strength washer (11) under bolt head with countersink towards bolt head.
H. Install high strength, plain washer (17) and castellated nut (16).
I. Tighten nut (16) 1500 to 1800 pound-inches torque.

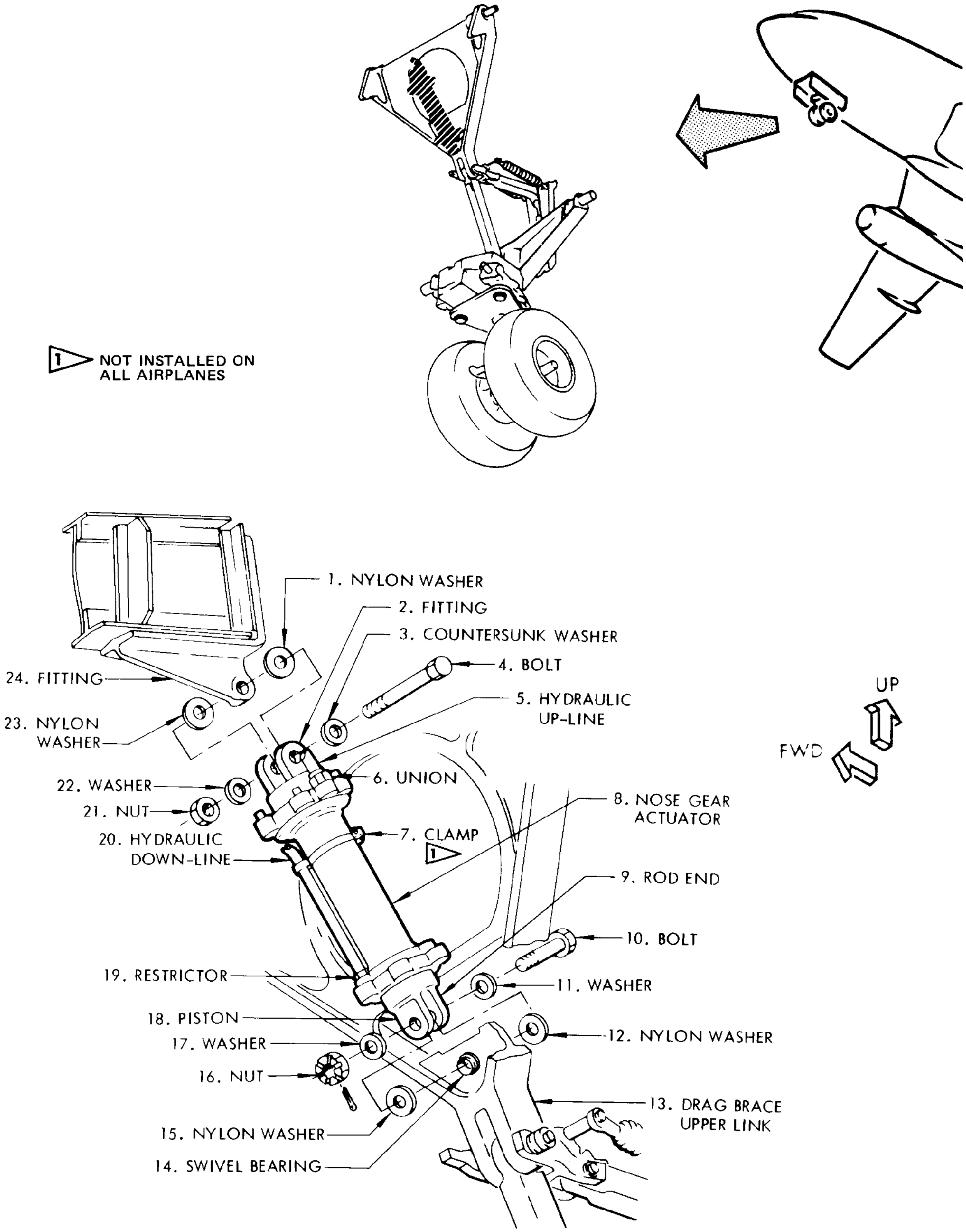
NOTE: If cotter pin cannot be installed within specified torque range, meet torque requirements by either interchanging nuts or adding one flat washer under the countersunk washer (11), on the opposite side of countersink. Use both methods if necessary.

J. Install cotter pin.
K. Slide fork of terminal fitting (2) of actuator, onto connective fitting (24) in top of wheel well.
L. Install nylon washer (1) and (23) between fork arm of terminal fitting (2) on actuator and connective fitting in top of wheel well, on each side of connective fitting.
M. Install lubricated, close tolerance, short thread bolt (4) with countersunk, high strength washer (3) under bolthead with countersink towards bolthead.
N. Install plain washer (22) and castellated nut (21).
O. Tighten nut 1500 to 1800 pound-inches torque.

NOTE: If cotter pin cannot be installed within specified torque range, meet torque requirements by either interchanging nuts or adding one flat washer under the countersunk washer, on the opposite side of countersink. Use both methods if necessary.

P. Install cotter pin.
Q. If installed, tighten bolt on clamp (7).
R. Remove plugs from lines and caps from actuator.
S. Connect hydraulic lines (5, 20) to respective bottom and top connective fittings on actuator.

4. Bleed Nose Gear Actuator (Airplane On Jacks)
A. Connect variable volume test bench and pressurize hydraulic system A to 100 psi maximum.
B. Jack airplane nose (Ref Chapter 7). Lower tail support jack as nose is raised.



Nose Gear Actuator Installation
Figure 401

C. Check that gear ground lock assemblies are installed in nose and main gear (Ref 32-00-01).

WARNING: CHECK THAT GROUND LOCK ASSEMBLIES ARE INSTALLED IN ALL LANDING GEAR TO PREVENT INADVERTENT OPERATION OF GEAR. INJURY TO PERSONNEL AND/OR DAMAGE TO EQUIPMENT COULD RESULT IF GEAR RETRACTS.

D. Actuate override trigger and move landing gear control handle to UP position.
E. Remove lockwire and open bleed plug, which is located on the aft side of the actuator, top head end.
F. Close bleed plug when fluid flow indicates air is bled from system.
G. Install NC32 monel lockwire, to lock wire bleed plug to actuator, using double twist method.
H. Return landing gear control handle to DN position.
I. Raise pressure in hydraulic system A to 3000 psi.
J. Remove ground lock assembly from nose gear (Ref 32-00-01).
K. Cycle the nose gear several times to bleed air from actuator and lines.

NOTE: The override trigger on the landing gear control handle must be actuated before the control handle can be moved.

L. Perform retraction test of nose landing gear (Ref 32-33-0).
M. Check hydraulic connections for leaks.
N. Install nose gear ground lock assembly (Ref 32-00-01), lower airplane nose, and remove jacks.
O. Add hydraulic fluid to reservoir as necessary (Ref Chapter 12, Hydraulic Servicing.

5. Bleed Nose Gear Actuator (Airplane On Ground)
A. General
(1) If jacking the airplane is not possible, the following procedure may be used as an alternate procedure to that above.
B. Procedure
(1) Make sure a functional test has been performed on the actuator.
(2) Make sure the landing gear ground lock assemblies are installed in the nose and main landing gear (Ref 32-00-01).

WARNING: MAKE SURE GROUND LOCK ASSEMBLIES ARE INSTALLED IN ALL LANDING GEAR TO PREVENT INADVERTENT OPERATION OF THE GEAR. INJURY TO PERSONNEL AND/OR DAMAGE TO EQUIPMENT COULD RESULT IF THE GEAR RETRACTS.

(3) Make sure the hoses are correctly routed through the hose guides and are not twisted.

(4) Connect a variable volume test bench to the airplane and pressurize hydraulic system A to 3000 psi.
(5) Using the manual override, move the landing gear selector handle from DOWN to UP several times. When you move the landing gear selector handle, leave the handle in each position at least three seconds before you move it to the next position.
(6) Move the landing gear selector handle to DOWN.
(7) Watch the rod end of the nose landing gear retract actuator while moving the landing gear selector handle to OFF. Make sure the rod end attempts to extend when the selector handle is moved from DOWN to OFF.
(8) Move the landing gear selector handle to DOWN.
(9) Check the hydraulic connections for leaks.
(10) Add hydraulic fluid to the reservoir as necessary (Ref Chapter 12, Hydraulic Servicing).
(11) Restore the airplane to normal.

NOSE GEAR LOCK ACTUATOR - REMOVAL/INSTALLATION

1. Equipment and Materials
   A. Ground Lock Assemblies - F72735 (Ref 32-00-01)
   B. Grease - BMS 3-33 (Preferred)
   C. Grease - MIL-PRF-23827 (Supercedes MIL-G-23827) (Alternate)
   D. Grease - MIL-G-21164 (Alternate)
   E. Corrosion Preventative Compound - MIL-C-11796, Class 3
2. Prepare to Remove Nose Gear Lock Actuator
   A. Ensure landing gear ground lock assemblies are installed (Ref 32-00-01).
   B. Depressurize hydraulic system A (Ref 29-11-0, Maintenance Practices).
   C. Jack nose of airplane until all weight is off nose gear. Use aft body jack at point C as necessary (Ref Chapter 7, Airplane Jacking).
3. Remove Nose Gear Lock Actuator
   A. Disconnect hydraulic lines (7, Fig. 401) from lock actuator (6). Plug lines.
   B. Disconnect bottom end of actuator from bracket (3) on bulkhead.
   C. Remove nuts and washers from lock brace shaft (2).
   D. Disconnect aft ends of lock springs (1) from shaft (2).
   E. Remove retainer bolt (10) from lock brace (9) and shaft.
   F. Tap out shaft (2) and raise lock brace (9) enough to give access to actuator upper attachment bolt (11).
   G. Remove upper attachment bolt and remove lock actuator from airplane.
   H. Remove hydraulic fittings from actuator and discard O-ring packings. Plug ports.
4. Prepare to Install Nose Gear Lock Actuator
   A. Remove plugs and install hydraulic fittings in actuator with new O-ring packings.
   B. Extend actuator rod 1-3/16 inches from full retraction.
   C. Fill actuator with hydraulic fluid and cap ports.
5. Install Nose Gear Lock Actuator
   A. Clean and lightly lubricate all bolts and washers (except retainer bolt (10, Fig. 401)) with grease, just before installing.
   B. Place actuator in position for installation with rod end up and hydraulic ports forward.
   C. Install a countersunk washer on upper attachment bolt (11) with countersink toward bolt head.
   D. Align rod end of actuator with fork in lock brace (9).
   E. Insert bolt (11) from left side of airplane with nylon washers (8) on each side of rod end between rod end and lock brace fork.
   F. Add washer and nut. Tighten nut 300 to 400 pound-inches torque.

      NOTE: If necessary, interchange nuts and/or add washer under bolt head, between lock brace and countersunk washer, to index cotter pin hole within torque limits.

   G. Lock nut with cotter pin.

H. Swing lock brace (9) down. Align lock brace with bracket (3) and insert shaft (2).

NOTE: If lock strut or either of lock strut components have been replaced, it will be necessary to check gap between lock brace and bracket (3), with both ends of lock strut attached. A clearance of 0.000 to 0.005 inch between lock brace and bracket must be maintained, if necessary, by shimming.

I. Rotate shaft (2) and adjust axially to align holes for retainer bolt (10) in shaft and lock brace.
J. Coat retainer bolt (10) with corrosion preventive compound and insert from top.
K. Add washer and nut, tighten nut.
L. Connect lock springs (1) to ends of shaft (2).
M. Add washer and nut to each end. Tighten nuts finger-tight and lock with cotter pins.
N. Insert lower end of actuator in bracket (3) with nylon washers (5) installed as in step E.
O. Install lower attachment bolt (4) from left side of airplane with countersunk washer under head as in step C.
P. Add washer and nut. Tighten nut 300 to 400 pound-inches torque.

NOTE: If necessary, interchange nuts and/or add washer under bolt head between bracket (3) and countersunk washer, to index cotter pin hole within torque limits.

Q. Lock nut with cotter pin.
R. Remove caps and plugs and connect hydraulic lines to actuator.

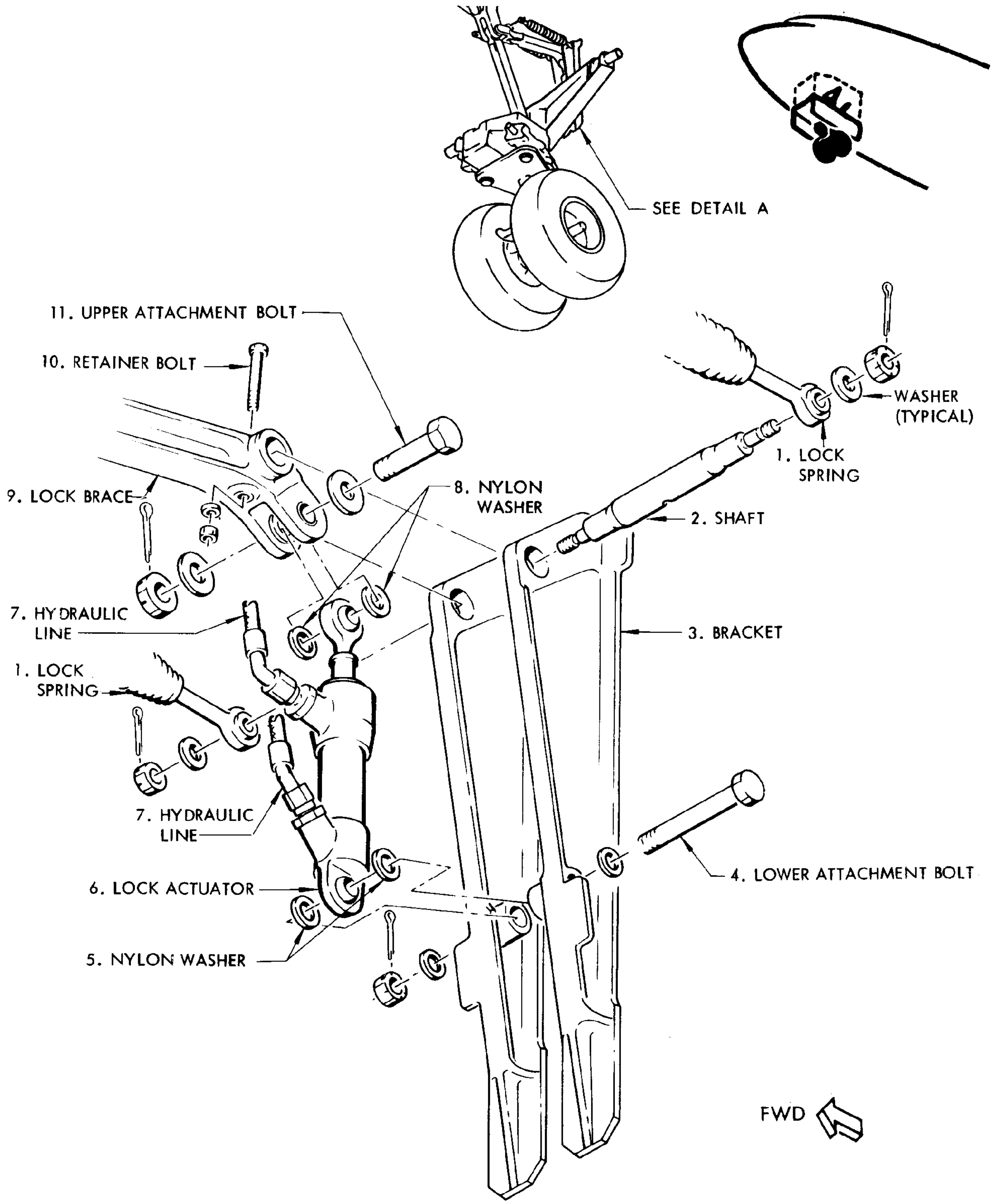
6. Bleed Nose Gear Lock Actuator (Airplane On Jacks)
A. Pressurize hydraulic system A (Ref 29-11-0 MP).
B. Jack airplane for nose gear retraction (Ref Chapter 7, Airplane Jacking).

WARNING: CLEAR PERSONNEL AND EQUIPMENT FROM NOSE GEAR PATH.

C. Remove nose gear ground lock assembly (Ref 32-00-01).

WARNING: CHECK THAT GROUND LOCK ASSEMBLIES ARE INSTALLED IN MAIN LANDING GEAR TO PREVENT INADVERTENT OPERATION OF GEAR. INJURY TO PERSONNEL AND/OR EQUIPMENT COULD RESULT IF GEAR RETRACTS.

D. Cycle gear through several extension and retractions to bleed air from actuator and lines and check for proper gear operation.
E. Check hydraulic connections for leaks.
F. Extend nose gear and install ground lock assembly (Ref 32-00-01).
G. Lower airplane and remove jacks.



DETAIL A

Nose Gear Lock Actuator Installation
Figure 401

H. Check hydraulic reservoirs for proper servicing and service if required.

7. Bleed Nose Gear Lock Actuator (Airplane On Ground)

A. General

(1) If jacking the airplane is not possible, the following procedure may be used as an alternate.

B. Procedure

(1) Make sure a functional test has been performed on the actuator.

(2) Make sure the landing gear ground lock assemblies are installed in the nose and main landing gear (Ref 32-00-01).

WARNING: MAKE SURE GROUND LOCK ASSEMBLIES ARE INSTALLED IN ALL LANDING GEAR TO PREVENT INADVERTENT OPERATION OF THE GEAR. INJURY TO PERSONNEL AND/OR DAMAGE TO EQUIPMENT COULD RESULT IF GEAR RETRACTS.

(3) Make sure the hoses are correctly routed and are not twisted.

(4) Connect a variable volume test bench to the airplane and pressurize hydraulic system A to 3000 psi.

(5) Using the manual override, move the landing gear selector handle from DOWN to UP several times. When you move the landing gear selector handle, leave the handle in each position at least three seconds before you move it to the next position.

(6) Move the landing gear selector handle to DOWN.

(7) Make sure the rod end of the lock actuator tries to retract when you move the landing gear lever from DOWN to the OFF position.

(8) Move landing gear selector handle to DOWN.

(9) Check the hydraulic connections for leaks.

(10) Add hydraulic fluid to the reservoir as necessary (Ref Chapter 12, Hydraulic Servicing).

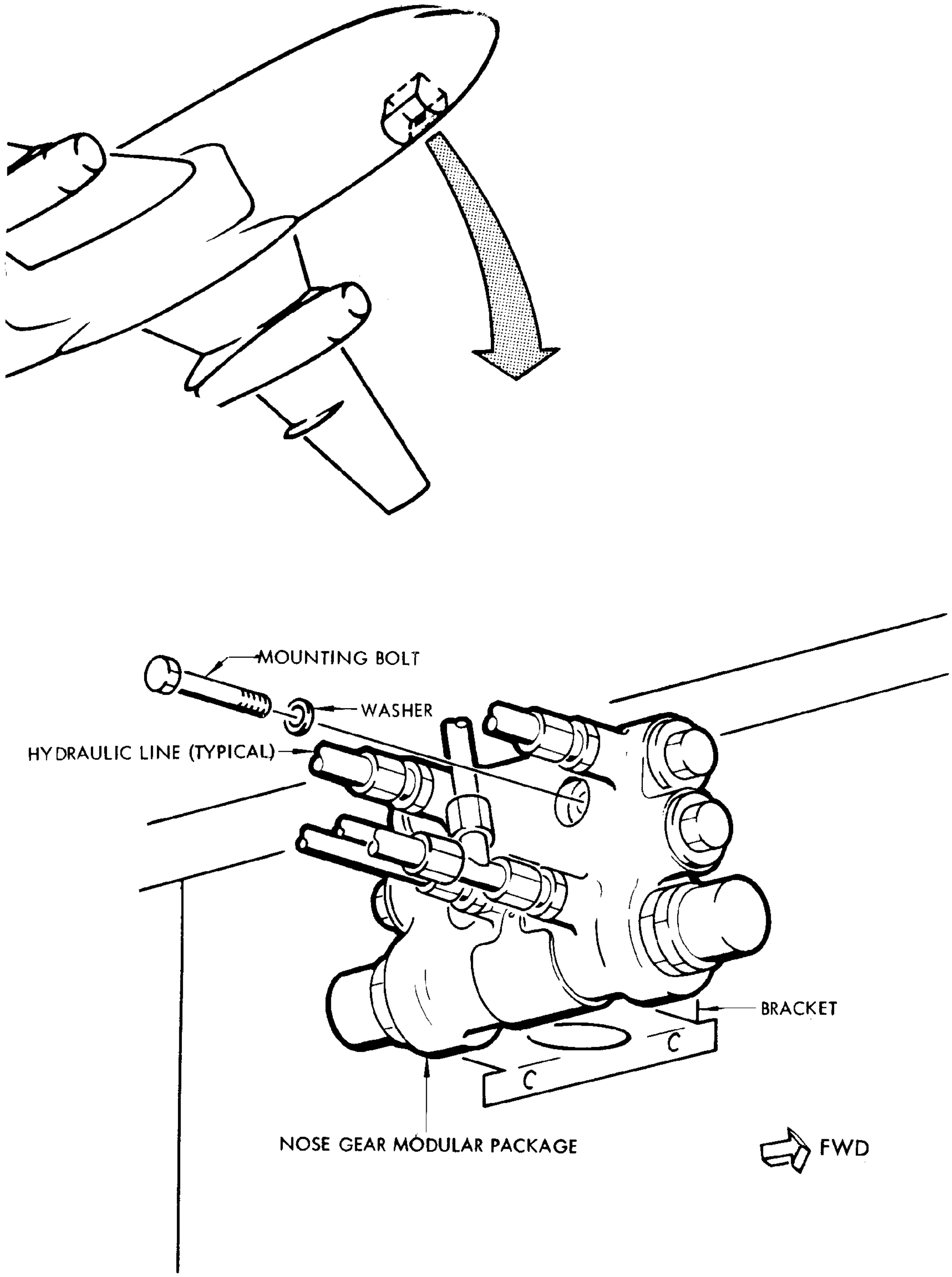
(11) Restore airplane to normal.

NOSE GEAR MODULAR PACKAGE - REMOVAL/INSTALLATION

1. Equipment and Materials
   A. Gear Ground Lock Assemblies F72735 (Ref 32-00-01).
2. Prepare to Remove Nose Gear Modular Package
   A. Check that landing gear ground lock assemblies (Ref 32-00-01) are installed.
   B. Depressurize hydraulic system.
3. Remove Nose Gear Modular Package
   A. Disconnect and plug hydraulic lines connected to modular package (Fig 401).
   B. Remove bolts and washers securing modular package and remove package from airplane.
   C. Remove hydraulic unions and discard O-ring packings. Plug ports.
4. Install Nose Gear Hydraulic Package
   A. Remove plugs and install hydraulic unions in hydraulic package with new O-ring packings.
   B. Fill package with hydraulic fluid. Cap unions.
   C. Place package in position on bracket. Install a washer on each mounting bolt and insert bolts through package to bracket (Fig. 401).
   D. Tighten bolts and secure package.
   E. Remove caps and plugs and connect hydraulic lines.
   F. Jack airplane for nose gear retraction (Ref Chapter 7, Airplane Jacking).
   G. Pressurize hydraulic system A (Ref 29-11-0 MP).
   H. Remove ground lockpin and cycle gear retraction several times to bleed air from package and lines.

      WARNING: ENSURE GROUND LOCK ASSEMBLIES ARE INSTALLED IN MAIN LANDING GEAR TO PREVENT INADVERTENT OPERATION OF GEAR. INJURY TO PERSONNEL AND/OR DAMAGE TO EQUIPMENT COULD RESULT IF GEAR RETRACTS. CLEAR ALL WHEEL WELL AREAS OF EQUIPMENT AND PERSONNEL BEFORE OPERATING GEAR.

   I. Check package hydraulic connections for leaks.
   J. Extend gear and install ground lock assembly (Ref 32-00-01).
   K. Lower airplane and remove jacks.



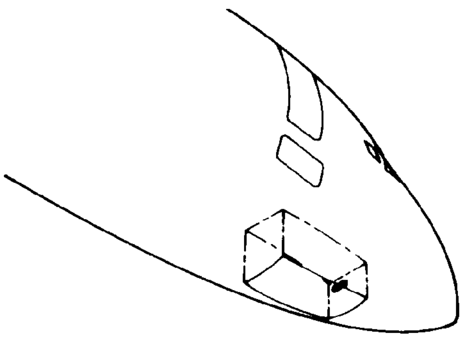
Nose Gear Modular Package Installation
Figure 401

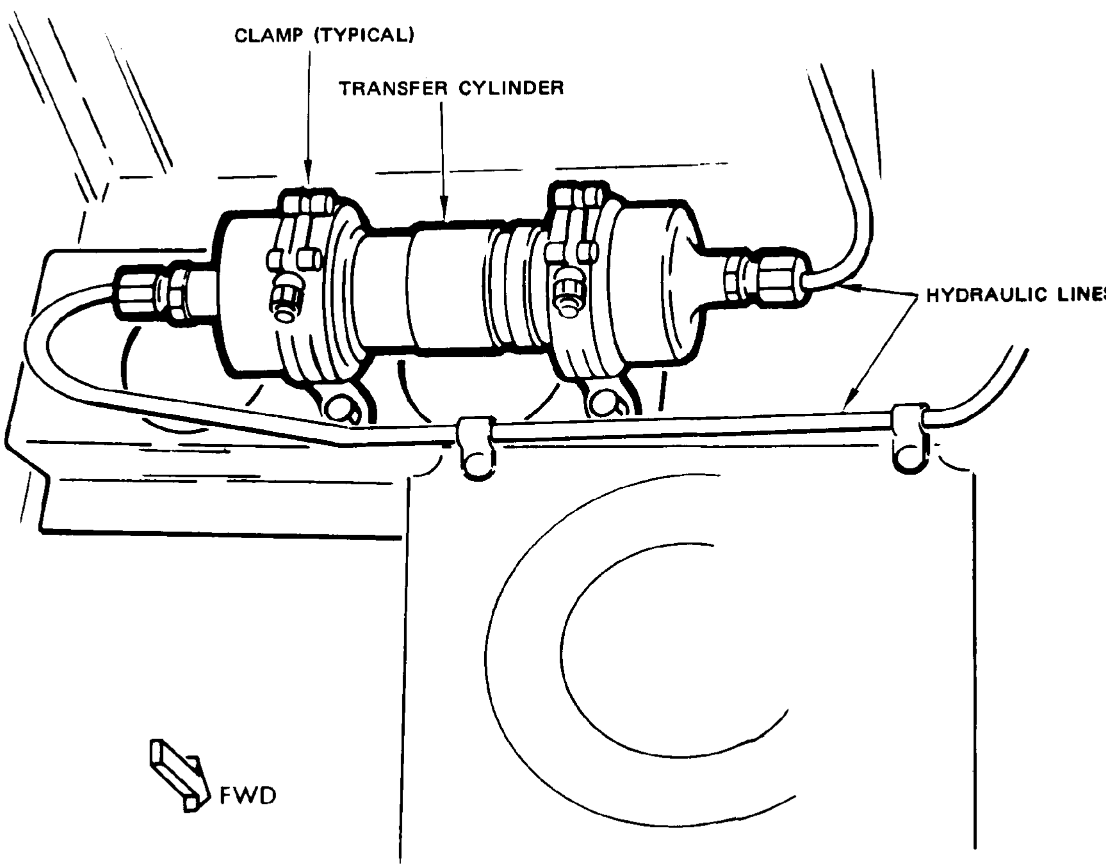
NOSE GEAR TRANSFER CYLINDER - REMOVAL/INSTALLATION

1. Equipment and Materials
   A. Gear Ground Lock Assemblies - F72735 (Ref 32-00-01)
2. Prepare to Remove Nose Gear Transfer Cylinder
   A. Ensure landing gear ground lock assemblies are installed (Ref 32-00-01).
   B. Depressurize hydraulic system.
3. Remove Transfer Cylinder
   A. Disconnect and plug hydraulic lines attached to cylinder (Fig 401).
   B. Loosen clamp bolts until transfer cylinder can be removed. Remove cylinder from airplane.
   C. Remove hydraulic unions and discard O-ring packings. Plug ports.
4. Install Nose Gear Transfer Cylinder
   A. Remove plugs and install hydraulic unions in transfer cylinder with new O-ring packings.
   B. Fill transfer cylinder from both ends with hydraulic fluid. Cap unions.
   C. Position transfer cylinder in clamps. Adjust position of cylinder until hydraulic lines are aligned (Fig 401).
   D. Remove caps, plugs and connect hydraulic lines finger-tight.
   E. Tighten clamps and secure cylinder.
   F. Tighten hydraulic lines.
   G. Jack airplane for nose gear retraction (Ref Chapter 7, Airplane Jacking).
   H. Pressurize hydraulic system A (Ref 29-11-0 MP).
   I. Remove ground lock assembly (Ref 32-00-01) and cycle gear retraction several times to bleed air from cylinder and lines.

      WARNING: ENSURE GROUND LOCK ASSEMBLIES ARE INSTALLED IN MAIN LANDING GEAR TO PREVENT INADVERTENT OPERATION OF GEAR. INJURY TO PERSONNEL AND/OR DAMAGE TO EQUIPMENT COULD RESULT IF GEAR RETRACTS. CLEAR ALL WHEEL WELL AREAS OF EQUIPMENT AND PERSONNEL BEFORE OPERATING GEAR.

   J. Check cylinder hydraulic connections for leaks.
   K. Extend gear and install ground lock assembly (Ref 32-00-01).
   L. Lower airplane and remove jacks.





Nose Gear Transfer Cylinder Installation
Figure 401

NOSE GEAR LOCK MECHANISM - REMOVAL/INSTALLATION

1. Equipment and Materials
   A. Gear Ground Lock Assemblies F72735 (Ref 32-00-01) for nose and each main landing gear
   B. Solvent - Napthta, Aliphatic TT-N-95 (Supercedes BMS 3-2 Solvent)
   C. Solvent - MIL-PRF-680 (Supercedes P-D-680 Solvent)
   D. Corrosion Preventive Compound, MIL-C-11796, Class 3
   E. Grease - BMS 3-33 (Preferred)
   F. Grease - MIL-PRF-23827 (Supercedes MIL-G-23827) (Alternate)
   G. Grease - MIL-G-21164 (Alternate)
   H. Feeler Gage
2. Prepare Nose Gear Lock Mechanism for Removal
   A. Install nose gear and main gear ground lock assemblies (Ref 32-00-01).
   B. Jack airplane nose until nose gear wheels clear the ground. Refer to Chapter 7, Jacking.
   C. Remove nose gear ground lock assembly (Ref 32-00-01).
3. Remove Nose Gear Lock Mechanism
   A. Remove bolt (14, figure 401) to disconnect lock link (6) from drag brace upper and lower links (8) and (13). Remove spacer bushing (11) and (12) from each lock link (6).
   B. Remove bolt from bottom end of lock actuator.
   C. Remove nuts and washers from each end of lock brace shaft (19).
   D. Stretch springs (1) and (5) and slide ends of spring off lock brace shaft (19).
   E. Remove bolt (17) and shaft (19).

      NOTE: There may be laminated shims between lock brace (3) and fitting (20). Retain shims for reinstallation.

   F. Swing lock brace (3) up to give access to actuator upper attachment and support lock actuator (16). Remove bolt (18) and disconnect actuator from lock brace.
   G. Remove nuts (7) and washers from spring retainer bolts. Remove springs (1) and (5).
   H. Remove lock strut, consisting of lock brace (3) and lock link (6) as a complete assembly.
4. Install Nose Gear Lock Mechanism

   CAUTION: THE LOCK LINK-LOCK BRACE ASSEMBLY (LOCK STRUT) CONSISTS OF A MATCHED PAIR, ADJUSTED TO GIVE THE CORRECT AMOUNT OF OVERCENTER LOCKING. IF EITHER PART IS REPLACED, THE COMPLETE ASSEMBLY MUST BE SET UP ON A SURFACE TABLE AND READJUSTED.

   A. Clean all components, and lubricate all except shaft (19, figure 401) and bolt (14) with grease, just before assembly.
   B. Install lock link assembly (3 and 6).
      (1) Apply a thin coat of corrosion preventive compound to lock brace shaft (19).

(2) Position lock brace (3) in fitting (20). Install shims as used in original installation and insert shaft (19).

NOTE: If the lock strut or either of its components have been replaced, it will be necessary to check the gap between the lock brace and fitting (20), with both ends of lock strut attached. A clearance of 0.000 to 0.005 inch between lock brace and fitting must be maintained, if necessary, by shimming.

(3) Insert bolt (17) through lock brace (3) and shaft (19).
(4) Add washer and nut and tighten nut to standard torque.

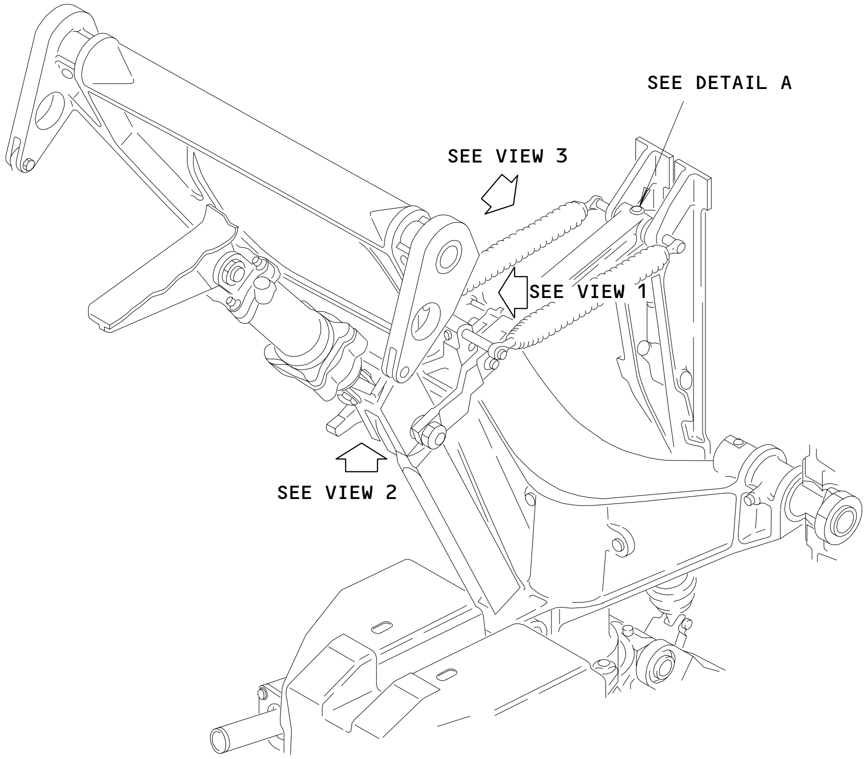
C. Raise lock strut to give access to lock actuator upper attachment bolt (18).
D. Align rod end of lock actuator (16) with fork in lock brace (3).
E. Install a countersunk washer on the upper attachment bolt (18) with countersink toward bolt head.
F. Position nylon washer on each side of rod end between rod end and lock brace fork and insert bolt (18) from left side of airplane.
G. Add washer and nut. Tighten nut 290 to 410 pound-inches torque. Lock nut with cotter pin.

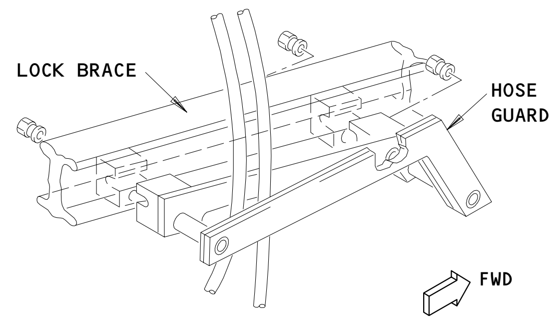
NOTE: If necessary, interchange nuts and/or add washer under bolthead, between lock brace and countersunk washer, to index cotter pin within torque limits.

H. Connect lock link (6) to drag brace.
(1) Install spacer bushings (11) and (12) in each arm of lock link (6).
(2) Place washer (15) on pin (9) with washer flat mating in recess in drag brace upper link (8).
(3) Apply a thin coat of corrosion preventive compound to bolt (14) and insert with bolthead to right of airplane, through spacer bushings, washer (15), and drag brace pin (9).
(4) Add washer and nut.
(5) Tighten nut 300 to 400 pound-inches torque. Lock nut with cotter pin.

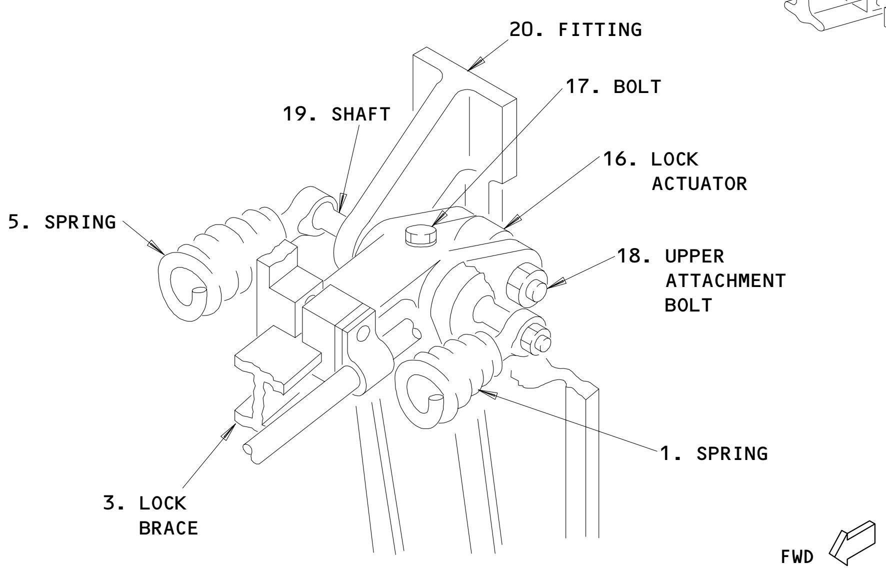
I. Connect bottom end of actuator to fitting (20) (Ref 32-33-21).
J. Deleted
K. Position springs (1) and (5) on spring retainer bolts. Add washers and nuts.
L. Tighten nuts finger-tight and lock with cotter pins.
M. Stretch springs (1) and (5) and slide connections over each end of lock spring shaft (19).
N. Add washers and nuts. Tighten nuts finger-tight and lock with cotter pins.

O. Install hose guard on lock brace as far aft as possible without riding on radius.
P. Check operation of nose gear (Ref 32-33-0 A/T).
Q. Lower airplane and remove jacks.



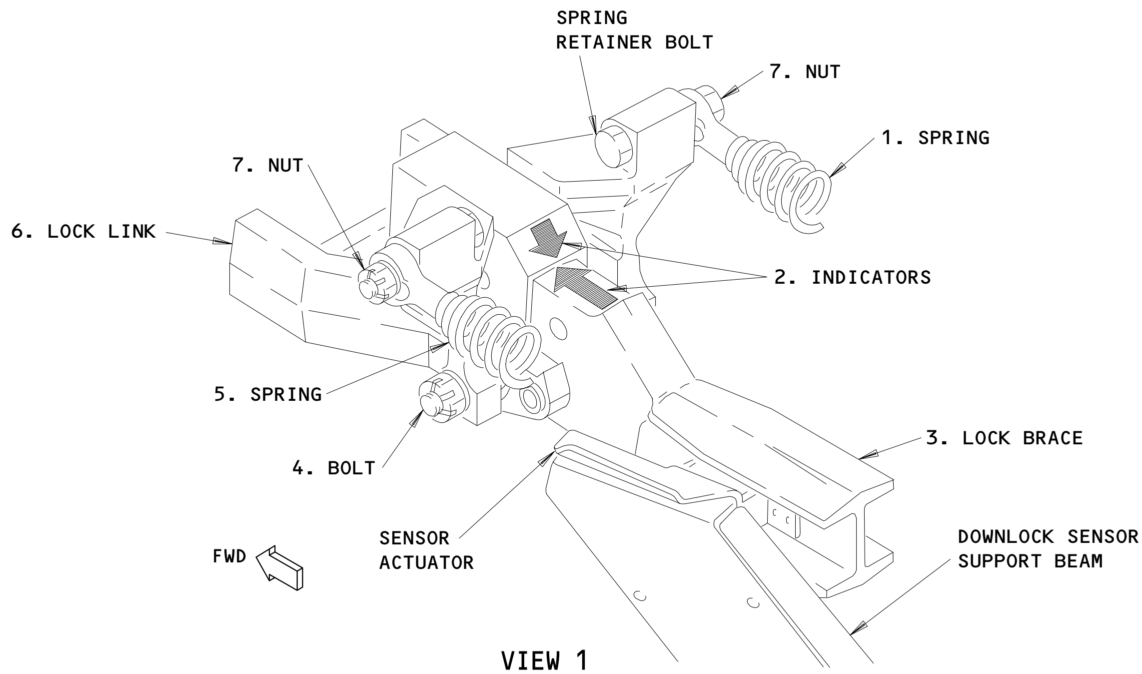


VIEW 3

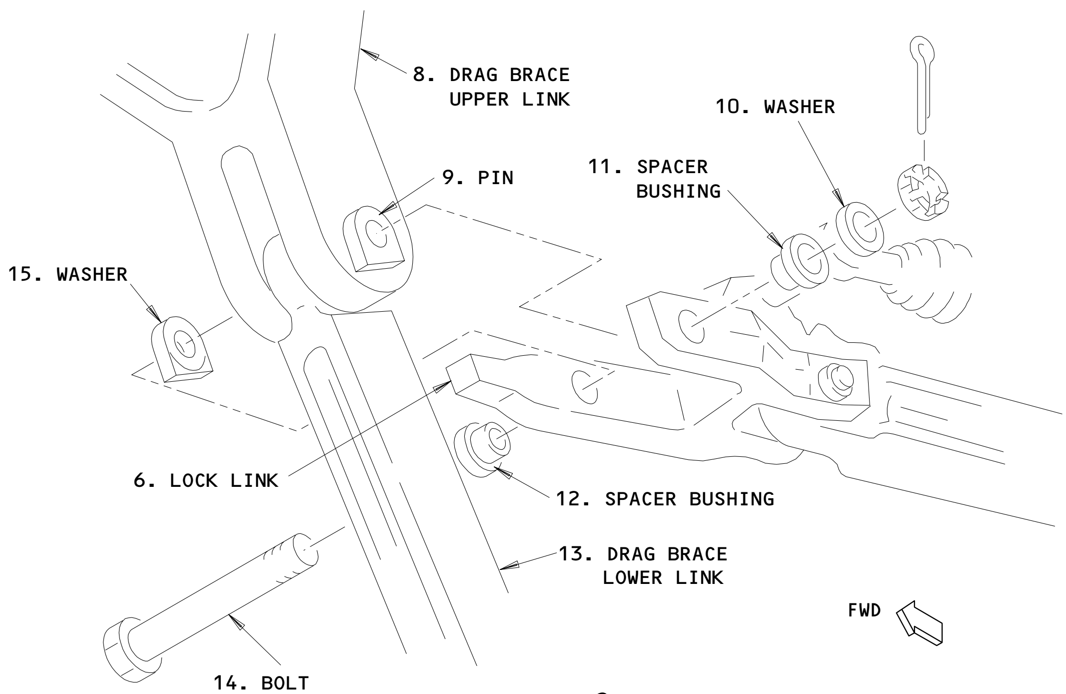


DETAIL A

Nose Gear Lock Mechanism Installation
Figure 401 (Sheet 1)



VIEW 1

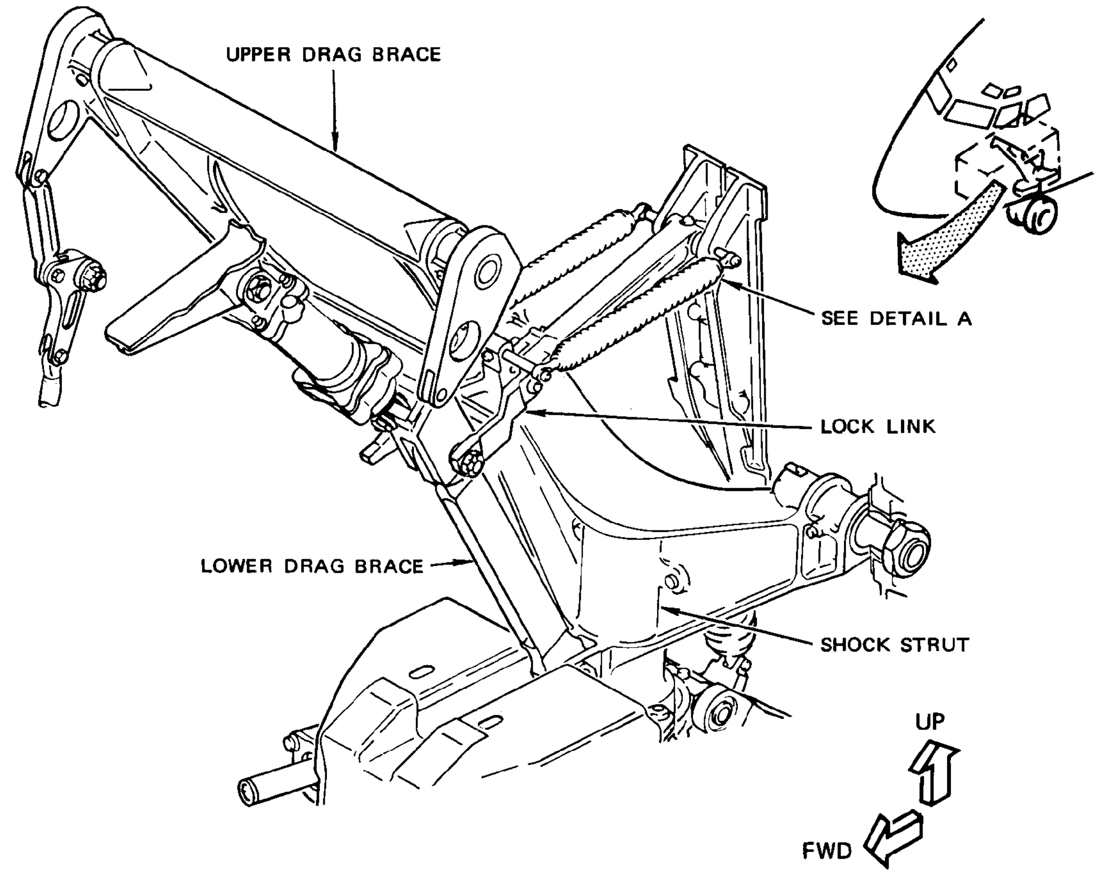


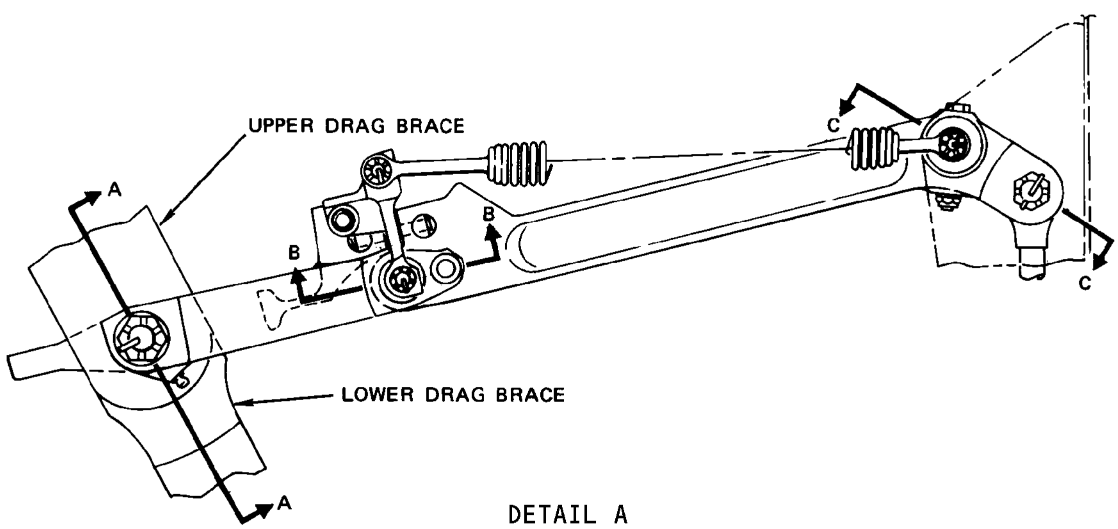
VIEW 2

Nose Gear Lock Mechanism Installation
Figure 401 (Sheet 2)

NOSE GEAR LOCK MECHANISM - INSPECTION/CHECK

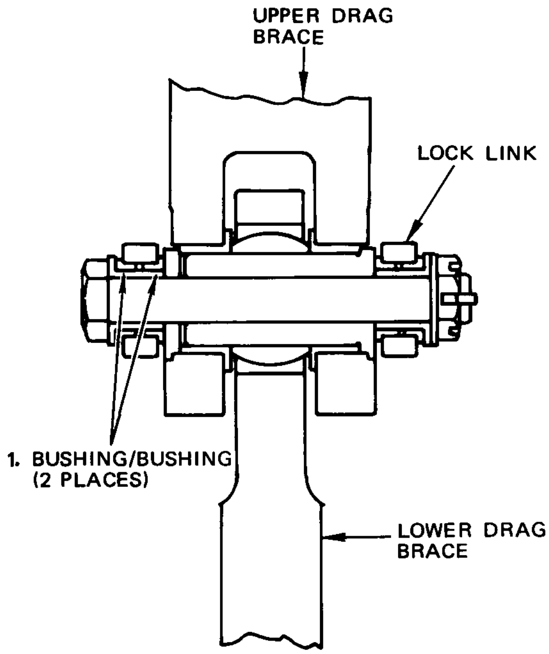
1. General
   A. These data consist of illustrations and wear limit charts. No procedure is given in this section for access to permit inspection. Refer to Nose Gear Lock Mechanism - Removal/Installation.
2. Nose Gear Lock Mechanism Wear Limits



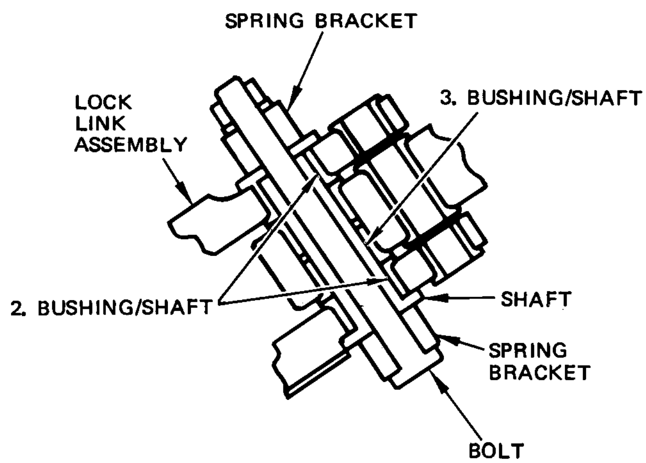


DETAIL A

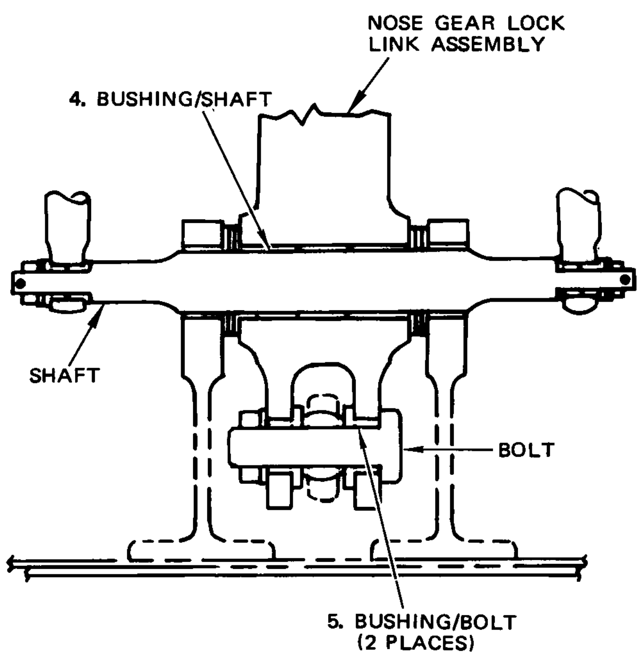
Nose Gear Lock Mechanism Wear Limits
Figure 601 (Sheet 1)



SECTION A-A



SECTION B-B



SECTION C-C

Nose Gear Lock Mechanism Wear Limits
Figure 601 (Sheet 2)

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS DIAMETER MIN	DESIGN LIMITS DIAMETER MAX	WEAR LIMITS MAX WEAR DIM.	WEAR LIMITS MAX DIAM CLEAR- ANCE	REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR.
1	BUSHING	ID	0.8150	0.8170	0.8210	0.010	X		
	BUSHING	OD	0.8116	0.8123	0.8090		X		
2	BUSHING	ID	0.6280	0.630	0.6340	0.010	X		
	SHAFT	OD	0.6242	0.6248	0.6220			X	*[2]
3	BUSHING	ID	0.628	0.630	0.6340	0.010	X		*[2]
	SHAFT	OD	0.6242	0.6248	0.6220			X	*[2]
4	BUSHING	ID	0.753	0.755	0.7590	0.010	X		
	SHAFT	OD	0.7492	0.7498	0.7470			X	*[2]
5	BUSHING	ID	0.4995	0.5000	0.5040	0.005	X		
	BOLT	OD	0.4985	0.4995	0.4975		X		
6	BUSHING	ID	0.2540	0.2545	0.258	0.007	X		
	SHAFT	OD	0.2525	0.2535	0.2505			X	*[2]
7	BUSHING	*[3]	1.000	1.002	1.008	0.010	X		
	BUSHING	*[4]	1.2495	0.999	0.992		X		
8	TOTAL AXIAL CLEAR- ANCE	--	0.000	0.010	--	*[6]*[7] 0.020	*[5]		
9	BUSHING	ID	1.2495	1.2500	1.253	0.005	X		
	PIN	OD	1.2485	1.2490	1.247			X	*[2]
10	BEARING	ID	--	--	*[8]	0.005 *[8]	X		
	BEARING	OD	--	--	*[8]		X		
	BEARING	ID	1.2495	1.2500	*[8]		X		
	PIN	OD	1.2485	1.2490	1.247			X	*[2]

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR.
			DIAMETER		MAX WEAR DIM.	MAX DIAM CLEARANCE			
			MIN	MAX					
11	BEARING	ID	--	--	*[8]	0.005 *[8]	X		
	BEARING	OD	--	--	*[8]		X		
	BEARING	ID	0.4995	0.5000	0.504		X		
	BOLT	OD	0.4985	0.4995	0.4975		X		

*[2] REFER TO OVERHAUL MANUAL FOR REPAIR INSTRUCTIONS
*[3] DISTANCE BETWEEN FLANGE FACES OF BUSHINGS IN FWD LOCK LINK ASSEMBLY
*[4] DISTANCE BETWEEN FLANGE FACES OF BUSHINGS IN AFT LOCK BRACE ASSEMBLY
*[5] REPLACE WORN BUSHINGS
*[6] MINIMUM BUSHING FLANGE THICKNESS 0.053
*[7] IF THE TOTAL AXIAL CLEARANCE EXCEEDS 0.020 AND BUSHING FLANGES ARE PER *[6], USE 69-42150-1 SHIM (MINIMUM QUANTITY REQUIRED) TO RESTORE DESIGN AXIAL CLEARANCE
*[8] THE TOTAL DIAMETRAL CLEARANCE BETWEEN THE BEARING RACE, BEARING BALL, AND PIN MUST NOT BE GREATER THAN THE SPECIFIED MAXIMUM DIAMETER CLEARANCE

NOSE GEAR WHEEL WELL DOOR LINKAGE - REMOVAL/INSTALLATION

1. Equipment and Materials
   A. Gear Ground Lockpin, F72735, for each landing gear.
   B. Feeler Gage
   C. Lockwire - Monel (0.040 in. Dia.) (NASM20995NC40 QQ-N-281)
   D. Grease - BMS 3-33 (Preferred)
   E. Grease - MIL-PRF-23827 (Supercedes MIL-G-23827) (Alternate)
   F. Grease - MIL-G-21164 (Alternate)
   G. Solvent - Napthta, Aliphatic TT-N-95 (Supercedes BMS 3-2 Solvent)
   H. Solvent - MIL-PRF-680 (Supercedes P-D-680 Solvent)
   I. Corrosion Preventive Compound, MIL-C-11796 Class 3
2. Remove Nose Gear Wheel Well Door Linkage (Fig. 401)
   A. Install nose and main gear ground lockpins.
   B. Disconnect door operator rod (5) from door center hinge fitting (6). (See detail A)
   C. Disconnect and remove actuator rod from crank assembly (3) by removing bolt at rod end.
   D. Remove link assembly (8) by removing bolt at each end.
   E. Remove crank assembly. (See detail B)
      (1) Remove lockwire from spring pin (15) at inboard end of door operator bolt (14) and remove spring pin.
      (2) Remove nut (13) from door operator bolt.
      (3) Slide crank assembly (3) off door operator bolt.
   F. Remove door operator bolt.
      (1) Remove aft access panel (11) in nose gear wheel well, from side on which linkage is being removed.
      (2) Remove antirotation bolt (17) at outboard end of door operator bolt (14).
      (3) Slide door operator bolt from door operator support fitting (12).
3. Install Nose Gear Wheel Well Door Linkage (Fig. 401)
   A. Clean and apply thin coat of corrosion compound to shank of door operator bolt (14).
   B. Install compound coated door operator bolt in door operator support fitting (12) on wheel well side bulkhead (16).
      (1) Mark a reference line on the unthreaded end of door operator bolt (14) to align with center of antirotation bolt (17) hole.
      (2) Position door operator bolt for installation from inboard out with reference line for center of antirotation bolthole aligned with antirotation bolthole in door operator support fitting.
      (3) Slide bolt into support fitting, maintaining alignment of reference mark and bolthole in support fitting.
      (4) Align bolt holes in door operator bolt and door operator support fitting and install close tolerance short thread antirotation bolt (17).
      (5) Install flat washer, shear nut, and corrosion resistant cotter pin.
   C. Install crank assembly (3) on door operator bolt (14).
      (1) Slide crank assembly onto door operator bolt.

(2) Install door operator nut (13) and tighten until a gap of 0.001 to 0.003 inch is measured between nut and the bushing which is in the crank assembly.
(3) Install spring pin (15) to lock door operator nut and lockwire spring pin with NC40 Monel lockwire.

D. Attach link assembly (8) to drag brace upper link (9) and crank assembly (3).
(1) Apply thin coat of corrosion preventive compound to shank of corrosion resistant steel, close tolerance, short thread bolt (1).
(2) Attach one end of link assembly to drag brace upper link with the compound-coated corrosion resistant steel bolt (1), flat washer, shear nut, and corrosion resistant steel cotter pin.
(3) Apply thin coat of corrosion preventive compound to shank of corrosion resistant steel, close tolerance, short thread bolt (2).
(4) Attach lower end of link assembly to crank assembly with the compound coated, corrosion resistant steel bolt (2), flat washer, shear nut, and corrosion resistant steel cotter pin.

E. Jack nose of airplane until nose wheel clears ground (Ref Chapter 7, Airplane Jacking).

<u>WARNING</u>: CHECK THAT GROUND LOCK ASSEMBLIES ARE INSTALLED IN MAIN LANDING GEAR TO PREVENT INADVERTENT OPERATION OF GEAR. INJURY TO PERSONNEL AND/OR EQUIPMENT COULD RESULT IF GEAR RETRACTS.

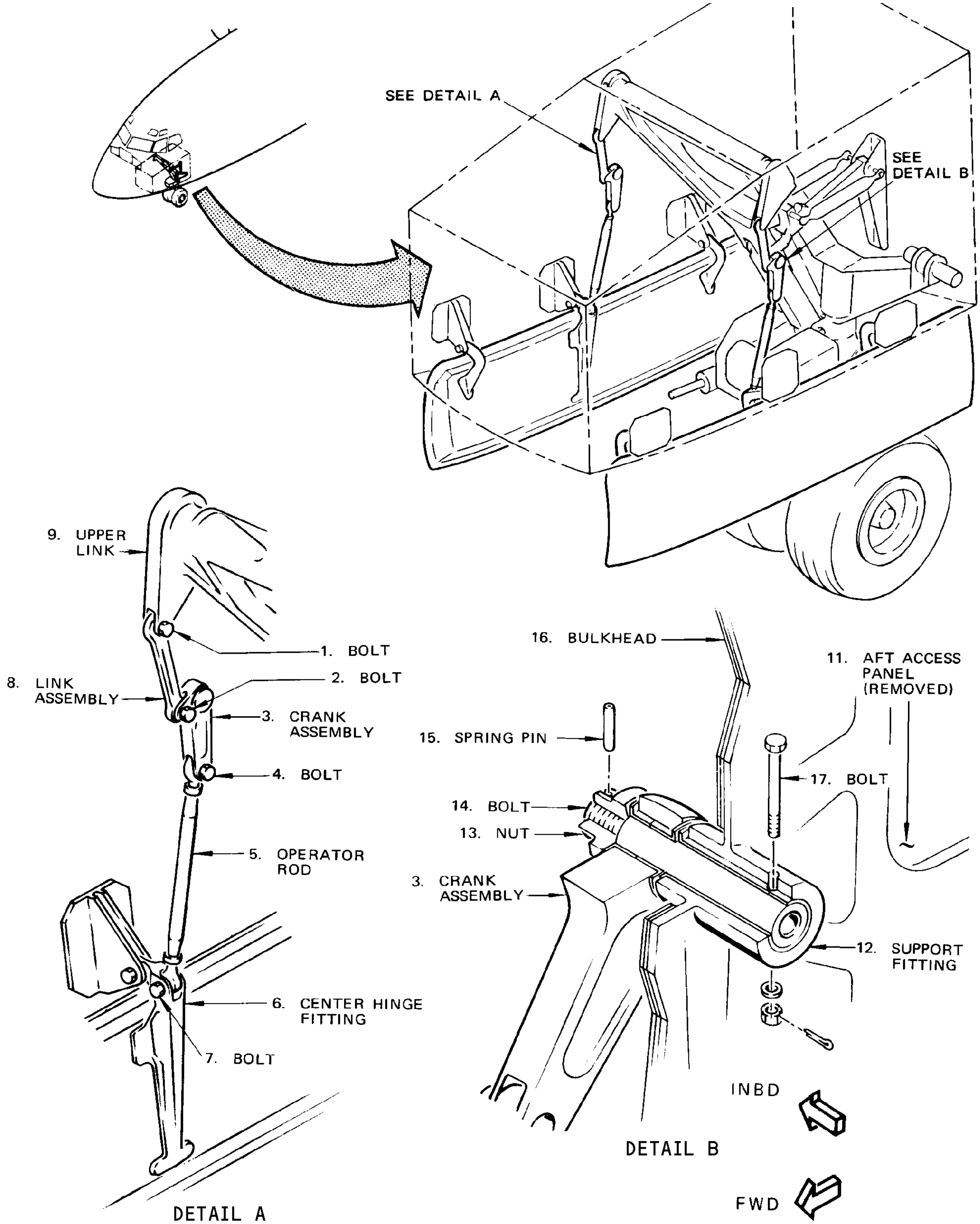
F. Pressurize hydraulic system A (Ref 29-11-0 MP). Retract nose gear using override trigger on gear control lever.

G. Connect actuator rod (5) to crank assembly (3) and door center hinge fitting (6).
(1) Apply thin coat of corrosion preventive compound to shank of corrosion resistant steel, close tolerance, short thread bolt (4).
(2) Attach one actuator rod end to lower end of crank assembly with the compound-coated corrosion resistant bolt (4), flat washer, shear nut, and corrosion resistant steel cotter pin.
(3) Apply thin coat of corrosion preventive compound to shank of corrosion resistant steel, close tolerance, short thread bolt (7).
(4) Attach actuator lower rod end to door center hinge fitting with the compound coated, corrosion resistant steel bolt (7), flat washer, shear nut, and corrosion resistant steel cotter pin.

H. Adjust door linkage (Ref Nose Gear Wheel Well Door Linkage - A/T).

I. Perform retraction test (Ref 32-33-0).

J. Lower the airplane and remove jacks.



Nose Wheel Well Door Linkage Installation
Figure 401

NOSE GEAR WHEEL WELL DOOR LINKAGE - ADJUSTMENT/TEST

1. Wheel Well Door Linkage Adjustment

NOTE: A NLG door rigging check is not required if reinstalling the same NLG door that was removed and no changes to the adjustments to the door stops, door seals, door hinges, or door pushrods was made.

A. Equipment and Materials
   (1) Gear Ground Lock Assemblies - F72735 (Ref 32-00-01)
   (2) G01912 Lockwire - Monel (0.032 In. Dia.) (NASM20995NC32 QQ-N-281)
   (3) Tail support jack

B. Adjust Nose Gear Wheel Well Door Linkage (Fig 501).
   (1) Install ground lock assemblies in nose and main landing gear (Ref 32-00-01).
   (2) Jack airplane nose until nose wheel clears. Lower tail support jack as nose is raised (Ref Chapter 7, Jacking).
   (3) Pressurize hydraulic system A (Ref Chapter 29).
   (4) Remove lockwire from jamnut and rod end lock on each end of door operator rod.
   (5) Loosen jamnut on each rod end.

   NOTE: Only loosen jamnut so operator rod can be turned for adjustment. Excessive loosening will disengage rod end lock from end of operator rod barrel.

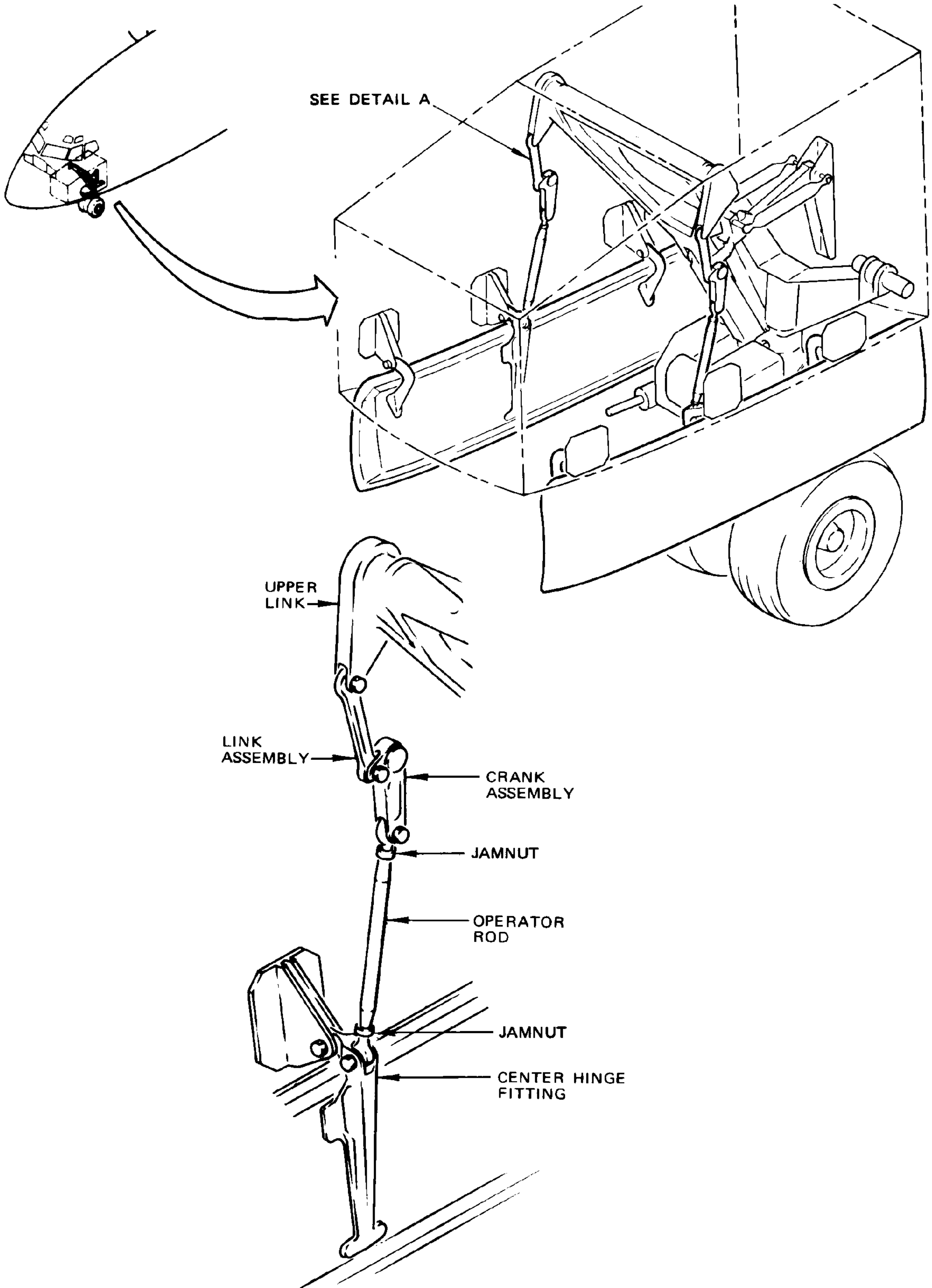
   (6) Remove gear ground lock assembly (Ref 32-00-01) from nose landing gear and retract nose landing gear. Refer to 32-33-0 for nose gear extension and retraction. Extend and retract nose landing gear as necessary while performing steps (7) and (8).

   WARNING: ENSURE GROUND LOCK ASSEMBLIES ARE INSTALLED IN MAIN LANDING GEAR TO PREVENT INADVERTENT OPERATION OF GEAR. INJURY TO PERSONNEL AND/OR EQUIPMENT COULD RESULT IF GEAR RETRACTS.

   (7) Apply 70 ±10 pounds preload approximately 1.0 inch aft and 1.0 inch outboard of the forward inboard corner or 85 ±10 pounds at the forward stop fitting on each door with nose landing gear retracted. Measure dimension below body contour at forward inboard corner on each door. If dimension is within 0.10 ±0.02 inch, proceed to step (10).
   (8) Remove weight, extend nose landing gear, and adjust each door operator rod in direction required to obtain 0.10 ±0.02-inch dimension.

   NOTE: Door operator rod is adjustable as a turnbuckle.

   (9) Repeat steps (7) and (8) as necessary to obtain required dimension.
   (10) Remove weight from door and extend nose landing gear.
   (11) Tighten jamnut on each door operator rod end.



DETAIL A

Nose Wheel Well Door Linkage Installation
Figure 501

(12) Lockwire each jamnut and rod end lock.

C. Check door operation.

(1) Pressurize hydraulic system A (Ref Chapter 29).

(2) Extend and retract gear and check for proper operation of doors. Refer to 32-33-0 for nose gear extension and retraction.

(3) Extend gear.

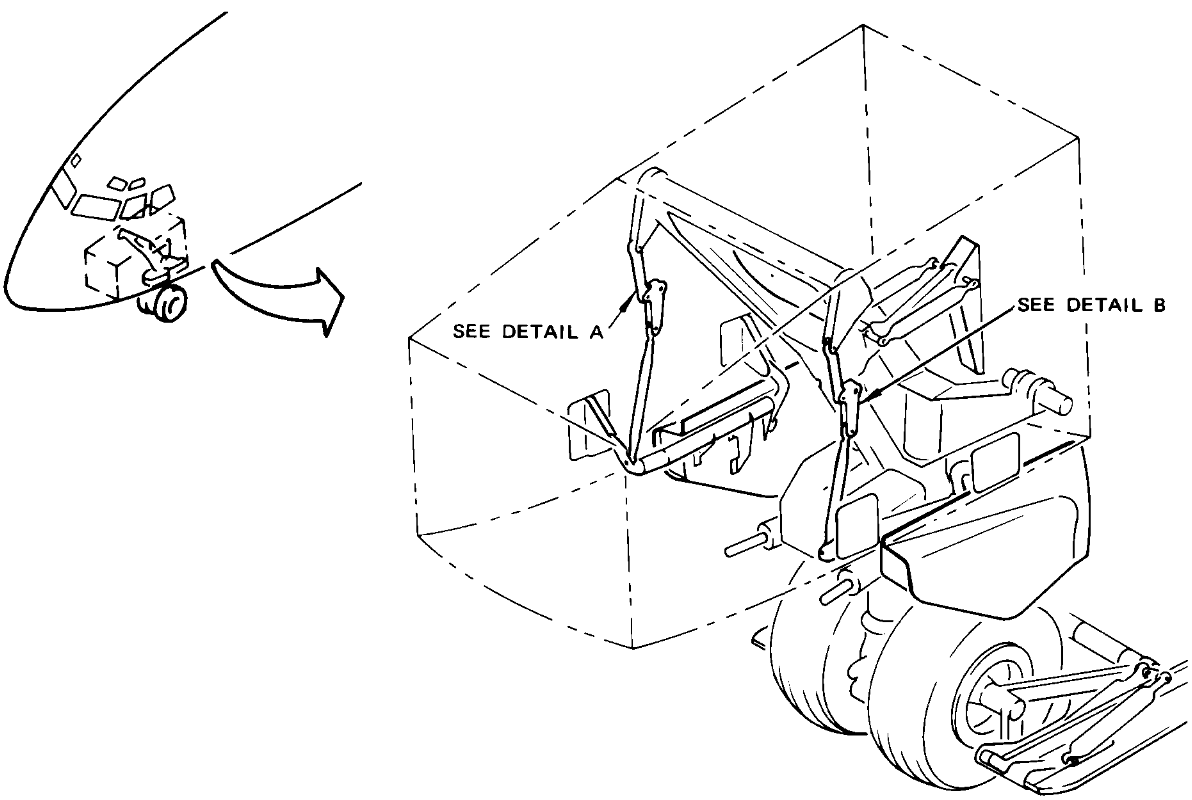
(4) Install ground lock assembly on nose gear (Ref 32-00-01).

(5) Remove jacks from airplane.

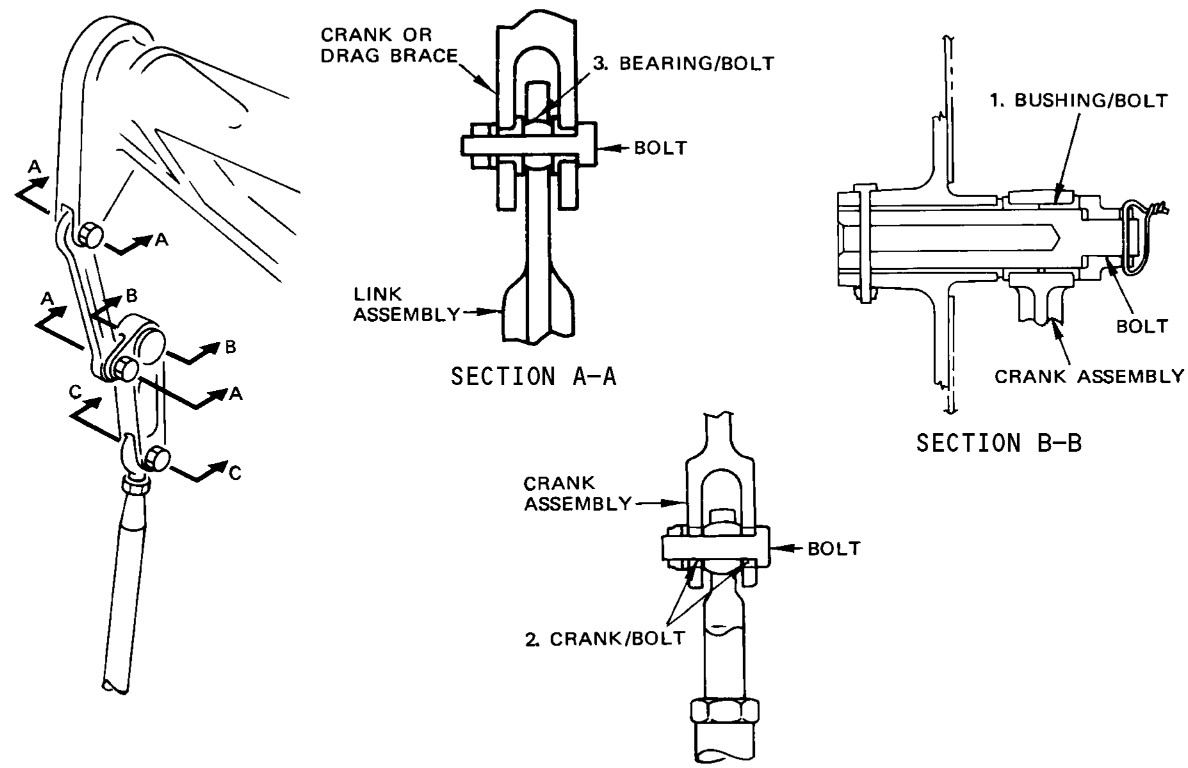
NOSE GEAR DOOR LINKAGE-INSPECTION /CHECK

1. General
   A. These data consist of illustrations and wear limit charts. No procedure is given in this section for access to permit inspection. Refer to Nose Gear Door Linkage - Removal/Installation.
2. Nose Gear Door Linkage Wear Limits (Fig. 601)
   A. Indication of wear in the nose gear door linkage may be indicated by moving the lower edge of the wheel well door with the gear down and locked. By manually moving the bottom of the door inboard and outboard, a total movement of approximately 0.42 inch or greater indicates the need for a more detailed check of the linkage.

      NOTE: Application of force sufficient to cause deflection of the door will result in increased door movement and false indications.



Nose Gear Door Linkage Wear Limits
Figure 601 (Sheet 1)



INDEX NO.	PART NAME	DIM.	DESIGN LIMITS DIAMETER MIN	DESIGN LIMITS DIAMETER MAX	WEAR LIMITS MAX WEAR DIM.	WEAR LIMITS MAX DIAM CLEARANCE	REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR.
1	BUSHING	ID	1.1250	1.1260	1.1310	0.010	X		*[1]
	BOLT	OD	1.1220	1.1240	1.1140			X	*[2]
2	CRANK	ID	0.3120	0.3125	0.3175	0.010	X		*[1]
	BOLT	OD	0.3115	0.3120	0.3100			X	
3	BEARING	ID	0.3120	0.3125	0.3175	0.005	X		
	BOLT	OD	0.3115	0.3120	0.3100		X		

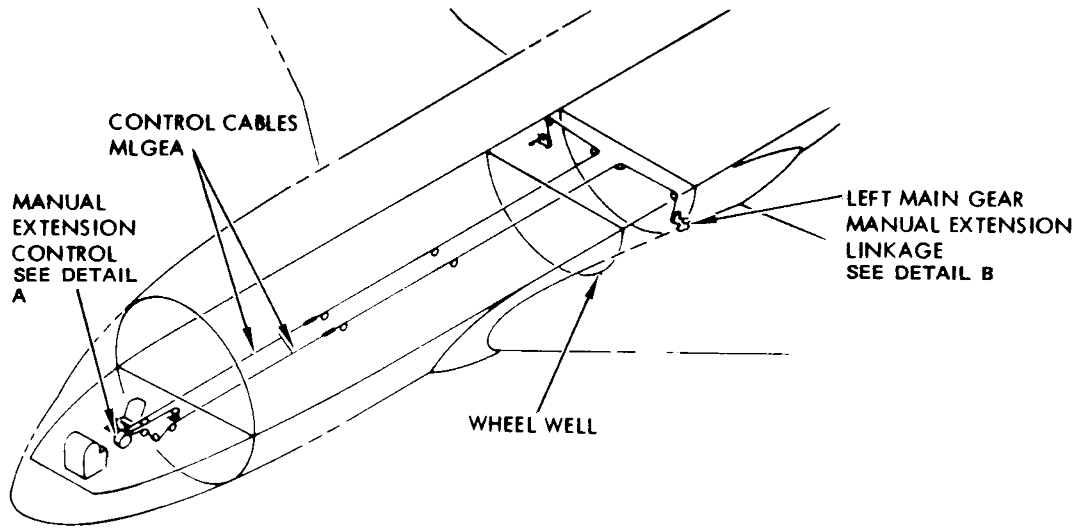
*[1] Install interference fit bushing and grind to design limits.

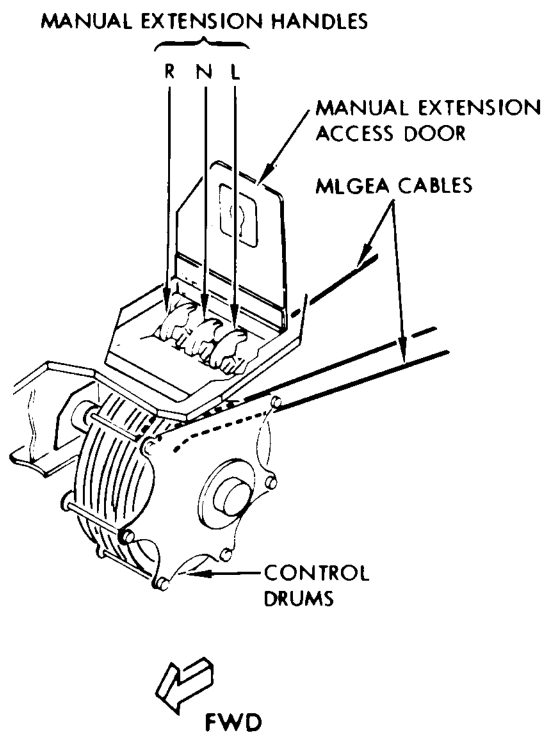
*[2] Repair per Overhaul Manual.

Nose Gear Door Linkage Wear Limits
Figure 601 (Sheet 2)

MAIN GEAR MANUAL EXTENSION SYSTEM - DESCRIPTION AND OPERATION

1. General
   A. The main gear manual extension system is used to lower the main gear when hydraulic system pressure is not available. Pulling a manual extension handle for the respective gear transmits motion through drums and cables to unlock the gear from the up and locked position. When the main gear uplock mechanism is released, the gear will free-fall to the down and locked position.
   B. Controls for main gear manual extension are located in the floor of the control cabin immediately aft and to the right of the aisle stand (Fig. 1). Three controls, one for the nose gear and one for each main gear, are installed in the control cabin floor protected by an access door. The landing gear control handle must be either in neutral or down position to prevent hydraulic lock during manual extension. A single pull of approximately 60 pounds on the manual extension handle releases the main gear uplock mechanism to allow the gear to extend. A spring attached to the manual extension linkage returns the system to the original position. The landing gear position and warning lights function normally during manual extension operation.
2. Main Gear Manual Extension Control Cable
   A. The main gear manual extension control cables are connected to the manual extension control drums installed beneath the control cabin floor and routed beneath the cabin floor through pulleys and eyeball type pressure seals to the main gear uplock release mechanism in the respective main gear wheel well (Fig. 2). When the manual extension handle is pulled to release the gear, the motion is transmitted by the control cables through the uplock release mechanism to the main gear uplock assembly. Motion supplied to the uplock assembly from the manual extension system releases the uplock hook from the uplock roller on the main gear to allow the main gear to fall to down and locked position.
3. Main Gear Manual Extension Linkage
   A. The main gear manual extension linkage is located in the main gear wheel well adjacent to the main gear uplock assembly (Fig. 1). Motion to release the main gear is transmitted by a cable MLGEA to a quadrant assembly. As the quadrant moves, it will push a crank moving the release rod attached to the quadrant assembly crank. The motion of these components will cause the release spring (not on all airplanes) to stretch. Movement of the release rod will move an arm attached to a cam shaft. Rotation of the cam shaft causes a two-fingered cam to contact rollers on the uplock links. As the cam rotates the uplock links, the uplock links pull against two springs and the stop link to pull out board on the uplock hook. As the uplock hook moves outboard, the main gear uplock roller is released and the main gear will free fall to the down and locked position. Further control cable movement is prevented when the uplock link rollers bottom out on the cam. The return spring attached to the quadrant assembly and the release spring (if installed) attached to the crank assembly will return the main gear manual extension system to the original position when the manual extension handle is released.

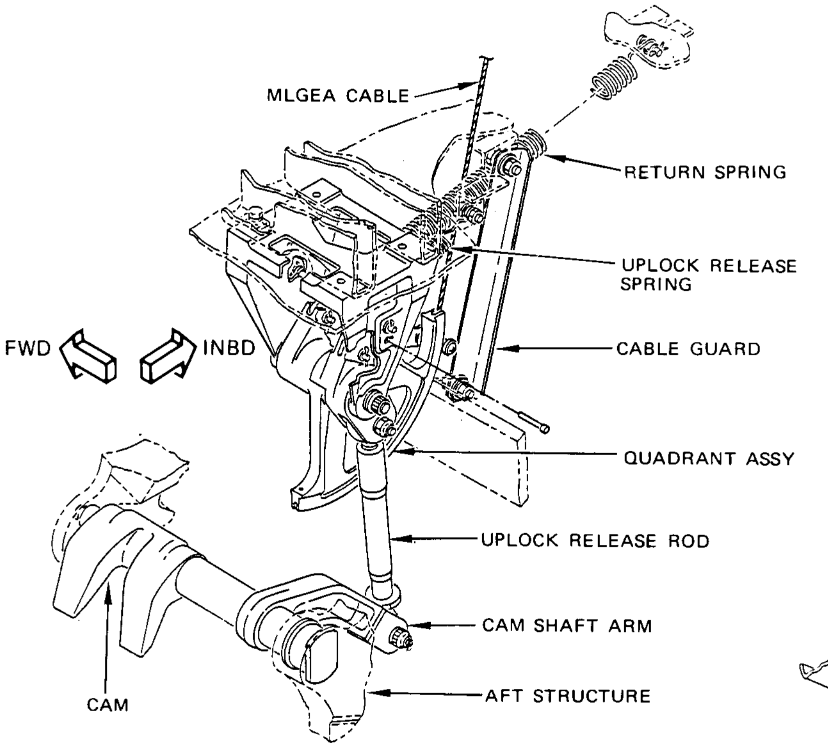




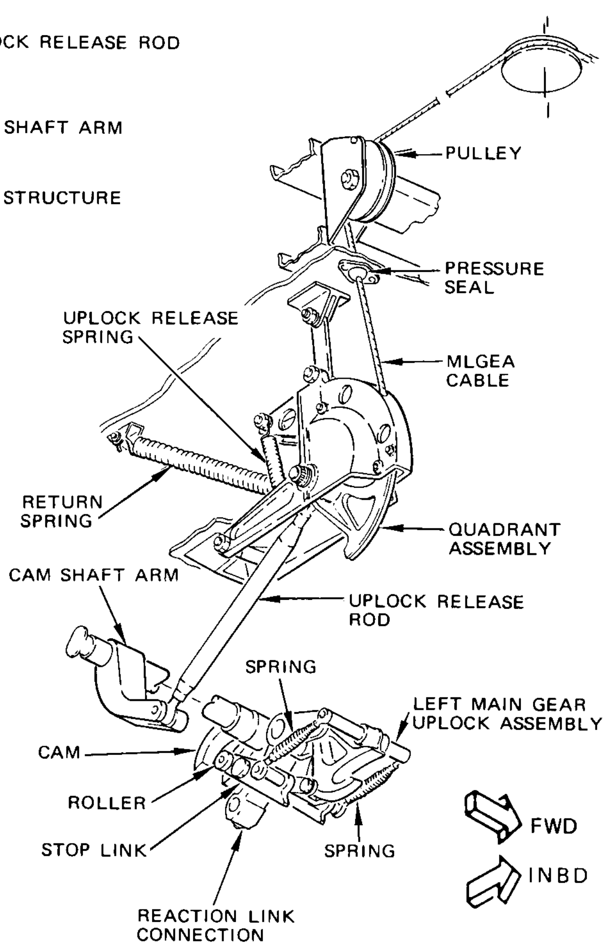
NOTE: QUADRANT GUARD IS NOT SHOWN
INSTALLED FOR CLARITY

DETAIL A

Main Gear Manual Extension System Component Location
Figure 1 (Sheet 1)



DETAIL B 2

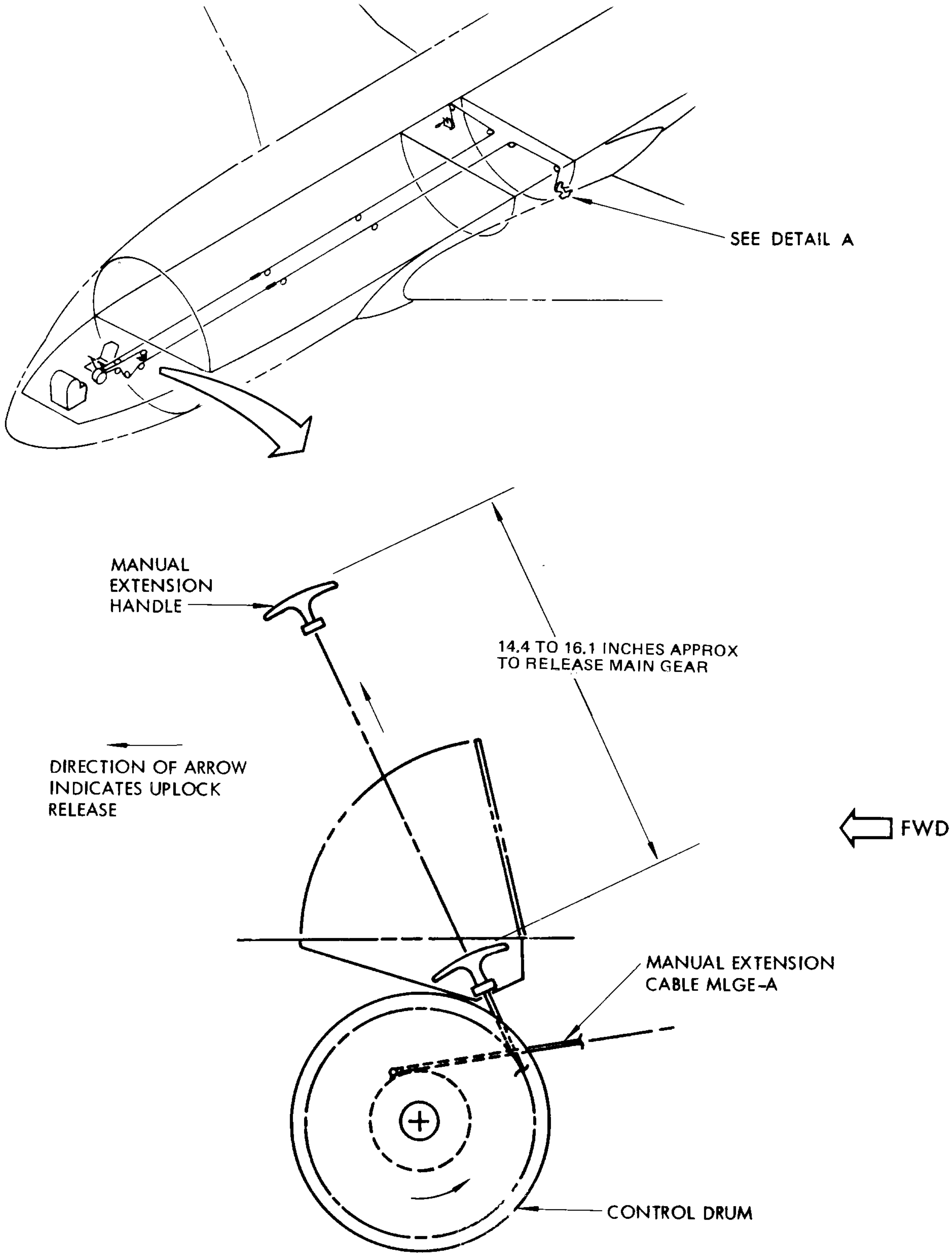


DETAIL B 1

1 TM C9-BAA, C9-BAB
CP CF-EPL, CF-EPO, CF-EPR
AR LV-JMW
QK EI-BJE, EI-BJP

2 TM ALL EXCEPT C9-BAA, C9-BAB
CP ALL EXCEPT CF-EPL, CF-EPO, CF-EPR
AR ALL EXCEPT LV-JMW
QK ALL EXCEPT EI-BJE, EI-BJP

Main Gear Manual Extension System Component Location
Figure 1 (Sheet 2)



Main Gear Manual Extension Control
Figure 2 (Sheet 1)

4. Operation

A. The main gear manual extension system is operated from the control cabin. Each gear is operated individually. To manually extend a main gear, proceed as follows:

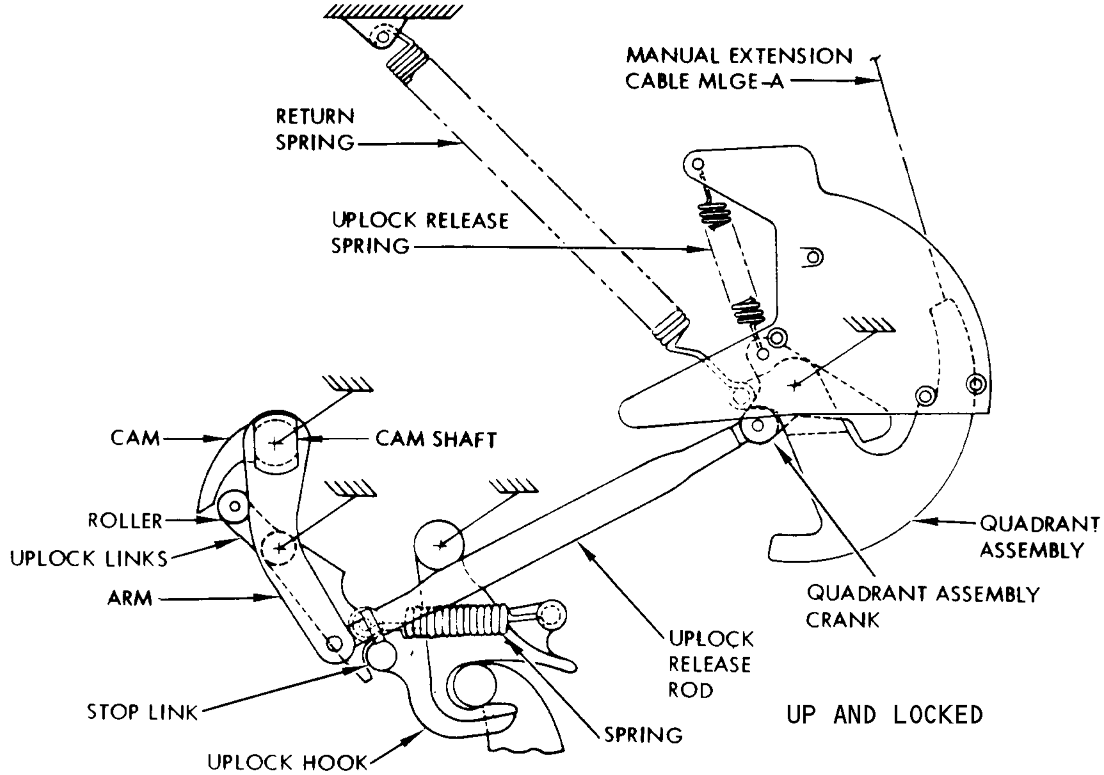
(1) Place landing gear control lever in neutral or down position.

(2) Open manual extension control access door.

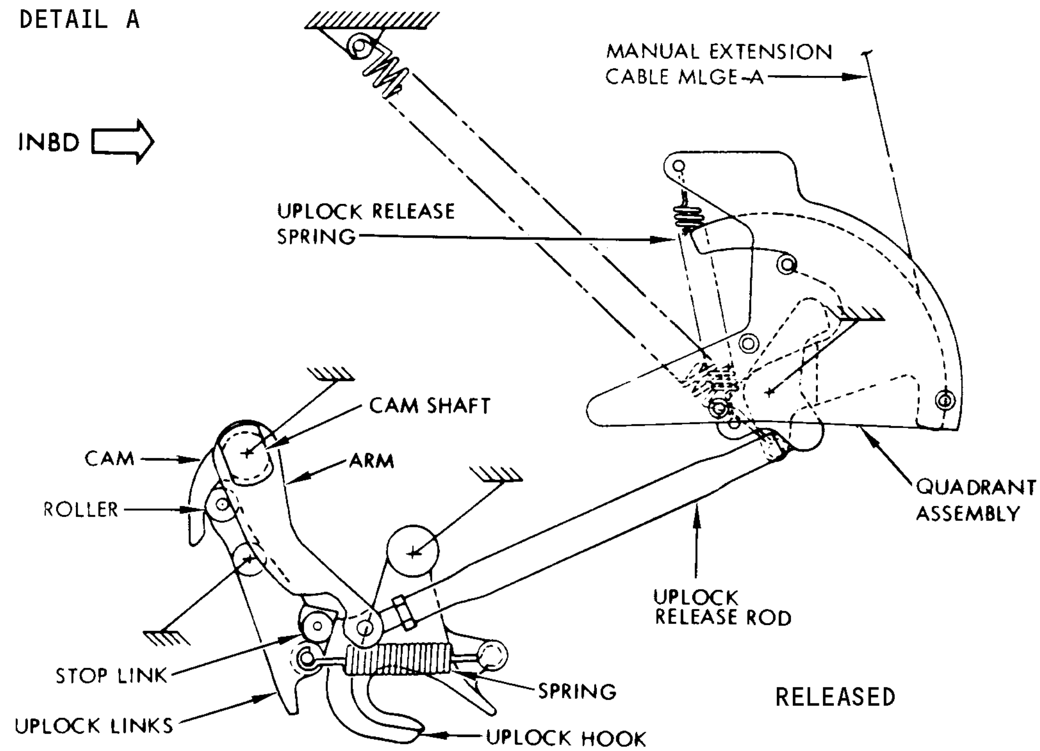
(3) Pull respective main gear manual extension handle approximately 14.4 to 16.1 inches and observe that main gear falls to down and locked position as indicated by the corresponding green light on the pilots' instrument panel.

(4) Release manual extension handle.

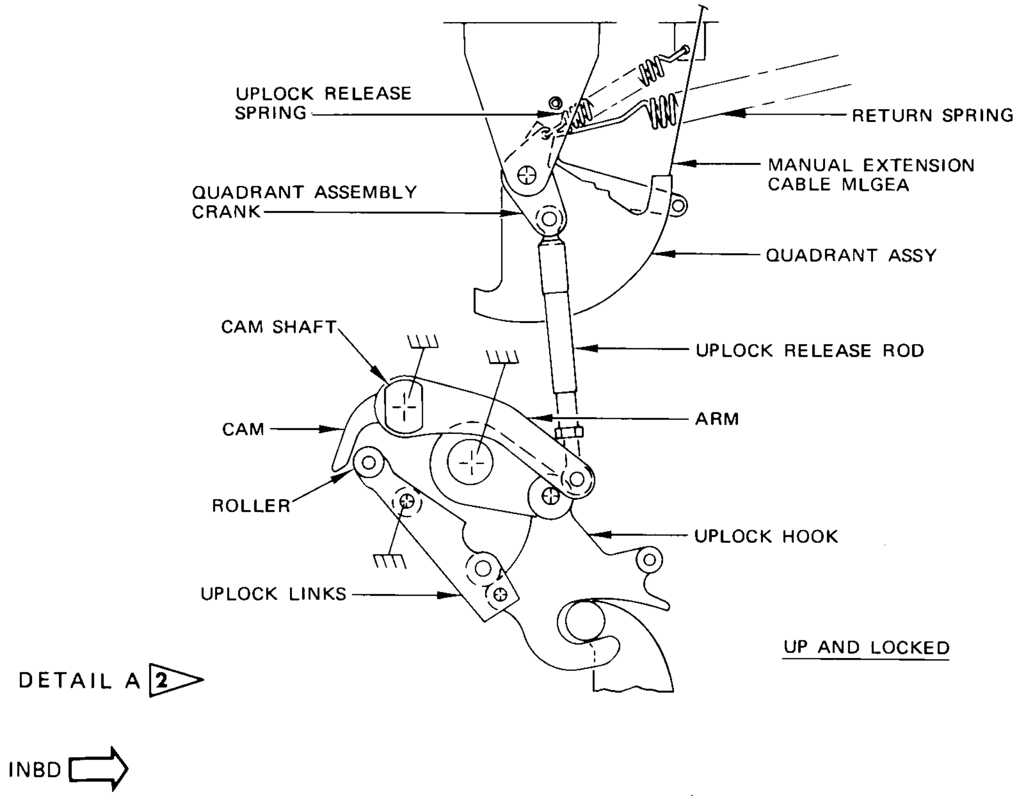
WARNING: DO NOT HOLD MANUAL EXTENSION HANDLE IN ANY EXTENDED POSITION DURING HYDRAULIC OPERATION OF THE LANDING GEAR.

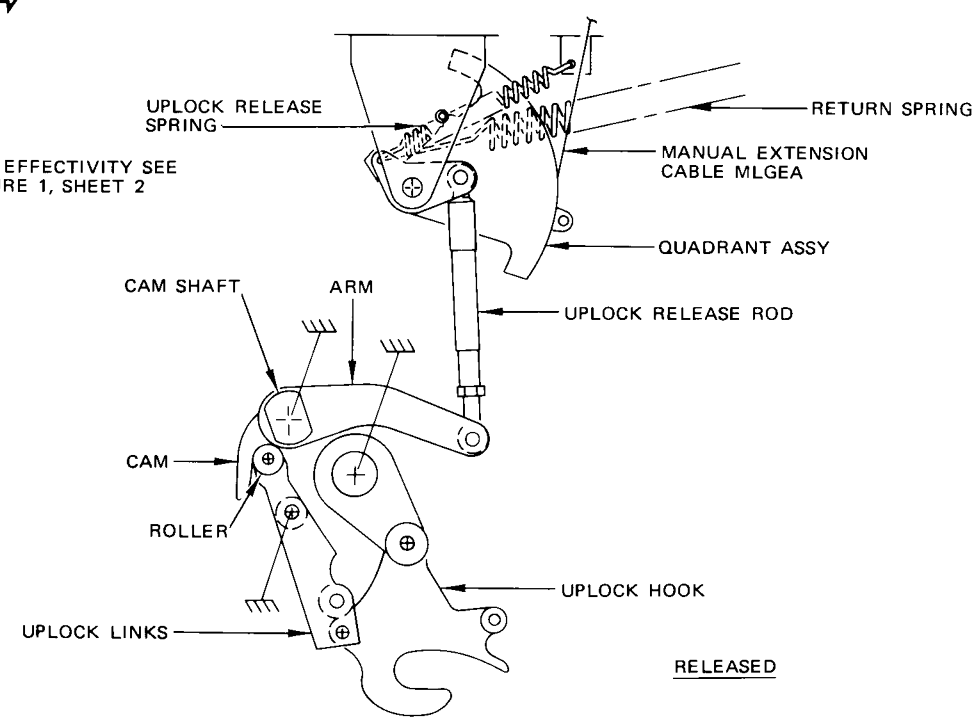


DETAIL A



Main Gear Manual Extension Control
Figure 2 (Sheet 2)





2 FOR EFFECTIVITY SEE FIGURE 1, SHEET 2

Main Gear Manual Extension Control
Figure 2 (Sheet 3)

MAIN GEAR MANUAL EXTENSION SYSTEM - TROUBLESHOOTING

1. General
   A. In troubleshooting the main gear manual extension system, the trouble symptoms are best identified by performing a test of manually extending the gear (AMM 32-34-0/501).
   B. The system is functionally tested with hydraulic system A depressurized and landing gear control lever in the off position.
   C. Two men are required, one stationed in the control cabin to operate the left and right main gear manual extension handles and one stationed near the gears to observe gear action. Main Gear manual extension system must be adjusted properly prior to trouble shooting. (Ref 32-34-0, Adjustment/Test)
2. Prepare for Troubleshooting
   A. Jack airplane until all tires clear ground (Ref Chapter 7, Jacking).
   B. Open manual extension access doors in control cabin floor and attach spring scale to manual extension handles of gear being tested.
   C. Connect external electrical power supply.
   D. Pressurize hydraulic system A (Ref 29-11-0, Maintenance Practices).
   E. Remove main gear ground lock assemblies (Ref 32-00-01).
   F. Check that all circuit breakers on landing gear circuit breaker panel P6 are closed.
   G. Move landing gear control lever to UP to retract main gear, then move control lever to OFF position.

      WARNING: PERSONNEL KEEP CLEAR OF GEAR PATHS TO PRECLUDE POSSIBLE INJURY TO PERSONNEL.

   H. Depressurize hydraulic system A (AMM 29-11-0/201) and proceed troubleshooting with pressure off.
   I. Following troubleshooting, restore airplane to normal.

3. Trouble Shooting Charts

With airplane jacked, main gear retracted, and hydraulic system A depressurized, pull upward and forward on main gear manual extension handles. Check that main gear free-fall to down and locked position and that force required to release gear from UP and locked position does not exceed 60 pounds. IF -

GEAR DOES NOT FREE-FALL TO DOWN AND LOCKED POSITION - Extend gear hydraulically. IF -

GEAR DOES NOT EXTEND - Visually inspect cables, pulleys, drums, and release mechanism, for security, damage, jamming or binding. Repair as required.

GEAR EXTENDS - Adjust and test affected gear (Ref 32-34-0).

FORCE REQUIRED TO RELEASE GEAR EXCEEDS ALLOWABLE - Cycle system several times and repeat initial check. IF -

FORCE WITHIN ALLOWABLE - System is operable.

FORCE EXCEEDS ALLOWABLE - Visually check cables, pulleys, drums, and release mechanism, for damage, jams, lubrication, binding, security of mounting, etc. Repair as required.

Main Gear Manual Extension System - Troubleshooting
Figure 101

MAIN GEAR MANUAL EXTENSION SYSTEM - ADJUSTMENT/TEST

1. Main Gear Manual Extension System Adjustment
   A. General
      (1) This procedure adjusts (rigs) either the left or right main gear manual extension system to obtain the cable tensions and clearances between components necessary for proper system operation.
   B. Equipment and Material
      (1) Rigging Pin, 0.311 +0.000/-0.002 inch diameter x 3.00 inch long, MS20392-4C
      (2) Rigging Pin, 0.311 +0.000/-0.002 inch diameter x 7.50 inch long, MS20392-46
      (3) Gear Ground Lock Assembly - (Ref 32-00-01)
      (4) Corrosion Preventive Compound, MIL-C-16173, Grade 2, or MIL-C-11796, Class 3
   C. Adjust Main Gear Manual Extension System
      (1) Ensure gear ground lock assemblies are installed in all landing gear (Ref 32-00-01)
      (2) Remove quadrant guard (Fig. 501).
         (a) Remove bolts attaching quadrant guard support brackets to strap beam (4 places).
         (b) Remove bolts attaching lower rod ends to quadrant guard.
      (3) Align rig pinholes and install rigging pin through quadrant assembly and quadrant support (View 1, Fig. 501).
      (4) Remove cargo compartment ceiling panels at approximately body station 420 and remove turnbuckle locking clip from cable MLGEA.
      (5) Adjust tension of cable MLGEA to match that of the springs so that rig pin is free.

         NOTE: When performing step (5), check that release handle is properly seated in V-slot of manual extension control (detail A).

      (6) Reduce rig load until quadrant stop clears rig pin by 0.05 inch maximum. Remove rig pin and check that quadrant crank contacts quadrant stop.
      (7) Install turnbuckle-locking clips on cable MLGEA (Ref 20-10-81).
      (8) Remove shock strut inner door of main landing gear being adjusted to facilitate adjustment of uplock release rod (Ref 32-13-11, R/I).
      (9) Jack airplane until all tires clear ground (Ref Chapter 7).
      (10) Check that external electrical power supply is connected.
      (11) Pressurize hydraulic system A (Ref 29-11-0, MP).
      (12) Remove gear ground lock assembly from main landing gear being adjusted. (Ref 32-00-01).
      (13) Check that all circuit breakers on landing gear circuit breaker panel (P6) are closed.

(14) Place landing gear control lever in UP position to retract main gear being adjusted to up and locked position. Place control lever in OFF position.
(15) Adjust uplock release rod at camshaft arm end to obtain 0.05 + 0.10/-0.01 inch clearance between cam and uplock link rollers. Torque nut of bolt attaching rod end to camshaft arm 50 to 70 pound-inches (view 2).

NOTE: Check adjustable rod end of uplock release rod for proper thread engagement. End of rod end should cover at least 50% of inspection hole.

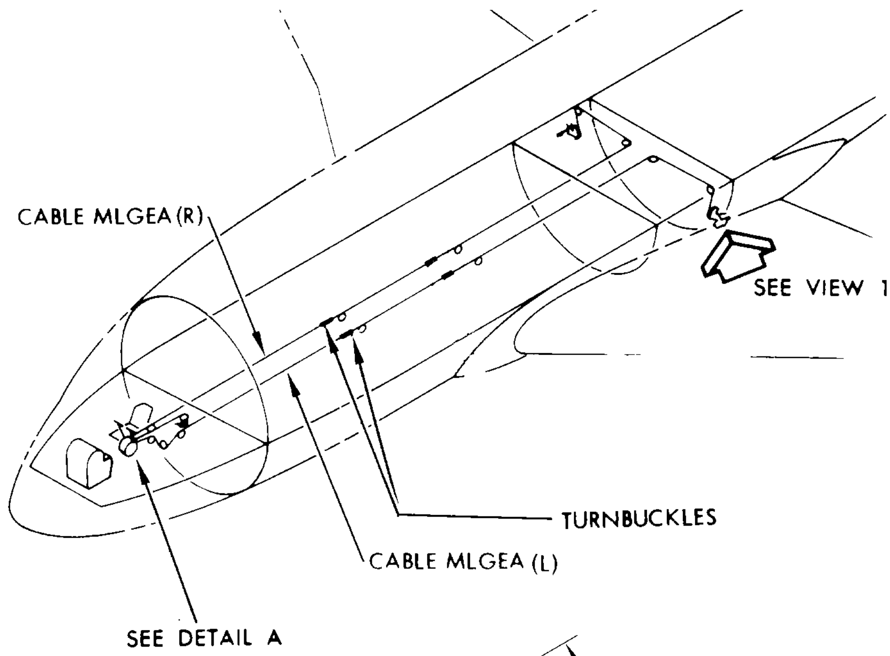
(16) Apply a thin coat of corrosion preventive compound to exposed threads of adjustable rod end.
(17) Remove rigging pin.
(18) Test operation of main gear manual extension system per par. 2.

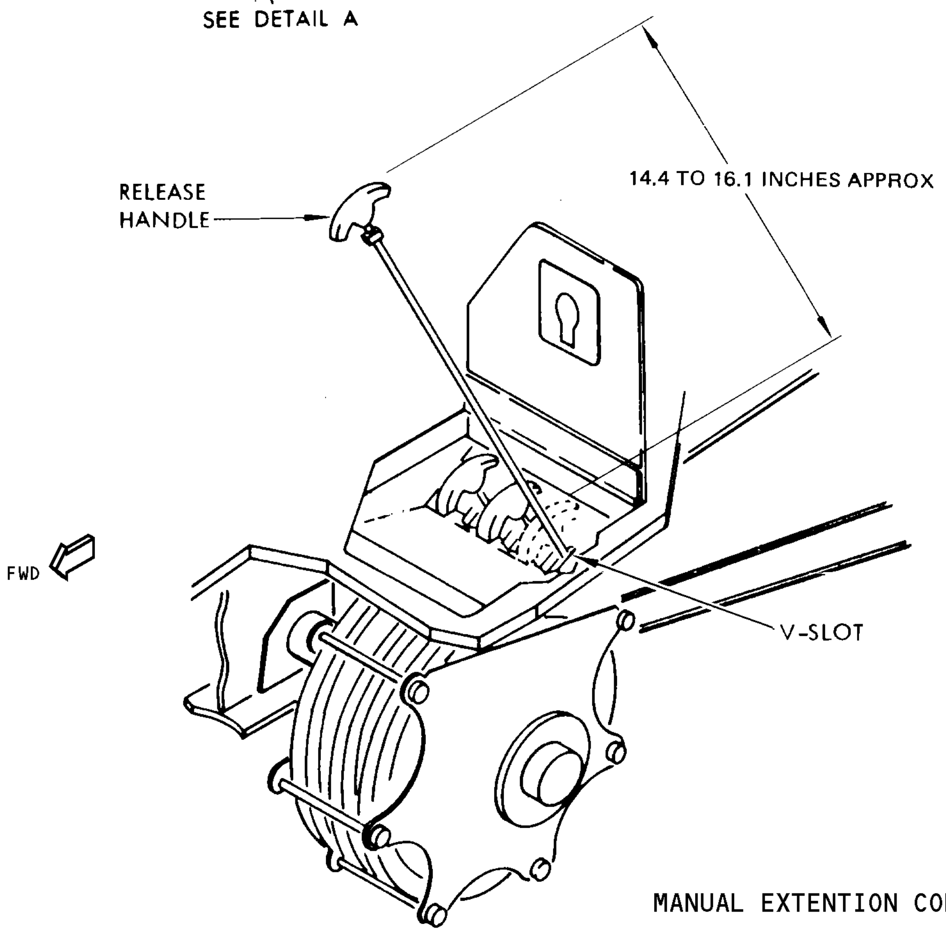
D. Restore Airplane to Normal
(1) Install gear ground lock assembly in main gear being adjusted (Ref 32-00-01).
(2) Lower airplane and remove jacks (Ref Chapter7).
(3) Install shock strut inner door (Ref 32-13-11 R/I).
(4) On airplanes with quadrant guard, install quadrant guard.
(a) Position guard over quadrant and install mounting bolts at strap beam (4 places).
(b) Install mounting bolts attaching rod ends to quadrant guard.
(5) Install cargo compartment ceiling panels.
(6) Determine if there is any further need for pneumatic, hydraulic or electrical power on airplane; if not, shut down sources.

2. Main Gear Manual Extension System Test

A. Equipment and Material
(1) Gear Ground Lock Assembly (Ref 32-00-01)
(2) Spring Scale -
(a) Minimum 20-pound capacity (Airplane on gear)
(b) Minimum 60-pound capacity (Airplane on jacks)

B. Test Manual Extension System (Airplane on Jacks)
(1) Jack airplane until all tires clear ground (Ref Chapter 7).
(2) Connect external electrical power supply.
(3) Install gear ground lock assembly on both main landing gears being tested (Ref 32-00-01).
(4) Pressurize hydraulic system A (Ref 29-11-0 MP).
(5) On airplanes with inflatable-type wheel well seal, pressurize pneumatic manifold.
(6) Check that all circuit breakers on landing gear circuit breaker panel (P6) are closed.
(7) Put the control level in the off position.

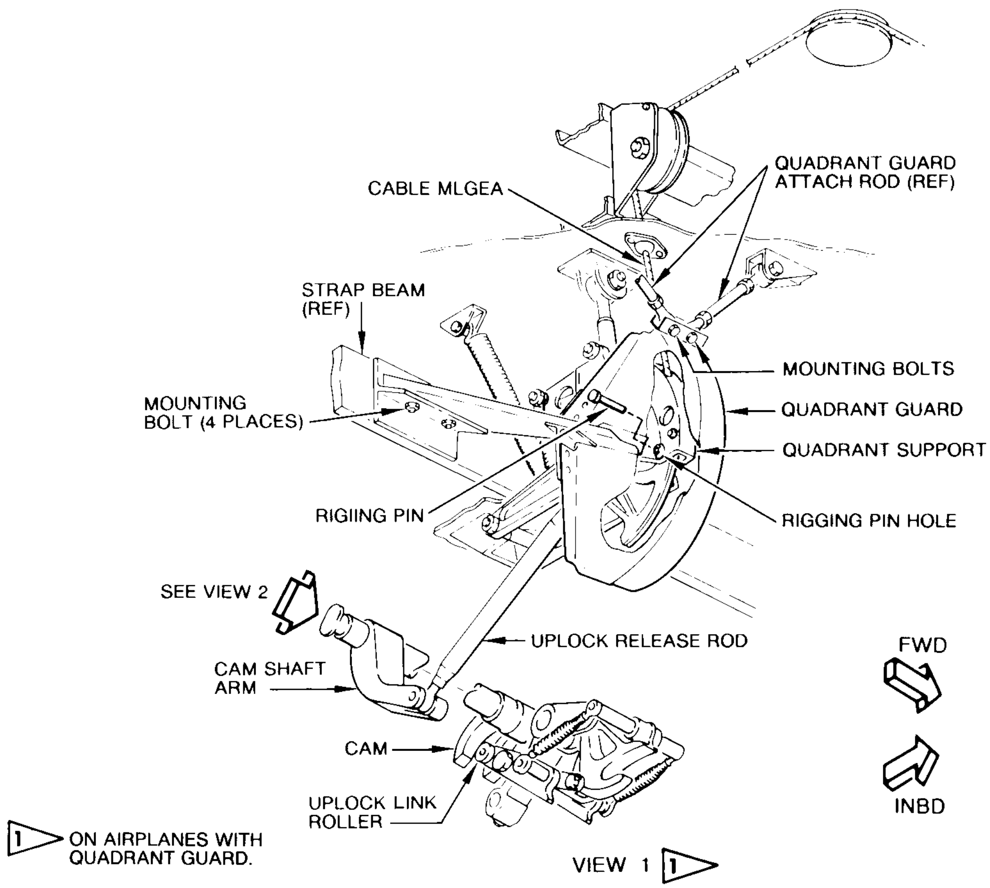


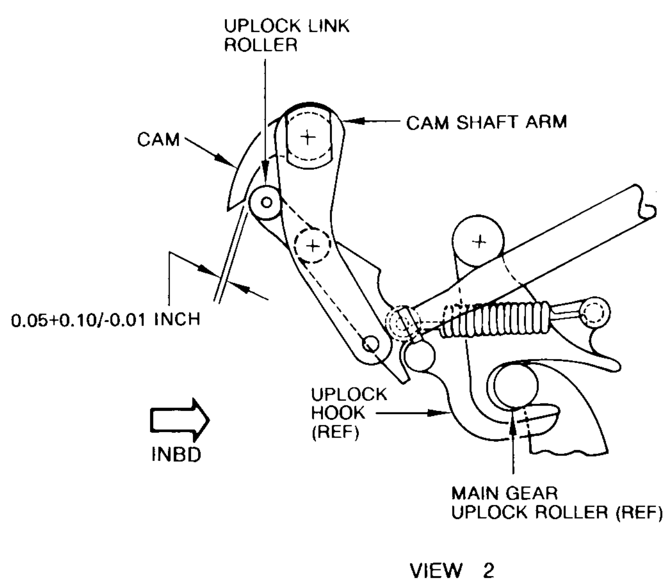


MANUAL EXTENTION CONTROL

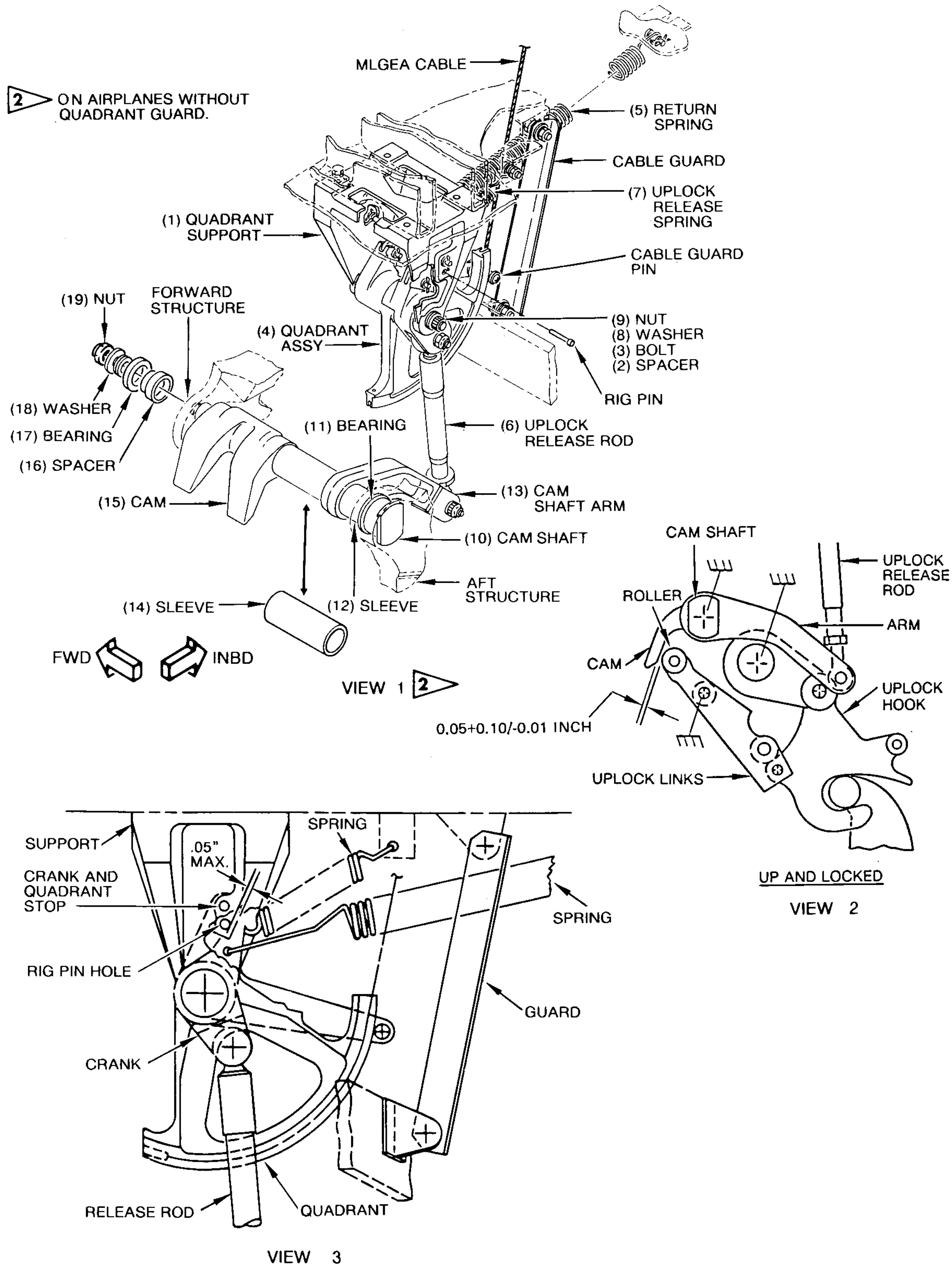
DETAIL A

Main Gear Manual Extension System
Figure 501 (Sheet 1)





Main Gear Manual Extension System
Figure 501 (Sheet 2)



Main Gear Manual Extension System
Figure 501 (Sheet 3)

(8) Attach the spring scale to the manual extension T handle of the left landing gear.
   (a) Make sure the load to start the handle from the seat has a minimum of 6.5 pounds.
   (b) Make sure the full travel of the T handle is 14.4 to 16.1 inches.
   (c) Make sure the load during full travel of the T handle is not more than 18.0 pounds.

      NOTE: The T handle must be pulled upward and forward when you measure the load.

   (d) Release the T handle.
   (e) Make sure the T handle goes back to its stowed position freely.

(9) Attach the spring scale to the manual extension T handle of the right landing gear.
   (a) Make sure the load to start the handle from the seat has a minimum of 6.5 pounds.
   (b) Make sure the full travel of the T handle is 14.4 to 16.1 inches.
   (c) Make sure the load during full travel of the T handle is not more than 18.0 pounds.

      NOTE: The handle must be pulled upward and forward when you measure the load.

   (d) Release the T handle.
   (e) Make sure the T handle goes back to its stowed position freely.

(10) Remove gear ground lock assembly from main landing gear being tested (Ref 32-00-01).

(11) Place landing gear control lever in UP position to retract main gear being tested to up and locked position. Place control lever in OFF position. Maintain hydraulic system A pressure at 3000 psi.

   CAUTION: CHECK THAT LANDING GEAR CONTROL LEVER IS PLACED IN OFF POSITION WHEN OPERATING MANUAL EXTENSION SYSTEM. IF MANUAL EXTENSION HANDLE IS HELD IN ANY EXTENDED POSITION AND CONTROL LEVER IS MOVED TO UP POSITION, SYSTEM CABLE FEED-BACK WILL CAUSE MANUAL EXTENSION HANDLE TO SNAP BACK FORCIBLY INTO V-SLOT.

(12) Open manual extension access door. On airplanes with inflatable-type wheel well, check that wheel seal deflates and wheel seal NOT SEALED light on pilots' landing gear panel comes on.

(13) Attach spring scale to manual extension handle of gear being tested.

(14) Pull upward and forward on manual extension handle with spring scale for full travel of approximately 14.4 to 16.1 inches.
   (a) Check that force required to release main gear from up and locked position does not exceed 60 pounds.

      NOTE: The handle must be pulled upward and forward when you measure the load.

   (b) Check that main gear free falls to down and locked position as evidenced by green indicator light on pilots' landing gear panel or that red marks on main gear side strut visual indicator align within + 0.03 inch.
   (c) On airplanes with inflatable-type wheel well seal, wheel seal NOT SEALED light should go off.

C. Restore Airplane to Normal
   (1) Install gear ground lock assembly (Ref 32-00-01).
   (2) Close manual extension access door.
   (3) Determine if there is further need for pneumatic, hydraulic, and electrical power on airplane; if not, shut down sources.
   (4) Lower airplane and remove jacks (Ref Chapter 7, Jacking Airplane).

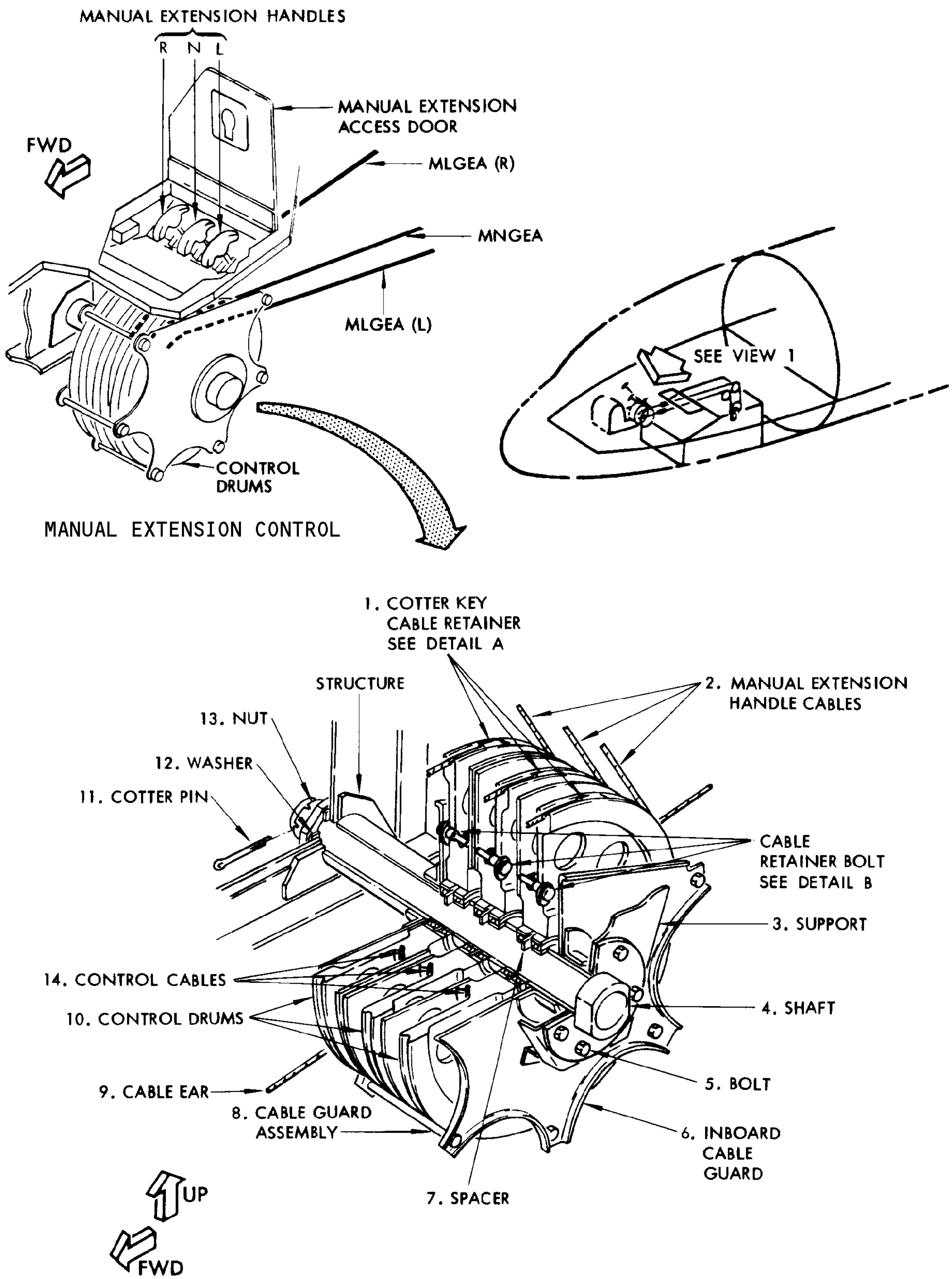
D. Test Manual Extension (Airplane on Gear)
   (1) Check all ground lock assemblies are installed (Ref 32-00-01).
   (2) With all gear down and locked, place landing gear control lever in OFF position.
   (3) Open access door in flight deck floor.
   (4) Attach spring scale to manual extension handle of gear being tested.
   (5) Pull upward and forward on manual extension handle with spring scale for full travel of approximately 14.4 to 16.1 inches.
      (a) Check that force required to release main gear uplock system does not exceed 18 pounds.
      (b) Check the manual extension handle returns to stowed position without hesitation or evidence of binding.
   (6) Repeat steps (1) thru (5) for opposite gear.
   (7) Close manual extension access door.

MANUAL EXTENSION CONTROL MECHANISM - REMOVAL/INSTALLATION

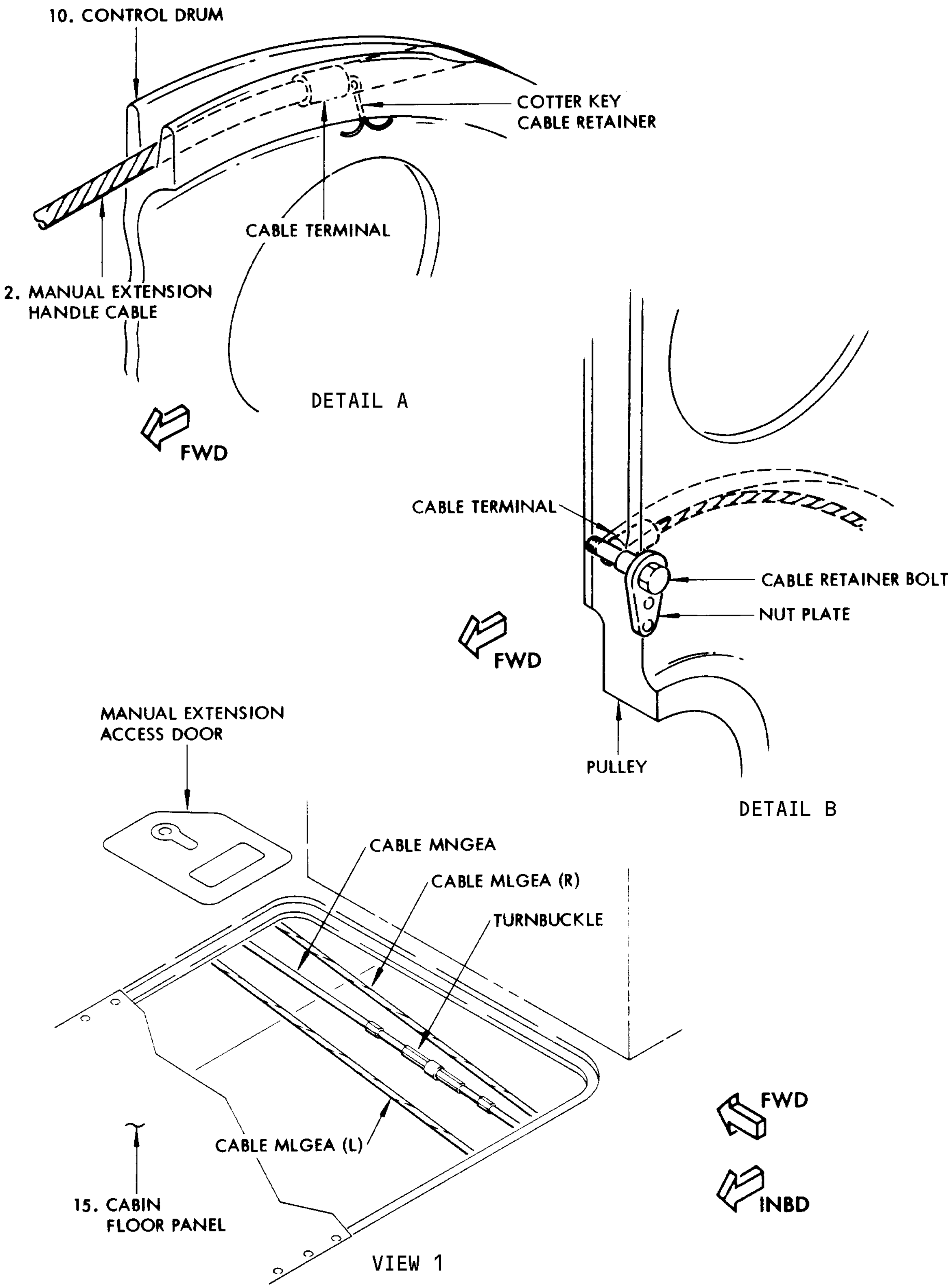
1. General
   A. The manual extension control mechanism provides controls for the nose gear manual extension system and each main gear manual extension system. The complete mechanism must be removed and installed when performing maintenance on either the nose gear or individual main gear manual extension systems.
2. Remove Manual Extension Control Mechanism
   A. Remove cabin floor panel (15, figure 401) and disconnect cable MNGEA at turnbuckle. (See view 1.)
   B. Remove cargo compartment ceiling panels at approximately body station 420 and disconnect cables MLGEA-L, and MLGEA-R, at turnbuckles.
   C. Detach manual extension handle cables (2) from control drums (10). (See detail A.)
   D. Remove cable retainers (1) and detach control cables (14) from control drums (10). (See detail A.)
   E. Remove grommet from clip on outboard cable guard and free elevator cable EAR (9) from control mechanism through slot in clip.
   F. Remove cotter pin (11), nut (13), and washer (12) from shaft (4) and remove shaft from control mechanism.

      NOTE: When performing step F, be prepared to catch spacer (7) as shaft (4) is pulled from control mechanism.

   G. Remove bolt (5) attaching inboard cable guard (6) to support (3).
   H. Remove control mechanism with control drums (10) from airplane structure moving outboard end of mechanism forward.
3. Install Manual Extension Control Mechanism
   A. Place control drums (10, figure 401) and spacer (7) in cable guard assembly (8).
   B. Position control mechanism in place on airplane structure.
   C. Insert shaft (4) through support (3), cable guard assembly (8), spacer (7), control drums (10), and structure.
   D. Install bolt (5) attaching inboard cable guard (6) to support (3).
   E. Install washer (12) and nut (13) on shaft (4). Torque nut 50 to 350 pound-inches. Install cotter pin (11).
   F. Insert elevator cable EAR (9) through slot in clip on outboard cable guard and install grommet on clip.
   G. Install control cables (14) on control drums (10) with cable retainers (1) (See detail B.)
   H. Install manual extension handle cables (2) on control drums (10) with cotter pins. Bend end of cotter pin into drum. (See detail A.)
   I. Connect cables MLGEA-L and MLGEA-R, at approximately body station 420.
   J. Connect cable MNGEA. (See view 1.)
   K. Adjust main gear manual extension system per 32-34-0.



Manual Extension Control Mechanism Installation
Figure 401 (Sheet 1)



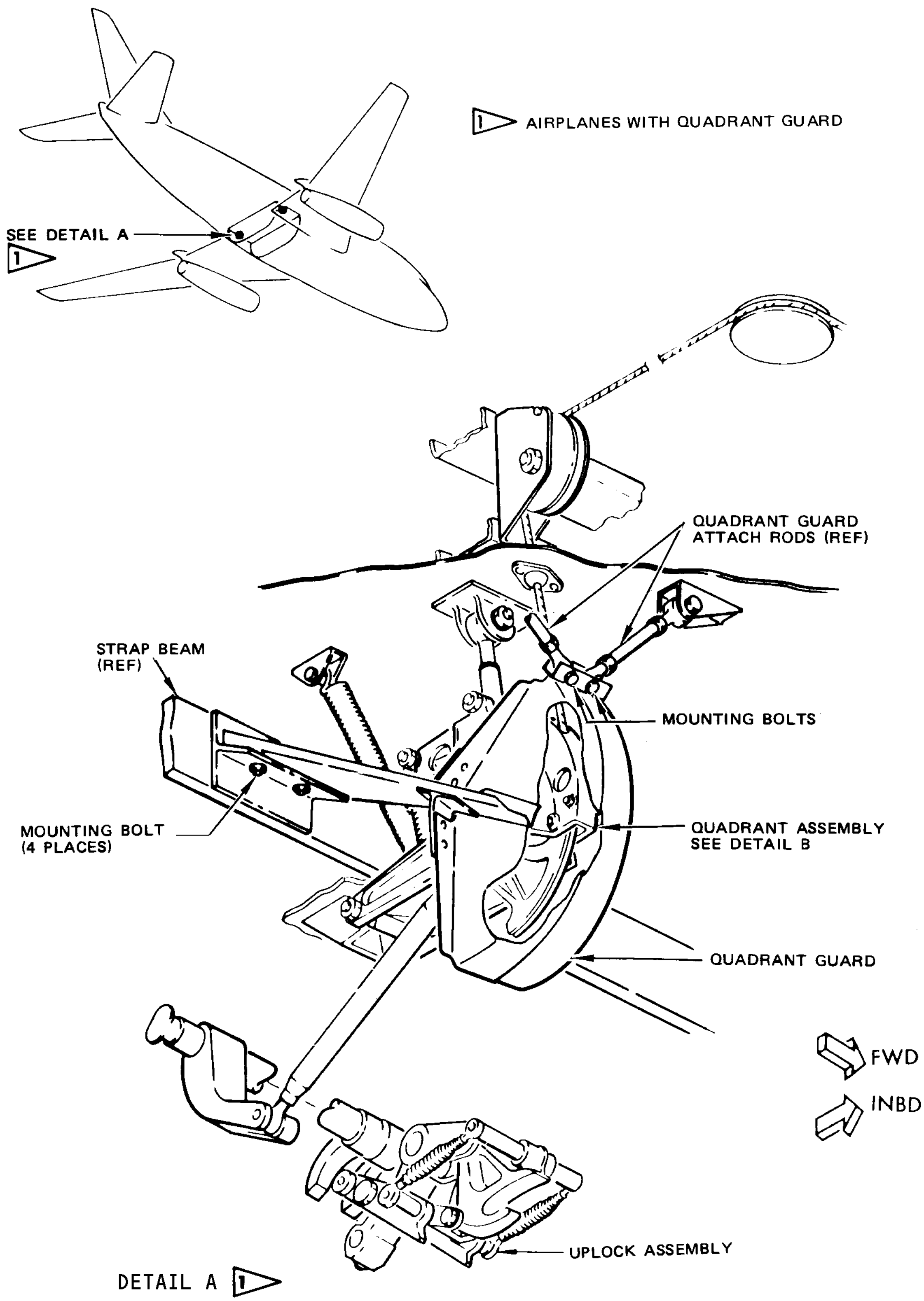
Manual Extension Control Mechanism Installation
Figure 401 (Sheet 2)

L. Test operation of main gear manual extension system per 32-34-0.
M. Adjust nose gear manual extension system per 32-35-0.
N. Test operation of nose gear manual extension system per 32-35-0.
O. Install cargo compartment ceiling panels at approximately body station 420.
P. Install cabin floor panel (15). (See view 1.)

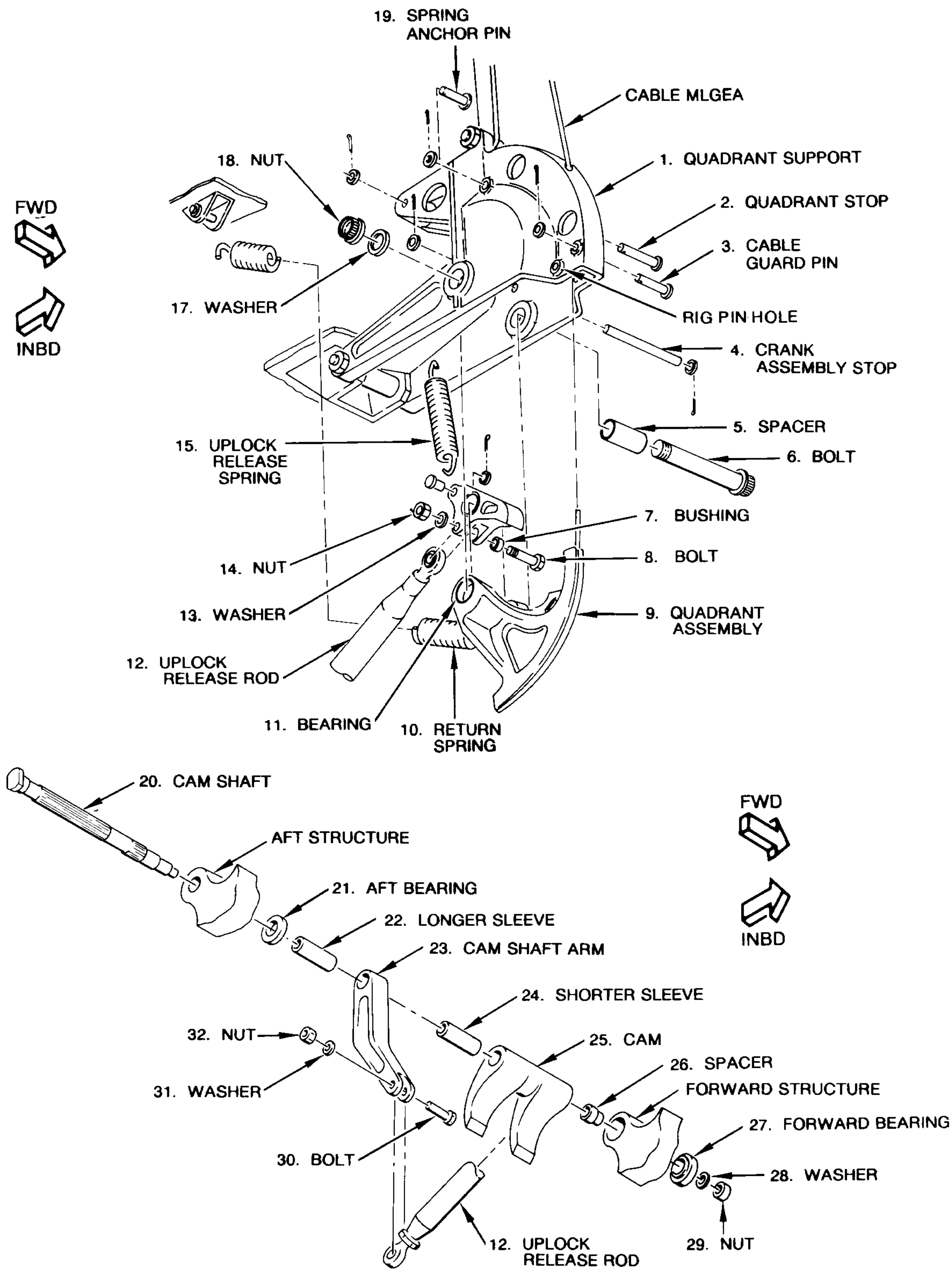
MAIN GEAR MANUAL EXTENSION LINKAGE - REMOVAL/INSTALLATION

1. General
   A. This procedure removes and installs either the left or right main gear manual extension linkage.
2. Equipment and Material
   A. Corrosion Preventive Compound - MIL-C-16173 Grade 2 or MIL-C-11796, Class 3 (Ref 20-30-21)
   B. Rod - 3/8 inch diameter X 3-1/4 inches long (material optional)
3. Remove Main Gear Manual Extension Linkage (Fig. 401)
   A. Remove cargo compartment ceiling panels at approximately body station 420 and disconnect cable MILGEA for manual extension linkage being removed.
   B. On airplanes with quadrant guard, remove quadrant guard.
      (1) Remove bolts attaching quadrant guard support brackets to strap beam (4) places.
      (2) Remove bolts attaching lower rod ends to quadrant guard.
   C. Detach cable MLGEA from quadrant assembly (9).
   D. Disconnect uplock release rod (12) at quadrant assembly (9). Disconnect uplock release spring (15) at quadrant assembly (12).
   E. Disconnect return spring (10) at quadrant assembly (9).
   F. Remove nut (18), washer (17) and remove bolt (6) and spacer (5) securing quadrant assembly (9) to quadrant support (1). Retain spacer (5).
   G. Disconnect uplock release rod (12) at camshaft arm (23), and quadrant assembly (9).
   H. Remove nut (29), shim (28A), and washer (28) from camshaft (20) and remove camshaft. Retain spacer (26), cam (25), sleeves (22 and 24), bearings (21 and 27), and camshaft arm (23).
4. Install Main Gear Manual Extension Linkage
   A. Lubricate mating splines of camshaft (10, Fig. 401), cam (25), and camshaft arm (23) with corrosion preventive compound.
   B. Install camshaft aft bearing (21) in aft structure.
   C. Insert camshaft (20) through aft structure and slip longer sleeve (22) over camshaft.
   D. Align splines of camshaft arm (23) and camshaft (22) and start camshaft arm on splines.
   E. Slip sleeve (24) over camshaft (20).
   F. Align splines of cam (25) and camshaft (20) and start cam on splines.
   G. Install spacer (26) on camshaft (20).
   H. Install camshaft forward bearing (27) in structure.
   I. Insert camshaft (20) through forward bearing (27) and install shim (18A).
   J. Make sure all parts are tightly stacked-up.
   K. Keep a gap between the end of the bearing (27) and shim (28A) to 0.005-0.015 inch (see Fig. 401, view A-A) before installing washer (28).

   NOTE: Use micrometer to measure the gap.

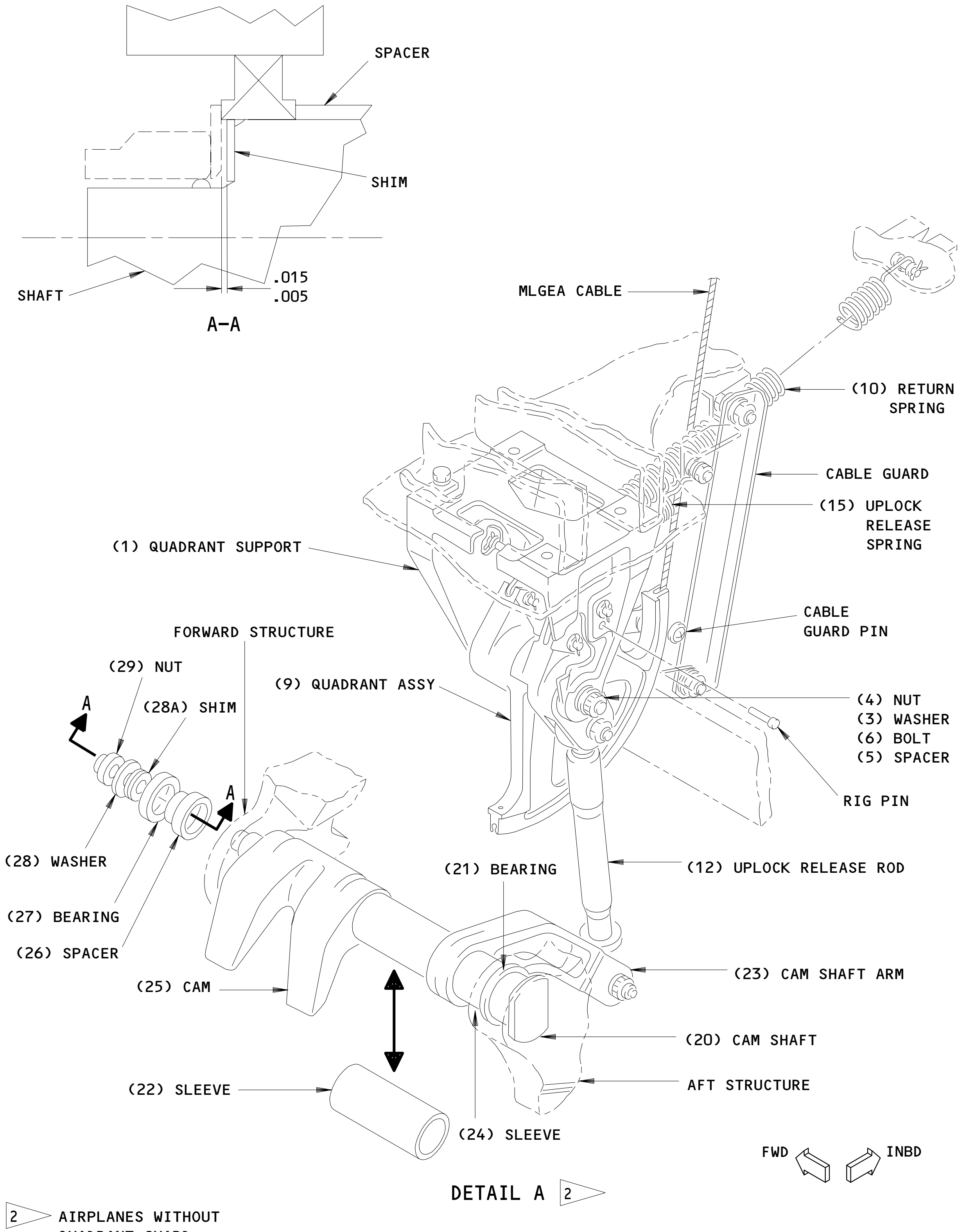


Main Gear Manual Extension Linkage Installation
Figure 401 (Sheet 1)



DETAIL B

Main Gear Manual Extension Linkage Installation
Figure 401 (Sheet 2)



Main Gear Manual Extension Linkage Installation
Figure 401 (Sheet 3)

L. Install washer (28) and tighten nut (29).
M. Install spacer (5) in quadrant assembly (9).

NOTE: When installing spacer (5), temporarily insert a 3/8-inch diameter rod approximately 3-1/4 inches long through quadrant to keep spacer in alignment.

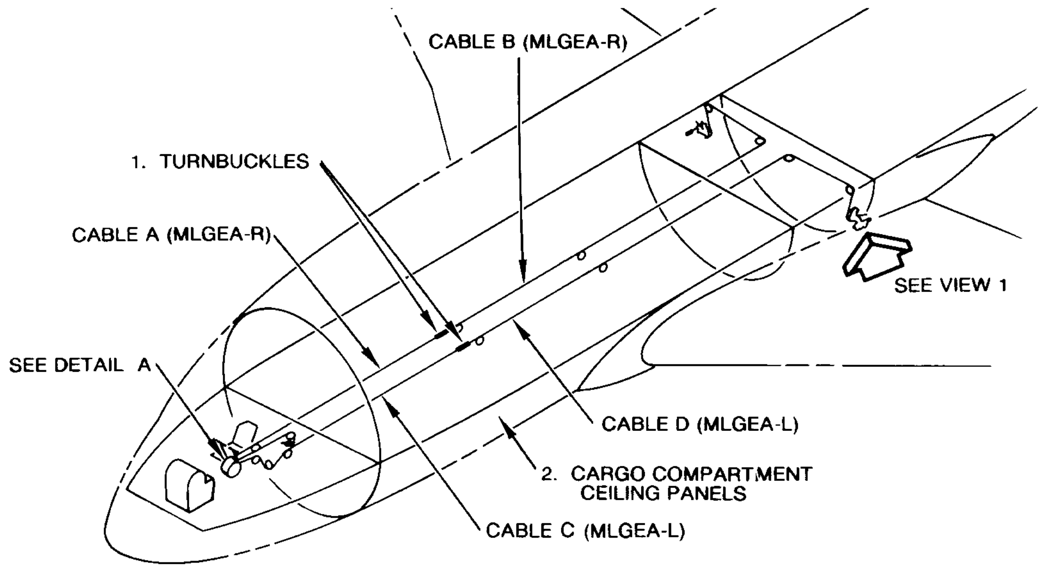
N. Place quadrant assembly (9) in quadrant support (1) and insert bolt (6) through quadrant support and quadrant assembly by pushing out temporary rod installed per step M.
O. Install washer (3) and nut (4) on bolt (6).
P. Install cable MLGEA on quadrant assembly (9).
Q. Connect uplock release rod (12) to quadrant assembly (9).
R. Connect uplock release rod (12) to camshaft arm (23) but do not tighten nut until performing adjustment on manual extension system.
S. Connect return spring (10) to quadrant assembly (9). Connect uplock release spring (15) to quadrant assembly (9).
T. Connect cable MLGEA at approximately body station 420).
U. Adjust manual extension system per 32-34-0.
V. Test manual extension system per 32-34-0.
W. Install cargo compartment ceiling panels.
X. On airplanes with circular quadrant guard install quadrant guard.
    (1) Position guard over quadrant and install mounting bolts at strap beam (4 places).
    (2) Install mounting bolts attaching rod ends to quadrant guard.

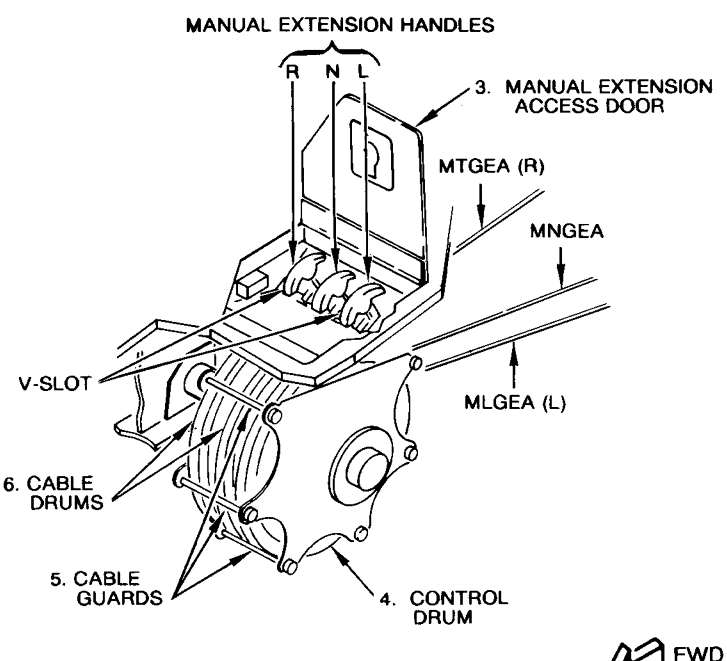
MAIN GEAR MANUAL EXTENSION SYSTEM CABLES - REMOVAL/INSTALLATION

1. General
   A. This procedure removes and installs either the left or right main gear manual extension system cables.
2. Equipment and Material
   A. Rigging Pin - 0.311 +0.000/-0.002 inch diameter x 3.0 inch long, Type MS20392-4C or equivalent
   B. Rigging Pin - 0.311 +0.000/-0.002 inch diameter x 7.5 inch long, Type MS20392-46
   C. Grease - MIL-G-25760 (AMM 20-30-21)
   D. Cable Tensiometer
3. Remove Main Gear Manual Extension System Cables (Fig. 401)
   A. Remove cargo compartment ceiling panels (2) at approximately body station 420 and loosen turnbuckle (1) of cable MLGEA of system being removed.
   B. Remove cotter pin and detach manual extension handle cable from control drum.
   C. Open manual extension access door (3) and remove handle and cable.
   D. Remove cable guard (5) from control drum (4).
   E. Remove cable retainer and detach cable MLGEA from control drum (5).
   F. On airplanes with quadrant guard, remove quadrant guard.
      (1) Remove bolts attaching quadrant guard support brackets to strap beam (4 places).
      (2) Remove bolts attaching lower rod ends to quadrant guard.
   G. Remove pressure seal (8) in main gear wheel well (AMM Chapter 20, Control Cabin Air Pressure Seal).
   H. Remove cotter pin and detach cable MLGEA from quadrant assembly (11).
   I. Remove cable guard pin (9) from quadrant support (12).
   J. Remove cables (AMM Chapter 20, Control Cables).
4. Install Main Gear Manual Extension System Cables
   A. Install system cables. For general cable installation information to be used in conjunction with the following steps (AMM Chapter 20, Control Cables).

      NOTE: See Fig. 401 for cable lengths and fittings. Turnbuckles are located at approximately body station 420.

   B. Install rigging pin (10) through quadrant (11) assembly and quadrant support (12).
   C. Attach cable MLGEA on quadrant assembly (11) and install cotter pin. Bend end of cotter pin into drum (4).
   D. Install cable guard (5) in control drum (4).
   E. Install cable guard pins (9) in quadrant assembly (11).
   F. Attach cable MLGEA on control drum (4) and install cable retainer.

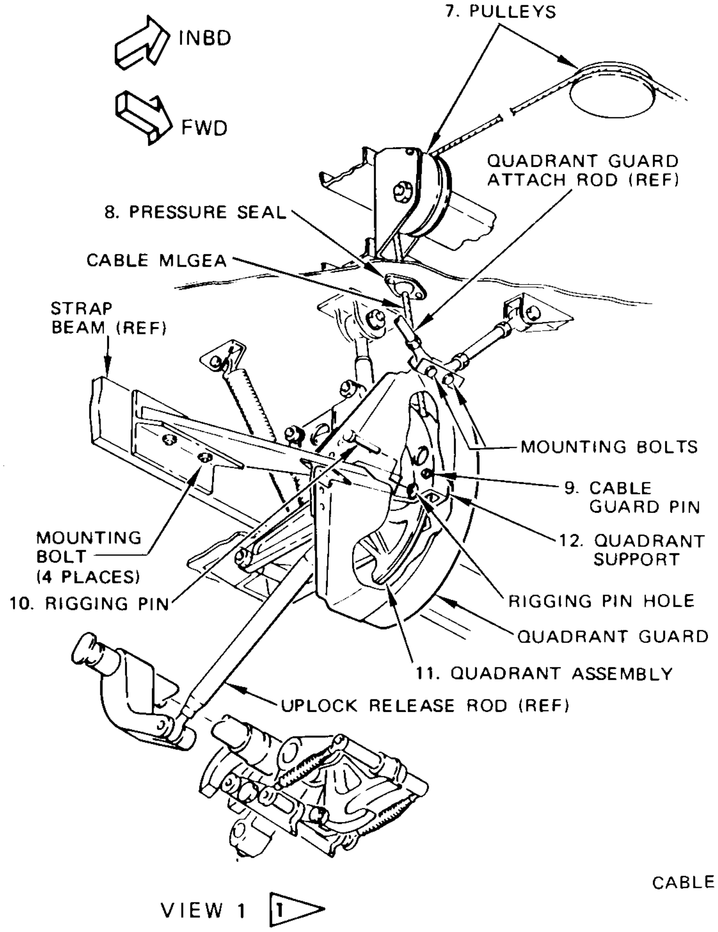




MANUAL EXTENSION CONTROL

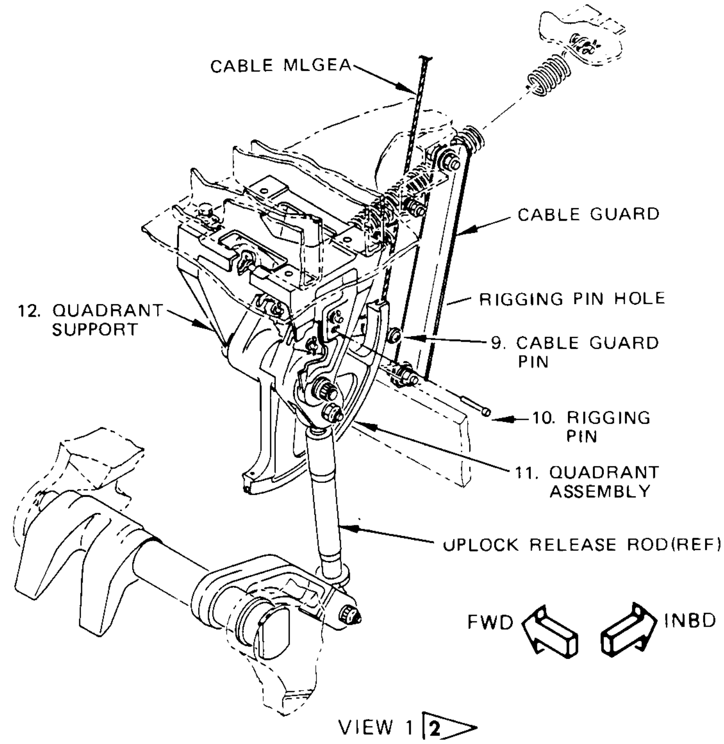
DETAIL A

Main Gear Manual Extension System Cable Installation
Figure 401 (Sheet 1)



1 AIRPLANES WITH QUADRANT GUARD.

2 AIRPLANES WITHOUT QUADRANT GUARD.



Main Gear Manual Extension System Cable Installation
Figure 401 (Sheet 2)

AIRPLANES 1

CABLE REF	FUNCTION	NO. REQ	LENGTH L1 (INCHES)	CABLE SIZE	FITTINGS 1	FITTINGS 2
A	MLGEA-R	1	163.9	1/8 7X19	MS21260L4LH	BACT14A4
B	MLGEA-R	1	378.8	1/8 7X19	MS21260L4RH	BACT14A4
C	MLGEA-L	1	181.9	1/8 7X19	MS21260L4LH	BACT14A4
D	MLGEA-L	1	378.8	1/8 7X19	MS21260L4RH	BACT14A4

AIRPLANES 2

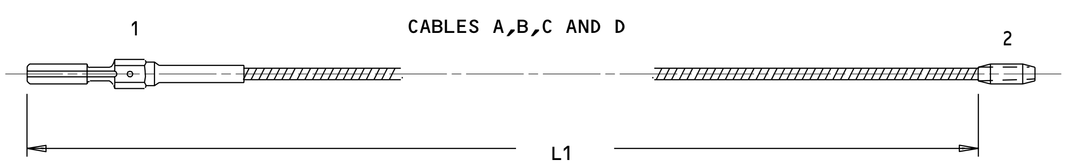
CABLE REF	FUNCTION	NO. REQ	LENGTH L1 (INCHES)	CABLE SIZE	FITTINGS 1	FITTINGS 2
A	MLGEA-R	1	164.0	3/32 7X7	MS21260L3LH	BACT14A3
B	MLGEA-R	1	380.2	3/32 7X7	MS21260L3RH	BACT14A3
C	MLGEA-L	1	182.4	3/32 7X7	MS21260L3LH	BACT14A3
D	MLGEA-L	1	380.2	3/32 7X7	MS21260L3RH	BACT14A3

MATERIAL: CABLES - CARBON STEEL PER BMS 7-265, TYPE I, COMP A (TZ) (PREFERRED)
- CARBON STEEL PER BMS 7-265, TYPE I, COMP A (FIRST OPTION)
- CARBON STEEL PER MIL-W-83420, TYPE I, COMP A (SECOND OPTION)
- CARBON STEEL PER MIL-W-1511 (THIRD OPTION)

1 AIRPLANES WITH QUADRANT GUARD

2 ALL EXCEPT 1

NOTE: DO NOT MIX TIN-ZINC (TZ) COVERED CABLES WITH OTHER TYPE CABLES ON THE SAME AIRPLANE BECAUSE TZ CABLES HAVE A DIFFERENT STRETCH RATE THAN OTHER CABLES.



Main Gear Manual Extension System Cable Installation
Figure 401 (Sheet 3)

G. Feed terminal end of manual extension handle cable through hole in V-slot and attach cable on control drum (4) and install cotter pin. Bend one end of cotter pin into drum.

H. Connect cable MLGEA at turnbuckle (1).

I. Rig cable to 100-pound rig load.

NOTE: When performing step I., make sure that the release handle is properly seated in V-slot of manual extension control.

J. Adjust manual extension system (AMM 32-34-0).

K. Test manual extension system (AMM 32-34-0).

5. Restore Airplane to Normal

A. Install pressure seals in main gear wheel well (AMM Chapter 20, Control Cable Air Pressure Seal).

B. On airplanes with quadrant guard, install quadrant guard.

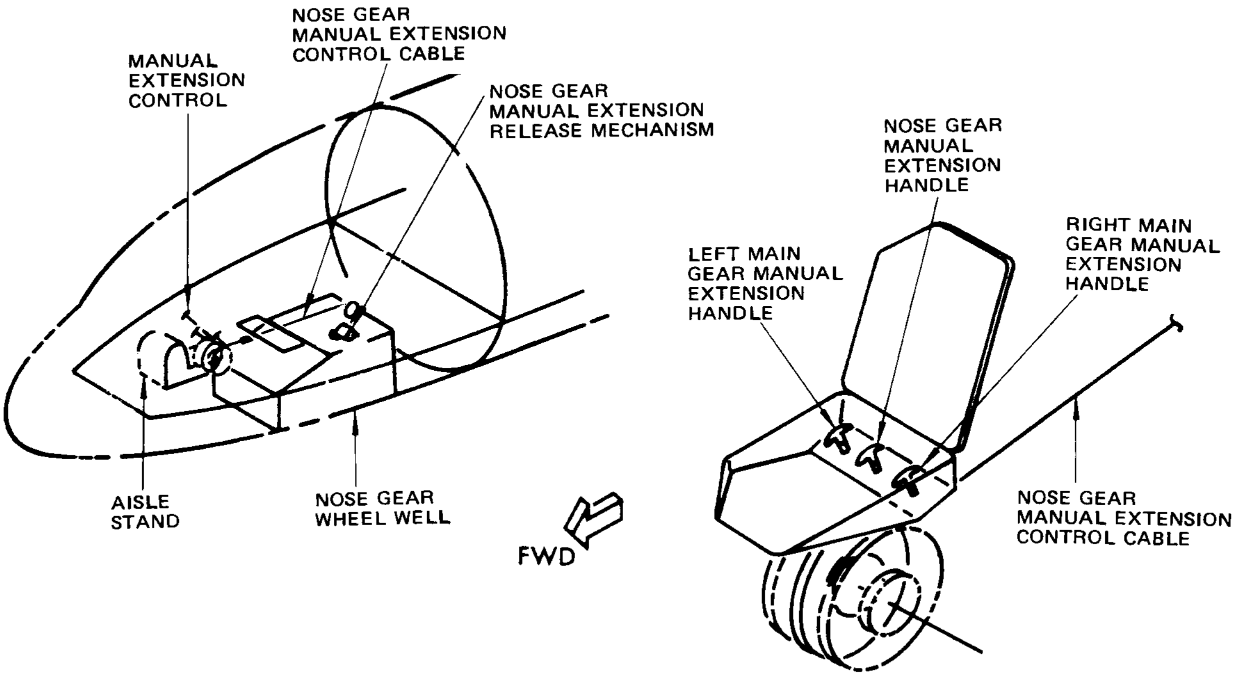
(1) Position guard over quadrant and install mounting bolts at strap beam (4 places).

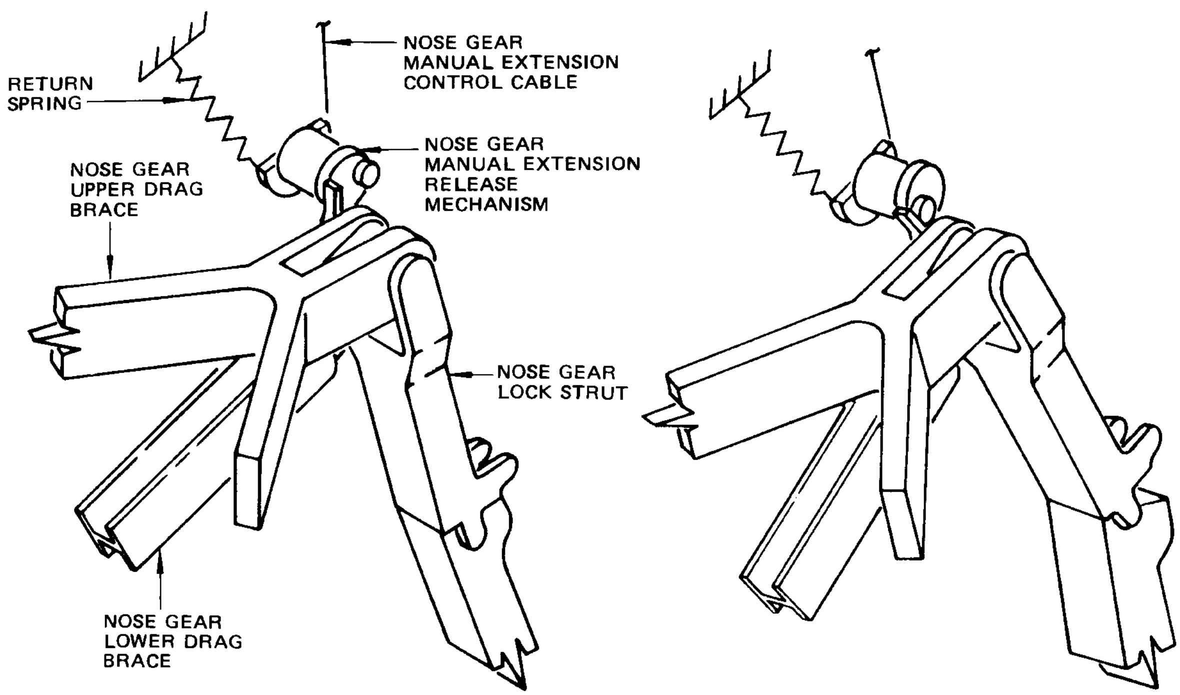
(2) Install mounting bolts attaching rod ends to quadrant guard.

C. Install cargo compartment ceiling panels.

NOSE GEAR MANUAL EXTENSION SYSTEM - DESCRIPTION AND OPERATION

1. General
   A. The nose gear manual extension system is used to lower the nose gear when hydraulic system pressure is not available. Pulling the manual extension handle for the nose gear transmits motion through drums and cables to unlock the gear from the up and locked position. When the nose gear is released from the up and locked position, the gear wil1 free fall to the down and locked position.
   B. Controls for nose gear manual extension are located in the floor of the control cabin immediately aft and to the right of the aisle stand (Fig. 1). Three controls, one for the nose gear and one for each main gear, are installed in the control cabin floor protected by an access door. The landing gear control handle must be either in neutral or down position to prevent hydraulic lock during manual extension. A single pull of approximately 70 pounds on the manual extension handle releases the nose gear lock mechanism to allow the gear to extend. A return spring attached to the torque tube quadrant assembly, and to the structure will return the system to its original position, when the handle is released. The landing gear position and warning lights function normally during manual extension operation.
2. Nose Gear Manual Extension Control Cable
   A. The nose gear manual extension control cable is connected to the manual extension control drum installed beneath the control cabin floor and routed beneath the cabin floor through pulleys and eyebal1-type pressure seals to the nose gear manual extension release mechanism in the nose gear wheel well (Fig. 2). When the manual extension handle is pulled to release the gear, the motion is transmitted by the control cable to the nose gear manual extension release mechanism. Motion supplied to the release mechanism unlocks the nose gear lock mechanism to allow the nose gear to fall to down and locked position.
3. Nose Gear Manual Extension Release Mechanism
   A. The nose gear manual extension release mechanism is located in the aft ceiling area of the nose gear wheel well (Fig. 2). Motion to release the nose gear is transmitted by a cable to a torque tube. A roller is attached eccentrically to the torque tube. As the torque tube rotates, the roller contacts an extension of the nose gear lock link. As the roller is forced against the lock link extension, a force is applied to move the lock strut from the overcenter (locked) position and the nose gear will free fall to the down and locked position. A stop attached to the torque tube contacts structure to prevent further control cable movement after the torque tube has been rotated approximately 100°. A return spring attached to the quadrant assembly and to the structure will return the system to its original position when the handle is released.





UP AND LOCKED

RELEASED

Nose Gear Manual Extension System Component Location
Figure 1

4. Operation

A. The nose gear manual extension system is operated from the control cabin. To manually extend the nose gear, proceed as follows:

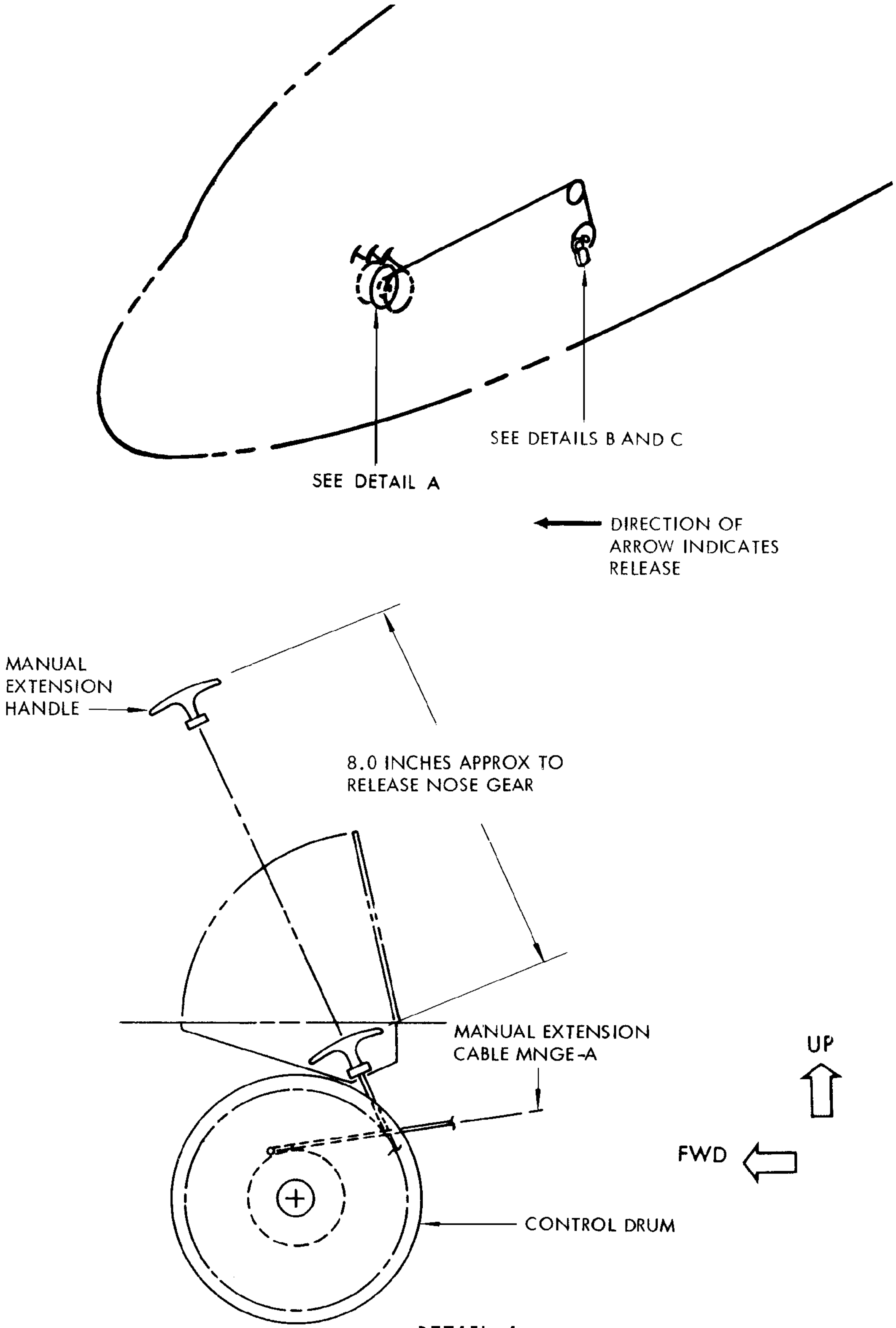
(1) Place landing gear control lever in neutral or down position.

(2) Open manual extension control access door.

(3) Pull nose gear manual extension handle approximately 8 inches and observe that nose gear falls to down and locked position as indicated by the green light on the pilots' instrument panel.

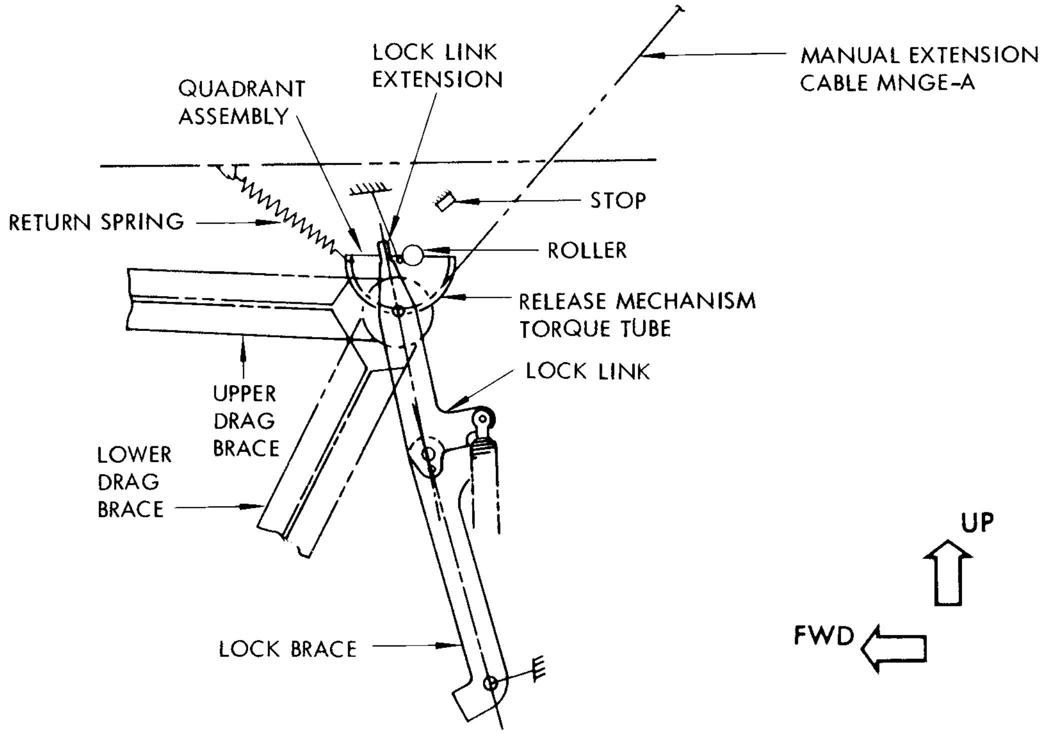
(4) Release manual extension handle.

WARNING: DO NOT HOLD MANUAL EXTENSION HANDLE IN ANY EXTENDED POSITION DURING HYDRAULIC OPERATION OF THE LANDING GEAR.

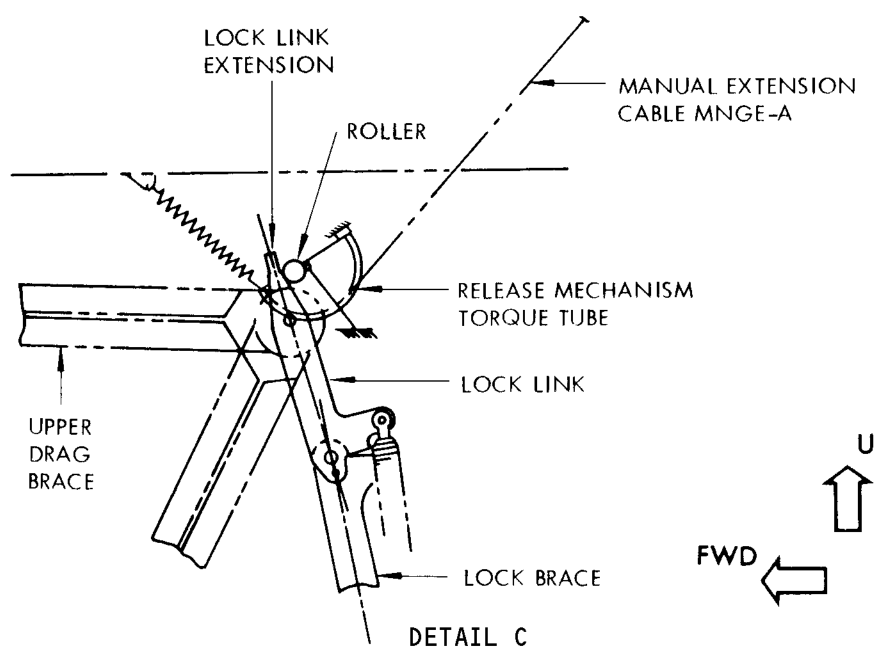


DETAIL A

Nose Gear Manual Extension Control
Figure 2 (Sheet 1)



DETAIL B
UP AND LOCKED



DETAIL C
RELEASED

Nose Gear Manual Extension Control
Figure 2 (Sheet 2)

445313

NOSE GEAR MANUAL EXTENSION SYSTEM - TROUBLESHOOTING

1. General
   A. In troubleshooting the nose gear manual extension system, the trouble symptoms are best identified by performing a test of manually extending the gear (Ref 32-35-0 A/T).
   B. The system is functionally tested with hydraulic system A depressurized and landing gear control lever in the off position.
   C. Two men are required, one stationed in the control cabin to operate the nose gear manual extension handle and one stationed near the gears to observe gear action.
   D. Nose gear manual extension system must be adjusted properly prior to troubleshooting (AMM 32-35-0/501).
2. Prepare for Troubleshooting
   A. Jack airplane until nose gear tires clear ground (Ref Chapter 7, Jacking).
   B. Open manual extension access doors in control cabin floor and attach spring scale to nose gear manual extension handle.
   C. Connect external electrical power supply.
   D. Pressurize hydraulic system A (Ref 29-11-0 MP).
   E. Remove nose gear ground lock assemblies (Ref 32-00-01).

      WARNING: CHECK THAT GROUND LOCK ASSEMBLIES ARE INSTALLED IN MAIN LANDING GEAR TO PREVENT INADVERTENT OPERATION OF GEAR. INJURY TO PERSONNEL AND/OR DAMAGE TO EQUIPMENT COULD RESULT IF GEAR RETRACTS.

   F. Check that nose gear is centered.
   G. Use override trigger and place landing gear control lever in UP position to retract nose gear, then move control lever to OFF position.

      WARNING: PERSONNEL KEEP CLEAR OF GEAR PATHS TO PRECLUDE POSSIBLE INJURY TO PERSONNEL.

      CAUTION: DO NOT TURN STEERING WHEEL WITH NOSE GEAR SHOCK STRUT FULLY EXTENDED TO PREVENT POSSIBLE DAMAGE TO SHOCK STRUT CENTERING CAMS.

   H. Depressurize hydraulic system A (Ref 29-11-0 MP) and proceed trouble shooting with pressure off.
   I. Following trouble shooting, restore airplane to normal.

3. Trouble Shooting Charts

With airplane jacked, nose gear retracted, and hydraulic system A depressurized, pull upward and forward on nose gear manual extension handles. Check that nose gear free-fall to down and locked position and that force required to release gear from UP and locked position does not exceed 70 pounds. IF -

GEAR DOES NOT FREE-FALL TO DOWN AND LOCKED POSITION - Extend gear hydraulically. IF -

GEAR DOES NOT EXTEND - Visually inspect cables, pulleys, drums, and release mechanism, for security, damage, jamming or binding. Repair as required.

GEAR EXTENDS - Adjust and test nose gear (Ref 32-33-0).

FORCE REQUIRED TO RELEASE GEAR EXCEEDS ALLOWABLE - Cycle system several times and repeat initial check. IF -

FORCE WITHIN ALLOWABLE - System is operable.

FORCE EXCEEDS ALLOWABLE - Visually check cables, pulleys, drums, and release mechanism, for damage, jams, lubrication, binding, security of mounting, etc. Repair as required.

Nose Gear Manual Extension System - Troubleshooting
Figure 101

NOSE GEAR MANUAL EXTENSION SYSTEM - ADJUSTMENT/TEST

1. General
   A. This procedure adjusts (rigs) the nose gear manual extension system to obtain the cable tensions and clearances between components necessary for proper system operation.
2. Equipment and Material
   A. Rigging Pin- 0.311 + 0.000/-0.002 -inch diameter x 5.00 inches long, Type MS20392-4C

      NOTE: Rigging pin is part of F70207-61.

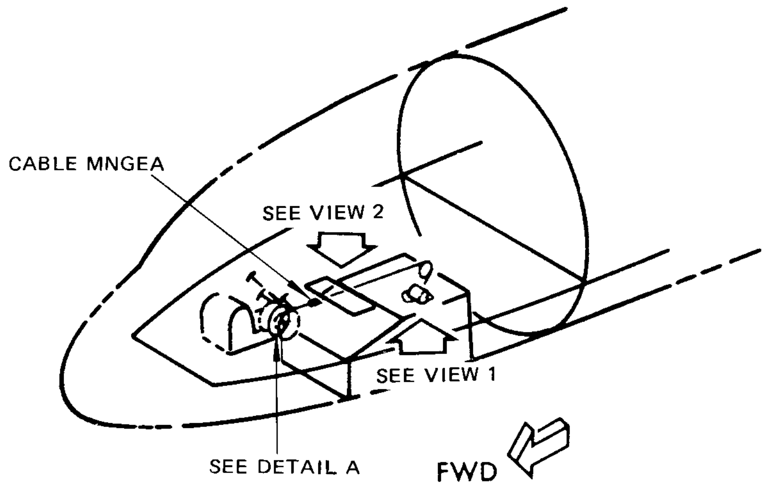
   B. Gear Ground Lock Assembly (Ref 32-00-01)
   C. Spring scale -0 to 100 pounds capacity
3. Adjust Nose Gear Manual Extension System (Fig. 501
   A. Align rig pin holes and install rigging pin through release mechanism torque tube and pulley bracket assembly.
   B. Remove cabin floor panel and remove turnbuckle locking clips from cable MNGEA.
   C. Rig MNGE cable
      (1) Rig cable to 100 pound rigging load.
      (2) Reduce rig load until cable tension matches that of spring tension and rig pin is free.

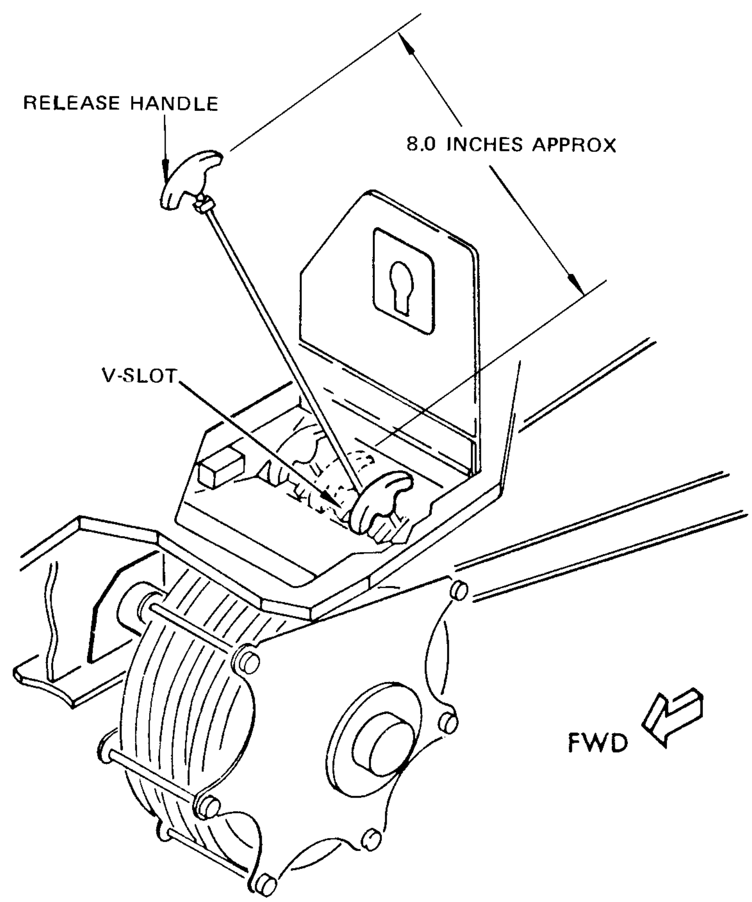
         NOTE: When performing step C, check that release handle is properly seated in V-slot of manual extension control.

   D. Install turnbuckle locking clips on cable MNGEA (Ref Chapter 20, Cable Turnbuckle Locking Clip).
   E. Install cabin floor panel.
   F. Remove rigging pin.
4. Test Nose Gear Manual Extension System
   A. Test Manual Extension System (Airplane on Jacks)
      (1) Jack airplane until nose gear tires clear ground (Ref Chapter 7, Jacking).
      (2) Connect external electrical power supply.
      (3) Pressurize hydraulic system A (Ref 29-11-0 MP).
      (4) Remove gear ground lock assembly from nose gear (Ref 32-00-01).

         WARNING: CHECK THAT GROUND LOCK ASSEMBLIES ARE INSTALLED IN MAIN LANDING GEAR TO PREVENT INADVERTENT OPERATION OF GEAR. INJURY TO PERSONNEL AND/OR EQUIPMENT COULD RESULT IF GEAR RETRACTS.

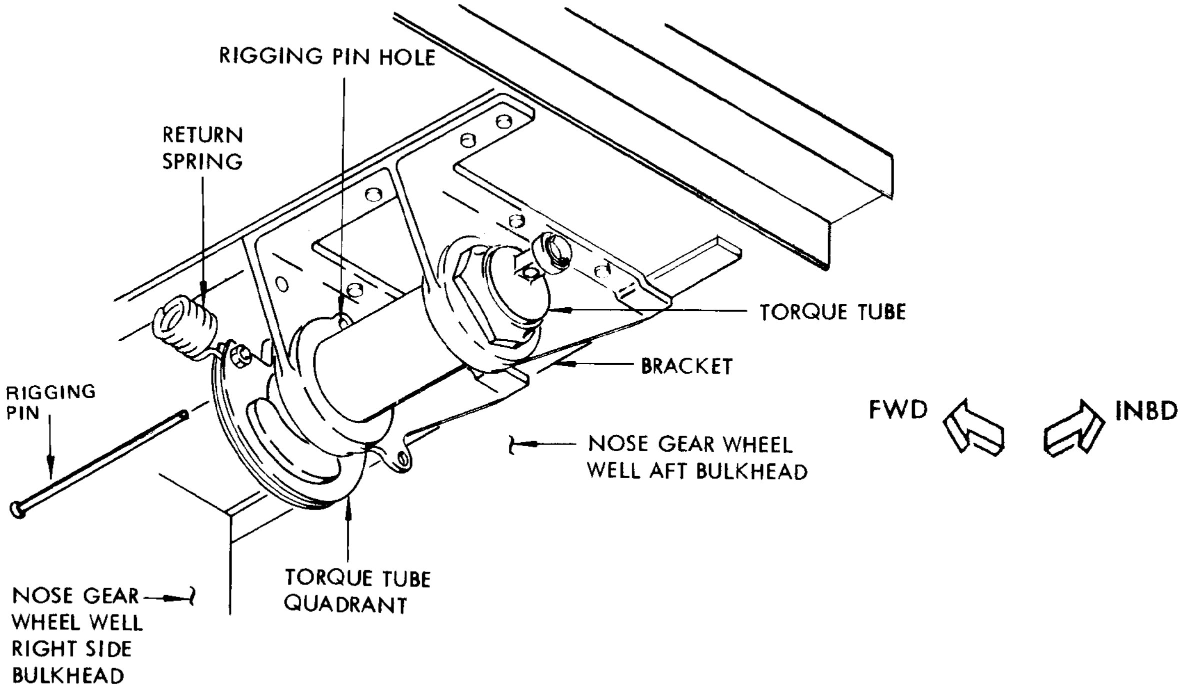
      (5) Check that nose gear is centered.



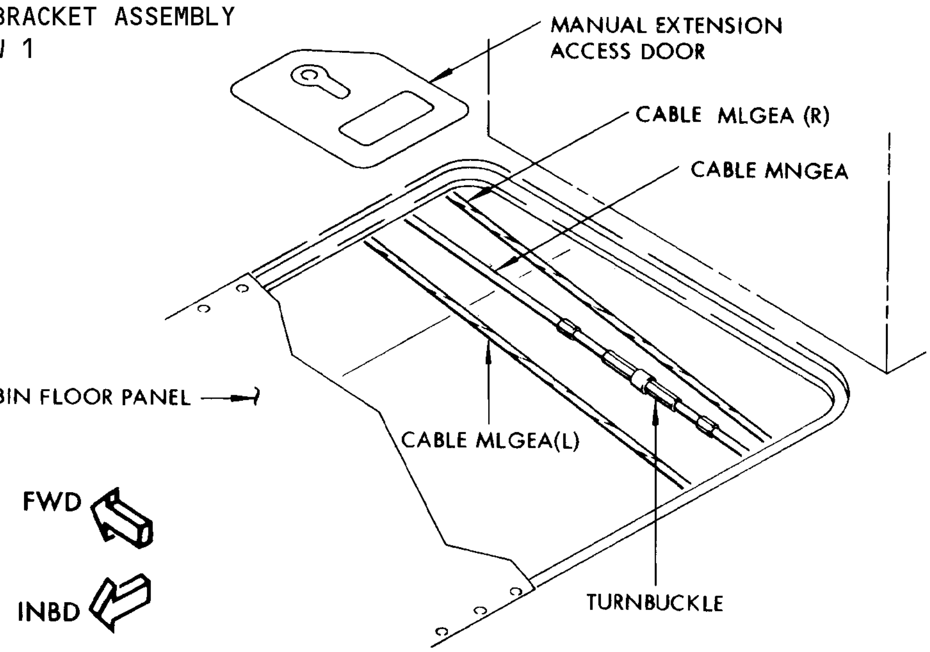


MANUAL EXTENSION CONTROL
DETAIL A

Nose Gear Manual Extension System
Figure 501 (Sheet 1)



TORQUE TUBE AND BRACKET ASSEMBLY
VIEW 1



VIEW 2

Nose Gear Manual Extension System
Figure 501 (Sheet 2)

(6) Use override trigger and place landing gear control lever in UP position to retract nose gear to up and locked position. Place control lever in OFF position. Maintain hydraulic system A pressure at 3000 psi.

CAUTION: CHECK THAT LANDING GEAR CONTROL LEVER IS PLACED IN OFF POSITION WHEN OPERATING MANUAL EXTENSION SYSTEM. IF MANUAL EXTENSION HANDLE IS HELD IN ANY EXTENDED POSITION AND CONTROL LEVER IS MOVED TO UP POSITION, SYSTEM CABLE FEEDBACK WILL CAUSE MANUAL EXTENSION HANDLE TO SNAP BACK FORCIBLY INTO V-SLOT.
DO NOT TURN STEERING WHEEL WITH NOSE GEAR SHOCK STRUT FULLY EXTENDED TO PREVENT POSSIBLE DAMAGE TO SHOCK STRUT CENTERING CAMS.

(7) Open manual extension access door and attach spring scale to nose gear manual extension handle.
(8) Pull upward and forward on manual extension handle with spring scale for full travel of approximately 8 inches.
   (a) Check that force required to release nose gear from up and locked position does not exceed 70 pounds.
   (b) Check that nose gear free falls to down and locked position as evidenced by green indicator light on pilots' landing gear panel or that red marks on nose gear lock strut visual indicator align within + 0.03 inch.
(9) Place control lever in UP position to retract nose gear to up and locked position. Place control lever in OFF position.
(10) Depressurize hydraulic system A.
(11) Repeat step (8). Results should be same.
(12) Restore airplane to normal.
   (a) Install gear ground lock assembly (Ref 32-00-01).
   (b) Close manual extension access door.
   (c) Determine if there is further need for hydraulic and electrical power on airplane, if not, shut down sources.
   (d) Lower airplane and remove jacks (Ref Chapter 7, Jacking Airplane).

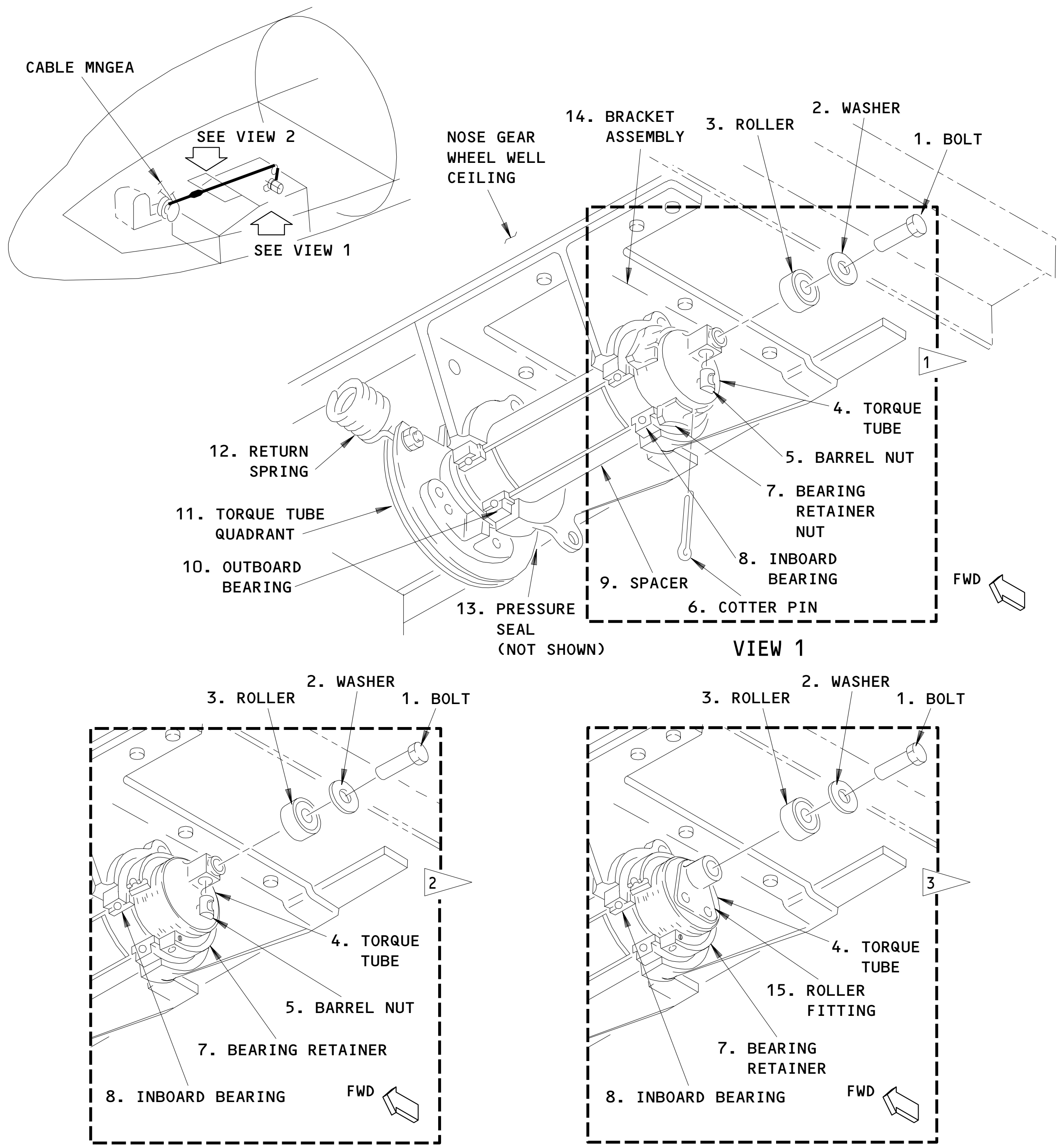
B. Test Manual Extension System (Airplane on Gear)
(1) Check ground lock assemblies are installed (Ref 32-00-01).
(2) With all gear down and locked, place landing gear control lever in OFF position.
(3) Open manual extension access door in flight deck floor.
(4) Attach spring scale to nose gear manual extension handle.
(5) Pull upward and forward on manual extension handle with spring scale for full travel of approximately 8 inches.
   (a) Check that force required to release nose gear uplock system does not exceed 28 pounds.

(b) Check that manual extension handle returns to stowed position without hesitation or evidence of binding.

(6) Close manual extension access door.

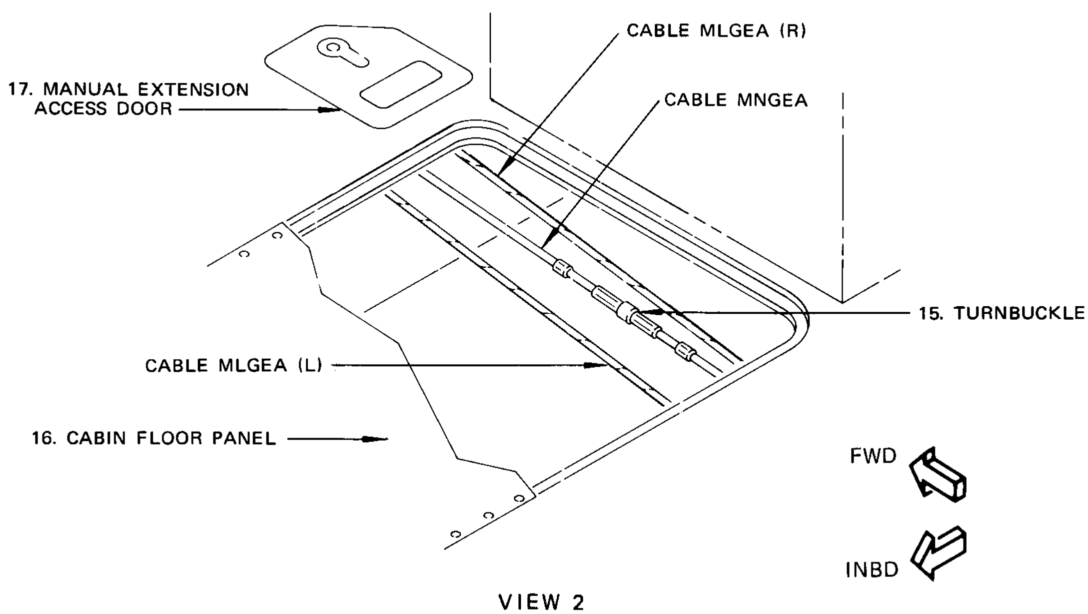
NOSE GEAR MANUAL EXTENSION RELEASE MECHANISM - REMOVAL/INSTALLATION

1. Equipment and Materials
   A. Grease - BMS 3-33 (Preferred)
   B. Grease - MIL-PRF-23827 (Supercedes MIL-G-23827) (Alternate)
   C. Grease - MIL-G-21164 (Alternate)
2. Remove Nose Gear Manual Extension Release Mechanism
   A. Remove cabin floor panel (17, figure 401) to remove turnbuckle locking clips and disconnect cable MNGEA at turnbuckle (15).
   B. Detach return spring (12) from torque tube quadrant (11).
   C. Remove cotter pins and detach cable MNGEA from torque tube quadrant (11).
   D. On AR LV-JMW
      NH JA8401 thru JA8403 and JA8405
      (1) Remove bolt (1) securing roller (3) to torque tube (4) and remove washer (2), roller (3), and barrel nut (5).
      (2) Remove cotter pin (6) and remove bearing retainer nut (7).
   E. On AR LV-JMX thru LV-JMZ, LV-JND and LV-JNE
      NH JA8406 thru JA8411
      (1) Remove bolt (1) securing roller (3) to torque tube (4) and remove washer (2), roller (3), and barrel nut (5).
      (2) Remove lockwire securing bearing retainer (7)to torque tube (4) and remove bearing retainer.
   F. On all except:
      AR LV-JMW thru LV-JMZ, LV-JMD and LV-JNE
      NH JA8401 thru JA8403, JA8405 thru JA8411
      (1) Remove bolt (1) securing roller (3) to torque tube (4) and remove washer (2) and roller (3).
      (2) Remove lockwire securing bearing retainer (7) to torque tube (4) and remove bearing retainer.
   G. Remove outboard bearing (10) from bracket assembly (14).
   H. Remove spacer (9) from torque tube (4).
   I. Remove torque tube (4) from bracket assembly (14) by pulling outboard on torque tube (4).
3. Install Nose Gear Manual Extension Release Mechanism (Fig. 401)
   A. Insert torque tube (4) through outboard bearing (10) in bracket assembly (14) into inboard flange of bracket assembly (14).
   B. Install spacer (9) over torque tube (4) through inboard flange of bracket assembly (14) so that end of spacer (9) presses against outboard bearing (10).
   C. Install outboard bearing (10).
   D. On AR LV-JMW CI ALL ND CF-NAB, CF-NAH NH JA8401 thru JA8403 and JA8405 PW 31 thru 733 WE N2711R, N4906, N4907,
      (1) Install bearing retainer nut (7) and cotter pin (6).
      (2) Insert barrel nut (5) in torque tube (4) and install roller (3), washer (2), and bolt (1).



1 AR LV-JMW
2 AR LV-JMX THRU LV-JMZ
LV-JND AND LV-JNE
NH JA-8406 THRU JA-8411
3 ALL EXCEPT 1 AND 2

Nose Gear Manual Extension Release Mechanism Installation
Figure 401 (Sheet 1)



Nose Gear Manual Extension Release Mechanism Installation
Figure 401 (Sheet 2)

E. On AR LV-JMX thru LV-JMZ
LV-JND and LV-JNE NH JA8406 thru JA8411
(1) Install bearing retainer (7) on torque tube (4) as follows:
(a) Apply grease to threads of bearing retainer.
(b) Install bearing retainer on torque tube and tighten bearing retainer 75 to 125 pound-inches.
(c) Secure bearing retainer to torque tube with lockwire through hole in torque tube occupied by barrel nut (5).
(2) Insert barrel nut (5) in torque tube (4) and install roller (3), washer (2), and bolt (1).

F. On all except:
AR LV-JMW thru LV-JMZ LV-JMD and LV-JNE NH JA8401 thru JA8403 JA8405 thru JA8411
(1) Install bearing retainer (7) on torque tube (4) as follows:
(a) Apply grease to threads of bearing retainer (7).
(b) Install bearing retainer on torque tube (4) and tighten bearing retainer 75 to 125 pound-inches.
(c) Secure bearing retainer to torque tube with lockwire through hole in roller fitting (15).
(2) Install roller (3), washer (2) and bolt (1) in torque tube (4).

G. Attach cable MNGEA to torque tube quadrant (11) with cotter pins.

H. Connect cable MNGEA at turnbuckle (15). (See view 2.)

I. Connect return spring (12) to torque tube quadrant (11).

J. Adjust and test manual extension system. Refer to 32-35-0, Nose Gear Manual Extension System - Adjustment/Test.

NOSE GEAR MANUAL EXTENSION SYSTEM CABLES - REMOVAL/INSTALLATION

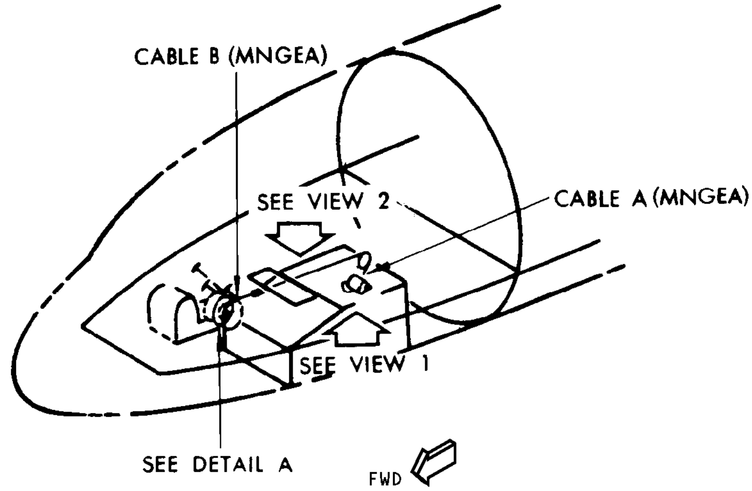
1. Equipment and Materials
   A. Rigging Pin - 0.311 +0.000/-0.002-inch diameter x 5.0 inches long, Type MS20392-4C

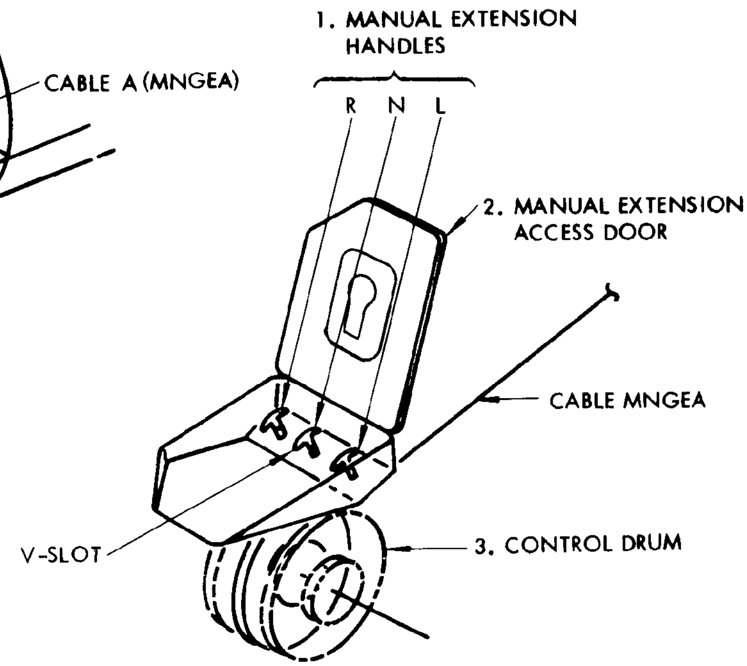
      NOTE: Rigging pin is F70207-3.

   B. Grease - MIL-G25760 (AMM 20-30-21)
   C. Cable Tensiometer
2. Remove Nose Gear Manual Extension System Cables
   A. Remove cabin floor panel (12, Fig. 401).
   B. Detach return spring (9) from torque tube quadrant (7).
   C. Remove turnbuckle locking clips and loosen turnbuckle (11) of cable MNGEA.
   D. Remove cotter pin and detach manual extension handle cable from control drum (3).
   E. Open manual extension access door (2) and remove handle and cable (1).
   F. Remove cable retainer and detach cable MNGEA from control drum (3).
   G. Remove pressure seal (8) in nose gear wheel well ceiling (Chapter 20, Control Cable Air Pressure Seal).
   H. Remove cotter pins and detach cable MNGEA from torque tube pulley (7).
   I. Remove cables (Chapter 20, Control Cables).
3. Install Nose Gear Manual Extension System Cables
   A. Install system cables. For general installation information to be used in conjunction with the following steps, refer to Chapter 20, Control Cables.

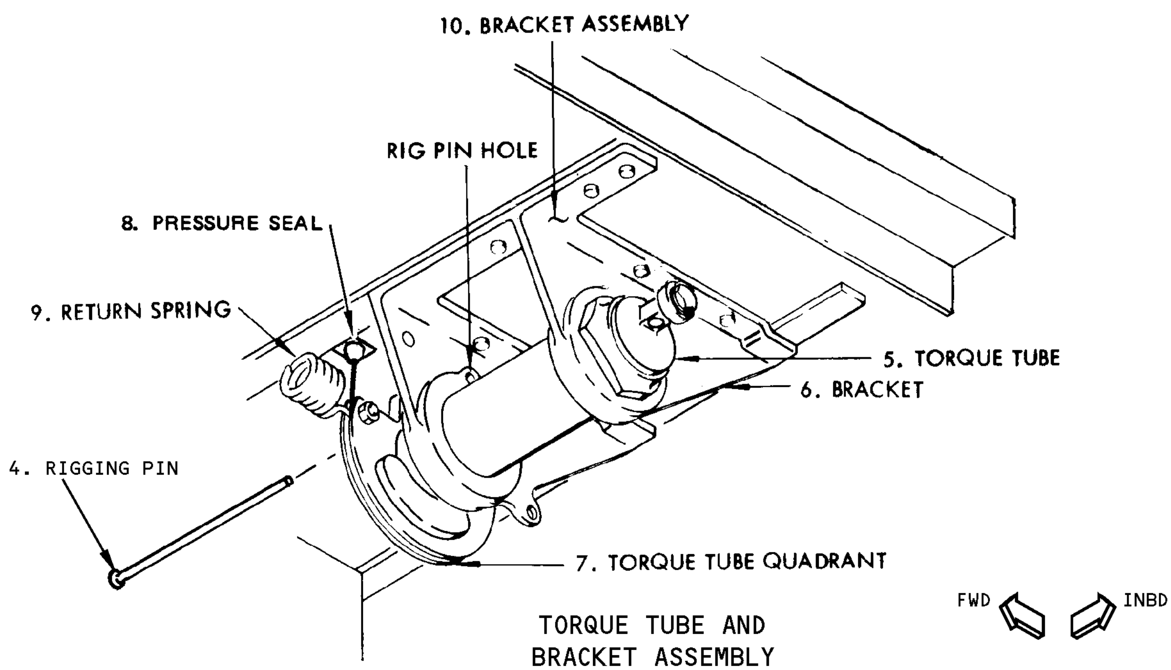
      NOTE: See Fig. 401 for cable lengths and fittings.

   B. Install rigging pin (4, Fig. 402) through torque tube pulley (7) and bracket assembly (10).
   C. Attach cable MNGEA on torque tube pulley (7) and install cotter pin.
   D. Attach cables MNGEA on control drum (3) and install cable retainer.
   E. Feed terminal end of manual extension handle cable through hole in V-slot and attach cable on control drum (3) and install cotter pin. Bend one end of cotter pin into end of drum.
   F. Connect cable MNGEA at turnbuckle (view 2).
   G. FL ALL EXCEPT N7340F thru N7348F, N7385F, N7391F thru N7398F;
      WE N2711R, N4906, and N4907;
      SA ZS-SBL thru ZS-SBN;
      ND CF-NAB and CF-NAH;
      AR LV-JMW;
      WA N4502W THRU N4530W;
      Rig cable to 200-pound rig load.





DETAIL A



TORQUE TUBE AND
BRACKET ASSEMBLY
VIEW 1

Nose Gear Manual Extension System Cable Removal/Installation
Figure 401 (Sheet 1)

44535O

1 AIRPLANES

CABLE REF	FUNCTION	NO. REQ'D	LENGTH		CABLE SIZE	FITTINGS 1	FITTINGS 2
A	MNGEA	1	L_1	35.80 IN.	1/8 7x19	MS21260S4(RH)	BACT14A(4)
B	MNGEA	1	L_1	22.10 IN.	1/8 7x19	MS21260S4(LH)	BACT14A(4)

2 AIRPLANES

CABLE REF	FUNCTION	NO. REQ'D	LENGTH		CABLE SIZE	FITTINGS 1	FITTINGS 2
A	MNGEA	1	L_1	35.80 IN.	3/32 7x7	MS21260S3(RH)	BACT14A(3)
B	MNGEA	1	L_1	22.10 IN.	3/32 7x7	MS21260S3(LH)	BACT14A(3)

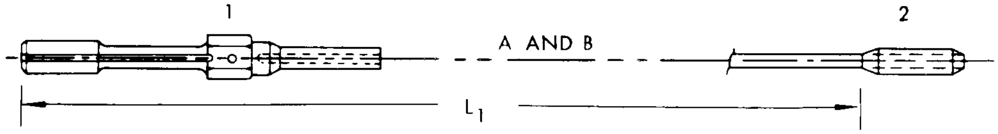
MATERIAL: CABLE PREFERRED – CARBON STEEL PER MIL–W–83420, TYPE I COMPOSITION A

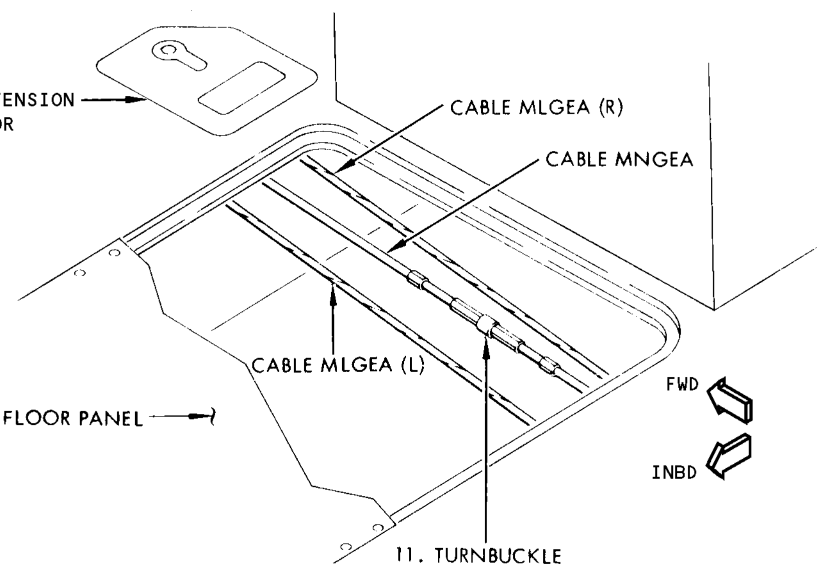
OPTIONAL – CARBON STEEL PER MIL–W–1511

1 WE N2711R, N4906, AND N4907
SA ZB–SBL THRU ZS–SBN
ND CF–NAB AND CF–NAH
AR LV–JMW
WA N4502W THRU N4530W
IN EI–ASA THRU EI–ASF AND EI–BCR

2 ALL EXCEPT 1

NOTE: DO NOT MIX TIN-ZINC (TZ) COVERED CABLES WITH OTHER TYPE CABLES ON THE SAME AIRPLANE BECAUSE TZ CABLES HAVE A DIFFERENT STRETCH RATE THAN OTHER CABLES.





Nose Gear Manual Extension System Cable Removal/Installation
Figure 401 (Sheet 2)

H. FL N7340F thru N7348F, N7385F, N7391F thru N7398F;
WE ALL EXCEPT N2711R, N4906, and N4907;
SA ALL EXCEPT ZS-SBL thru ZS-SBN;
ND ALL EXCEPT CF-NAB and CF-NAH;
AR ALL EXCEPT LV-JMW;
WA ALL EXCEPT N4502W THRU N4530W;
Rig cable to 100-pound rig load.

NOTE: When performing step G. or H. (as applicable), ensure release is properly seated in V-slot of manual extension control.

I. Connect return spring to torque tube quadrant (7).
J. Adjust manual extension system (AMM 32-35-0).
K. Test manual extension system (AMM 32-35-0).
L. Install pressure seal (8) in nose gear wheel well ceiling.
M. Install cabin floor panel (12) and close manual extension access door (2).

WHEELS AND BRAKES - DESCRIPTION

1. General
   A. The airplane is supported during landing, takeoff, and ground operations on six wheel and tubeless tire assemblies. Four are on the main landing gear and two on the nose landing gear. Each main wheel is provided with a brake unit bolted to a flange on the axle. The brakes are multiple disc type, with stationary carrier and divided lining discs, and segmented rotating brake discs. Each brake is provided with pistons, which actuate the brakes when hydraulic pressure is applied. The brakes are also provided with combination return springs and automatic adjusters. The automatic adjusters compensate for brake wear.
   B. To provide ground braking capability and to stop spinning wheels after takeoff, two braking systems are provided.
      (1) A hydraulic brake system is the normal braking system and is controlled by the captain's or first officer's rudder pedals through linkage and cables to the brake metering valve for each main landing gear. Each brake metering valve serves a dual purpose and directs A system hydraulic pressure to the inboard brake and B system hydraulic pressure to the outboard brake of its gear.
      (2) A parking brake system provides braking while the airplane is parked or moored. It is controlled by a handle on the control stand. The parking brake linkage holds the brake pedals in the brake applied position and a linkage actuated switch closes the parking shutoff valve in the common return line from the antiskid valves.
   C. An antiskid system assumes automatic control of brake pressure through the antiskid valves. The antiskid system is normally on with the on-off switch on the pilots' aisle stand.

HYDRAULIC BRAKE SYSTEM - DESCRIPTION AND OPERATION

1. General
   A. The hydraulic braking system aids airplane control during ground operations. Brakes hold the airplane during parking, mooring, and engine run; stop spinning wheels after takeoff; shorten the landing run; and assist in turning when the airplane is taxied.
   B. The brake system is manually controlled by the captain's or first officer's rudder pedals through linkage and cables to the brake metering valve for each main gear. Each brake metering valve serves a dual purpose as it directs system A hydraulic pressure up to 3000 psi to the inboard brake and system B hydraulic pressure up to 3000 psi to the outboard brake of the main gear it serves. An antiskid system is incorporated into the braking system on all airplanes. Refer to 32-42-0, Antiskid System - Description and Operation). An automatic braking system is incorporated on some airplanes. (See Fig. 1 for effectivity.) Refer to 32-43-0, Automatic Braking System - Description and Operation.
   C. The brake system consists of dual cables and linkage, dual metering valves, brake valve feel augmentation actuators, main gear brake swivels, disk-type brakes, hydraulic pressure accumulators, transmitters and gages (Fig. 1). A parking brake shutoff valve, covered in 32-44- 0, and an antiskid control valve, covered in 32-42-0, are mentioned in the operation of the brake system, but are considered components of the parking brake system and the antiskid system, respectively. On airplanes with an automatic braking system, two solenoid bypass valves, four shuttle valves, and two brake pressure comparators are installed in the brake hydraulic system. These components are mentioned in operation of the brake system, but are part of the automatic braking system and are covered in 32-43-0. The brake valve feel augmentation actuators provide increased brake pedal resistance at low braking pressure without increasing the pedal resistance at maximum braking pressure. The brakes are of the rotating disk type and are self-adjusting. The hydraulic pressure accumulators are charged to 1000 psi to provide braking pressure for parking or whenever the main hydraulic systems are depressurized. The hydraulic pressure transmitter provides a brake system hydraulic pressure indication on a remote gage in the control cabin. The brakes are applied automatically to stop the spinning main gear wheels when the landing gear is retracted. A snubber is provided in the nose wheel well to stop the spinning nose wheels (Ref 32-45-0). A ground interconnect valve allows pressurization of all brakes from B system hydraulic pressure. The valve is controlled by a switch on the overhead panel (P5) and can be opened only when the parking brake is set.

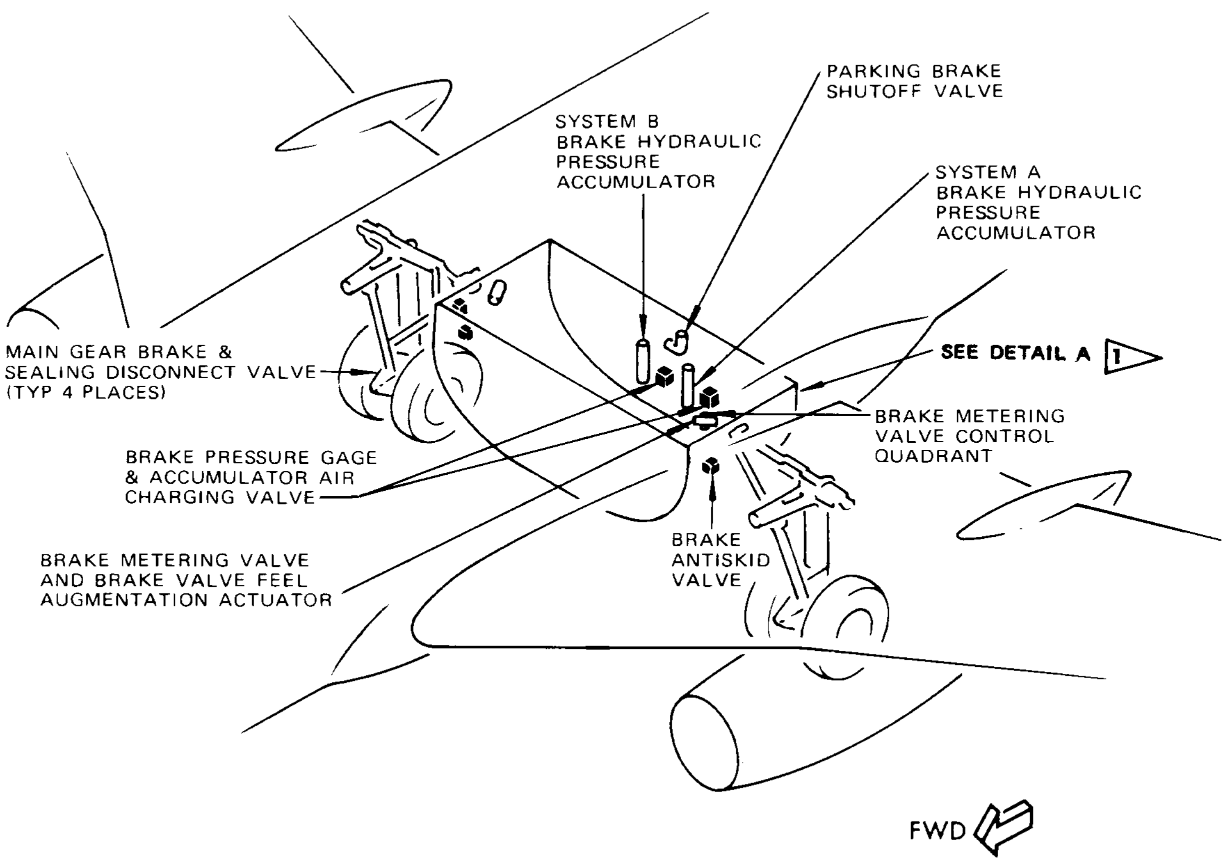
2. Brake Control Linkage

A. The rudder pedals (brake pedals) actuate brake control linkage below the control cabin floor. (See figure 2.) Captain's and first officer's brake pedals are interconnected through linkage below the control cabin floor, to have identical brake operation from both positions. Connected to the control linkage are two horizontal quadrants. The quadrants are connected to the brake metering valves by dual control cables. Movement of either right or left brake pedal will actuate the corresponding right or left main gear brake metering valve and movement of both brake pedals together will apply both main gear brakes.

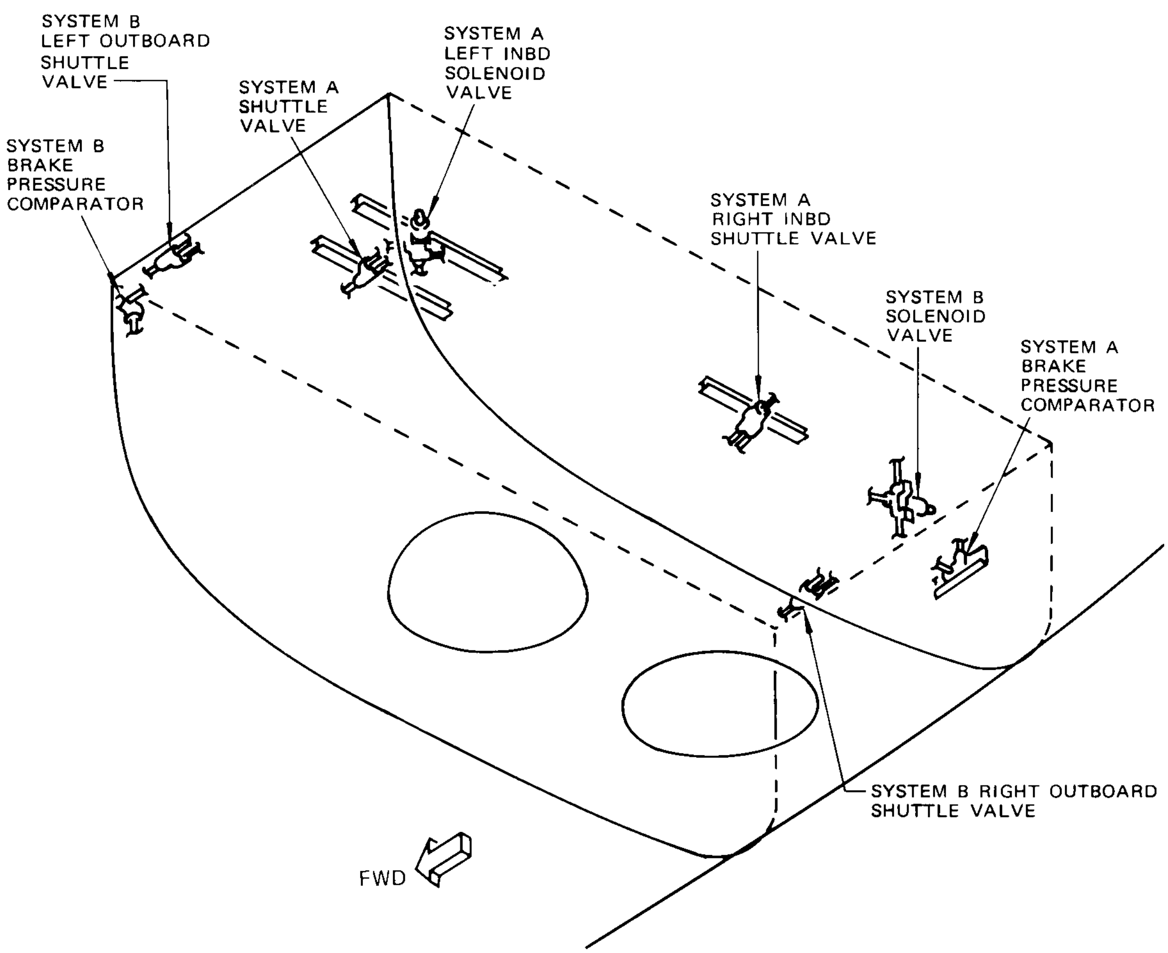
3. Brake Metering Valve

A. For each main landing gear, a dual brake metering valve is installed on the brake metering valve control quadrant housing assembly located near the top outboard forward corner of each main wheel well (Fig. 1). The brake-metering valve housing assembly contains a crank, a link assembly, an auto brake piston, a brake metering valve slide, and a brake input shaft. The brake input shaft projects completely through the valve. The brake input shaft's upper end mates with the control quadrant shaft and, on the lower end, a crank arm is attached to actuate a piston of the brake valve feel augmentation actuator assembly (Detail A, Fig. 2). Attached to each valve are seven hydraulic lines: two each pressure, brake, return, and one automatic braking (Fig. 3). Valve ports are opened or closed by operating two circular grooved valve slides from the brake-input shaft through the link assembly. The link assembly will displace both valve slides together or only one slide if the other will not move for any reason.

B. When the brake pedals are depressed, through the mechanical linkage and cables, an inward movement is imparted to the metering valve slide. As the slide moves in, the return port is closed and the pressure port opens to direct hydraulic pressure to the brakes (Fig. 3). Brake hydraulic pressure through a passage in the valve piston enters the compensating chamber. The pressure in the compensating chamber acts on the end of the piston creating a return force tending to close the valve. This return force varies with the intensity of braking pressure and provides a feel at the pedals. The desired braking effect with antiskid system OFF is obtained by depressing the pedals a greater or lesser distance. Cable stretch and variation of pedal position permit the valve piston to move back until both pressure and return ports are closed. At this point braking effect remains constant. When the pedals are released the pressure in the compensating chamber and the return spring move the valve slide out and the return line opens. As the return line opens, pressure in the brake line falls, the brakes are released and return force on the valve slide is relieved. The desired braking effect with antiskid system on is obtained by depressing the brake pedals to actuate the main wheel brakes as needed based on required stopping distance and holding steady pressure. The antiskid system will modulate pilots metered brake pressure by electrically controlling the antiskid control valve to maintain maximum braking pressure and efficiency over all types of runway braking conditions.



Brake Hydraulic System Component Location
Figure 1 (Sheet 1)



AUTOMATIC BRAKING
SYSTEM HYDRAULIC COMPONENTS 1

DETAIL A

1 *TM all except CR-BAA and CR-BAB*
AR all except LV-JMW thru LV-JMZ, LV-JND, and LV-JNE

Brake Hydraulic System Component Location
Figure 1 (Sheet 2)

C. Automatic wheel snubbing for the main gear on gear retraction is provided by a small diameter piston operating in a cylinder attached to the metering valve (Fig. 3). The cylinder is connected to the landing gear retract hydraulic line. When the landing gear control handle is placed to UP position, hydraulic pressure is directed to the automatic brake piston and the piston extends. Because one end of the piston rests on the link assembly, extension of the slide opens the metering valve and applies brakes; therefore stopping spinning wheels before the landing gear retracts.

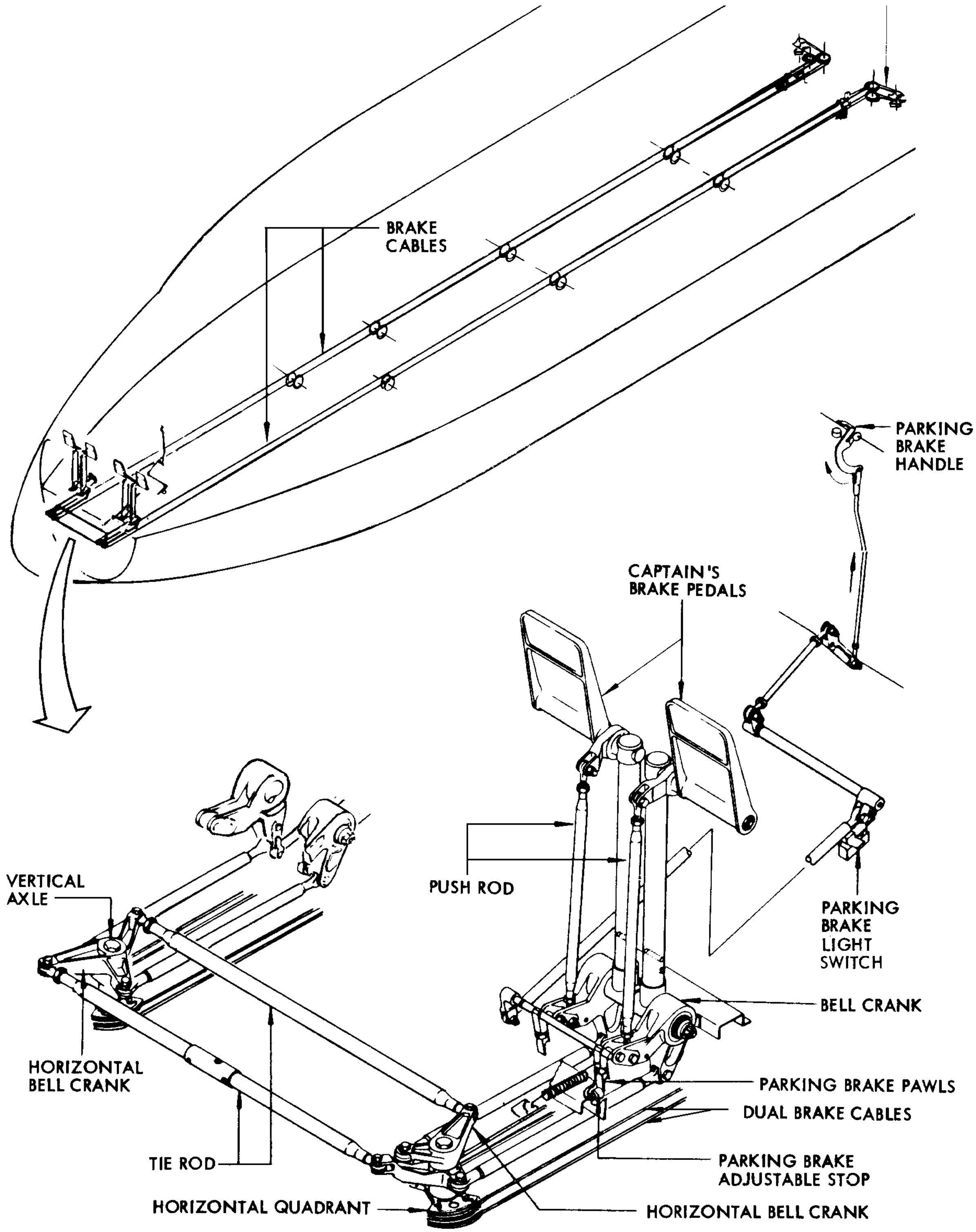
4. Brake Valve Feel Augmentation Actuator

A. The brake valve feel augmentation actuator increases brake pedal resistance at low braking pressure without increasing brake pedal resistance at maximum braking pressure.

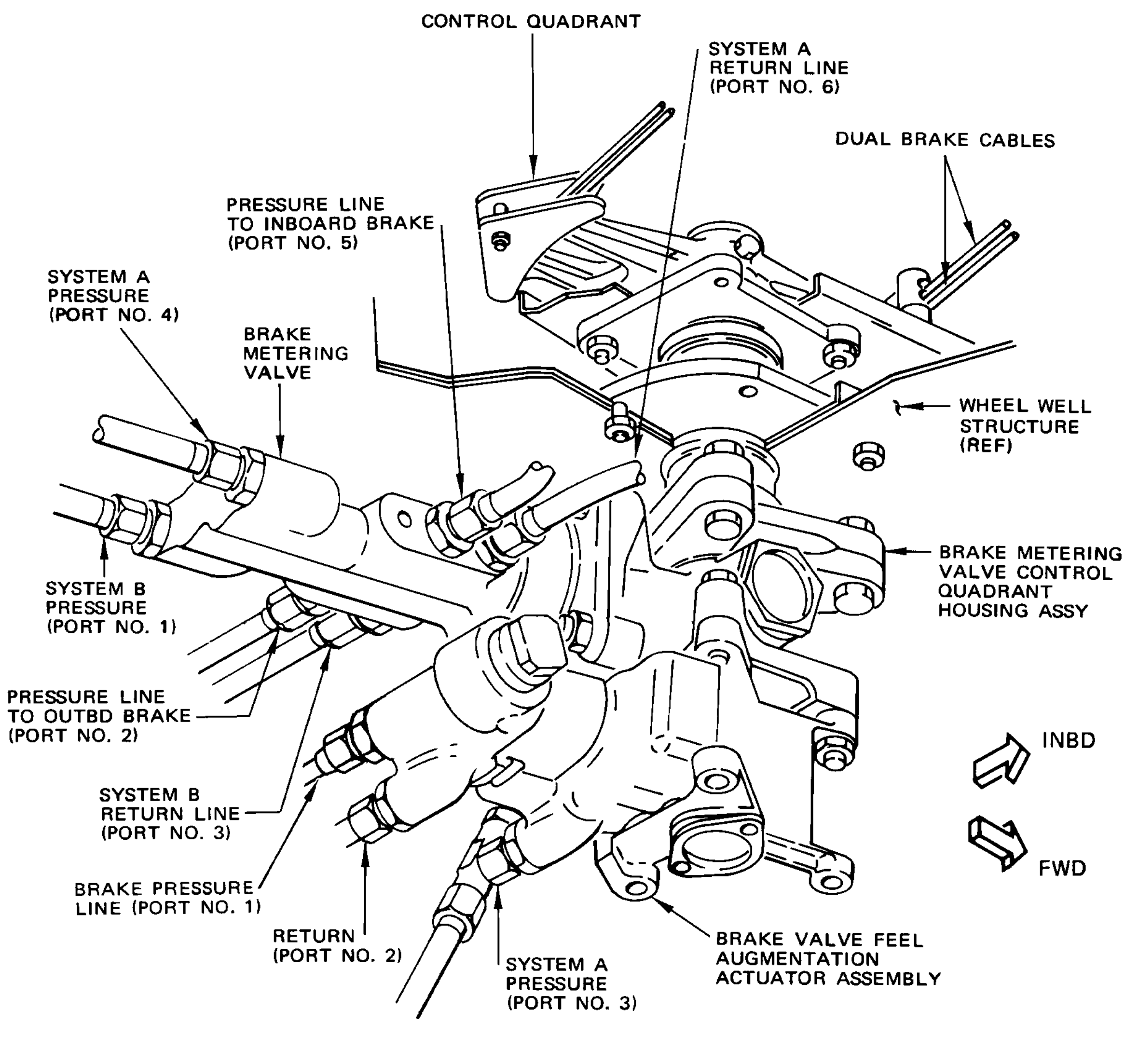
B. The brake valve feel augmentation actuator is assembled on the brake metering valve housing assembly. (See detail A, figure 2.) Attached to each feel actuator assembly are three hydraulic lines; one for system A pressure, one for brake pressure and one for return pressure. The actuator housing assembly consists of a piston assembly, slide assembly, a pressure regulator, and a spring-loaded check valve.

C. When the brake pedals are partially depressed for low braking pressure, brake pressure is directed to port 1 of the actuator through a hydraulic line downstream of brake metering valve. (See figure 8.) This brake pressure will act against system A pressure coming from port 3. The differential pressure will be more and the check valve will remain open. The brake pressure from port 1 will be directed to act on head ends of the piston through slide assembly. (See figure 4.) This pressure will cause the piston to move. The crank arm attached to the brake metering valve shaft will move with the movement of the brake input shaft to contact the piston causing it to move in the opposite direction of brake pressure applied on head ends of the piston thus increasing brake pedal resistance. The piston will move forward forcing brake pressure hydraulic fluid back to the slide assembly. This brake pressure will move slide assembly, controlled by a pressure regulator, thus compressing spring and opening the valve for return pressure.

D. When the brake pedals are fully depressed for high braking pressure, the brake pressure through port 1 will act against system A pressure coming from port 3. The differential pressure will be less or negligible. In this condition the spring-loaded check valve will move from open to the closed position thus preventing flow of hydraulic fluid through the actuator assembly. Brake pressure will not act on head ends of the piston but the crank arm will move with the brake input shaft thus contacting its roller with the piston. The piston will move without resistance as the brake pressure is not acting on head ends of the piston. So at maximum braking pressure pedal resistance will not be increased.



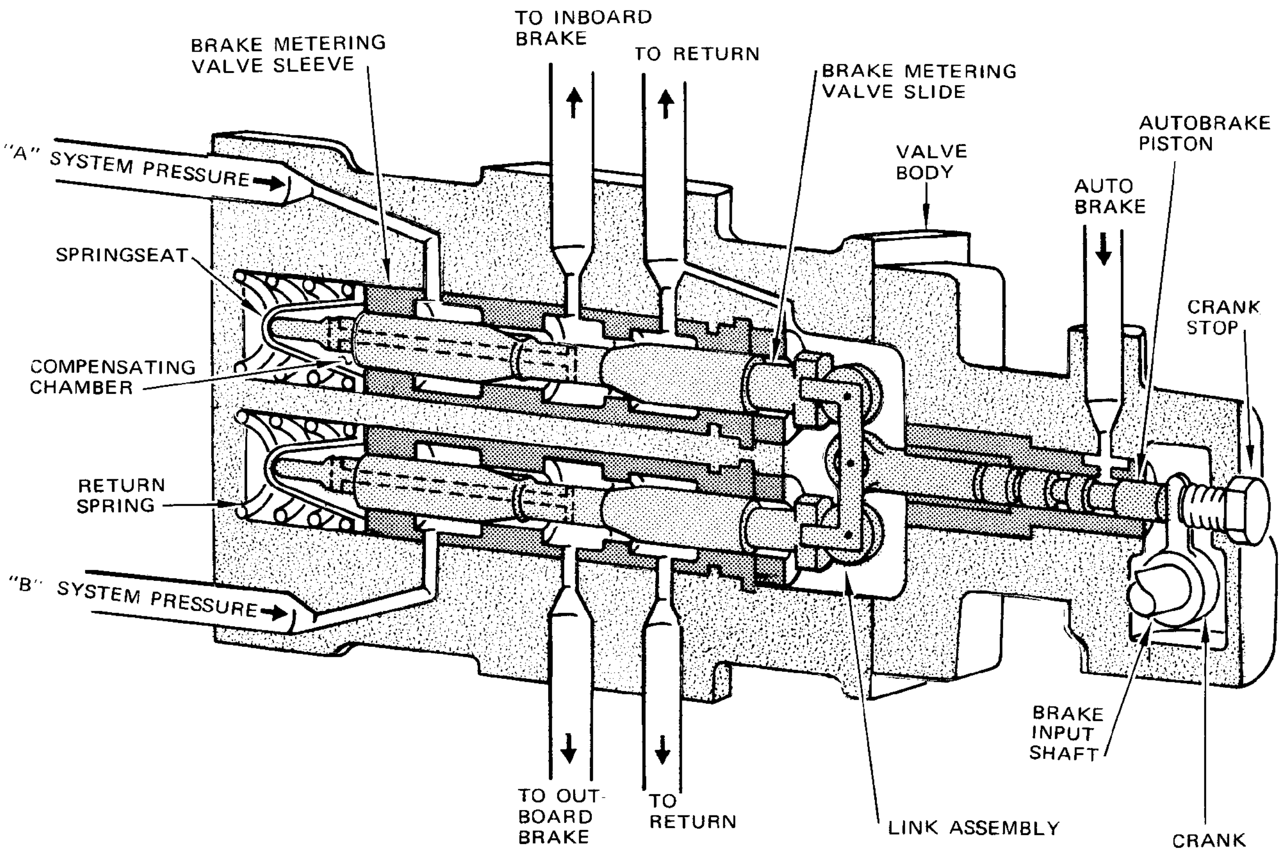
Brake Control Linkage
Figure 2 (Sheet 1)



DETAIL A

NOTE: GUARD INSTALLATION IS NOT SHOWN FOR CLARITY

Brake Control Linkage
Figure 2 (Sheet 2)

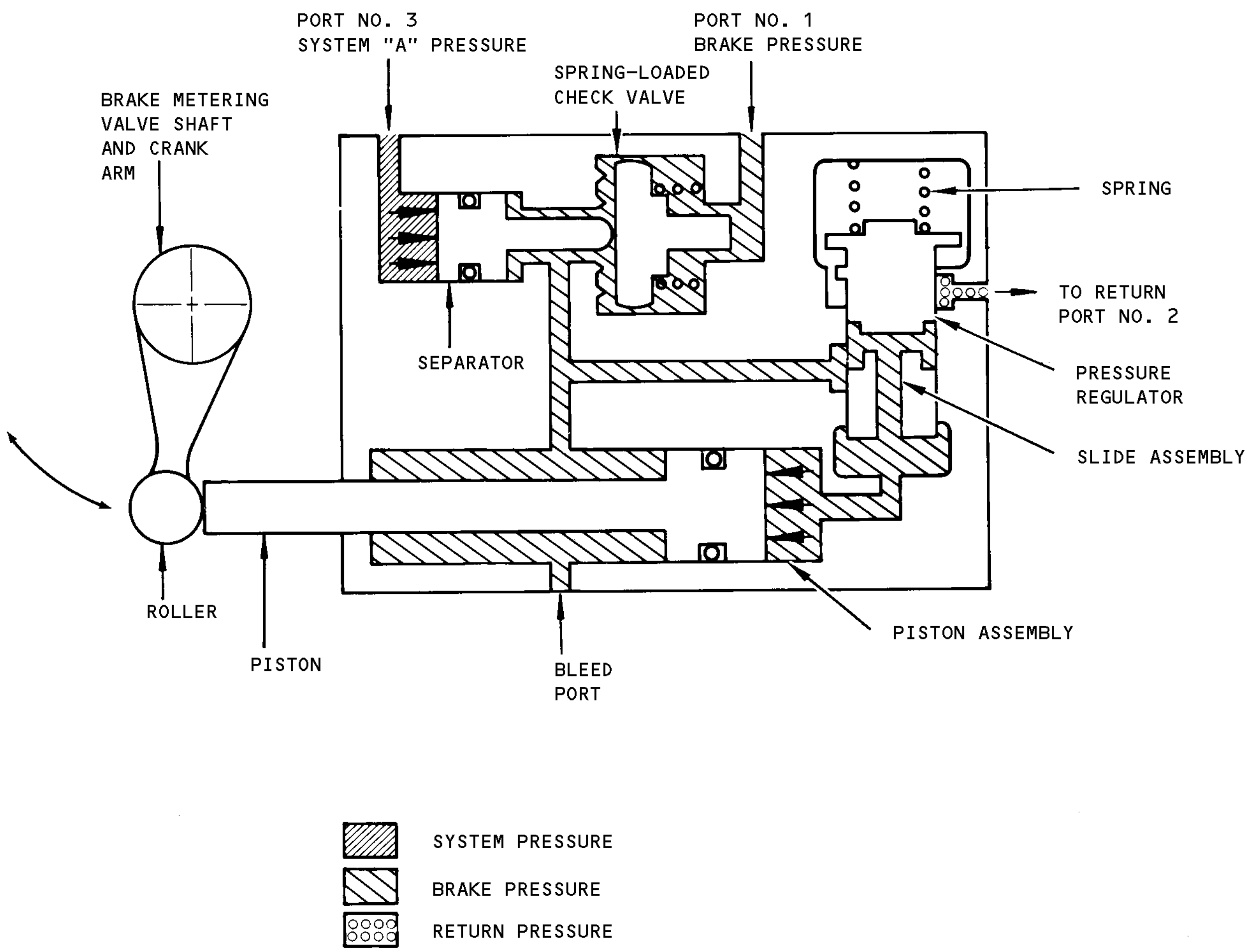


Brake Metering Valve Schematic
Figure 3

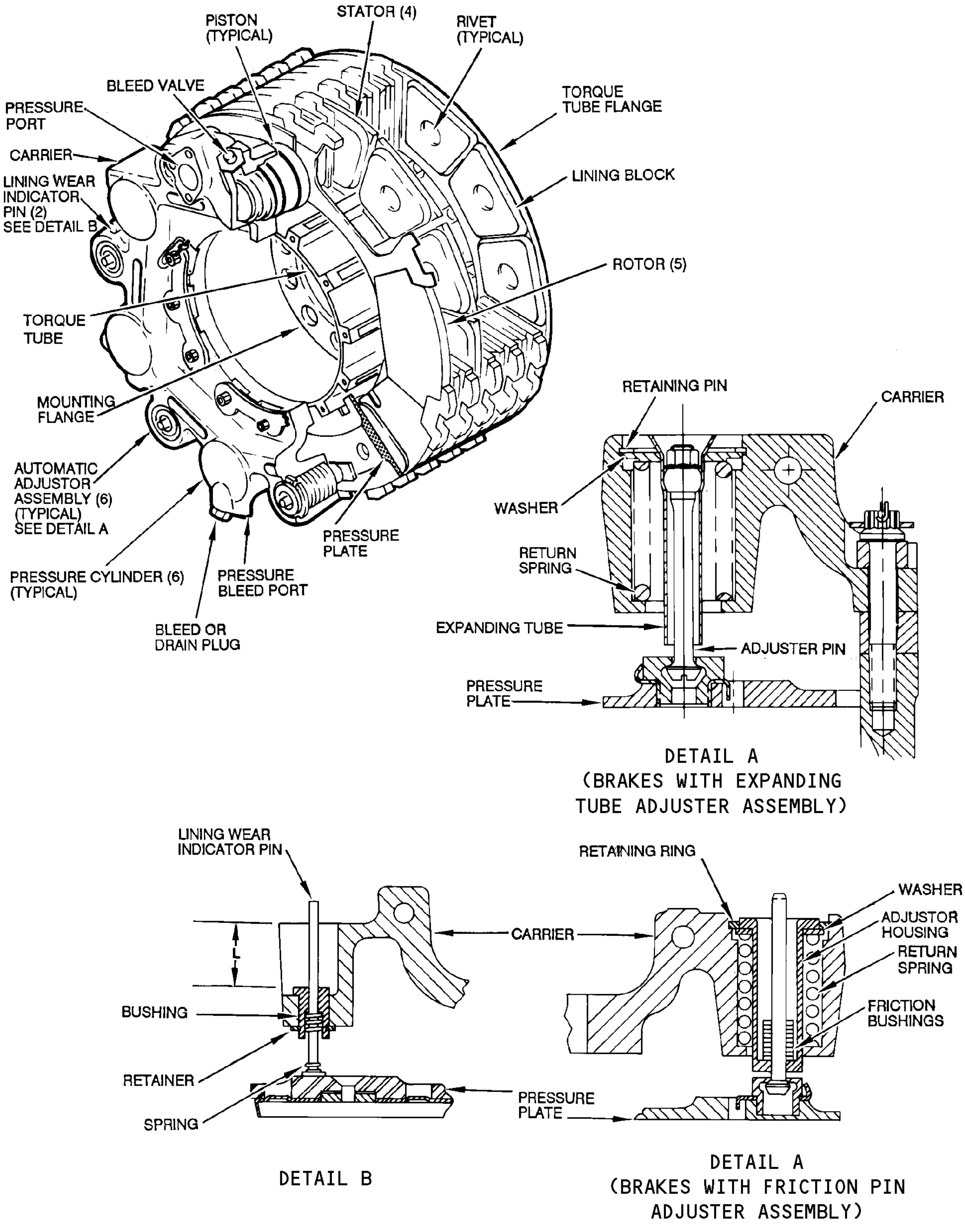
5. Main Gear Brakes

A. The main landing gear brake is a multidisc type consisting of five rotating and six stationary frictional elements. (See figure 5.) Two of the stationary discs, pressure plate and backing plate, are lined on one surface. The remaining four stationary discs, stators, are lined on both surfaces and are notched on the inside diameter to enable them to fit and slide axially on the torque tube splines. The linings are made from an inherently heat stable cerametallic material that will maintain its original strength and friction ability at incandescent temperatures. The rotating discs, rotors, are keyed to the wheel. Each rotor consists of seven solid steel segments that are secured to a spider with keyed straps. The brake carrier houses six pistons interconnected through drilled passages and six automatic adjuster assemblies. A bleed plug is provided at the bottom of the carrier and a bleed valve assembly is provided at the top.

B. On brakes with friction pin adjuster assemblies, when the brakes are applied, hydraulic fluid under system pressure enters the inlet port of the brake and is distributed to the pistons. As the pistons (with fluid pressure exerted upon them) move out, they actuate the pressure plate which presses the stators and rotors together against the torque tube backing plate. As the brake elements wear, the friction pin attached to the pressure plate is pulled through the friction bushings. When fluid pressure is released, the pressure plate is moved back by the piston return springs, thus allowing the rotors and the wheel to rotate freely. The piston return spring pressure is less than the pressure exerted by the friction bushings upon the friction pins. Thus the pressure plate is only returned to the position where force is applied to the friction bushing. This maintains a constant running clearance throughout brake lift. Separate lining wear indicator pins are provided at two places. (See Detail B, Fig. 5). Dimension L is set at brake assembly. Subsequent lining wear will cause dimension L, with brake pressure applied, to decrease to a point indicating when the brake must be removed for lining replacement.



Brake Valve Feel Augmentation Actuator Schematic
Figure 4



Main Gear Brake
Figure 5

C. On brakes with expanding tube adjuster assemblies, when the brakes are applied, hydraulic fluid under system pressure enters the inlet port of the brake, through a disconnect valve, and is distributed to the pistons. As the pistons move out, from the fluid pressure applied to them, they move the pressure plate axially against the stack of stators and rotors so that the stack is compressed between the pressure plate and the torque tube backing plate and rotational braking friction is developed. As the brake elements wear, the adjuster pin and ball assembly, attached to the pressure plate, is pulled through the adjuster tube (Detail A, Fig. 5). This movement forces the ball to expand the surrounding tube reducing an original interference fit between the ball and tube for a distance down the tube equal to the wear. When fluid pressure is released, the pressure plate is moved back by return springs in the adjuster assemblies, thus allowing the rotors and stators to separate and rotate freely. The return spring pressure is enough to move the adjusting pin ball through the expanded portion of the adjuster tube but is not enough to force the ball through the interference portion. This maintains a constant running clearance throughout brake life. Separate lining wear indicator pins are provided at two places (Detail B). Dimension L is set at brake manufacture or overhaul. Subsequent lining wear will cause dimension L, with brake pressure applied, to decrease to a point indicating when the brake must be removed for lining replacement.

D. The bleed plug at the bottom of the carrier can be used for draining the brake system. The bleed valve assembly at the top of the carrier and the bleed plug at the bottom are used for bleeding the brake system.

6. <u>Hydraulic Brake Accumulator</u>

A. Two hydraulic brake accumulators are mounted on the aft wall of the main wheel well. The hydraulic brake system is made up of two independent systems with separate pressure sources and requiring individual accumulators (Fig. 1). The precharge is 1000 +50 psi. A charging valve, a pressure gage and a pressure transmitter for each accumulator is mounted on the aft wall also.

B. The brake accumulator stores energy for brake operation, dampens pressure fluctuations, and assures instantaneous flow of fluid to the brakes. When fully charged, the accumulator holds a reserve of fluid under pressure sufficient for approximately three brake applications and for maintaining parking brake pressure.

7. <u>Main Gear Brake Swivel Assemblies</u>

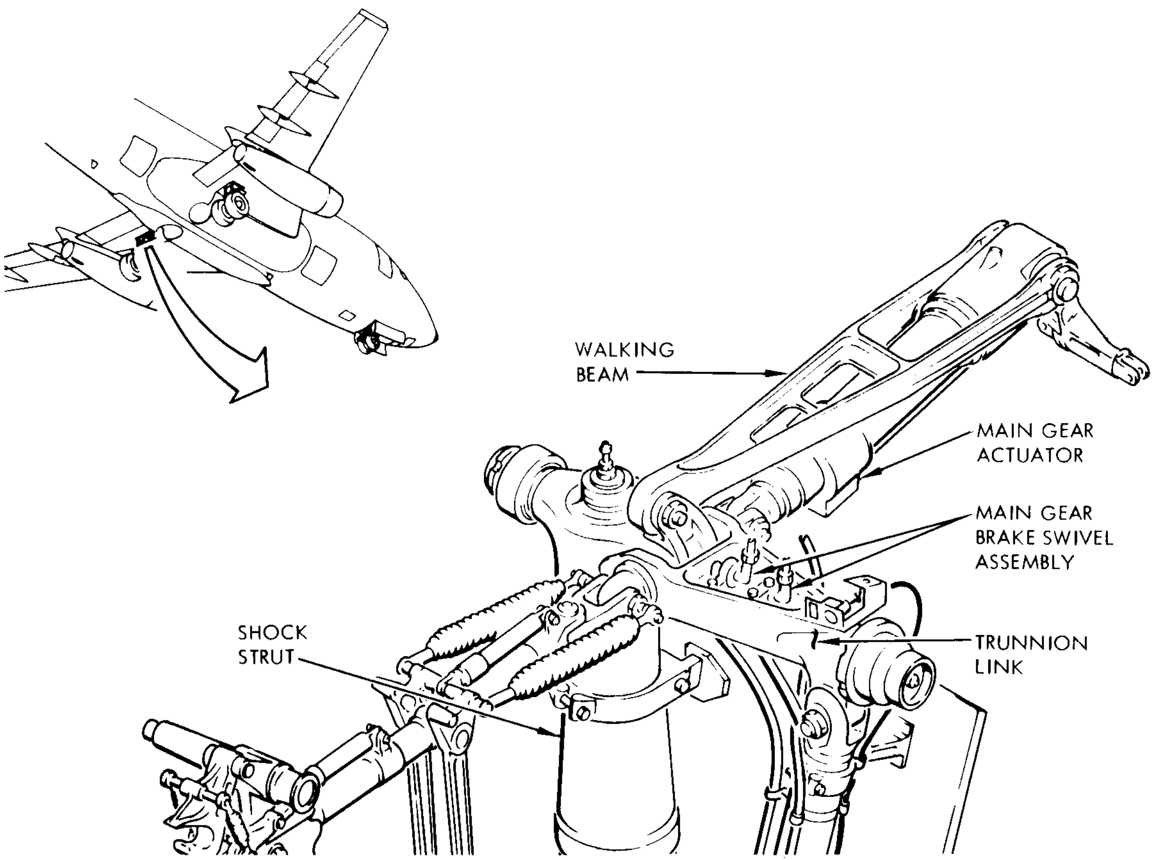
A. The hydraulic brake lines mounted on the structure and on the landing gear of the airplane are connected by main gear brake swivel assemblies. The swivel assemblies permit continued flow in the hydraulic lines during retraction or extension of the landing gear. Swivel assemblies are mounted on the trunnion link of each gear.

B. The swivel assembly consists of two main parts. One is the rotating part or housing mounted on the trunnion link and the other is the stationary part or body. There is an individual swivel for each brake line (Fig. 6).

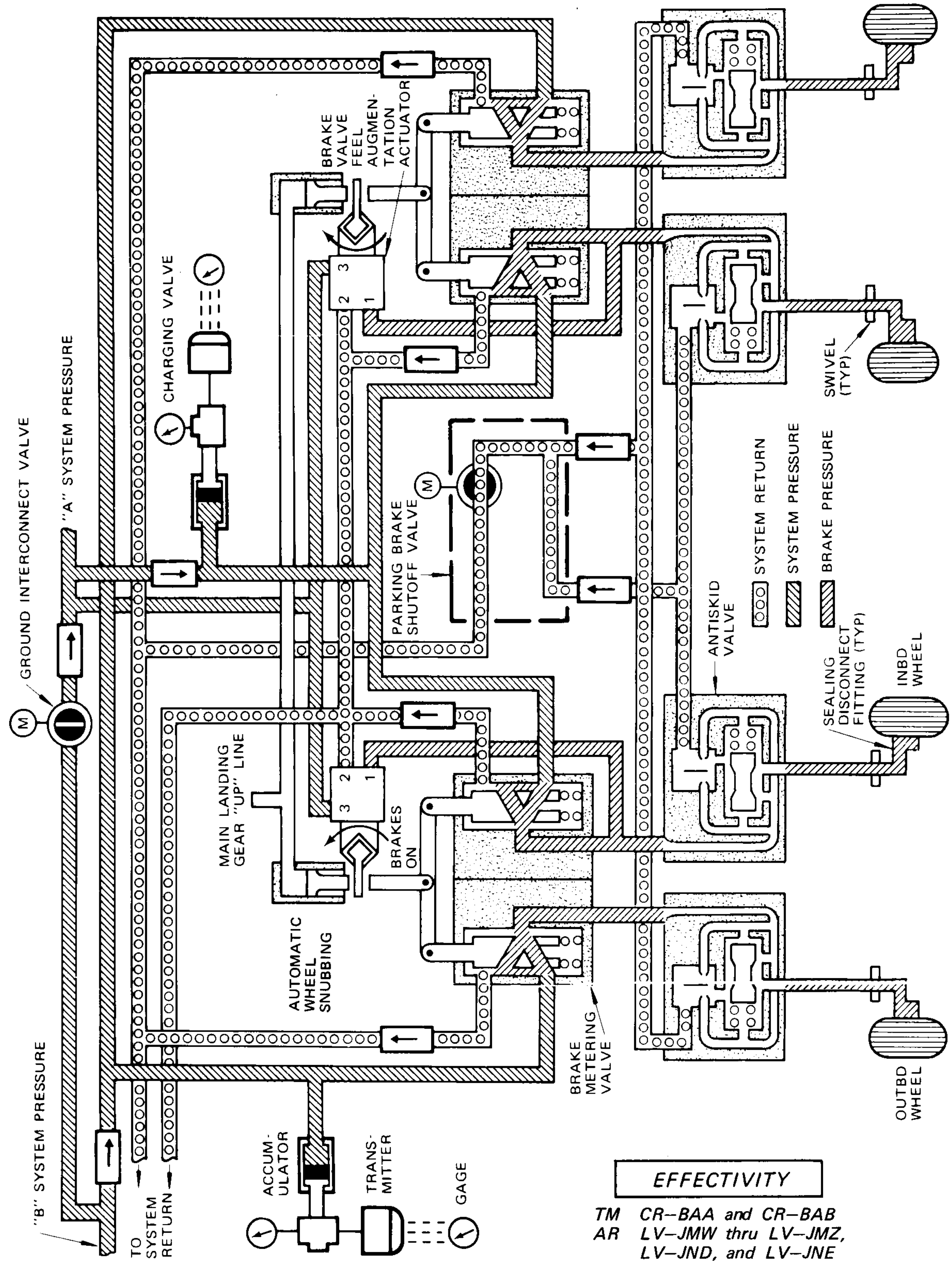
8. <u>Operation</u>

A. When the captain or first officer depresses the brake pedals, the brake metering valves are opened and hydraulic fluid is directed to the brakes through antiskid valves (Fig. 7). The intensity of pressure established in the brakes varies directly with the amount of pedal force maintained. Feel at the brake pedals depends on brake metering valve return spring, brake pressure diverted to oppose metering valve piston and brake pressure acting on head ends of piston in brake valve feel augmentation actuator. Depressing left or right brake pedals gives independent left or right brake operation on the main landing gear. When pedal force is reduced, fluid in the brakes is released to the hydraulic system return. Energy for brake operation in event of normal hydraulic system failure is stored in the brake accumulators. The accumulators are pre-charged with compressed air or nitrogen and contain sufficient energy for approximately three full brake applications.

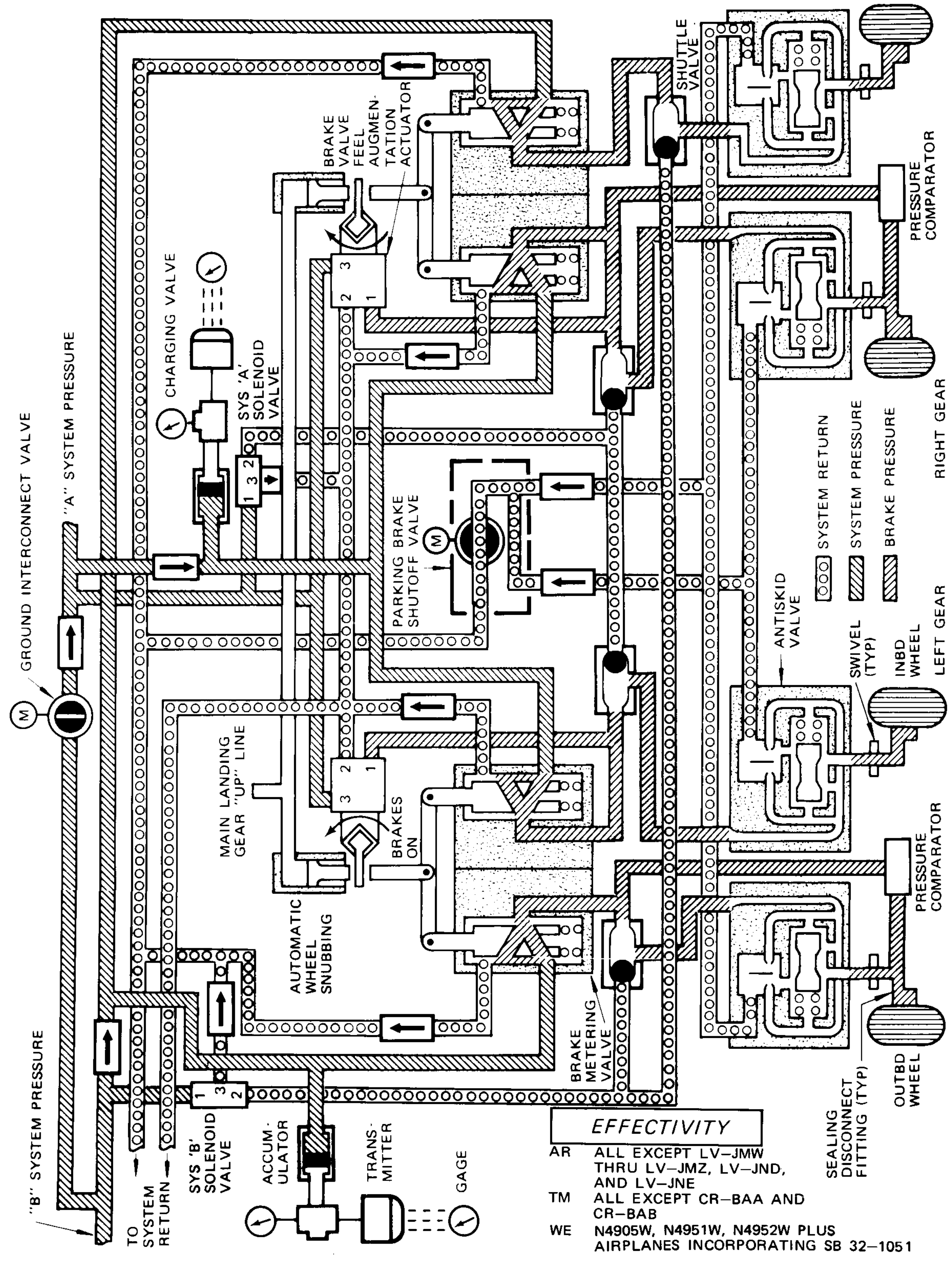
B. On airplanes with automatic braking, the brake metering valves are bypassed and antiskid valves modulate brake pressure as required by the automatic braking system. Refer to 32-43-0 for automatic braking operation.



Main Gear Brake Swivel Assembly
Figure 6



Hydraulic Brake System Schematic
Figure 7 (Sheet 1)



Hydraulic Brake System Schematic
Figure 7 (Sheet 2)

HYDRAULIC BRAKE SYSTEM - TROUBLESHOOTING

1. General
   A. The following precheck items should be performed before troubleshooting the hydraulic brake system:
      (1) Perform brake system operation test. Refer to Hydraulic Brake System - Adjustment/Test. If system malfunctions, refer to Hydraulic Brake System Troubleshooting Chart.
      (2) Pressurize hydraulic systems A and/or B (AMM 29-11-0/201, Hydraulic System A and AMM 29-12-0/201, Hydraulic System B).
      (3) Make sure that the antiskid system is functioning normally (AMM 32-42-0).
      (4) AR ALL EXCEPT LV-JMW thru LV-JMZ, LV-JND, and LV-JNE;
          TM ALL EXCEPT CR-BAA and CR-BAB;
          Make sure that the automatic braking system is functioning normally (AMM 32-43-0).

2. Hydraulic Brake System Trouble Shooting Chart

Station observer's at left and right main landing gear wheels. Operator in control cabin depresses brake pedals. IF -

SYSTEM IS JAMMED

Check for obstruction in system. IF -

OK - Check parking brake pawls for jamming. IF -

NOT OK - Remove obstruction and repair any damage.

OK - Check brake pedal linkage for displaced bolts. IF -

NOT OK - Repair or replace defective parking brake linkage or pawls.

OK - Check for seized bearings in brake linkage. IF -

NOT OK - Replace or adjust bolts as required.

OK - Check brake metering valve for binding. IF -

NOT OK - Replace seized bearings.

Binding, replace brake metering valve and brake valve feel augmentation actuator

PEDALS ARE STIFF TO OPERATE

Check cables for binding in bulkhead seals. IF -

NOT OK - Clean and lubricate cable passing through seals.

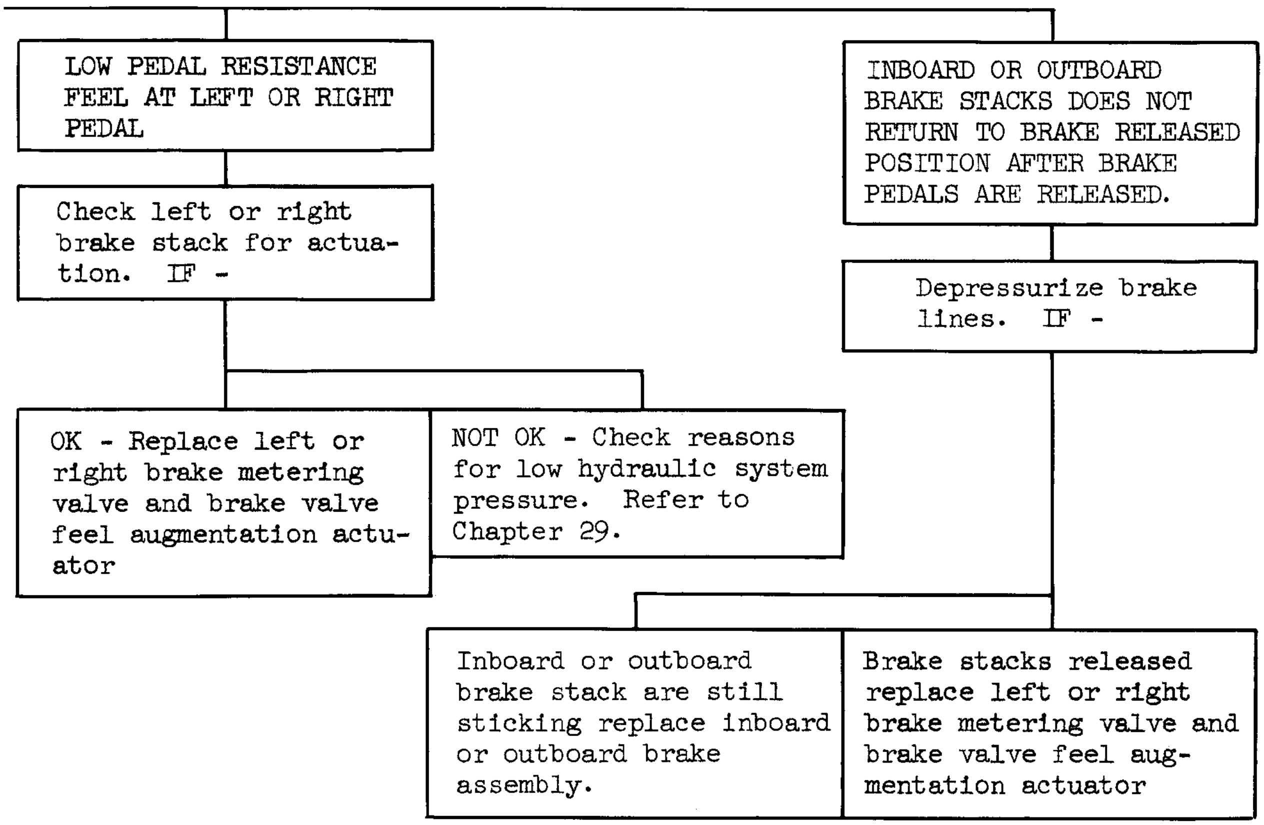
OK - Check for dry or corroded bearings in linkage and pulleys. IF -

NOT OK - Replace faulty bearings.

OK - Check brake metering valve for binding. IF -

Binding replace brake metering valve and brake valve feel augmentation actuator

Hydraulic Brake System - Troubleshooting
Figure 101 (Sheet 1)



Hydraulic Brake System - Troubleshooting
Figure 101 (Sheet 2)

HYDRAULIC BRAKE SYSTEM - MAINTENANCE PRACTICES

1. Bleed the Hydraulic Brake System
   A. General
      (1) The brake hydraulic system must be bled when a hydraulic line of the brake system is opened or if a component connected to the system is replaced. When the system is bled, the air in the brake lines or a component of the brake system is transmitted to the reservoir by the return lines or released to the atmosphere.
      (2) The quantity of time to bleed the system will be kept to a minimum if the brakes are filled and bled on the bench.
      (3) There is one test in this task: test of the Brake Fuses.
   B. Standard Tools and Equipment
      (1) Container - 2 U.S. gallons capacity
      (2) Locks - Ground
   C. Consumable Materials
      (1) Hydraulic Fluids, Fire Resistant - BMS 3-11, to replenish system after bleeding
   D. References
      (1) 12-12-00/201, Hydraulic Reservoir
      (2) 24-22-00/201, External Electrical Power
      (3) 29-11-00/201, Hydraulic System A
      (4) 29-12-00/201, Hydraulic System B.
      (5) 32-00-01/201, Ground Locks
   E. Bleed the Brake System to the Antiskid Valves
      (1) Make sure that the ground locks of the landing gear are installed in the nose gear (Ref. 32-00-01/201).
      (2) Supply the external electrical power (Ref. 24-22-00/201).
      (3) Pressurize hydraulic systems A and B (Ref. 29-11-00/201 and 29-12-00/201).
      (4) Put the chocks on the wheels and push the brake pedals to release the parking brake.
      (5) Push the brake pedals of the captain or the first officer slowly and fully a minimum of six times to bleed the system.
   F. Bleed the Brake System though the brakes

      NOTE: This procedure is recommended after you bleed the system to the antiskid valves if there are signs of air in the brake system. This will be shown by a slow brake response or chattering.

      (1) Pressurize hydraulic systems A and B (Ref. 29-11-00/201 and 29-12-00/201).
      (2) Remove the bleeder screw and washer from the bleeder valve on the brake.
      (3) Connect a flexible hose to the bleeder valve.

(4) Put the free end of the hose in the clean container not fully filled with the same fluid used in the brake system.
(5) Remove the lockwire on the bypass lever of the hydraulic fuse for the brake that is bled.
(6) Move the bypass lever to the open position, hold it open and apply the brakes.
(7) Apply the brakes while you open and close the bleeder valve on the brakes with an applicable wrench.
(8) Do this operation until all the air is gone from the flow of fluid.
(9) Close the bleeder valve while the pressure is kept on.
(10) Remove the bleed hose, tighten the bleeder valve to 40 pound-inches, and install the bleed screw and the washer.
(11) Release the bypass lever on the fuse, allow the lever to go back to the closed position and install the lockwire.
(12) Fill the hydraulic reservoirs (Ref 12-12-00/201).

2. Hydraulic Brake Fuse Test

A. General
(1) The hydraulic brake fuse test does a check on the capacity of the fuse to control the fluid leak when a hydraulic line breaks. Do the test for each fuse in the system.

B. Standard Tools and Equipment
(1) Container - 2 U.S. gallons capacity

C. References
(1) 12-12-00/201, Hydraulic Reservoir
(2) 29-11-00/201, Hydraulic System A
(3) 29-12-00/201, Hydraulic System B.

D. Procedure
(1) Remove the screw from the end of the bleed fitting on the brake and install the bleed hose in the end of the fitting.
(2) Put a container with a minimum capacity of two U.S. gallons below the brake bleed fitting.
(3) Pressurize hydraulic systems A and B (Ref 29-11-00/201 and 29-12-00/201).
(4) Push the brake pedals to the maximum position to apply full brake pressure.

NOTE: The parking brake can be used to keep the brake pedals pushed during the check.

(5) While full brake pressure is applied, open the brake bleeder valve and let the fluid go into the container until the flow stops.
(6) Make sure the quantity collected in the container is 20-40 cubic inches or approximately 0.08 to 0.17 gallons.
(7) Close the bleeder valve and remove the bleed hose.
(8) Tighten the bleeder valve to 40 pound-inches and install the bleed screw and the washer.

(9) Remove the lockwire on the bypass lever of the hydraulic fuse you do a test on.
(10) Move the bypass lever to the open position and hold it open for a minimum of five seconds.
(11) Release the bypass lever on the fuse, allow the lever to go back to the closed position and install the lockwire.
(12) Do the test at each of the four brake locations.
(13) Make sure the quantity of fluid collected in the container from all four brakes is not more than 0.75 gallon.
(14) Fill the hydraulic reservoirs (Ref 12-12-00/201).
(15) Put the airplane back to its usual condition.

HYDRAULIC BRAKE SYSTEM - ADJUSTMENT/TEST

1. General
   A. After repair or replacement of linkage or cables, the mechanical portion of the brake control system must be rigged. Adjustments are made until brake pedals reach correct angle of slope. Linkage and cables are then adjusted until metering valves are closed.
   B. The hydraulic brake system is tested to check the function of the entire system. Tests are made on periodic inspection or on brake malfunction report. Pressure is checked at accumulator and brake lines. Brakes are checked at wheels for correct operation and for automatic response.
   C. The surrounding temperature of the airplane should be stable for one hour prior to rigging.
2. Adjust Hydraulic Brake System
   A. Equipment and Materials
      (1) Rigging pins, 5/16-inch diameter by 10-inches long. Four required
      (2) Cable Tensiometer, 0-200 pounds
   B. Adjust Brake Control Linkage
      (1) Put chocks on the wheels and release the parking brake.
      (2) Operate the rudder pedal adjustment crank (Fig. 501) to put the rudder pedals of the captain or the first officer in the neutral position.

         NOTE: Count the number of times the crank turns from the full forward and the full aft adjustment to find the middle position.

      (3) Install a rigging pin through the floor beams and the bellcranks below each pair of rudder pedals (Fig. 501).
      (4) Install the rigging pins through each pair of rudder pedal arms (Fig. 501).

         NOTE: To permit the rigging pin installation in the rudder pedal arms, adjust the tie rods (Fig. 502) by the procedure that follows:

      (5) Disconnect the right end of the tie rods.
         (a) You may remove the two bolts at the center of the forward tie rod to adjust the length of the forward tie rod.
      (6) Install the rigging pins through the bellcranks.
      (7) Loosen the jamnuts and adjust the length of the tie rods until you can freely install the rod end bolts.
      (8) Tighten the jamnuts and replace the rod end bolts.

WARNING: YOU MUST REINSTALL AND TIGHTEN THE TWO BOLTS IN THE CENTER OF THE FORWARD TIE ROD IF THEY WERE REMOVED TO ADJUST THE LENGTH OF THE FORWARD TIE ROD, TO PREVENT INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(a) If the two bolts at the center of the forward tie rod were removed, reinstall and tighten the two bolts in the center of the forward tie rod when adjustment of the tie rod is complete.

(9) Make sure that the rigging pins are loose and you can see the inspection holes of the rod end threads.

(10) Place a square against each brake pedal and adjust the pushrod until the pedal tips are 3.06 + 0.26/-0.21 inches from square (Fig. 501).

C. Adjust Main Gear Brake Control Cables.

(1) Loosen main gear brake cables LGBA and LGBB at turnbuckles.

(2) Tension cables LGBA first then cables LGBB per table 1 (Fig. 502).

(3) Install turnbuckle locking clips.

(4) Lockwire turnbuckles of cable systems LGBA, LGBA? and LGBB, LGBB? together with lockwire. (See Detail A, Fig. 502)

(5) Remove rigging pins.

3. Test Hydraulic Brake System

A. Equipment and Materials

(1) Pressure gages - 0 to 3500 psi for hydraulic fluid (4 required), Hydraulic Brake Pressure Checking Gage Equipment F72977-62 Preferred, F72977-44 Alternate, F72977-45 Alternate, F72977-46 Alternate, F72977-47 Alternate

(2) Hydraulic service cart - 0 to 3000 psi

(3) Gear Ground Lock Assemblies - F72735 (Ref 32-00-01)

B. Prepare to Test Hydraulic Brakes

(1) Chock wheels and release parking brakes.

(2) Connect external electrical power.

(3) Check that main and nose landing gear ground lock assemblies are installed (Ref 32-00-01).

(4) Depressurize hydraulic System A and B (Ref 29-11-0, 29-12-0 MP).

(5) Depressurize brake system accumulators by operating brakes fully for three times. Check accumulator gages to agree with placard. Adjust precharge pressure if required.

(6) Remove upper bleed screw at each brake and install pressure gage at each upper bleed port.

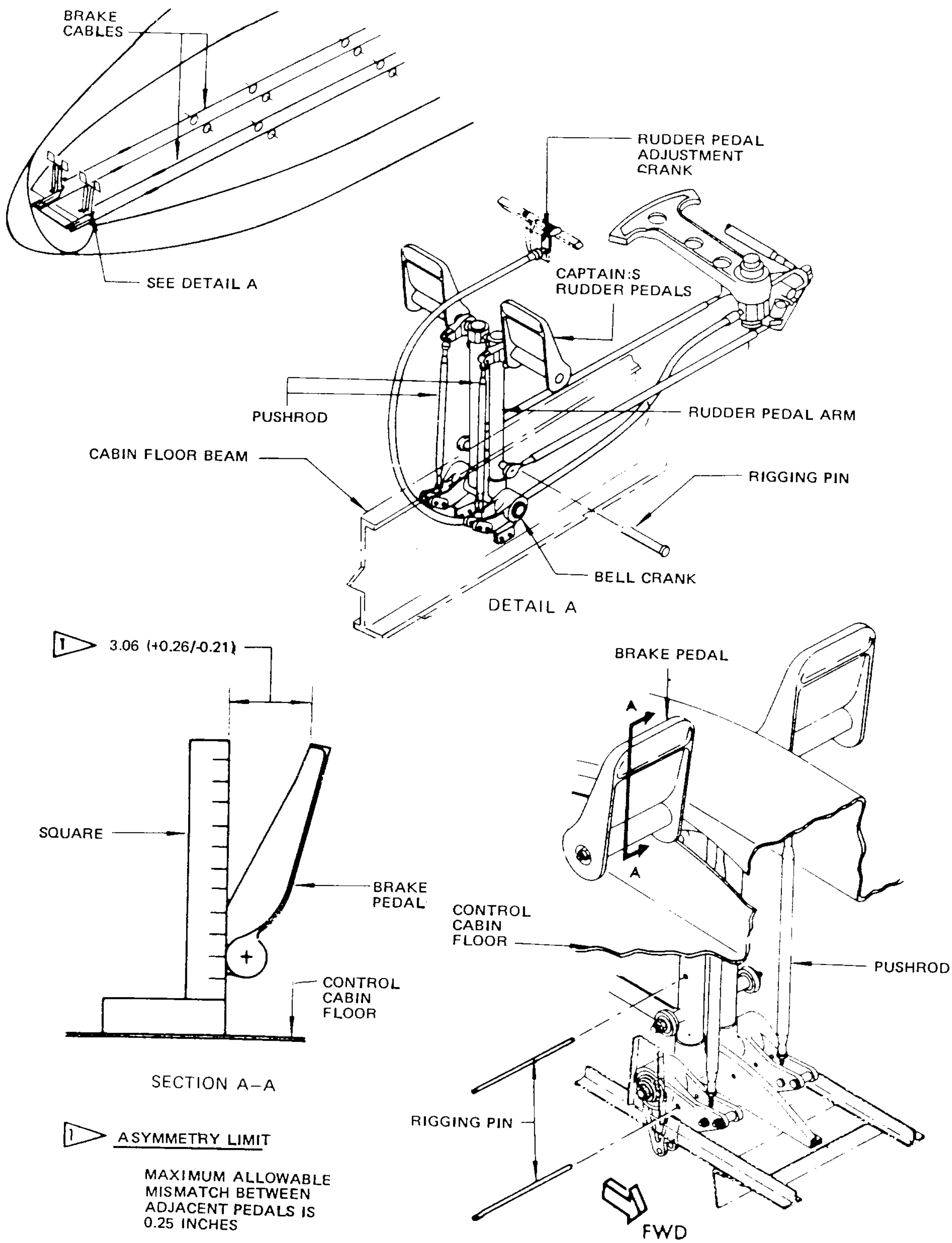
(7) Check brake system plumbing continuity.

(a) Check that ground interconnect valve circuit breaker located on panel P6 is open and is suitably tagged to prevent inadvertent closing during brake system test.

(b) Check that ground interconnect valve is closed and valve position indicator is on position 1.

(c) Pressurize hydraulic system B to 3000 psi through the ground power modular unit using hydraulic service cart (Ref 29-12-0). Depress and hold brake pedals.

1) Check pressure to be 3000 + 100 psi at each outboard wheel brake gage.



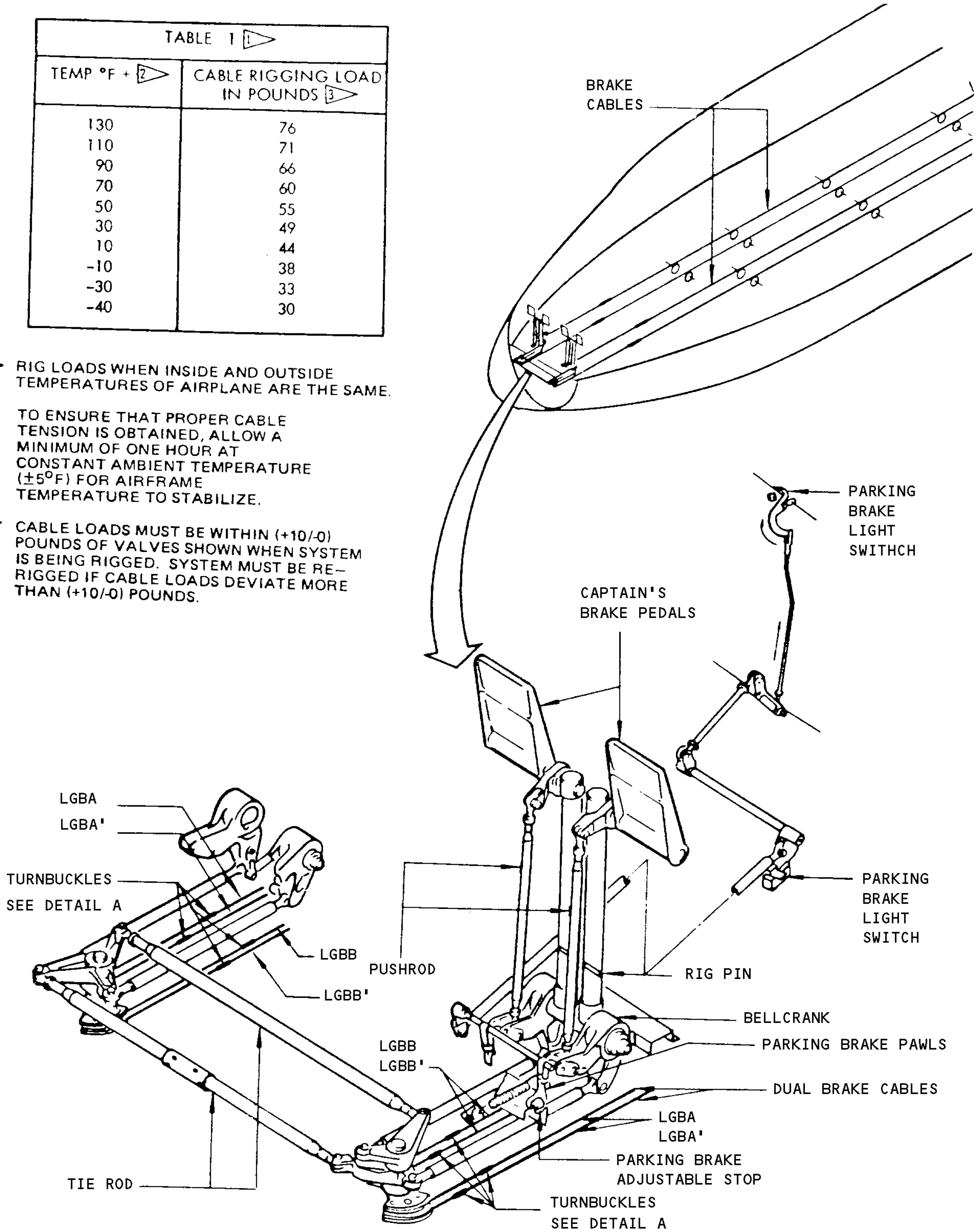
Hydraulic Brake Pedal Adjustment
Figure 501

TABLE 1 [1]	
TEMP °F + [2]	CABLE RIGGING LOAD IN POUNDS [3]
130	76
110	71
90	66
70	60
50	55
30	49
10	44
-10	38
-30	33
-40	30

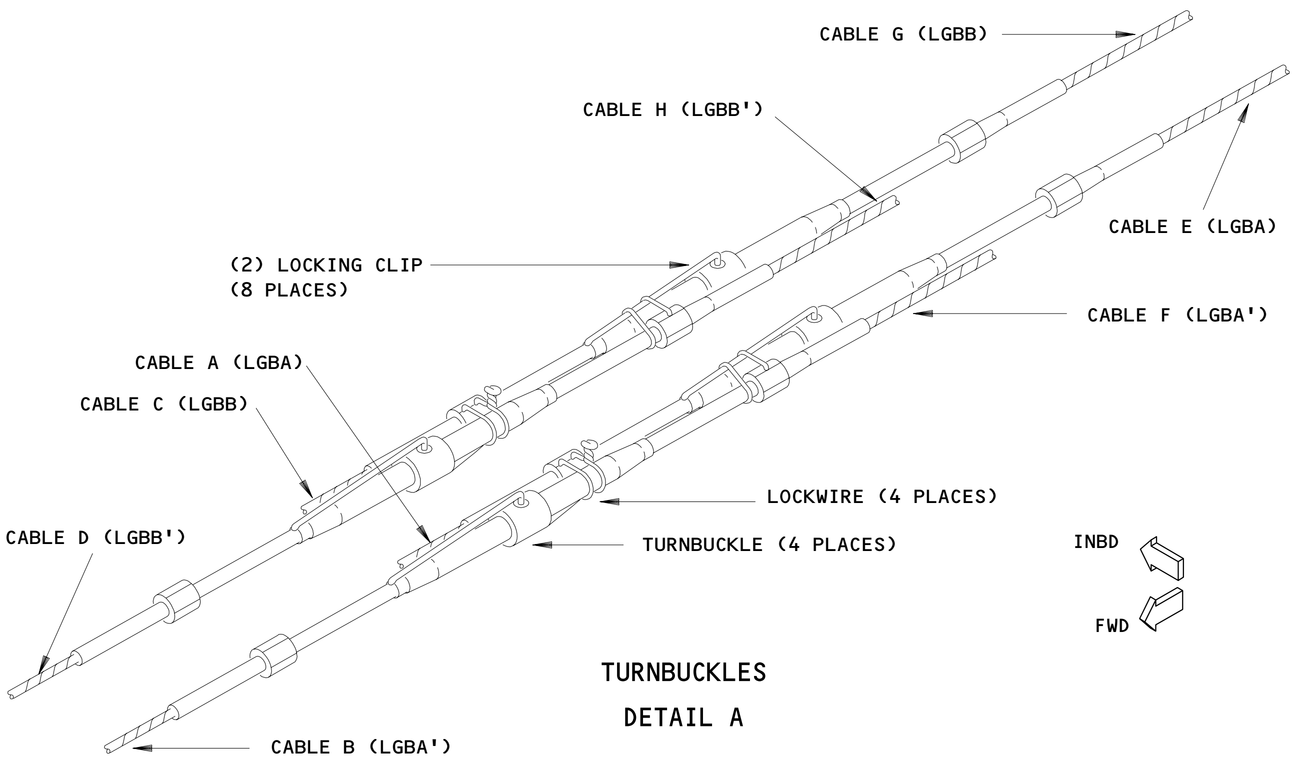
[1] RIG LOADS WHEN INSIDE AND OUTSIDE TEMPERATURES OF AIRPLANE ARE THE SAME.

[2] TO ENSURE THAT PROPER CABLE TENSION IS OBTAINED, ALLOW A MINIMUM OF ONE HOUR AT CONSTANT AMBIENT TEMPERATURE (±5°F) FOR AIRFRAME TEMPERATURE TO STABILIZE.

[3] CABLE LOADS MUST BE WITHIN (+10/-0) POUNDS OF VALVES SHOWN WHEN SYSTEM IS BEING RIGGED. SYSTEM MUST BE RE-RIGGED IF CABLE LOADS DEVIATE MORE THAN (+10/-0) POUNDS.



Hydraulic Brake System Cables and Brake Metering Valve
Figure 502 (Sheet 1)



TURNBUCKLES
DETAIL A

Hydraulic Brake System Cables and Brake Metering Valve
Figure 502 (Sheet 2)

2) Check that each inboard wheel brake gage indicates return pressure (50 psi or less).

(d) Manually open ground interconnect valve by placing ground interconnect valve indicator to position 2.

CAUTION: GROUND INTERCONNECT VALVE SHOULD NOT BE OPENED MANUALLY WITH ELECTRICAL POWER ON. THIS MIGHT CAUSE DAMAGE TO THE INTERCONNECT VALVE MOTOR.

(e) Pressurize hydraulic systems A and B to 3000 psi through the ground power modular unit using hydraulic service cart (Ref 29-11-0 and 29-12-0).

(f) Check that pressure indicators inside the control cabin read 3000 + 100 psi.

(8) Deleted.

C. Test Main Gear Brakes

(1) Fully depress and hold the captain's or first officer's brake pedals against stop. Check pressure at each brake to be 3000 + 100 psi (Fig. 503).

(2) Release brake pedals and check each brake assembly for release by observing the brake stack movement. Check that gage pressure at the brakes falls to 50 psi or less.

(3) Depressurize hydraulic systems leaving the brake system pressurized with the accumulators.

(4) Observe brake pressure after three complete brake applications. Pause between each application to obtain maximum pressure. Brake pressure shall not be less than 800 psi at the brakes.

(5) Pressurize A and B hydraulic systems to 3000 psi (Ref 29-11-0 and 29-12-0). Pull override trigger and place landing gear control lever in UP position. Check that pressure at each brake rises to 350 psi within 4 seconds and stabilizes above this pressure.

WARNING: CHECK THAT GROUND LOCK ASSEMBLIES ARE INSTALLED IN ALL LANDING GEAR TO PREVENT INADVERTENT OPERATION OF GEAR. INJURY TO PERSONNEL AND/OR EQUIPMENT COULD RESULT IF GEAR RETRACTS.

(6) Place landing gear control lever in the OFF position. Check release of each brake assembly as observed by the brake stack release.

(7) Place landing gear control lever in the DN position and check that each brake assembly remains released.

D. Restore System to Normal

(1) Depressurize hydraulic System A and B. Refer to 29-11-0 and 29-12-0.

(2) Remove pressure gages from each brake bleed port and install bleed screw.

(3) Pressurize hydraulic systems A and B. (Refer to 29-11-0 and 29-12-0.) Check that accumulators are precharged per placard.

(4) Bleed brakes by depressing brake pedals slowly and fully for six times and check brake operation by observing friction pin movement in response to brake pedal movement.

(5) Manually close ground interconnect valve by placing ground interconnect valve indicator to position 1.

<u>CAUTION</u>: GROUND INTERCONNECT VALVE SHOULD NOT BE CLOSED MANUALLY WITH ELECTRICAL POWER ON. THIS MIGHT CAUSE DAMAGE TO THE INTERCONNECT VALVE MOTOR.

(6) Check that ground interconnect valve circuit breaker on P6 is closed.
(7) Set parking brake.
(8) Remove System A and B hydraulic power. Refer to 29-11-0 and 29-12-0.
(9) Determine if there is any further need for electrical power on the airplane, if not, remove external power.

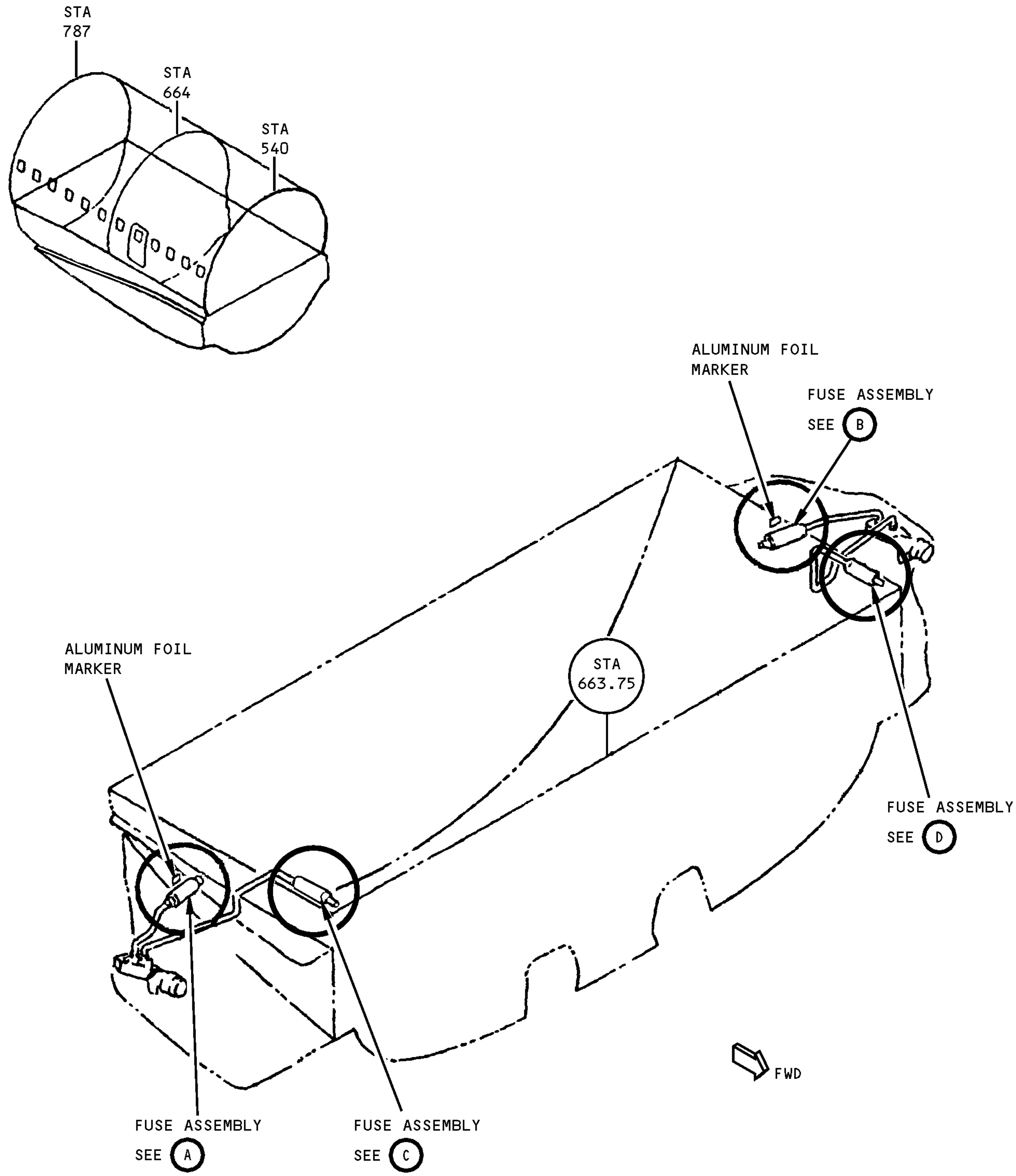
BRAKE HYDRAULIC FUSES - REMOVAL/INSTALLATION

1. General
   A. This procedure has two tasks:
      (1) A removal of the hydraulic fuses for the brake system for the main landing gear.
      (2) An installation of the hydraulic fuses for the brake system for the main landing gear.
   B. There is one hydraulic fuse for each brake. The four fuses are located in the airplane main landing gear wheel well.
   C. Bleed the brakes after fuse replacement.
2. Brake Hydraulic Fuse Removal
   A. References
      (1) AMM 29-09-300/201, Hydraulic Reservoir Pressurization System
      (2) AMM 32-00-01/201, Ground Lock Assemblies
   B. Prepare for the Removal
      (1) Make sure the downlocks are installed on the nose and main landing gear (AMM 32-00-01/201).

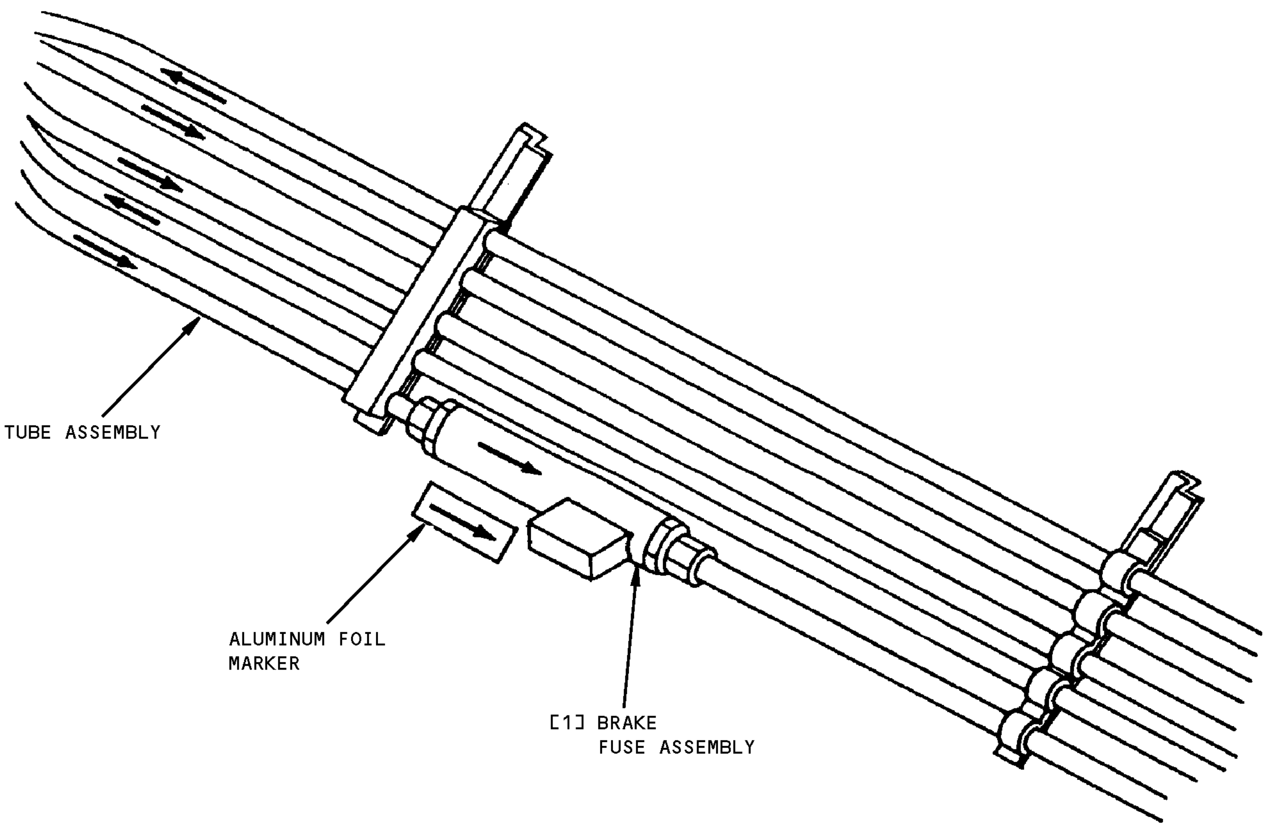
      WARNING: MAKE SURE THE DOWNLOCKS ARE INSTALLED ON ALL THE LANDING GEAR. WITHOUT THE GROUND LOCKS, THE LANDING GEAR COULD RETRACT AND CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

      (2) Make sure the tires have chocks installed around them.
      (3) Release the parking brake.
      (4) Depressurize the hydraulic reservoirs (AMM 29-09-300/201).
      (5) Fully depress the brake pedals 12 times to remove pressure from the brake accumulators.
   C. Hydraulic Fuse Removal (Fig. 401).
      (1) Disconnect the hydraulic tubes from the brake fuse assembly (1).
      (2) Install plugs in the hydraulic tubes and fittings.
      (3) Remove the screws (3), washers (4), and the clamps (2) as necessary.
      (4) Remove the brake fuse assembly (1).
3. Brake Hydraulic Fuse Installation
   A. References
      (1) AMM 29-11-0/201, Hydraulic System A
      (2) AMM 29-12-0/201, Hydraulic System B
      (3) AMM 32-41-0/201, Hydraulic Brake System
   B. Hydraulic Fuse Installation (Fig. 401).

   WARNING: MAKE SURE THAT YOU INSTALL THE NEW FUSE CORRECTLY. IF YOU INSTALL THE NEW FUSE BACKWARDS, THIS CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.



Brake Hydraulic Fuses Replacement
Figure 401 (Sheet 1)



BRAKE FLOW FUSE
(LOOKING UP FORWARD AND INBOARD)
(RIGHT SIDE IS SHOWN)
A

Brake Hydraulic Fuses Replacement
Figure 401 (Sheet 2)

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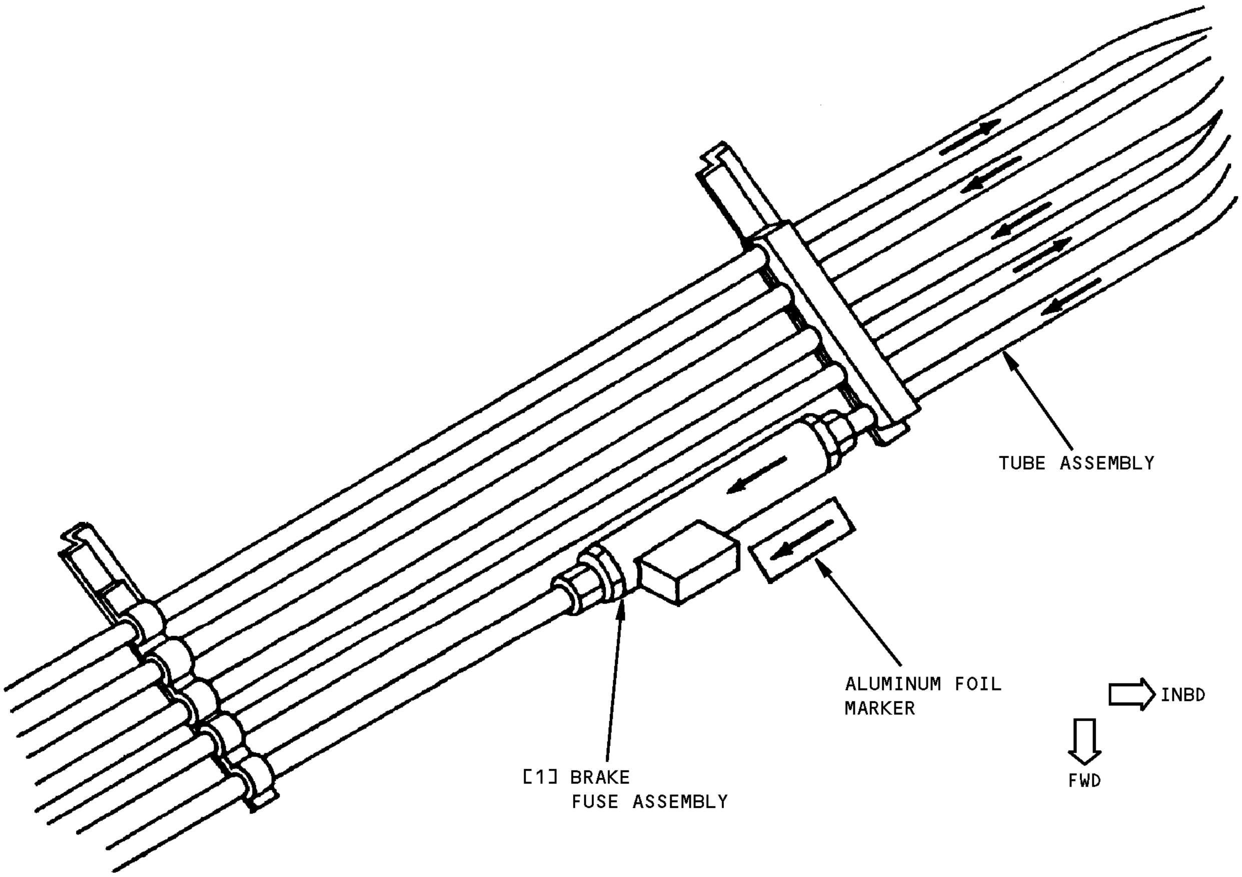
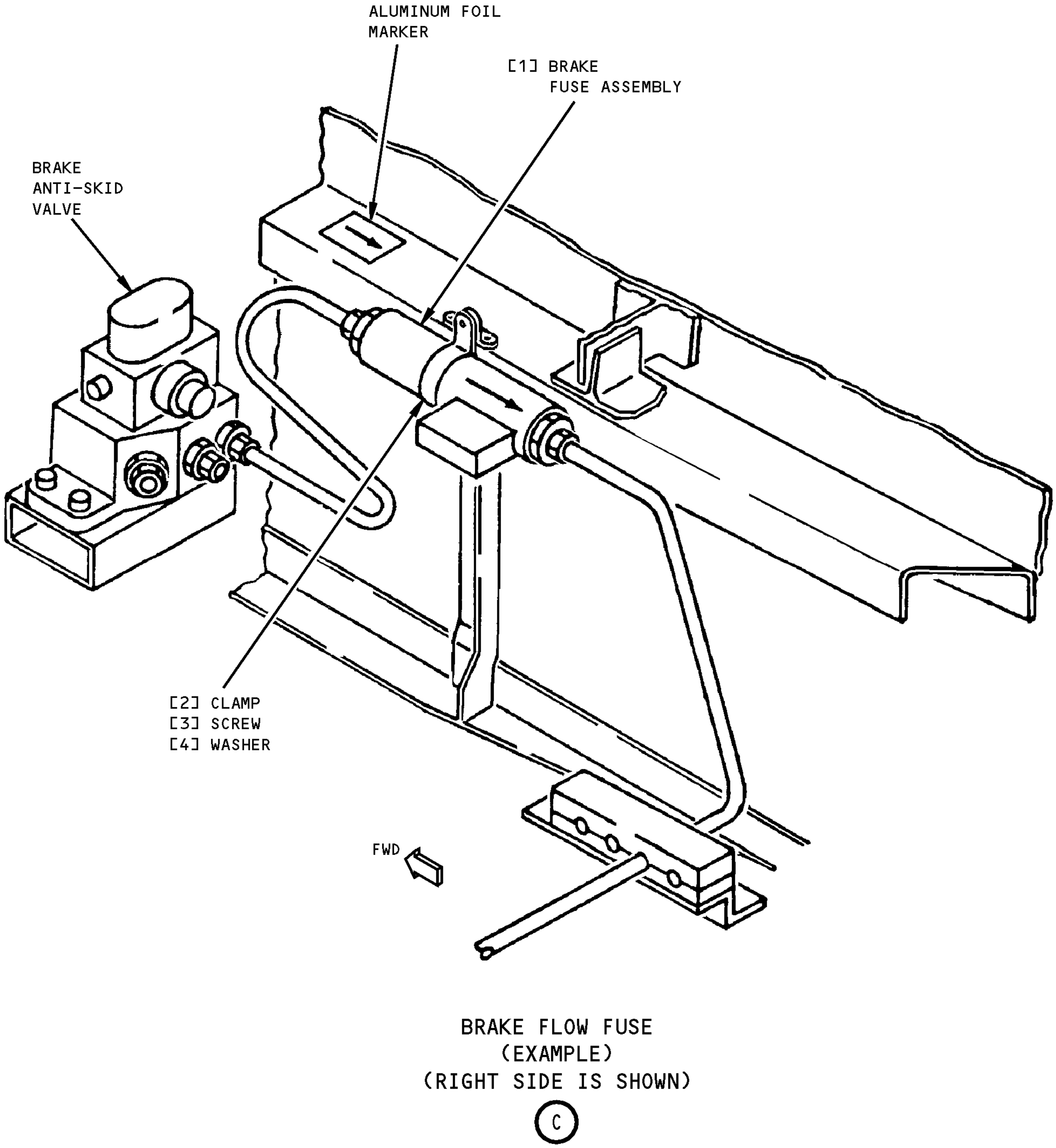
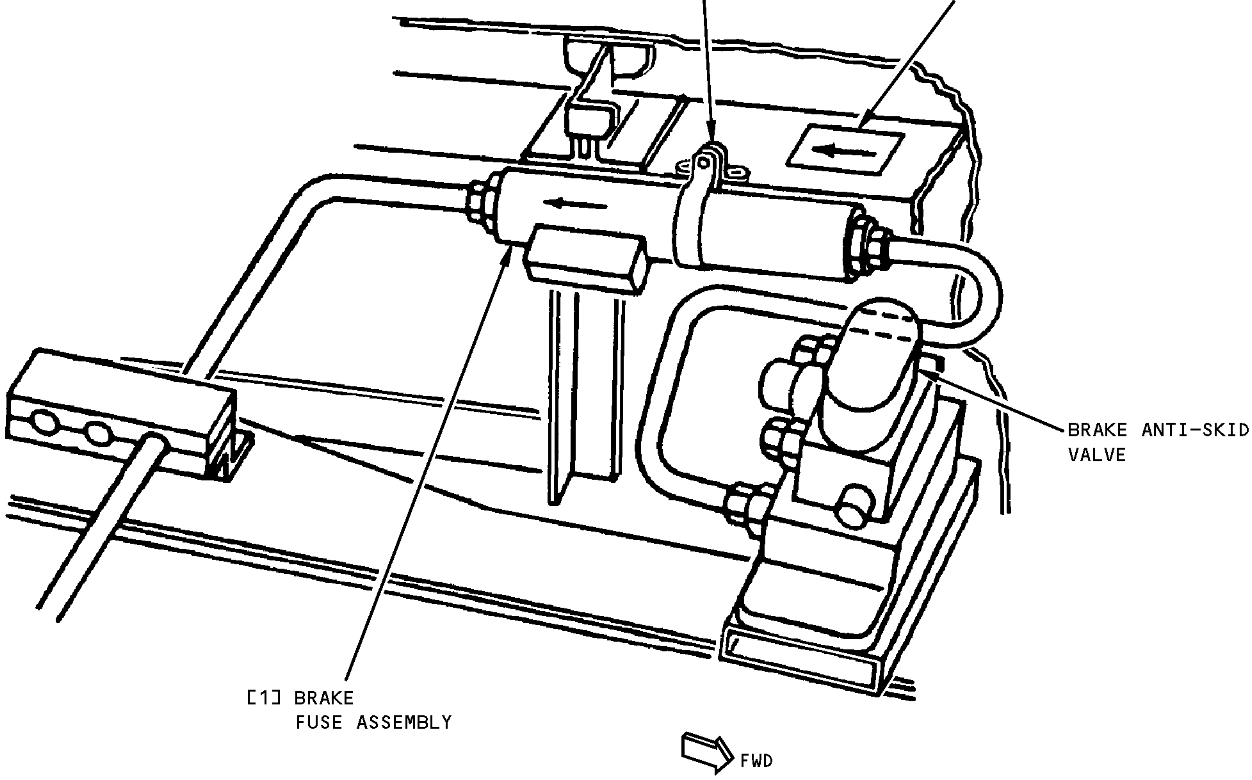


BRAKE FLOW FUSE
(LOOKING UP FORWARD AND INBOARD)
(LEFT SIDE IS SHOWN)
B

Brake Hydraulic Fuses Replacement
Figure 401 (Sheet 3)



Brake Hydraulic Fuses Replacement
Figure 401 (Sheet 4)



BRAKE FLOW FUSE
(LEFT SIDE IS SHOWN)

D

Brake Hydraulic Fuses Replacement
Figure 401 (Sheet 5)

(1) Hold the fuse assembly (1) in its position and install the clamps (2), washers (4) and screws (3) as necessary.
(2) Remove the plugs from the hydraulic tubes and fittings.
(3) Connect the hydraulic tubes to the fuse assembly (1).

C. Hydraulic Brake Fuse Installation Test
(1) Pressurize hydraulic systems A and/or B (AMM 29-11-0/201, AMM 29-12-0/201).
(a) If you replaced a hydraulic fuse for an inboared brake, you will need to pressurize the hydraulic system A.
(b) If you replaced a hydraulic fuse for an outboard brake, you will need to pressurize the hydraulic system B.
(2) Do a visual test of the fuse assembly (1) for hydraulic leaks.
(3) Do the hydraulic brake fuse test (AMM 32-41-0/201).
(4) Bleed the appropriate brake system (AMM 32-41-0/201).

D. Put the Airplane Back to Its Usual Condition
(1) Remove hydraulic power (AMM 29-11-0/201 or AMM 29-12-0/201).
(2) Set the parking brake.

BRAKE METERING VALVE CONTROL QUADRANT - REMOVAL/INSTALLATION

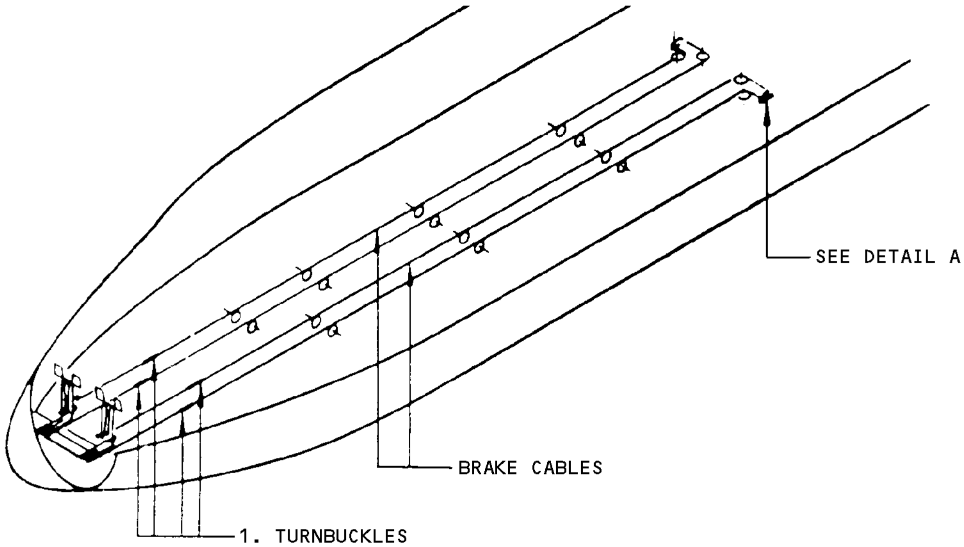
1. General
   A. This procedure covers removal/installation of brake metering valve control quadrants for both captain's and first officer's brake system.
2. Equipment and Materials
   A. Gear Ground Lock Assembly - F72735 (Ref 32-00-01)
3. Prepare for Removal
   A. Check that gear ground lock assembly is installed in nose gear (Ref 32-00-01).
   B. Unlock and remove passenger seats to clear floor covering area from station 664 thru station 695 (Ref Chapter 25, Passenger Seats)
   C. Remove carpet by pulling carpet up from double-backed tape.
   D. Remove right or left outboard panel from station 664 thru station 695 to gain access of control quadrant assembly.
4. Remove Brake Metering Valve Control Quadrant
   A. Loosen turnbuckles (1, Fig. 401) on cables LGBA, LGBA', LGBB and LGBB'.
   B. Disconnect cotter pin (8) and remove cables LGBA, BGBA', LGBB and LGBB' from control quadrant assembly (2).
   C. Remove four attach bolts (7) from bearing retainer plate (6).
   D. Remove bearing retainer plate (6) and control quadrant assembly (2).

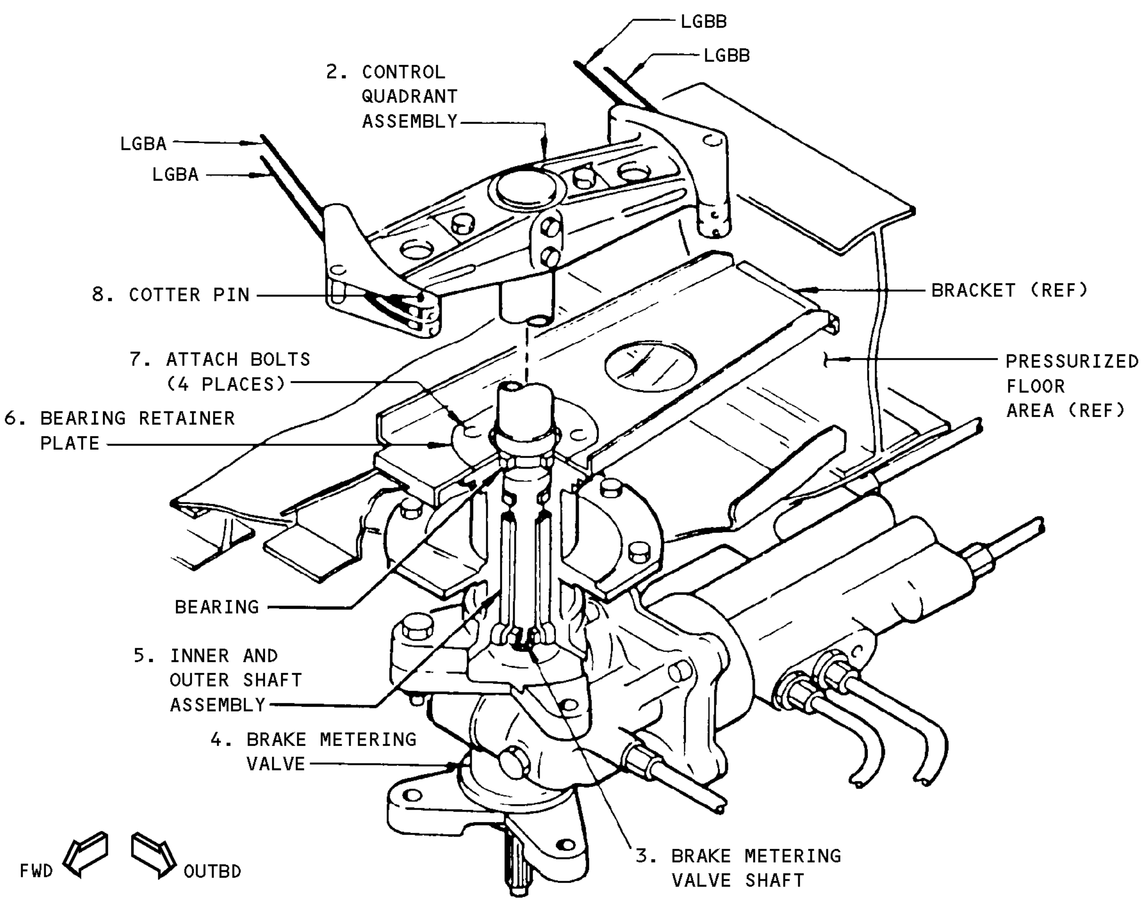
      NOTE: Quadrant assembly (2) will come out as a quadrant, shaft, bearing, and retainer plate (6).

5. Install Brake Metering Valve Control Quadrant
   A. Align splines of control quadrant assembly (2, Fig. 401) and brake metering valve (4). Install control quadrant assembly (2).

      NOTE: Control quadrant assembly shaft (5) mates with brake metering valve shaft (3), which is spring-loaded to off position.

   B. Install and attach four bolts (7) to bearing retainer plate.
   C. Connect cables LGBA, LGBA', LGBB and LGBB' to control quadrant assembly (2), using cotter pin (8).
   D. Adjust and test brake system per 32-41-0.
6. Restore Airplane to Normal Configuration
   A. Install right or left outboard panel from station 664 thru station 695.
   B. Install carpet using double-backed tape.
   C. Install passenger seats (Ref Chapter 25, Passenger Seats).





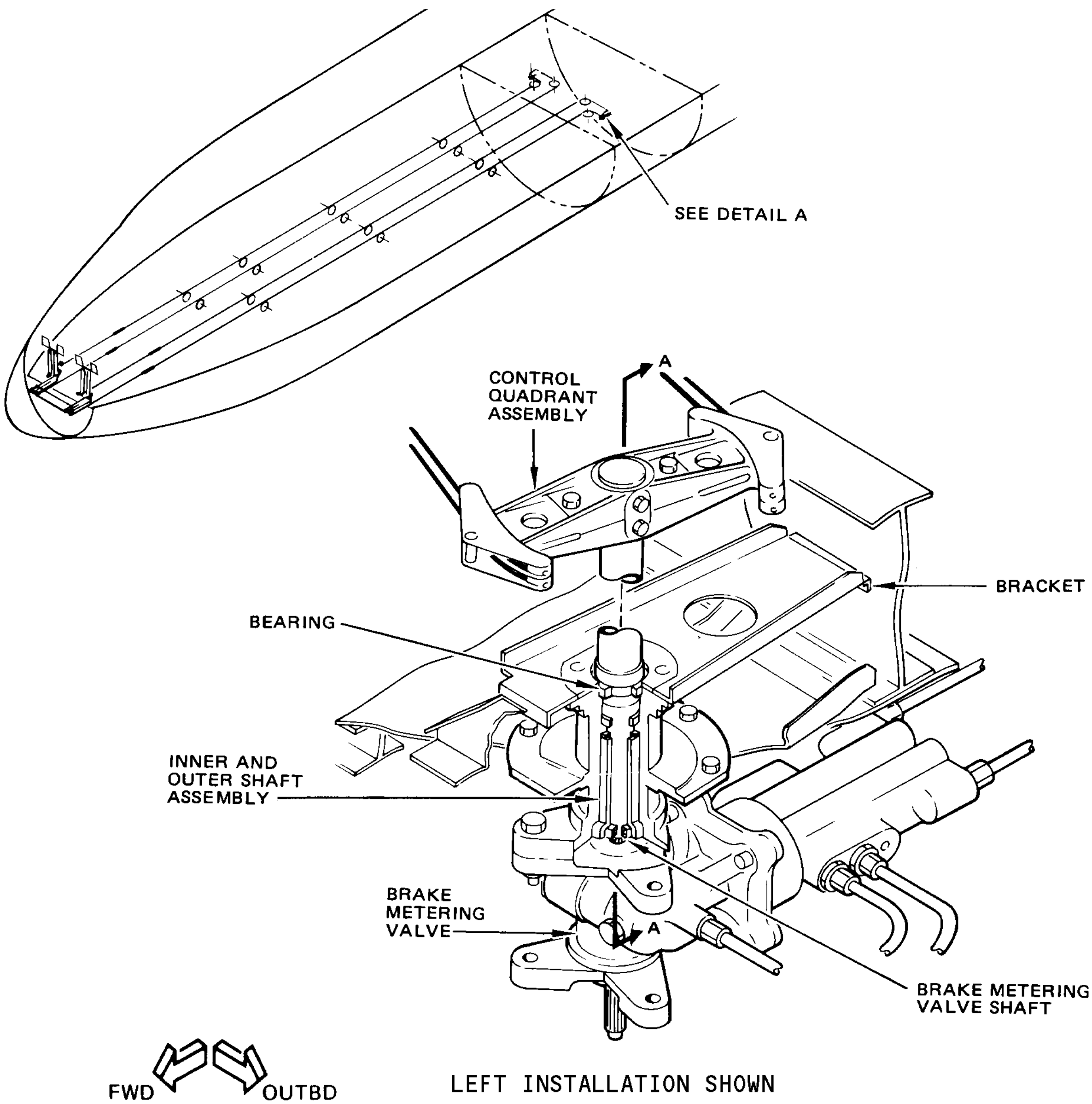
LEFT INSTALLATION SHOWN
RIGHT INSTALLATION SIMILAR
DETAIL A

NOTE: BRAKE VALVE FEEL AUGMENTATION ACTUATOR AND GUARD IS NOT SHOWN FOR CLARITY

Brake Metering Valve Control Quadrant Installation
Figure 401

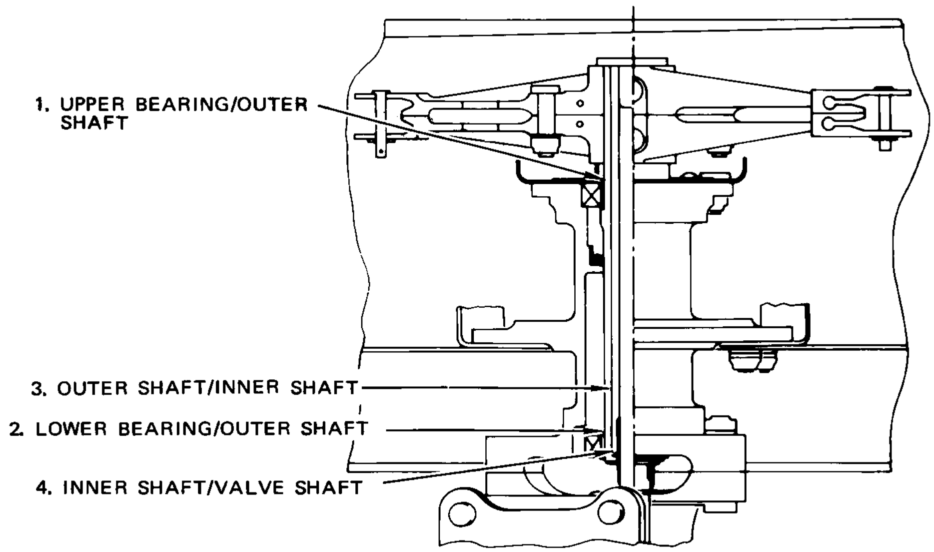
BRAKE METERING VALVE CONTROL QUADRANT - INSPECTION/CHECK

1. General
   A. This data consists of an illustration and a wear limit chart. No procedure is given in this section for gaining access to permit inspection. For this information, refer to Brake Metering Valve Control Quadrant - Removal/Installation.
2. Brake Metering Valve Control Quadrant Wear Limits (See figure 601.)



LEFT INSTALLATION SHOWN
RIGHT INSTALLATION SIMILAR
DETAIL A

Brake Metering Valve Control Quadrant Wear Limits
Figure 601 (Sheet 1)



SECTION A-A

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS DIAMETER MIN	DESIGN LIMITS DIAMETER MAX	WEAR LIMITS MAX WEAR DIM.	WEAR LIMITS MAX DIAM CLEARANCE	REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR.
1	UPPER BEARING	ID	0.9995	1.0000	1.0005	0.0025	X		
	OUTER SHAFT	OD	0.9990	0.9995	0.9980			X	*[1]
2	LOWER BEARING	ID	0.9990	1.0000	1.0005	0.0025	X		
	OUTER SHAFT	OD	0.9990	0.9995	0.9980			X	*[1]
3	OUTER SHAFT	ID				0.005 *[2]	X		
	INNER SHAFT	OD					X		
4	INNER SHAFT	ID				0.005 *[2]	X		
	VALVE SHAFT	OD					X		

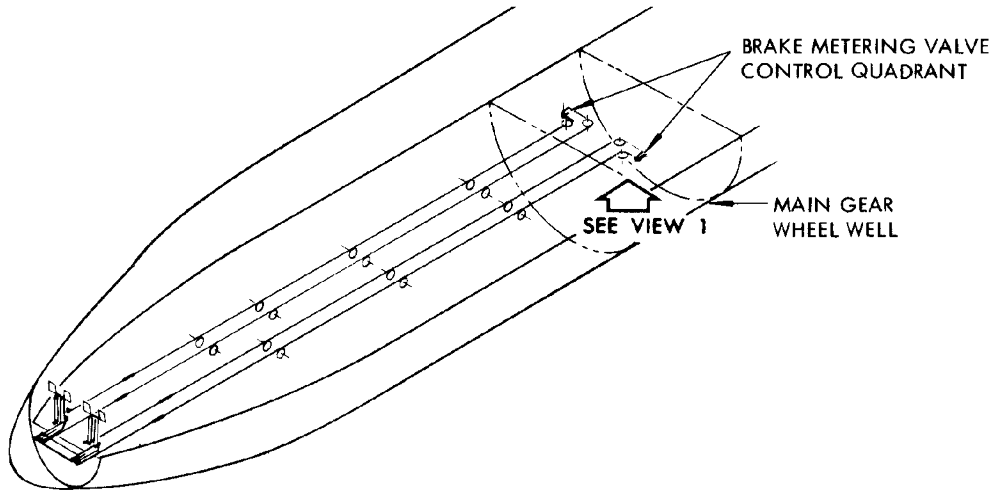
*[1] Cadmium plate (0.0002 to 0.0003 inch thick) with post-plate chromate treatment to 0.9995-inch OD and bake 3 hours minimum at 375 (± 25)°F. Refer to Overhaul Manual, 20-42-05.

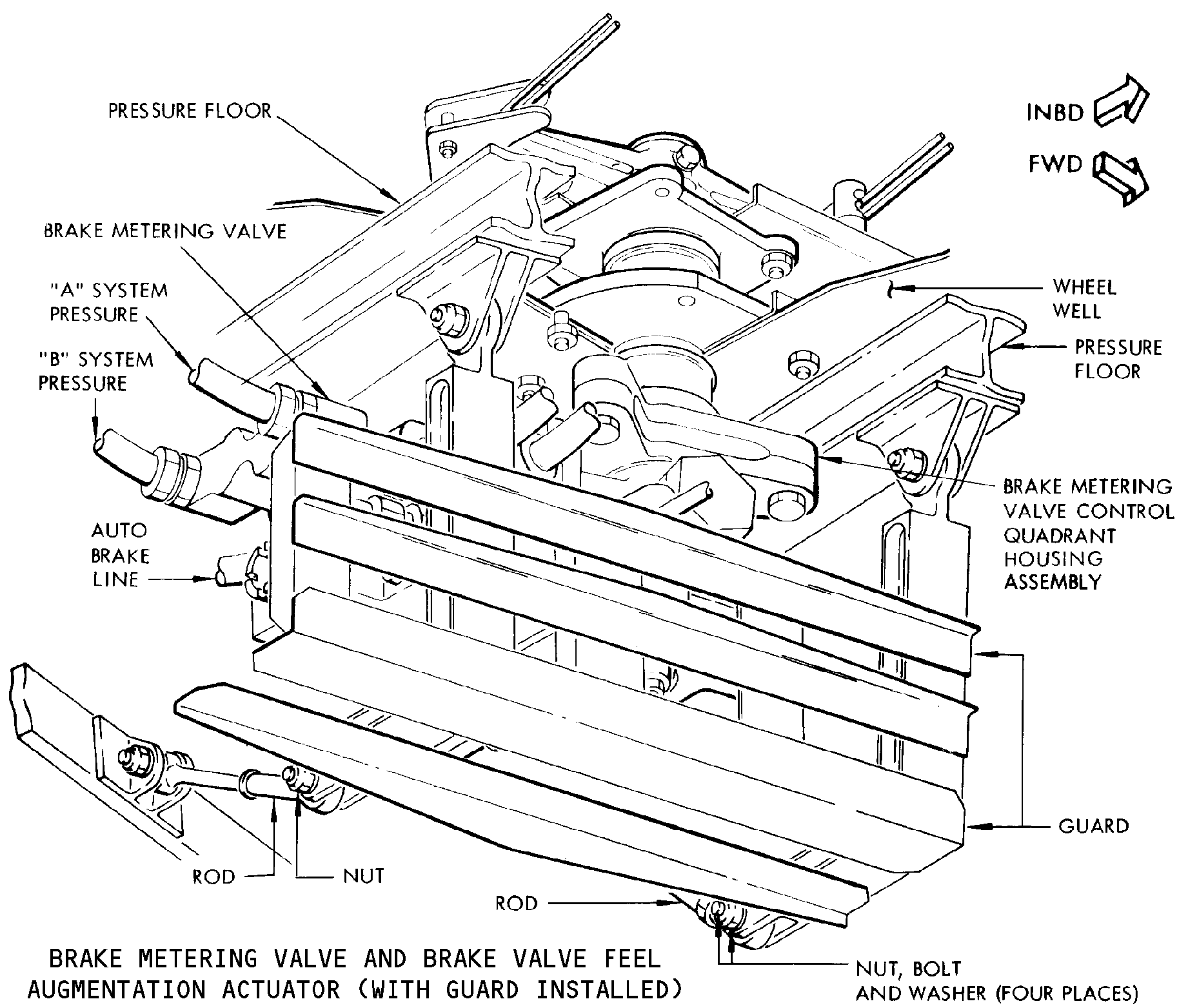
*[2] Spline backlash measured at pitch diameter of spline.

Brake Metering Valve Control Quadrant Wear Limits
Figure 601 (Sheet 2)

BRAKE METERING VALVE - REMOVAL/INSTALLATION

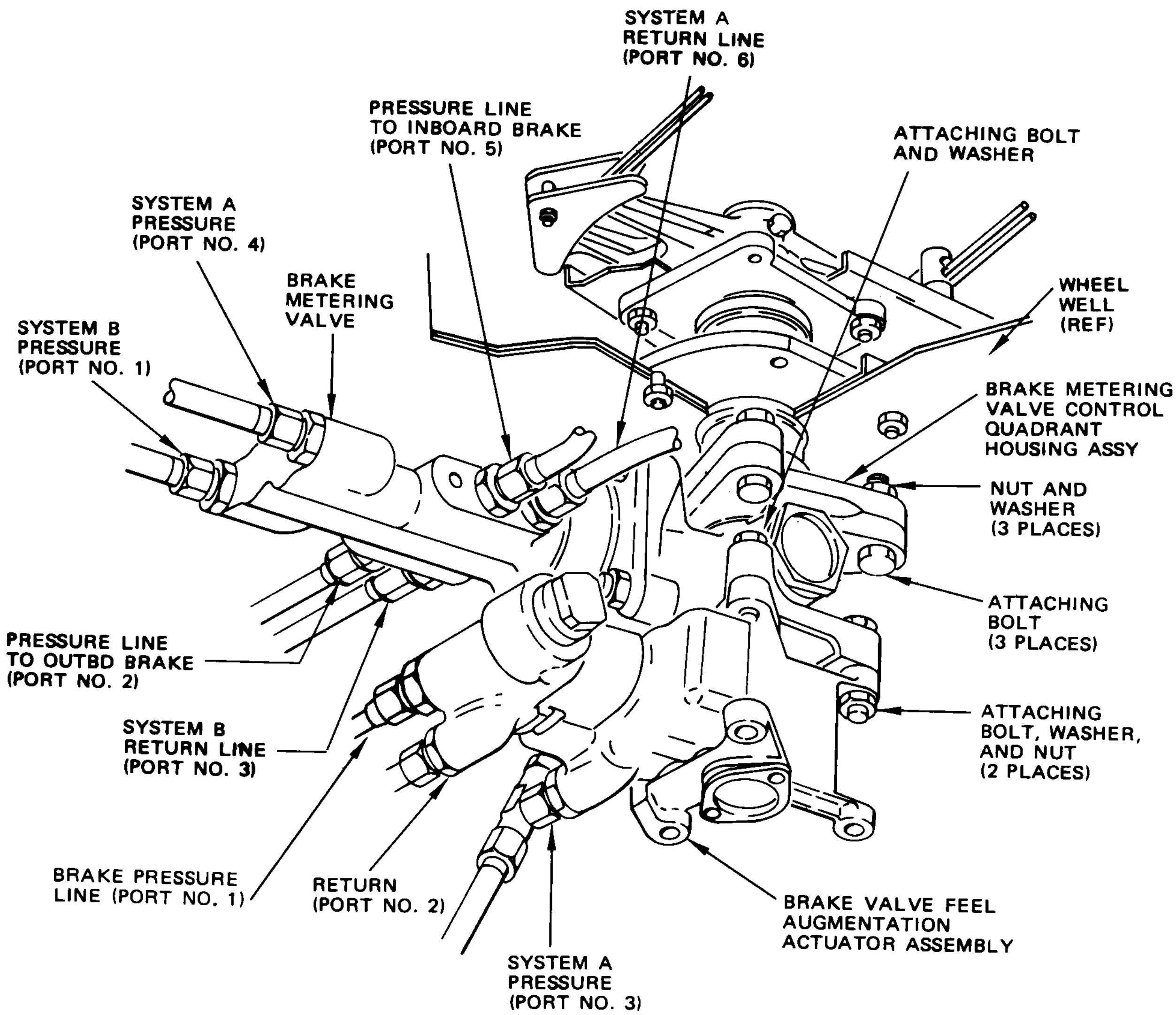
1. General
   A. This procedure covers removal/installation of either left or right brake metering valve. The brake metering valve should be removed or installed with brake valve feel augmentation actuator assembly. After removing brake metering valve, these two units, i.e., brake metering valve and brake valve feel augmentation actuator can be separated.
2. Equipment and Materials
   A. Gear Ground Lock Assemblies - F72735 (Ref 32-00-01)
   B. Hydraulic Fluid, Fire Resistant - BMS 3-11, or equivalent
   C. Corrosion Preventive Compound - MIL-C-11796, Class 1, 2, and 3.
3. Prepare to Remove Brake Metering Valve
   A. Check that landing gears are down and locked and ground lock assemblies installed (Ref 32-00-01).
   B. Chock wheels and release parking brake.
   C. Depressurize hydraulic system A and B (Ref 29-11-0 and 29-12-0 MP).
   D. Discharge brake accumulators by operating brakes fully eight times.
4. Remove Brake Metering Valve
   A. Remove nut, bolt, and washer (4 places) to disconnect rods from guard (Fig. 401).
   B. Remove guard from brake metering valve and brake valve feel augmentation actuator assembly.
   C. Disconnect hydraulic lines from metering valve and brake valve feel augmentation actuator. Cap valve ports, actuator ports, and hydraulic lines.
   D. Remove check valve from brake metering valve return port No. 3. Cap valve port.
   E. Remove three sets of attaching bolts, nuts, and washers and detach brake metering valve from brake metering valve control quadrant housing assembly.
   F. Remove brake metering valve and brake valve feel augmentation actuator.
   G. Remove brake valve feel augmentation actuator assembly from brake metering valve by removing two sets of attaching bolts, nuts, and washers plus a single bolt and washer.
5. Install Brake Metering Valve
   A. Apply corrosion preventive compound to mating spline surfaces of brake metering valve assembly shaft and feel augmentation actuator assembly crank.
   B. Stack brake metering valve and feel augmentation actuator assemblies together with splines of shaft and crank engaged. Ensure that brake metering valve is on top and that metering valve port No. 2 and 3 and feel augmentation port No. 1, 2, and 3 will all point outboard with metering valve port No. 1 and 4 pointing to the rear when assemblies are installed in airplane.





BRAKE METERING VALVE AND BRAKE VALVE FEEL
AUGMENTATION ACTUATOR (WITH GUARD INSTALLED)
VIEW 1

Brake Metering Valve Installation
Figure 401 (Sheet 1)



BRAKE METERING VALVE AND BRAKE VALVE FEEL
AUGMENTATION ACTUATOR (GUARD REMOVED)
VIEW 1

Brake Metering Valve Installation
Figure 401 (Sheet 2)

445505

C. Align matching bolt holes and secure brake metering valve assembly to feel augmentation actuator assembly using two sets of bolts, washers, and nuts plus a single bolt and washer. (See figure 401.)
D. Lubricate new O-ring with hydraulic fluid and install check valve in brake metering valve system B return (No. 3) port with check valve arrow pointing away from brake metering valve.
E. Lubricate new O-rings with hydraulic fluid and install unions in remaining ports of brake metering valve and feel augmentation actuator.
F. Apply corrosion preventive compound to mating spline surfaces, align splines, and engage shaft ends of brake metering valve and control quadrant housing assembly installed on airplane.
G. Align matching bolt holes and secure brake metering valve assembly to control quadrant-housing assembly using three bolts, installed head down, with washers and nuts.
H. Connect all hydraulic lines.
I. Install guard on brake metering valve and brake valve feel augmentation actuator assembly by attaching guard with four rods using bolt, nut, and washer.
J. Test hydraulic brake system. Refer to 32-41-0, Hydraulic Brake System - Adjustment/Test.
K. Bleed main gear brakes and check for brake operation by observing friction pin movement in response to brake pedal movement. Refer to 32-41-0, Hydraulic Brake System - Maintenance Practices for bleeding procedure.

<u>WARNING</u>: MAIN GEAR BRAKES MUST BE BLED ACCORDING TO THE BLEEDING PROCEDURE LISTED IN HYDRAULIC BRAKE SYSTEM - MAINTENANCE PRACTICES OR INOPERABLE BRAKES MAY OCCUR DUE TO IMPROPER BLEEDING.

6. <u>Restore Airplane to Normal Configuration</u>
A. Service hydraulic reservoir. Refer to Chapter 12, Hydraulic Servicing.
B. Set parking brakes. After 5 or 10 minutes, check hydraulic line connections for leaks.

MAIN GEAR WHEEL BRAKE - REMOVAL/INSTALLATION

1. Equipment and Materials
   A. Wheel Change Dolly - Commercially available
   B. Axle Protection Sleeve - F80007-1 or F72913-8
   C. Torque wrench - required for 150 to 350 pound-feet torque
   D. Gear Ground Lock Assembly (Ref 32-00-01)
   E. Grease (Ref 20-30-21)
      (1) Aeroshell #5 (preferred)
      (2) MIL-G-81322 (first alternate)
      (3) MIL-G-25760 (second alternate)
   F. Thread Lubricant
      (1) Ease-Off 990 or equivalent
   G. Main Gear Axle Nut Socket - F80168-2 or 80168-3
   H. Hydraulic Fluid, Fire Resistant - BMS 3-11 (Ref 20-30-21)
   I. Grease, BATCO X8401-2
   J. Axle Thread Protector - F72913-11
2. Remove Main Gear Wheel Brake
   A. Check that landing gear is down and locked and ground lock assemblies are installed (Ref 32-00-01).
   B. Depressurize hydraulic system A and/or B (Ref 29-11-0 MP and 29-12-0 MP).
   C. Chock wheels and release parking brake.
   D. Discharge brake accumulators by operating brakes fully six times.

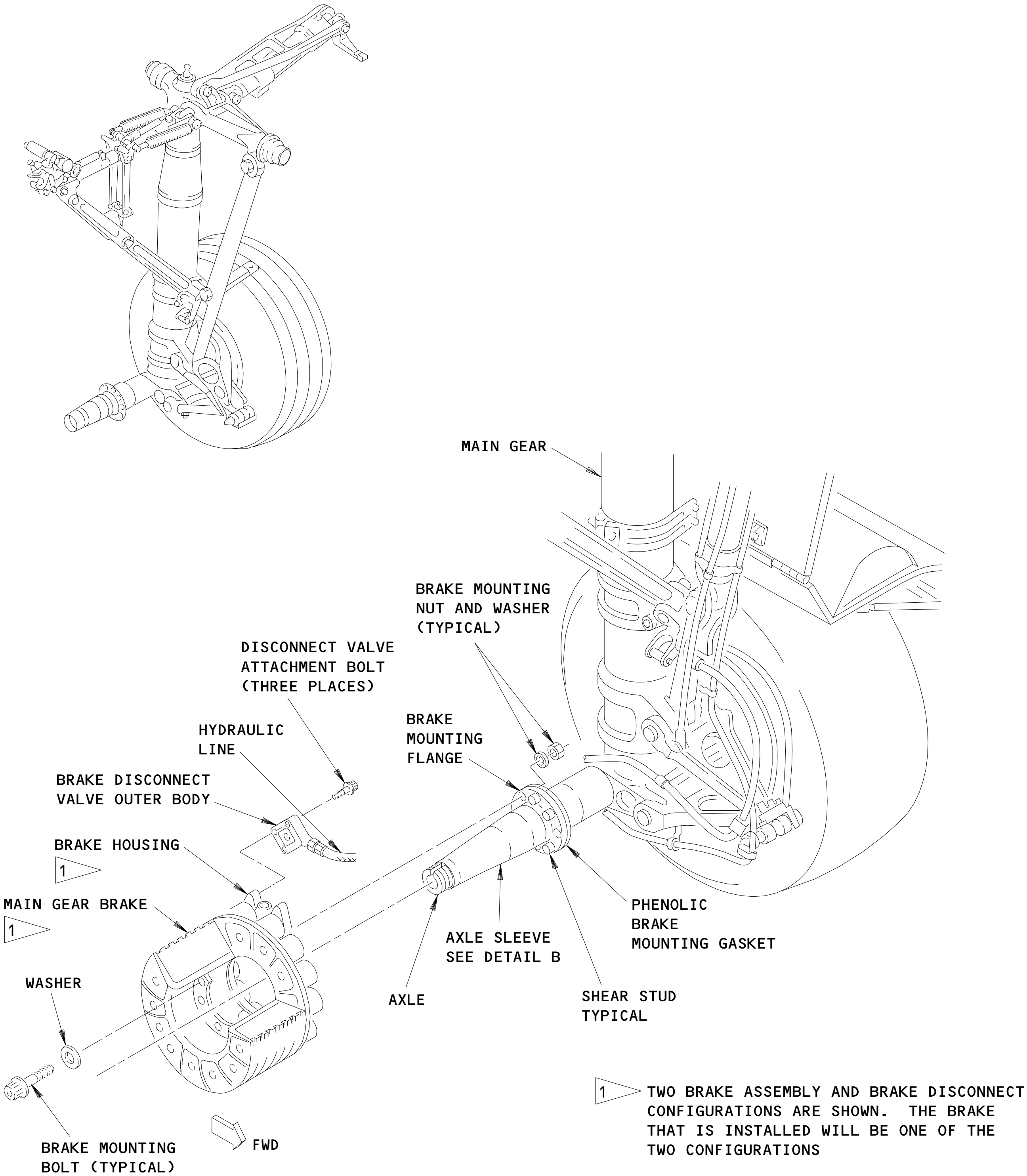
      NOTE: Inboard brakes are in hydraulic system A; outboard brakes in system B.

   E. Break lockwire, remove three attaching bolts, and pull off outer body of brake disconnect valve leaving inner disconnect remaining in brake pressure port. Discard exposed preformed seal and two backup rings in groove of removed portion of disconnect.

      NOTE: To prevent loss of hydraulic fluid and entrance of dirt, do not break hose connection at disconnect fitting.

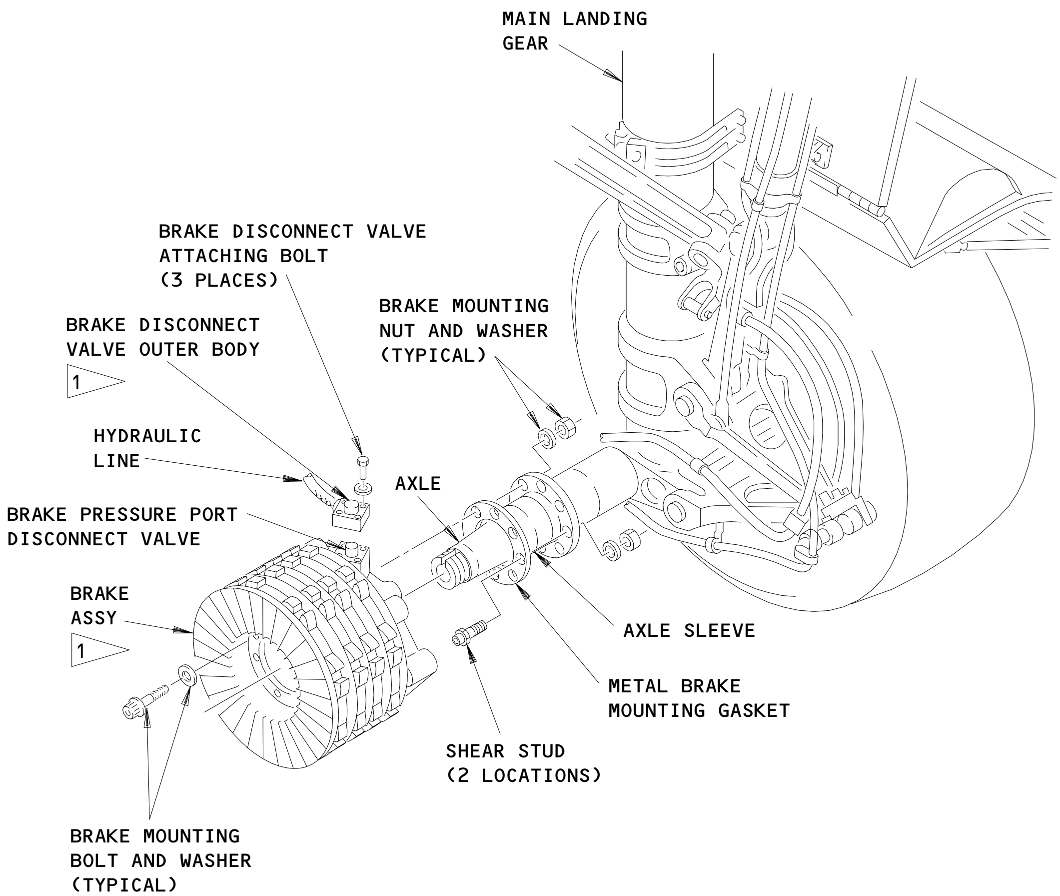
   F. Jack axle to raise wheel and tire assembly clear of ground (Ref Chapter 7, Jacking Airplane).
   G. Remove wheel and tire assembly (Ref 32-45-11 R/I).
   H. Install axle thread protector and axle protection sleeve.
   I. Remove brake and if in poor condition, remove gasket from axle mounting flange.

      NOTE: If a metal gasket is installed, the brake-mounting studs will have to be removed. Pressing or light tapping of studs may be used if necessary.



INSTALLATIONS WITH PHENOLIC BRAKE MOUNTING GASKET

Main Gear Wheel Brake Installation
Figure 401 (Sheet 1)



Main Gear Wheel Brake Installation
Figure 401 (Sheet 2)

J. Visually inspect brake attachment flange for evidence of cracks. If cracks are found, remove shock strut and repair the axle.
K. Visually inspect lower quadrant of main gear axle between brake mounting flanges for evidence of cracks. If cracks are found, main gear shock strut must be replaced (Ref 32-11-21 R/I).

3. Prepare to Install Brake
   A. Ensure that inner or pressure port portion of disconnect valve is installed in pressure port on top surface of brake carrier.
      (1) Screw pressure port portion of disconnect valve into boss in brake housing until flange on disconnect contacts face of boss.
      (2) Turn flange counterclockwise to align bolt holes.
   B. If it is necessary to replace the brake mounting gasket, do the following steps:

      NOTE: For airplanes having the phenolic gasket configuration, it is recommended that the metallic gasket configuration be installed per SB 32-1253.

      (1) For airplanes with a phenolic gasket, clean the faying surfaces and put the gasket through the studs against the brake flange.

         NOTE: You can use BAC5010 (Type 94) adhesive to hold the gasket to the brake flange. Apply the adhesive on 3 to 5 places between the holes.

      (2) For airplanes with a metal gasket, replace the gasket as follows:
         (a) Clean the faying surfaces and put the gasket against the brake flange.
         (b) Install the two shear studs through the gasket and into the brake flange holes at the 3 o'clock and 9 o'clock positions (12 o'clock position is straight up with the gear down and locked).
         (c) Install the studs as follows:
            1) Apply a layer of BMS 5-95 sealant on the part of the stud shanks not threaded.
            2) Push the studs into the holes on the brake flange.

               NOTE: A temperature differential fit (refer to BAC5435) can be used to make the installation easier and/or prevent damage to the studs.

            3) Coat threads of the studs with thread lubricant EASE-OFF 990 or equivalent.
            4) Install washers and nuts.

5) Tighten the nuts with a dial or a needle type torque wrench to find the run-on torque.
6) Tighten the nuts to a torque of 200 to 300 inch-pounds plus the run-on torque but do not tighten more than 700 inch-pounds (total torque).

C. Check for evidence of heat damage on axle brake flanges. If heat damage is observed, repair main gear axle per 32-11-111.

4. Install Main Gear Wheel Brake

A. Lubricate brake mounting bolts with EASE-OFF 990 or equivalent.

B. Position brake so bleed port is at top and install brake mounting bolts, washers, and nuts with heads of bolts pointing toward outer end of landing gear axle (Fig. 401) as follows:

NOTE: Make sure you use the correct grip length bolts during installation. The correct bolt grip length is 15/16 inch. Make sure the head of the bolt is pointing toward the outer end of the landing gear axle. Incorrect bolt orientation will result in interference between the bolt and the wheel grease seal.

(1) Tighten the brake mounting bolts in the two steps that follow:

CAUTION: IF YOU INSTALL THE SAME LOCKNUTS THAT YOU REMOVED, YOU MUST DO A CHECK TO MAKE SURE THAT THE LOCKNUTS MEET THE MINIMUM BREAKAWAY TORQUE VALUES AS GIVEN IN AMM 20-50-11.

(a) Tighten the bolts to 60-70 pound-feet in a crisscross pattern.

NOTE: Tighten the bolts, not the nuts.

(b) Tighten the bolts to a last torque of 125-135 pound-feet in a circular pattern.

C. Lubricate new preformed seal and two backing rings with clean hydraulic fluid and install seal and backup rings in groove of outer body of brake disconnect valve.

D. Before installing the hose half of the brake disconnect, apply a light coating of BATCO X8401-2 grease on the underside of the mounting flange of the hose half.

E. Engage outer body of brake disconnect valve with inner portion installed in brake carrier pressure port.

F. Position outer body of disconnect valve with three holes aligned and connecting hydraulic hose pointing forward. Install three sets of bolts and washers, tighten 130 to 150 pound-inches, and secure with lockwire.

NOTE: Only three of the four tapped holes in the brake carrier pressure port boss are used for disconnect valve attachment.

G. Install wheel and tire assembly (Ref 32-45-11 R/I)

H. Lower and remove axle jack (Ref Chapter 7, Jacking Airplane).

I. Pressurize hydraulic system B (Ref 29-11-0 and 29-12-0).

NOTE: System A for inboard brake; system B for outboard brake.

J. Bleed brake system by depressing captain's or first officer's brake pedals fully and slowly for six times.

WARNING: MAIN GEAR BRAKES MUST BE BLED AFTER INSTALLATION OR INOPERABLE BRAKES MAY OCCUR.

NOTE: Check brake pressure plate for tendency to hang or stick during brake application.

K. Service hydraulic reservoir (Ref Chapter 12, Hydraulic Servicing).
L. Set parking brakes.

5. Install Main Gear Wheel Brake

A. Position brake so that bleed port is at top and install three sets of brake mounting bolts, washers, and nuts with heads of bolts pointing toward outer end of landing gear axle (Fig. 401) as follows:

NOTE: Make sure you use the correct grip length bolts during installation. The correct bolt grip length is 15/16 inch. Make sure the head of the bolt is pointing toward the outer end of the landing gear axle. Incorrect bolt orientation will result in interference between the bolt and the wheel grease seal.

(1) Tighten the brake mounting bolts in the two following steps:
(a) Tighten the bolts to 60-70 pound-feet in a criss-cross pattern.

NOTE: Tighten the bolts, not the nuts.

(b) Tighten the bolts to a last torque of 125-135 pound-feet in a circular pattern.

B. Lubricate new preformed seal and two backing rings with clean hydraulic fluid and install seal and backup rings in groove of outer body of brake disconnect valve.
C. Engage outer body of brake disconnect valve with inner portion installed in brake carrier pressure port.
D. Position outer body of disconnect valve with three holes aligned and connecting hydraulic hose pointing forward. Install three sets of bolts and washers, tighten 130 to 150 pounds-inches, and secure with lockwire.

NOTE: Only three of the four tapped holes in the brake carrier pressure port boss are used for disconnect valve attachment.

E. On axles without axle sleeve retaining bolt installed, check for outboard migration of axle sleeve. Drive sleeve inboard, if necessary, by tapping with a soft block of aluminum to ensure sleeve is seated against inboard wheel spacer prior to installing wheel (Detail B, Fig. 401).

F. Lubricate inner wheel bearing and grease seal with grease and install inner wheel bearing, grease seal, and retaining ring in inboard side of wheel.

G. Remove axle thread protector and axle protection sleeve. Install axle thread protector.

H. Thoroughly clean axle and apply light film of grease.

I. Position wheel assembly on dolly and align with axle. Align wheel rotor drive keys with rotor slots on brake and slide wheel onto brake and axle.

J. Lubricate outer wheel bearing with grease and install outer wheel bearing and washer.

NOTE: Check that washer is installed with outer diameter tapering in toward outboard wheel bearing with locking key on outboard side of washer.

K. Remove axle thread protector.

L. Lubricate threads with grease and install axle nut.
   (1) While rotating wheel, tighten axle nut to 300 pound-feet, torque to properly seat the bearings.
   (2) Loosen nut to zero torque.
   (3) While rotating wheel, retighten to 150 pound-feet in one continuous rotation of the axle nut. This method will prevent improper reading of the breakaway torque resulting from stop and start rotation of the nut. Check for alignment of locking holes.
   (4) If locking holes are not aligned, continue tightening to first locking hole.

M. Install axle nut retainer ring.

N. Install hubcaps
   (1) On airplanes without automatic brakes,
      (a) On airplanes with bolted dust cap assembly, install hubcap, antiskid transducer rotor, and dust cap. Lockwire bolts.
      (b) On airplanes with riveted dust cap assembly, install hubcap. Lockwire bolts.

      NOTE: Prior to installation of hubcap, check that air charging valve extension and hole on hubcap are aligned (outboard wheels only).

      (c) Install hubcap fairing (outboard wheels only).

(2) On airplanes with automatic brakes,
    (a) Install hubcap using three sets of bolts and washers. On outboard wheels, align hole in hubcap with tire pneumatic valve extension prior to installing bolts. Install lockwire on all bolts.
    (b) Place hubcap fairing on hubcap and secure by rotating eight Camloc fasteners (outboard wheels only).

O. Inflate tire to proper pressure (Ref Chapter 12, Landing Gear Tire Servicing).
P. Lower and remove axle jack (Ref Chapter 7, Jacking Airplane).
Q. Pressurize hydraulic system B (Ref 29-11-0 and 29-12-0).

NOTE: System A for inboard brake; system B for outboard brake.

R. Deleted.
S. Bleed brake system by depressing captain's or first officer's brake pedals fully and slowly for six times.

NOTE: Check brake pressure plate for tendency to hang or stick during brake application.

T. Service hydraulic reservoir (Ref Chapter 12, Hydraulic Servicing).
U. Set parking brakes.

MAIN GEAR BRAKE - INSPECTION/CHECK

1. Main Gear Brake Check
   A. General
      (1) The main gear brake unit can be checked with wheel in place. Further checks are made of brake unit when the wheel is off.
   B. Equipment and Materials
      (1) Gear Ground Lock Assembly - F72735 (AMM 32-00-01)
   C. Prepare for Check
      (1) Check that landing gear is down and locked and ground lock assemblies are installed (AMM 32-00-01).
      (2) Chock wheels and release parking brake.
      (3) Provide electrical power to airplane.
   D. Check Main Gear Brake with Wheel in Place
      (1) Pressurize hydraulic systems A and B (AMM 29-11-0/201 and AMM 29-12-0/201).
      (2) Fully apply and release the left and right captain's or first officer's brake pedals five times.
      (3) With the brakes not applied, do a check of the brakes for fluid leaks at these locations: Brake pistons, brake housing ports, inlet and drain ports, bleed ports, flexible hoses, brake carrier drilled passage plugs, and connections between brake unit and brake metering valve.
      (4) If the total leakage per brake at the above locations is greater than 1 drop per minute with the brake pedals not applied, repair the leak(s) or replace (or deactivate if applicable) the brake prior to dispatch.
      (5) Slowly apply the brake pedals to the stops (the parking brake may be set).
      (6) While the brake pedals are applied, do a check of the brakes for fluid leaks at the same locations as in step (3).
      (7) If the total leakage per brake at the above locations is greater than 5 drops per minute, while the brakes are being applied, repair the leak(s) or replace (or deactivate if applicable) the brake prior to dispatch.
      (8) Brakes with leaks below these limits must be rechecked prior to each flight, and should be repaired or replaced at the next opportunity that manpower and material allow.
      (9) The brake must be removed, inspected and cleaned in accordance with the brake supplier component maintenance manual if it is suspected that a brake has been exposed to significant levels of contamination. Signs of contamination include a wet or oily appearance, buildup of charred residue, or heavy smoke after landing.
      (10) With parking brake set, check for worn brake unit.

CAUTION: DO NOT LET THE BRAKE UNIT WEAR UNTIL THE RELINE INDICATOR PIN IS BELOW THE SURFACE. DAMAGE TO EQUIPMENT CAN OCCUR.

NOTE: Each brake has two brake wear indicator pins.

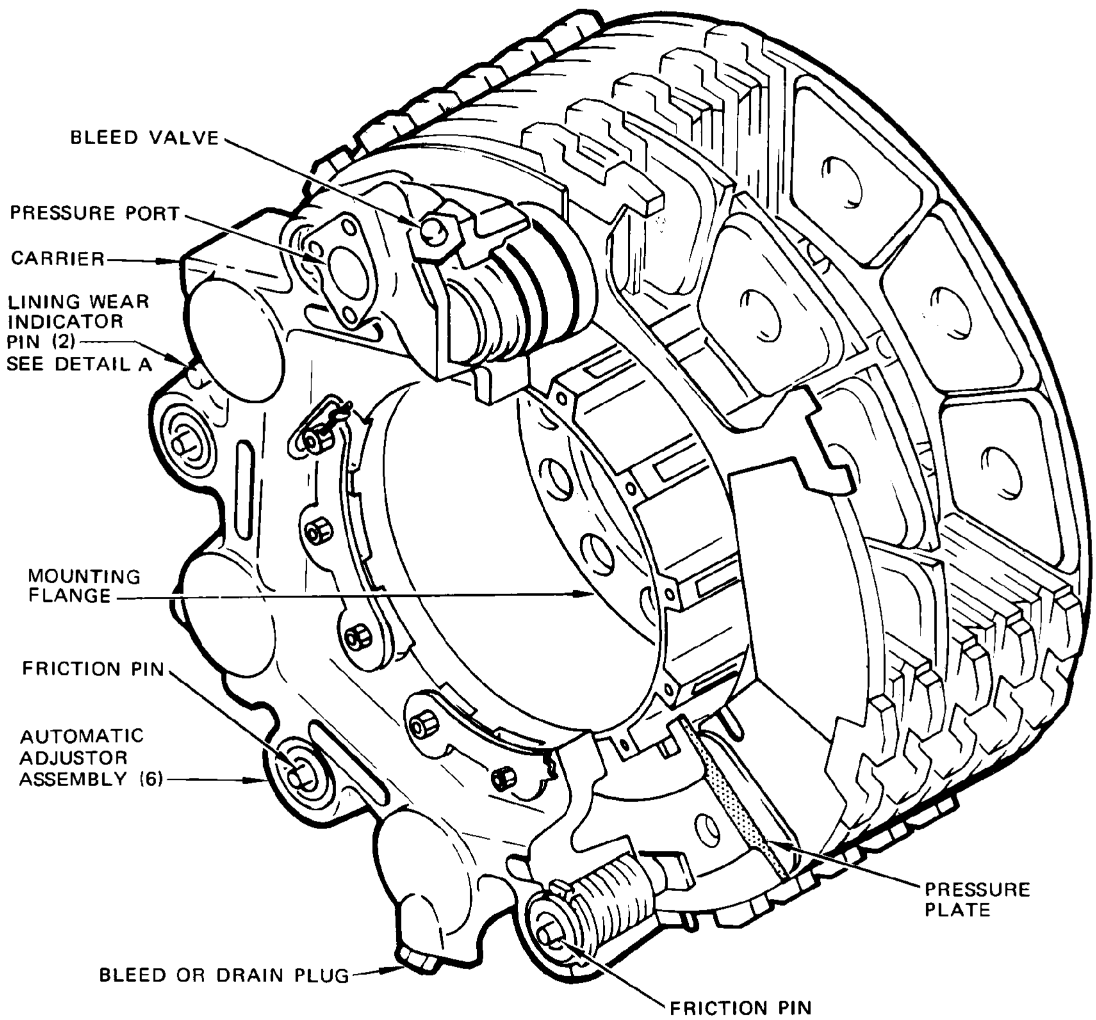
(a) If the two wear indicator pins are missing, you must replace the brake prior to the next flight.
(b) If one wear indicator pin is missing, the brake can stay in service if the remaining wear pin operation is satisfactory.
(c) If either indictor pin is flush with surface of bushing as shown in Fig. 601, brake must be replaced. It may be advisable, however, to remove brakes at 1/16- to 1/8-inch extension to avoid seal or brake damage when operator experience indicates this is necessary or the brake manufacturer advises this is desirable.

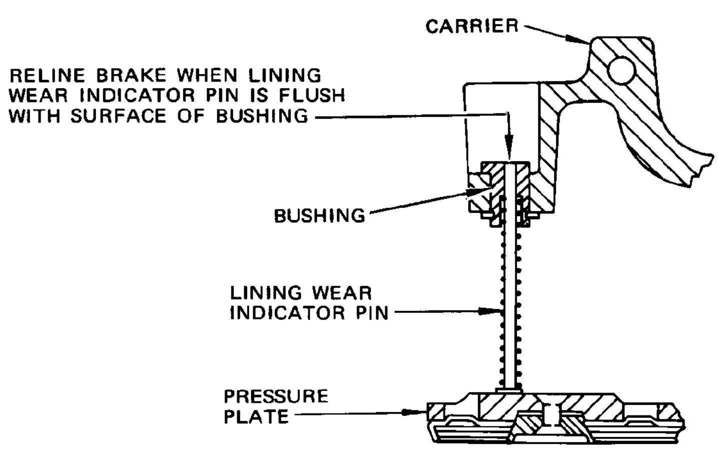
E. Check Main Gear Brake with Wheel Removed
(1) The brake unit must be removed, inspected and cleaned in accordance with the brake supplier component maintenance manual if it is suspected that a brake has been exposed to significant levels of contamination. Signs of contamination include a wet oily appearance, a buildup of charred residue, or heavy smoke after landing.
(2) Check brake unit for cracks, breaks, bends, or other damage that may cause malfunction or leakage.
(3) Visually check for loose or excessively worn parts.
(4) Check brake pressure plate for tendency to bind or stick during brake application and release.
(5) Depress and release brake pedals fully for at least five times.

NOTE: If brake disks misalign when brake pressure is off it will be necessary to align brake disks before installing wheel.

(6) Check for effective braking action and a minimum running clearance of 0.082 inch.
(7) Set parking brake.
(8) Determine if there is any further need for electrical power on airplane, if not, remove electrical power.

F. Check Main Gear Brake with Wheel Removed
(1) The brake unit must be removed, inspected and cleaned in accordance with the brake supplier component maintenance manual if it is suspected that a brake has been exposed to significant levels of contamination. Signs of contamination include a wet oily appearance, a buildup of charred residue, or heavy smoke after landing.
(2) Check brake unit for cracks, breaks, bends, or other damage that may cause malfunction or leakage.
(3) Visually check for loose or excessively worn parts.
(4) Check brake pressure plate for tendency to bind or stick during brake application and release.





DETAIL A

Main Gear Brake Lining Wear Limits
Figure 601

(5) Depress and release brake pedals fully for at least five times.

NOTE: If brake disks misalign when brake pressure is off it will be necessary to align brake disks before installing wheel.

(6) Check for effective braking action and a minimum running clearance of 0.082 inch.
(7) Set parking brake.
(8) Determine if there is any further need for electrical power on airplane, if not, remove electrical power.

MAIN GEAR BRAKE - APPROVED REPAIRS

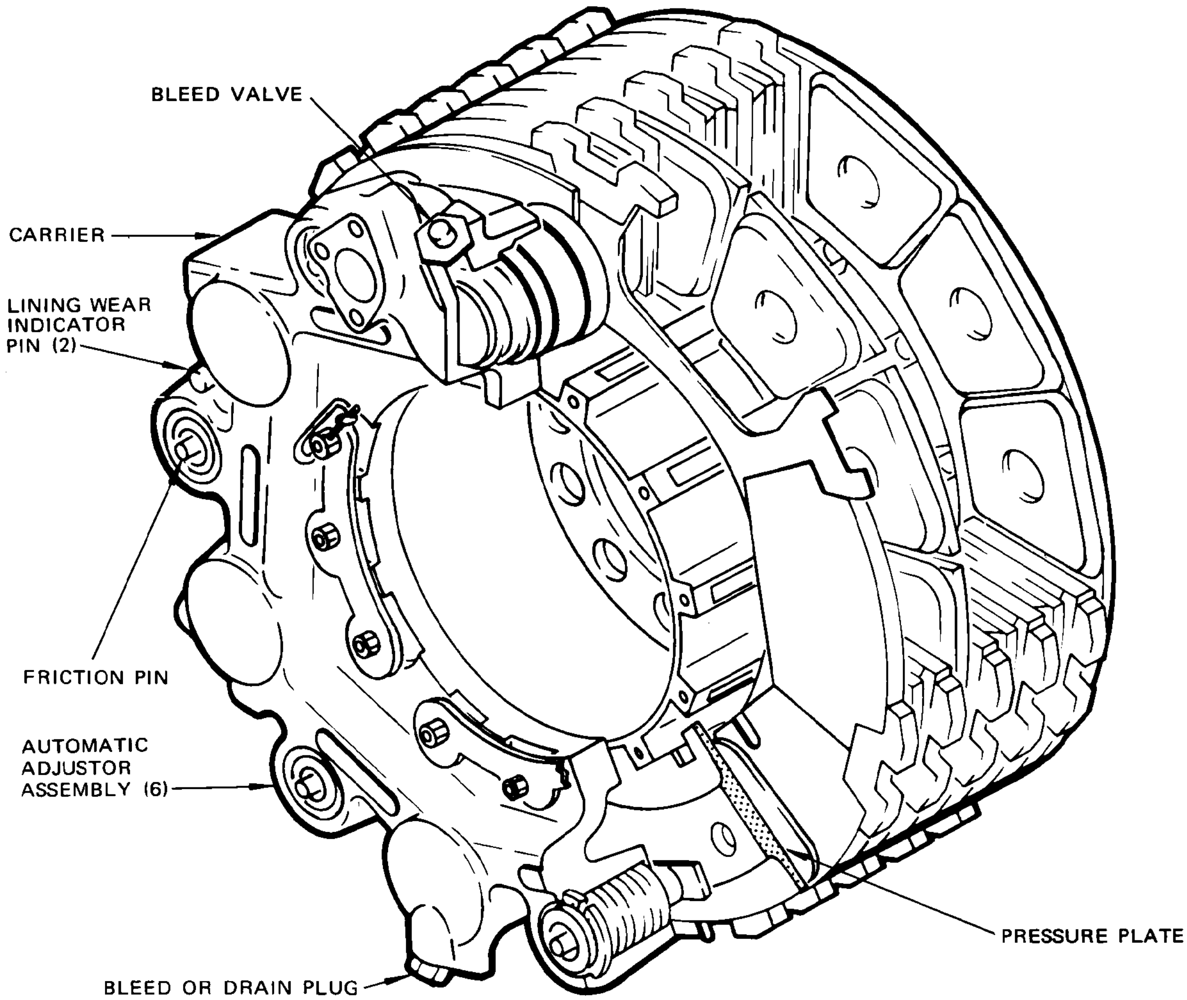
1. General
   A. The automatic adjuster assembly is replaced for missing or pulled-through friction pin without removing wheel and tire assembly.
2. Equipment and Materials
   A. Gear Ground Lock Assembly - F72735 (Ref 32-00-01)
   B. Hydraulic Fluid, Fire Resistant - BMS 3-11 to replenish system after approved repairs
3. Prepare for Repair
   A. Check that landing gear is down and locked and ground lock assemblies are installed (Ref 32-
   00-01).
   B. Depressurize hydraulic system A and/or B (Ref 29-11-0, Maintenance Practices and 29-12-0, Maintenance Practices).

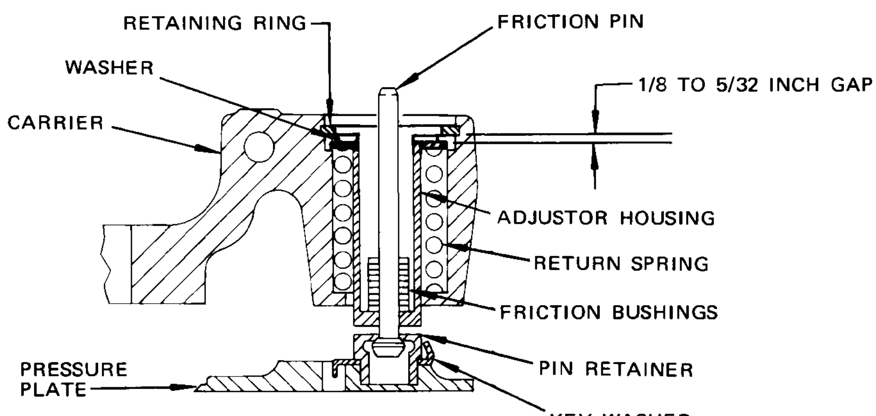
      NOTE: Inboard brakes are in hydraulic system A; outboard brakes in system B.

   C. Discharge brake accumulators by operating brakes fully eight times.
   D. Chock wheels and release parking brake.
4. Repair Main Gear Brake Unit for Missing or Pulled-Through Friction Pin in Automatic Adjuster Assembly
   A. Remove screw, washer, and cut lockwire from bleed valve (Fig. 801).
   B. Connect a flexible hose to bleed valve and submerge free end of hose in a clean receptacle partially filled with hydraulic fluid.
   C. Open bleed valve and move pistons to initial position by applying force on the pressure plate.
   D. When pistons are fully returned to initial position, close bleed valve and block pressure plate.
   E. Remove flexible hose from bleed valve and install washer and screw.
   F. Tighten bleed valve to a torque value of 40 + 10 pound-inches.
   G. Lockwire bleed valve with lockwire.
   H. Bend tab of keywasher and remove pin retainer.
   I. Remove adjuster assembly from carrier.
   J. Install a new adjuster assembly in carrier.
   K. Place a new keywasher on pressure plate with key in slot and screw pin retainer in pressure plate.

      NOTE: Lubricate pin retainer prior to assembly.

   L. Tighten pin retainer to a torque value of 75 (+ 5) pound-inches.
5. Restore Airplane to Normal
   A. Remove block installed in step 4.D.
   B. Pressurize hydraulic system A and or B. Refer to 29-11-0 and 29-12-0.
   C. Check that brake accumulators are precharged per placard.





DETAIL A

Missing or Pulled-Through Friction Pin-Automatic
Figure 801

D. Bleed brakes by depressing brake pedals slowly and fully for six times and check brake operation by observing friction pin movement in response to brake pedal movement.
E. Check brake pressure plate for tendency to hang or stick during brake application.
F. Service hydraulic reservoir. Refer to Chapter 12, Hydraulic Servicing.
G. Set parking brake.
H. Shut down hydraulic power source. Refer to 29-11-0 and 29-12-0.

HYDRAULIC BRAKE ACCUMULATOR - REMOVAL/INSTALLATION

1. General
   A. This procedure covers removal and installation of system A and system B brake accumulators. System A brake accumulator is located on the aft wall of left wheel well and system B brake accumulator is located on the aft wall of right wheel well. The procedure is written around the system A accumulator, which is typical. Differences are noted.
2. Equipment and Materials
   A. Ground Lock Assembly - F72735 (Ref 32-00-01)
   B. Hydraulic Fluid, Fire Resistant - BMS 3-11
3. Remove Hydraulic Brake Accumulator
   A. Ensure the landing gear is down and locked and ground lock assemblies installed (Ref 32-00-01).
   B. Depressurized hydraulic system A (Ref 29-11-0, Hydraulic System A - Maintenance Practices) and depressurize system A accumulator by applying brakes fully six times.

      NOTE: For removal of system B brake accumulator, depressurize hydraulic system B (refer to 29-12-0, Hydraulic System B - Maintenance Practices) and depressurize system B accumulator by applying brakes fully six times.

   C. Remove dust cap from brake accumulator charging valve.
   D. Discharge nitrogen pressure from accumulator by loosening swivel hexagonal nut on charging valve a maximum of one turn.

      WARNING: DO NOT LOOSEN VALVE BODY OR VALVE MAY BLOW OFF, RESULTING IN INJURY TO PERSONNEL.

   E. Disconnect hydraulic line from upper end of accumulator. Cap line and hydraulic accumulator port (Fig. 401).
   F. Disconnect pressure gage line on lower end of accumulator.
   G. Loosen bolts and release clamps. Remove accumulator from airplane.
   H. Remove hydraulic union and O-ring from lower end of accumulator.
   I. Remove reducer union and O-ring from upper end of accumulator.
4. Install Hydraulic Brake Accumulator
   A. Install hydraulic union with new O-ring at lower end and reducer union with new O-ring at upper end of accumulator.
   B. Before installation, ensure accumulator piston is bottomed on hydraulic side of accumulator.
   C. Install accumulator inside clamps in left wheel well and align gage line and fittings.
   D. Connect gage line to lower end and hydraulic line to upper end of accumulator. (See figure 401.)

E. Precharge hydraulic accumulator according to instructions on aluminum foil marker near pressure gage in right wheel well. Tighten swivel hexagon nut. Replace cap on charging valve.

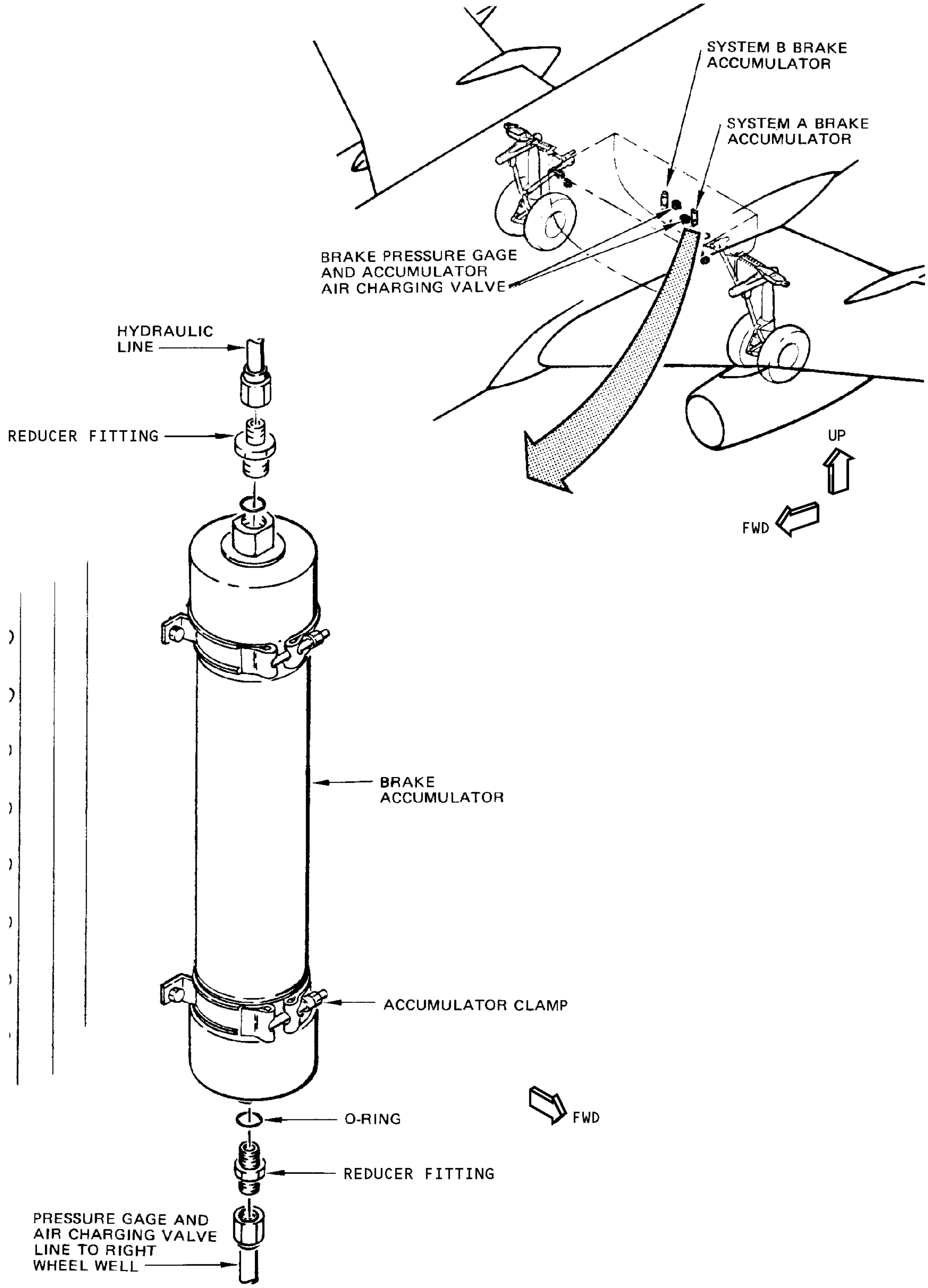
F. Pressurize hydraulic system A. (Refer to 29-11-0.) System A gage should read approximately 3000 psi.

NOTE: For installation of system B brake accumulator, pressurize hydraulic system B. Refer to 29-12-0.

G. Check hydraulic and gage line connections at accumulator for leaks.

H. Bleed system by depressing captain's or first officer's brake pedals approximately six times.

I. Check system A hydraulic reservoir and service. Refer to Chapter 12, Hydraulic Servicing.



Brake Accumulator Installation
Figure 401

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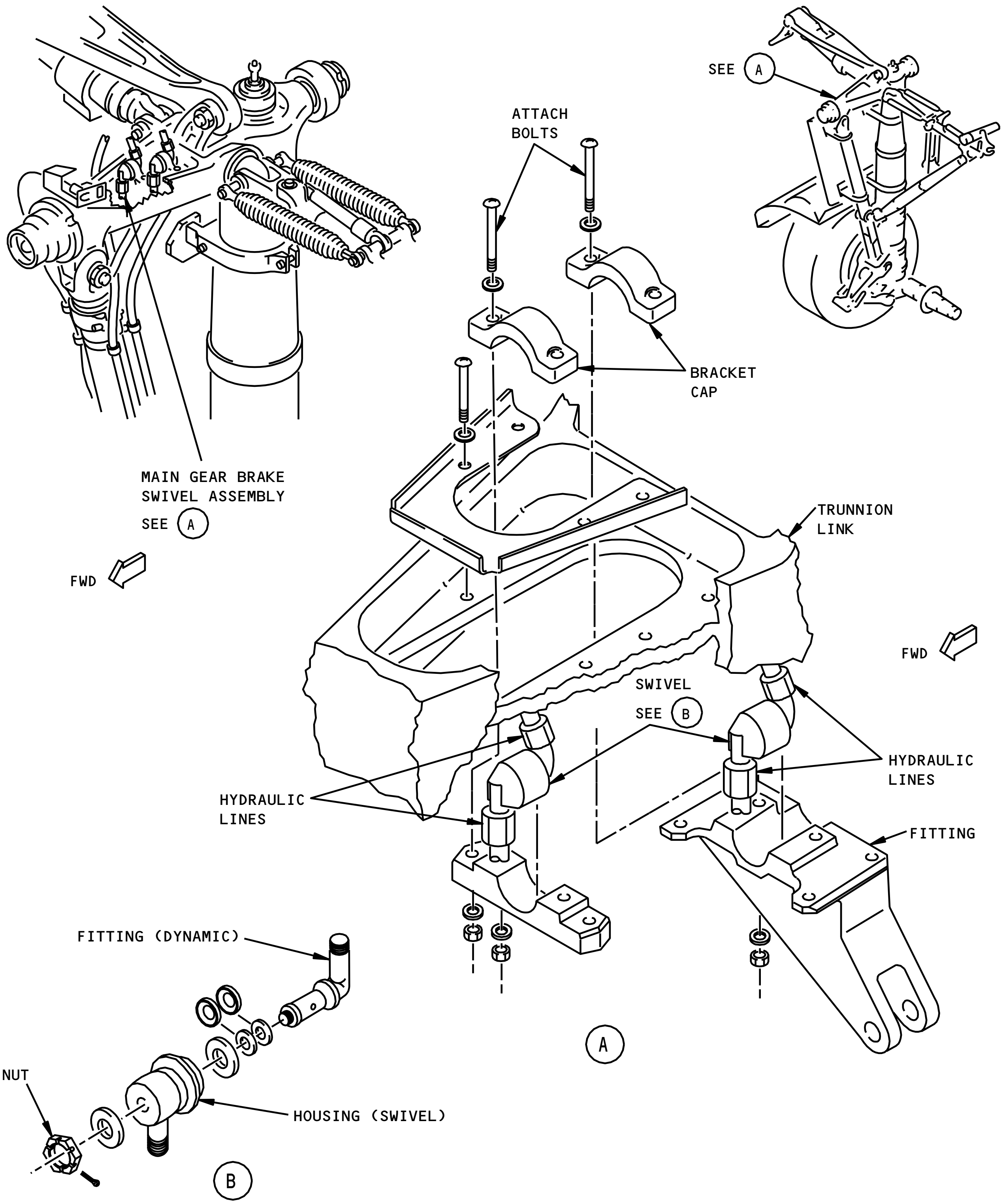
MAIN GEAR BRAKE SWIVEL - REMOVAL/INSTALLATION

1. Remove Main Gear Brake Swivel
   A. Check that landing gear ground downlocks are engaged.
   B. Chock wheels and release parking brake.
   C. Depressurize hydraulic system A and B (Ref 29-11-0 MP and 29-12-0 MP).
   D. Disconnect and cap hydraulic lines connected to swivel.
   E. Remove attach bolts from bracket cap (Fig. 401).
   F. Remove bracket cap and swivel.
2. Install Main Gear Brake Swivel
   A. Install swivel and align holes of bracket cap and bracket.

   WARNING: MAKE SURE THAT THE SWIVEL JOINT AND HYDRAULIC LINES ARE ORIENTED AS SHOWN IN FIG. 401, DETAIL A. THE HYDRAULIC LINE TO THE BRAKE ASSEMBLY MUST BE CONNECTED TO THE SWIVEL HOUSING AND THE HYDRAULIC LINE FROM THE ANTI-SKID VALVE TO THE SWIVEL FITTING AS SHOWN IN FIGURE 401, DETAIL B.IF THE ASSEMBLY OF THE SWIVEL AND THE HYDRAULIC LINES ARE ROTATED 180 DEGREES, THE HYDRAULIC LINES CAN BE CONNECTED BUT THE SWIVEL WILL NOT OPERATE. THIS CAN CAUSE THE HYDRAULIC LINES TO BREAK DURING EXTENSION AND RETRACTION AND CAUSE THE BRAKES PRESSURE TO BE LOST.

   B. Attach bolts to bracket cap (Fig. 401).
   C. Remove caps and connect hydraulic lines to swivel.
   D. Pressurize hydraulic system A and B (Ref 29-11-0 and 29-12-0).
   E. Check for leaks.
   F. Depress pilots' brake pedals slowly and fully for six times to bleed system.
   G. Service hydraulic reservoir (Ref Chapter 12, Hydraulic Servicing).
   H. Depress pilots' brake pedals and set parking brakes.



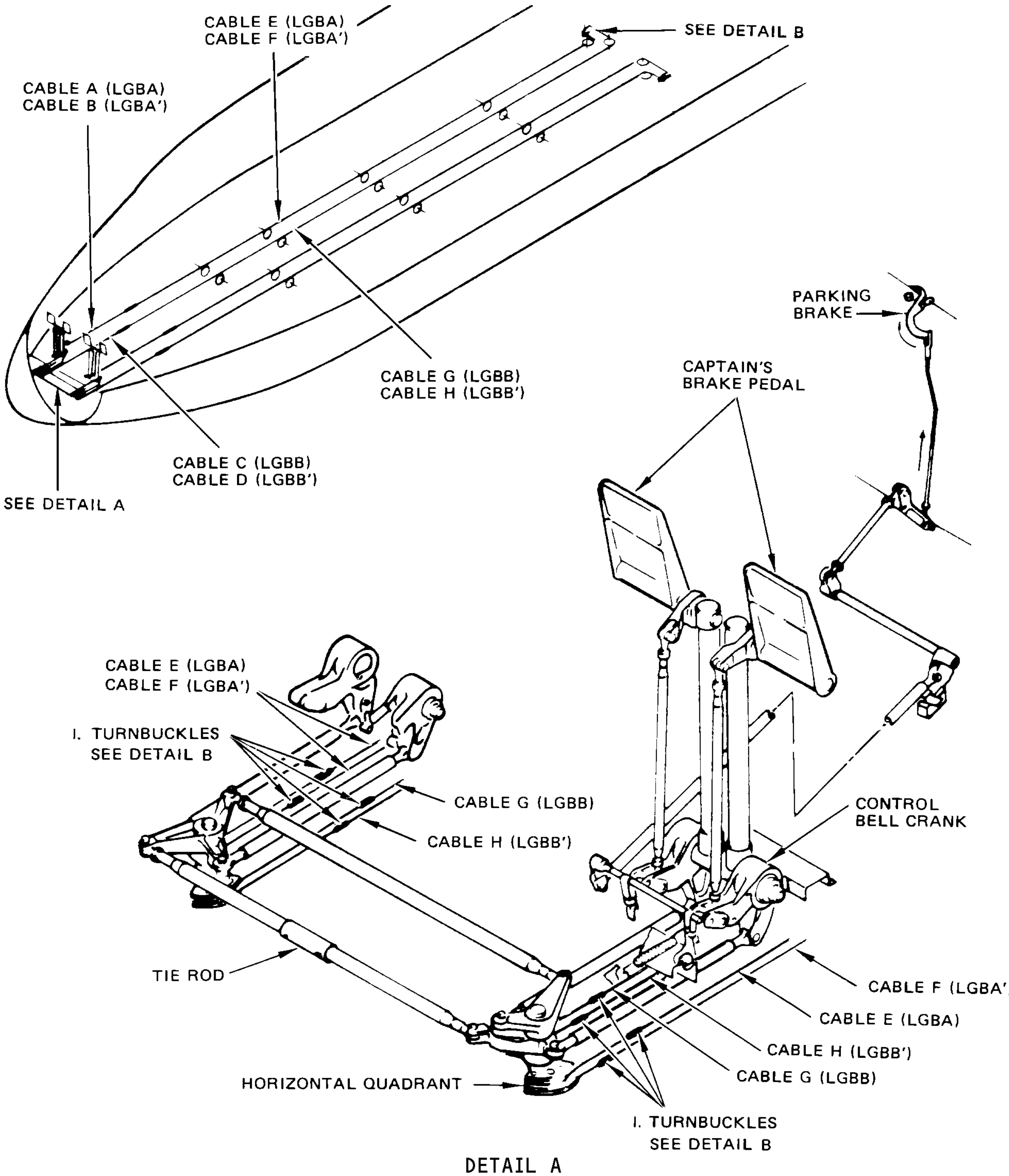
Main Gear Brake Swivel Installation
Figure 401

HYDRAULIC BRAKE CONTROL CABLES - REMOVAL/INSTALLATION

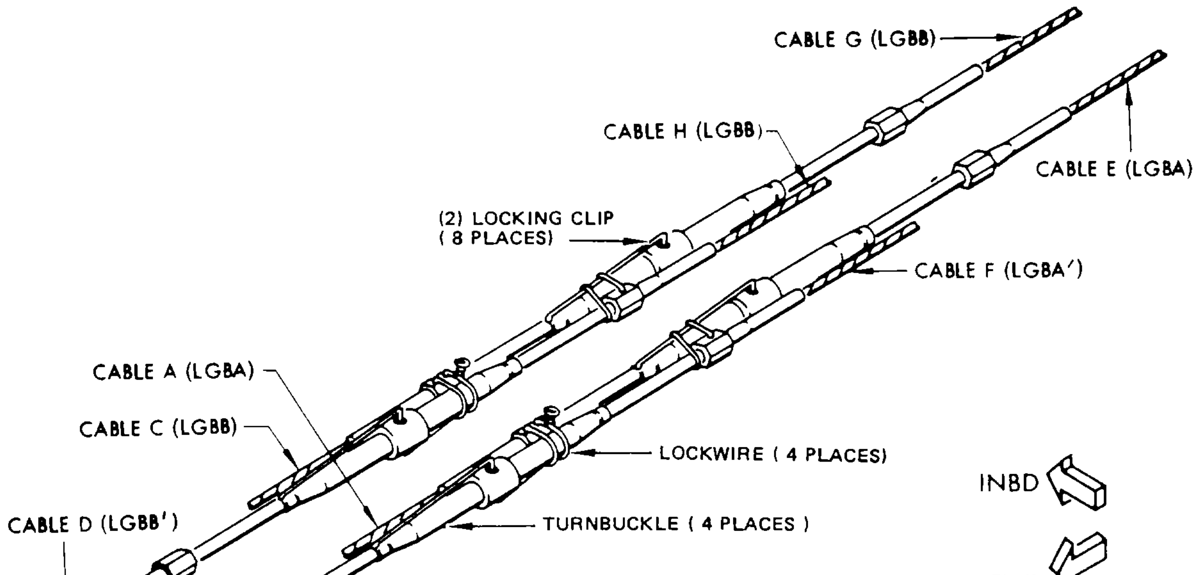
1. General
   A. For cable length and fittings, see chart on figure 401. For general cable installation information, refer to Control Cables, Chapter 20.
2. Equipment and Materials
   A. Tensiometer
   B. Gear Ground Lock Assembly - F72735 (Ref 32-00-01)
   C. G02436 Lockwire - Monel (0.040 In. Dia.) (NASM20995NC40)
3. Prepare to Remove Hydraulic Brake Control Cables
   A. Check that gear ground lock assembly is installed in nose gear (Ref 32-00-01).
   B. Chock wheels and release parking brake.
   C. Open forward access door 1103 just forward of nose wheel well to gain access to cables, turnbuckles, and pulleys.
   D. Unlock and remove passenger seats to clear floor covering area to gain access to brake metering valve control quadrant assemblies (Ref Chapter 25, Passenger Seats).

      NOTE: Seats and floor covering are above forward half of main wheel well.

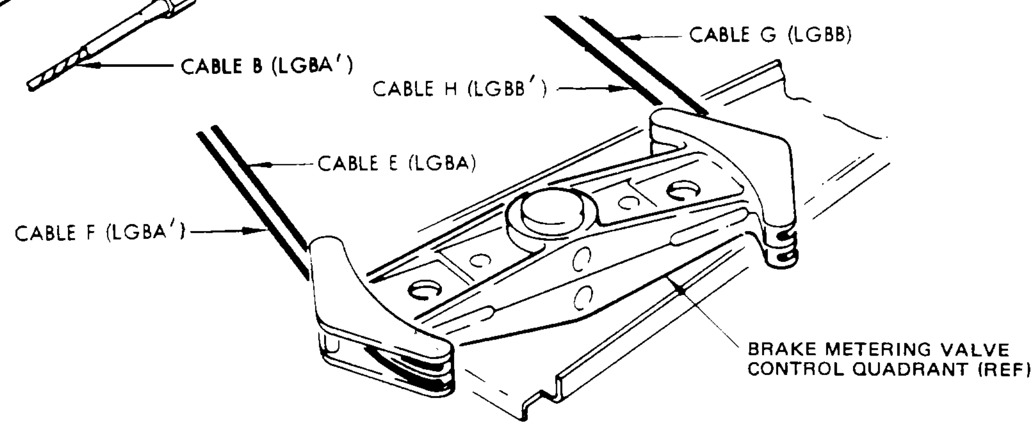
   E. Remove carpet as necessary (Ref Chapter 25, Passenger Cabin Floor Covering).
   F. Remove the right and left outboard floor panels, as necessary, to gain access to brake metering valve control quadrant assemblies.
4. Remove Hydraulic Brake Control Cables
   A. Remove lockwires and separate each pair of turnbuckles (1, Fig. 401) on cable systems LGBA, LGBA' and LGBB, LGBB' respectively and remove locking clip (2) from each turnbuckle. Discard locking clips.
   B. Loosen turnbuckles of each system.
   C. Disconnect cables of cable systems LGBA, LGBA' and LGBB, LGBB' at right and left horizontal quadrants respectively.
   D. Disconnect cables of cable systems LGBA, LGBA' and LGBB, LGBB' at right and left brake metering valve quadrants respectively and remove cables.
5. Install Hydraulic Brake Control Cables
   A. String replacement cables E. F, G, and H through fairleads and connect to their respective brake metering valve control quadrant (3). (See detail B, figure 401.)
   B. String replacement cables A, B, C, and D through their respective fairleads and pulleys and connect to their respective horizontal quadrant.
   C. Connect all cables at turnbuckles (l). (See detail A, figure 401.)
   D. Adjust cables per 32-41-0, Hydraulic Brake System - Adjustment/Test.
   E. Lockwire turnbuckles of cable systems LGBA, LGBA' and LGBB, LGBB' together with lockwire. (See detail A, figure 401.)



Brake Control Cables Installation
Figure 401 (Sheet 1)



DETAIL B

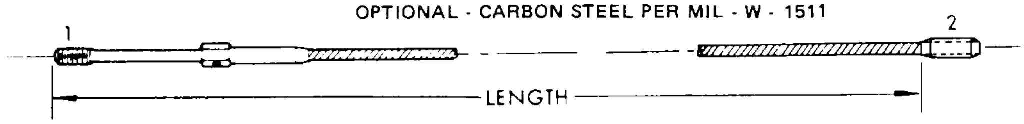


DETAIL C

CABLE REF	FUNCTION	NO REQD	LENGTH INCHES	CABLE SIZE	FITTINGS 1	2
A	LGBA	2	17.20	3/32 x 7 x 7	MS21260-L3RH	BACT14A3
B	LGBA'	2	12.50	3/32 x 7 x 7	MS21260-L3RH	BACT14A3
C	LGBB	2	15.20	3/32 x 7 x 7	MS21260-L3RH	BACT14A3
D	LGBB'	2	10.50	3/32 x 7 x 7	MS21260-L3RH	BACT14A3
E	LGBA	2	561.2	3/32 x 7 x 7	MS21260-L3LH	BACT14A3
F	LGBA'	2	566.0	3/32 x 7 x 7	MS21260-L3LH	BACT14A3
G	LGBB	2	565.2	3/32 x 7 x 7	MS21260-L3LH	BACT14A3
H	LGBB'	2	570.0	3/32 x 7 x 7	MS21260-L3LH	BACT14A3

MATERIAL : CABLE PREFFERRED - CARBON STEEL PER MIL - W - 83420, TYPE I COMPOSITION A

OPTIONAL - CARBON STEEL PER MIL - W - 1511



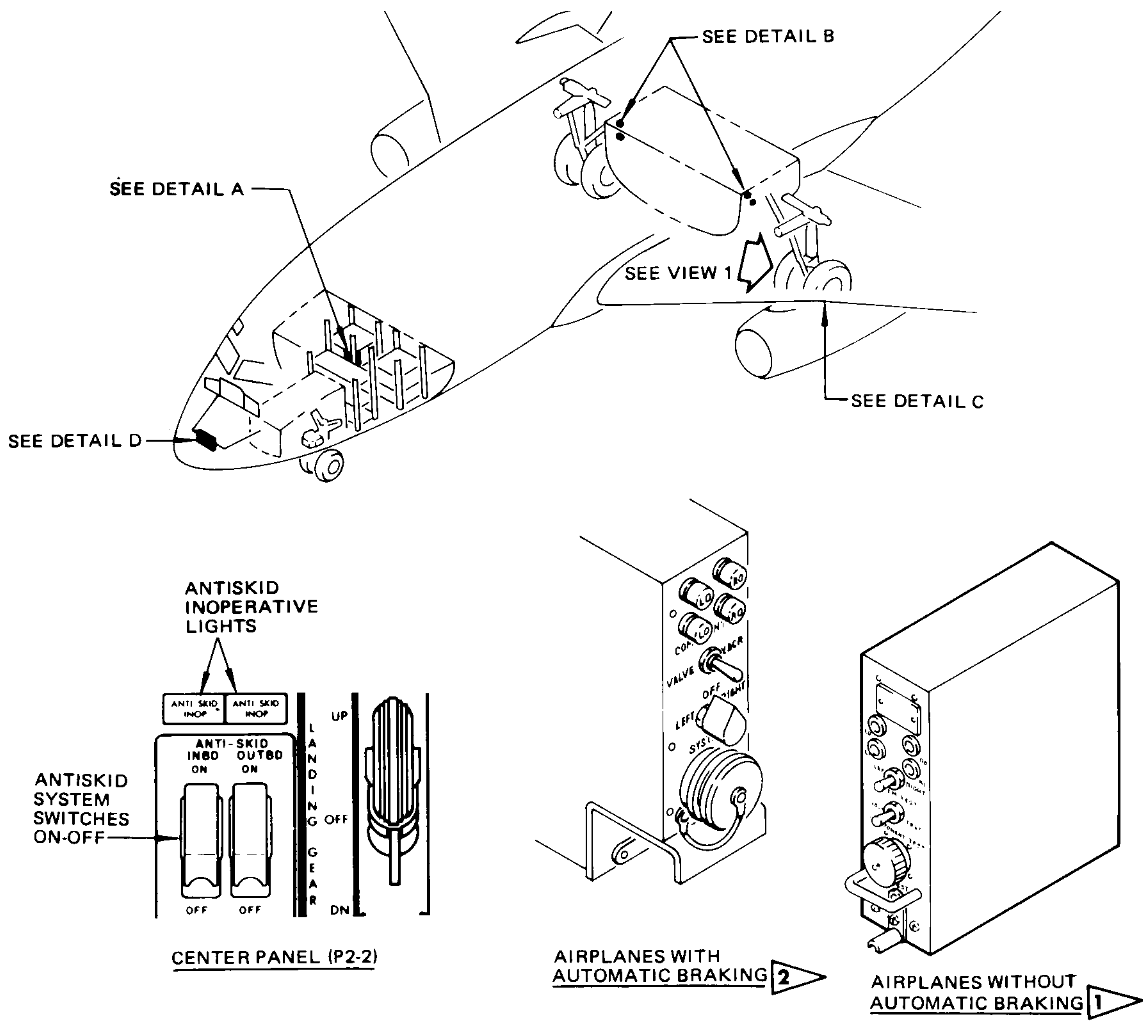
Brake Control Cables Installation
Figure 401 (Sheet 2)

F. Test brake system. Refer to 32-41-0, Hydraulic Brake System - Adjustment/Test.

6. Restore Airplane to Normal Configuration
   A. Close forward access door 1103.
   B. Install the right and left outboard floor panels from station 664 thru station 695.
   C. Install carpet. Refer to Passenger Cabin Floor Covering, Chapter 25.
   D. Install passenger seats. Refer to Passenger Seats, Chapter 25.
   E. Set parking brake.

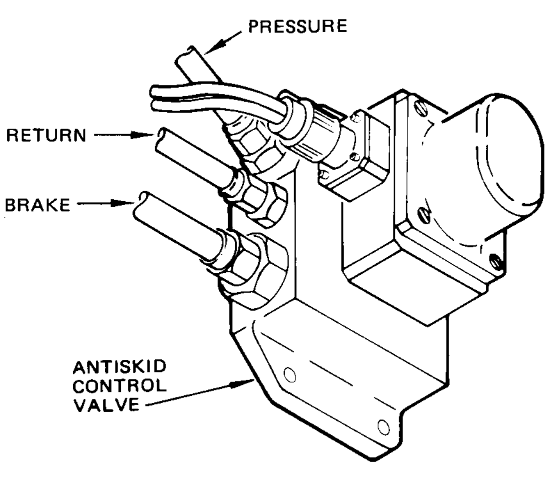
ANTISKID SYSTEM - DESCRIPTION AND OPERATION

1. General
   A. The antiskid system prevents wheels skidding by limiting the hydraulic pressure applied to the brakes by the hydraulic brake system, 32-41-0. Maximum braking efficiency is obtained when all wheels are in a slight skid or at a maximum rate of deceleration short of a skidding wheel. The system electronically controls an antiskid control valve to continuously vary braking pressure in response to wheel action. The system controls wheels individually. Each wheel rate of deceleration is compared with a preset rate of deceleration. Wheel decelerations within the airplane deceleration capability produce no correction signal. Wheel decelerations above this rate are treated as skids or approaching skids and correction signals are sent to the antiskid control valve to reduce applied brake pressure. The correction signal is reduced when the wheel returns to speed again. The system continuously seeks a level of correction signal producing skidding of slight severity and thereby attains maximum braking efficiency. Maximum braking is obtained under any variety of runway conditions.
   B. On airplanes with automatic braking (see figure 5 for effectivity), the antiskid system controls brake pressure through the antiskid valves in response to automatic braking system signals. The antiskid system overrides the automatic braking system at all times to provide skid and locked wheel protection during automatic braking. The antiskid control shield contains selected deceleration circuits function when the automatic braking system is operating. The circuits compare actual airplane velocity as determined from wheel speed transducers with a reference velocity computed from the selected airplane deceleration rate. Differences between actual and reference velocities produce error voltages processed and sent to the antiskid control valves vary brake pressure as required to decelerate the airplane at the selected rate. In the automatic braking mode, the antiskid system operates on a paired wheel basis. On initiation of automatic braking, the brakes are fully released until the wheels spin up to an equivalent 60- to 65-knot airplane velocity. At this velocity, automatic braking system "on-ramp" signals are sent to the antiskid control shield directing the antiskid valves to gradually increase brake pressure to the required level. When emergency dropout signals are received from the automatic brake control unit, the antiskid control shield signals the antiskid valves to release brake pressure instantly. When normal dropout (off-ramp) signals are received, the antiskid control shield signals the antiskid valves to gradually reduce brake pressure to obtain smooth transfer from automatic to manual braking, and to shutoff of the automatic braking system. Refer to 32-43-0 for discussion of the automatic braking system.



ANTISKID SYSTEM CONTROL SHIELD

DETAIL A

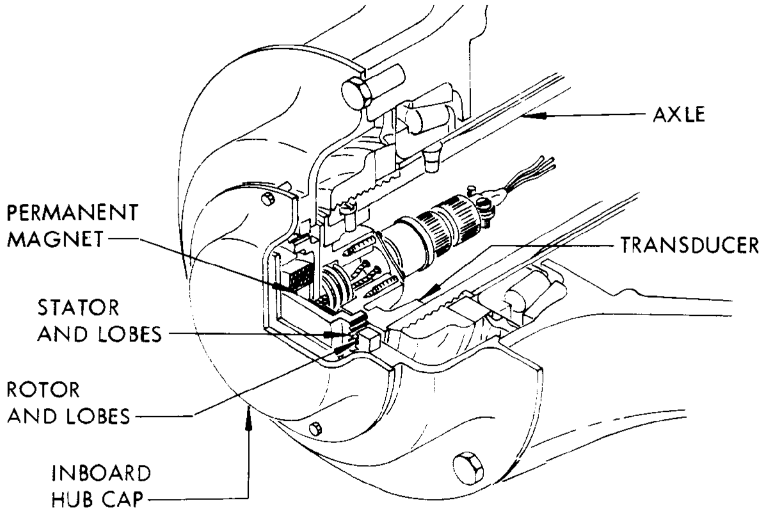


DETAIL B

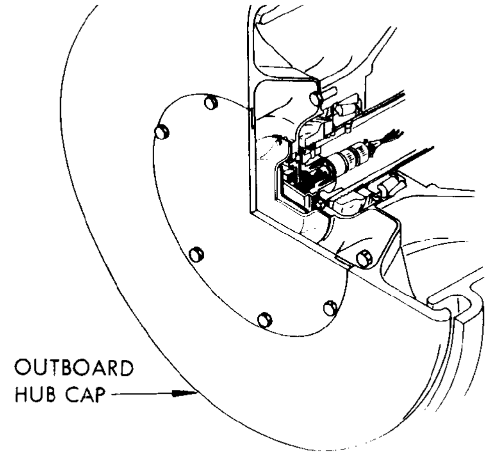
1 AR LV-JMW THRU LV-JMZ, LV-JND, LV-JNE
TM CR-BAA, CR-BAB
CP CF–CPB THRU CF–CPE, CF–CPU, CF–CPV, CF–CPZ
IC VT–EAG THRU VT–EAM
IN EI– THRU EI–ASH
NZ ZK–NAC THRU ZK–NAE, ZK–NAJ THRU ZK–NAL

2 AR ALL EXCEPT LV-JMW THRU LV-JMZ, LV-JND, LV-JNE
IM ALL EXCEPT CR-BAA, CR-BAB
CP ALL EXCEPT CF–CPB THRU CF–CPE CF–CPU, CF–CPV, CF–CPZ
IC ALL EXCEPT VT–EAG THRU VT–EAM
IN ALL EXCEPT EI–ASA THRU EI–ASH
NZ ALL EXCEPT ZK–NAC THRU ZK–NAE ZK–NAJ THRU ZK–NAL

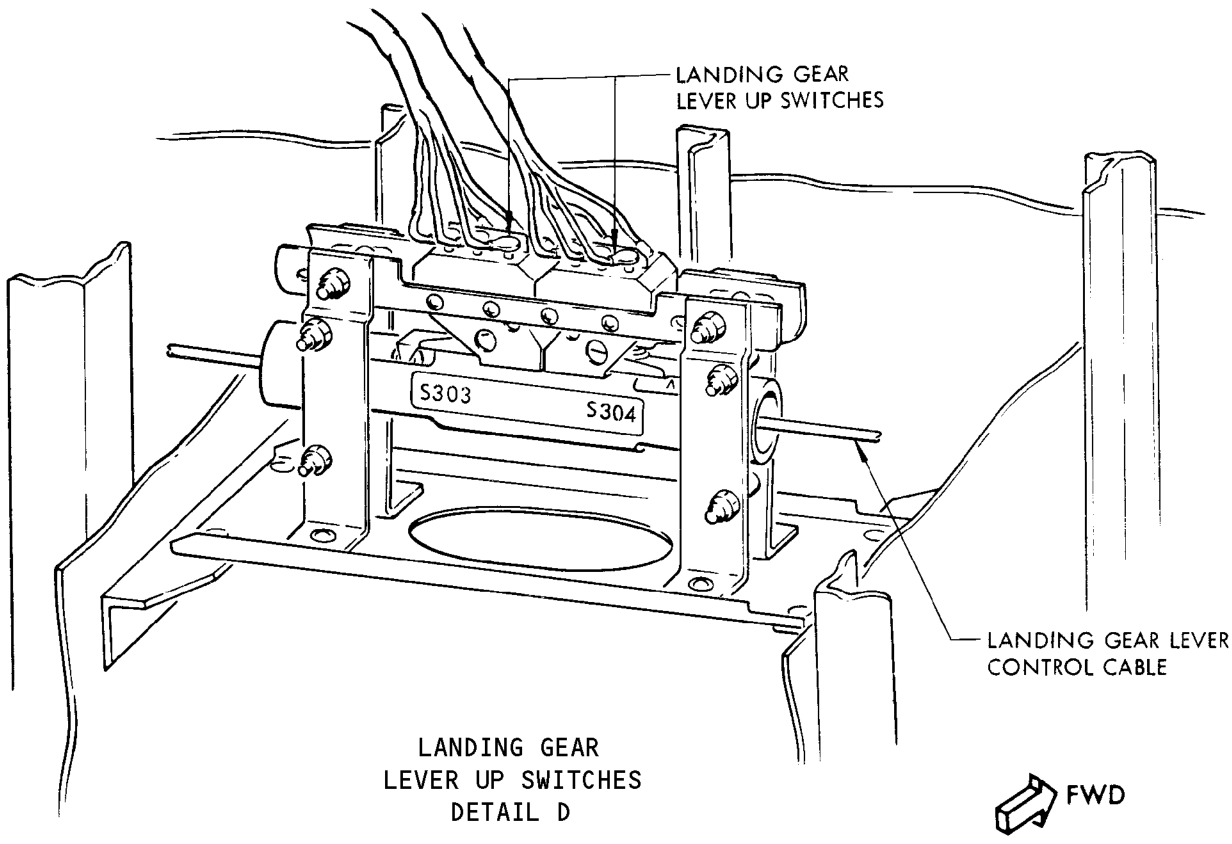
Antiskid System Component Location
Figure 1 (Sheet 1)



TRANSDUCER INSTALLATION
INBOARD MAIN GEAR
VIEW 1



TRANSDUCER INSTALLATION
OUTBOARD MAIN GEAR
DETAIL C



LANDING GEAR
LEVER UP SWITCHES
DETAIL D

Antiskid System Component Location
Figure 1 (Sheet 2)

C. The antiskid system consists of individual wheel speed sensors or transducers, an antiskid control shield, and four antiskid control valves (Fig. 1). The system also incorporates a test circuit and indicators enable the system to be checked for proper operation on the ground. Test circuits monitor antiskid operation continuously during airplane operation. Two microswitches, operated by the landing gear lever, disable the antiskid during the landing gear retraction cycle.

2. Transducer

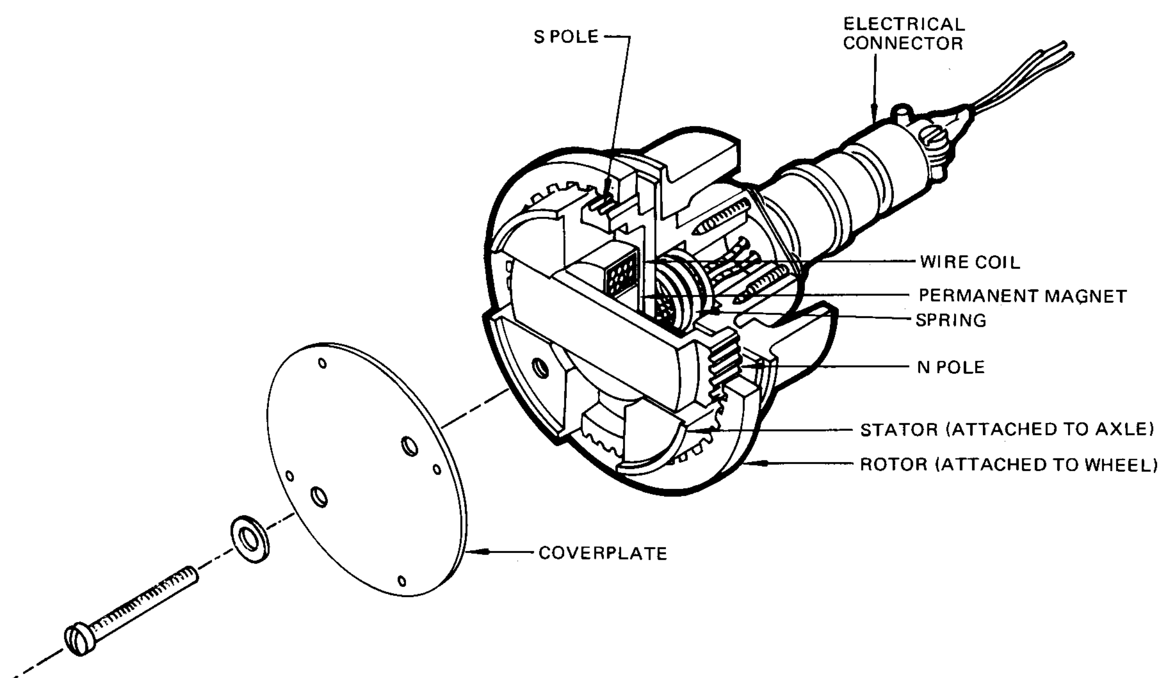
A. The transducer is a speed sensing device. It contains only one moving part, a rotor turning outside a fixed stator (Fig. 2). The stator is firmly attached to the axle of each wheel. The rotor is attached to the hubcap and moves with the wheel. The rotor has 72 poles, or lobes, extending inward from its inner circumference. The stator has lobes extending outward at four points 90 degrees apart. The stator contains a permanent magnet to provide a magnetic field. When the wheel is turning, the lobes on the rotor approach and recede from the lobes on the stator, thus changing the distance between them. The change in distance causes a change in the magnetic field of the stator because of the variation in magnetic coupling (magnetic reluctance) between the stator and rotor. This change in magnetic field generates in the stator coil an ac voltage directly proportional to the rotational speed of the wheel. This ac signal is fed into a converter in the antiskid control shield.

3. Antiskid Control Shield (Airplanes without automatic braking) (See figure 5 for effectivity.)

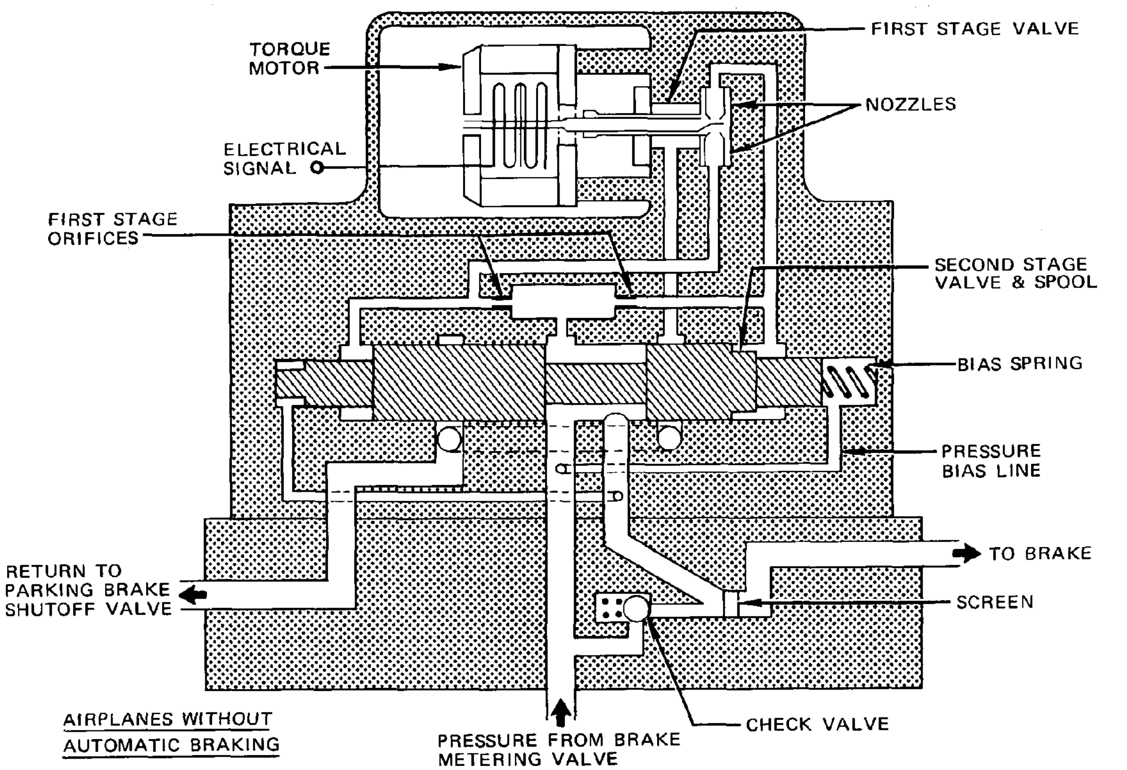
A. The antiskid control shield is located in the equipment compartment and contains the necessary circuits for control of the antiskid system (Fig. 1). The control circuits are separated on individual cards for each pair of inboard and outboard wheels. Each wheel is controlled separately by the converter and the skid control circuit. The locked wheel detector circuit controls either the inboard or outboard pair of wheels.

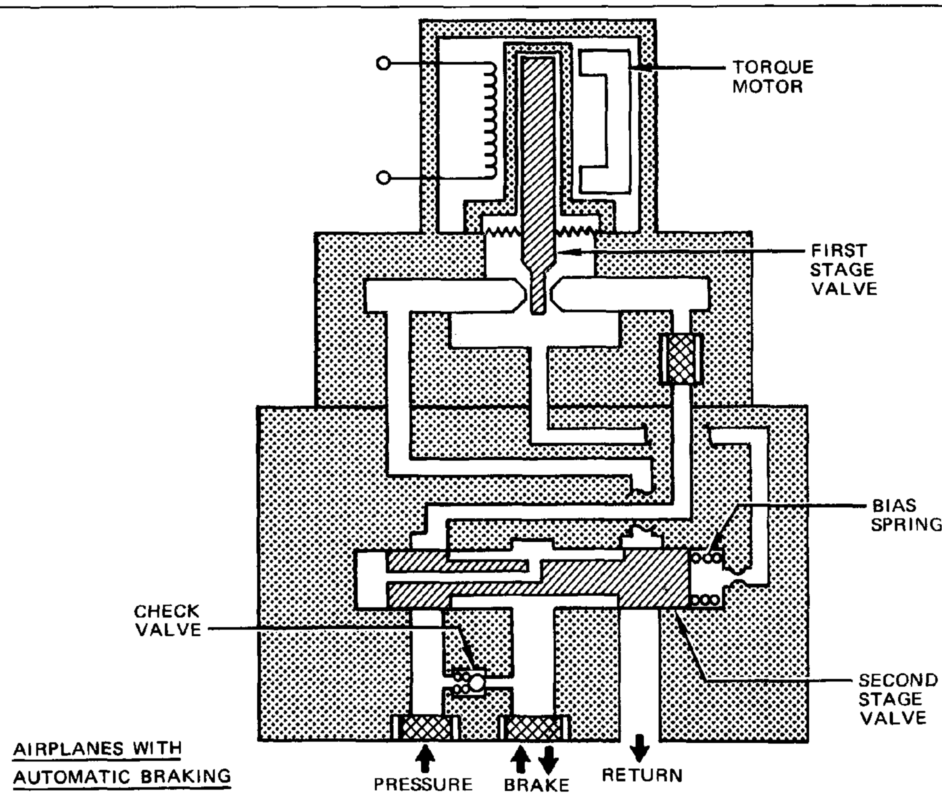
B. The control circuit contains both skid control and locked wheel sensing components. When wheel deceleration is within certain predetermined limits, the wheel skid control components are inactive. When the wheel speed falls below the value allowed by the predetermined maximum deceleration rate, the skid control circuit sends a release signal to the antiskid control valve for that wheel. Subsequent wheel spinup causes the brakes to be reapplied at a lower pressure. The reapplication pressure is determined by the length of time required for the wheel to spin up. The skid control circuit continuously seeks a level of brake application to attain maximum braking efficiency under any variety of runway conditions. The locked wheel sensing components provide a full brake release signal in the event of a locked wheel.

4. Antiskid Control Shield (Airplanes with automatic braking) (See figure 5 for effectivity.)
   A. The antiskid control shield is located in the electrical/electronic equipment compartment. It contains all the circuits necessary for antiskid control, and those circuits necessary to respond to autobrake control module commands for automatic braking control. The control shield contains four identical wheel circuit cards (one for each main wheel), two identical selected deceleration cards (one for inboard and one for outboard paired wheels), two identical power supplies (inboard and outboard paired wheels), antiskid pilot relays for speed brake deployment logic, and failure monitoring cards. Each main wheel card includes antiskid control, test logic, speed brake spinup control and locked wheel and squat (air safety) logic. Each of the selected deceleration cards controls a pair of wheels, inboard or outboard. Antiskid control is on an individual wheel basis. Locked wheel and automatic braking control are on a paired wheel basis, inboard or outboard.
   B. On the face of the control shield are two test switches (component and system) and four indicator lights which assist in isolation of antiskid system troubles on the ground.
5. Antiskid Control Valve
   A. The antiskid control valve is an electrically controlled hydraulic valve which controls hydraulic pressure applied to the brakes in accordance with signals received from the antiskid control shield. Each of the control valves, in turn, consists of an electrically controlled 1st-stage or servo valve, and a hydraulically controlled 2nd-stage valve (Fig. 3). Each of the control valves operates independently of the other to control the brake on one wheel.
   B. On airplanes without automatic braking, the electrically controlled 1st-stage valve consists of a torque motor controlling a flapper between two restricted hydraulic outlets. The torque motor moves the flapper to block one outlet while allowing free flow from the other creating a pressure differential. The pressure differential affects the 2nd-stage valve spool on either end depending on torque motor current. The 2nd-stage valve spool is spring biased in the pressure-to-brake position and the 1st-stage flapper is also biased to provide a pressure differential to assist the spring action when there is no current to the torque motor. The torque motor provides a pressure differential in the valve proportional to the current it has received. Any movement of the flapper tends to create a pressure differential on the end of the 2nd-stage valve spool to compress the spring and close the valve reducing brake pressure. The pressure differential on the 2nd-stage valve spool is balanced by the ratio of existing brake pressure and pilot's metered brake pressure acting on the 2nd-stage so that the brake pressure responds directly to the electrical signal received from the antiskid control shield.



Transducer
Figure 2





Antiskid Control Valve Schematic
Figure 3

C. On airplanes with automatic braking, the 1st-stage valve contains a torque motor controls the position of a flapper between two restricted hydraulic ports. One port is pressure into the 1st-stage valve chamber; the other is flow to return from the chamber. Movement of the flapper toward one port or the other further restricts pressure flow into the valve chamber or flow to return from the chamber in order to increase or decrease pressure in the chamber. The 2nd-stage valve is spring offset and pressure bias controlled. The end of the 2nd-stage spool opposing spring force senses brake pressure. The end assisting spring force senses 1st-stage valve pressure. When the torque motor receives no control current, the 2nd-stage valve spool is spring offset to port pressure entering the antiskid valve directly to the brakes. The return port is blocked. When a decrease in brake pressure is required, a current is sent to the torque motor to restrict pressure flow into the 1st-stage valve chamber. This decreases pressure in the chamber and on one end of the 2nd-stage valve spool, causing it to open and bleed some pressure to return. The amount of pressure bled to return depends on torque motor current which, in turn, depends on the reduction in brake pressure required. Torque motor current is decreased to reduce pressure bias on the 2nd-stage valve spool, allowing it to move toward the spring offset direction to increase brake pressure.

6. Landing Gear Lever Up Switches

A. The landing gear lever up switches are located in the lower nose section forward of the nose wheel well. They are actuated by a cam fastened to the landing gear lever control cable.

B. The antiskid system is disabled during the retraction cycle of the landing gear to allow positive braking action. This ensures the wheels will be stopped before the wheels enter the wheel well.

C. These two switches in the antiskid system are operated when the landing gear lever is placed in the UP position. One switch interrupts power to the antiskid module. The other switch opens the circuit to the antiskid inoperative lights. The light circuit is opened to prevent a false antiskid inoperative condition to register when the antiskid power is cut off during the landing gear retraction cycle.

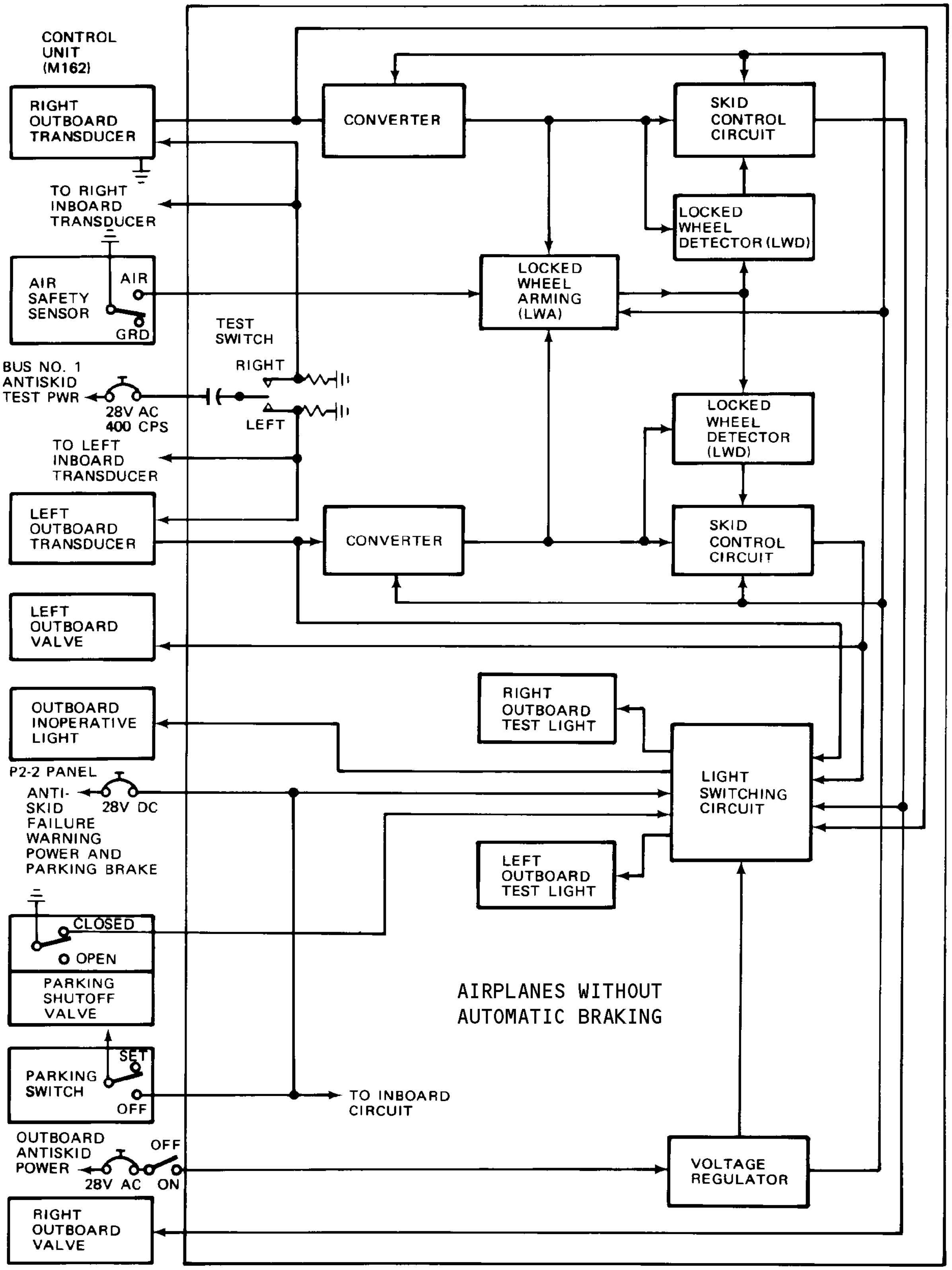
7. Antiskid Test Circuit

A. The antiskid test circuit is a continuous function during operation of the antiskid system. Any loss of power to the system, an open valve, or transducer circuit will cause the inoperative light for the affected pair of wheels (either inboard or outboard) to come on (Fig. 5). If an inoperative light comes on, the particular channel can be switched off and the inoperative light will remain on. This is a constant reminder antiskid protection is off and manual braking techniques should be used.

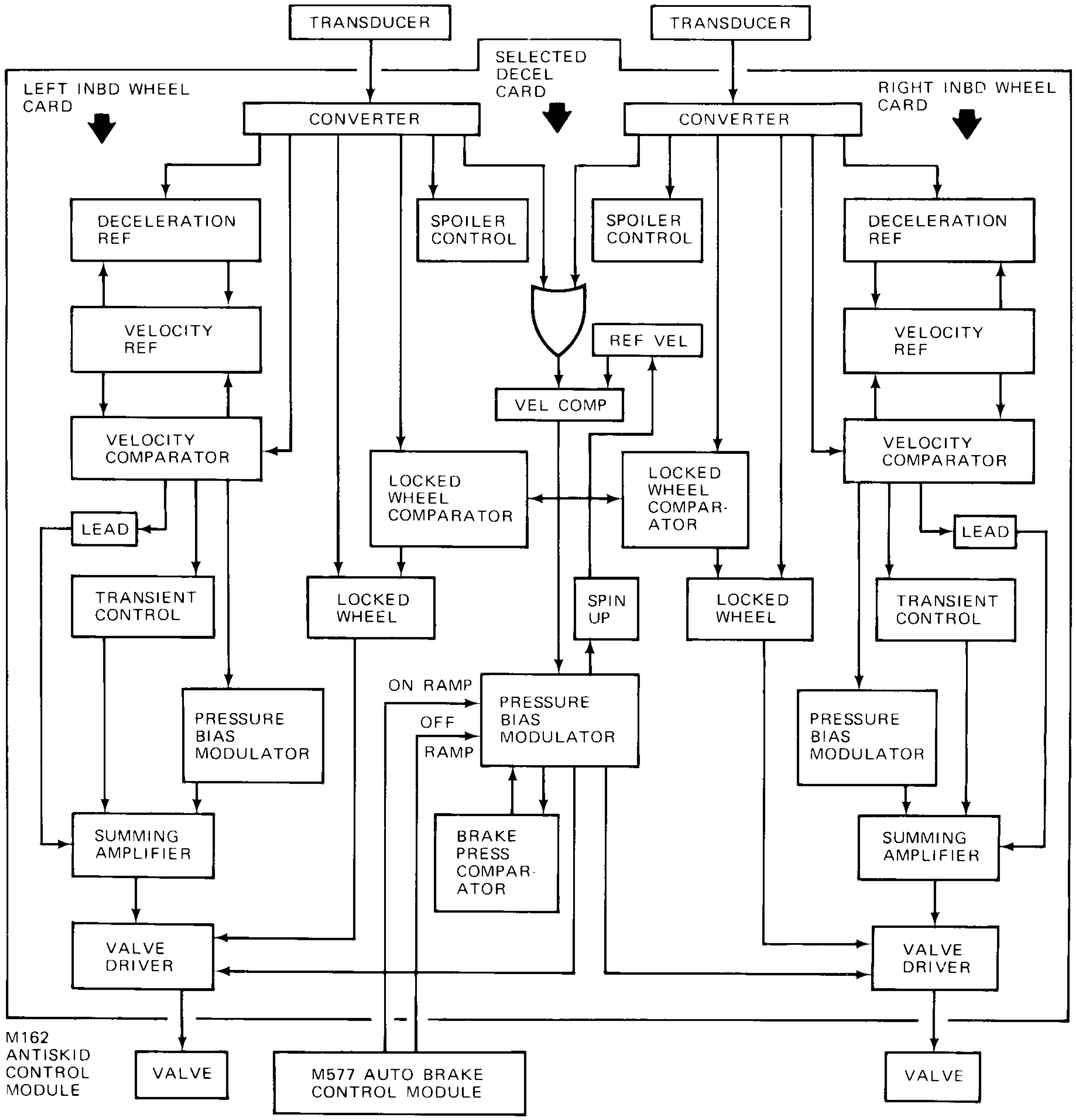
B. Ground test features are built into the antiskid control shield. Two test switches and four indicator lights are located on the front of the antiskid control shield. The antiskid control shield is located in the equipment compartment and is accessible to the ground crew for trouble shooting. The two test switches are marked SYSTEMS TEST and COMPONENT TEST. During a systems test, the SYSTEMS TEST switch is held in either the momentary left or right position and a simulated wheel speed signal of 400 Hz is injected in either the left or right gear control circuit. If the switch is held in the left position and the system operates properly, the right indicator lights will come on indicating that more than 75% of full brake release voltage has been sent to the right valves. If the switch is held in the right position, the left indicator lights should come on. If during the systems test one light or a pair of lights fail to show, the component switch is used to localize trouble in either the antiskid control valve, transducer or antiskid control shield.

C. The COMPONENT TEST switch is used to isolate failures indicated by the antiskid inoperative lights on the center panel in the control cabin. If an inoperative light on the center panel is on, the lights on the face of the antiskid control shield are checked. Any light illuminated on the control shield (LO, RO, LI or FI) indicates a fault in the channel.

(1) On airplanes without automatic braking,
if any of the lights on the face of the control shield are on, place the test switch in the VALVE Position. If the light remains on, it indicates a fault in the control shield. (The valve circuit may be continuously energized by the failure in the amplifier). If none of the lights on the face of the control shield are on, the problem is due to an open transducer circuit, an open brake shutoff valve with the parking brake set, or a power failure. If the light goes off after placing the component test switch in the VALVE position, place the component test switch in the XDCR position. If the light comes on, it indicates the corresponding antiskid valve is defective. If the light remains off, replace the corresponding transducer. If the light still remains off, replace the corresponding antiskid valve. If no control shield light comes on, the parking brake shutoff valve is de-energized or power is lost to a wheel circuit in the control shield.



Antiskid System Block Diagram
Figure 4 (Sheet 1)



NOTE: INBOARD ANTISKID SYSTEM SHOWN. OUTBOARD SYSTEM SIMILAR.

AIRPLANES WITH AUTOMATIC BRAKING

Antiskid System Block Diagram
Figure 4 (Sheet 2)

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(2) On airplanes with automatic braking, if the component test switch is positioned to VALVE and the fault light goes out, it is an indication of an open valve circuit. If the switch is positioned to XDCR and the light goes out, the associated transducer circuit is either shorted or open. If the fault light remains on with the switch in both the XDCR and VALVE positions, then the fault is located in the control shield. The illumination of two inoperative lights on the center instrument panel accompanied by all four fault lights on the front of the antiskid control shield is an indication of a problem in the parking brake valve or switching circuit, or a loss of primary power to both outboard and inboard antiskid channels.

8. Operation (Airplanes without automatic braking) (See Fig. 5 for effectivity.)

A. For antiskid system operation, the main antiskid ON-OFF switches on the pilots' center panel (P2) must be in ON position (Fig. 5). Prior to touchdown, the locked wheel detector (LWD) circuit is closed since no wheel speed exists, and the locked wheel arming (LWA) circuit is energized by the landing gear safety sensor to send a full brake release signal thru the skid control circuit to the antiskid control valve. The brakes will then be released regardless of brake pedal pressure. At touchdown, wheel spin-up causes the LWD circuit to block the LWA signal from the skid control circuit and the control valve, and allows brake pressure application. For a pair of wheels without touchdown protection, the lack of an arming signal (with both wheels below 30 mph) allows pressure to be metered to the brakes in proportion to the pilots' foot pressure. Once the wheels spin up past 30 mph, the locked wheel protection is armed through the wheel speed signal and normal control is applied.

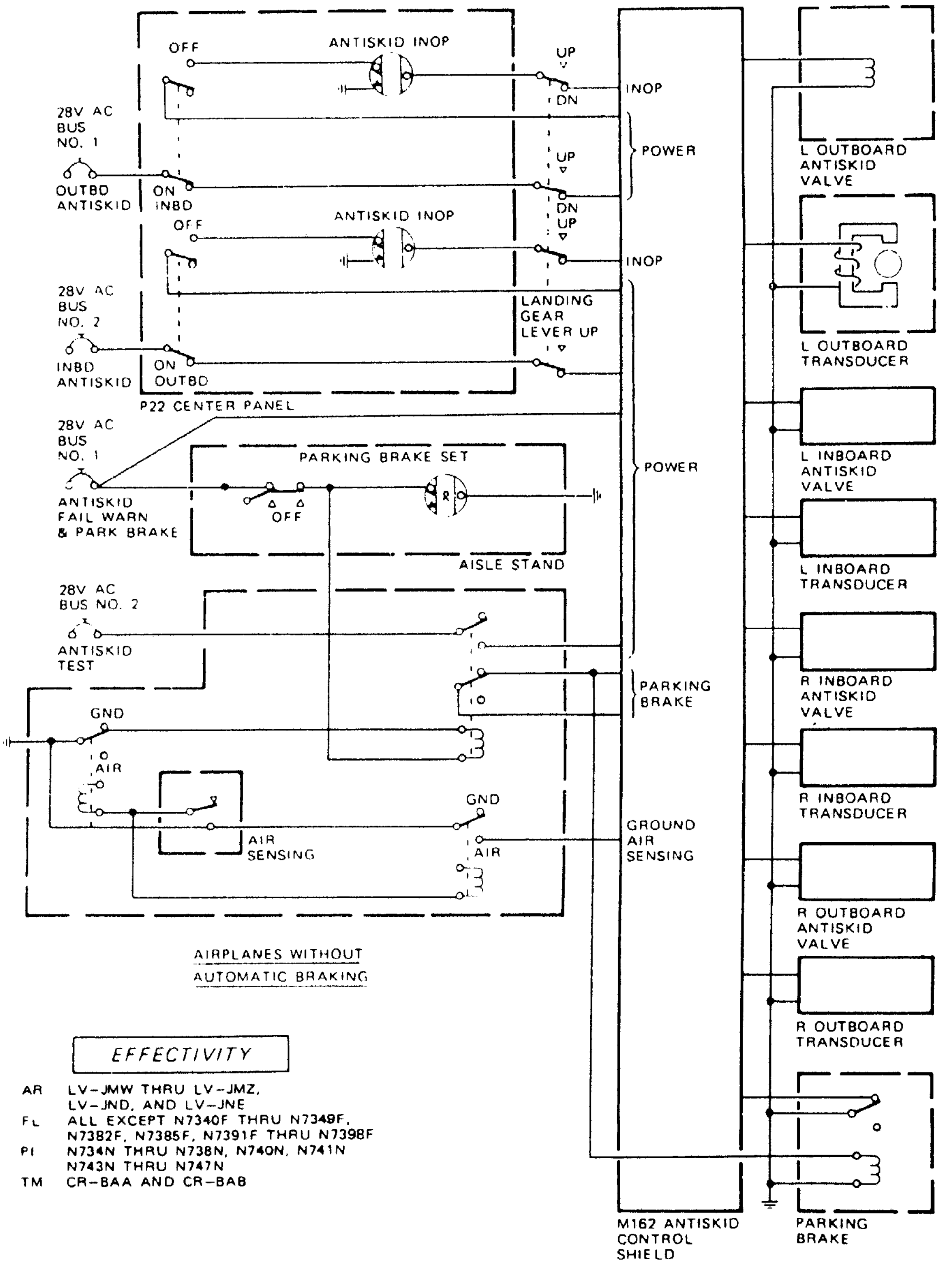
B. The transducer produces an ac output signal with a frequency proportional to the rotational speed of the wheel. This signal is fed to the converter in antiskid control shield.

C. The ac signal from the transducer is changed to a dc voltage proportional to wheel speed. The dc voltage is then applied to the skid control circuit. If a sudden drop occurs in this dc voltage due to a reduction in wheel speed (incipient skid), the skid control circuit Will detect this change in voltage and, if it is above a preset level, Will send a signal to the control valve to release brake pressure.

D. The voltage signal to the control valve is monitored by a special feedback circuit within the skid control circuit. Immediately following a brake release, the feedback circuit acts to modulate the brake pressure to a level just below the skid threshold point, and thereby, attains maximum braking efficiency.

E. The touchdown locked wheel protection circuits are for the mated pairs of inboard or outboard wheels and prevent locked wheels both at touchdown and during ground operation. These are auxiliary circuits for releasing brake pressure whenever a wheel speed goes below approximately 10 mph while the locked wheel arming (LWA) circuit is energized. The LWA circuit is energized by either the closed safety switch (airborne) or a wheel of a mated pair with a speed over 20 mph. The LWA circuit, when energized, sends a signal to the locked wheel detector circuit (LWD) and if the associated wheel speed is above 10 mph, the LWD circuit blocks the LWA signal from the skid control circuit. If the associated wheel speed drops below 10 mph with the mated wheel speed at least 20 mph, the LWD circuit closes and passes the LWA signal onto the skid control circuit where it causes a full release signal to be sent to the antiskid control valve.

F. When the captain's or first officer's brake pedals are depressed, hydraulic fluid under pressure is metered to the main gear antiskid control valves. Fluid flows into the pressure port, past the ends of the 2nd-stage spools, and then to brake pressure ports. Fluid also flows through restrictors and ports on each side of the 1st-stage valves, and then to the return port. When the 1st-stage valve is in a neutral position (antiskid off or no skid signals) the pressure drops, caused by flow through the restrictors, on each side of the valve are equal. The reduced pressures on each side of the 1st-stage valve are applied to the ends of the 2nd-stage valve spool. A s long as the pressures sensed at each end of the 2nd-stage valve spool are equal, spring pressure holds the spool in the "open" position, allowing free flow of pressure to the brake port. When a skid signal is received from the control shield, it is applied to the 1st-stage valve which moves to restrict the flow of fluid through the control port. Since this imposes an additional restriction to fluid flow, the pressure at this port increases. This increased pressure is sensed at the end of the 2nd-stage valve spool, which moves from the "open" position. Displacement of the 2nd-stage valve spool from the open position reduces the pressure available at the brake port. Differences in control pressures are balanced by differences between supply and brake pressures. Since the movement of the 1st-stage valve, and hence that of the 2nd-stage valve, is proportional to the strength of the correction signal received, the antiskid control valve can control brake pressure from essentially zero to the full pressure available from the brake metering valves, thus permitting skidding of modest severity and thereby attaining optimum braking efficiency.



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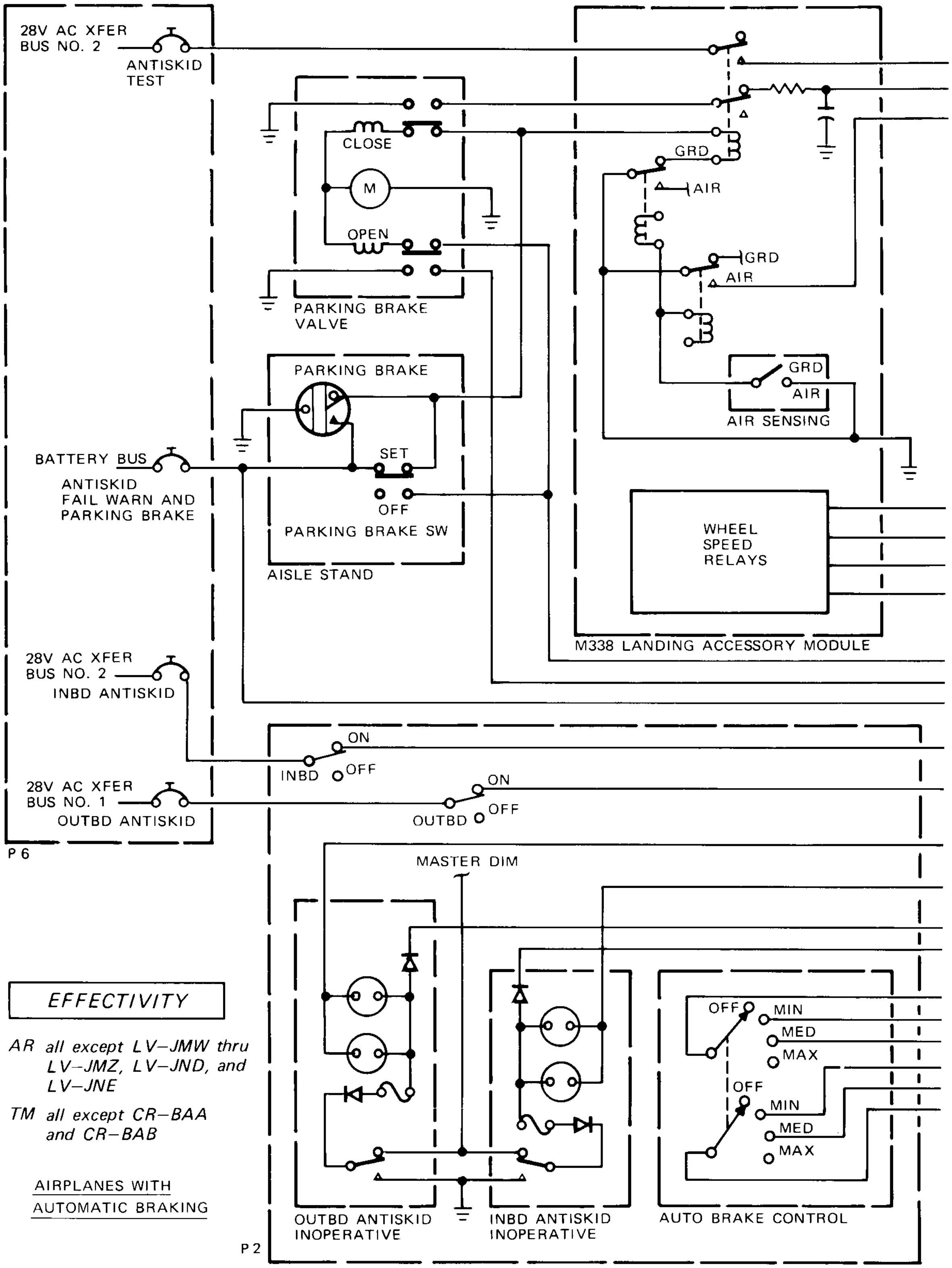
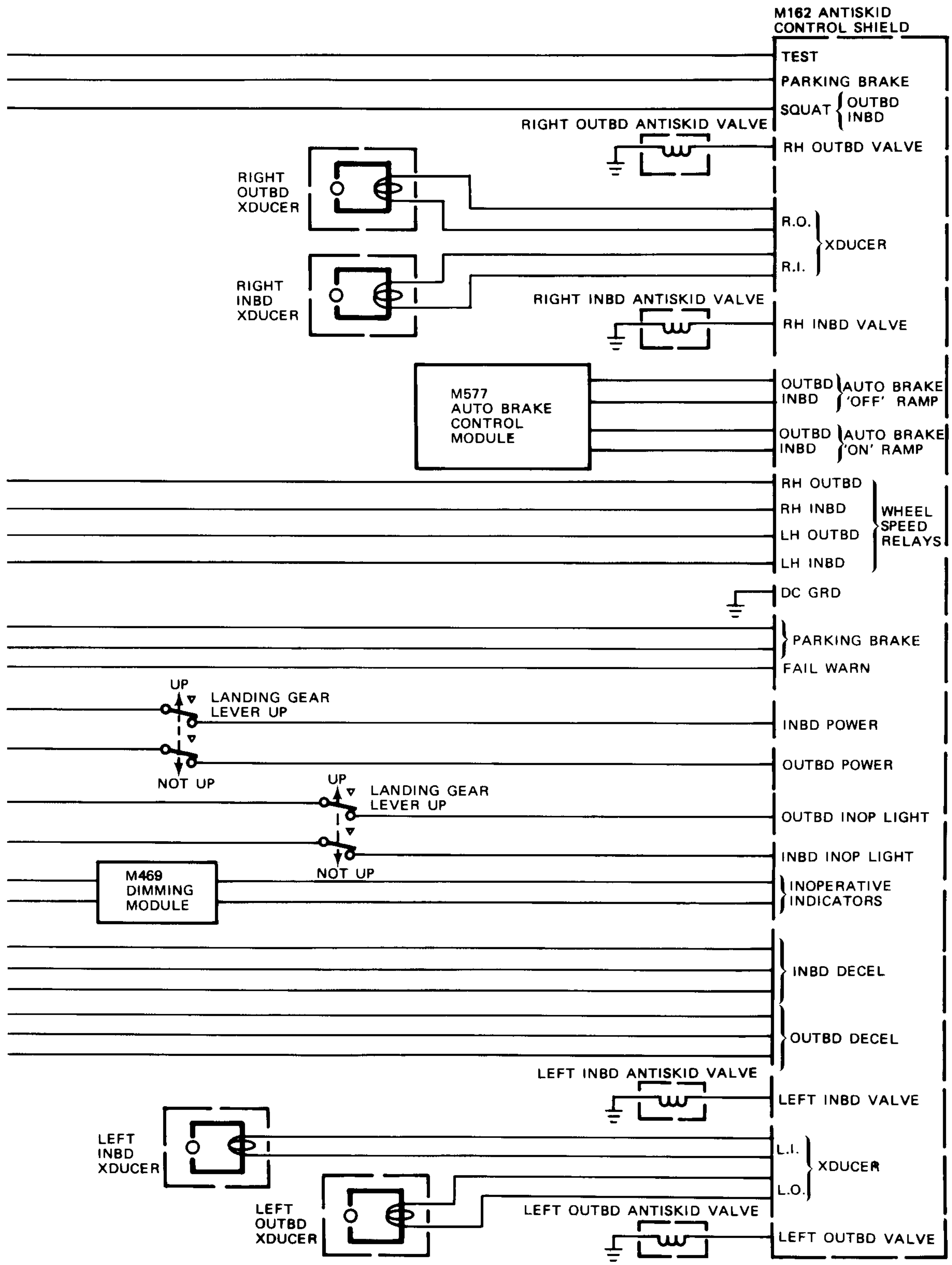
Antiskid System Control Circuit
Figure 5 (Sheet 1)

Antiskid System Control Circuit
Figure 5 (Sheet 1)

32-42-0
Page 13



Antiskid System Control Circuit
Figure 5 (Sheet 2)



Antiskid System Control Circuit
Figure 5 (Sheet 3)

9. Operation (Airplanes with automatic braking) (See figure 5 for effectivity.)

A. Normal Antiskid Mode

(1) Wheel speed transducers, one driven by each wheel, produce electrical frequency outputs which are proportional to wheel speed. The signals are processed by individual wheel circuit cards in the antiskid control shield to control brake pressure to the applicable wheel. The transducer frequency output signal is accepted by a converter circuit on the wheel circuit card where it is converted to a dc voltage which is proportional to wheel speed. (See figure 4.)

(2) The converter output signal (representing wheel speed) is sent to a velocity reference loop consisting of deceleration and velocity reference circuits. The output of the velocity reference loop is a voltage which represents instantaneous (reference) airplane velocity. The velocity reference output is sent to a velocity comparator circuit which also receives converter (wheel speed) signals. The comparator circuit compares wheel speed with reference velocity. The output is a velocity error voltage, positive or negative, which is proportional to the magnitude of the difference between wheel speed and reference velocities.

(3) Velocity comparator output is sent to a pressure bias modulator circuit which is the main controlling component for brake pressure correction. The pressure bias modulator circuit is a memory circuit in terms of pressure control. The modulator varies brake pressure in an attempt to hold velocity error output from the comparator at a set value which is the modulator threshold. Reference velocity decreases more rapidly than wheel velocity, causing velocity error voltage output from the comparator to decrease. The pressure bias modulator reacts by increasing brake pressure to slow the wheel. Conversely, the modulator decreases brake pressure for velocity error voltages above threshold.

(4) Lead and transient control circuits form parallel paths with the pressure bias modulator for control of the antiskid valves. The lead circuit anticipates when the tire is about to skid and responds by decreasing brake pressure before the tire can go into a deep skid. The transient control circuit provides rapid recovery from very sudden, unpredicted deep skids, such as could occur when a tire suddenly comes into contact with an ice patch, paint strip, etc.

(5) Output signals from the pressure bias modulator and transient and lead circuits are sent to a summing amplifier which provides a composite signal to the valve driver. The valve driver provides a current to the servo coil in the antiskid valve to modulate brake pressure as required.

B. Touchdown Protection Mode

(1) Touchdown protection circuits prevent touchdown with locked wheels. The inboard wheels are controlled by two air safety relay inputs which prevent brake application in the airborne mode. Wheel spinup inputs override the air safety brake release inputs to allow brake application when wheel velocity reaches a preset level, even though the air safety relay may still be in the airborne mode.

C. Locked Wheel Protection Mode

(1) Locked wheel circuits compare wheel speeds in inboard and outboard wheel pairs. Valve overdrive signals are sent to release brake pressure at the slow wheel of an antiskid pair when the slow wheel speed has dropped to 25% of its associated wheel speed. Discriminator circuits ignore wheel speed differences due to turning. Locked wheel protection drops out at speeds between 11 and 25 knots.

D. Automatic Braking Mode

(1) Antiskid operation in the automatic braking mode is the same as in normal antiskid mode except the reference velocity against which wheel speed is compared is established in a selected deceleration circuit. Operation in the automatic braking mode is on a paired wheel basis to obtain symmetrical braking. The selected deceleration circuit uses a ramp voltage as a reference velocity. The slope of the ramp determines the airplane deceleration rate and is selected when the automatic braking system is turned on. Velocity error voltages between wheel speed and reference velocity cause brake application in an attempt to decelerate the airplane at the rate selected when the automatic braking system was turned on. Inputs from the automatic braking system are required to operate the antiskid system in the automatic braking mode. Those inputs are on-ramp, off-ramp and abrupt dropout. They are generated in the automatic braking system as described in 32-43-0. On-ramp signals initiate automatic braking and cause the antiskid control shield to smoothly apply brake pressure to the value required to decelerate the airplane at the selected rate. Off-ramp signals initiate smooth, gradual transfer from automatic to manual mode (with antiskid backup) at static brake pressure level or when brake pressure approximately equals pilot's applied pressure. Abrupt dropout signals immediately transfer braking to manual mode with antiskid backup in the event of emergencies.

E. Antiskid control is energized when the two antiskid switches on the center panel are turned on, but actual antiskid control is not possible until the air safety relay (touchdown protection) is in the ground mode, or wheel speed exceeds a preset value and overrides air safety protection. In the normal antiskid mode of operation, brake pressure applied by the pilot through brake metering valves is transmitted to the brakes unmodified by the antiskid valves. When an impending skid is detected, a control signal is sent from the antiskid control shield to the appropriate antiskid valve, causing the valve to open by an amount dependent on the strength of the signal. The open antiskid valve bleeds an appropriate amount of brake metering valve pressure to return to reduce pressure and prevent a skid. When the skid has been prevented and wheel speed has returned to normal, control signals to the antiskid valves are reduced or eliminated. All other brake hydraulic system components operate as normal to provide brake pressure. In the automatic braking mode of operation, however, solenoid valves bypass the brake metering valves, using system pressure directly as the pressure source. The antiskid control shield responds to inputs from the automatic braking control module to control the antiskid valves for brake pressure modulation. Refer to 32-43-0 for Automatic Braking System Operation.

ANTISKID SYSTEM - TROUBLESHOOTING

1. General
   A. Antiskid system trouble symptoms are best identified by performing a test of the antiskid system (Ref Antiskid System - Adjustment/Test).
   B. If the test lights do not react as specified in the system test, proceed to isolate the cause by means of the following chart.
   C. A malfunction of the antiskid system is indicated when an ANTISKID INOP light on the pilot's center panel P2 comes on. Isolation of the malfunction can be accomplished by using the failure isolation circuit of the antiskid control shield. The four lights and two switches on the front of the control shield are used for fault isolation, and by proper interpretation of light behavior when the COMPONENT TEST switch is operated, the fault can be isolated to a specific transducer, antiskid valve, or the control shield. If both ANTISKID INOP lights are on and the failure cannot be isolated to antiskid valves or transducers with the use of the COMPONENT TEST switch, the failure is in parking brake circuit (Ref 32-41-0 and 32-44-0).
2. Antiskid System Troubleshooting Chart

One or both antiskid INOP lights are on with INBD and OUTBD ANTISKID switches in ON position and parking brake released.

Check RO, RI, LO and LI lights on antiskid control shield. IF -

One or more RO, RI, LO, or LI light on antiskid control shield is on - Place COMPONENT TEST switch in VALVE position. IF -

All RO, RI, LO, and LI lights on antiskid control shield are off - Place COMPONENT TEST switch in XDCR position. IF -

A

LIGHT GOES OFF - Place COMPONENT TEST switch in XDCR position. If light comes on, corresponding antiskid valve is defective. If light remains off, first replace corresponding transducer, then, if trouble still exists, replace corresponding antiskid valve (Ref 32-42-11 and 32-42-21).

LIGHT REMAINS ON - Antiskid control shield is defective. Replace control shield per 32-42-21.

A

LIGHT COMES ON - Corresponding transducer is defective. Replace transducer per 32-42-11.

LIGHTS REMAIN OFF - Antiskid control shield is defective. Replace control shield per 32-42-21.

EFFECTIVITY

AR LV-JMW thru LV-JMZ, LV-JND, LV-JNE
MD 5R-MFA
TS N73711 thru N73713, N73715, N73717
SA ZS-SBL thru ZS-SBR

Antiskid System - Adjustment/Test
Figure 101 (Sheet 1)

One or both ANTISKID INOP light is on with INBD and OUTBD ANTISKID switches in ON position and parking brake released.

Check RO, RI, LO and LI lights on antiskid control shield and place COMPONENT TEST switch in VALVE position. IF -

LIGHT GOES OFF - Corresponding antiskid valve is defective. Replace valve per 32-42-31.

LIGHT REMAINS ON - Place COMPONENT TEST switch in XDCR position. IF -

LIGHT GOES OFF - Corresponding transducer is defective. Replace transducer per 32-42-11.

LIGHT REMAINS ON - Antiskid control shield is defective. Replace control shield per 32-42-21.

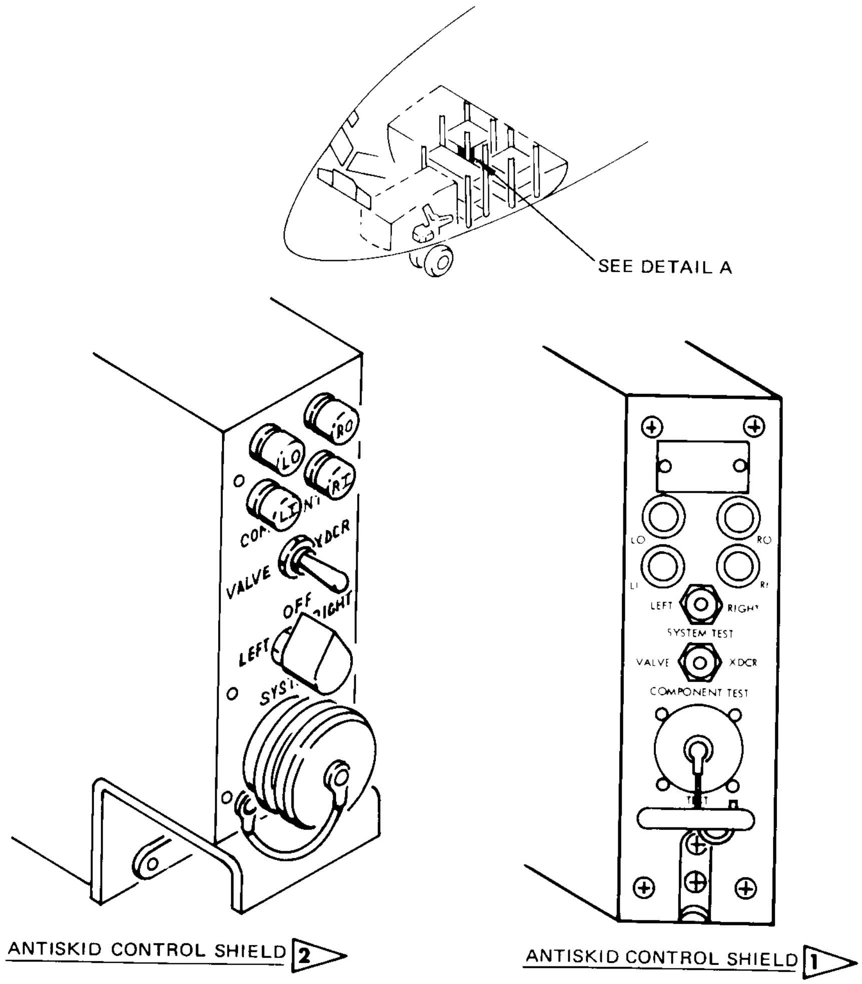
EFFECTIVITY

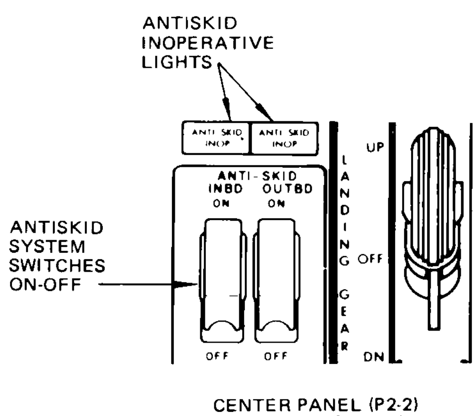
AR ALL EXCEPT LV-JMW thru LV-JMZ, LV-JND, LV-JNE
MD ALL EXCEPT 5R-MFA
TS ALL EXCEPT N73711 thru N73713, N73715, N73717
SA ALL EXCEPT ZS-SBL thru ZS-SBR

Antiskid System - Adjustment/Test
Figure 101 (Sheet 2)

ANTISKID SYSTEM - ADJUSTMENT/TEST

1. Antiskid System Test
   A. General
      (1) Ground test features are built into the antiskid control unit. Two test switches and four indicator lights are accessible for a quick confidence examination of each channel of the system. This test is designed to first test the indication/monitor function and then test the individual components of the antiskid system: antiskid control shield, antiskid control valves, wheel speed transducers, and switches. If it is desired to test the complete antiskid system, perform the entire test in sequence.
      (2) After replacement of the antiskid control shield, perform the antiskid indication/monitor test and the antiskid control shield test.
      (3) After replacement of an antiskid control valve, perform the antiskid indication/monitor test and the antiskid control valve test.
      (4) After replacement of a wheel speed transducer, perform the antiskid indication/monitor test and the wheel speed transducer test.
      (5) After replacement of a switch, perform the individual switch test.
      (6) If the indications obtained are not as specified, refer to Antiskid System - Trouble Shooting and Inspection/Check.
   B. Equipment and Materials
      (1) Antiskid Functional Test Tool - F80208-1 (Fig. 502) (airplanes without automatic braking)
      (2) DC voltmeter - 0- to 15-volt range
      (3) Axle jacks
      (4) Gear Ground Lock Assembly - F72735 (Ref 32-00-01)
   C. Prepare for Test
      (1) Pressurize hydraulic systems A and B (AMM 29-11-0/201 and AMM 29-12-0/201).
      (2) Check that ground lock assemblies are installed in all gear (AMM 32-00-01).
      (3) Close all landing gear circuit breakers on P6 panel.
      (4) Open ground interconnect valve circuit breaker on P6 panel.
      (5) Check that wheel chocks are in place.
   D. Test Antiskid System
      (1) Test Antiskid Indication/Monitor Function (Fig. 502).
         (a) Release parking brake.
         (b) Set inboard and outboard antiskid switches on pilot's panel to OFF position. Check that ANTISKID INOP lights are on.
         (c) Set both inboard and outboard antiskid switches to ON position. Check that ANTISKID INOP lights go off.





1
- AR LV-JMW THRU LV-JMZ, LV-JND, AND LV-JNE
- BU LN-SUA, LN-SUG, LN-SUP, LN-SUS
- CP CF-CPB THRU CF-CPE, CF-CPU, CF-CPV, CF-CPZ
- FL ALL EXCEPT N7382F
- IC VT-EAG THRU VT-EAM
- IN EI-ASA THRU EI-ASH

2
- AR ALL EXCEPT LV-JMW THRU LV-JMZ, LV-NJD AND LV-JNE
- BU ALL EXCEPT LN-SUA, LN-SUG, LN-SUP, LN-SUS
- CP ALL EXCEPT CF-CPB THRU CF-CPE, CF-CPU, CF-CPV, CF-CPZ
- FL N7382F
- IC ALL EXCEPT VT-EAG THRU VT-EAM
- IN ALL EXCEPT EI-ASA THRU EI-ASH

Antiskid System Controls
Figure 501

(d) Set parking brake. Check that ANTISKID INOP lights remain off.

NOTE: The ANTISKID INOP lights may come on momentarily when parking brake valve opens or closes.

(e) Release parking brake. Check that ANTISKID INOP lights remain off or go off.

NOTE: The ANTISKID INOP lights may come on momentarily when parking brake valve opens or closes.

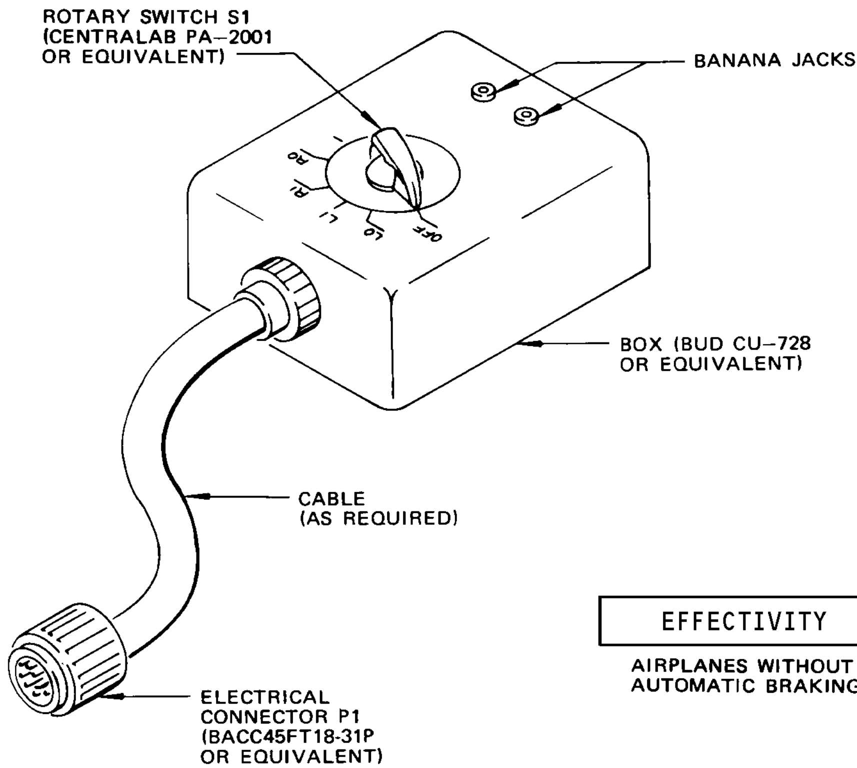
(f) Pull inboard antiskid circuit breaker. Check that inboard ANTISKID INOP light comes on.
(g) Push inboard antiskid circuit breaker in. Check that inboard ANTISKID INOP light goes off.
(h) Pull outboard antiskid circuit breaker. Check that outboard ANTISKID INOP light comes on.
(i) Push outboard antiskid circuit breaker in. Check that outboard ANTISKID INOP light goes off.

(2) Test Antiskid Control Shield
(a) Check press-to-test circuit of the four lights on the antiskid control shield located in the electrical/electronic equipment compartment.
(b) Set parking brake.
(c) Place SYSTEM TEST switch on antiskid control shield in LEFT position. Check for the following conditions:
1) RO and RI lights are on
2) LO and LI lights are off

NOTE: On airplanes with automatic braking, upon releasing switch, all lights will go off.
On airplanes without automatic braking, upon releasing switch, all lights will come on and then go off.

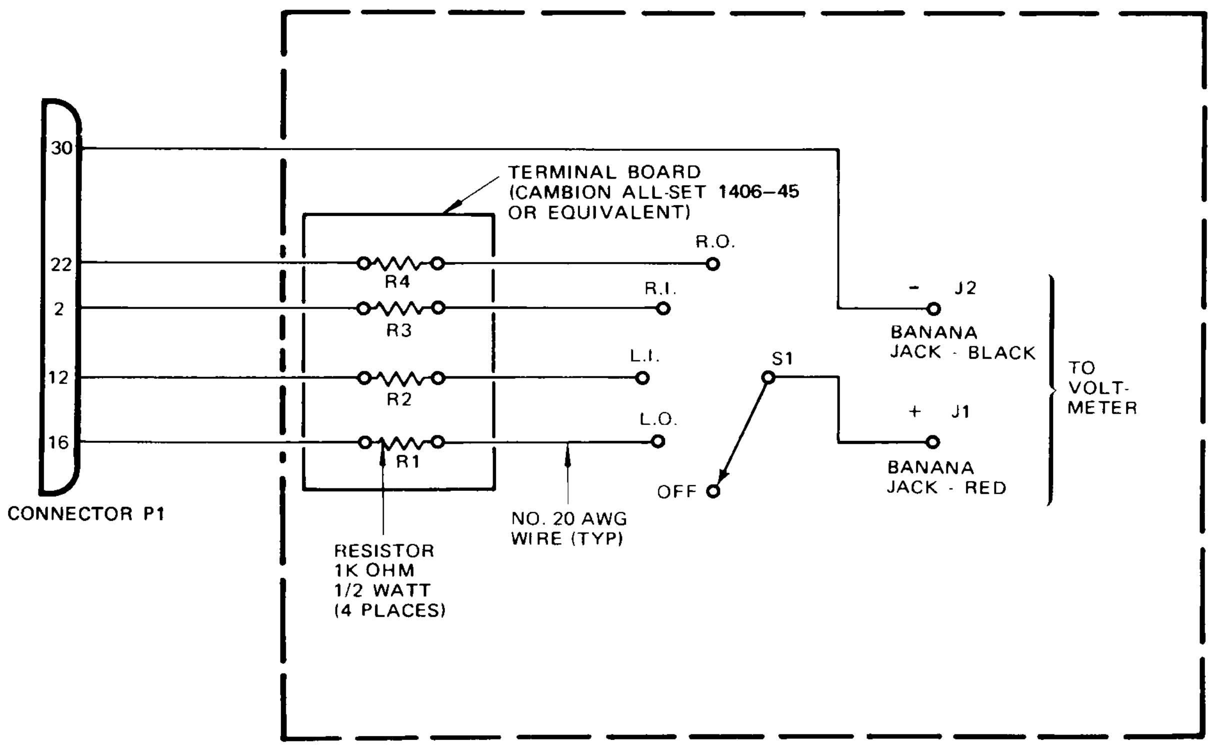
(d) Place SYSTEM TEST switch in RIGHT position. Check for the following conditions:
1) LO and LI lights are on
2) RO and RI lights are off

NOTE: On airplanes with automatic braking, upon releasing switch, all lights will go off.
On airplanes without automatic braking, upon releasing switch, all lights will come on and then go off.



EFFECTIVITY

AIRPLANES WITHOUT AUTOMATIC BRAKING



Antiskid System Functional Test Tool
Figure 502

(e) Release parking brake.
(f) Depress and hold brake pedals. Check that all brakes are applied.
(g) On airplanes with automatic braking, hold SYSTEM TEST switch in LEFT or RIGHT position while performing step (h).
(h) Press AIR SENSING TEST switch on landing gear electrical module.
   1) Check that LI and RI lights on antiskid control shield come on.
   2) Check that left inboard and right inboard brake stacks release and left outboard and right outboard brake stacks remain applied.
(i) Release AIR SENSING TEST switch and SYSTEM TEST switch. Check that all brakes are applied.
(j) On airplanes incorporating SB 32-1085, test outboard touchdown protection function.
   1) Connect antiskid/auto brake tester to antiskid control shield test connector.
   2) Depress and hold brake pedals. Simulate a 65-knot wheel speed on left inboard and right inboard wheels with tester. Check that left outboard and right outboard brake stacks release and left inboard and right inboard brake stacks remain applied.
   3) Remove left inboard wheel speed simulation. Check that left inboard brake releases and left and right outboard brakes apply.
   4) Remove right inboard wheel speed simulation and reapply left inboard wheel speed simulation. Check that right inboard brakes release and left inboard brakes apply.
   5) Remove left inboard wheel speed simulation and remove tester.
(k) Release brake pedals. Check that all brakes release.

(3) Test Left Outboard Antiskid Control Valve
(a) Disconnect electrical connector D926 from left outboard antiskid control valve. Check that outboard ANTISKID INOP light on pilot's panel and LO light on antiskid control shield come on.
(b) Place COMPONENT TEST switch on antiskid control shield to VALVE position. Check that outboard ANTISKID INOP light and LO light go off. Release COMPONENT TEST switch. Check that outboard ANTISKID INOP light and LO light come on.
(c) Connect electrical connector D926 to valve. Check that outboard ANTISKID INOP light and LO light go off.
(d) Check that parking brake is released and disconnect electrical connector D928 from shutoff valve. Check that inboard and outboard ANTISKID INOP lights come on.

(e) Set parking brake and place SYSTEM TEST switch on antiskid control shield to RIGHT position. Check that left inboard and left outboard brakes release and right inboard and right outboard brakes remain applied.
(f) Release SYSTEM TEST switch. Check that all brakes release momentarily and then apply.
(g) Release parking brake and connect electrical connector D928 to shutoff valve. Check that inboard and outboard ANTISKID INOP lights go off.

(4) Test Left Inboard Antiskid Control Valve
(a) Disconnect electrical connector D924 from left inboard antiskid control valve. Check that inboard ANTISKID INOP light on pilot's panel and LI light on antiskid control shield come on.
(b) Place COMPONENT TEST switch on antiskid control shield to VALVE position. Check that inboard ANTISKID INOP light and LI light go off. Release COMPONENT TEST switch. Check that inboard ANTISKID INOP light and LI light come on.
(c) Connect electrical connector D924 to valve. Check that inboard ANTISKID INOP light and LO light go off.
(d) Check that parking brake is released and disconnect electrical connector D928 from shutoff valve. Check that inboard and outboard ANTISKID INOP lights come on.
(e) Set parking brake and place SYSTEM TEST switch on antiskid control shield to RIGHT position. Check that left inboard and left outboard brakes release and right inboard and right outboard brakes remain applied.
(f) Release SYSTEM TEST switch. Check that all brakes release momentarily and then apply.
(g) Release parking brake and connect electrical connector D928 to shutoff valve. Check that inboard and outboard ANTISKID INOP lights go off.

(5) Test Right Inboard Antiskid Control Valve
(a) Disconnect electrical connector D930 from right inboard antiskid control valve. Check that inboard ANTISKID INOP light on pilot's panel and RI light on antiskid control shield come on.
(b) Place COMPONENT TEST switch on antiskid control shield to VALVE position. Check that inboard ANTISKID INOP light and RI light go off. Release COMPONENT TEST switch. Check that inboard ANTISKID INOP light and RI light come on.
(c) Connect electrical connector D930 to valve. Check that inboard ANTISKID INOP light and RI light go off.
(d) Check that parking brake is released and disconnect electrical connector D928 from shutoff valve. Check that inboard and outboard ANTISKID INOP lights come on.

(e) Set parking brake and place SYSTEM TEST switch on antiskid control shield to LEFT position. Check that right inboard and right outboard brakes release and left inboard and left outboard brakes remain applied.

(f) Release SYSTEM TEST switch. Check that all brakes release momentarily and then apply.

(g) Release parking brake and connect electrical connector D928 to shutoff valve. Check that inboard and outboard ANTISKID INOP lights go off.

(6) Test Right Outboard Antiskid Control Valve

(a) Disconnect electrical connector D932 from right outboard antiskid control valve. Check that outboard ANTISKID INOP light on pilot's panel and RO light on antiskid control shield come on.

(b) Place COMPONENT TEST switch on antiskid control shield to VALVE position. Check that outboard ANTISKID INOP light and RO light go off. Release COMPONENT TEST switch. Check that outboard ANTISKID INOP light and RO light come on.

(c) Connect electrical connector D932 to valve. Check that outboard ANTISKID INOP light and RO light go off.

(d) Check that parking brake is released and disconnect electrical connector D928 from shutoff valve. Check that inboard and outboard ANTISKID INOP lights come on.

(e) Set parking brake and place SYSTEM TEST switch on antiskid control shield to LEFT position. Check that right inboard and right outboard brakes release and left inboard and left outboard brakes remain applied.

(f) Release SYSTEM TEST switch. Check that all brakes release momentarily and then apply.

(g) Release parking brake and connect electrical connector D928 to shutoff valve. Check that inboard and outboard ANTISKID INOP lights go off.

(7) Test Wheel Speed Transducers (airplanes without automatic braking)

(a) Check that both inboard and outboard antiskid switches on pilot's panel are in ON position.

(b) Check that parking brake is released.

(c) Jack main landing gear with axle jacks and connect antiskid functional test tool to test receptacle on antiskid control shield (Fig. 502).

(d) Manually spin each wheel in sequence and check that voltmeter associated with that wheel registers less than 0.6 volt at 0 rpm and rises to approximately 1 volt at 80 rpm.

(e) Disconnect antiskid functional test tool.

(f) Lower main landing gear and remove jacks.

(8) Test Wheel Speed Transducers (airplanes with automatic braking)
  (a) Remove hubcaps from wheels to be tested and rotate transducer drive coupling to check for excessing bearing free play and that drive coupling is not bent.
  (b) Check that parking brake is released and disconnect electrical connector D928 from parking brake shutoff valve. Check that inboard and outboard ANTISKID INOP lights on pilot's panel come on.
  (c) Set parking brake.
  (d) Test left outboard transducer.
    1) Manually spin left outboard transducer drive coupling. Check that right outboard brake releases.
    2) Stop spinning transducer drive coupling. Check that left outboard brake releases momentarily and then applies.
  (e) Test left inboard transducer.
    1) Manually spin left inboard transducer drive coupling. Check that right inboard brake releases.
    2) Stop spinning transducer drive coupling. Check that left inboard brake releases momentarily and then applies.
  (f) Test right inboard transducer.
    1) Manually spin right inboard transducer drive coupling. Check that left inboard brake releases.
    2) Stop spinning transducer drive coupling. Check that right inboard brake releases momentarily and then applies.
  (g) Test right outboard transducer.
    1) Manually spin right outboard transducer drive coupling. Check that left outboard brake releases.
    2) Stop spinning transducer drive coupling. Check that right outboard brake releases momentarily and then applies.
  (h) Release parking brake and connect electrical connector D928 to shutoff valve. Check that inboard and outboard ANTISKID INOP lights go off.
  (i) Install hubcaps.

(9) Test Landing Gear Lever Up Switch
  (a) Set parking brake.
  (b) Check that gear ground lock assemblies are installed (AMM 32-00-01).

WARNING: CHECK THAT GROUND LOCK ASSEMBLIES ARE INSTALLED IN ALL LANDING GEAR TO PREVENT INADVERTENT OPERATION OF GEAR. INJURY TO PERSONNEL AND/OR EQUIPMENT COULD RESULT IF GEAR RETRACTS.

  (c) Place landing gear lever in UP position.

(d) Press AIR SENSING TEST and GRD SENSING TEST switches on landing gear electrical module.
  1) Check that ANTISKID INOP lights on pilot's panel do not come on.
  2) Check that brakes do not release.

(e) Release AIRSENSING TEST and GRD SENSING TEST switches.

(f) Place landing gear lever in DN position.

(g) Release parking brake.

E. Restore Airplane to Normal

(1) Close ground interconnect valve circuit breaker on P6 panel.

(2) Reset the parking brake.

(3) Determine if there is further need for hydraulic power on airplane, if not, remove systems A and B hydraulic power (AMM 29-11-0 and AMM 29-12-0).

(4) Determine if there is further need for electrical power on airplane; if not, shut down source.

ANTISKID SYSTEM - INSPECTION/CHECK

1. Antiskid System Inspection

   A. General

      (1) Visual inspection of skid control system wiring and components should be accomplished as a part of routine periodic inspection of the aircraft brake hydraulic and electrical systems.

   B. Prepare for Examination

      (1) Examine control box assembly.

         (a) Check for security of installation in electronic equipment rack.

         (b) Check front panel indicator lenses, switches, and test receptacle dust cover for tightness.

      (2) Examine electrical wiring.

         (a) Check tightness of electrical connectors and receptacles at control box, each valve unit, and each wheel transducer.

         (b) Check wires and cables for damage or deterioration to insulation, shielding, or conductors, and for proper routing and clamping.

         CAUTION: CHECK WIRING HARNESS IN AREA PASSING UNDER AXLE FOR DAMAGE OR PREVIOUS REPAIR. IF WIRES HAVE BEEN DAMAGED OR SPLICED, REPLACE HARNESS.

         NOTE: If fitting at main gear axle is loose, replace fitting or add up to two split washers between fitting and axle by removing elbow fitting, loosening connecting fitting, removing expandable fitting from axle, slipping split washer(s) over antiskid wiring, and reinstalling fittings. If more than two washers are required to tighten fitting, replace harness or install new fittings.

      (3) Examine control valve units.

         (a) Check for security of attachment hardware and lockwiring.

         (b) Check for fluid leakage around valve body and at tubing connections.

      (4) Examine wheel speed transducers.

         (a) Check tightness of exciter ring in wheel hub and condition of potting.

         (b) Check security of transducer attachment hardware, access plate, and lockwiring.

         (c) Check transducer housing for damage and deterioration of potting.

      (5) Ensure electrical power is available.

C. Examine Antiskid System

(1) Set inboard and outboard antiskid switches on pilots panel to ON position.

(2) Set parking brake.

(3) On antiskid control unit in electrical equipment compartment, ensure all lights are off.

(4) Place system test switch, located on antiskid control box, in right position. Check for the following conditions:

(a) L0 and L1 lights are on.

(b) Upon release of switch, all lights shall go off.

(5) Place system test switch in left position. Check for the following conditions:

(a) R0 and R1 lights are on.

(b) Upon release of switch, all lights shall go off.

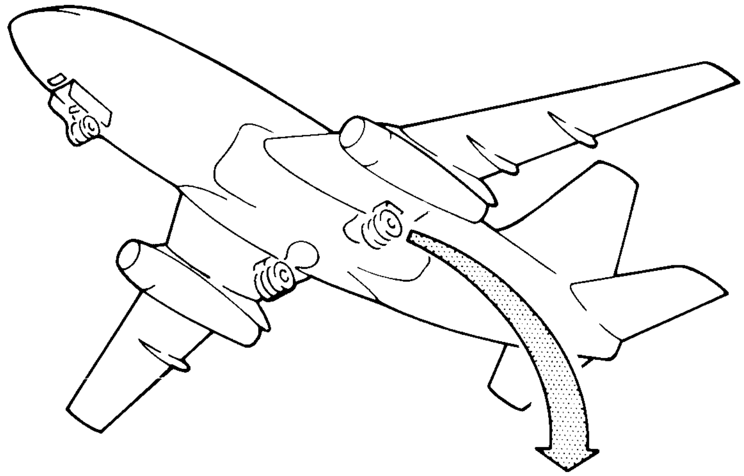
(6) If no further requirements exist, shut down electrical power.

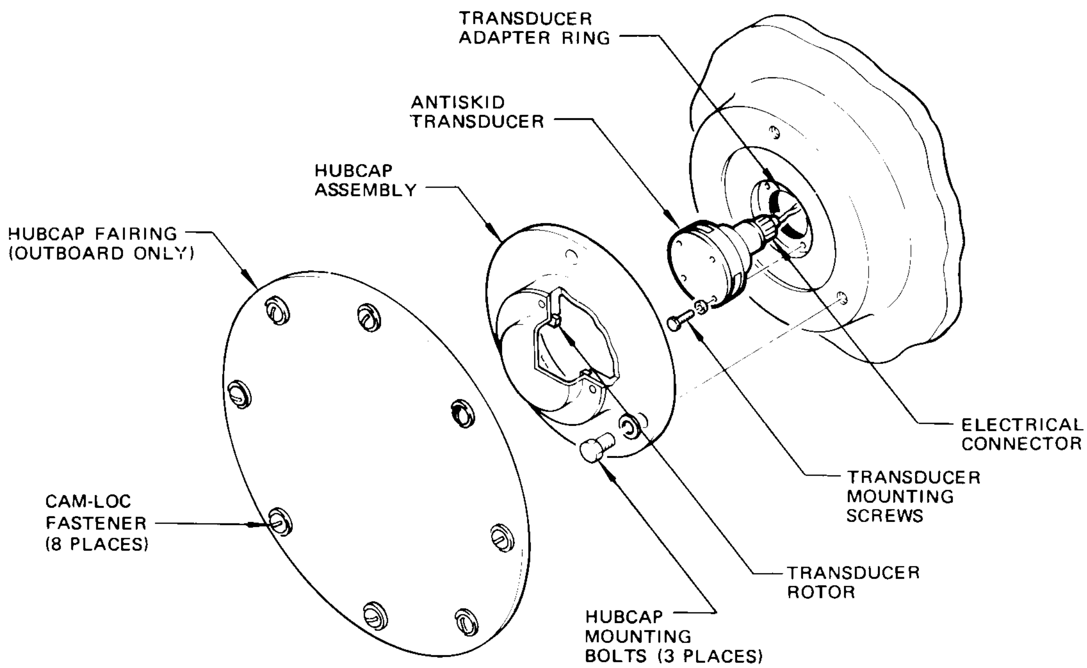
ANTISKID TRANSDUCER - REMOVAL/INSTALLATION

1. General
   A. A transducer is installed inside each main landing gear wheel axle.
      (1) Either of two types of transducers may be installed, rotating or non-rotating type (Fig. 401).
   B. A sleeve type adapter, part of the transducer assembly holds the transducer in place within the axle cavity.
      (1) The adapter is not removed during normal removal/installation of the transducer.
2. Equipment and Materials
   A. Oil - V79TERESSO, (Ref 20-30-21), or equivalent, (SAE 40 engine oil)
   B. Torque Adapter Tool - Hydro-Aire Co., Part No. T-33264, used for removing transducer lockring. Hydro-Aire Div., Crane Co., 3000 Winona Ave., Burbank, California
   C. Adapter-Antiskid Transducer Spin-Up - A32075-1 (Optional), A32075-9 (Optional), A32075-10 (Preferred)
   D. Drill - capable of 500- to 1000 RPM to be used with transducer spin-up adapter. Recommended drill: Chicago Pneumatic, Part No. CP-9289-9
   E. Antiskid Functional Test Tool - 3TE65-45113
   F. DC voltmeter - 0- to 10-volt range
   G. Axle jacks
   H. Gear Ground Lock Assembly (AMM 32-00-01)
3. Remove Transducer (Fig. 401)
   A. Check that gear ground lock assembly is installed in nose gear (Ref 32-00-01).
   B. Open OUTBD ANTISKID, INBD ANTISKID, ANTISKID FAIL WARN & PARKING BRAKE, and ANTISKID TEST circuit breakers on P6 control panel.
   C. If gaining access to outboard wheel transducer, remove hubcap fairing by rotating eight Cam-Loc fasteners.
   D. Remove three bolts and remove hubcap from wheel.
   E. On AR LV-JMW thru LV-JMZ, LV-JND, and LV-JNE; TM CR-BAA and CR-BAB, remove two transducer mounting screws.
   F. On AR ALL EXCEPT LV-JMW thru LV-JMZ, LV-JND, and LV-JNE; TM ALL EXCEPT CR-BAA and CR-BAB, remove transducer attachment to axle as follows:
      (1) Remove screw, washer, and drive coupling from end of transducer shaft.
      (2) Remove transducer lockring using torque adapter tool.
   G. Guide transducer out of adapter in axle only far enough to gain access to electrical connector.

      CAUTION: AVOID EXCESS PULL ON TRANSDUCER ELECTRIC CABLE.

   H. Disconnect electrical connector and remove transducer.
4. Install Transducer (Fig. 401)
   A. Connect transducer to cable by engaging electrical connector.





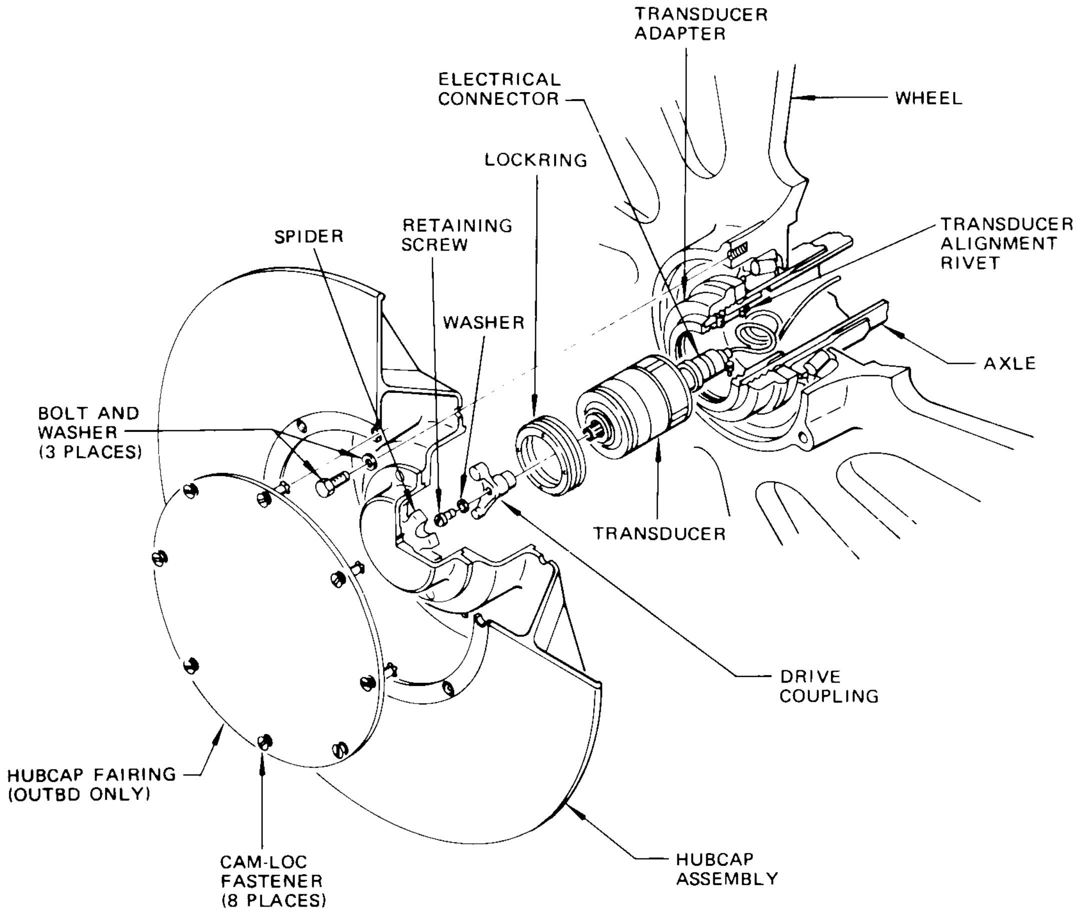
AIRPLANES WITH NONROTATING TYPE TRANSDUCERS AND RIVETED HUBCAP ASSEMBLY

EFFECTIVITY

AR LV–JMW thru LV–JMZ, LV–JND, and LV–JNE

TM CR–BAA and CR–BAB

Antiskid Transducer Installation
Figure 401 (Sheet 1)



EFFECTIVITY

AR all except LV–JMW thru LV–JMZ, LV–JND, and LV–JNE

TM all except CR–BAA and CR–BAB

Antiskid Transducer Installation
Figure 401 (Sheet 2)

B. On AR LV-JMW thru LV-JMZ, LV-JND, and LV-JNE; TM CR-BAA and CR-BAB, position nonrotating type transducer in axle and install two sets of mounting screws and washers. Lockwire screws.

C. On AR ALL EXCEPT LV-JMW thru LV-JMZ, LV-JND, and LV-JNE; TM ALL EXCEPT CR-BAA and CR-BAB, install and check rotating type transducer as follows:

(1) Align key slot on transducer housing with projecting rivet head in adapter and guide transducer in place in axle cavity.

CAUTION: IF KEY SLOT IN TRANSDUCER HOUSING IS NOT PROPERLY ALIGNED WITH RIVET HEAD IN ADAPTER, TRANSDUCER HOUSING MAY BIND IN ADAPTER AND DAMAGE TO TRANSDUCER, TRANSDUCER SHAFT, OR DRIVE COUPLING MAY RESULT DURING NEXT REMOVAL.

(2) Install lockring and tighten to 260 +20 pound-inches torque using torque adapter tool. Lockwire lockring to adapter.

(3) Check felt dust seal on outer end of transducer. If dry, saturate felt with oil.

(4) Install drive coupling, washer, and retaining screw on splined end of transducer shaft. Lockwire screw to drive coupling. Check that drive coupling turns freely in transducer.

(5) Check applicable transducer operation.

(a) Pressurize hydraulic systems A and B (Ref 29-11-0 and 29-12-0, Maintenance Practices).

(b) Provide electrical power to antiskid system.

(c) Close all landing gear circuit breakers on P6 panel.

(d) Check that wheel chocks are in place.

(e) Release parking brake.

(f) Set inboard and outboard antiskid switches on pilot's panel to OFF position. Check that ANTISKID INOP lights are on.

(g) Set both inboard and outboard antiskid switches to ON position. Check that ANTISKID INOP lights go off.

(h) Set parking brake. Check that ANTISKID INOP lights go off.

NOTE: The ANTISKID INOP lights may come on momentarily when parking brake valve opens or closes.

(i) Release parking brake. Check that ANTISKID INOP lights remain off.

NOTE: The ANTISKID INOP lights may come on momentarily when parking brake valve opens or closes.

(j) Pull inboard antiskid circuit breaker. Check that inboard ANTISKID INOP light comes on.

(k) Push inboard antiskid circuit breaker in. Check that inboard ANTISKID INOP light goes off.

(l) Pull outboard antiskid circuit breaker. Check that outboard ANTISKID INOP light comes on.

(m) Push outboard antiskid circuit breaker in. Check that outboard ANTISKID INOP light goes off.

(n) Test Wheel Speed Transducers (airplanes without automatic braking).

1) Check that both inboard and outboard antiskid switches on pilot's panel are in ON position.
2) Check that parking brake is released.
3) Jack main landing gear with axle jacks and connect antiskid functional test tool to test receptacle on antiskid control shield.
4) Manually spin applicable wheel in sequence and check that voltmeter associated with that wheel registers less than 0.6 volt at 0 rpm and rises to approximately 1 volt at 80 rpm.
5) Disconnect antiskid functional test tool.
6) Lower main landing gear and remove jacks.

(o) Test Wheel Speed Transducers (airplanes with automatic braking).

1) Remove hubcaps from wheels to be tested and rotate transducer drive coupling to check for excessive bearing free play and that drive shaft is not bent.
2) Check that parking brake is released and disconnect electrical connector D928 from parking brake shutoff valve. Check that inboard and outboard ANTISKID INOP lights on pilot's panel come on.
3) Set parking brake.
4) Test the left outboard transducer.

a) Turn the left outboard transducer drive coupling to approximately 500-1000 RPM.

NOTE: The transducer spin-up equipment tool can be used to rapidly turn the transducer.

b) Make sure the right outboard brake releases.
c) Stop the movement of the transducer as quickly as possible.
d) Make sure that the left outboard brake releases momentarily and then applies again in 5 to 10 seconds.

5) Test the left inboard transducer.
   a) Turn the left inboard transducer drive coupling to approximately 500-1000 RPM.

      NOTE: The transducer spin-up equipment tool can be used to rapidly turn the transducer.

   b) Make sure the right inboard brake releases.
   c) Stop the movement of the transducer as quickly as possible.
   d) Make sure that the left inboard brake releases momentarily and then applies again in 5 to 10 seconds.
6) Test the right outboard transducer.
   a) Turn the right outboard transducer drive coupling to approximately 500-1000 RPM.

      NOTE: The transducer spin-up equipment tool can be used to rapidly turn the transducer.

   b) Make sure the left outboard brake releases.
   c) Stop the movement of the transducer as quickly as possible.
   d) Make sure that the right outboard brake releases momentarily and then applies again in 5 to 10 seconds.
7) Release parking brake and connect electrical connector D928 to shutoff valve. Check that inboard and outboard ANTISKID INOP lights go off.

D. Position hubcap on wheel. On airplanes with rotating type transducers, verify that drive coupling engages spider in hubcap.
E. Attach hubcap to wheel with three sets of bolts and washers and install lockwire.
F. If wheel is on outboard side, install hubcap fairing.
G. Set parking brake.
H. Set inboard and outboard antiskid switches to the OFF position.
I. Determine if there is further need for electrical power on airplane; if not, shut down source.
J. Determine if there is further need for hydraulic power on airplane; if not, remove systems A and B hydraulic power (AMM 29-11-0/201, AMM 29-12-0/201).

ANTISKID CONTROL SHIELD - REMOVAL/INSTALLATION

1. General
   A. To remove the antiskid control shield, make sure all antiskid circuit breakers are opened. Release latch and remove unit from rack. When installing antiskid control shield, make sure pins are straight in component and rack connectors and secure latch.
   B. When the antiskid control shield is replaced, perform the antiskid system test as follows:
      (1) Prepare for Test
         (a) Ensure gear ground lock assembly is installed in nose gear (Ref 32-00-01).
         (b) Pressurize hydraulic systems A and B (Ref 29-11-0 and 29-12-0, Maintenance Practices).
         (c) Provide electrical power to antiskid system.
         (d) Close all landing gear circuit breakers on P6 panel.
         (e) Ensure wheel chocks are in place.
      (2) Test Antiskid Control Shield
         (a) Release parking brake.
         (b) Set inboard and outboard antiskid switches on pilot's panel to OFF position. Ensure ANTISKID INOP lights are on.
         (c) Set both inboard and outboard antiskid switches to ON position. Ensure ANTISKID INOP lights go off.
         (d) Set parking brake. Ensure ANTISKID INOP lights remain off.

            NOTE: ANTISKID INOP lights may come on momentarily when parking brake valve opens or closes.

         (e) Release parking brake. Ensure ANTISKID INOP lights remain off.

            NOTE: ANTISKID INOP lights may come on momentarily when parking brake valve opens or closes.

         (f) Pull inboard antiskid circuit breaker. Ensure inboard ANTISKID INOP light comes on.
         (g) Push inboard antiskid circuit breaker in. Ensure inboard ANTISKID INOP light goes off.
         (h) Pull outboard antiskid circuit breaker. Ensure outboard ANTISKID INOP light comes on.
         (i) Push outboard antiskid circuit breaker in. Ensure outboard ANTISKID INOP light goes off.
         (j) Check press-to-test circuit of the four lights on the antiskid control shield located in the electrical/electronic equipment compartment.
         (k) Set parking brake.

(l) Place SYSTEM TEST switch on antiskid control shield in LEFT position. Check that RO and RI lights are on and LO and LI lights are off.

NOTE: On airplanes with automatic braking, upon releasing switch, all lights will go off. On airplanes without automatic braking, upon releasing switch, all lights will come on and then go off.

(m) Place SYSTEM TEST switch in RIGHT position. Check that LO and LI lights are on and RO and RI lights are off.

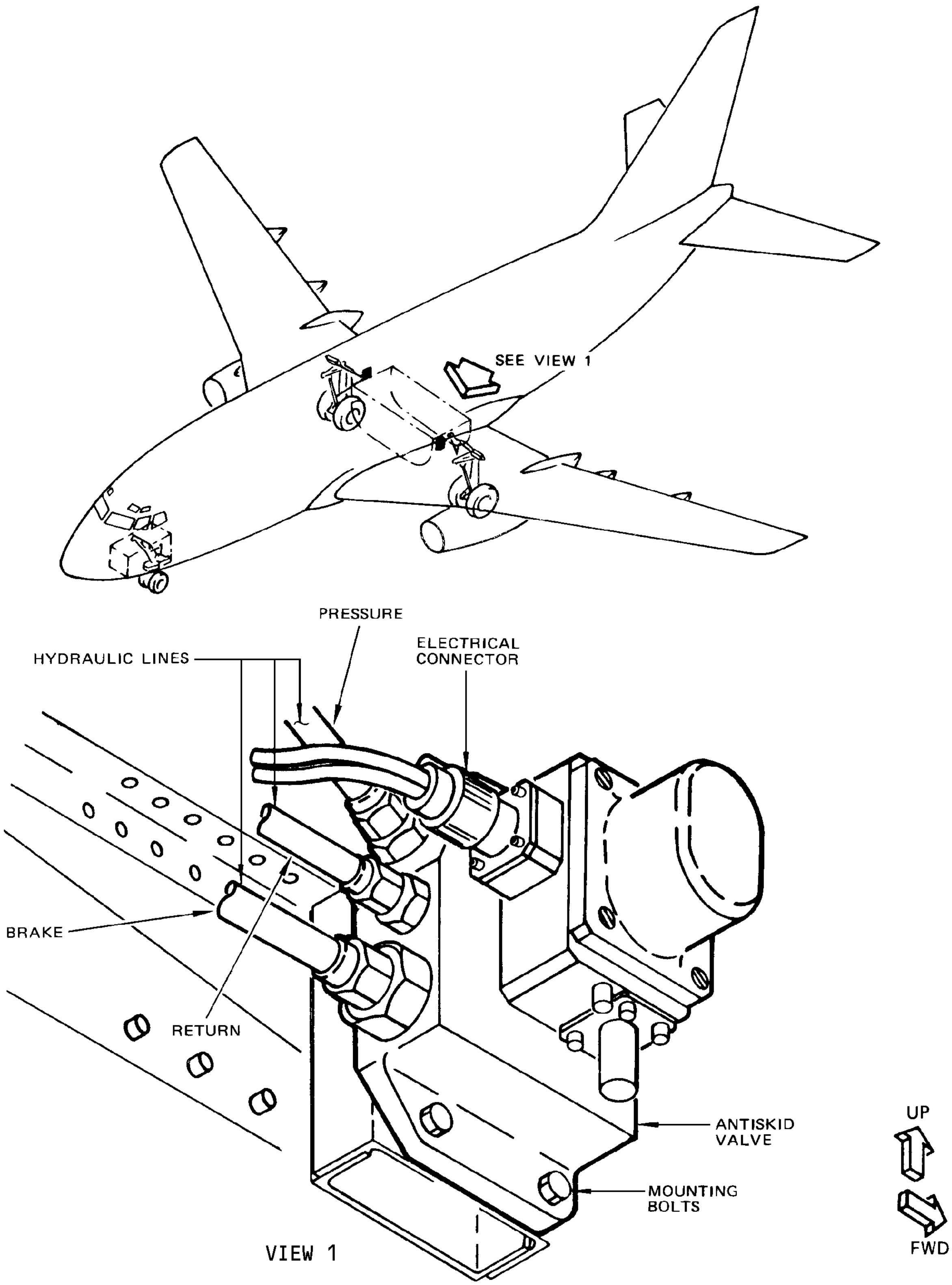
NOTE: On airplanes with automatic braking, upon releasing switch, all lights will go off. On airplanes without automatic braking, upon releasing switch, all lights will come on and then go off.

(n) Release parking brake.
(o) Depress and hold brake pedals. Check that all brakes are applied.
(p) Hold SYSTEM TEST switch in LEFT or RIGHT position while performing step (q).
(q) Press AIR SENSING TEST switch on landing gear electrical module. Check that LI and RI lights on antiskid control shield come on. Check that left inboard and right inboard brake stacks release and left outboard and right outboard brake stacks remain applied.
(r) Release AIR SENSING TEST switch and SYSTEM TEST switch. Check that all brakes are applied.
(s) On airplanes incorporating SB 32-1085, test outboard touchdown protection function.
   1) Connect antiskid/auto brake tester F80129-100 to antiskid control shield test connector.
   2) Simulate a 65-knot wheel speed on left inboard and right inboard wheels with tester. Check that left outboard and right outboard brake stacks release and left inboard and right inboard brake stacks remain applied.
   3) Remove left inboard wheel speed simulation. Check that left inboard brakes release and left and right outboard brakes apply.
   4) Remove right inboard wheel speed simulation and reapply left inboard wheel speed simulation. Check that right inboard brakes release and left inboard brakes apply.
   5) Remove left inboard wheel speed simulation and remove tester.
(t) Release brake pedals. Check that all brakes release.

ANTISKID VALVE - REMOVAL/INSTALLATION

1. Equipment and Materials
   A. Deleted
   B. Gear Ground Lock Assembly (Ref 32-00-01)
2. Remove Antiskid Valve
   A. Ensure gear ground lock assembly (Ref 32-00-01) is installed in nose gear.
   B. Open OUTBD ANTISKID, INBD ANTISKID, ANTISKID FAIL WARN & PARKING BRAKE and ANTISKID TEST circuit breakers on P6 load control panel.
   C. Chock wheels and release parking brake.
   D. Operate brakes several times to depressurize brake hydraulic system.
   E. Depressurize hydraulic systems A and B (Ref 29-11-0 and 29-12-0, Maintenance Practices).
   F. Remove electrical connector (Fig. 401).
   G. Disconnect hydraulic lines and cap off.
   H. Support valve and remove mounting bolts; then remove valve.
3. Install Antiskid Valve
   A. Position valve, install and lockwire bolts (Fig. 401).
   B. Connect hydraulic lines.
   C. Install electrical connector.
   D. Pressurize hydraulic systems A and B (Ref 29-11-0 and 29-12-0).
   E. Pressurize hydraulic accumulators (Ref Chapter 12, Gaseous System Servicing).
   F. Set parking brakes and check fittings for leaks.
   G. Close circuit breakers.
   H. Check operation of applicable valve.
      (1) Pressurize hydraulic systems A and B (Ref 29-11-0 and 29-12-0, Maintenance Practices).
      (2) Provide electrical power to antiskid system.
      (3) Close all landing gear circuit breakers on P6 panel.
      (4) Ensure wheel shocks are in place.
      (5) Release parking brake.
      (6) Set inboard and outboard antiskid switches on pilot's panel to OFF position. Ensure ANTISKID INOP lights are on.
      (7) Set both inboard and outboard antiskid switches to ON position. Ensure ANTISKID INOP lights go off.
      (8) Set parking brake. Ensure ANTISKID INOP lights go off.

         NOTE: The ANTISKID INOP lights may come on momentarily when parking brake valve opens or closes.



Antiskid Valve Installation
Figure 401

(9) Release parking brake. Ensure ANTISKID INOP lights remain off.

NOTE: The ANTISKID INOP lights may come on momentarily when parking brake valve opens or closes.

(10) Pull inboard antiskid circuit breaker. Ensure inboard ANTISKID INOP light comes on.
(11) Push inboard antiskid circuit breaker in. Ensure inboard ANTISKID INOP light goes off.
(12) Pull outboard antiskid circuit breaker. Ensure outboard ANTISKID INOP light comes on.
(13) Push outboard antiskid circuit breaker in. Ensure outboard ANTISKID INOP light goes off.
(14) Test Left Outboard Antiskid Control Valve
(a) Disconnect electrical connector D926 from left outboard antiskid control valve. Ensure outboard ANTISKID INOP light on pilot's panel and LO light on antiskid control shield come on.
(b) Place COMPONENT TEST switch on antiskid control shield to VALVE position. Ensure outboard ANTISKID INOP light and LO light go off. Release COMPONENT TEST switch. Ensure outboard ANTISKID INOP light and LO light come on.
(c) Connect electrical connector D926 to valve. Ensure outboard ANTISKID INOP light and LO light go off.
(d) Ensure parking brake is released and disconnect electrical connector D928 from shutoff valve. Ensure inboard and outboard ANTISKID INOP lights come on.
(e) Set parking brake and place SYSTEM TEST switch on antiskid control shield to RIGHT position. Ensure left inboard and left outboard brakes release and right inboard and right outboard brakes remain applied.
(f) Release SYSTEM TEST switch. Ensure all brakes release momentarily and then apply.
(g) Release parking brake and connect electrical connector D928 to shutoff valve. Ensure inboard and outboard ANTISKID INOP lights go off.
(15) Test Left Inboard Antiskid Control Valve
(a) Disconnect electrical connector D924 from left inboard antiskid control valve. Ensure inboard ANTISKID INOP light on pilot's panel and LI light on antiskid control shield come on.
(b) Place COMPONENT TEST switch on antiskid control shield to VALVE position. Ensure inboard ANTISKID INOP light and LI light go off. Release COMPONENT TEST switch. Ensure inboard ANTISKID INOP light and LI light come on.
(c) Connect electrical connector D924 to valve. Ensure inboard ANTISKID INOP light and LO light go off.

(d) Ensure parking brake is released and disconnect electrical connector D928 from shutoff valve. Ensure inboard and outboard ANTISKID INOP lights come on.
(e) Set parking brake and place SYSTEM TEST switch on antiskid control shield to RIGHT position. Ensure left inboard and left outboard brakes release and right inboard and right outboard brakes remain applied.
(f) Release SYSTEM TEST switch. Ensure all brakes release momentarily and then apply.
(g) Release parking brake and connect electrical connector D928 to shutoff valve. Ensure inboard and outboard ANTISKID INOP lights go off.

(16) Test Right Inboard Antiskid Control Valve
(a) Disconnect electrical connector D930 from right inboard antiskid control valve. Ensure inboard ANTISKID INOP light on pilot's panel and RI light on antiskid control shield come on.
(b) Place COMPONENT TEST switch on antiskid control shield to VALVE position. Ensure inboard ANTISKID INOP light and RI light go off. Release COMPONENT TEST switch. Ensure inboard ANTISKID INOP light and RI light come on.
(c) Connect electrical connector D930 to valve. Ensure inboard ANTISKID INOP light and RI light go off.
(d) Ensure parking brake is release d and disconnect electrical connector D928 from shutoff valve. Ensure inboard and outboard ANTISKID INOP lights come on.
(e) Set parking brake and place SYSTEM TEST switch on antiskid control shield to LEFT position. Ensure right inboard and right outboard brakes release and left inboard and left outboard brakes remain applied.
(f) Release SYSTEM TEST switch. Ensure all brakes release momentarily and then apply.
(g) Release parking brake and connect electrical connector D928 to shutoff valve. Ensure inboard and outboard ANTISKID INOP lights go off.

(17) Test Right Outboard Antiskid Control Valve
(a) Disconnect electrical connector D932 from right outboard antiskid control valve. Check that outboard ANTISKID INOP light on pilot's panel and RO light on antiskid control shield come on.
(b) Place COMPONENT TEST switch on antiskid control shield to VALVE position. Check that outboard ANTISKID INOP light and RO light go off. Release COMPONENT TEST switch. Check that outboard ANTISKID INOP light and RO light come on.
(c) Connect electrical connector D932 to valve. Check that outboard ANTISKID INOP light and RO light go off.

(d) Check that parking brake is released and disconnect electrical connector D928 from shutoff valve. Check that inboard and outboard ANTISKID INOP lights come on.
(e) Set parking brake and place SYSTEM TEST switch on antiskid control shield to LEFT position. Check that right inboard and right outboard brakes release and left inboard and left outboard brakes remain applied.
(f) Release SYSTEM TEST switch. Check that all brakes release momentarily and then apply.
(g) Release parking brake and connect electrical connector D928 to shutoff valve. Check that inboard and outboard ANTISKID INOP lights go off.

I. Set parking brake.
J. Determine if there is further need for electrical power on airplane; if not, shut down source.
K. Determine if there is further need for hydraulic power on airplane; if not, remove systems A and B hydraulic power (Ref 29-11-0 and 29-12-0).

ANTISKID VALVE - INSPECTION/CHECK

1. Antiskid Valve Check
   A. General
      (1) The purpose of this check is to determine if the individual antiskid valve has excessive internal leakage by observing pressure decay as registered on the brake pressure gages in the control cabin.
   B. Equipment and Materials
      (1) Gear Ground Lock Assembly (Ref 32-00-01)
   C. Check Antiskid Valves
      (1) Ensure gear ground lock assembly is installed in nose gear (Ref 32-00-01).
      (2) Depressurize hydraulic systems A and B (Ref 29-11-0, and 29-12-0).
      (3) Turn flight control and spoilers off (Ref Chapter 27).
      (4) Depressurize brake hydraulic system to brake accumulator precharge pressure (approximately 1000 psi) by operating brakes fully 8 times.
      (5) Record pressure registered on brake pressure gages.
      (6) Turn one hydraulic system B pump on (Ref 29-12-0)
      (7) Open ground interconnect valve.
      (8) Set parking brake.
      (9) Place inboard and outboard antiskid switches on pilot's panel to ON. Ensure brake pressure gages read approximately 3000 psi.
      (10) Turn system B hydraulic pump off. Ensure brake pressure remains at approximately 3000 psi.

         NOTE: If brake pressure decreases, brake metering valves or brake check valves may be leaking internally.

      (11) Apply just enough pressure to rudder pedals for parking brake light to go off. Ensure brake pressure decreases approximately 100 psi.
      (12) Record pressure registered on brake pressure gages.
      (13) Depress left brake pedal fully and record pressure registered on brake pressure gages after 50 seconds.
      (14) If pressure recorded in step (13) decreases to 50 psi above pressure recorded in step (5) in 50 seconds or less, the applicable antiskid valve should be replaced:
         (a) If system A pressure decreases beyond limits, replace left inboard antiskid valve.
         (b) If system B pressure decreases beyond limits, replace left outboard valve.
      (15) Repeat steps (4) thru (12).
      (16) Depress right brake pedal fully and record pressure registered on brake pressure gages after 50 seconds.

(17) If pressure recorded in step (16) decreases to 50 psi above pressure recorded in step (5) in 50 seconds or less, the applicable antiskid valve should be replaced:

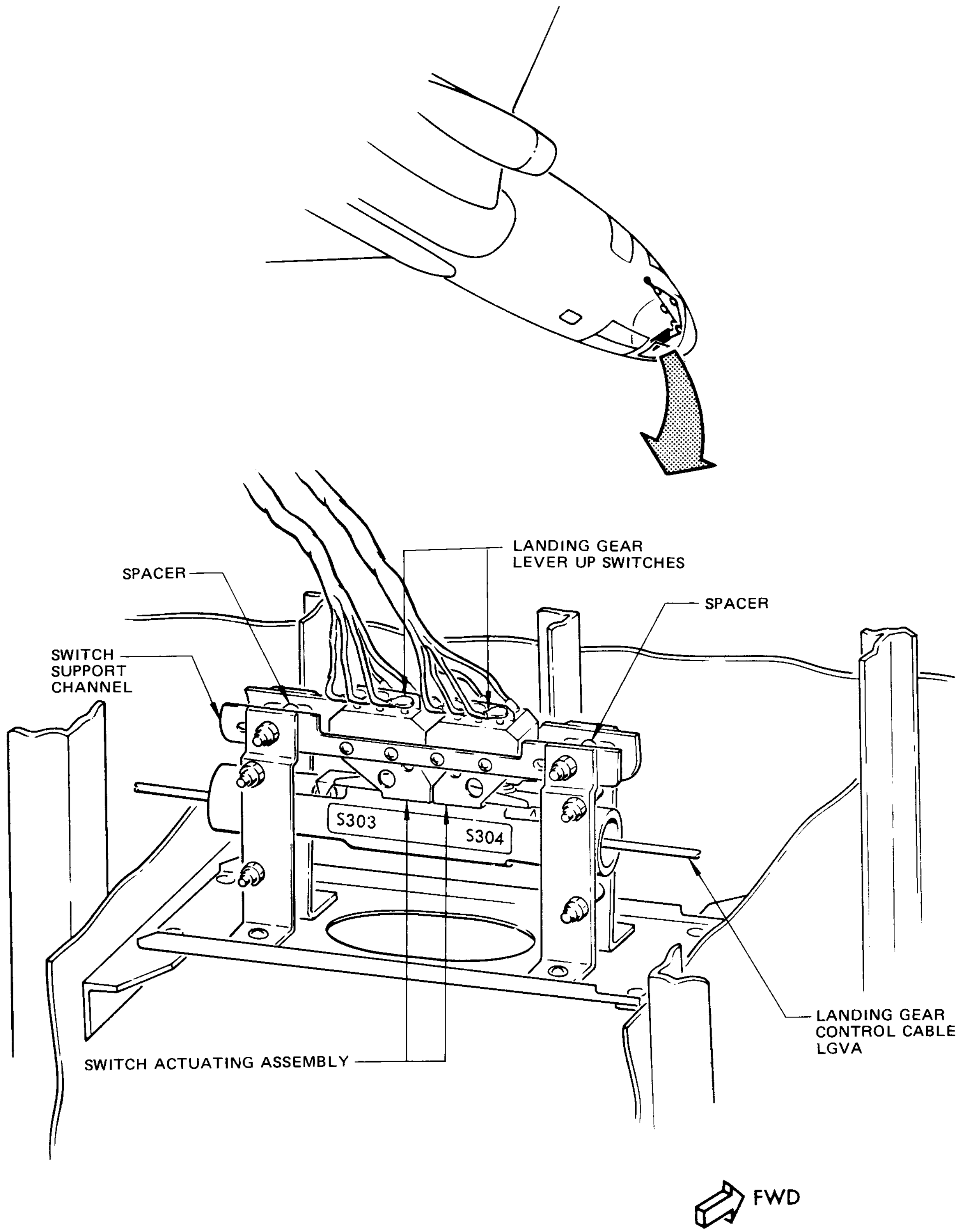
(a) If system A pressure decreases beyond limits, replace right inboard antiskid valve.

(b) If system B pressure decreases beyond limits, replace right outboard antiskid valve.

(18) Close ground interconnect valve.

ANTISKID LANDING GEAR LEVER UP SWITCHES - REMOVAL/INSTALLATION

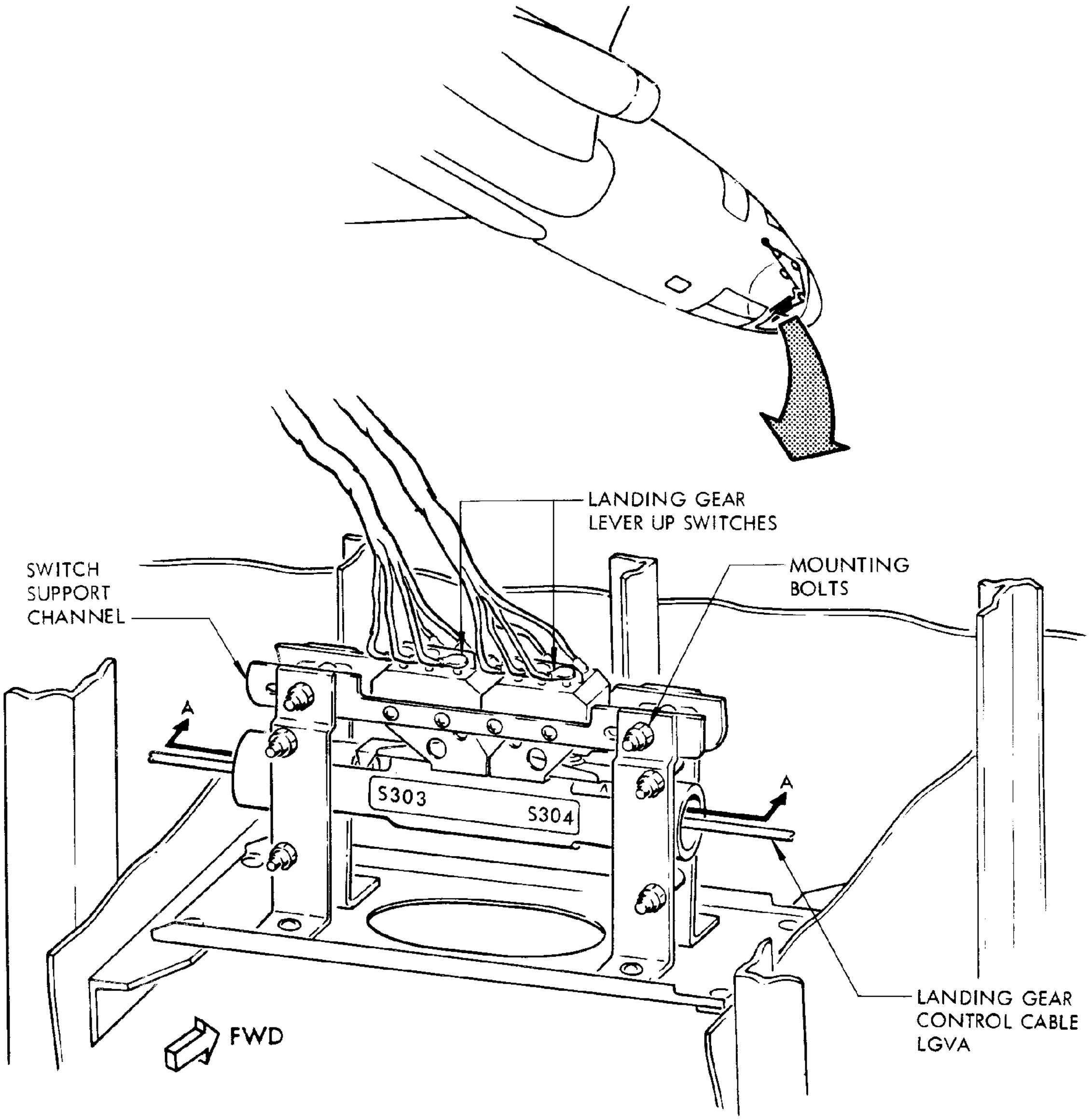
1. Equipment and Materials
   A. Gear Ground Lock Assembly (Ref 32-00-01)
2. Remove Antiskid Landing Gear Up Switches
   A. Ensure gear ground lock assembly is installed in nose gear (Ref 32-00-01).
   B. Open OUTBD ANTI-SKID and INBD ANTI-SKID circuit breakers.
   C. Open forward nose compartment access door.
   D. Disconnect electrical leads from antiskid landing gear up switches (Fig. 401).
   E. Remove bolts, with spacers, attaching switch support channel to support bracket. Remove support channel containing switches.
   F. Remove switch assembly from support channel.
   G. Remove switch from switch actuating assembly.
3. Install Antiskid Landing Gear Up Switches
   A. Install switch in actuating assembly (Fig. 401).
   B. Install switch assembly in support channel.
   C. Position support channel in place and install mounting bolts and spacers. Do not tighten.
   D. Connect electrical leads to switch terminals.
   E. Close circuit breakers opened in 1.A.
   F. Adjust switch (Ref Antiskid Landing Gear Up Switches - Adjustment/Test).

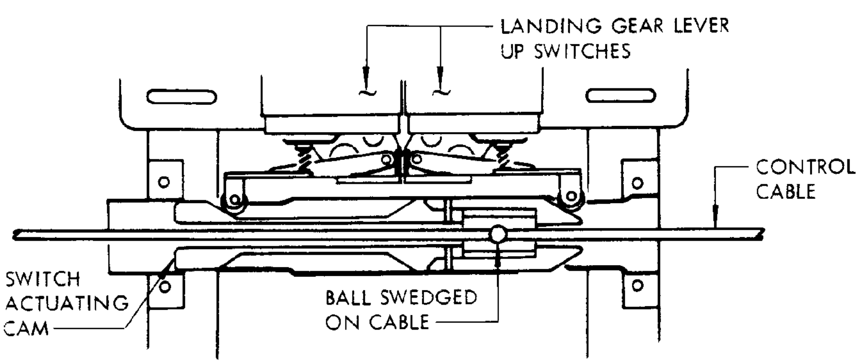


Landing Gear Lever Up Switches Installation
Figure 401

ANTISKID LANDING GEAR LEVER UP SWITCHES - ADJUSTMENT/TEST

1. Antiskid Landing Gear Lever Up Switches - Adjustment
   A. Equipment and Materials
      (1) Gear Ground Lock Assemblies (Ref 32-00-01)
      (2) Ohmmeter
   B. Prepare to Adjust Landing Gear Lever Up Switches
      (1) Open OUTBD ANTI-SKID and INBD ANTI-SKID circuit breakers on P6 panel are open.
      (2) Check that gear ground lock assemblies are installed (Ref 32-00-01).
      (3) Check that hydraulic system A is depressurized (Ref 29-11-0, Maintenance Practices).
      (4) Open forward nose compartment access door.
      (5) Place landing gear lever in DN position.
   C. Adjust Antiskid Landing Gear Lever Up Switches
      (1) Connect ommeter across terminals of each switch and check that ohmmeter indicates a closed circuit (Fig. 501).
      (2) Set landing gear lever to OFF. Check that ohmmeter indicates a closed circuit.
      (3) Slowly move landing gear lever from OFF detent position toward UP position. Check that ohmmeter indicates switch actuation on or before 12 degrees of lever travel as lever moves from OFF position.
      (4) With landing gear lever in UP position, slowly move lever toward OFF position. Check that ohmmeter indicates switch deactuation before lever is 4 degrees from OFF position.
      (5) If necessary, adjust support channel until above tolerances are met then tighten installation bolts.
      (6) Repeat steps (1) thru (4) until each switch is closed for DN and OFF position of landing gear lever and open for UP position with tolerances specified.
      (7) Close all circuit breakers opened in 1.B.(1).





SECTION A-A

Landing Gear Lever Up Switches Adjustment
Figure 501

AUTOMATIC BRAKING SYSTEM - DESCRIPTION AND OPERATION

1. General
   A. The automatic braking system operates in conjunction with the antiskid system to obtain automatic (feet off) braking any of three selectable deceleration rates during landing. The automatic braking system bypasses the pilot's brake metering valves and applies system pressure directly to the brake units through the antiskid valves. Control of brake pressure is obtained through control of the antiskid valves. The antiskid control shield responds to signals from the automatic braking system to control the antiskid valves and modulate brake pressure. Automatic brake pressure is applied in pairs with the inboard and outboard brakes forming the pairs. The deceleration rate circuits are contained in the antiskid control shield, but are energized when the automatic braking system is turned on.
   B. The antiskid system has priority over the automatic braking system at all times for skid and locked wheel protection. The pilot can override the automatic braking system at any time by applying brake pressure equal to or higher than that by the automatic braking system. Go-around protection is obtained through engine thrust lever switches. Advancement of the thrust levers causes immediate dropout of the automatic braking system.
   C. The automatic braking system consists of a control switch, control module, two solenoid valves, four shuttle valves, and two brake pressure comparators (Fig. 1). Two brake pedal switches, two engine thrust lever switches, a spoiler arming switch, and an autospoiler test switch control the various functions of the automatic braking system. Antiskid system components are incorporated into the autobrake system as a necessary part of the system.
2. Solenoid Valve
   A. The solenoid valves bypass system pressure around the brake metering valves during automatic braking and apply pressure directly to the antiskid valves. Two solenoid valves are installed, one in hydraulic system A, which supplies inboard brake pressure, and one in hydraulic system B, which supplies outboard brake pressure.

B. The valves are three-way, two-position solenoid valves which bypass pressure around the brake metering valves when energized. When de-energized, the valves close to allow normal braking to occur.

3. Shuttle Valve

A. Four shuttle valves are installed in the automatic braking system, one in each of the four brake pressure lines upstream of the antiskid valves. The shuttle valves port pressure to the antiskid valve from either the brake metering valve or system hydraulic pressure through the solenoid valves, whichever is higher.

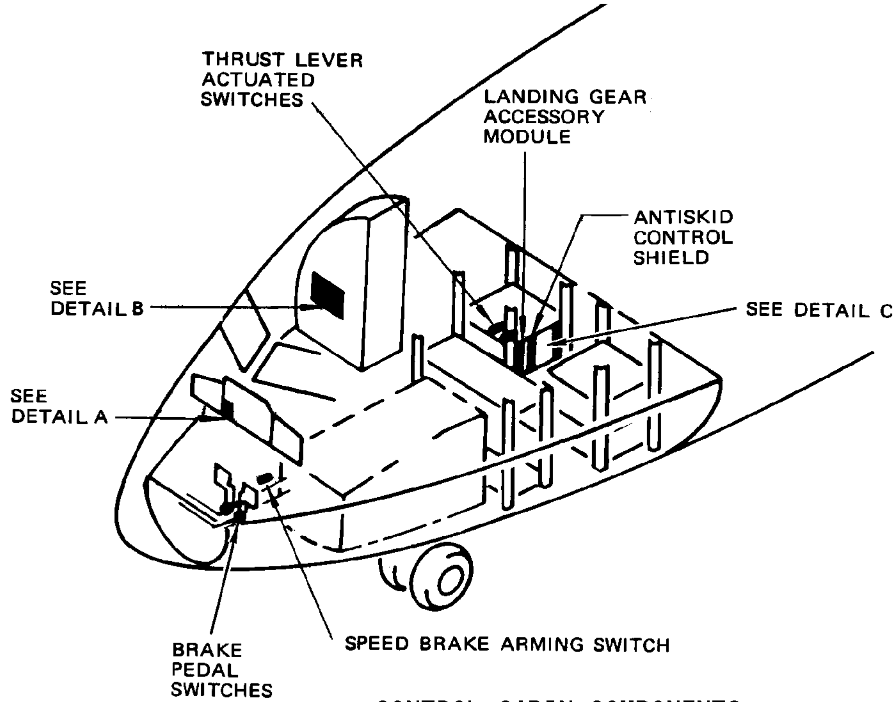
4. Brake Pressure Comparator

A. Two brake pressure comparators are installed in the automatic braking system, one in the left gear brake hydraulic system and one in the right. Each comparator compares applied brake pressure with brake metering valve pressure for its respective gear. The comparator produces a voltage signal when metering valve pressure is within approximately 50 psi (lower than) brake pressure so that a smooth transfer from automatic to manual braking can be made on shutoff of automatic braking system.

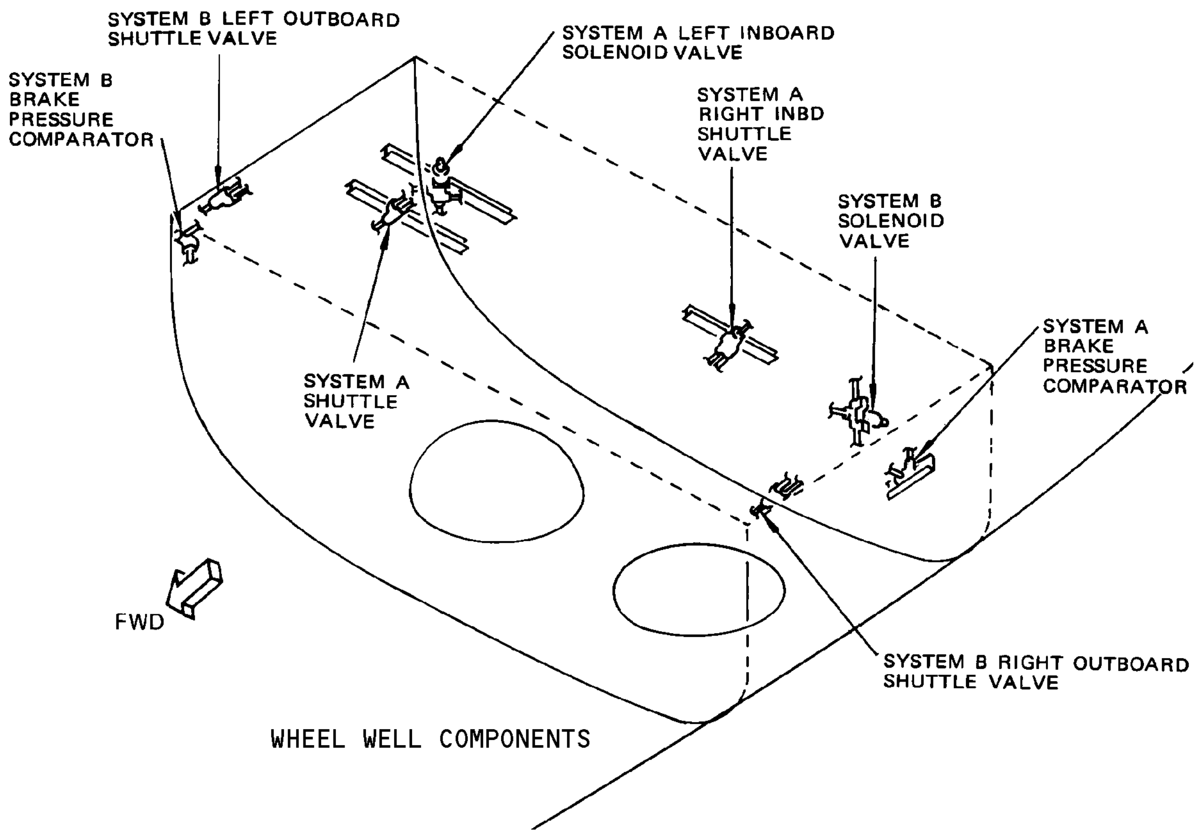
B. The comparator is a hydraulically actuated electrical transducer which operates as a linear variable differential transformer. It contains a pressure biased, spring offset slide and two coaxially mounted transducer coils (Fig. 2). One end of the slide senses brake pressure. The other end senses metering valve pressure. When the automatic braking system is operating, brake pressure displaces the slide against the spring and no electrical output is produced. If brake pressure decreases, due to autobrake off-ramp signals, or metering valve pressure increases, due to brake pedal inputs, so that metered pressure is within 50 psi (lower than) brake pressure, spring force will overcome the reduced pressure bias. The slide will return to its spring offset position, creating a voltage signal which will cause transfer from automatic to manual braking.

5. Automatic Braking Control Module

A. The automatic braking control module is located in the electrical/electronics equipment compartment. It provides the logic and commands for automatic braking mode of operation of the antiskid system and for detection of failures in the system. These commands are on-ramp, off-ramp and abrupt drop-out. The module contains seven relays to control operation of the automatic braking system, and five printed circuit cards to control power and provide failure detection logic. The front panel contains a test switch and four failure indicator lights to assist in trouble shooting the system.



CONTROL CABIN COMPONENTS



WHEEL WELL COMPONENTS

Automatic Braking System Component Locations
Figure 1 (Sheet 1)

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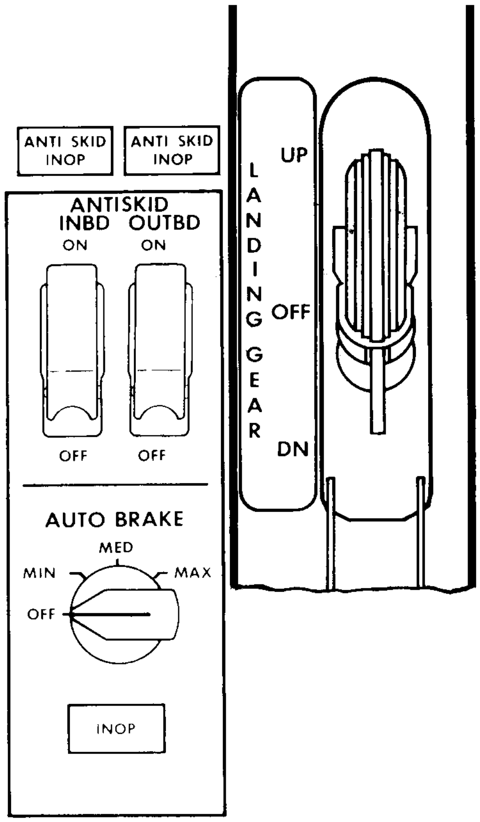
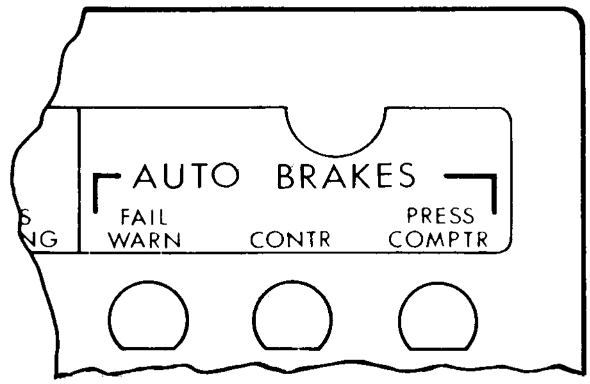
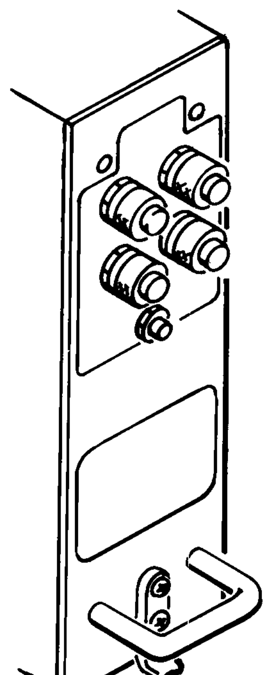


CENTER PANEL
DETAIL A

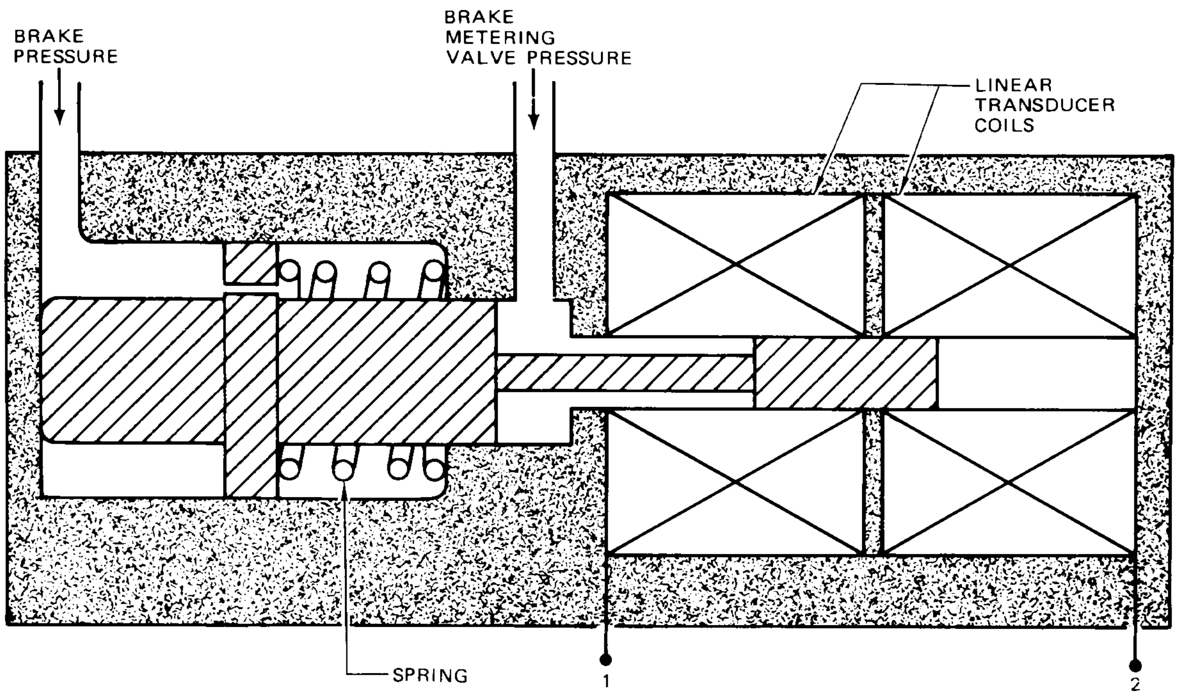


P6 PANEL
DETAIL B



AUTOMATIC BRAKING CONTROL MODULE
DETAIL C

Automatic Braking System Component Locations
Figure 1 (Sheet 2)



Brake Pressure Comparator Schematic
Figure 2

6. Automatic Braking Test Circuit

   A. The automatic braking test circuit is a continuous function during operation of the automatic braking system. Any loss of power or antiskid capability, or malfunction of the wheel speed relays, autobrake relays, solenoid valves or pressure comparators will cause the AUTOBRAKE INOP light on P2 panel to come on. Whenever the light comes on, automatic braking has dropped out. Antiskid will still be available unless the failure was in the antiskid system.

   B. Ground test features are built into the automatic braking control module to assist in checking out the system. These features include a test switch and four failure detection lights on the front of the module. If the automatic braking and antiskid systems are energized and the test switch is pressed, the applicable failure light will indicate whether the failure is in the solenoid valve, power supply, antiskid or autobrake relay circuits.

7. Automatic Braking System Switches

   A. The automatic braking system is controlled by a master control switch, speed brake arming switch, brake pedal switches and engine thrust lever switches. The master control switch (AUTOBRAKE) in the control cabin has four positions: OFF, MIN, MED and MAX. The switch is turned to one of the three indicated deceleration rates in order to turn the system on. The selection of the position determines how quickly the airplane will be stopped on landing. The speed brake arming switch (operated by the speed brake handle) has two positions, down and armed. Before the automatic braking system can be armed, the switch must be in the down position in order to reset the system. In order to arm the system, the speed brake arming switch must be placed in the armed position (speed brake deployed). The brake pedal switches are actuated by the captain's brake pedals. When the pedals are depressed, the switch closes and

   B. initiates the off-ramp logic to gradually transfer braking from automatic to manual mode. The engine thrust lever switches are actuated by advancement of the levers beyond approximately the 12.5-degree position. When actuated, the switches energize the go-around and test relay in the automatic braking control module. The relay causes the automatic braking mode to drop out and release the brakes for a go-around. An autospoiler test switch is provided to test the go-around function of the system.

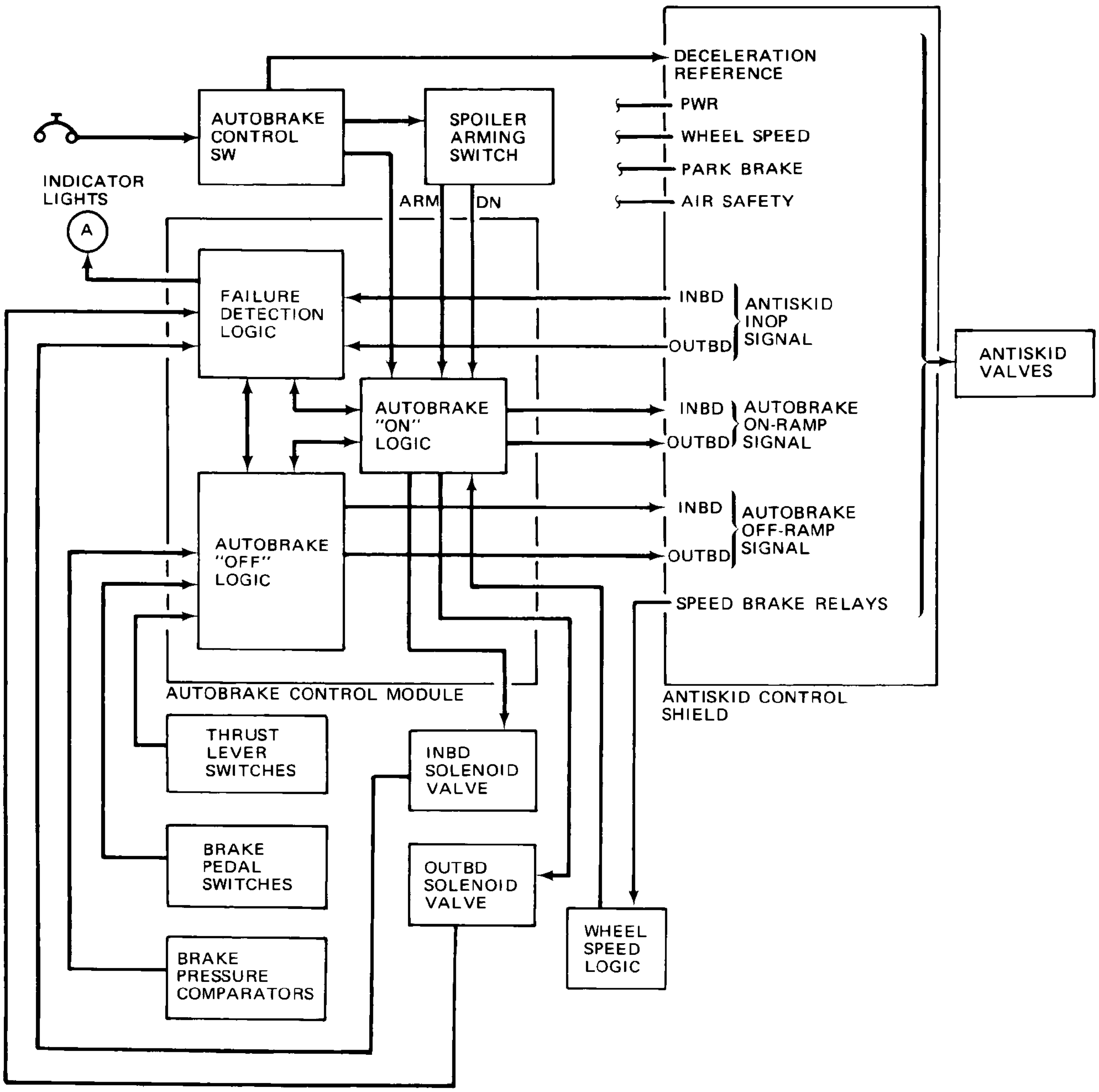
8. Operation

   A. The automatic braking system operates in conjunction with the antiskid system to obtain automatic (feet off) braking during the landing roll. The automatic braking system provides on-ramp, off-ramp and abrupt drop-out signals to operate the antiskid system in the automatic braking mode. Touchdown, locked wheel, and skid protection are available as described in AMM 32-42-0 and override any inputs from the automatic braking system.

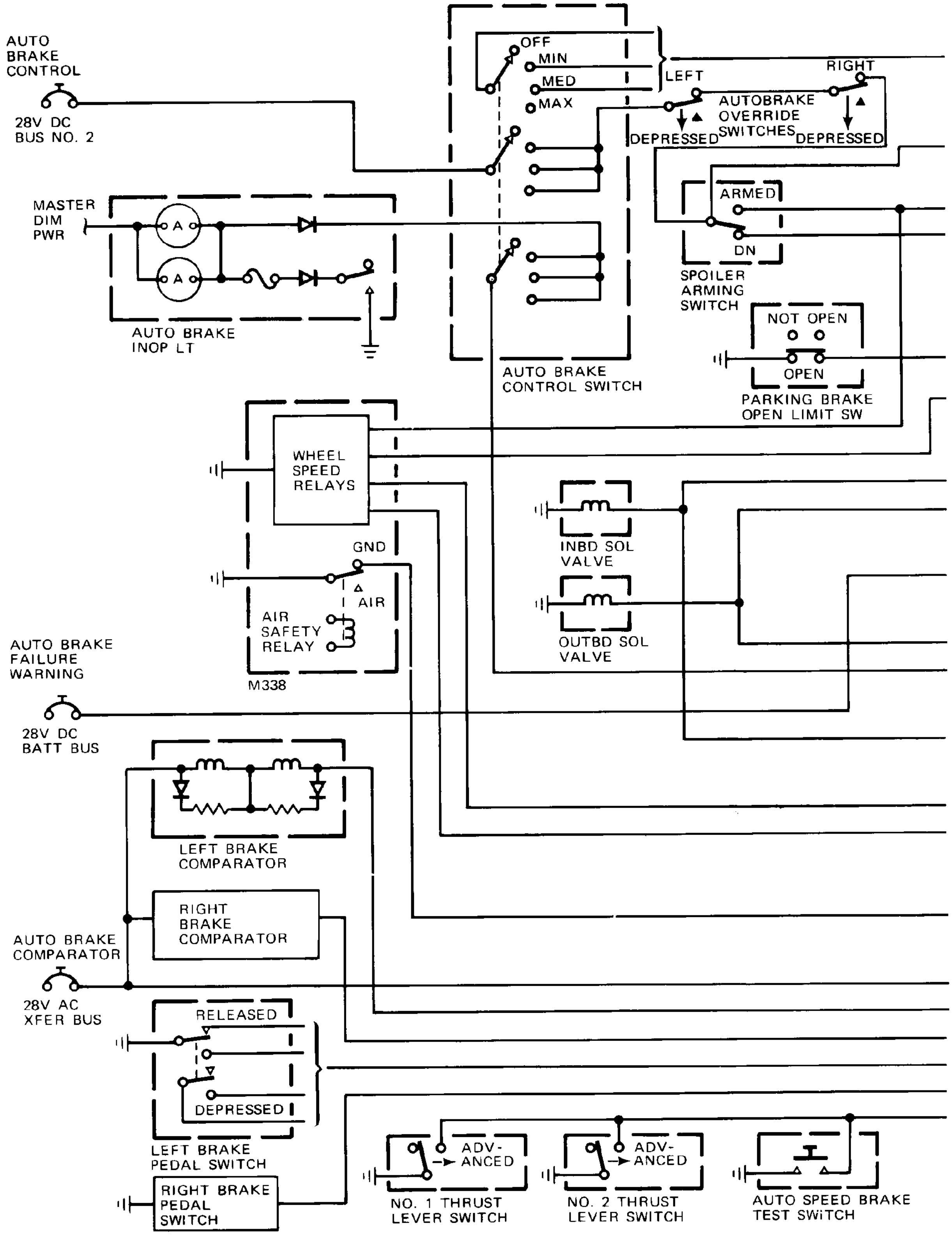
B. Before touchdown, the INBD and OUTBD ANTISKID system switches on center (P2) panel are placed in ON position, and the AUTOBRAKE switch is placed in MIN, MED or MAX position depending on deceleration level desired on landing. These master switches energize the automatic braking system. Before landing, the speed brake arming switch is in the down position, and the automatic braking system is reset for arming. On touchdown as the wheels spin up to approximately 65 knots, the wheel speed relays pull in, causing the speed brake to be deployed (if the speed brake control lever was placed in the ARMED position) and energizes an output relay in the autobrake control module. Automatic braking is available when the output relay closes (energized).

C. When the output relay closes, signals are sent to open (energize) the solenoid bypass valves and to initiate on-ramp response in the antiskid control shield. The open solenoid valves bypass system pressure around the brake metering valves, making manual braking efforts unnecessary except to initiate off-ramp and override control of the automatic braking system. On-ramp signals energize circuits in the antiskid control shield which signal the antiskid valves to apply a gradually increasing pressure to the brakes. Pressure increases until the pressure required to decelerate the airplane at the selected rate is reached. After this, the antiskid control shield reacts to skids and locked wheels as in the normal antiskid mode of operation, except that recovery brake pressure is that which is compatible with the selected deceleration rate.

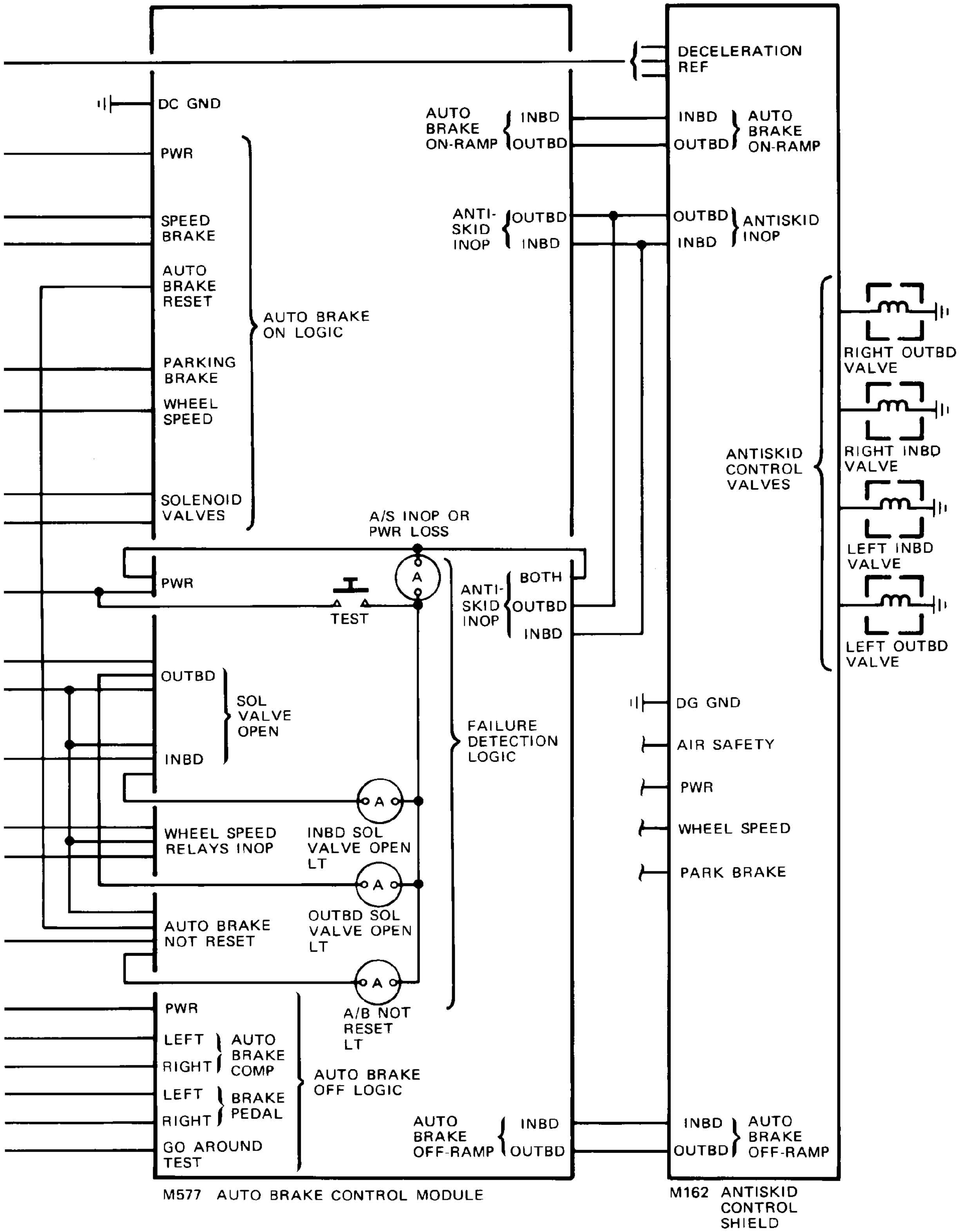
D. Transfer from automatic to manual mode of braking with antiskid backup can be made at any time during the landing roll. Once transfer is made, the system must be reset and armed before automatic braking can be attained. To reset the system, the speed brake handle must be moved to the down position. The system is armed by moving the speed brake handle to the ARM position provided that wheel speed relays are closed. Transfer from automatic to manual braking can be made smoothly (off-ramp) or abruptly. Off-ramp transfer from automatic to manual braking is initiated by light, constant application of one or both brake pedals or by moving the deployed speed brake handle back to the armed detent. The off-ramp circuit in the antiskid control shield causes brake pressure to decay gradually to static brake pressure level (in the absence of metered pressure), where an automatic brake drop-out can be obtained by applying some pressure on the brake pedals. If one or both brake pedals are depressed farther during off-ramp control, so that metering valve pressure is available as automatic brake pressure is decreasing, the brake pressure comparators will signal a drop-out to the automatic braking system when metered pressure is within 50 psi lower than brake pressure. Equal pressure transfer to manual braking will then occur. The higher the value of metered pressure, the sooner equal pressure transfer will occur.



Automatic Braking System Block Diagram
Figure 3



Automatic Braking System Control Circuit
Figure 4 (Sheet 1)



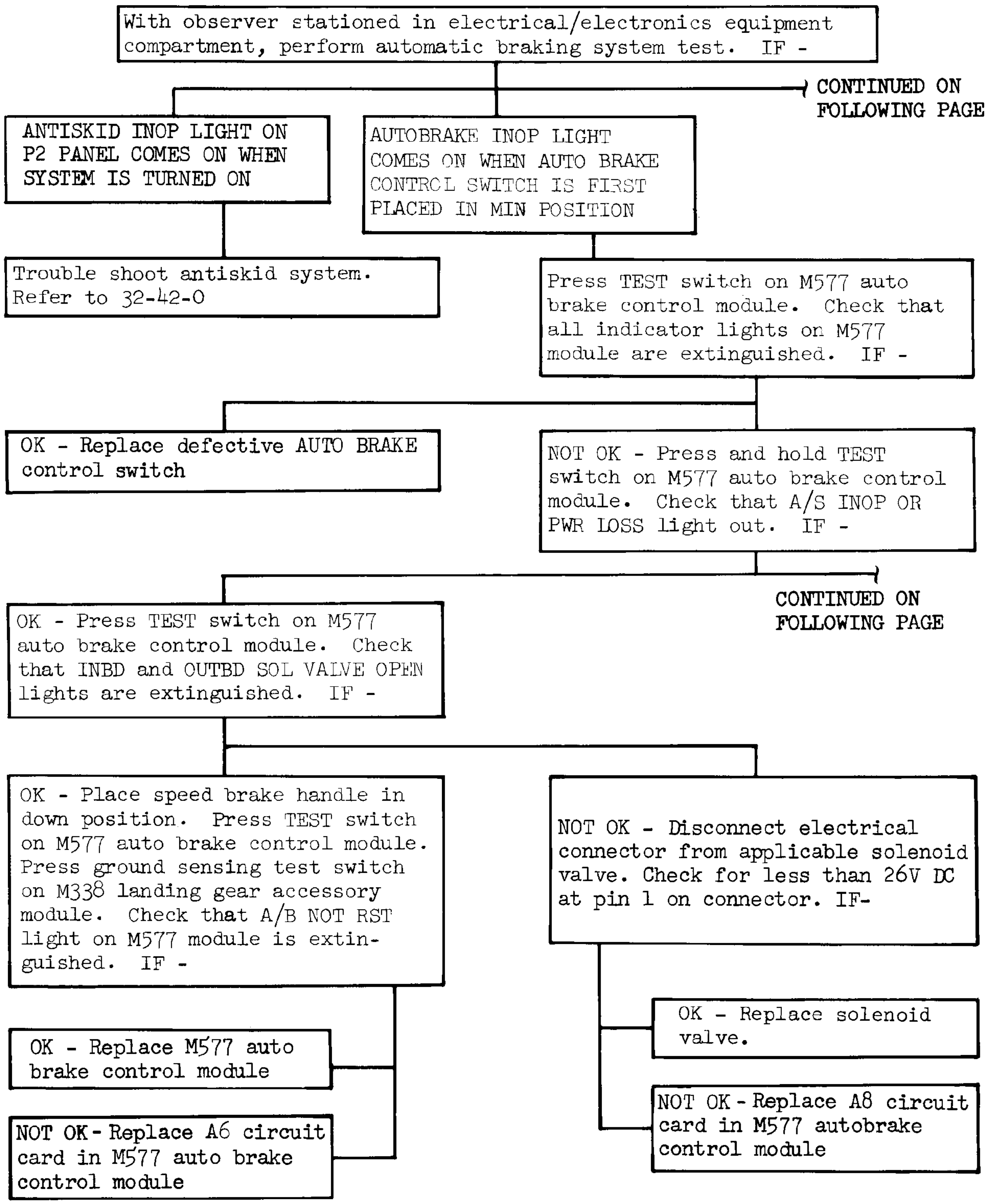
Automatic Braking System Control Circuit
Figure 4 (Sheet 2)

E. Immediate transfer from automatic to manual braking with antiskid backup can be achieved by turning the automatic braking switch off, advancing one or both thrust levers beyond approximately 12.5-degree idle (go-around), moving the speed brake handle to down or depressing and then releasing one or both brake pedals. In addition to the voluntary methods for obtaining abrupt drop-out of automatic braking, any of the following protective modes will cause an abrupt drop-out: Loss of power, failure of one of the automatic braking system components, failure in the antiskid system or closing of the parking brake valve.

AUTOMATIC BRAKING SYSTEM - TROUBLESHOOTING

1. General
   A. Troubleshooting of the automatic braking system is based on performance of the system test and generally follows the sequence in the system test. This troubleshooting procedure assumes that the system test is being run, and that the failure indicator lights have been checked and found to be good.

2. Automatic Braking System Trouble Shooting Chart



Automatic Braking System - Troubleshooting
Figure 101 (Sheet 1)

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SOL VALVE OPEN INDICATOR LIGHT FAILS TO ILLUMINATE WHEN ELECTRICAL CONNECTOR IS DISCONNECTED FROM VALVE

Check for less than 26V DC at pin 1 of disconnected electrical connector
IF -

OK - Replace defective A8 circuit card in M577 auto brake control module.

NOT OK - Replace M577 auto brake control module

CONTINUED FROM PRECEDING PAGE

NOT OK - Check for 28V DC at pin 48 on M577 auto brake control module electrical connector in mounting rack. IF -

OK - Replace A7 circuit card in M577 auto brake control module. Check that light extinguishes.
IF -

OK - System operable.

NOT OK - Replace M577 auto brake control module

NOT OK - Check for 28V DC at terminal 31 on AUTO BRAKE control switch. IF -

OK - Replace AUTO BRAKE switch.

NOT OK - Repair defective wiring

Automatic Braking System - Troubleshooting
Figure 101 (Sheet 2)

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CONTINUED ON FOLLOWING PAGE

ONE SOLENOID VALVE DOES NOT CLOSE WHEN THROTTLE SWITCHES ARE ADVANCED AND SYSTEM IS ARMED AND OPERATING

Place TEST switch on M577 auto brake control module and check that applicable SOL VALVE OPEN light illuminates. IF -

OK - Replace solenoid valve

NOT OK - Replace A8 circuit card in M577 auto brake control module

Automatic Braking System - Troubleshooting
Figure 101 (Sheet 3)

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CONTINUED BELOW

BOTH SOLENOID VALVES FAIL TO CLOSE WHEN THROTTLE SWITCHES ARE ADVANCED WHEN SYSTEM IS ARMED AND OPERATING

Replace M577 auto brake control module

CONTINUED FROM ABOVE

CONTINUED ON FOLLOWING PAGE

BRAKE PEDAL OFF-RAMP ANTISKID VALVE CONTROL VOLTAGE DOES NOT INCREASE WHEN BRAKE PEDALS ARE DEPRESSED AND HELD LIGHTLY

Replace A5 circuit card in M577 auto brake control module. Repeat brake pedal off ramp test and check that antiskid valve voltage increases gradually. IF -

OK - System operable

NOT OK - Replace brake pressure comparator

Automatic Braking System - Troubleshooting
Figure 101 (Sheet 4)

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SOLENOID VALVES DO NOT CLOSE INSTANTLY WHEN BRAKE PEDAL IS DEPRESSED AND IMMEDIATELY RELEASED

Replace A6 circuit card in M577 auto brake control module and repeat brake pedal emergency release test. Check that solenoid valves close instantly. IF -

OK - System operable

NOT OK - Replace M577 auto brake control module

CONTINUED FROM ABOVE

INBOARD OR OUTBOARD SOLENOID VALVE DOES NOT CLOSE IMMEDIATELY WHEN CORRESPONDING ANTISKID CONTROL SWITCH IS TURNED OFF

Replace A8 circuit card in M577 auto brake control module and repeat test. Check that solenoid valve closes immediately. IF -

OK - System operable

NOT OK - Replace M577 auto brake control module

Automatic Braking System - Troubleshooting
Figure 101 (Sheet 5)

AUTOMATIC BRAKING SYSTEM - ADJUSTMENT/TEST

1. Automatic Braking System Test
   A. General
      (1) With the exception of the functional test tool, only the system built-in test features are used to test the automatic braking system. Refer to trouble shooting procedures in this section if any required result is not obtained during the test.
   B. Equipment and Materials
      (1) Antiskid/Autobrake Tester - F80129-1 or F80129-100
      (2) DC voltmeter, 0- to 10-volt range
      (3) Pressure gages-0 to 4000 psi, for hydraulic fluid BMS 3-11 (2 or 4 as required), Hydraulic Brake System Pressure Checking Gage Equipment - F72977-62 Preferred, F72977-44 Alternate, F72977-45 Alternate, F72977-46 Alternate, F72977-47 Alterante
      (4) Gear Ground Lock Assembly - F72735 (Ref 32-00-01)
   C. Prepare for Test
      (1) Check that ground lock assembly is installed in main and nose gear (Ref. 32-00-01).
      (2) Place chocks under wheels
      (3) Install pressure gages in RO and RI brake lines (LI and LO installation optional).
      (4) Pressurize hydraulic systems A and B.

         NOTE: To pressurize hydraulic system A using hydraulic test stand or hydraulic system B electric motor-driven pumps, the ground interconnect valve must be opened using the following steps.

         (a) Pressurize hydraulic system B (Ref 29-12-0 MP)
         (b) Set parking brake.
         (c) Move ground interconnect switch on P5 panel to open.
         (d) Open GRND INTER valve circuit breaker on P6 panel.
         (e) Release parking brake.
      (5) Provide electrical power to system.
      (6) Close all antiskid and autobrake circuit breakers on P6 panel.
      (7) Open AUTO SPEED BRAKE circuit breaker on P6 panel.
   D. Test Automatic Braking System
      (1) Release parking brake.
      (2) Check that spoiler handle is stowed.
      (3) Place INBD and OUTBD ANTISKID switches on center panel in ON position. Check that both ANTISKID INOP lights are off.
      (4) Place AUTO BRAKE control switch on center panel in MIN position. Check that AUTOBRAKE INOP light is out.
      (5) Check dc control power loss detection function.
         (a) Open AUTO BRAKE CONTROL circuit breaker on P6 panel. Check that AUTO BRAKE INOP light comes on.
         (b) Press TEST switch on autobrake control module in electrical/electronic equipment compartment. Check that A/S INOP OR PWR LOSS (DS4) indicator light comes on.

(c) Close AUTO BRAKE CONTROL circuit breaker and check that AUTO BRAKE INOP and A/S INOP OR PWR LOSS indicator lights go out.

(6) Check master light test function.
(a) Turn MASTER DIM AND TEST lights switch to TEST position. Check that AUTO BRAKE INOP light illuminates.
(b) Return switch to BRIGHT. Check that AUTO BRAKE INOP light goes out with the other lights.

(7) Check ac control power loss detection function.
(a) Open PRESS CMPTR circuit breaker. Check that AUTO BRAKE INOP light on autobrake control module comes on.
(b) Press TEST switch on autobrake control module and check that A/S INOP OR PWR LOSS indicator light comes on.

(8) Check master light dim function.
(a) Turn MASTER DIM AND TEST lights switch to DIM position. Check that AUTO BRAKE INOP light goes dim.
(b) Return switch to BRIGHT and close PRESS CMPTR circuit breaker. Check that AUTO BRAKE INOP light extinguishes.
(c) Depress TEST switch. Check that A/S INOP OR PWR LOSS light extinguishes.

(9) Check inboard solenoid valve open circuit detection function.
(a) Place speed brake handle in ARMED position.
(b) Disconnect electrical connector from inboard autobrake solenoid valve. Check that AUTO BRAKE INOP light comes on.
(c) Press TEST switch on autobrake control module. Check that INBD SOL VALVE OPEN (DSI) indicator light comes on.
(d) Connect inboard autobrake solenoid valve electrical connector. Check that AUTO BRAKE INOP and INBD SOL VALVE OPEN indicator lights go off.

(10) Check outboard solenoid valve open detection function.
(a) Disconnect electrical connector from outboard autobrake solenoid valve. Check that AUTO BRAKE INOP light comes on.
(b) Press TEST switch on autobrake control module. Check that OUTBD SOL VALVE OPEN (DS2) indicator light comes on.
(c) Connect outboard solenoid valve electrical connector. Check that AUTO BRAKE INOP and OUTBD SOL VALVE OPEN indicator lights go off.
(d) Place speed brake handle in DOWN position.

(11) Remove protective cover at test connector J2 on antiskid control shield. Antiskid control shield is located on E3-2 shelf in electrical equipment area. Install antiskid - autobrake - auto speed brake tester.

NOTE: Before installing, check that all switches on tester are off.

(12) Close AUTO SPEED BRAKE circuit breaker.

WARNING: THE SPOILERS WILL OPERATE WITH AUTOBRAKE APPLICATION. TO AVOID INJURY OR DAMAGE, THE SPOILER AREA SHOULD BE CLEAR.

NOTE: To rearm the speedbrake handle for the remaining test steps, move throttles forward and back each time rearm is required.

(13) Initiate automatic braking system operation.
(a) Move automatic speed brake arming handle to ARMED position.
(b) Set up tester as follows:
1) Place master switch to ON position.
2) Place WHEEL SPEED LO, LI, RO and RI switches in OFF position.
3) Set rotary VELOCITY potentiometer to a position greater than 65 knots.
4) Place WHEEL SPEED velocity switch in VEL position.

NOTE: Throughout the test, LO, LI, RO and RI switches referred to are located in tester WHEEL SPEED section. Disregard all lamps on tester during test.

(c) Simulate 65-knot wheel speed on left outboard wheel with tester. Check that brakes remain released. Remove wheel speed simulation.
(d) Repeat step (b) for all other main gear wheels. Result should be the same.
(e) Place speed brake handle in FULL UP position.
(f) Simulate 65-knot wheel speed on left outboard and right inboard wheels. Check that autobrake solenoid valves open and left outboard and right inboard brake stacks apply within 3 seconds.
(g) Remove wheel speed simulation and stow and rearm speed brake arming handle to ARMED position.
(h) Place speed brake handle in FULL UP position.
(i) Simulate 65-knot wheel speed on left inboard and right outboard wheels. Check that autobrake solenoid valves open and left inboard and right outboard brake stacks apply within 3 seconds.
(j) Remove wheel speed simulation and stow and rearm speed brake arming handle to ARMED position.
(k) Simulate 65-knot wheel speed on left outboard and right outboard wheels. Check that autobrake solenoid valves open and all brake stacks apply. Speed brake handle will move to FULL UP position.
(l) Remove wheel speed simulation and stow and rearm speed brake arming handle to ARMED position.

(m) Simulate 65-knot wheel speed on left inboard and right inboard wheels. Check that autobrake solenoid valves open and one or two brake stacks on each side apply. Speed brake handle will move to FULL UP position.

(14) Check No. 1 throttle switch transfer function.

(a) Advance No 1 throttle while holding speed brake handle from stowing. Check that both autobrake solenoid valves close and all four brake stacks release instantly. Retard No. 1 throttle.

NOTE: Autobrake will reset with throttle switch actuation if speed brake handle returns to stowed position.

(15) Check autobrake not reset warning function.

(a) Remove wheel speed simulation from all wheels.

(b) Press and hold in the GRD SENSING test switch on landing gear accessory module in electrical/electronic equipment compartment. Check that AUTO BRAKE INOP light comes on.

(c) Press TEST switch on faceplate of autobrake control module. Check that A/B NOT RST (DS3) indicator light comes on.

(d) Reapply 65-knot wheel speed simulation to any one wheel. Check that AUTO BRAKE INOP and A/B NOT RST indicator lights go off.

(e) Release GRD SENSING test switch. Check that AUTO BRAKE INOP and A/B NOT RST indicator lights go off.

(16) Check autobrake reset function.

(a) Remove wheel speed simulation from all wheels.

(b) Move speed brake arming handle to DOWN position, then back to ARMED position.

(c) Press GRD SENSING test switch on landing gear accessory module. Check that AUTO BRAKE INOP light remains off.

(d) Press TEST switch on autobrake control module. Check that A/B NOT RST (DS3) light remains off.

(e) Release test switches.

(17) Simulate 65-knot wheel speed on all four wheels simultaneously, the last within 5 seconds of the first. Check that both autobrake solenoid valves open and all four brakes apply within 3 seconds. Speed brake handle will move to FULL UP position.

(18) Check No. 2 throttle switch transfer function.

(a) Advance No. 2 throttle. Check that both solenoid valves close and all four brake stacks release instantly. Retard throttle.

NOTE: Autobrake will reset with throttle switch actuation if speed brake handle returns to stowed position.

(19) Check autobrake on-ramp function.
  (a) Reset autobrake system by moving speed brake handle to DOWN position.
  (b) Remove all wheel speed simulation.
  (c) Rearm the autobrake system by moving spoiler handle to ARMED position.
  (d) Set functional test box meter to register control voltage to the right inboard antiskid valve. Check that meter indicates a steady voltage of 1 +0.5 volts.
  (e) Simulate 65-knot wheel speed on all four wheels simultaneously. Check that test meter shows a rapid rise to 7 +1 volts, then a gradual decay to a steady 2.25 +0.75 volts over a 2 to 4-second period. Check that all brakes apply.
  (f) Repeat steps (a) thru (e) with functional test box meter set to read control voltage each of the left outboard, left inboard, and right outboard antiskid valves.

(20) Check auto spoiler test switch transfer function.
  (a) Press SPEED BRAKE TEST switch No. 3 on center instrument pan l. Check that both autobrake solenoid valves close and all brakes release instantly.

(21) Check autobrake reapplication function.
  (a) Simulate 65-knot wheel speed on all four wheels simultaneously.
  (b) Reset autobrake system by lowering speed brake handle to DOWN position.
  (c) Rearm system by moving speed brak handle to ARMED position. Check that all brakes reapply.

(22) Check right brake pedal off-ramp function.
  (a) Open AUTO BRAKES PRESS COMPTR circuit breaker on P6 panel.
  (b) Set functional test box meter to read control voltage at the right inboard antiskid valve.
  (c) Partially depress right brake pedal and hold steady pressure. Check that test meter shows a gradual increase from initial steady reading to a higher steady reading of 8 +1 volts in less than 3 seconds.
  (d) Without having released right brake pressure since off-ramp initiation, gradually release right brake pedal. Check that right brake stacks release and test meter voltage decreases to 1 (+ 0.5) volts.

(23) Repeat steps (21) and (22) with test meter set to read right outboard antiskid valve control voltage.

(24) Repeat step (21).

(25) Check left brake pedal off-ramp function.
  (a) Set functional test box meter to read control voltage at the left outboard antiskid valve.

(b) Partially depress left brake pedal and hold steady pedal pressure. Check that test meter shows a gradual increase from initial steady reading to a higher steady reading of 8 (+ 1) volts in less than 3 seconds.

(c) Without having released left brake pressure since off-ramp initiation, gradually release left brake pedal. Check that left gear brake stacks release and test meter voltage decreases to 1 (+ 0.5) volts.

(26) Repeat steps (21) and (25) with test meter set to read left inboard antiskid valve control voltage.

(27) Repeat ste p (21).

(28) Close AUTO BRAKES PRESS COMPTR circuit breaker.

(29) Check speed brake handle off-ramp function.

(a) Set functional test box meter to read left inboard antiskid valve control voltage.

(b) Starting with speed brake handle in full deployed position, move handle slowly toward ARMED position. Check for handle position, where test meter voltage starts to rise gradually from initial steady state value to a final steady 8 (+ 1) volts, as being between 40 degrees (3.84 inches) and 34 degrees (3.28 inches) aft of the nominal down and locked detent position. Check for a voltage rise time of appproximately 3 seconds.

NOTE: Handle travel is measured along upper surface of detent plate.

(c) Continue handle movement forward to ARMED position. Check for a steady 8 + 1 volts on test meter.

(d) Repeat steps (a), (b), and (c) for left outboard, right inboard, and right outboard antiskid valves.

(30) Deleted.

(31) Check autobrake reapplication function.

(a) Simulate 65-knot wheel speed on all four wheels simultaneously.

(b) Reset autobrake system by lowering speed brake handle to DOWN position.

(c) Move speed brake handle to ARMED position. Check that all brakes reapply.

(32) Check right pressure comparator function.

(a) Depress right brake pedal to midtravel. Check that both left brakes release.

(b) Release right brake pedal. Check that both right brakes release.

(33) Check autobrake reapplication function.

(a) Simulate 65-knot wheel speed on all four wheels simultaneously.

(b) Reset autobrake system by lowering speed brake handle to DOWN position.
(c) Move speed brake handle to ARMED position. Check that all brakes reapply.

(34) Check left pressure comparator function.
(a) Depress left brake pedal to midtravel. Check that both right brakes release.
(b) Release left brake pedal. Check that both left brakes release.

(35) Check autobrake reapplication function.
(a) Simulate 65-knot wheel speed on all four wheels simultaneously.
(b) Reset autobrake system by lowering speed brake handle to DOWN position.
(c) Move speed brake handle to ARMED position. Check that all brakes reapply.

(36) Check inboard antiskid inoperative functions.
(a) Turn INBD ANTISKID switch to OFF. Check that INBD ANTISKID INOP light comes on, inboard solenoid valve closes and left and right inboard brake stacks release.
(b) Turn INBD ANTISKID switch to ON. Check that INBD ANTISKID INOP light goes off, inboard solenoid valve opens and left and right inboard brake stacks reapply.

(37) Check outboard antiskid inoperative functions.
(a) Turn OUTBD ANTISKID switch to OFF. Check that OUTBD ANTISKID INOP light comes on, outboard solenoid valve closes and left and right outboard brake stacks release.
(b) Turn OUTBD ANTISKID switch to ON. Check that OUTBD ANTISKID INOP light goes of, outboard solenoid valve opens and left and right outboard brake stacks reapply.

(38) Check both antiskid systems inoperative function.
(a) Turn INBD and OUTBD ANTISKID switches to OFF. Check that AUTO BRAKE INOP light comes on.
(b) Press TEST switch on autobrake control module. Check that A/S INOP OR PWR LOSS (DS4) indicator light comes on.
(c) Turn INBD and OUTBD ANTISKID switches to ON. Check that AUTO BRAKE INOP and A/S INOP OR PWR LOSS indicator lights go off.

(39) Place AUTO BRAKE control switch OFF. Check that AUTO BRAKE INOP light remains off and all brake stacks release immediately.

(40) Check autobrake override switch function.
(a) Stow speed brake handle, place AUTO BRAKE control switch in MIN position, and depress right brake pedal to stop. Check that AUTO BRAKE INOP light comes on.
(b) Release right brake pedal. Check that AUTO BRAKE INOP light goes off.
(c) Depress left brake pedal. Check that AUTO BRAKE INOP light comes on.

(d) Release left brake pedal. Check that AUTO BRAKE INOP light goes off.

E. Restore System to Normal

(1) Disconnect functional test box from antiskid module.

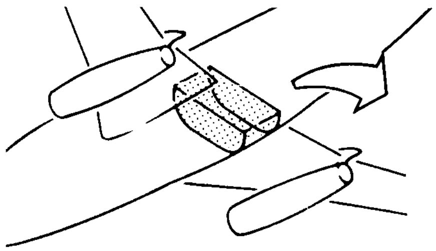
(2) Set parking brake.

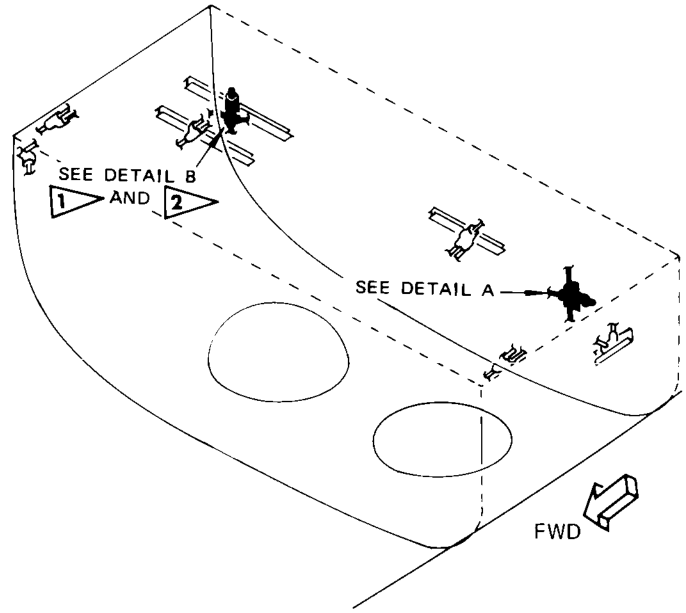
(3) Determine the need for electrical power. Remove power if not required.

(4) Determine the need for hydraulic power. Remove power if not required (Ref 29-11-0 and 29-12-0).

AUTOBRAKE SOLENOID VALVE - REMOVAL/INSTALLATION

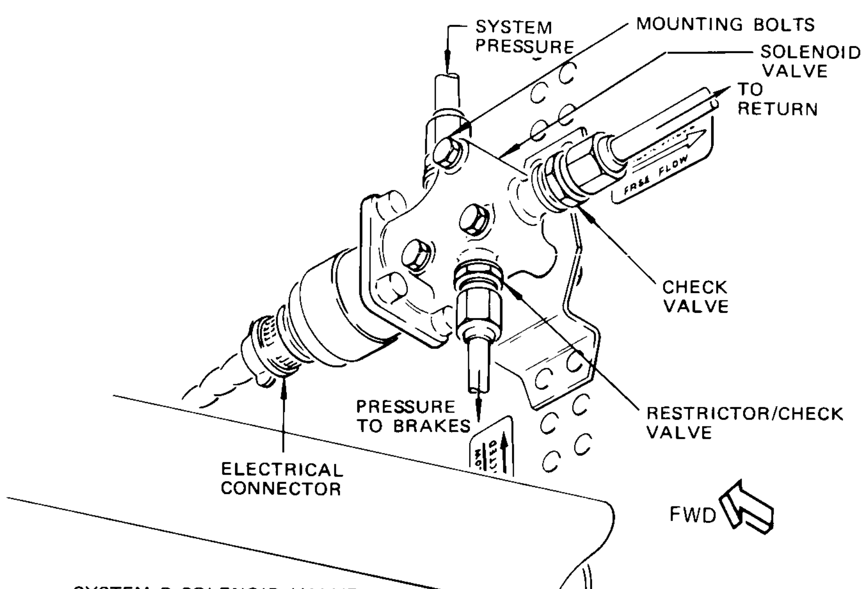
1. General
   A. This procedure covers removal/installation of either system A or system B solenoid valves. System A solenoid valve is in the left wheel well on the ceiling. System B solenoid valve is on the aft wall of the right wheel well.
2. Equipment and Materials
   A. Gear Ground Lock Assembly - F72735 (Ref 32-00-01)
3. Prepare to Remove Solenoid Valve
   A. Ensure both landing gears are down and locked. Ensure gear ground lock assembly is installed in nose gear (Ref 32-00-01).
   B. Chock wheels and release parking brake.
   C. Depressurize system A and B hydraulic systems (Ref 29-11-0, Maintenance Practices and 29-12-0, Maintenance Practices).
   D. Discharge brake accumulators by operating brakes fully eight times.
   E. Pull AUTO BRAKE CONTROL, AUTO BRAKE COMPARATOR and AUTO BRAKE FAILURE WARNING circuit breakers on P6 panel.
4. Remove Solenoid Valve
   A. Disconnect electrical connector from valve (Fig. 401).
   B. Disconnect hydraulic lines. Cap lines and plug ports in valve. Catch fluid by draining in a suitable container.
   C. Remove check and restrictor/check valves from solenoid valve ports for installation in replacement valve.
   D. Remove three bolts, washers and nuts and remove valve from bracket.
5. Install Solenoid Valve
   A. Install check valve, using new O-ring, in port 3 of solenoid valve. Free flow is out of valve as indicated on decal on structure by the valve mounting bracket. (See figure 401.)
   B. Install restrictor/check valve, using new O-ring, in port 2 of solenoid valve. Free flow is out of valve as indicated on decal on structure by the valve mounting bracket.
   C. Install solenoid with three bolts, washers and nuts.
   D. Connect hydraulic lines to solenoid valve.
   E. Connect electrical connector to solenoid.
   F. Bleed brake hydraulic system. Refer to 32-41-0, Hydraulic Brake System - Maintenance Practices (Bleed Main Gear Brake System).
   G. Test automatic braking system. Refer to 32-43-0, Automatic Braking System - Adjustment/Test.





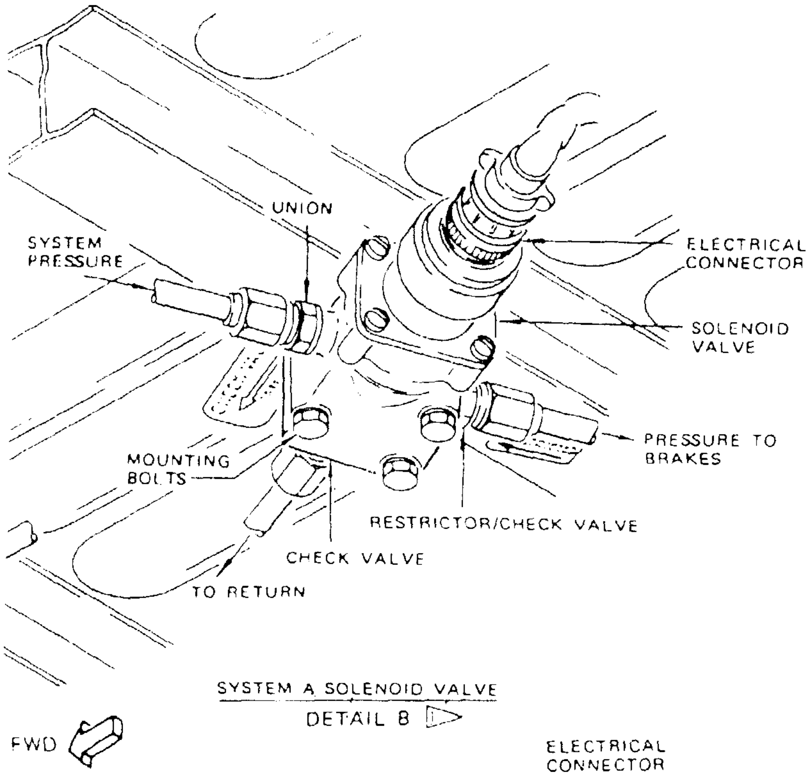
1 AR LV-JTD, LV-JTO
IR EP-IRF, EP-IRG, EP-IRH
ND CR-NAW
QK 200

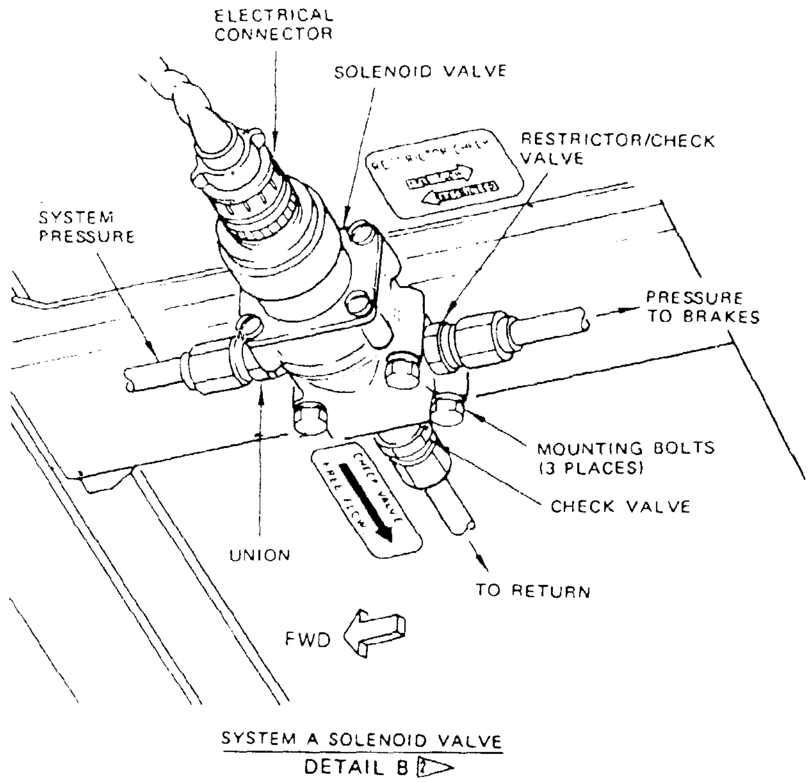
2 AR ALL EXCEPT LV-JTD, LT-JTO
IR ALL EXCEPT E-IRF, EP-IRG, EP-IRH
ND ALL EXCEPT CF-NAW
QK ALL EXCEPT 100, 101, 200



SYSTEM B SOLENOID VALVE
DETAIL A

Autobrake Solenoid Valve Installation
Figure 401 (Sheet 1)

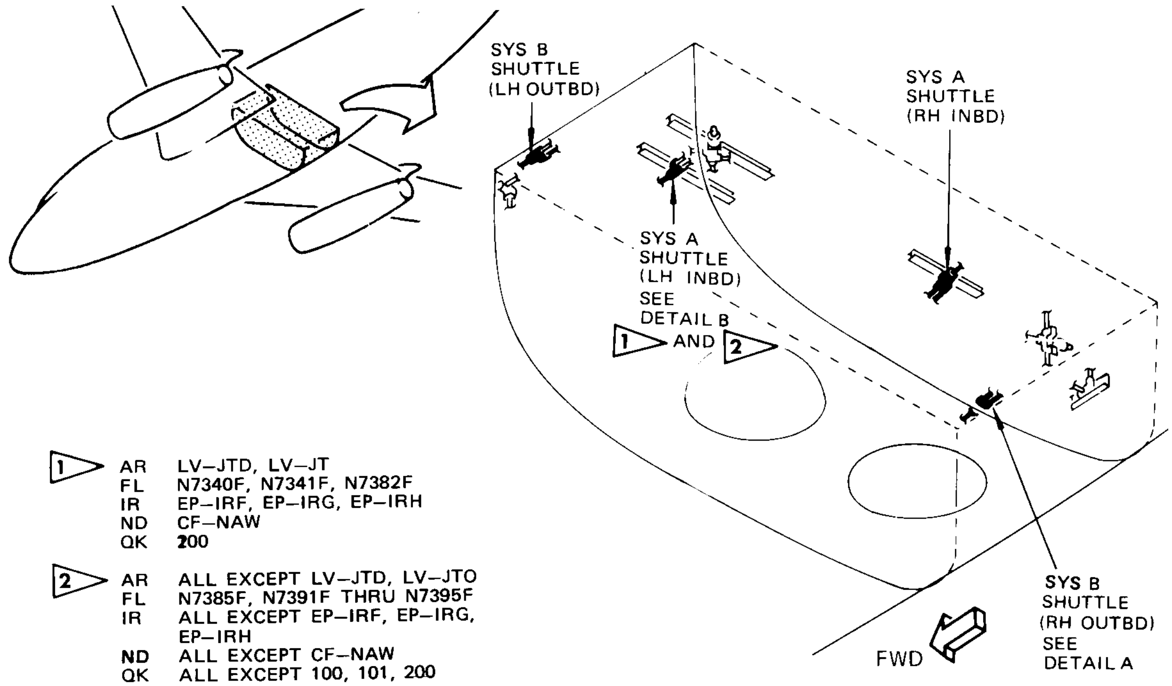


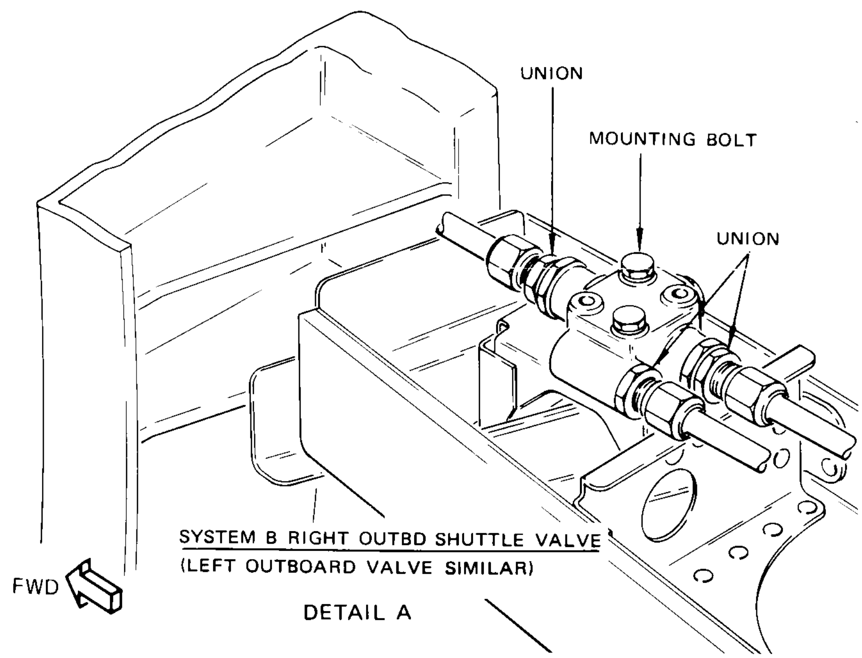


Autobrake Solenoid Valve Installation
Figure 401 (Sheet 2)

AUTOBRAKE SHUTTLE VALVE - REMOVAL/INSTALLATION

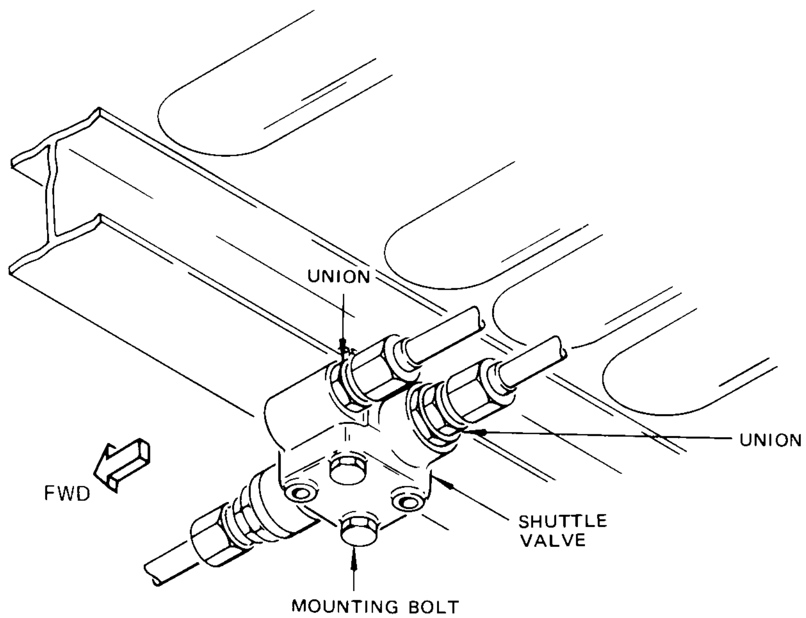
1. General
   A. This procedure covers removal/installation of the four shuttle valves in the automatic braking system. System B (outboard wheel) shuttle valves are located in the upper forward outboard side of the respective wheel well. System A (inboard wheel) shuttle valves are located near the middle on the ceiling of the respective wheel well.
2. Equipment and Materials
   A. Gear Ground Lock Assembly (Ref 32-00-01)
3. Prepare for Removal
   A. Ensure both landing gears are down and locked. Ensure gear ground lock assembly is installed in nose gear (Ref 32-00-01).
   B. Chock wheels and release parking brake.
   C. Depressurize system A and B hydraulic systems (Ref 29-11-0, Maintenance Practices and 29-
      12-0, Maintenance Practices).
   D. Discharge brake accumulators by operating brakes fully eight times.
4. Remove Shuttle Valve
   A. Disconnect hydraulic lines from shuttle valve. Cap lines and plug ports. Catch fluid by draining in a suitable container (Fig. 401).
   B. Remove two bolts and washers securing valve to bracket. Remove valve.
   C. Remove unions from valve ports for installation on replacement valve.
5. Install Shuttle Valve
   A. Install unions in valve ports. Use new O-rings. (See figure 401.)
   B. Install shuttle valve with two bolts and washers.
   C. Connect hydraulic lines to unions.
   D. Bleed brake hydraulic system. Refer to 32-41-0, Hydraulic Brake System - Maintenance Practices (Bleed Main Gear Brake System).





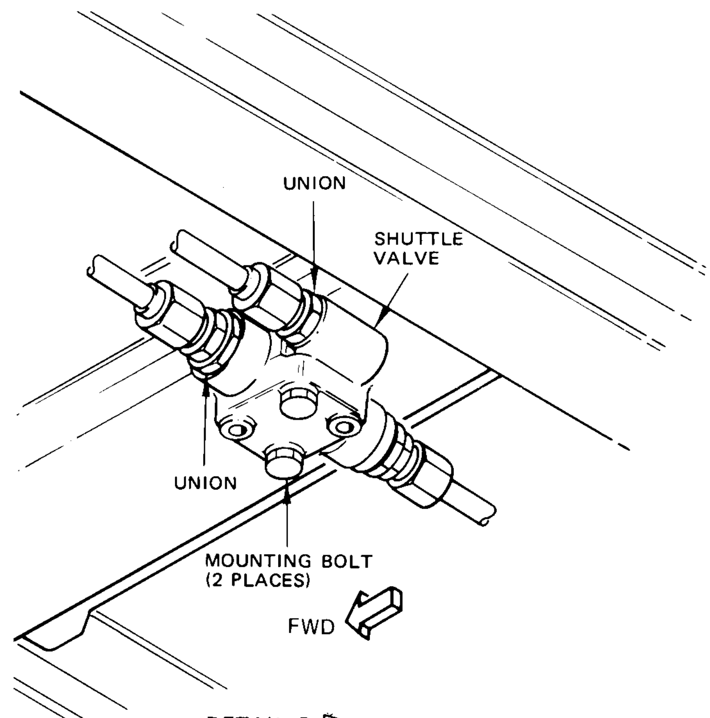
DETAIL A

Autobrake Shuttle Valve Installation
Figure 401 (Sheet 1)



SYSTEM A LEFT INBOARD SHUTTLE VALVE (RIGHT INBOARD VALVE SIMILAR)

DETAIL B 1



DETAIL B 2

Autobrake Shuttle Valve Installation
Figure 401 (Sheet 2)

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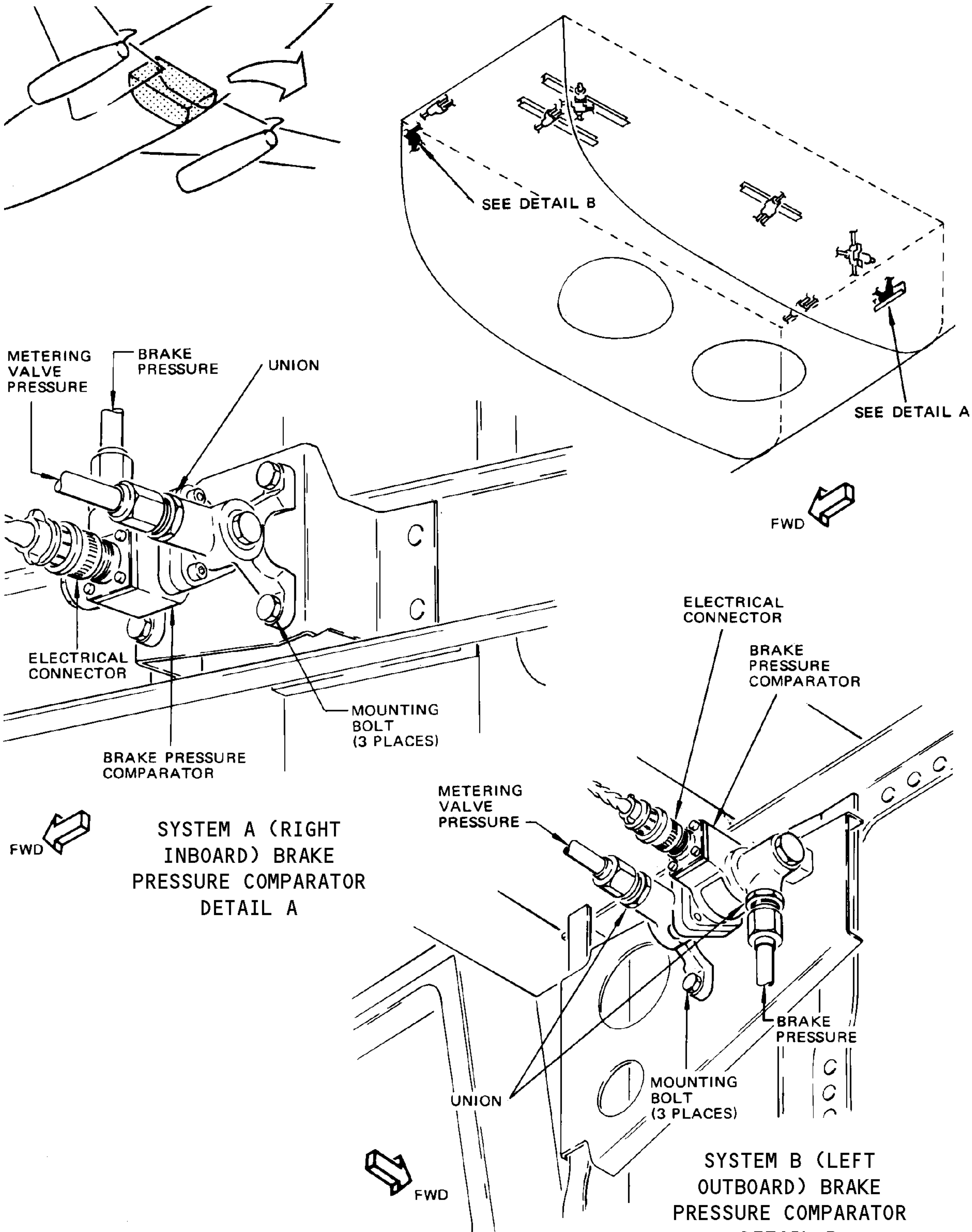
BRAKE PRESSURE COMPARATOR - REMOVAL/INSTALLATION

1. General
   A. The left and right brake pressure comparators are located on the outboard side of the left and right wheel wells, respectively. They receive manual inputs from the captain's left and right brake pedals.
2. Equipment and Materials
   A. Gear Ground Lock Assembly (Ref 32-00-01)
3. Prepare to Remove Pressure Comparator
   A. Ensure both landing gears are down and locked. Ensure gear ground lock assembly is installed in nose gear (Ref 32-00-01).
   B. Chock wheels and release parking brake.
   C. Depressurize system A and B hydraulic systems (Ref 29-11-0, Maintenance Practices and 29-12-0, Maintenance Practices).
   D. Discharge brake accumulators by operating brakes fully eight times.
   E. Pull AUTOBRAKE CONTROL, AUTO BRAKE COMPARATOR and AUTO BRAKE FAILURE WARNING circuit breakers on P6 panel.
4. Remove Brake Pressure Comparator
   A. Disconnect hydraulic lines from comparator. Catch fluid in a suitable container. Cap lines and plug valve ports (Fig. 401).
   B. Disconnect electrical connector from comparator.
   C. Remove three bolts and washers. Remove comparator.
   D. Remove unions from comparator hydraulic ports for installation in replacement comparator.
5. Install Brake Pressure Comparator
   A. Install unions in comparator ports with new O-rings (Fig. 401).
   B. Install comparator with three bolts and washers.
   C. Connect electrical connector to comparator.
   D. Connect hydraulic lines to comparator.
   E. Bleed brake hydraulic system. Refer to 32-41-0, Hydraulic Brake System - Maintenance Practices (Bleed Main Gear Brake System).
   F. Check operation of brake pressure comparator. Refer to 32-43-31, Brake Pressure Comparator - Adjustment/Test.



Brake Pressure Comparator
Figure 401

BRAKE PRESSURE COMPARATOR - ADJUSTMENT/TEST

1. Brake Pressure Comparator Test
   A. General
      (1) This test requires that the antiskid and automatic braking systems be complete and operating.
   B. Equipment and Materials
      (1) Antiskid/Auto Brake Tester F80129-1 or F80129-100
      (2) Gear Ground Lock Assembly F72735 (Ref 32-00-01)
   C. Prepare for Test
      (1) Ensure gear ground lock assembly is installed in nose gear (Ref 32-00-01).
      (2) Pressurize hydraulic systems A and B (Ref 29-11-0, Maintenance Practices and 29-12-0, Maintenance Practices).
      (3) Connect electrical power to system.
      (4) Close all autobrake and antiskid circuit breakers on P6 panel.
      (5) Open AUTO SPEED BRAKE circuit breaker on P6 panel to prevent its deployment during the test.
      (6) Place chocks under the wheels.
      (7) Release parking brake.
   D. Test Brake Pressure Comparator
      (1) Connect functional test tool to test connector on M162 antiskid control shield in electrical/electronic equipment compartment.
      (2) Turn both antiskid switches on P2 panel on.
      (3) Turn autobrake switch on P2 panel to MIN.
      (4) Using functional test tool, simulate 65-knot wheel speed on all four wheels, the last within 5 seconds of the first.
      (5) Move speed brake handle to down then to ARM.
      (6) Check that AUTO BRAKE INOP light on P2 panel is out.
      (7) Set functional test tool to read left outboard or right inboard antiskid valve control voltage, depending on which comparator is to be tested.
      (8) Depress captain's left or right brake pedal slightly and hold steady pressure.

         NOTE: Depress left brake pedal if left brake comparator is being tested. Depress right brake pedal if right brake pressure comparator is being tested.

(9) Check that antiskid valve control voltage rises gradually from its initial steady value to a higher steady value within 3 seconds of brake pedal depression. Check that solenoid valves close within the 3-second period.

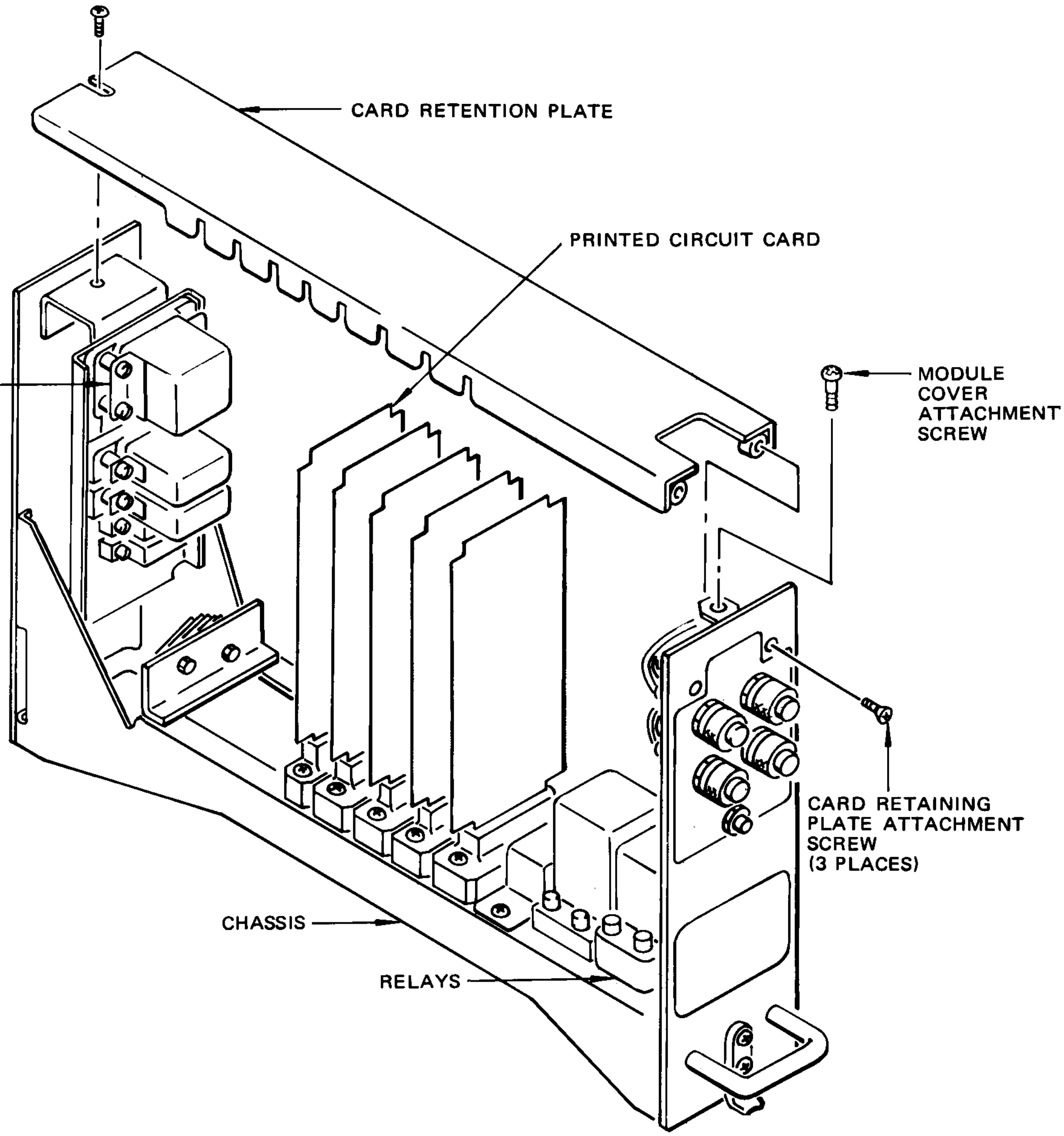
<u>NOTE</u>: The INBD and OUTBD SOL VALVE OPEN lights on M577 autobrake control module in electrical/electronic equipment compartment will come on when the solenoid valves close and the TEST switch is pushed in.

AUTOBRAKE CONTROL MODULE - REMOVAL/INSTALLATION

1. General
   A. Before removing the autobrake control module, open AUTO BRAKE FAIL WARN, AUTO BRAKE CONTROL and AUTO BRAKE COMPARATOR circuit breakers on the P6 panel. To remove the module, release the latch and pull straight out of the rack. When installing the module, make sure all the connector pins are straight, then push the module straight back.
   B. After replacing the autobrake module, perform automatic braking system test (Ref 32-43-0, Automatic Braking System - Adjustment/Test).

AUTOBRAKE CONTROL MODULE CIRCUIT CARD - REMOVAL/INSTALLATION

1. General
   A. This procedure describes disassembly/assembly of the autobrake control module for replacement of circuit cards. It should be used when a malfunction is isolated to the control module. It is assumed the control module has been removed from the airplane.
2. Remove Autobrake Control Module Circuit Card
   A. Remove cover attachment screw and slide cover off chassis. (See figure 401.)
   B. Remove three card retaining plate attachment screws and remove plate from chassis.
   C. Pull card straight up and out of its connector.
3. Install Autobrake Control Module Circuit Card
   A. Align card with connector and push straight down. (See figure 401.)
   B. Place card retaining plate on chassis with slots in plate engaged with card edges. Install three plate retaining screws.
   C. Slide cover onto chassis and secure with attachment screw.

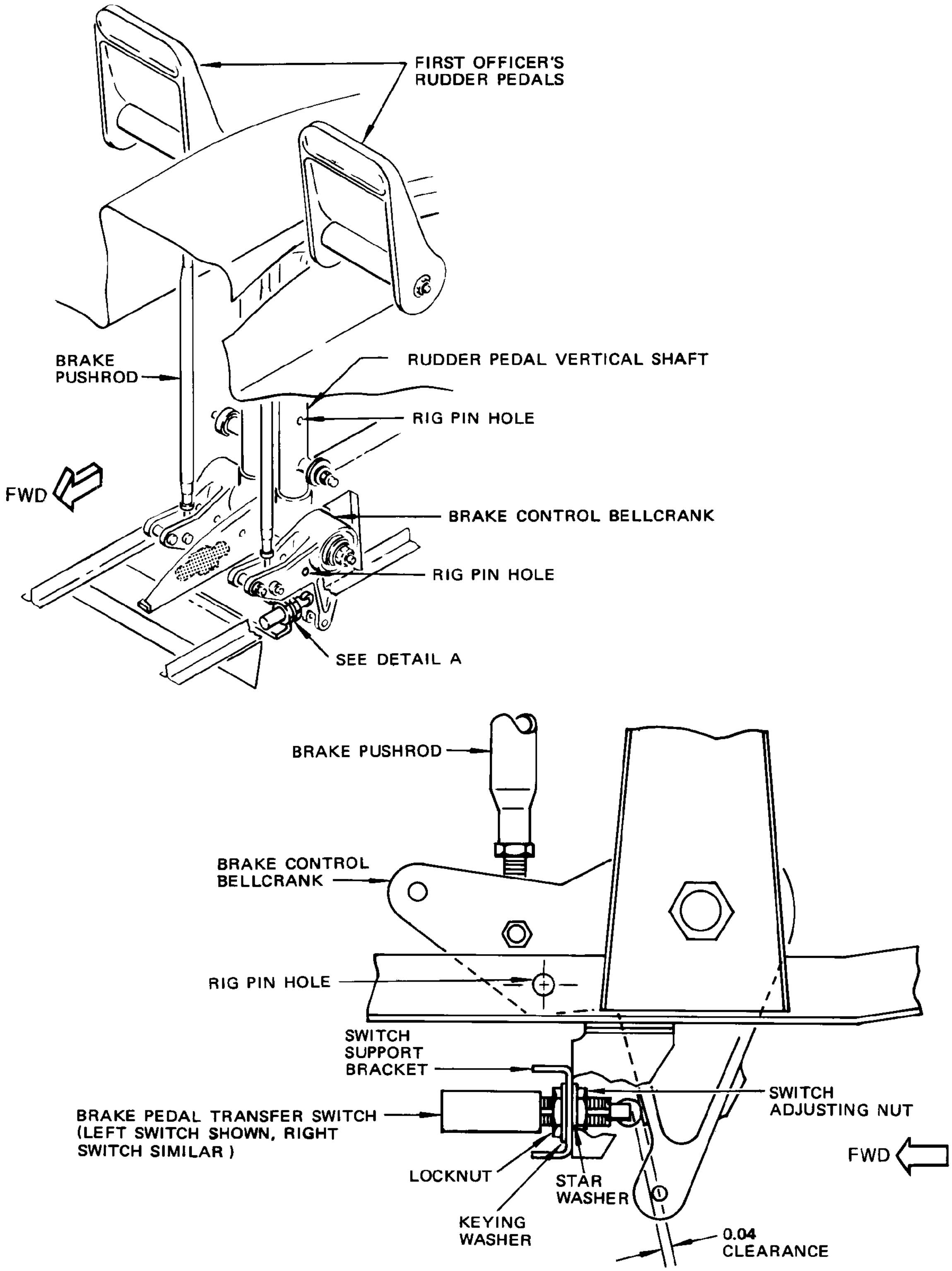


NOTE: CONTROL MODULE COVER
SHOWN REMOVED

Autobrake Control Module Circuit Card Installation
Figure 401

BRAKE PEDAL TRANSFER SWITCH - REMOVAL/INSTALLATION

1. General
   A. The two brake pedal transfer switches (S550 and S582), used for the automatic braking system, are mounted forward of the lower arms of the first officer's brake control bellcranks located below the control cabin floor. The left brake pedals actuate one switch, S550, while the right pedals actuate the other, S582.
   B. The switches are adjusted in both the brake off (switch deactuated) and brake partially applied (switch-actuated) positions.
2. Equipment and Materials
   A. Rigging Pins - 5/16-inch diameter by 10 inches minimum length (2 required)
   B. Rigging Pin - 1/4-inch diameter by 10 inches minimum length (1 required)
   C. Rigging Pin - 3/16-inch diameter by 10 inches minimum length (1 required)
   D. Gear Ground Lock Assembly - F72735 (Ref 32-00-01)
3. Remove Brake Pedal Transfer Switch (Fig. 401)
   A. Ensure gear ground lock assembly is installed in nose gear (Ref 32-00-01).
   B. Gain access to brake pedal switches through lower nose compartment access door 1103.
   C. Open AUTO BRAKE CONTROL, COMPARATOR and FAILURE WARNING circuit breakers on P6 panel.
   D. Remove switch electrical leads back to splice area and cut leads at splices. Mark splices for assistance when installing replacement switch.
   E. Remove nut and washer from switch shaft and remove switch from support bracket.
4. Install Brake Pedal Transfer Switch (Fig. 401)
   A. With switch locknut on switch shaft and key washer tang positioned to engage support bracket keying slot, insert switch shaft through bracket. Add star washer and adjusting nut finger-tight.
   B. Adjust brake pedal transfer switch.
      (1) Neutralize rudder pedals and install 5/16-inch diameter rig pin through rudder pedal vertical shafts and structure. If necessary, crank rudder pedal adjustment crank to position shaft for rig pin installation.
      (2) Install a second 5/16-inch diameter rig pin through structure and brake control bellcrank.
      (3) Check that both 5/16-inch diameter rig pins fit freely. Adjust brake pushrod if required. Refer to 32-41-0, Hydraulic Brake System - Adjustment/Test (Adjust Hydraulic Brake System).
      (4) Check for a clearance of at least 0.04 inch between switch and bellcrank striker plate. (Detail A) If necessary, thread nuts forward or aft to obtain required clearance and tighten locknut.



DETAIL A

Brake Pedal Transfer Switch Installation
Figure 401

(5) Remove 5/16-inch rig pin from brake control bellcrank and install 1/4-inch diameter rig pin. Apply sufficient force on brake pedal to hold rig pin in place.
(6) Adjust brake pedal switch to be closed (actuated) with brake pedal depressed against 1/4-inch diameter rig pin.
(7) Check actuation by listening for actuation. Before switch leads are spliced, actuation can be determined by checking for electrical continuity across pins 2 and 3 and across pins 5 and 6.
(8) Release brake pedals and remove 1/4-inch diameter rig pin from bellcrank.
(9) Insert 3/16-inch diameter rig pin through structure and brake control bellcrank. Apply sufficient pedal force to hold pin in place.
(10) With brake pedal depressed against 3/16-inch diameter pin, check that switch has opened (no continuity through pins 2 and 3 and through pins 5 and 6).
(11) Repeat steps (4) through (10) as required to obtain required switch actuation range and neutral clearance.
(12) Ensure that locknut is tight and install lockwire.
(13) Remove rig pins from brake control bellcrank and rudder pedal vertical shaft.

C. Route switch leads back to splice area. Splice leads into wire bundle as marked during removal.

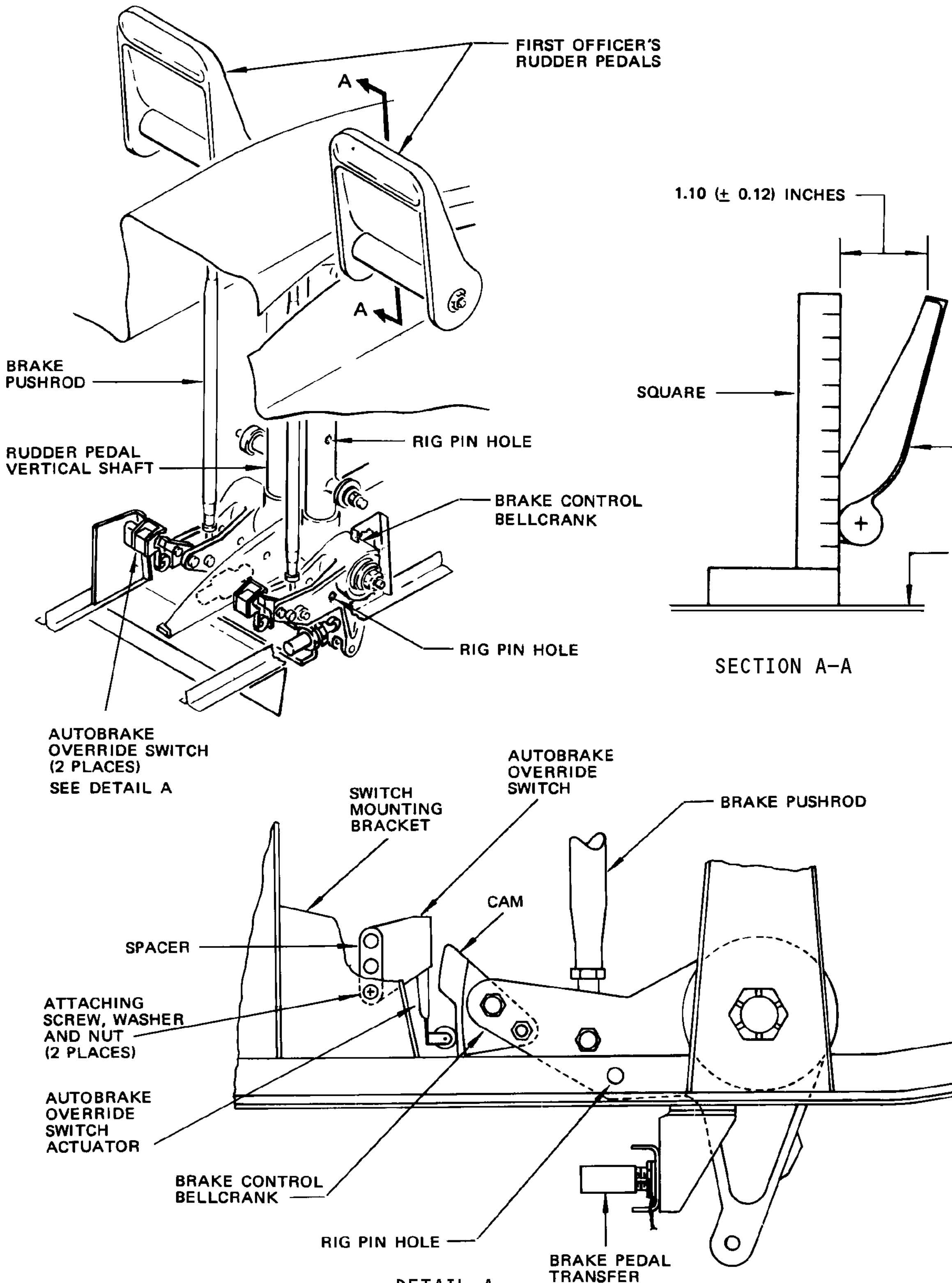
AUTOBRAKE OVERRIDE SWITCH - REMOVAL/INSTALLATION

1. General
   A. The two autobrake override switches (S592 and S594) are mounted forward of the forward arms of the first officer's brake control bellcranks located below the control cabin floor. The switches contact cams mounted on the ends of the bellcranks arms. One switch, S592, is actuated by the left brake pedals while the other, S594 is actuated by the right pedals.
   B. The switches are adjusted in both the brake off (switch normally closed) and brake depressed (switch open) positions.
2. Equipment and Materials
   A. Rigging pins, 5/16-inch diameter by 10 inches minimum length (2 required).

      NOTE: Rigging pins are part of F70207-108.

   B. Gear Ground Lock Assemblies (Ref 32-00-01).
3. Remove Autobrake Override Switch (Fig. 401).
   A. Check that gear ground lock assemblies is installed in nose gear (Ref 32-00-01).
   B. Gain access to autobrake override switches through lower nose compartment access door 1103.
   C. Open AUTO BRAKE CONTROL, COMPARATOR, AND FAILURE WARNING circuit breakers on P6 panel.
   D. Disconnect electrical leads from switch.
   E. Remove two sets of nuts, washers, and screws and separate switch/actuator assembly and spacer from airplane structure.
4. Install Autobrake Override Switch (Fig. 401).
   A. Position switch/actuator assembly and spacer on airplane structure and install two sets of screws, washers, and nuts.
   B. Connect electrical leads to switch.
   C. Adjust autobrake override switch.
      (1) neutralize rudder pedals and install 5/16-inch diameter rig pin through rudder pedal vertical shafts and structure. If necessary, crank rudder pedal adjustment crank to position shaft for rig pin installation.
      (2) Install a second 5/16-inch diameter rig pin through structure and brake control bellcrank.
      (3) Check that both 5/16-inch diameter rig pins fit freely. Adjust brake pushrod, if required. Refer to 32-41-0, Hydraulic Brake System - Adjustment/Test (Adjust Hydraulic Brake System).
      (4) Check that switch actuator follower is on lower, aft portion of cam and that there is electrical continuity across both leads of switch.
      (5) Remove rig pin from brake control bellcrank and structure.

(6) Depress brake pedal slowly until inclined ramp of cam actuates switch as indicated by sound and open circuit across both leads of switch.
(7) Check for pedal travel of 7.5 (± 1) degrees of pedal travel from off position to point where switch actuates. If a brake pedal protractor is unavailable, check for a linear pedal displacement of 1.10 (± 0.12) inches as measured at the pedal tip per Fig. 401, section A-A.
(8) Bend tab on switch actuator, if necessary, to correct switch actuation point.
(9) Remove rig pin from rudder pedal vertical shaft.



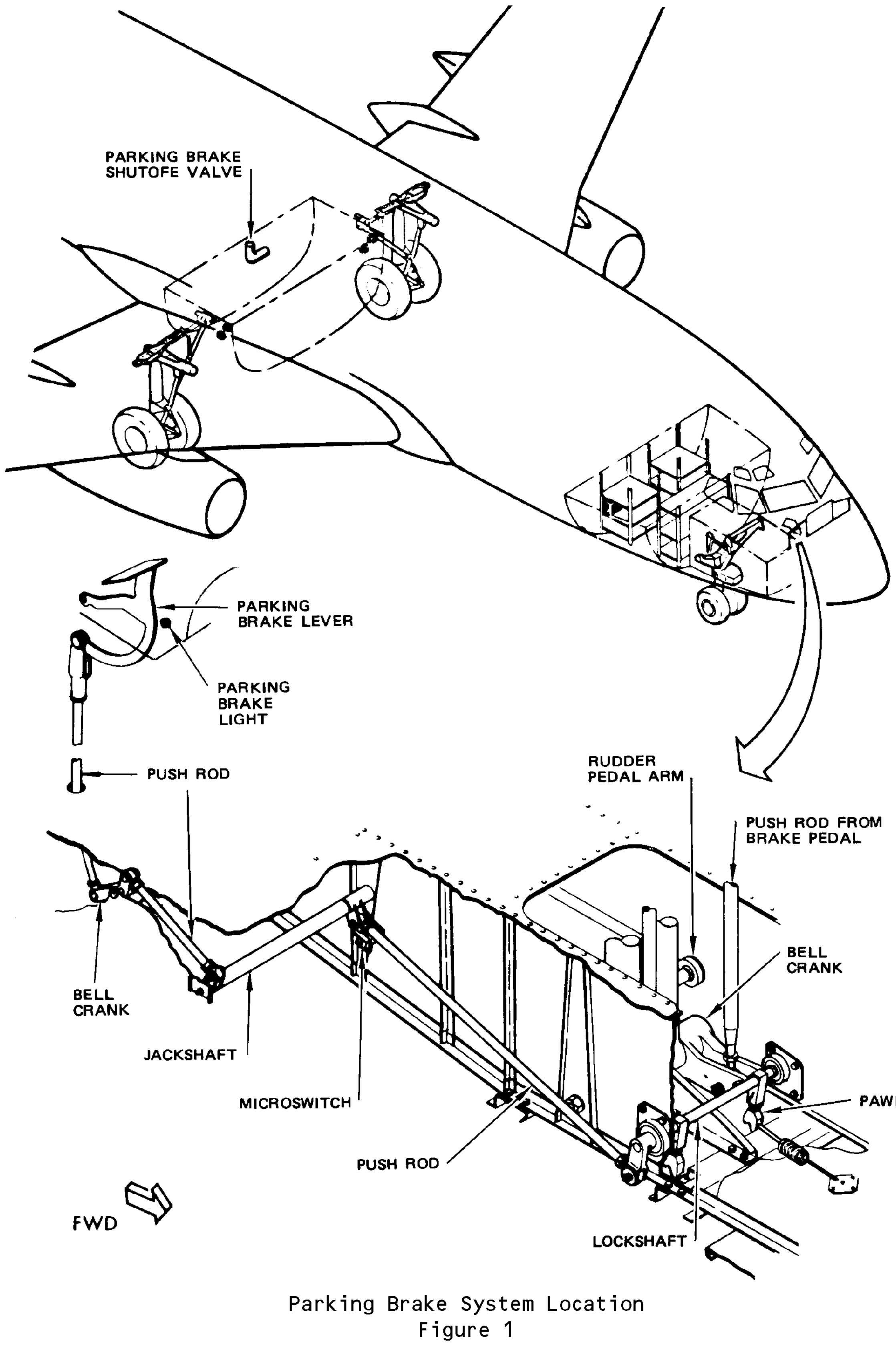
Autobrake Override Switch Installation
Figure 401

PARKING BRAKE SYSTEM - DESCRIPTION AND OPERATION

1. General
   A. A parking brake system is provided to permit setting the brakes during parking or mooring. The system consists of a parking brake lever on the control stand and a mechanical linkage to position pawls in the lower nose compartment which lock the brake linkage in the brakes applied position. (See figure s 1 and 2.) A parking brake shutoff valve prevents hydraulic pressure loss.
   B. To release parking brakes, the captain's or first officer's brake pedals need only be fully applied and then released. A light on the control stand, next to parking brake lever, is provided to indicate when the parking brake is on.

      CAUTION: PARKING BRAKES SHOULD NOT BE SET FOLLOWING A HIGH ENERGY STOP. HIGH ENERGY STOPS ARE DEFINED AS A REFUSED TAKE OFF OR ANY STOP OTHER THAN NORMAL. UNDER STATIC PRESSURE, HOT BRAKE SURFACES TEND TO FUSE TOGETHER. THEREFORE, AFTER A HIGH ENERGY STOP, OR FOLLOWING TOUCH AND GO STOPS, A COOLING PERIOD OF 40 to 60 MINUTES FOR BRAKE UNITS SHOULD BE ALLOWED BEFORE THE PARKING BRAKE IS SET.

2. Parking Brake Linkage
   A. The parking brake is controlled by a lever, hinged on top of the control stand. (See figure 2.) The parking brake linkage is shown in figure 2. When the parking brake lever is pulled, pawls swing toward the rudder pedals and engage the forward ends of bell cranks in the captains' brake linkage. The parking brake will not engage unless both brake pedals are depressed.
3. Parking Brake Light
   A. The parking brake light is located on the control stand. (See figure 2.) The light is a socket type with a red plastic translucent cover. When the parking brake is on, the outboard lever on the jackshaft operates a microswitch to illuminate the light on the pilot's control stand. Power for the light is taken from a 28 volt dc battery bus. When the parking brake is applied, the microswitch also actuates the parking brake shutoff valve to prevent brake pressure loss to the return line through the antiskid valve.
4. Parking Brake Shutoff Valve
   A. The parking brake shutoff valve is installed in a common return line in the main wheel well between the four antiskid control valves and a system return line and prevents pressure bleed off when parking brakes are set. (See figure 4.)



Parking Brake System Location
Figure 1

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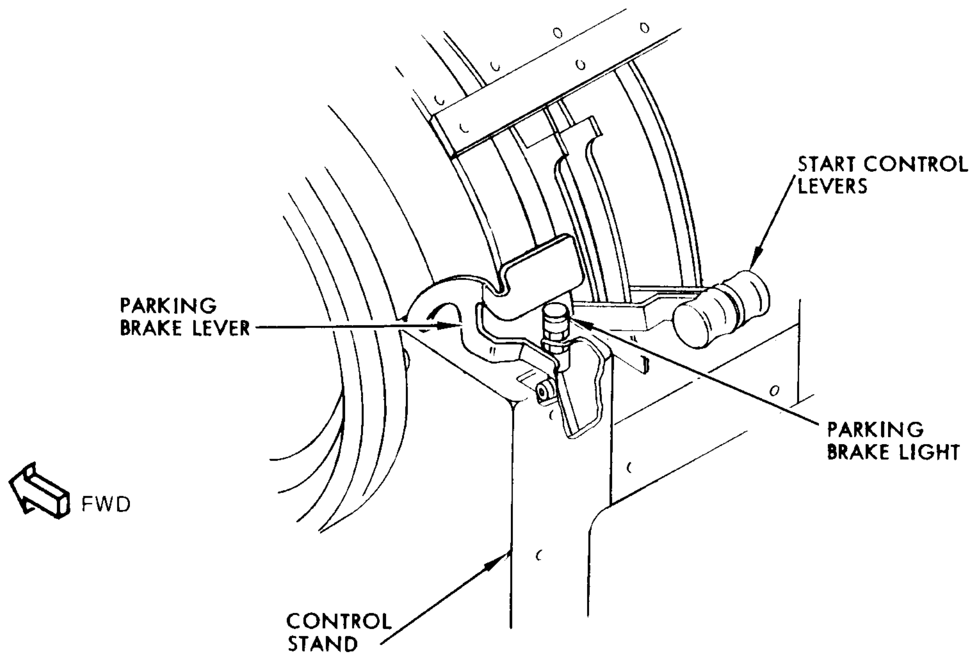
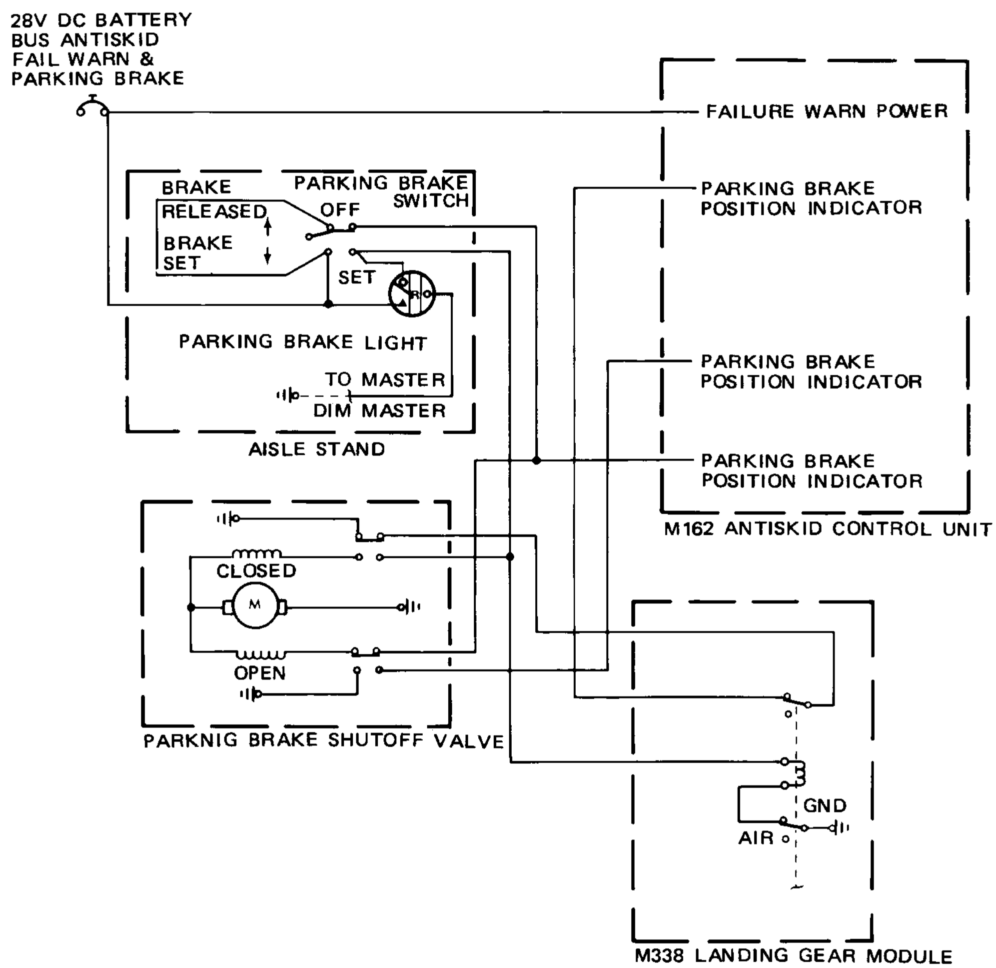


Parking Brake Lever and Light
Figure 2

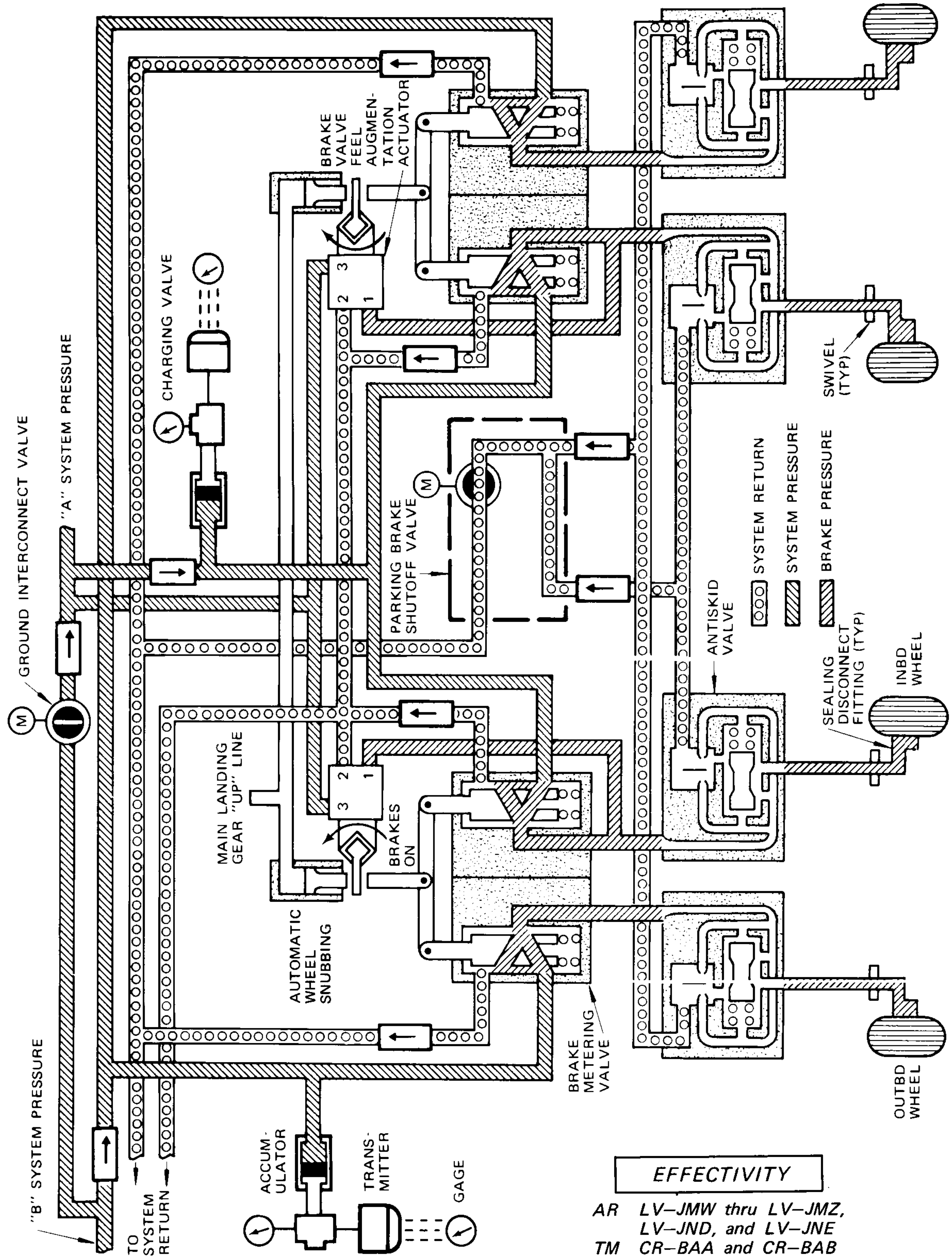
B. The parking brake shutoff valve is a 28 volt dc motor-operated ball-type valve. When parking brakes are set or released, the parking brake switch will actuate to energize the shutoff valve to closed or open position. (See figure 3.)

5. Operation

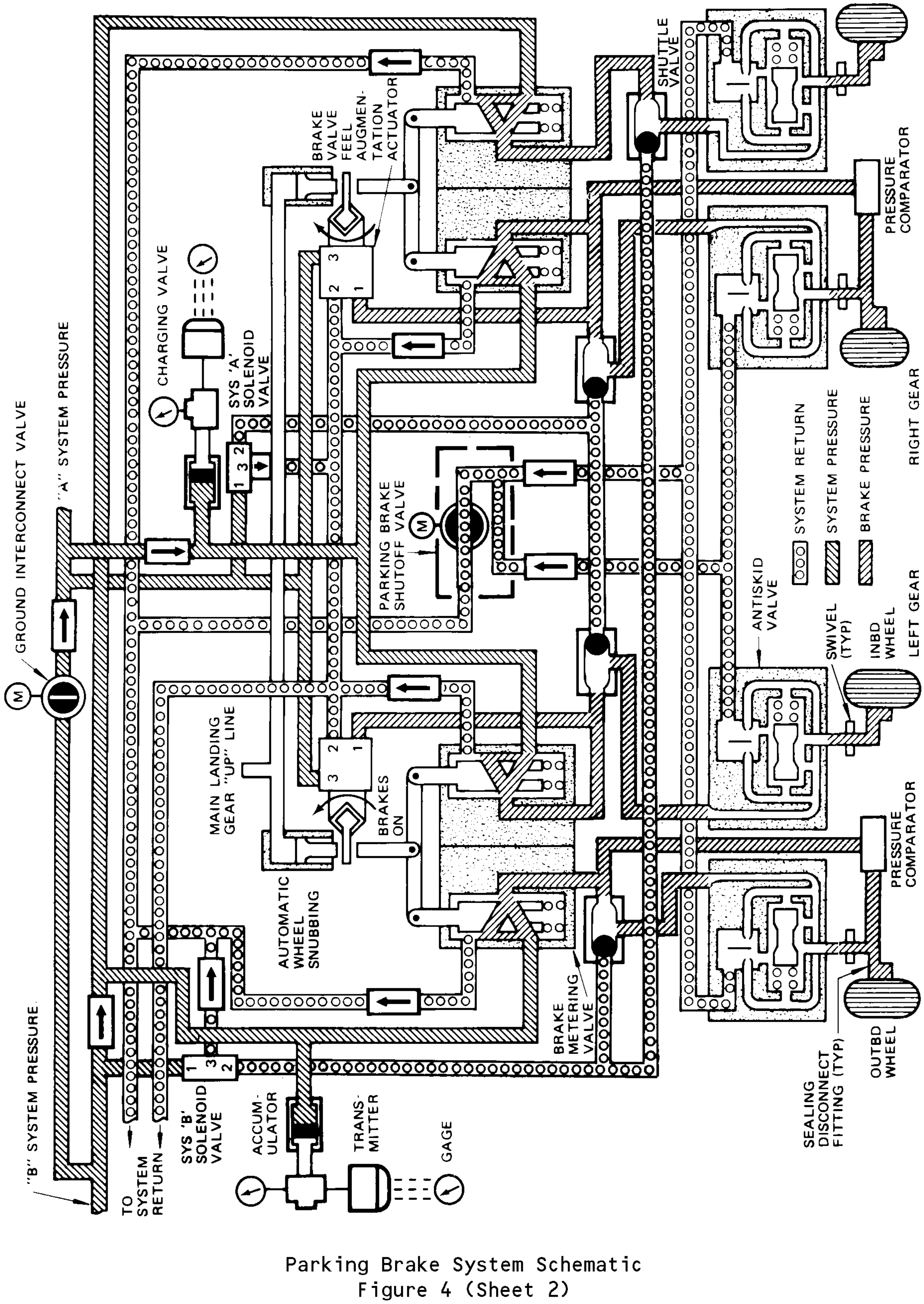
A. The parking brakes are set by depressing the brake pedals and lifting the parking brake lever and then releasing the brake pedals. The parking brake light will come on and remain on as long as battery power is on. To release the parking brakes, the brake pedals are depressed and released.



Parking Brake Shutoff Valve Circuit
Figure 3



Parking Brake System Schematic
Figure 4 (Sheet 1)



Parking Brake System Schematic
Figure 4 (Sheet 2)

PARKING BRAKE SYSTEM - TROUBLESHOOTING

1. General
   A. Troubleshooting the parking brake system should be performed whenever the brake accumulator pressure decays below the requirement stated in the parking brake system test (Ref A/T).
   B. The following precheck items should be performed before troubleshooting the parking brake system:
      (1) Check that hydraulic brake system is bled and functioning properly (Ref 32-41-0 MP and A/T).
      (2) Check that hydraulic accumulators are properly serviced (Ref 12-15-11, Hydraulic Accumulator Servicing).
2. Parking Brake System Troubleshooting
   A. Do the parking brake system bleed down test of Parking Brake System - A/T.
   B. If the parking brake bleed down rate is too high, do the troubleshooting as referenced in the Parking Brake System Troubleshooting Chart.
3. Parking Brake System Troubleshooting Chart

PARKING BRAKE SYSTEM - TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	ISOLATION PROCEDURE	REMEDY
Parking brake system accumulator bleed down rate is too high	Waiting less than 10 minutes after turning on the pumps to start the parking brake bleed down test		Allow 10 minutes with pumps running and parking brake set for accumulator temperatures to stabilize
	Incorrect accumulator precharge	Check precharge with brake system depressurized	Service accumulator (Ref 12-15-11)
	Either brake accumulator check valve leaking	Perform brake accumulator bleed down test with parking brake not set. If the bleed down rate is above 150 psi in 10 minutes, the check valve may be leaking	Replace check valve(s)
	Gap between parking brake pawl and brake control bellcrank pick-up bolt is too large		Adjust parking brake pawls per requirements (see pawl adjustment in 32-44-0/501, PARKING BRAKE SYSTEM-ADJUSTMENT/ TEST)
	Brake metering valve leaking internally	Plug return to inboard or outboard side of brake metering valve and perform bleed down test	Replace brake metering valve(s) (Ref 32-41-21/ 401)
	Parking valve not closing when parking brake is set	Check parking brake switch and wiring	Repair or replace as necessary
	Parking valve leaking internally	Plug parking brake valve return line and perform bleed down test	Replace parking brake valve (Ref 32-44-21/401)

Parking Brake System - Troubleshooting
Figure 101 (Sheet 1)

TROUBLE	PROBABLE CAUSE	ISOLATION PROCEDURE	REMEDY
Parking brake system accumulator bleed down rate is too high (Continued)	Autobrake shuttle valve leaking internally (Airplanes equipped with autobrakes only)(will cause excessive bleed down on inboard OR outboard brakes, but not on both)	Plug line between a shuttle valve and the autobrake valve and perform bleed down test	Replace shuttle valve(s) (Ref 32-43-21/401)
	Feel augmentor leaking internally (will cause excessive leakage on inboard brakes only)	Plug return line to one of the feel augmentors and perform bleed down test	Replace feel augmentor(s) (Ref 32-XX-XX)

Parking Brake System - Troubleshooting
Figure 101 (Sheet 2)

BRAKE ACCUMULATOR SYSTEM - PARKING BRAKE RELEASED - TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	ISOLATION PROCEDURE	REMEDY
Brake accumulator system pressure bleed-down rate is too high	Waiting less than 10 minutes after turning on the pumps to start test		Allow 10 minutes with pumps running for accumulator temperatures to stabilize
	Incorrect accumulator precharge	Check precharge with brake system depressurized	Service accumulator (Ref 12-15-11)
	Brake accumulator check valve leaking (check valve upstream of accumulator)		Replace check valve
	Brake accumulator pressure relief valve leaking (for airplanes equipped with this valve per SB 737-32-1163)	Plug relief valve and perform bleed-down test	Replace brake accumulator pressure relief valve
	Brake metering valve leaking internally	Plug A and B system pressure inputs to suspect brake metering valve and perform bleed-down test	Replace brake metering valve (Ref 32-41-21/401)

Parking Brake System - Troubleshooting
Figure 101 (Sheet 3)

PARKING BRAKE SYSTEM - ADJUSTMENT/TEST

1. Parking Brake System Adjustment
   A. General
      (1) The parking brake system is adjusted to hold brakes on with a set parking brake lever position. Adjustment may be necessary after pedal linkage is reset, or after replacements in parking brake linkage. Pressure setting is controlled by adjusting two pawls (Fig. 501). The handle is adjusted by adjusting pushrods, and by the setting of a bumper stop.
   B. Equipment and Materials
      (1) On airplanes with rig pin hole in jackshaft, Rigging pin - 0.309/0.311 inch diameter by 6.8 inches long (one required)

         NOTE: The rigging pin is part of kit F70207-61

      (2) Ground Lock Assembly (Ref 32-00-01)
   C. Prepare to adjust parking brake system.
      (1) Check that all ground lock assemblies are installed (Ref 32-00-01).
      (2) Put chocks on the wheels and release the parking brake.
   D. Adjust the Parking Brake Pawls
      (1) Remove the antirotation cotter pin in the two pawls.
      (2) Loosen the two pawl locknuts on top of the pawls.
      (3) Extend each pawl one at a time by unscrewing the pawl counterclockwise until the parking brake can no longer be set.
      (4) Complete the adjustment by turning the pawls back clockwise 1 to 2 turns.
      (5) Make sure that the parking brake can be set from the brake pedals of the pilot and the copilot.
      (6) Install the antirotation cotter pins in the two pawls.
      (7) Tighten the pawl locknuts.
   E. Set the Bumper Stops for the Pawls
      (1) Add or remove washers to set the bumper stops.
      (2) With the parking brake released, the pick-up bolt on the brake control bellcrank should clear the pawl by 0.16 to 0.20 inch when you operate the brake pedals (Detail C, Fig. 501, Sheet 2).
   F. Parking Brake Lever Pushrods Adjustment
      (1) On airplanes without the jackshaft rigging pin:
         (a) With the parking brake lever resting on the top of the control stand, adjust the upper pushrod to align the lower leg of the jackshift approximately 13 degrees from the vertical (Detail E, Fig. 501, Sheet 2).
         (b) Adjust the lower pushrod to allow the pawls to just contact the bumper stops (Fig. 501, Sheet 2).
      (2) On airplanes with the jackshaft rigging pin:
         (a) Install the jackshaft rigging pin (Fig. 501, Sheet 3).

(b) If the rig pin cannot be installed, adjust the upper or the lower pushrods until the pin can be installed.
(c) Adjust the upper pushrod until the parking brake lever just rests on the top of the control stand.
(d) Adjust the lower pushrod to allow the pawls to just touch the bumper stops (Fig. 501, Sheet 2).
(e) Remove the jackshaft-rigging pin.

G. Parking Brake Switch Adjustment
(1) Loosen the bolts on the switch-mounting bracket.
(2) With the brake pedals released, pull the parking brake lever until it stops.
(3) With the parking brake held in the up position, turn the switch until the switch actuating roller touches the rod end of the lower pushrod.
(4) Tighten the switch mounting bolts.

2. <u>Parking Brake System Test</u>

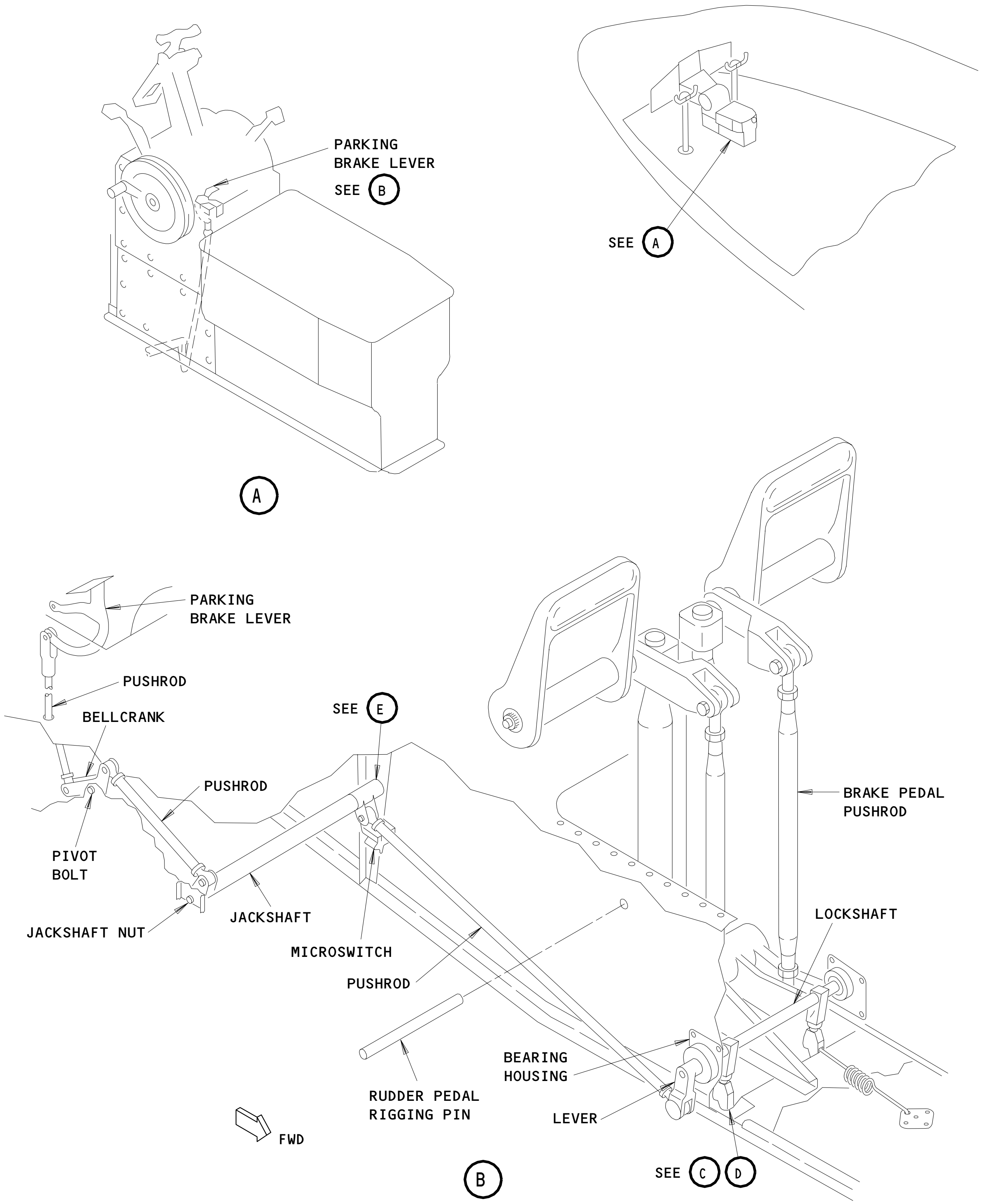
A. Equipment and Materials
(1) Pressure Gages - 0 to 3500 psi, for hydraulic fluid. 4 gages are necessary, Hydraulic Brake System Pressure Checking Gage Equipment - F72977-62 Preferred, F72977-44 Alternate, F72977-45 Alternate, F72977-46 Alternate, F72977-47 Alternate
(2) Ground Locks - Landing Gear

B. Prepare for Parking Brake System Test
(1) Provide external electrical power (Ref. 24-22-0/201).
(2) Make sure that you install the ground locks of the main and nose gear (Ref. 32-00-01/201).

C. Brake System Accumulator Precharge Check
(1) Remove the pressure from hydraulic systems A and B (Ref. 29-11-0/201 and 29-12-0/201).
(2) Place chocks under wheels.
(3) Fully apply the brakes approximately 10 times to remove the brake pressure from the brake accumulators.
(4) Remove the bleed screws and install the pressure gages at the bleed ports of the brakes.
(5) Make sure that the precharge pressures of the brake accumulator agree with the placards on the aft wall of the wheel well.

D. Parking Brake System Test
(1) Pressurize hydraulic systems A and B (Ref. 29-11-0/201 and 29-12-0/201).
(2) Push the brake pedals and set the parking brake.
(3) Make sure that the parking brake light stays on.
(4) Make sure that the pressure at each brake is 3000 ± 100 psi.
(5) Fully push the brake pedals.
(6) Make sure that the parking brake lever goes back to the parking brake released position and the parking brake light goes off.

E. Accumulator Bleed Down Test - Parking Brake Set
(1) Pressurize hydraulic systems A and B (Ref. 29-11-0/201 and 29-12-0/201).



Parking Brake Linkage Adjustment
Figure 501 (Sheet 1)

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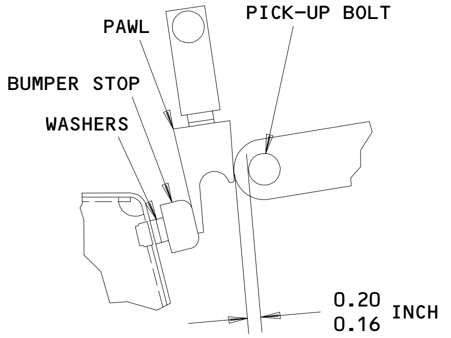

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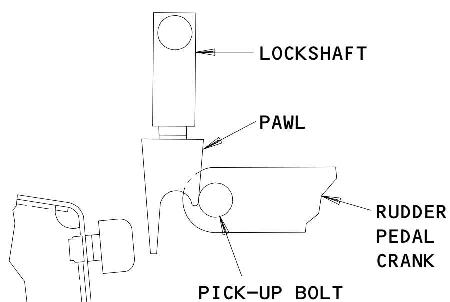

POSITION 1

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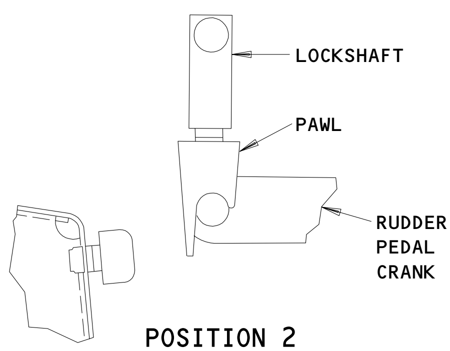

POSITION 2

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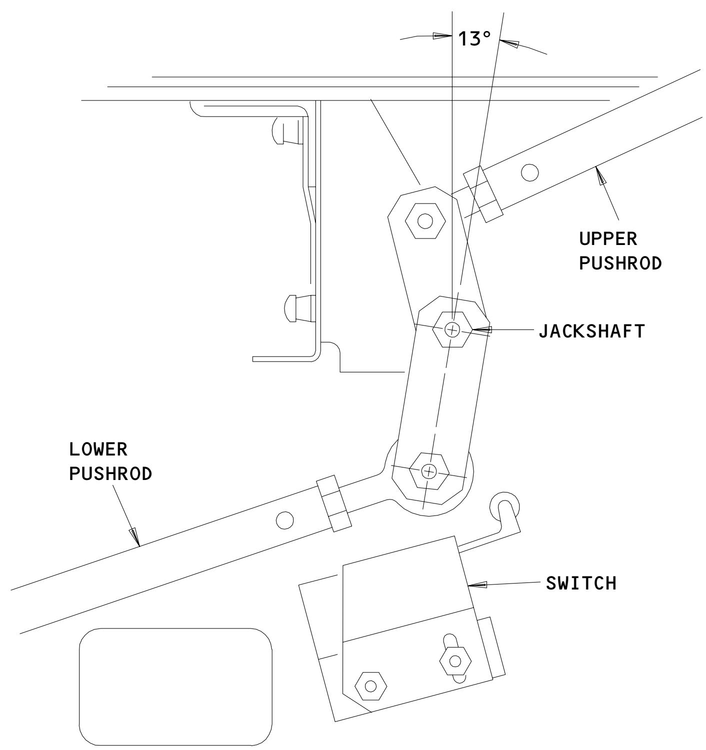

AIRPLANES WITHOUT
JACKSHAFT RIGGING PIN

E

Parking Brake Linkage Adjustment
Figure 501 (Sheet 2)

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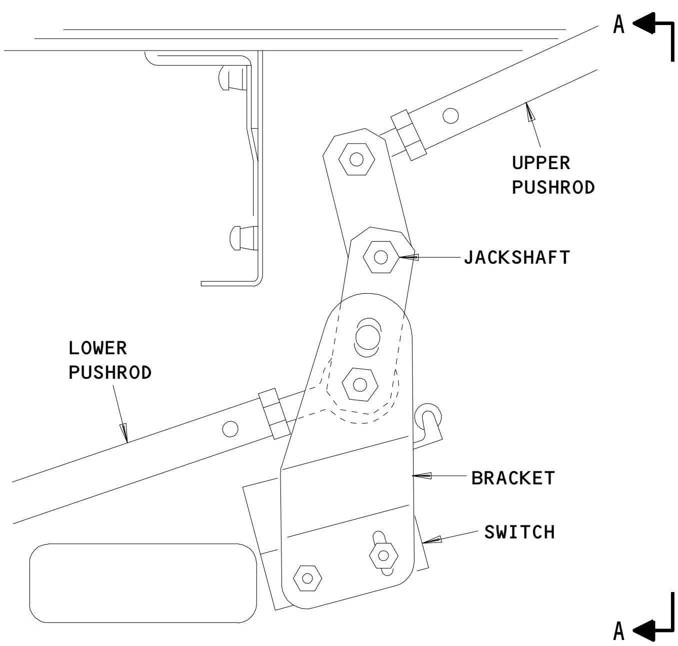
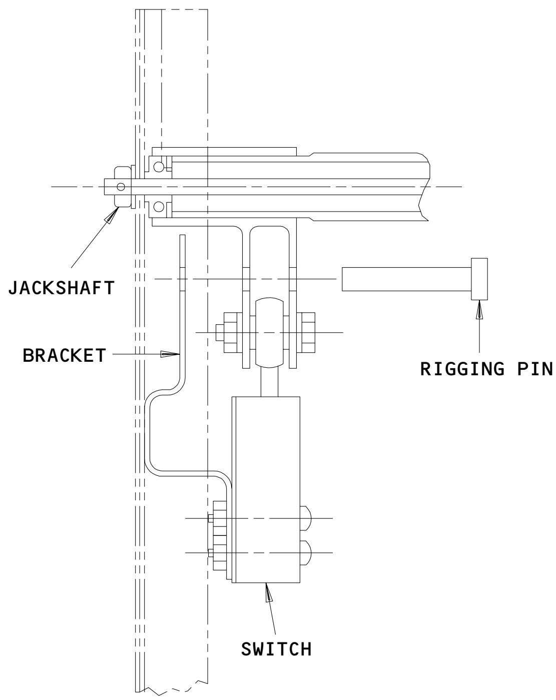


AIRPLANES WITH
JACKSHAFT RIGGING PIN
E



A-A

Parking Brake Linkage Adjustment
Figure 501 (Sheet 3)

(2) Set the parking brake.
(3) Remove the pressure from hydraulic systems A and B after 10 minutes.

NOTE: It is necessary to operate the pumps at least 10 minutes to let the accumulator temperatures stabilize.

(4) Do a check at the end of any time periods that follow. If the necessary pressure drop for one time period is not within the limits, you can use the next time period.

NOTE: It is permitted to read the brake pressures from the brake pressure gage in the flight compartment, the brake accumulator gages, or the brake pressure gages installed on the brakes.

(a) After 10 minutes, the pressure drop should be less than 250 psi
(b) After 30 minutes, the pressure drop should be less than 500 psi
(c) After 1 hour, the pressure drop should be less than 700 psi
(d) After 8 hours, the brake pressures should be greater than 1000 psi.

(5) If the brake accumulator pressures bleed down faster than it is allowed, do the parking brake trouble shooting procedure (Ref 32-44-0/101).
(6) The trouble shooting of the parking brake system can be delayed until the next convenient maintenance period if the conditions that follow are met:
(a) With the parking brake set, the brake accumulator pressure drop must be less than 1000 psi in the first 1/2 hour
(b) With the parking brake released, the brake accumulator pressure drop must be less than 350 psi in the first 1/2 hour.
(c) The system passes the "Accumulator Bleed Down Test - Parking Brake Released".

F. Accumulator Bleed Down Test - Parking Brake Released
(1) Pressurize hydraulic systems A and B (Ref 29-11-0/201 and 29-12-0/201).
(2) Record A and B brake pressures.

NOTE: It is permitted to read brake pressures from the brake pressure gage in the flight compartment, the brake accumulator gages, or the brake pressure gages installed on the brakes.

(3) Shut off source of hydraulic power for systems A and B after 10 minutes. Record the time of shutoff as the test start time.

NOTE: It is necessary to supply hydraulic power for at least 10 minutes before test start to let the accumulator temperatures stabilize.

(4) Do a check on the pressure at 30 minutes after test start. The pressure drop should be smaller than 450 psi for each system A and B.

(5) If the brake accumulator pressures bleed down faster than is allowed, do the Brake Accumulator System - Parking Brake Released trouble shooting procedure.

G. Return the Airplane to Normal

(1) Remove the pressure gages in the brakes and install the bleeder plugs.

(2) Pressurize the hydraulic systems A and B (Ref 29-11-0/201 and 29-12-0/201).

(3) Push the brake pedals slowly and fully six times to bleed the brakes.

(4) Remove chocks from wheels if not needed.

PARKING BRAKE LINKAGE - REMOVAL/INSTALLATION

1. Equipment and Materials
   A. Ground Lock Assembly (Ref 32-00-01)
   B. On airplanes with rigging pin hole on jackshaft, Rigging pin - 0.309/0.311 inch diameter by 6.8 inches long (one required)

   NOTE: The rigging pin is part of kit F70207-61.

2. Remove Parking Brake Linkage
   A. Ensure ground lock assembly is installed in nose gear (Ref 32-00-01).
   B. Detach pushrod (7, Fig. 402) from lever (6) on lockshaft (3).
   C. Remove securing bolt and take lever off lockshaft.
   D. Remove bolts securing bearing housing (4) at inboard end of lockshaft.
   E. Tap lockshaft inboard until outboard end leaves bearing.
   F. Remove bearing and housing from inboard end of shaft and disconnect return spring (5) from structure.
   G. Take out shaft in an aft and outboard direction.
   H. Detach aft end of pushrod (7) from jackshaft (8). Remove pushrod.
   I. Detach pushrod (10) at lever on inboard end of jackshaft.
   J. Remove nut (9) on end of stud through jackshaft. Tap out stud and remove jackshaft.
   K. Remove stabilizer trim control wheel (15) from the left side of control stand.
   L. Remove both access panels (13) and (14) below thrust levers on left side of control stand.
   M. Detach pushrod at short lever on bellcrank (12) in control stand.
   N. Withdraw pushrod below cabin floor.
   O. Detach pushrod (1) at long lever on bellcrank.
   P. Remove bolt (11) through pivot of bell crank and take out bellcrank.
   Q. Detach and remove pushrod from parking brake lever (1).

   NOTE: Bearings for lockshaft and jackshaft can be changed when parking brake linkage is disassembled.

3. Install Parking Brake Linkage
   A. Manipulate lockshaft (3) into position. Line up with bearings and insert inboard end of shaft in bearing.
   B. Set lockshaft in position, fit outboard bearing and housing (4) over shaft. Insert bolts with red anticorrosive washers under heads and secure bearing housing.
   C. Reconnect return spring (5) to structure.
   D. Fit lever (6) on inboard end of lockshaft. Insert and tighten, securing bolt with red anticorrosive washers under head and nut.
   E. Place jackshaft (8) in position and tap in stud. Fit jackshaft nut (9) and secure jackshaft.

F. Fit bellcrank (12) in lower portion of control stand with short lever up and long lever aft. Fit bolt and secure bellcrank.

G. With captain's rudder pedals in neutral, install rudder pedal rig pin through pedal shafts.

H. Adjust the parking brake pawls.
   (1) Remove the antirotation cotter pin in the two pawls.
   (2) Loosen the two pawl locknuts on top of the pawls.
   (3) Extend each pawl one at a time by unscrewing the pawl counterclockwise until the parking brake can no longer be set.
   (4) Complete the adjustment by turning the pawls back clockwise 1 to 2 turns.
   (5) Make sure that the parking brake can be set from the brake pedals of the pilot and the copilot.
   (6) Install the antirotation cotter pins in the two pawls.
   (7) Tighten the pawl locknuts.

I. Set the bumper stops for the pawls.
   (1) Add or remove washers to set the bumper stops.
   (2) With the parking brake released, the pick-up bolt on the brake control bellcrank should clear the pawl by 0.16 to 0.20 inch when you operate the brake pedals (Detail C, Fig. 501, Sheet 2).

J. Position jackshaft (8) for pushrod installation.
   (1) On airplanes without jackshaft rigging pin, rotate jackshaft (8) until outboard forks are 13 +2 degrees from vertical (Fig. 401, Sheet 2, Detail C).
   (2) On airplanes with jackshaft rigging pin, Rotate jackshaft until rigging pin can be installed through outboard forks and rigging pin hole in brake switch mounting bracket (Fig. 402, Detail E). Install rigging pin.

K. Install parking brake lever (2) so that stop surface of lever is against top of control stand.

L. Install pushrods (1, 7, 10) and adjust as required.

   NOTE: When adjusting rod length, at least half of inspection hole must be covered by threaded rod end.

   (1) Attach pushrod (7) to lockshaft lever (6) using red anticorrosive washer under bolt head and under spacer below washer and nut.

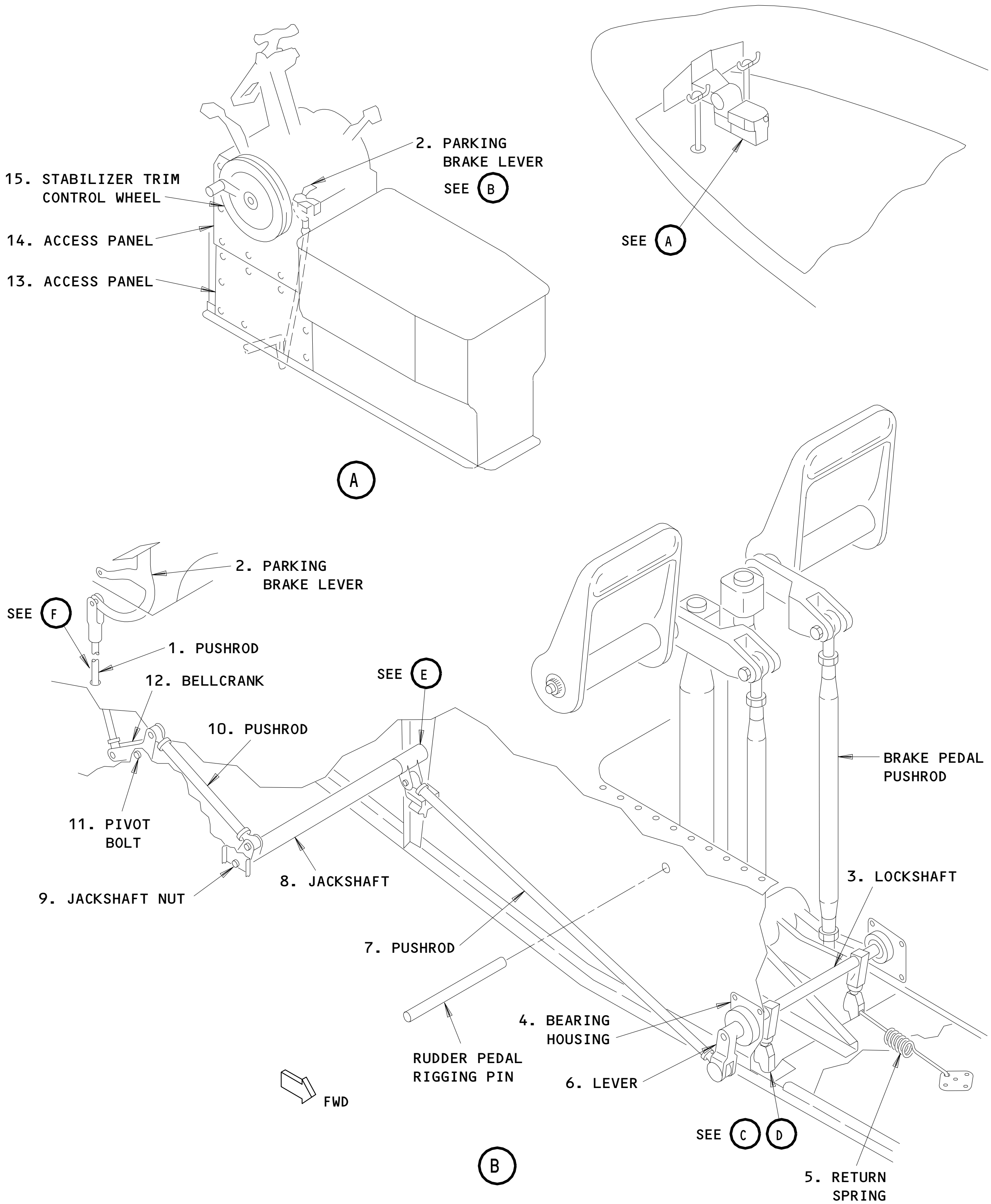
M. Adjust parking brake switch actuator (Fig. 401, Sheet 2, Detail E).
   (1) Loosen the bolts on the switch mounting bracket.
   (2) With the brake pedals released, pull the parking brake lever until it stops.
   (3) With the parking brake held in the up position, turn the switch until the switch actuating roller touches the rod end of the lower pushrod.
   (4) Tighten the switch mounting bolts.

N. Install both access panels (13) and (14) below thrust lever on left side of control stand.

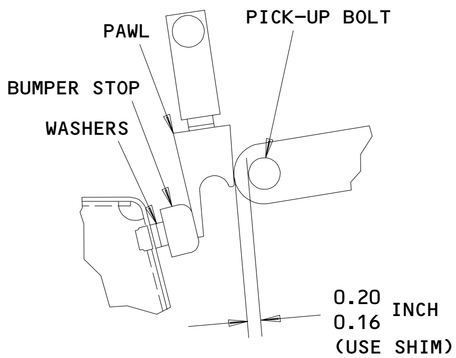
O. Install left stabilizer trim control wheel (15) with handle 90 +15 degrees apart from handle on right trim control wheel.

P. Remove rigging pin from jackshaft and pedal shafts.

Q. Test parking brake operation (Ref 32-44-0 A/T).



Parking Brake Linkage Installation
Figure 401 (Sheet 1)



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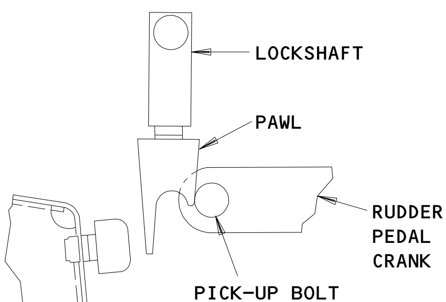

POSITION 1

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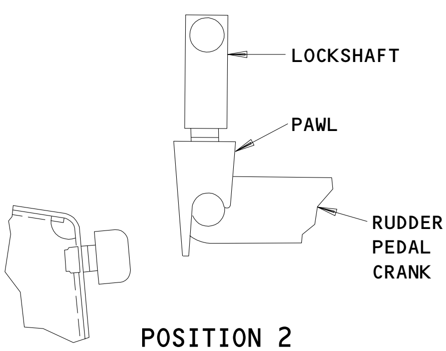

POSITION 2

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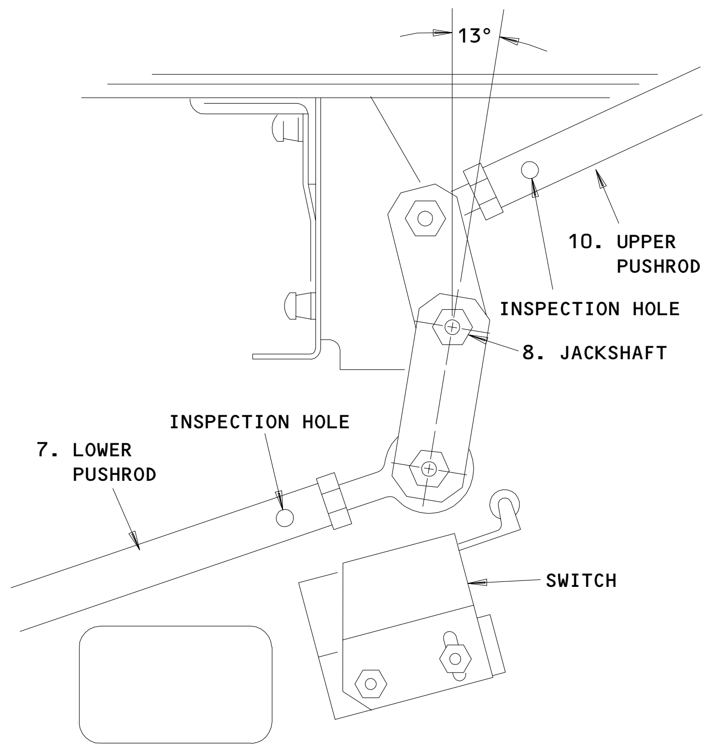
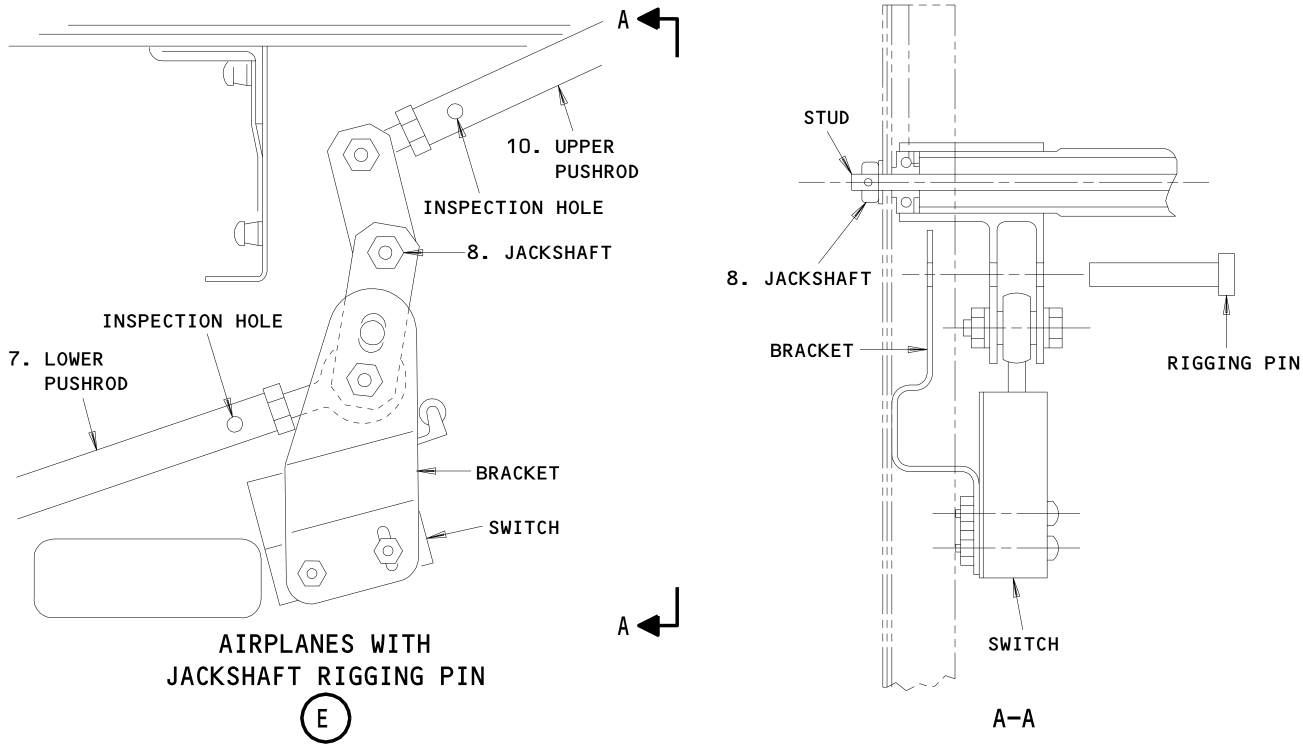
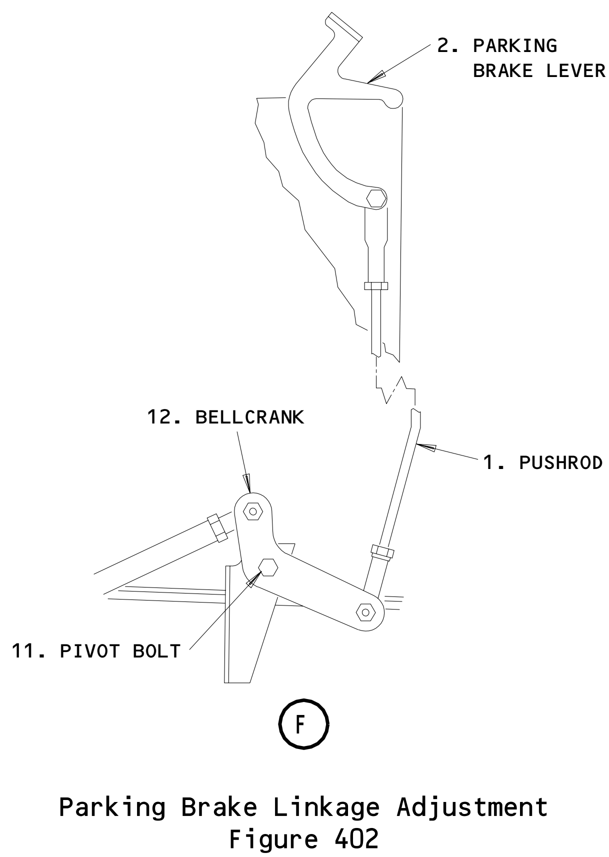


AIRPLANES WITHOUT
JACKSHAFT RIGGING PIN

E

Parking Brake Linkage Installation
Figure 401 (Sheet 2)

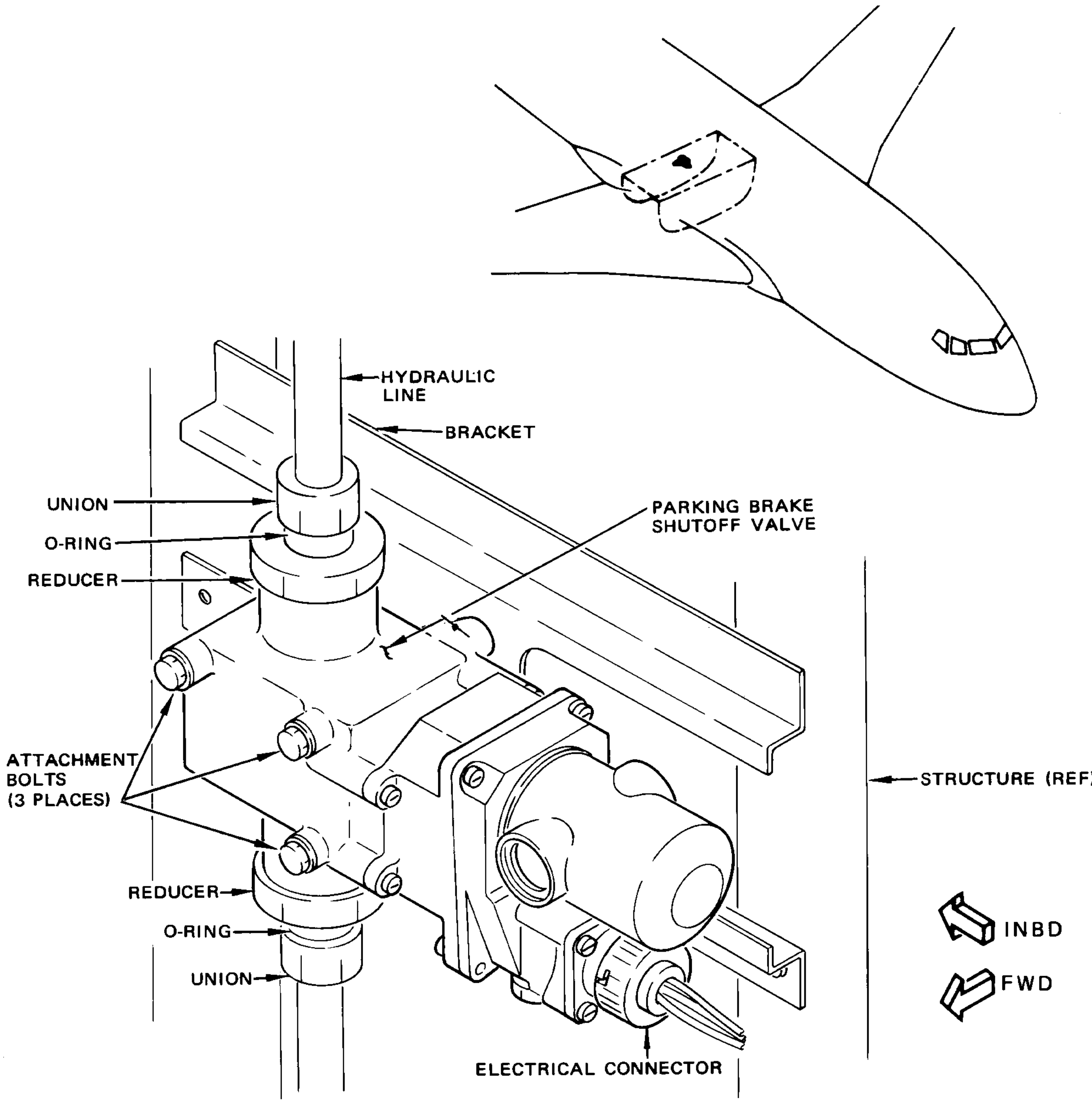




Parking Brake Linkage Adjustment
Figure 402

PARKING BRAKE SHUTOFF VALVE - REMOVAL/INSTALLATION

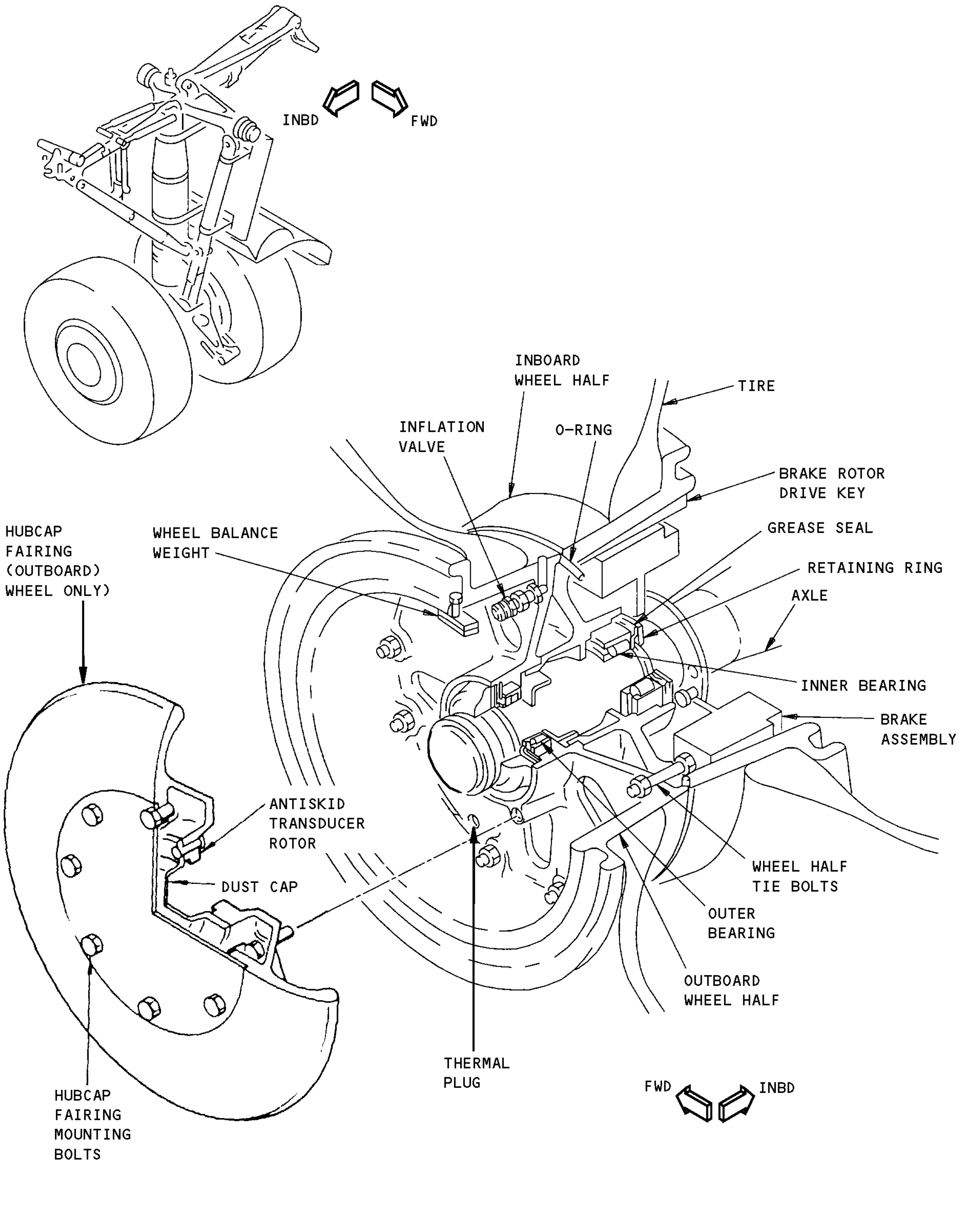
1. Equipment and Materials
   A. Gear Ground Lock Assembly (Ref 32-00-01)
2. Remove Parking Brake Shutoff Valve
   A. Check that gear ground lock assembly is installed in nose gear (Ref 32-00-01).
   B. Chock wheels and release parking brake.
   C. Open ANTISKID FAIL WARN & PARKING BRAKE circuit breaker on load control center panel P6.
   D. Disconnect electrical connector at valve.
   E. Depressurize hydraulic systems A and B (Ref 29-11-0, Maintenance Practices and 29-12-0, Maintenance Practices).
   F. Disconnect and plug hydraulic lines from shutoff valve (Fig. 401).
   G. Remove three attachment bolts.
   H. Remove parking brake shutoff valve from bracket, remove reducers, discard O-rings, and plug ports.
3. Install Parking Brake Shutoff Valve
   A. Install reducers with new O-rings in parking brake shutoff valve (Fig. 401).
   B. Install shutoff valve on the bracket in main wheel well using three attachment bolts.
   C. Remove plugs and caps and connect hydraulic lines to shutoff valve.
   D. Pressurize hydraulic systems A and B (Ref 29-11-0 and 29-12-0).
   E. Connect electrical connector to valve and close ANTISKID FAIL WARN & PARKING BRAKE circuit breaker on load control center panel P6.
   F. Depress brake pedals three times slowly and fully before setting parking brakes.
   G. Depress brake pedals, lift parking brake handle, and release pedals to set parking brake. Check that parking brake light illuminates on control panel control stand.
   H. Depress brake pedals fully and release. Check that parking brake light is off.
   I. Set parking brake.
   J. Check shutoff valve connection for leaks.



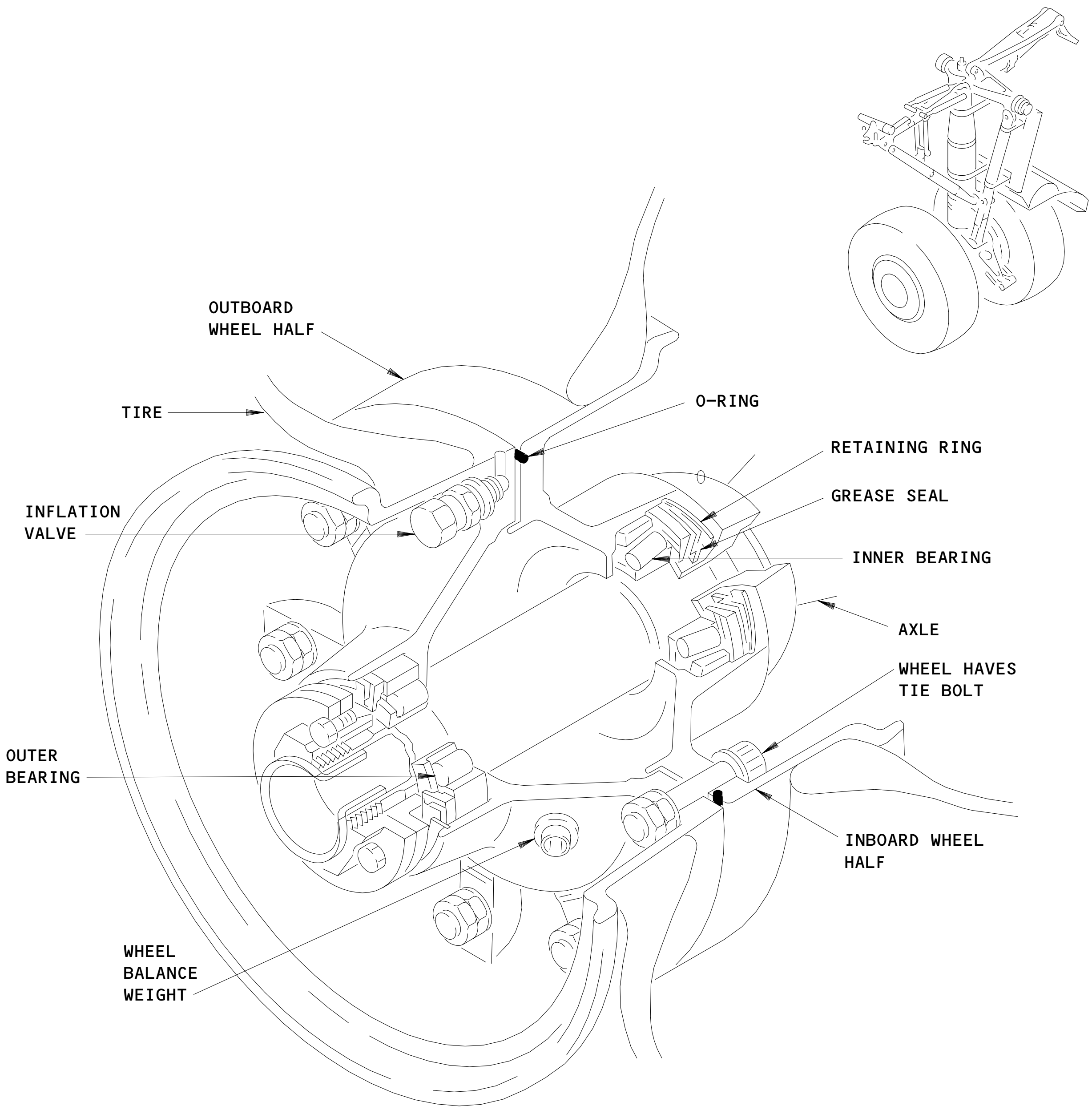
Parking Brake Shutoff Valve Installation
Figure 401

TIRES AND WHEELS - DESCRIPTION AND OPERATION

1. General
   A. Each gear (nose and main) is equipped with two tire and wheel assemblies designed to withstand high rolling speeds. All wheels have provisions for attaching balance weights for dynamic balance. After takeoff, spinning of main gear wheels and nose gear wheels is stopped by main gear brakes and nose wheel snubbbers respectively.
   B. Each outboard main gear wheel and tire is covered with a fairing attached to the outboard main wheel hubcap. Each inboard wheel is provided with a small hubcap. The wheel and tire assemblies are designated Nos. 1, 2, 3 and 4, counting from the left looking forward.
2. Main Gear Wheel and Tire
   A. The main gear wheel assembly is made of forged aluminum. The wheels are made in separate halves to facilitate mounting of tubeless tires. The halves are bolted together and an O-ring seal is installed in an annular groove between the bolts and rim to prevent air leakage (Fig. 1). The inner bearings are protected against loss of lubrication and entrance of dirt by a grease seal. A dust cap attached to the hubcap cover protects the outer bearing from dirt. An antiskid transducer rotor assembly attached to the inboard side of the dust cap rotates with the wheel. Each main gear wheel is fitted with a brake system with five rotors and a disk-type power brake. Refer to 32-41-0. The brake rotors are keyed to the wheel assembly. An air charging valve is sealed in the outer half of each wheel for tire inflation. An air charging valve extension is provided on the outboard wheel to allow tire pressurization and checks with the hubcap fairing installed. The tires are protected against excessive pressure due to overheat, by three thermal plugs equally spaced around the wheel. These thermal plugs will deflate the tire when a wheel becomes overheated.
   B. The main gear tires are 40 X 14, Type VII tubeless tires.
3. Nose Gear Wheel and Tire
   A. The nose gear wheel assembly (Fig. 2) consists of forged aluminum made in separate halves for ease to mount the tubeless tires. The inner and outer wheel halves are bolted together and the joint between wheel halves is sealed with an O-ring. An air valve is located in the outer wheel half to permit inflation of mounted tires. The wheels are installed with an inner and outer roller bearing assembly on the tapered axle. The inner and outer bearings are protected against loss of lubricant and the entrance of dirt by grease seals.
   B. The nose gear tires are 24 x 7.7, Type VII tubeless tire.



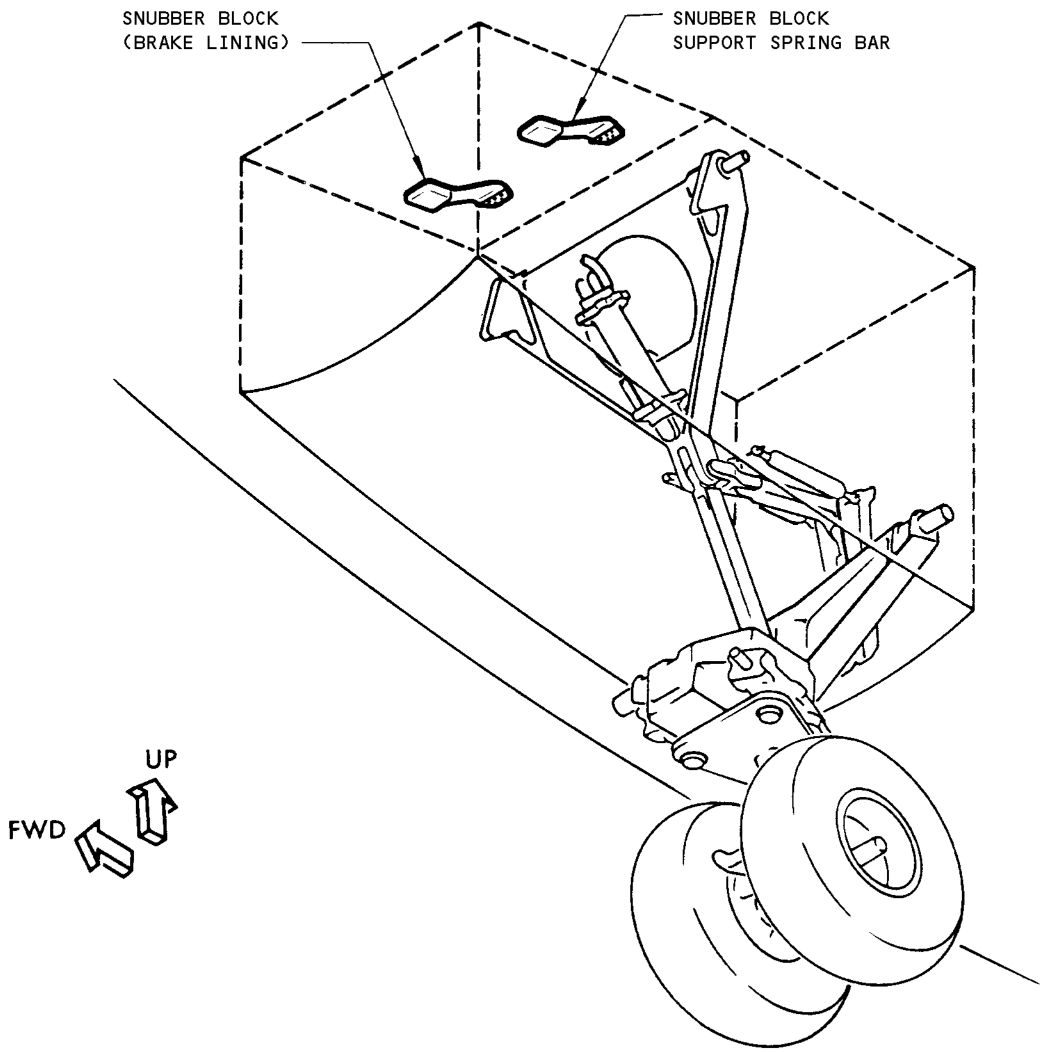
Main Gear Wheel and Tire
Figure 1



Nose Gear Wheel and Tire
Figure 2

4. Nose Wheel Snubber

A. Two wheel snubbers are located on the ceiling panel in the nose wheel well to stop wheel rotation and the attending noises. (See figure 3.) When the nose gear is retracted after a takeoff, nose wheel rotation will be stopped by wheel contact with the snubbers. Each snubber consists of a spring bar attached to wheel well structure with a snubbing block of brake lining bolted to the forward (contact) end of the bar.



Nose Wheel Snubber
Figure 3

TIRES AND WHEELS - MAINTENANCE PRACTICES

1. Tire Deflation
   A. General

      WARNING: DEFLATE THE TIRE FULLY BEFORE YOU REMOVE THE WHEEL AND TIRE ASSEMBLY. IF YOU DO NOT FULLY DEFLATE THE TIRE, INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR. BUT, WHEN YOU REMOVE THE WHEEL AND TIRE ASSEMBLY ONLY FOR MAINTENANCE ON THE BRAKE, YOU DO NOT HAVE TO DEFLATE THE TIRE IF YOU INSPECT THE WHEEL AND TIRE ASSEMBLY TO ENSURE THAT IT IS SAFE FOR REMOVAL WITHOUT DEFLATION (SEE THE STEPS THAT FOLLOW). FOR ALL OTHER MAINTENANCE, WHICH INCLUDES ALL TIRE AND WHEEL MAINTENANCE, YOU MUST DEFLATE THE TIRES BEFORE REMOVAL.

      (1) If you remove the wheel and tire for brake maintenance only, you do not have to deflate the tire if you have the conditions that follow:
          (a) The tires are not worn too much (Ref 32-45-00/601).
          (b) The tires are not hot.
          (c) There is no evidence of wheel damage, including cracked or missing tie bolts or tie nuts, or cracks in the wheel.
      (2) Always approach the wheels from the front or rear.

          NOTE: Be very careful when you go near the wheel if you think there is tire or wheel damage.

      (3) If the tire is hot, let the tire cool before you deflate it.
   B. Equipment and Materials
      (1) Tire deflator - F70294-1 or Schrader No. 4400
   C. Deflate Tire
      (1) For outboard wheels, remove hubcap, hubcap fairing and valve stem extension and bracket.

          WARNING: DO NOT ATTEMPT TO REMOVE VALVE CORE UNTIL TIRE IS COMPLETELY DEFLATED. VALVE CORE WILL BE EJECTED AT HIGH VELOCITY IF UNSCREWED BEFORE AIR PRESSURE HAS BEEN RELEASED.

      (2) Remove valve cap and apply tire deflator to release tire pressure completely.
2. Tire Inflation
   A. General
      (1) Tires should not be inflated to operating pressure until wheel is installed on the airplane. The airplane should remain on jacks until the tire is inflated.

(2) Use an accurately calibrated airplane tire inflation gage for checking tire pressure. Do not overinflate tire. Refer to Landing Gear Tire Servicing, Chapter 12.

NOTE: Handle inflation gages carefully and make regular periodic checks for accuracy. Check gages any time malfunction is suspected.

(3) Use only authorized tools and equipment and inflate tire.

WARNING: TIRE AND/OR WHEEL FAILURE MAY OCCUR, CAUSING INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT, IF TIRE IS OVERINFLATED FROM ANY HIGH PRESSURE SOURCE. TIRE AND WHEEL ASSEMBLIES MUST BE SERVICED WITH INFLATION EQUIPMENT WHICH HAS BEEN SPECIFICALLY DESIGNED FOR THIS OPERATION.

TIRES AND WHEELS - INSPECTION/CHECK

SA 1. General

A. This section provides procedures for inspection and check of landing gear tires and wheels while installed on airplane. Inspection procedures with wheel removed are provided in applicable wheel vendor manual.

2. Examine Main and Nose Landing Gear Wheels

A. Examine wheels for cracks, flaked paint and evidence of overheating. Check dust caps for loose attach bolts.

B. Check wheels for missing tie bolt nuts. If tie bolt is missing, remove wheel. Inspect wheel assembly and replace tie bolt using procedures in applicable wheel vendor manual.

C. Inspect Wheel Halves

(1) Check for abnormally tilted wheel and for missing pieces of flange.

(2) Check for any areas on the wheel which show significant impact damage.

D. Examine thermal fuse on main gear wheels.

(1) If inspection shows that a pressure loss was due to the melting of the wheel thermal fuse, the tire should be removed from service. Also, all other main gear tire-wheels should be checked for melted thermal fuses, especially at the tire-wheel positions with hot brakes.

(2) If a tire has been rolled flat, or if the tire-wheel has been removed due to melted wheel thermal fuse, the removal reason should be tagged to the wheel, and the wheel should be inspected in accordance with the wheel vendor's service instructions.

3. Check That Tire Pressure is Within Specified Limits (AMM 12-15-51)

A. If a tire has been rolled flat, or has been judged to have rolled at 30% or more under specified pressure, both tires on that axle should be removed from service. If it is evident that pressure loss took place after the airplane was parked and no rolling took place, remove the tire with the low pressure. Drop in tire pressure may be due to one or more of the following reasons:

(1) Decrease in ambient temperature after filling tire.

(2) Dry or faulty O-ring seal between wheel halves.

(3) Leaks through defective thermal plug seals.

(4) Leaks at the tirebead seat.

(5) Leaks through vent holes in tire sidewall.

4. Examine Tires

A. Examine tires for air leakage, abrasion, uneven wear, cuts and flat spots. Remove from service tires exhibiting the following conditions.

(1) Cuts or weather checks in grooves, tread or sidewalls which reach cord body (Fig. 602).

(2) Examine the tires for the presence of contaminants.
  (a) Keep the tires clean of contaminants such as oils, fuels, hydraulic fluids, aircraft cleaning agents and greases. Cover the tires if these or other potentially harmful chemicals may spill or drip on the tires.
  (b) Wipe off the tire with a soapy solution if the tire becomes contaminanted.
  (c) The tire should be removed from service as soon as practical if the surface of the tire appears soft, spongy, or there are bulges present.
(3) Blisters, bulges or other evidence of ply separation in tread or sidewall area (Fig. 602).
(4) Any tire with a flat spot through the reinforcing cords at the tread-undertread interface (Fig. 602).

NOTE: If the cut protector (radial) or tread reinforcement ply (bias) shows, the tire should be replaced as soon as possible. If necessary, the tire may be used for a small number of landings until it is replaced. However, you may not be able to retread the tire if you leave the tire in service too long with this condition.

(5) Other damage or combination of items which might result in tire problems.

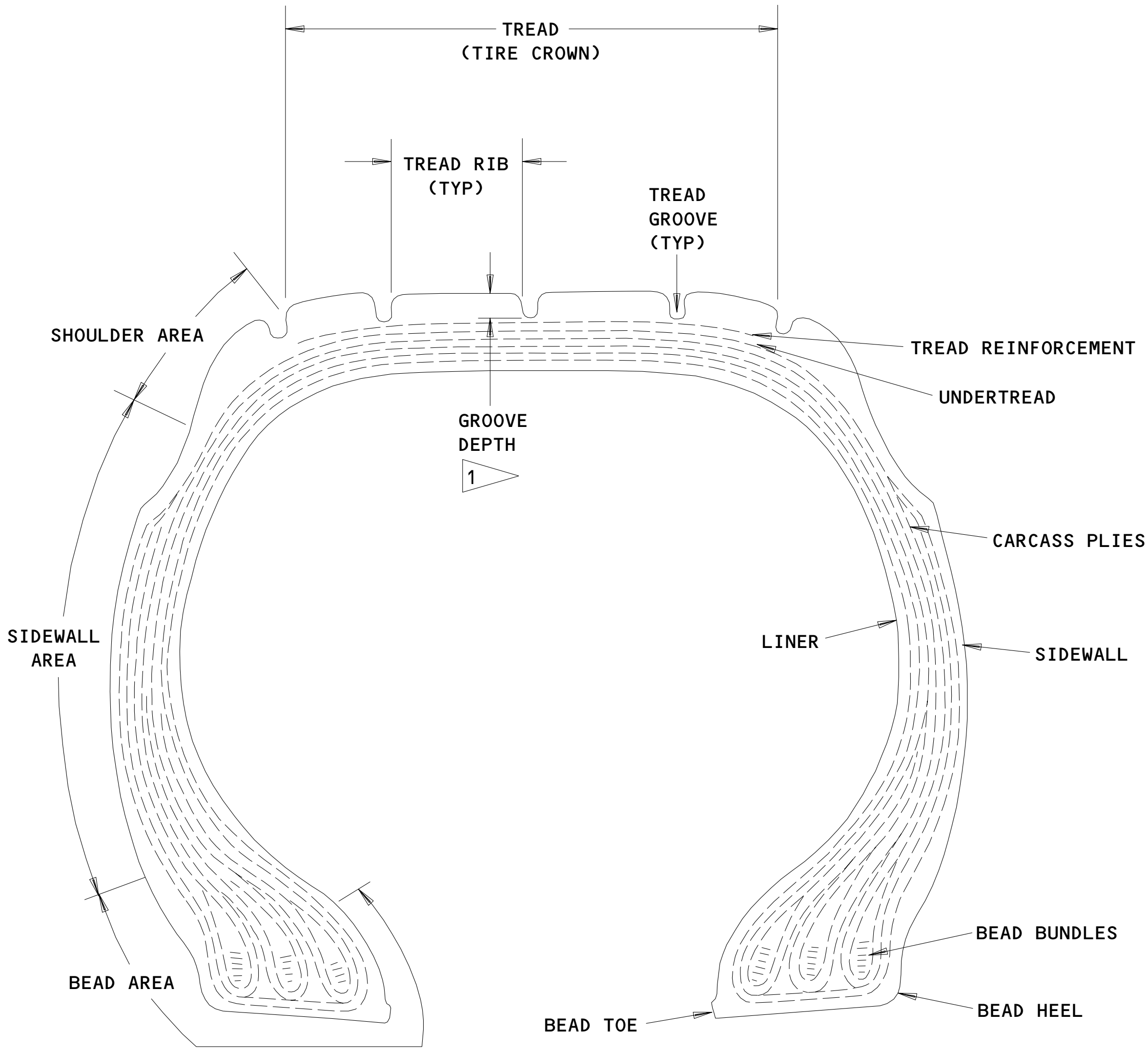
B. Examine tires for wear.
  (1) When the average tread depth is reduced to 1/32 inch, remove tire from service. On center groove tire, measure at center groove. On center rib tire, measure at grooves nearest center.
  (2) When shoulder tread wears below bottom of groove, fabric is showing or blisters/cracks are found in bottom of groove, remove tire from service (Fig. 602).

C. Tread Conditions and Service
  (1) Cuts
    (a) Transverse Cuts (Fig. 602)
      1) Shallow cuts and puncture type cuts that are contained within a rib, less than 1 inch in length and have not exposed carcass plies may be left in service.
      2) Remove from service if cut is deeper than tread groove and extends across a rib from groove to groove.
    (b) Circumferential cuts (Fig. 602)
      1) Cuts deeper than tread groove, but not into the carcass plies, with the ends not more than 1/2 inch apart measured transversal and 2 inches in length may continue in service.
      2) If only one rib is involved, a cut less than groove depth up to 12 inches in length may be left in service if the ends of cut is not more than 1/2 inch apart measured transversely.
  (2) Open tread splice (Fig. 602)
    (a) Remove from service if separation exists.

(3) Skid burns, ice burns, flat spots (Fig. 602)
    (a) An oval-shaped flat spot caused by a skid. May be left in service unless the deformation extends to or into the carcass plies or balance is affected.
(4) Blister or bulge (Fig. 602)
    (a) Separation of the tire structure in the tread or sidewall. Remove from service.

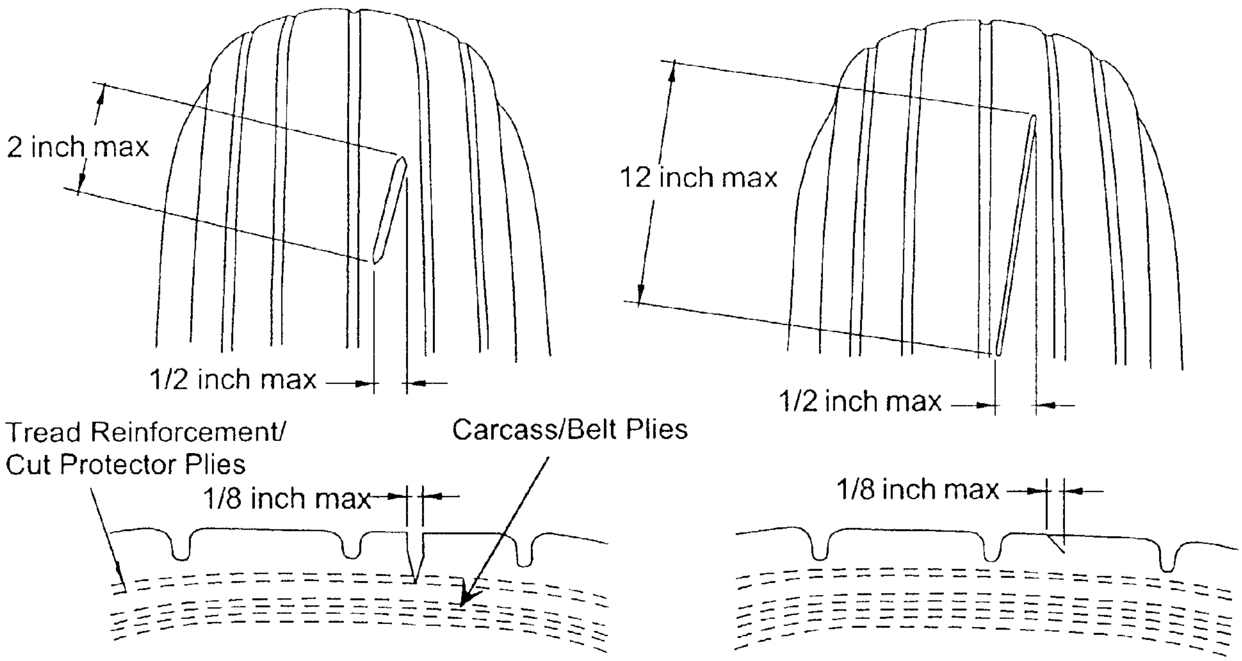
        <u>NOTE</u>: Mark effected area with crayon for easier relocation after deflation.

(5) Chevron cutting (Fig. 602)
    (a) If damage exceeds any single cut limit, or chunking occurs which exposes the fabric, remove tire from service.
(6) Groove cracking (Fig. 602)
    (a) A circumferential crack at the base of a tread groove. Remove from service if carcass plies are visible.
(7) Rib undercutting (Fig. 602)
    (a) Remove from service if crack extends under a tread rib.
(8) Tread flaking, chipping or chunking (Fig. 602)
    (a) Remove from service if damage exposes any fabric.
(9) Thrown tread, peeled rib (Fig. 602)
    (a) Remove from service.
(10) Circumferential cracks, radial cracks (Fig. 602)
    (a) Cracks in sidewall or shoulder area. Remove from service if cracks expose carcass plies.
(11) Ozone and weather checking (Fig. 602)
    (a) Sidewall cracks caused by age/weather deterioration. Remove from service if cracks expose carcass plies.
(12) Puncture (Fig. 602)
    (a) If hole is greater than 0.125 inch in diameter or extends into carcass plies remove tire from service.



1 MEASURE AT CENTER GROOVE(S)
(MOLD SKID DEPTH)

Tire Nomenclature (Typical)
Figure 601

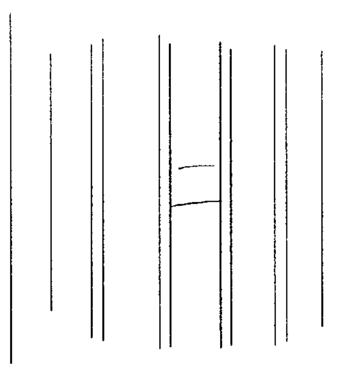


Circumferential Cuts

Cuts that penetrate the tread reinforcement/cut protector plies are not serviceable if:

a) cut exceeds the above limits.
b) cut penetrates the carcass plies (bias) or belt plies (radial)
c) cut is not contained within one rib.

Cuts that do not expose fabric are not serviceable if they exceed the above limits.

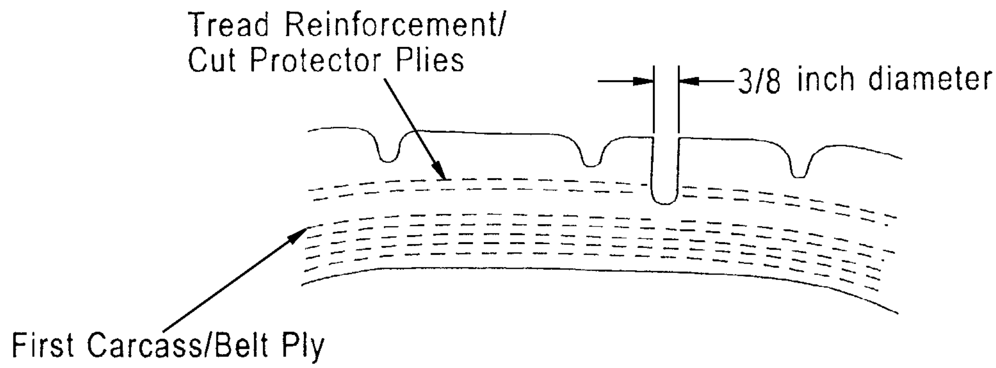


Transverse Cuts

a) Transverse cuts that are contained within a rib and penetrate into the carcass plies (bias) or belt plies (radial) are not serviceable.

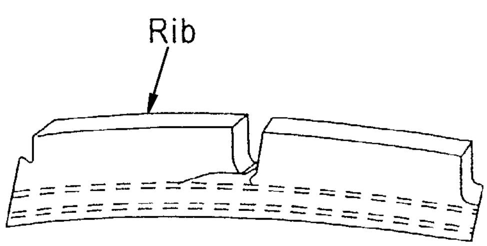
b) Cuts that extend across a rib from groove to groove which are deeper than the groove are not serviceable.

Tire Wear Conditions
Figure 602 (Sheet 1)



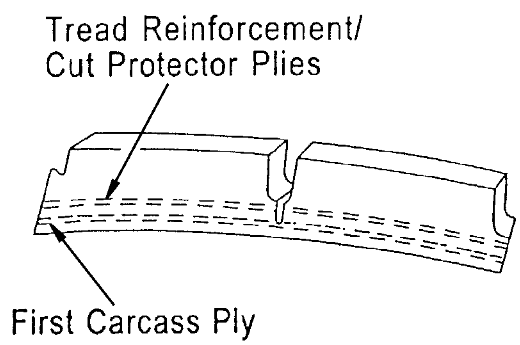
Puncture

Tires with holes larger than 3/8 inch diameter or holes that penetrate into the carcass plies (bias) or belt plies (radial) are not serviceable.



Rib Undercuts

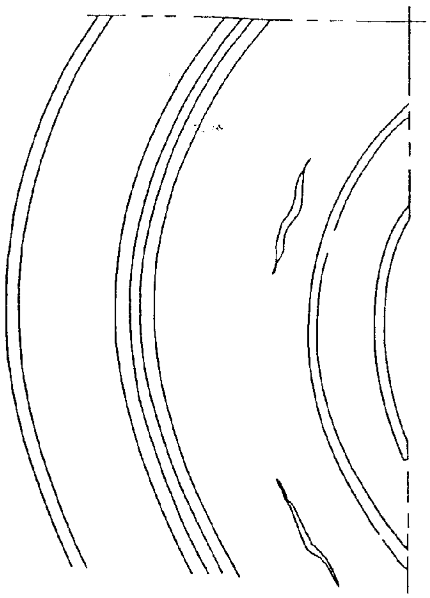
Tires with a crack that extends below a tread rib are not serviceable.



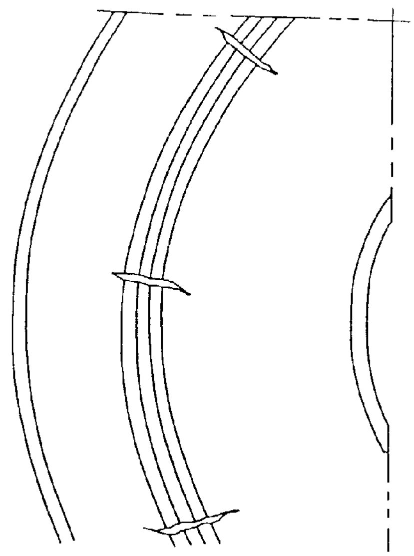
Groove Cracks

Tires with circumferential cracks at the bottom of the grooves are not serviceable if the cracks exposes any fabric.

Tire Wear Condition
Figure 602 (Sheet 2)

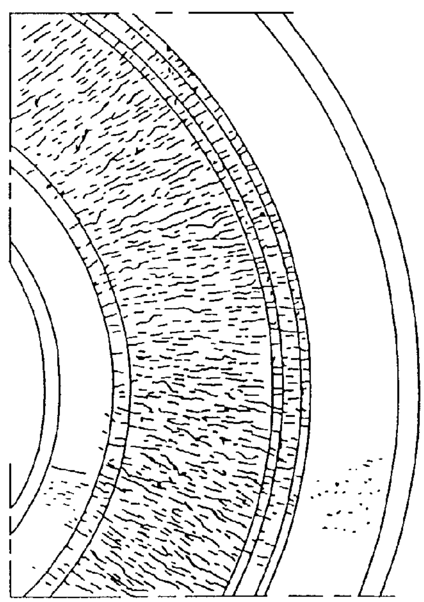


Circumferential Sidewall Cracks



Radial Sidewall Cracks

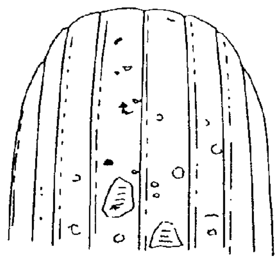
Tires with circumferential or radial cracks in the sidwall or shoulder area that expose the fabric are not serviceable.



Ozone and/or Weather Cracks

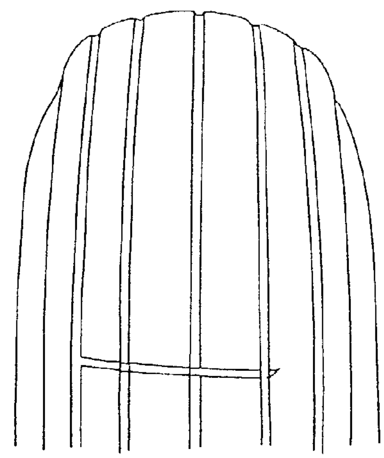
Tires with cracks in the sidewall which are caused by age/weather deterioration are not sericeable if the fabric is exposed.

Tire Wear Conditions
Figure 602 (Sheet 3)



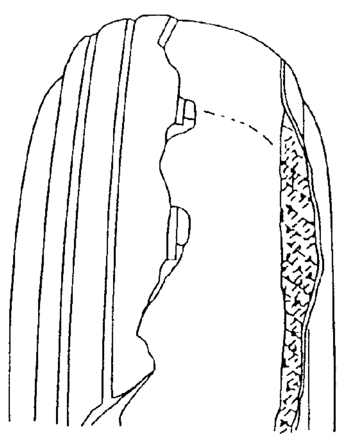
Tread Flaking, Chipping or Chunking

Tires with flaking, chipping or chunking treads are not serviceable if any fabric is exposed.



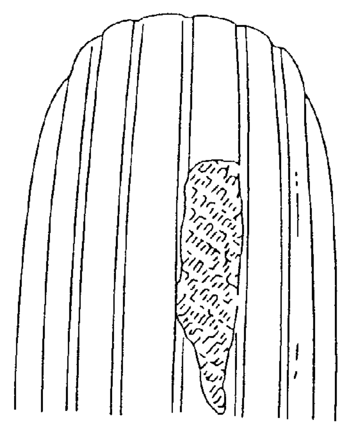
Open Tread Splice

Tires with an open tread splice are not serviceable. A closed tread splice will appear as a thin line that crosses the tread ribs.



Thrown Tread

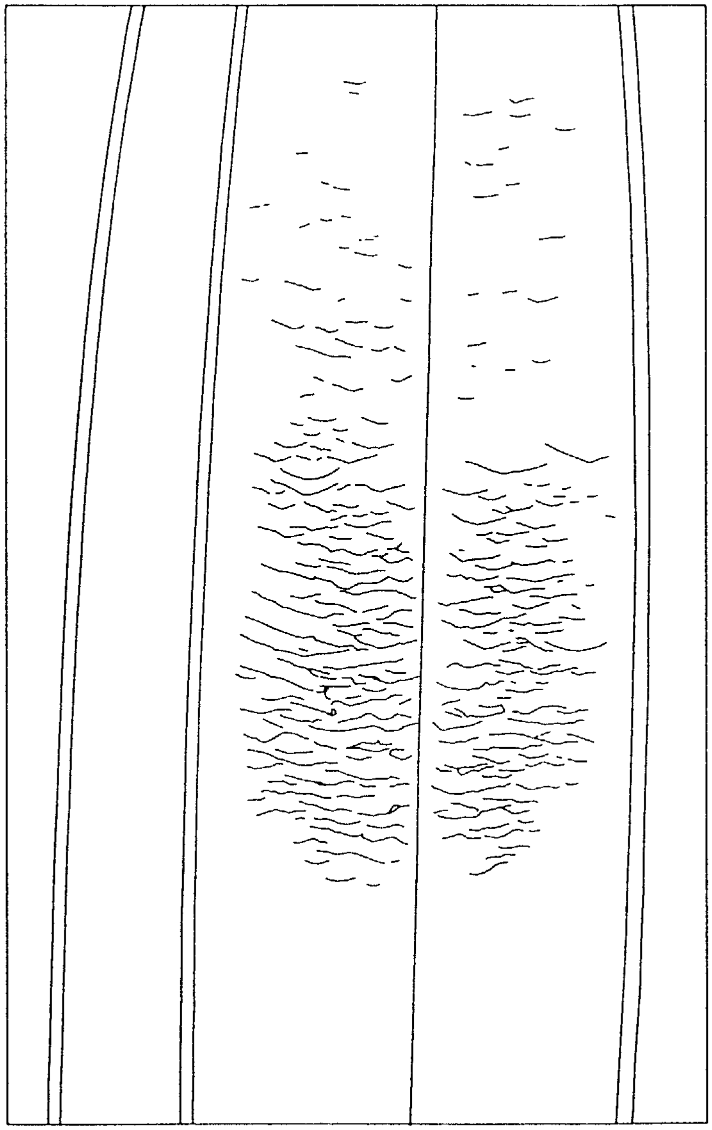
Tires with thrown treads are not serviceable.



Peeled Rib

Tires with peeled ribs are not serviceable.

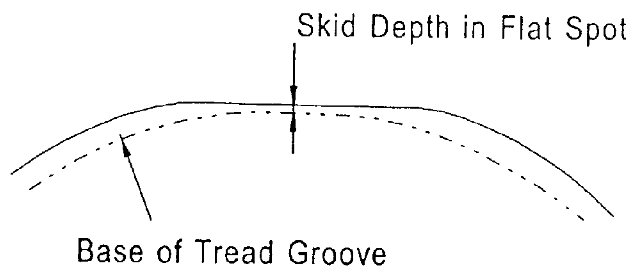
Tire Wear Conditions
Figure 602 (Sheet 4)



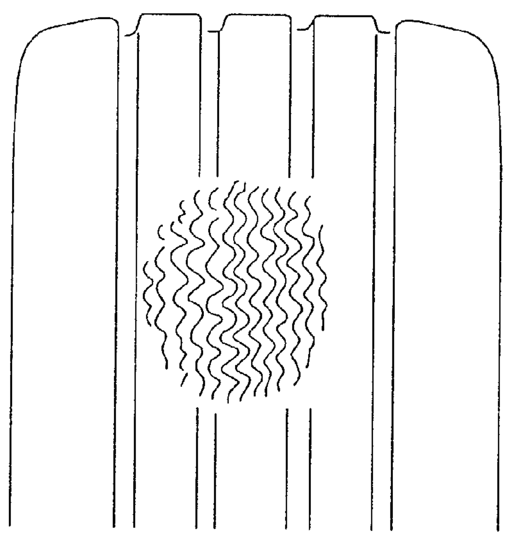
Chevron Cuts

Tires with chevron cuts in the tread are not serviceable if any of the single cut limits are exceeded or chunking occurs which exposes the fabric.

Tire Wear Conditions
Figure 602 (Sheet 5)

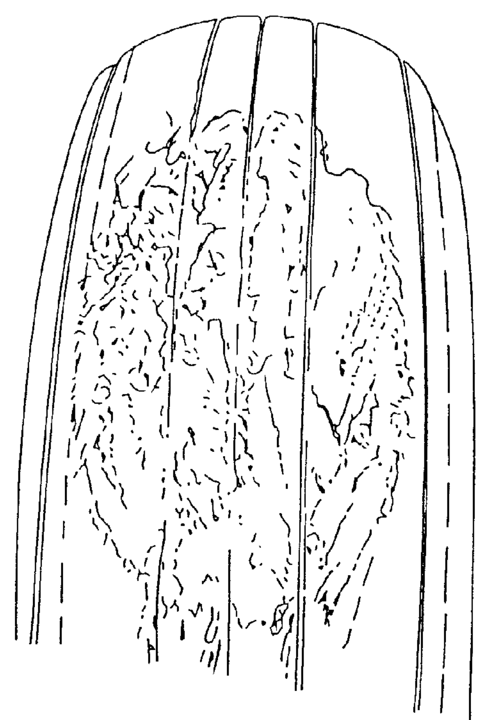


Tread Flat Spots



Flat Spot

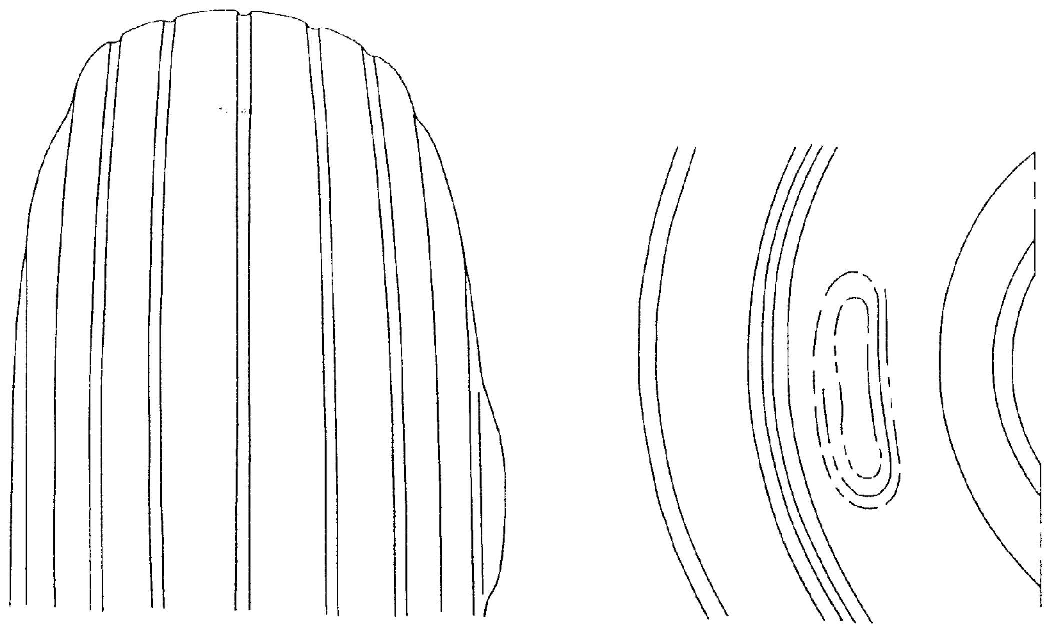
Tires with flat spots are not serviceable if the flat spot exposes the tread reinforcement or cut protector plies or tire balance is affected.



Ice Skid Burn/Tread Rubber Reversion

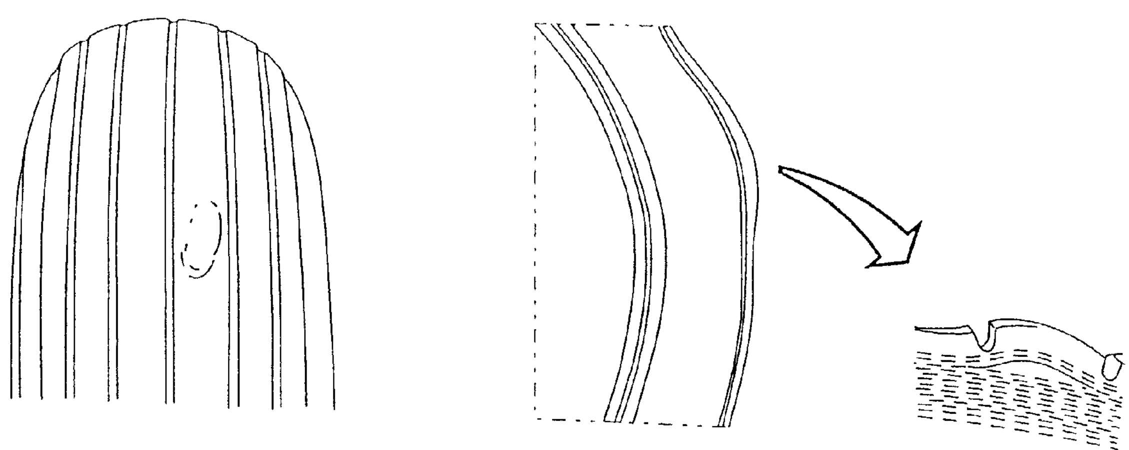
Tires with ice burns/tread rubber reversion are not serviceable if the damage exposes the tread reinforcement or cut protector plies or tire balance is affected.

Tire Wear Conditions
Figure 602 (Sheet 6)



Sidewall Separation

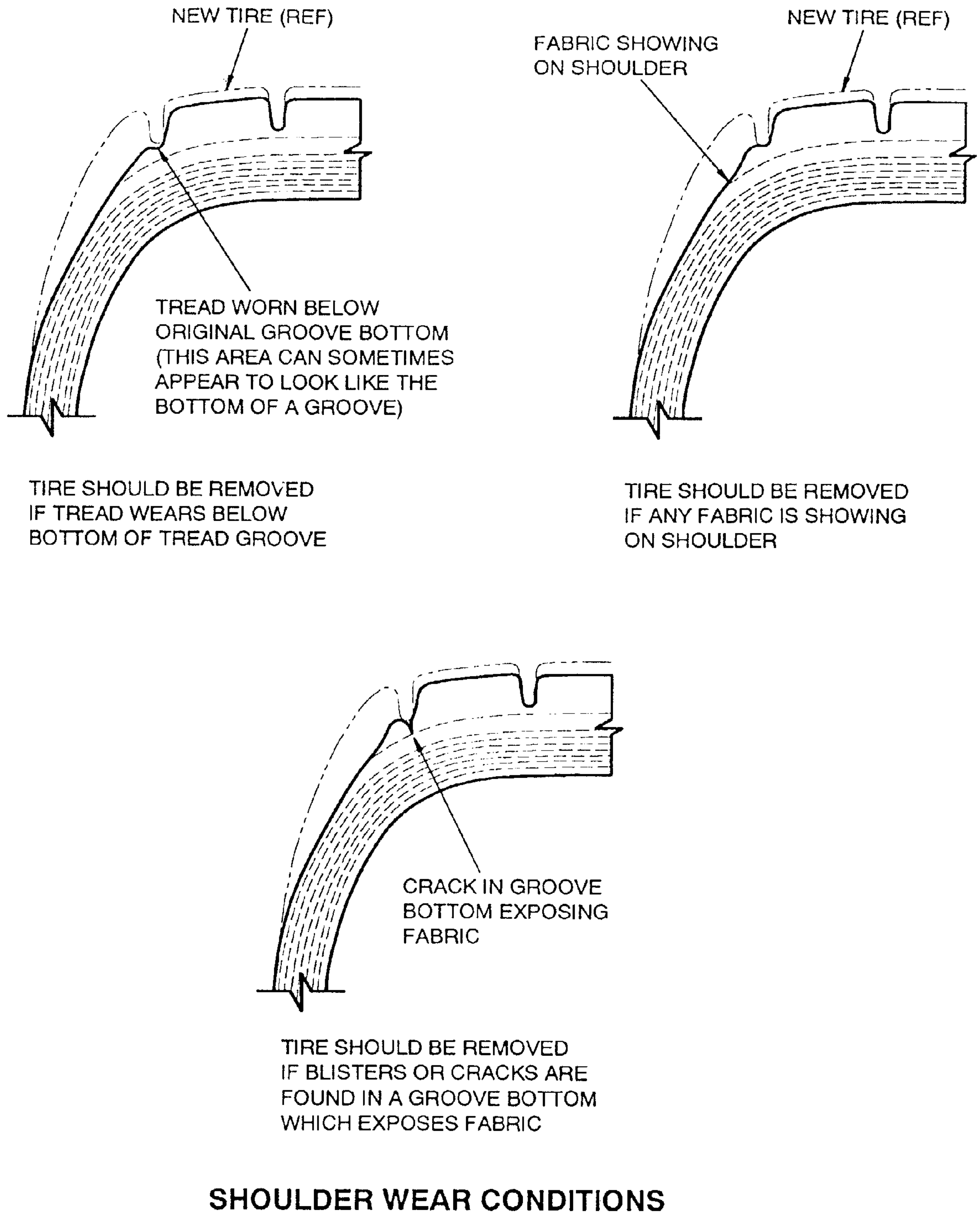
Tires with blisters or bulges in the sidewall are not serviceable. Remove tire immediately.



Tread Separation

Tires with blisters or bulges in the tread are not serviceable. Remove tire immediately.

Tire Wear Conditions
Figure 602 (Sheet 7)



Tire Wear Conditions
Figure 602 (Sheet 8)

MAIN GEAR WHEEL AND TIRE - REMOVAL/INSTALLATION

1. General
   A. The main gear tire and wheel assembly is removed when changing a tire, a brake unit, or for the inspection and lubrication of a wheel.
   B. Matching of tires on dual wheels is recommended so each tire will have the same contact area with the ground and carry an equal share of the load. Whenever possible, install tires having equal pressure and inflated diameters within 7/16 inch.
2. Equipment and Materials
   A. Wheel change dolly - Commercially available
   B. Axle Thread Protector - F72913-11
   C. Torque wrench required for 350 pound-feet torque
   D. Airplane axle jack for main gear
   E. Grease (Ref 20-30-21)
      (1) MIL-G-81322 (preferred)
      (2) Aeroshell #5 (alternate)
   F. Axle Nut Socket - F80168-1, or F80168-2, or F80168-3
   G. Deleted
   H. Gear Ground Lock Assemblies (Ref 32-00-01)
3. Remove Main Gear Wheel
   A. Ensure gear ground lock assemblies are installed in all gear (Ref 32-00-01).
   B. Set parking brake.

      NOTE: Setting the parking brakes will hold the brake disks aligned for wheel installation. If brake disks misalign when brake pressure is off, it will be necessary to align brake disks before installing wheel.

   C. Jack axle to raise wheel and tire assembly clear of ground (Ref Chapter 7).

      WARNING: REMOVE AND INSTALL THE MAIN WHEEL AND TIRE ASSEMBLIES ONE AT A TIME IF YOU NEED TO REPLACE EACH OF THE TWO ASSEMBLIES. THIS IS TO PREVENT INJURY TO PERSONS OR DAMAGE TO EQUIPMENT IF THE AIRPLANE ACCIDENTLY FALLS OFF OF THE JACK.

   D. Deflate tire (Ref 32-45-0 MP).

      WARNING: FAILURE TO DEFLATE TIRE COULD RESULT IN INJURY IF A DEFECTIVE TIRE/WHEEL SHOULD EXPLODE.

(1) If tire cannot be deflated, back off valve stem slowly while applying a slight pressure on the valve stem during removal.

WARNING: EXCESSIVE TWISTING FORCE CAN CAUSE SEPARATION OF VALVE CORE PARTS. STAY OUT OF VALVE PATH DURING REMOVAL OR INJURY MAY RESULT.

E. Remove hubcap fairing (outboard wheels only).
F. On airplanes with bolted dust cap assembly, remove dust cap, antiskid transducer rotor, and hubcap (Fig. 401).
G. On airplanes with riveted dust cap assembly, remove hubcap.
H. Remove axle nut retainer ring and axle nut (Detail A).
I. Remove washer, grease seal, and outer wheel bearing.
J. Install axle thread protector.
K. Position wheel change dolly, raise wheel and remove.
L. Mark the reason for the tire removal on the tire to aid the inspectors when they examine the tire.
M. Remove retaining ring grease seal and inner wheel bearing.

4. Prepare for Installation

A. Check general conditions of wheel, tire, axle, seals, inner and outer bearing.
B. Remove the axle thread protector.
C. Check axle nut threads for nicks, burrs, deformed threads.
D. If axle nut threads have nicks, burrs, or deformed threads, do a dimensional check on the axle and axle nut (Ref 32-11-85 I/C)
E. Lubricate inner and outer wheel bearing and grease seals with grease.
F. Check wheel fuse plugs for general condition and security of attachment.
G. Check and align brake disks if necessary.

5. Install Main Gear Wheel

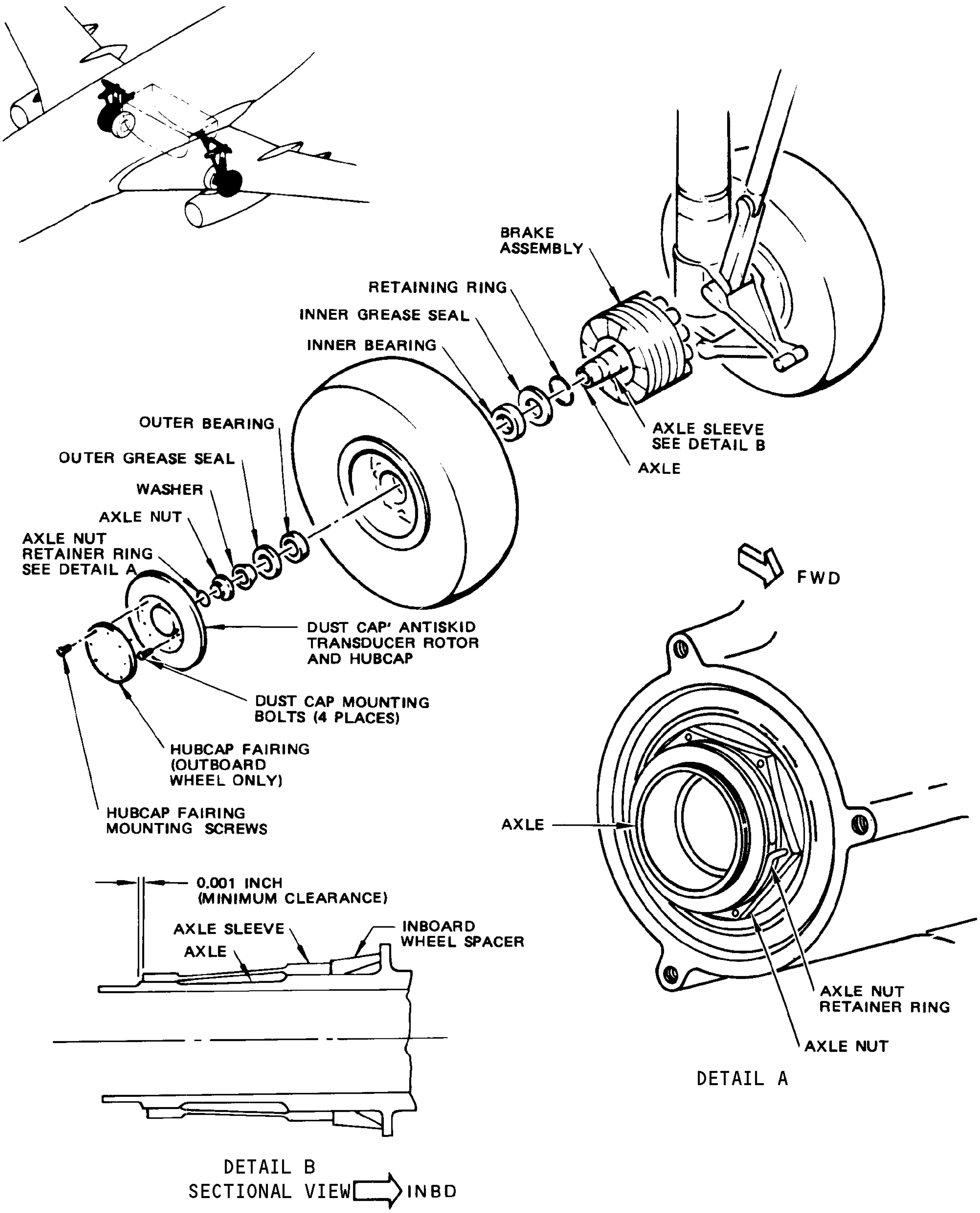
A. Install axle thread protector
B. On axles without axle sleeve retaining bolt installed, check for outboard migration of axle sleeve. Drive sleeve inboard by tapping with a soft block of aluminum to ensure sleeve is seated against inboard wheel spacer prior to installing wheel (Fig. 401).
C. Install inner wheel bearing, grease seal, and retaining ring in inboard side of wheel.
D. Position wheel assembly on dolly and slide into position on brake and axle.

NOTE: Make sure the rotor drive keys on the wheel fully engage the key slots in the brake rotors.

E. Install outer wheel bearing, outer grease seal if required, and washer.

NOTE: Check that washer is installed with outer diameter tapering in toward wheel bearing.

F. Remove axle thread protector.



Main Gear Wheel Installation
Figure 401

446012

G. Lubricate threads with grease and install axle nut.
   (1) While rotating wheel, tighten axle nut to 300 pound-feet lube torque.
   (2) Loosen nut to zero torque.
   (3) While rotating wheel, retighten to 150 pound-feet in one continuous rotation of the axle nut. This method will prevent improper reading of the break-away torque resulting from stop and start rotation of the nut. Check for alignment of locking holes.
   (4) If locking holes are not aligned, continue tightening to first locking hole.
H. Install axle nut retainer ring.
I. On airplanes with bolted dust cap assembly, install hubcap, antiskid transducer rotor, and dust cap. Torque bolts to 50-80 inch-pounds and lockwire bolts.
J. On airplanes with riveted dust cap assembly, install hubcap. Torque bolts to 50-80 inch-pounds and lockwire bolts.

CAUTION: DO NOT OVERTIGHTEN THE HUBCAP BOLTS. IF THE BOLTS ARE OVERTIGHTENED, IT WILL CAUSE DAMAGE TO THE BOLTS AND THE HUBCAP. MAKE SURE THE HUBCAP IS SEATED PROPERLY BEFORE TORQUING THE BOLTS.

NOTE: Prior to installation of hubcap on outboard wheels, check that air charging valve extension and hole on hubcaps are aligned.

K. Install hubcap fairing (outboard wheels only).
L. Prior to let down, check tire for proper pressure (Ref Chapter 12, Landing Gear Tire Servicing and 32-45-0 MP).
M. Lower main gear and remove jack.

NOSE GEAR WHEEL - REMOVAL/INSTALLATION

1. General
   A. Matching of tires on dual nose wheels is recommended to prevent any tendency to shimmy from uneven ground contact areas. Whenever possible, install tires having equal pressure and inflated diameters within 5/16 inch and matching tread design.
2. Equipment and Materials
   A. Wheel Change Dolly - Commercially available
   B. Torque wrench, required for 150 pound-feet torque
   C. Grease (Ref 20-30-21)
      (1) MIL-G-81322 (preferred)
      (2) Aeroshell #5 (alternate)
   D. Axle Nut Socket - F80168-1, F80168-2, or F80168-3
   E. Gear Ground Lock Assembly (Ref 32-00-01)
   F. Axle thread protection - 0.013 inch x 1.00 inch stainless steel shim stock 12 inches long
3. Remove Nose Gear Wheel
   A. Check that gear ground lock assembly is installed in nose gear (Ref 32-00-01).
   B. Jack airplane nose until wheel clears (Ref Chapter 7, Jacking Airplane).

      WARNING: REMOVE AND INSTALL THE NOSE WHEEL AND TIRE ASSEMBLIES ONE AT A TIME IF YOU NEED TO REPLACE EACH OF THE TWO ASSEMBLIES. THIS IS TO PREVENT INJURY TO PERSONS OR DAMAGE TO EQUIPMENT IF THE AIRPLANE ACCIDENTLY FALLS OFF OF THE JACK.

   C. Deflate tire (Ref 32-45-0 MP).

      WARNING: FAILURE TO DEFLATE TIRE COULD RESULT IN INJURY IF A DEFECTIVE TIRE/WHEEL SHOULD EXPLODE.

      (1) If tire cannot be deflated, back off valve stem slowly while applying a slight pressure on the valve stem during removal.

         WARNING: EXCESSIVE TWISTING FORCE CAN CAUSE SEPARATION OF VALVE CORE PARTS. STAY OUT OF VALVE PATH DURING REMOVAL OR INJURY MAY RESULT.

   D. Remove axle nut lockbolts and axle nut (Fig. 401).
   E. Remove wheel bearing washer, retaining ring, and grease seal.
   F. Tape axle thread protection over axle threads.
   G. Position wheel change dolly, raise wheel and remove.
   H. Remove outer bearing.

I. Mark the reason for the tire removal on the tire to aid the inspectors when they examine the tire.
J. Remove inner bearing, grease seal, retaining ring, and spacer.

4. Prepare for Installation

A. Check wheel, axle, inner and outer bearing, grease seal, spacer and general condition of tire. Lubricate bearings, seals, and threads with grease.

CAUTION: EXAMINE THE AXLES FOR CORROSION. CORROSION CAN CAUSE AN AXLE TO CRACK AND FAIL.

(1) Do a visual examination of the axles for corrosion.

B. If axle nut threads have nicks, burrs, or deformed threads, do a dimensional check on the axle and the axle nut (Ref 32-21-71 I/C).

5. Install Nose Wheel

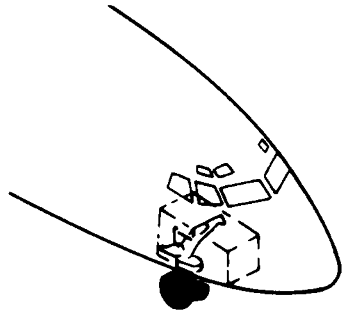
A. Install spacer on axle and install three cotter pins to hold spacer.
B. Install inner bearing, grease seal, and retaining ring in inboard side of wheel.

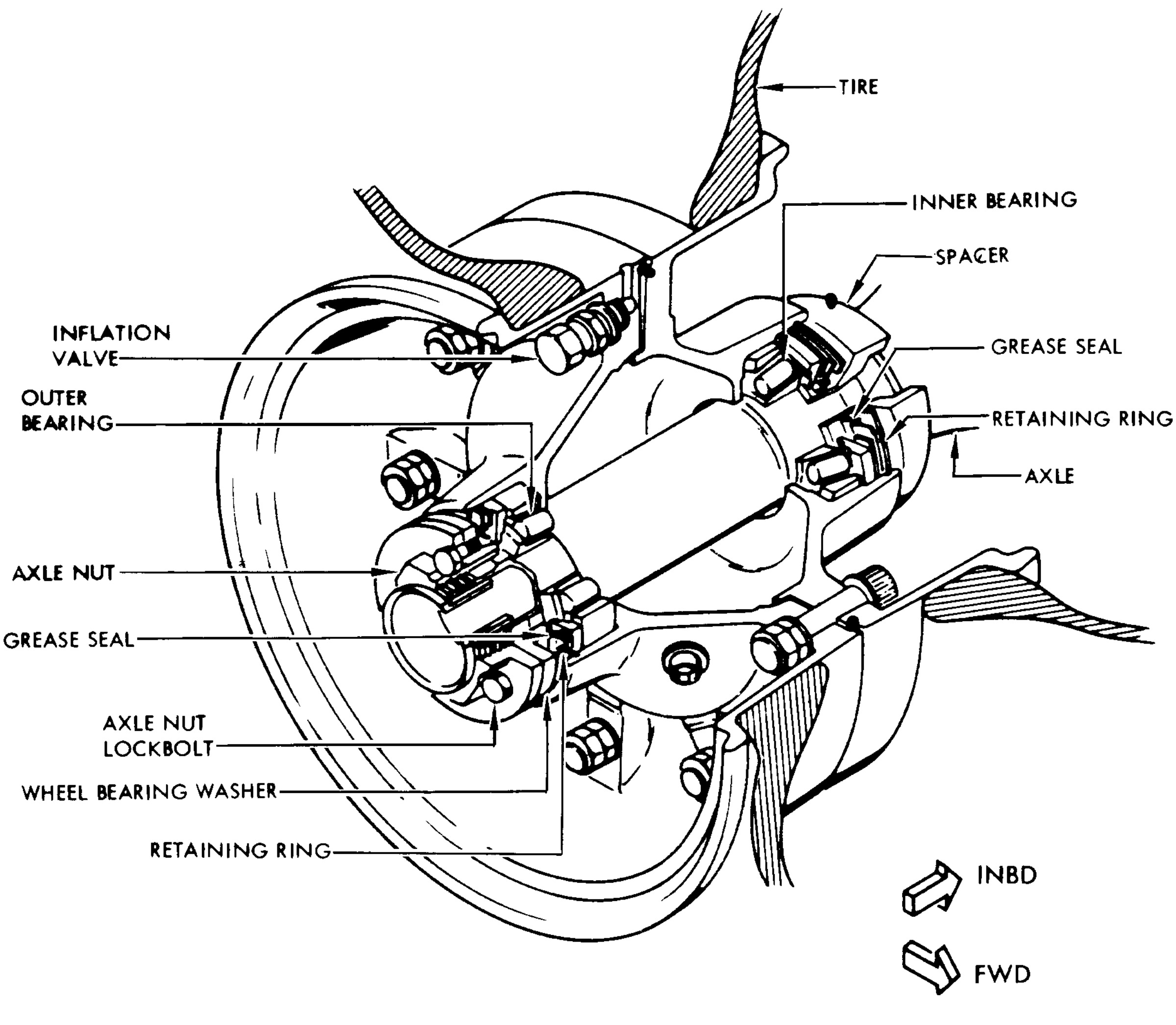
NOTE: Check that inner bearing is installed on the wheel side opposite inflation valve. Check that tab of grease seal fits indentation of cutout in wheel housing.

C. Position wheel assembly on dolly and slide into position on axle.
D. Remove axle thread protection.
E. Install outer bearing, grease seal, and retaining ring in outboard side of wheel.

NOTE: Check that tab of grease seal fits indentation in cutout in wheel housing.

F. Install wheel bearing washer with key of washer inserted in keyway of axle.
G. Lubricate threads and install axle nut.
(1) While rotating wheel, tighten nut to 90 pound-feet.
(2) Back axle nut off until nut is just loose (zero torque).
(3) While again rotating wheel, retighten axle nut 20 to 40 pound-feet in one continuous rotation, and at the same time, align two of the lockbolt holes in the flange of the nut with two of the four lockbolt holes in the wheel bearing washer.
H. Install the two axle nut lockbolts (Fig. 401).
I. Install lockwire between the two axle nut lockbolt heads.
J. Inflate tire (Ref Chapter 12, Landing Gear Tire Servicing and 32-45-0 MP).
K. Lower nose gear and remove jack (Ref Chapter 7, Jacking Airplane).





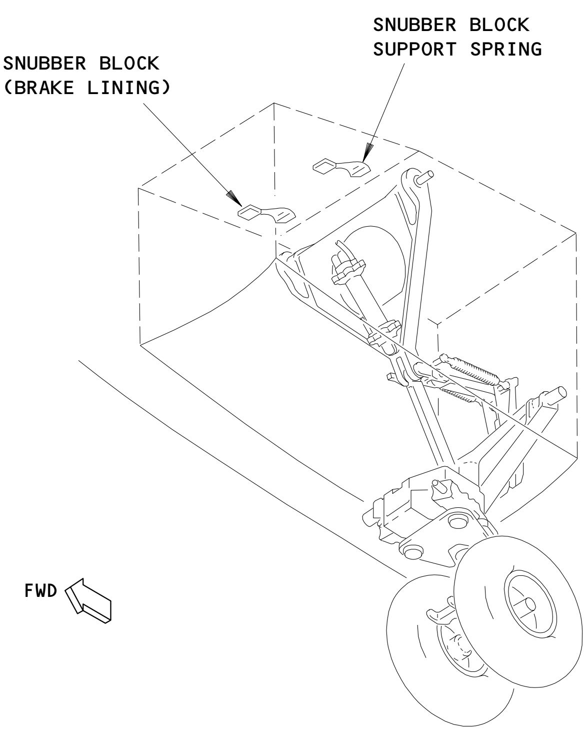
Nose Gear Wheel Installation
Figure 401

NOSE GEAR WHEEL SNUBBER- MAINTENANCE PRACTICES

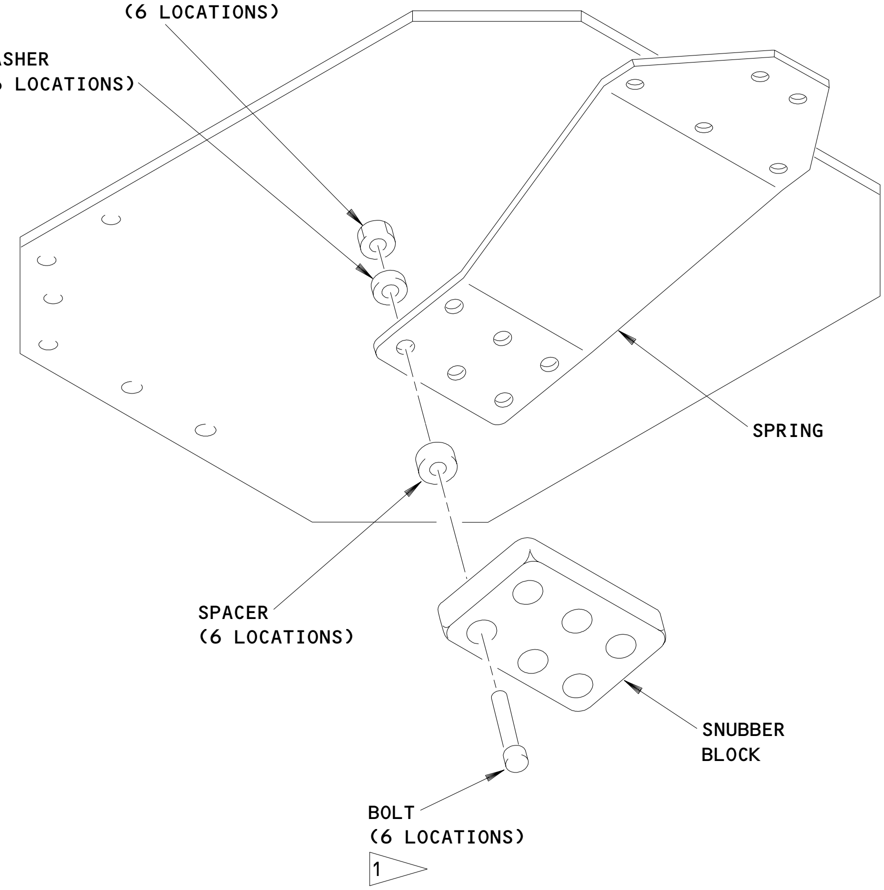
1. General (Fig. 201)
   A. A nose gear wheel snubber is provided for each nose wheel tire. The two units are installed at the top panel assembly of the forward nose wheel well.
   B. This procedure provides instructions for removal/installation of snubber brake shoe and inspection for wear.

   WARNING: THE NOSE WHEEL SNUBBERS CONTAINING ASBESTOS FIBERS OR DUST MAY BE HARMFUL IF INHALED. A PROTECTIVE TYPE RESPIRATOR SHOULD BE WORN BY PERSONNEL WHEN HANDLING OR WHEN EXPOSED TO ACTIVITIES CAPABLE OF GENERATING SUCH AIRBORNE FIBERS OR DUST.

2. Nose Gear Wheel Snubber Brake Shoe Removal/Installation (Fig. 202)
   A. Check that landing gear ground lock assemblies are installed (Ref 32-00-01).
   B. Set Parking Brake.
   C. Remove attach bolts and nuts holding snubber block to snubber spring (six attach points).
   D. Install new snubber brake shoe.
      (1) Install new shoe as shown in Fig. 202.
      (2) Include spacers between the spring and shoe at all six attach points.
   E. Release parking brake.
3. Nose Gear Wheel Snubber Brake Shoe Inspection/Check
   A. Replace brake shoe if worn to within 1/16 inch of shoe fastener head.



Nose Wheel Snubber
Figure 201



1 FOR ONE OR TWO SPACERS, 1-INCH BOLTS ARE USED. IF THREE SPACERS ARE REQURIED, 1.25-INCH BOLTS MUST BE USED.

Nose Wheel Snubber Installation
Figure 202

NOSE WHEEL STEERING SYSTEM - DESCRIPTION AND OPERATION

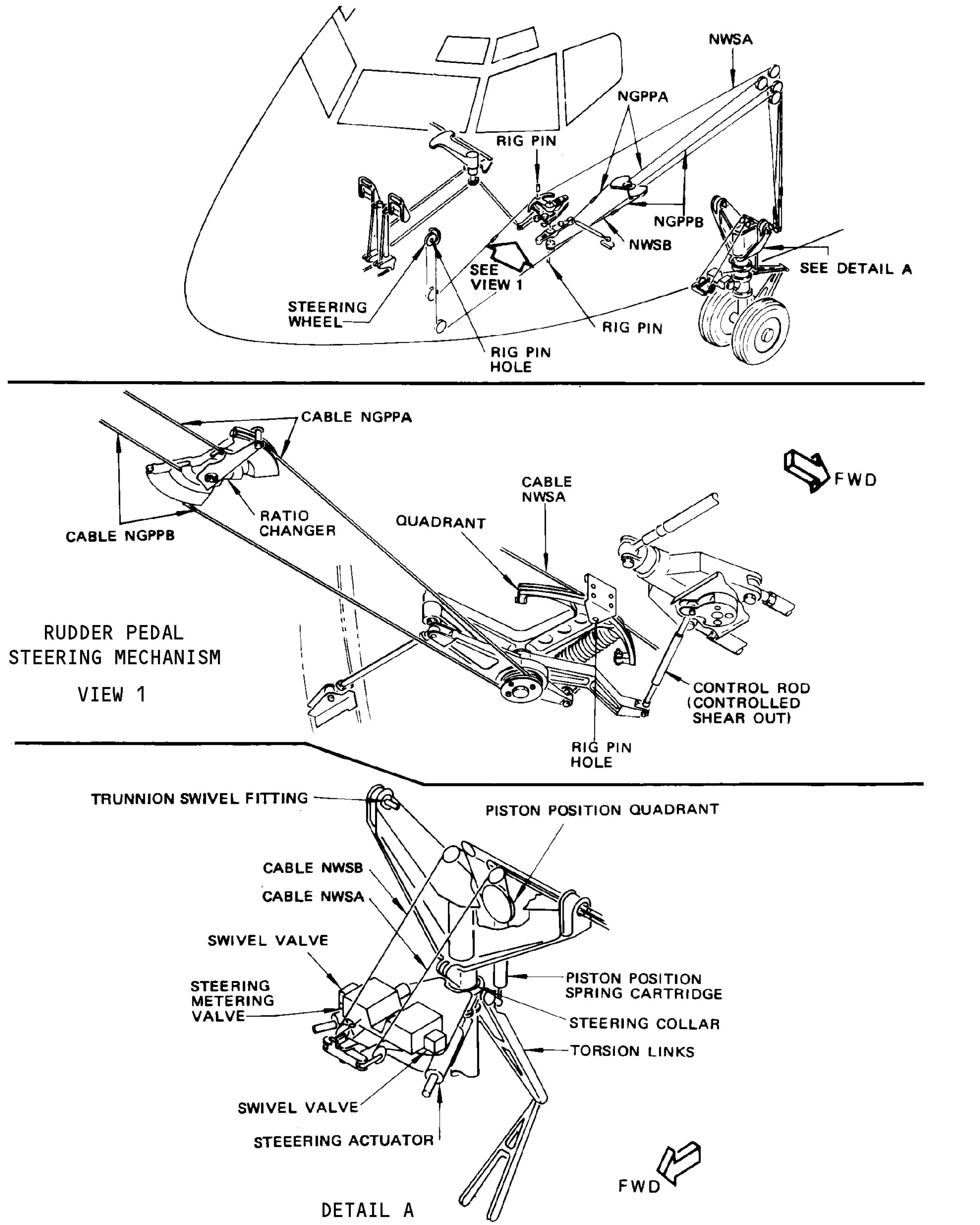
1. General
   A. Nose wheel steering is provided for aircraft directional control during ground maneuvers and taxiing. Hydraulic power is used to turn the nose wheels from zero to 78 degrees to either side. Steering is controlled by a wheel on the left side of the control cabin, and by an interconnect mechanism from the rudder pedals and is spring-loaded to the center position. Airplanes with a steering depressurization valve can be towed through turns up to 78 degrees without disconnecting the torsion links or depressurizing hydraulic system A. Internal cams center the nose gear when the nose gear shock strut is fully extended, therefore turning the wheels or towing should not be attempted unless the inner cylinder is compressed more than two inches.
   B. Normal steering is accomplished by using the steering wheel located on the left sidewall forward of the captain's position (Fig. 1). Movement of the steering wheel in either direction is transmitted by cables to a steering metering valve which directs 3000 psi hydraulic fluid to the nose wheel steering actuators for turning the steerable portion of the nose gear. A steering wheel movement of 95 degrees will give 78 degrees of nose wheel turning.
   C. Rudder pedal steering is available during takeoff, landing, and taxiing where small directional changes are required. The rudder pedal linkage is connected to the steering cables. Full deflection of the rudder pedals produces about seven degrees of nose wheel turn. The rudder pedal steering mechanism is engaged for steering on the ground by the piston position system. The piston position system consists of linkage and cables connected to the upper torsion link on the nose gear. When the nose gear is compressed by airplane weight, the movement of the torsion link is transmitted by linkage and cables to reposition stops mounted on a clutch crank in the rudder pedal steering mechanism (Fig. 3). In this position any movement of the rudder pedals will be transmitted into ground directional control of the nose wheel through the action of the rudder pedal steering mechanism.
2. Steering Metering Valve
   A. The steering metering valve is a piston and sleeve type valve located on the nose gear. Combined with the metering valve are a pair of swivel valves to direct hydraulic fluid for turns. The piston and sleeve assembly is ported to direct 3000 psi hydraulic fluid through the swivel valves to the steering actuators. Movement of the control cable positions the valve piston for the required turn. When the wheels reach the required turn angle, the piston is returned to neutral position by follow-up action of the control cable.

B. During steering operation hydraulic fluid is directed by the metering valve to one side of the right actuator piston and to the opposite side of the left actuator piston producing a push-pull action on the steering collar (Fig. 2). This push-pull action continues as long as the valve piston is displaced or until approximately 33 degrees of steering. At this point the pulling actuator has reached the end of its stroke and the turning motion of the actuator has closed off the hydraulic pressure and return lines in the steering actuator swivel valve. Continued pushing by the other actuator moves the pulling actuator past the null point. Above 33 degrees of steering, hydraulic pressure for the steering cylinder that is overcenter has been closed off and both ports have been ported to return. Further turning from 33 degrees to the maximum of 78 degrees is provided by the pushing actuator only. The steering wheel must be turned 95 degrees to obtain the maximum turning angle of 78 degrees.

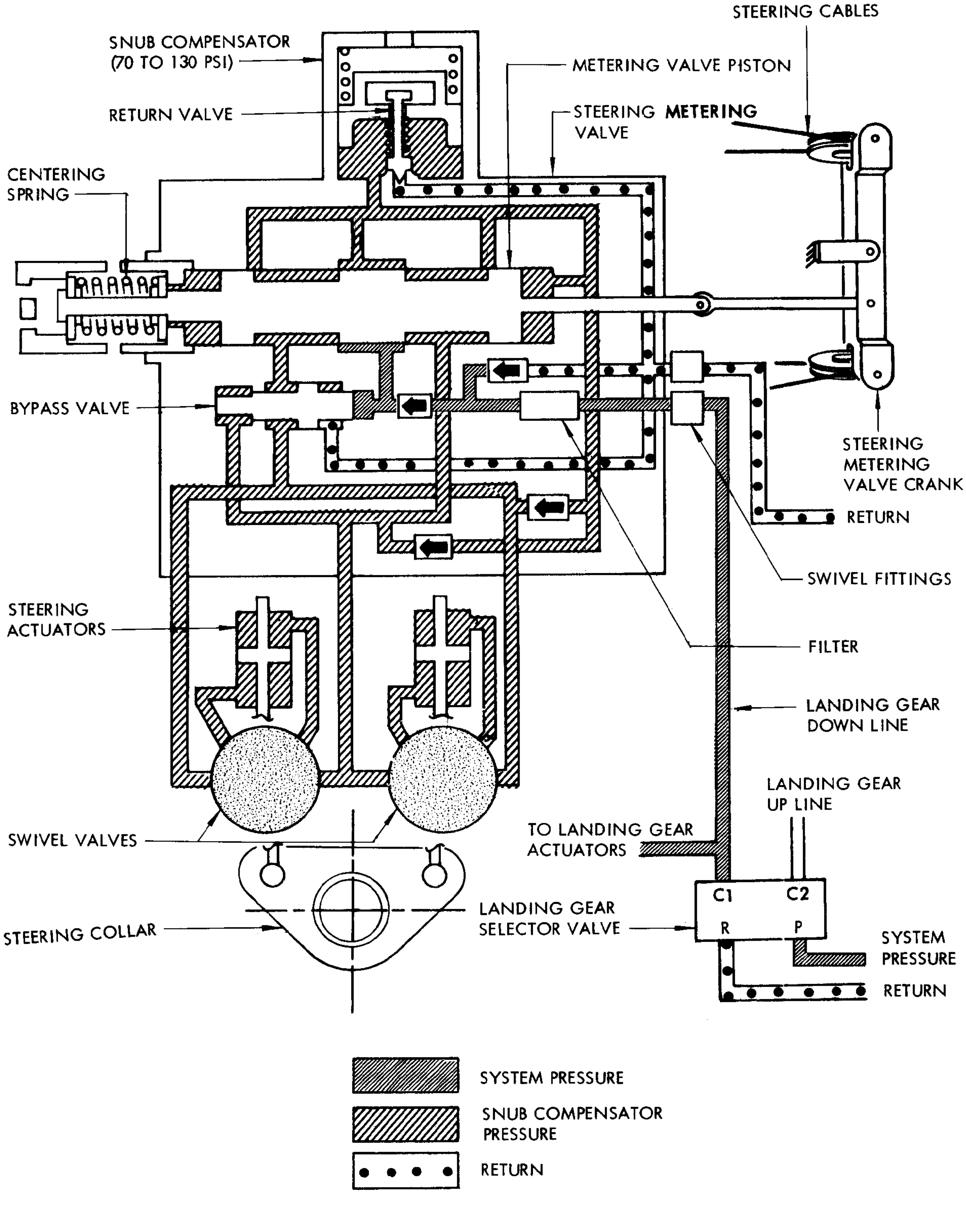
C. The steering metering valve incorporates a spring compensator to maintain a pressure of 70 to 130 psi against the actuator pistons to act as a shimmy damper. The valve structure includes two bypass check valves to allow flow of hydraulic fluid between each set of ports to prevent cavitation. A bypass valve protects the steering system from high pressures developed in the steering cylinders during towing. With the steering hydraulic system depressurized, residual pressure, coupled with small frictional forces within the valve, act to retain the bypass valve in the closed position (Fig. 2). When the nose gear is turned by the towing vehicle the steering actuator pistons act as pumps, forcing fluid out of the steering cylinders and creating a pressure differential across the bypass valve. The valve opens allowing equalizing pressure to act against the actuator pistons in opposition to the turning force supplied by the towing vehicle. The net result is that pressure is equalized on the opposing sides of the steering actuator pistons. The bypass valve is held in the closed position whenever the steering hydraulic system is pressurized.

3. <u>Nose Gear Steering Collar</u>

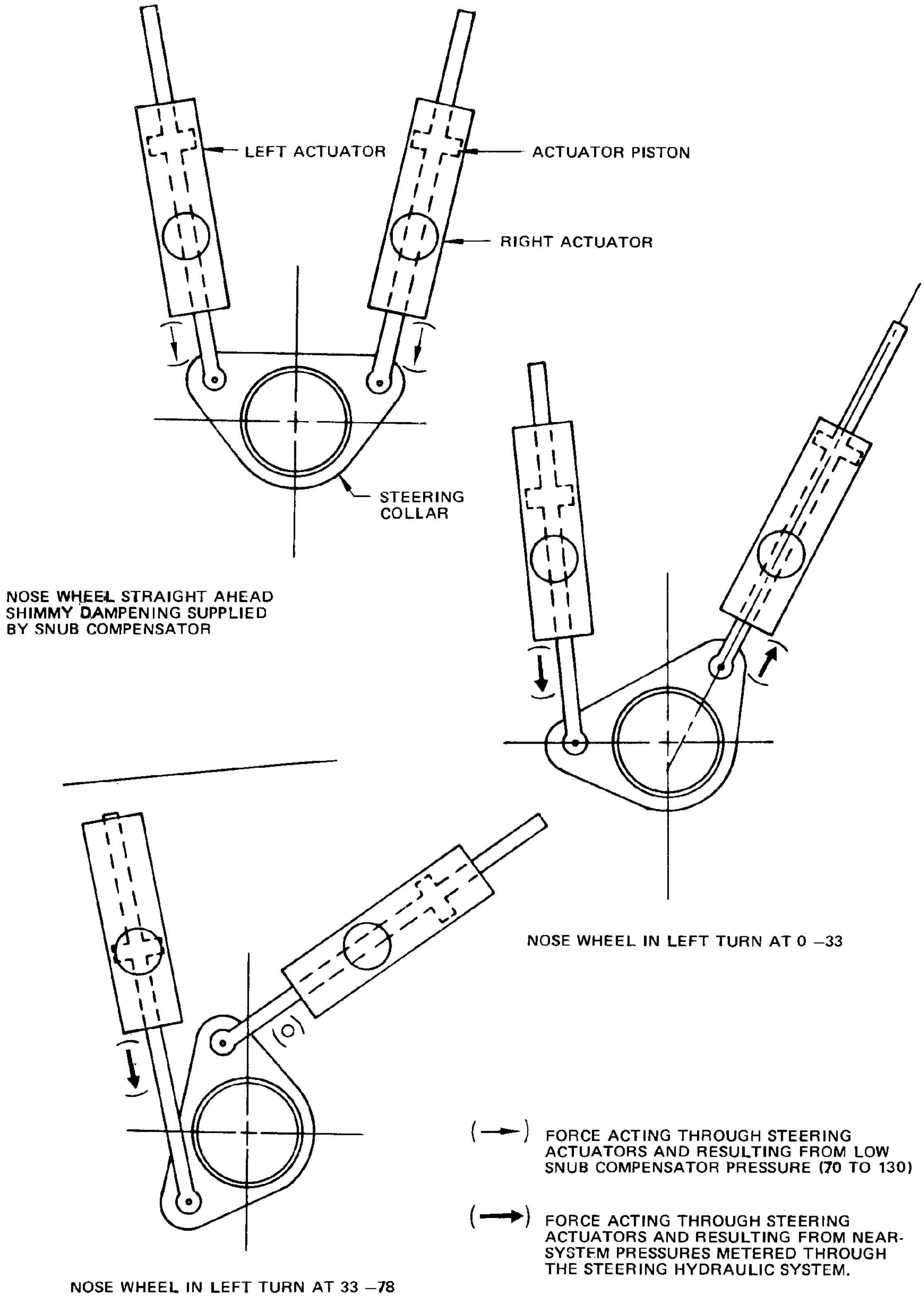
A. The nose gear steering collar is held clamped around the outer cylinder, by a bolt, in an annular recess immediately below the trunnions (Fig. 1). Both of the two steering cylinders are connected to the steering collar and the upper end of the upper torsion link is also connected to the steering collar. When force is applied to the steering collar, by either steering cylinder, the collar transfers the force through the torsion links to turn the inner cylinder to the right or left respectively to which cylinder force is applied to give steering action to the nose wheels.



Nose Wheel Steering System Component Location
Figure 1



Nose Wheel Steering Schematic
Figure 2 (Sheet 1)



Nose Wheel Steering Schematic
Figure 2 (Sheet 2)

4. Rudder Pedal Steering Mechanism
   A. The rudder pedal steering mechanism consists of a steering crank, a clutch arm, a cable drum, an eccentric mounted in the clutch crank, and a rudder pedal steering quadrant. (See figure 3.) This mechanism connects the rudder pedals to nose wheel steering and is actuated by the piston position system when the nose gear is compressed by airplane weight. This compression movement of the nose gear is transmitted by piston position linkage and cables to move the eccentric and reposition the clutch crank so that the stops, mounted on the clutch crank, do not contact the clutch arm. In this position, the clutch arm contacts the stops on the steering crank and any movement of the rudder pedals is transmitted from the steering crank to the rudder pedal steering quadrant. (See figure 4, condition 1.) This quadrant is connected to the nose wheel steering cables and is free to move with the cables whenever nose wheel steering is used, or drive the cables when positioned by the rudder pedal steering mechanism. (See figure 4, condition 2.) B. When the nose gear is extended, the piston position system positions the eccentric to move the stops mounted on the clutch crank into contact with the clutch arm. This prevents any movement of the rudder pedals from reaching the clutch arm and moving the quadrant. (See figure 4, condition 3.)
   B. When the nose gear is extended, the piston position system positions the eccentric to move the stops mounted on the clutch crank into contact with the clutch arm. This prevents any movement of the rudder pedals from reaching the clutch arm and moving the quadrant. (See figure 4, condition 3.)
5. Steering System Cables
   A. The nose wheel steering cable system consists of two sets of 3/32 inch diameter carbon steel cable with tin-coated corrosion-resisting steel terminals. The first set of cables is used to actuate the steering metering valve by turning the steering wheel and its two cables are designated NWSA and NWSB. The second set of cables makes up the piston position system to engage rudder pedal steering. Its two cables are designated NGPPA and NGPPB.
   B. The steering cables, NWSA and NWSB, begin at the steering wheel drum and terminate on the steering collar at the back of the nose gear shock strut. Movement of the steering wheel puts one cable under tension and the steering control crank mounted on the nose gear is displaced moving the control piston in the steering metering valve. Movement of the control piston directs fluid under pressure to the steering cylinder which moves the steering collar. The steering collar moves in the desired direction of turn and as the amount of turn is reached, the tension in the cable is reduced by the follow-up action and the control piston is returned to the centered position. The wheel must be held throughout the turn or the system will return to center by action of the centering spring in the rudder pedal steering mechanism.

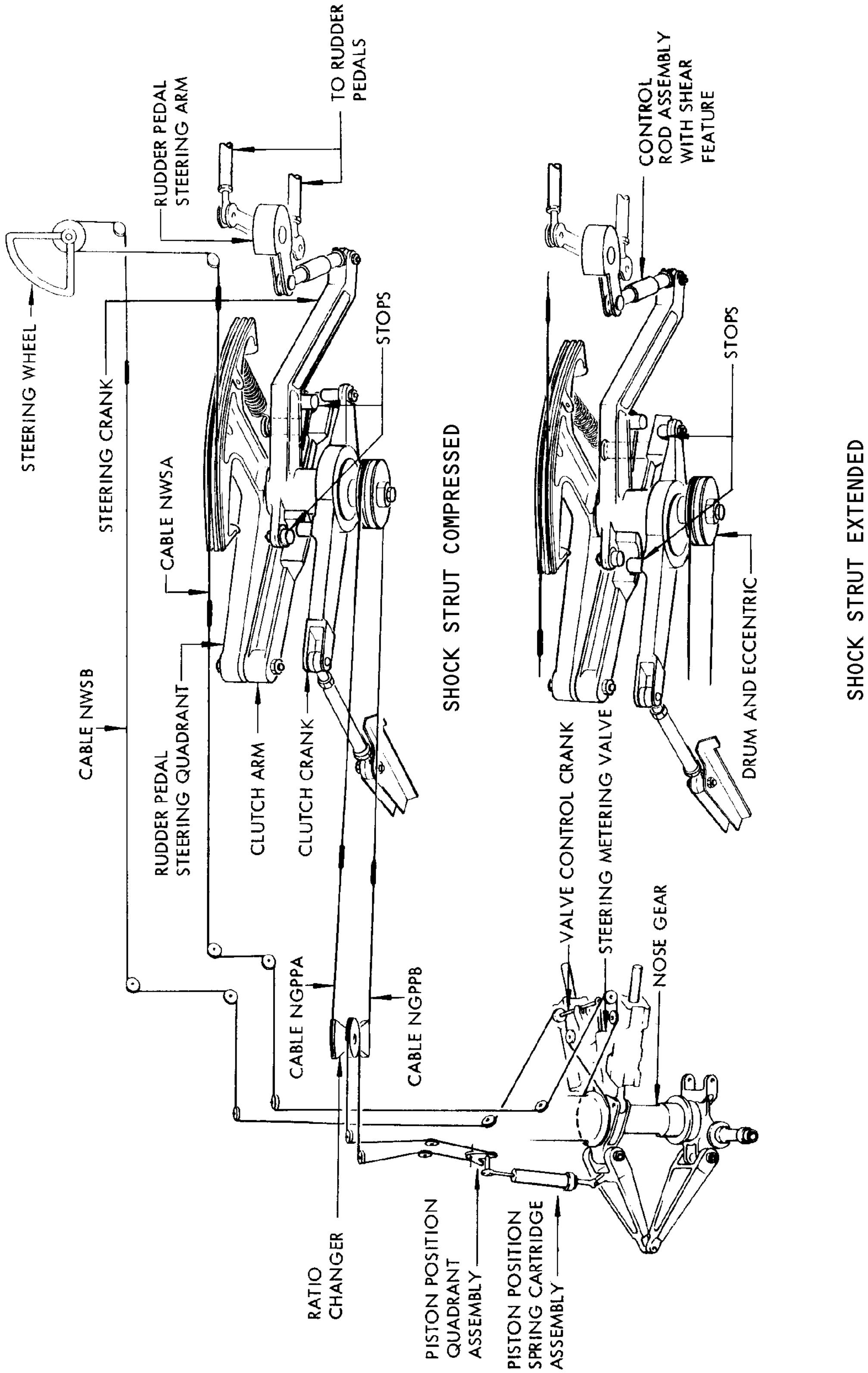
C. The piston position system cables, NGPPA and NGPPB, are driven by linkage connected to the torsion links. When the torsion links are compressed by nose gear action, the connecting linkage moves a quadrant and the NGPP cables reposition stops in the rudder pedal steering mechanism to allow rudder pedal steering.

6. Operation

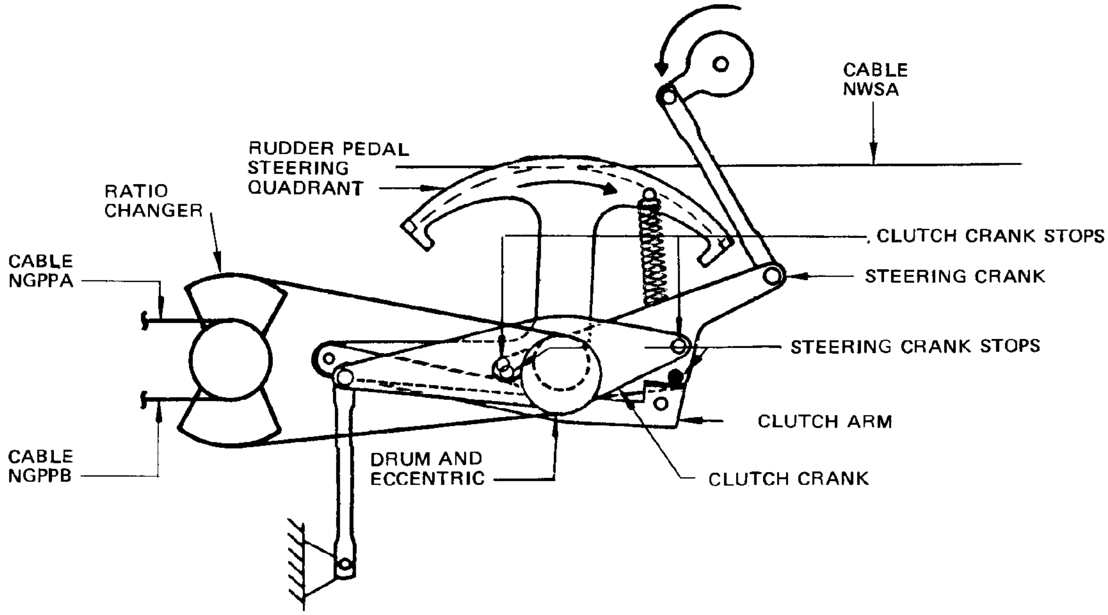
A. Nose wheel steering is available when the nose gear is in the down position and compressed by weight of the airplane. Positioning the landing gear control lever to down makes system hydraulic pressure available from the landing gear down line to the steering metering valve for steering. The nose gear must be compressed more than two inches before steering is attempted to avoid damage to the centering cams.

B. When the steering wheel is rotated for a turn, the steering cables move and displace the steering metering valve piston. Hydraulic fluid is directed by the metering valve through the swivel valves to the steering actuators. The steering actuators produce a turning moment on the steering collar transmitted by the torsion links to the lower steerable portion of the nose gear. Continued displacement of the metering valve piston combined with the steering actuator swivel valves produces 78 degrees of wheel turn for 95 degrees of steering wheel rotation. During a turn the metering valve piston is displaced until the required degree of nose wheel turning is reached and then returned to the center position by the follow-up action of the cable.

C. Nose wheel steering is also available through the rudder pedals. The rudder pedal steering mechanism is actuated by the piston position system when the nose gear is compressed. The compression movement is transmitted by linkage and cables to move the eccentric and reposition the clutch crank and allow the clutch arm to contact the stops mounted on the steering crank. In this position any movement of the rudder pedals is transmitted from the steering arm to the quadrant. The quadrant moves the nose wheel steering cables displacing the steering metering valve piston for the required turn.

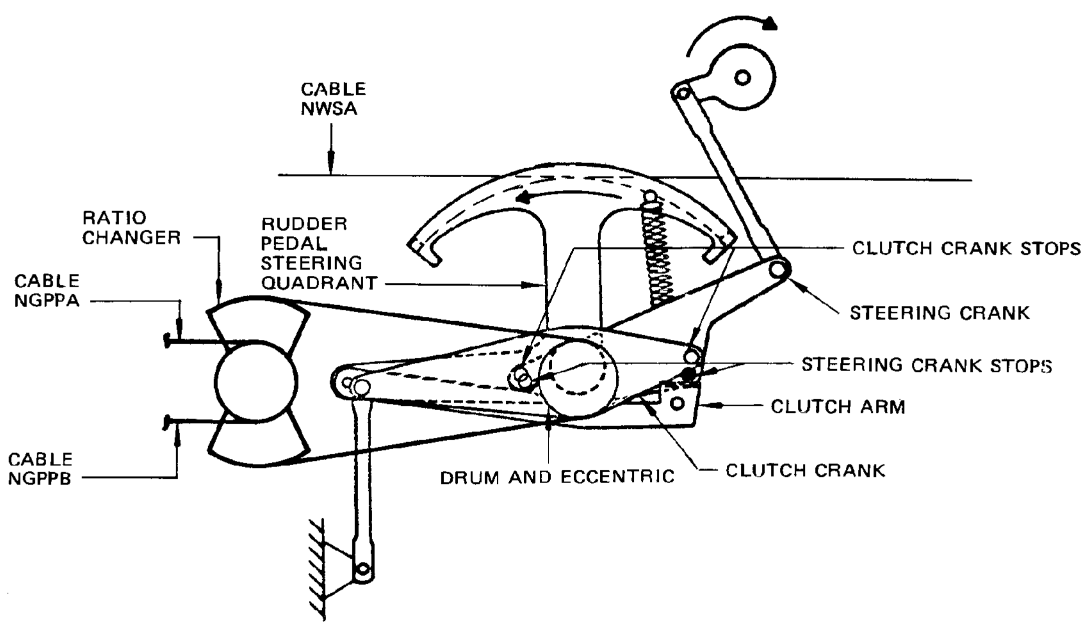


Rudder Pedal Steering Mechanism
Figure 3



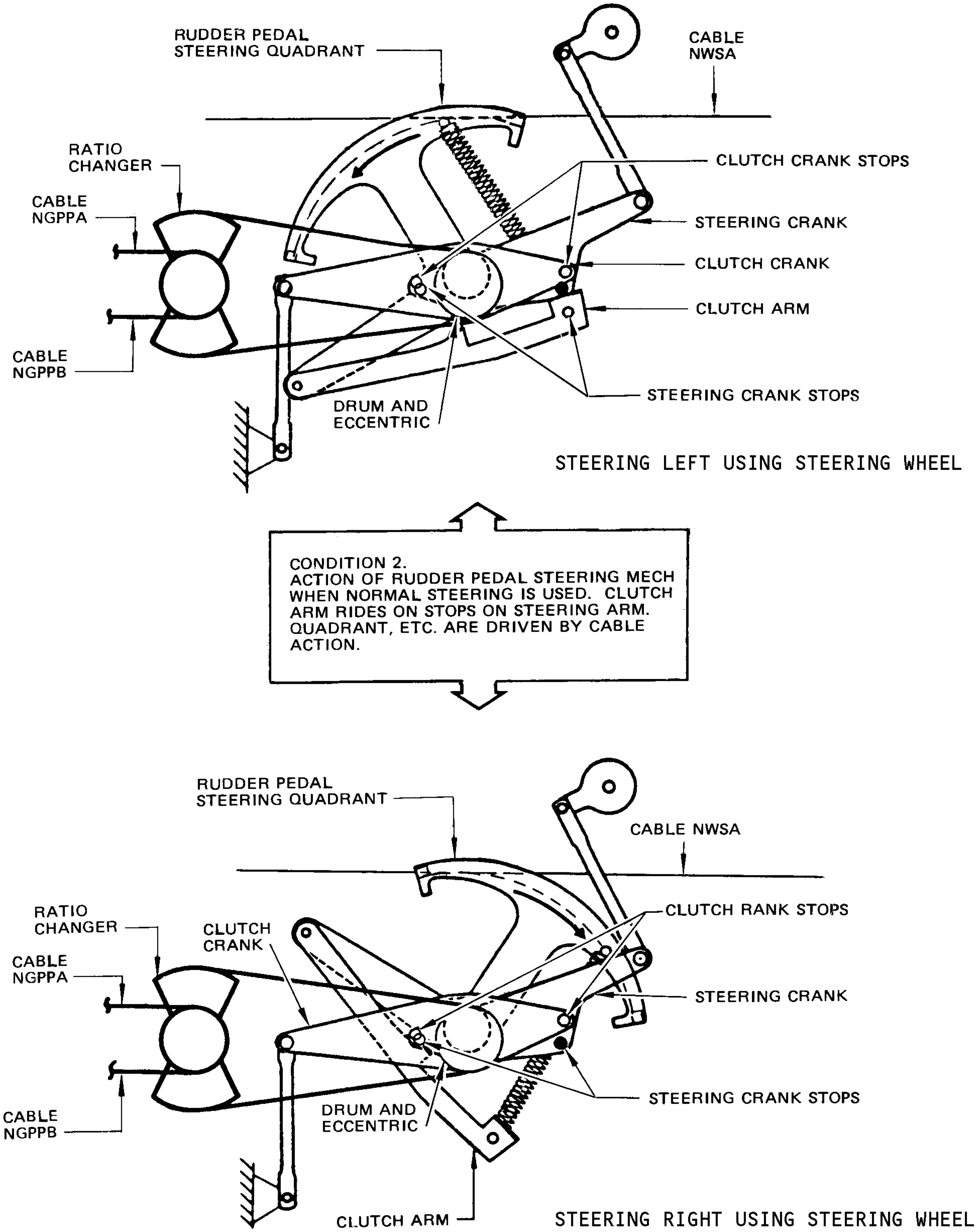
STEERING LEFT AT 7° USING RUDDER PEDALS

CONDITION 1.
ACTION OF RUDDER PEDAL STEERING MECH WHEN USED FOR STEERING. CLUTCH ARM RIDES ON STOPS ON STEERING CRANK. QUADRANT AND CLUTCH ARM WORK TOGETHER AND ARE DRIVEN BY ACTION OF STEERING CRANK.

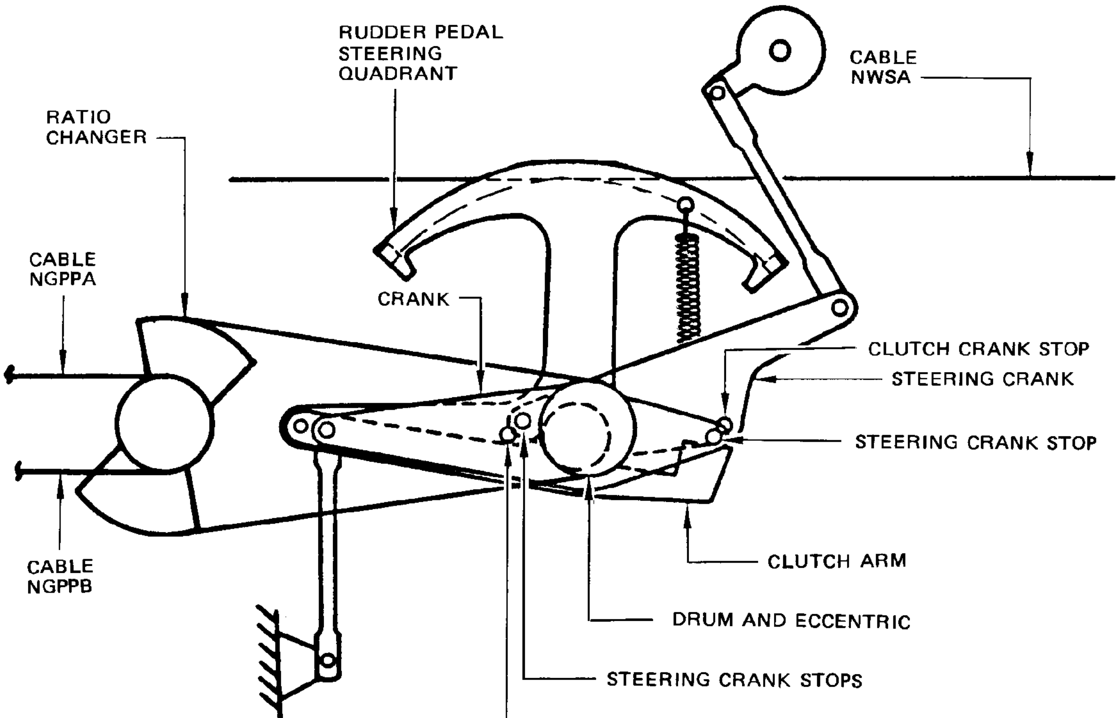


STEERING RIGHT AT 7° USING RUDDER PEDALS

Rudder Pedal Steering Mechanism Schematic
Figure 4 (Sheet 1)



Rudder Pedal Steering Mechanism Schematic
Figure 4 (Sheet 2)



CONDITION 3.
ACTION OF RUDDER PEDAL STEERING WITH NOSE GEAR EXTENDED AND CLUTCH ARM RIDING ON STOPS ON CLUTCH CRANK. STEERING CRANK IS FREE TO MOVE WITH RUDDER MOVEMENT AND DOES NOT CONTACT CLUTCH ARM. CLUTCH CRANK WITH STOPS MOVED INTO CONTACT BY ACTION OF DRUM AND ECCENTRIC.

Rudder Pedal Steering Mechanism Schematic
Figure 4 (Sheet 3)

NOSE WHEEL STEERING SYSTEM - TROUBLESHOOTING

1. Prepare for Troubleshooting

WARNING: MAKE SURE THAT THE GROUND LOCKS ARE INSTALLED IN ALL OF THE LANDING GEAR. WITHOUT THE GROUND LOCKS, THE LANDING GEAR CAN RETRACT AND CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

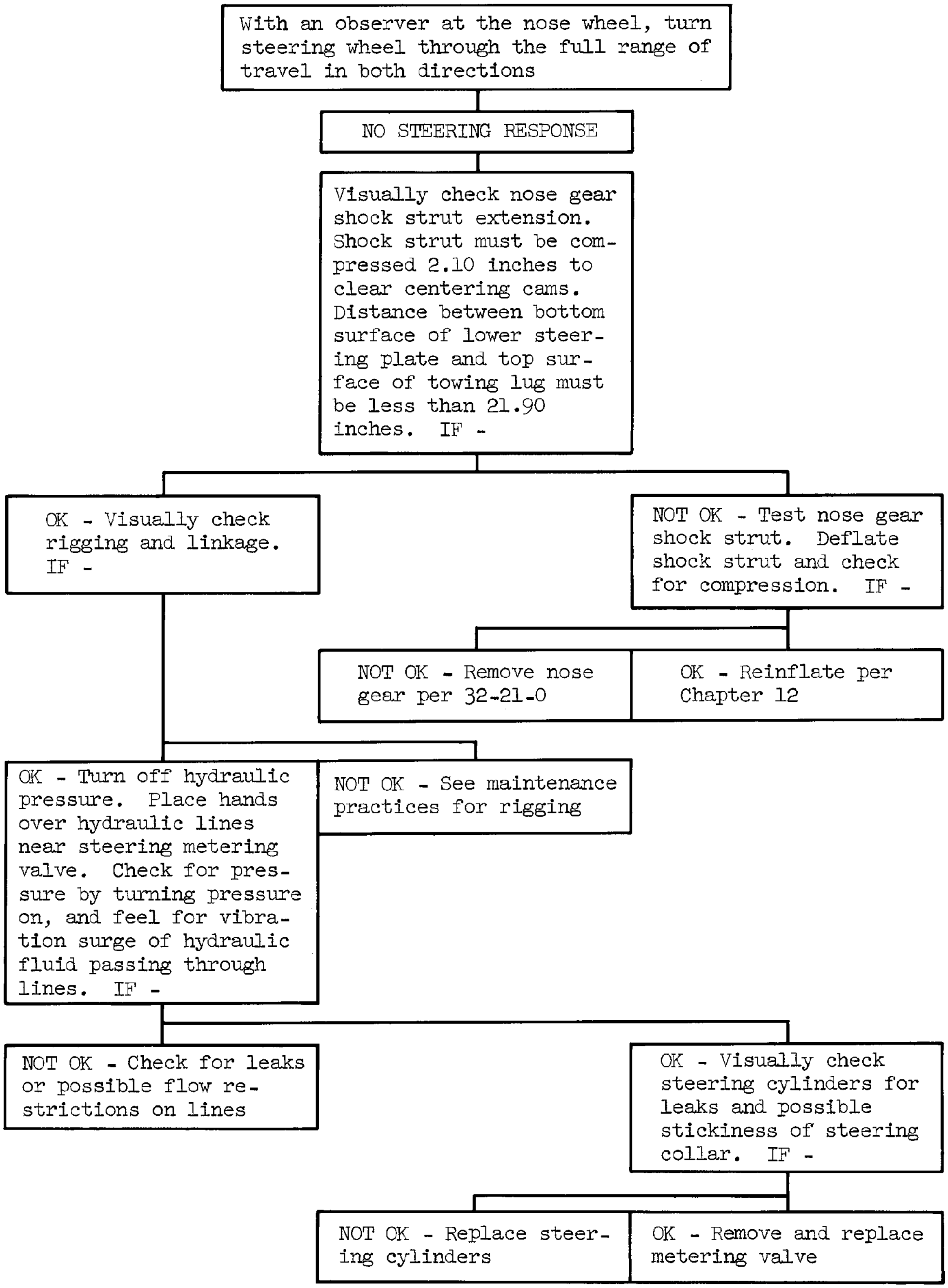
A. Make sure the ground locks are installed in the nose and main landing gear (AMM 32-00-01/201).
B. Lift the nose of the airplane with jacks until the nose gear tires are clear of the ground and the shock strut is fully extended (AMM 07-11-21/201).

CAUTION: MAKE SURE YOU DO NOT OPERATE THE STEERING WHEEL WITH THE SHOCK STRUT FULLY EXTENDED AND THE TORSION LINKS CONNECTED OR DAMAGE TO THE SHOCK STRUT CENTERING CAMS CAN OCCUR.

C. Put greased plates under the nose wheels.
D. Lower the airplane and remove the jacks (AMM 07-11-21/201).
E. Make sure that the landing gear handle is in DN position.
F. Pressurize hydraulic system A (AMM 29-11-0/201).

2. Troubleshooting Charts

WARNING: TO PREVENT PERSONNEL INJURY OR EQUIPMENT DAMAGE DURING INTERNAL LEAKAGE CHECKS, KEEP PERSONNEL AND EQUIPMENT CLEAR OF HYDRAULIC COMPONENTS THAT CAN MOVE.



Nose Wheel Steering System - Troubleshooting
Figure 101 (Sheet 1)

With an observer at the nose wheel, turn steering wheel throught the full range of travel in both directions. IF -

NOSE GEAR STEERS TOO SLOW.

Check for sufficient hydraulic system pressure. IF -

OK - Turn off hydraulic pressure, place hands over hydraulic lines. Check for pressure by turning pressure on and feel for vibration surge of hydraulic fluid passing through lines. IF -

NOT OK - Refer to Chapter 29 Hydraulic Systems.

OK - Visually check steering cylinders and possible stickiness of steering collar.

NOT OK - Check for leads on lines, or possible flow restriction on lines.

OK -Check filter in steering metering valve. IF -

NOT OK - If metal chips are present replace steering metering valve (Ref 32-51-11, R/I).
Inspect nose gear transfer cylinder and replace if required.
Clean and flush nose gear hydraulic system from selector valve thru nose gear modular package.

Nose Wheel Steering System - Troubleshooting
Figure 101 (Sheet 2)

During normal taxi operation. IF -

NOSE GEAR VIBRATES.

Check tires for proper inflation, flat spots, and/or tires being out of round and unequal tire diameter.

OK - Check that steering hydraulic system is properly bled. IF -

NOT OK - Service or replace tires (12-15-51, 32-45-00, 32-45-21). 1

OK - Check nose gear shock strut servicing. IF -

NOT OK - Bleed steering hydraulic system (32-51-00, Test).

OK - Check nose gear torsional free play (32-21-00, I/C). IF -

NOT OK - Service nose gear shock strut (12-15-41).

NOT OK - Repair and replace torsion links, link assembly, towing collar, steering collar, and steering cylinder rod and attachments as necessary.

1 TO REMAIN FREE OF FORE AND AFT VIBRATION OF THE NOSE GEAR, WHEELS AND TIRES MUST BE MAINTAINED WITHIN BALANCE LIMITS SPECIFIED BY THE MANUFACTURER. WHEELS, WHEN ASSEMBLED IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS, ARE NOT A SIGNIFICANT CONTRIBUTOR TO IMBALANCE AND SHOULD NOT CHANGE DURING OPERATION. OUT-OF-BALANCE TIRES RESULTING FROM FLAT SPOTS ARE THE PRIMARY CAUSE OF FORE AND AFT VIBRATION. PER FAR 37.167 (TSO-C62C), TIRE IMBALANCE MUST NOT EXCEED 14 IN-OZ FOR A 24 INCH TIRE. TIRES THAT CONNOT BE MAINTAINED IN BALANCE MUST BE REPLACED.

Nose Wheel Steering System - Troubleshooting
Figure 101 (Sheet 3)

With an observer at the nose wheel, turn steering wheel through the full range of travel in both directions. IF -

NOSE GEAR WILL NOT FOLLOW-UP AND CENTER

Check cable tension. IF -

OK - Check metering valve actuator arm and follow-up linkage for binding and insecurity. IF -

NOT OK - Apply correct cable tension

OK - Replace metering valve

NOT OK - Remove and repair or replace linkage if necessary

Nose Wheel Steering System - Troubleshooting
Figure 101 (Sheet 4)

NOSE WHEEL STEERING SYSTEM - ADJUSTMENT/TEST

1. Nose Wheel Steering System Adjustment
   A. General
      (1) Adjustment of the nose wheel steering system consists of rigging the nose wheel steering cables and the nose gear piston position cables. The steering system is rigged to operate the steering metering valve by either the steering wheel or rudder pedal steering. In general, cables require rigging when tension values deviate from the values given in Table I of Fig. 501 more than (+15/-5) pounds. Cable temperatures should be allowed to stabilize at least 1 hour before attempting rigging and/or checking the cable tension.
   B. Nose Wheel Piston Position System Adjustment
      (1) Equipment and Materials
         (a) Rigging Pins - 5/16-inch diameter, Type MS20392 (4 required)

            NOTE: Rigging pins are part of F70207-61

         (b) Cable tensiometer
         (c) Deleted
         (d) Ground Lock Assembly (Ref 32-00-01)
      (2) Prepare to Adjust Nose Wheel Piston Position System
         (a) Check that ground lock assembly is installed in nose gear (Ref 32-00-01).
         (b) On airplanes without centering markers (Ref SB 32-1117), jack nose of airplane until nose gear tires clear ground and shock strut is fully extended (Ref Chapter 7).

            CAUTION: TAKE CARE NOT TO OPERATE STEERING WHEEL WITH SHOCK STRUT FULLY EXTENDED AND TORSION LINKS CONNECTED OR DAMAGE TO SHOCK STRUT CENTERING CAMS MAY RESULT.

         (c) On airplanes with centering markers (Ref SB 32-1117); jack nose wheels of airplane using axle jack until nose gear tires clear ground (Ref Chapter 7).
         (d) Check that hydraulic system A is depressurized.

(3) Adjust Nose Wheel Piston Position System
(a) Center nose wheels
1) On airplanes without centering markers, check that shock strut is centered by action of centering cams (shock strut fully extended).

NOTE: To obtain nose gear centering, shock strut may require pressurizing for extension (apply 200 psi maximum) and manual assist for centering nose gear in detent of centering cam. Cam detent may not be positive. (Interface tolerance may allow + 1 degree backlash. If backlash does exist, center nose gear to midposition of detent.

2) On airplanes with centering markers (Ref SB 32-1117), center nose wheels by aligning marker on steering collar with marker on steering collar bearing.
(b) Adjust piston position spring cartridge so that rigging pin 7 will fit freely in quadrant (View 1, Fig. 501).
1) Disconnect spring cartridge at crank.

NOTE: Observe position and thickness of washers for use during installation of spring cartridge.

2) Adjust length of spring cartridge upper rod end by loosening locknut, disengaging key, and turning rod end bearing in fitting as required.
3) Install rigging pin 7 in quadrant.
4) Engage key, tighten locknut 95 to 110 pound-inches and lockwire upper rod end.
5) Reconnect spring cartridge to crank tighten to standard torque install cotter pin.
(c) Disconnect rudder pedal steering mechanism idler link at airplane structure (View 2).
(d) Disconnect upper and lower torsion links at apex bolt.
(e) Secure clutch arm so that clutch arm does not contact cam followers on eccentric crank (View 2).
(f) Install rigging pin 5 in piston position cable drum and rigging pin 1 in quadrant.
(g) Install rigging pin 6 in piston position ratio changer quadrant (View 3).
(h) If new NGPPA and NGPPB cables have been installed:
1) Rig NGPPA and NGPPB cables to 120 +12 pounds at 70°F.

2) Remove rigging pins 1, 5, 6, and 7 and cycle piston position system through 25 full cycles (stop to stop) by manually displacing disconnected end of upper torsion link vertically.
3) Connect torsion links with apex bolt.
4) Install rigging pins 1, 5, 6, and 7.

(i) Adjust tension of all segments of cables NGPPA and NGPPB to 40 +10/-0 pounds at 70°F ambient temperature. See Table 1 for tension required for other ambient temperatures. Check that all rigging pins are loose.
(j) Remove rigging pins 5, 6, and 7.
(k) Release clutch arm to center eccentric crank by spring loading clutch arm against cam followers.
(l) Adjust length of rudder pedal steering mechanism idler link so that attachment bolt fits freely. Tighten locknuts and connect idler link to airplane structure.

NOTE: After accomplishment of step (1), a small amount of misalignment at rigging pins 5, 6, and 7 is acceptable; however, with clutch arm held off cam followers on eccentric crank as in step (e), rigging pins 5, 6, and 7 must fit freely.

(m) On SV HZ-AGA thru HZ-AGE; AR LV-JMW thru LV-JMZ, LV-JND, LV-JNE, LV-JTD, LV-JTO; less SV and AR airplanes incorporating SB 78-1023, adjust nose gear air-
ground switch(es) (Ref 32-42-61, A/T).
(n) Install locking clips in turnbuckles of cables NGPPA and NGPPB.
(o) Ensure rigging pin 1 is removed from quadrant (view 2).
(p) Ensure rigging pin 5 is removed from piston position cable drum (view 2).
(q) Ensure rigging pin 6 is removed from piston position ratio changer quadrant (view 3).
(r) Ensure rigging pin 7 is removed from piston position quadrant assembly (view 1).
(s) Test nose wheel steering system per par. 2.
(t) On SV HZ-AGA thru HZ-AGE; AR LV-JMW thru LV-JMZ, LV-JND, LV-JNE, LV-JTD, LV-JTO; less SV and AR airplanes incorporating SB 78-1023, test nose gear air-
ground switch function of thrust reverser system (Ref Chapter 78, Thrust Reverser System).
(u) Lower airplane and remove jacks (Ref Chapter 7, Jacking Airplane).

C. Nose Wheel Steering System Adjustment

(1) Equipment and Materials

(a) Rigging Pin - 5/16-inch diameter, Type MS20392 (4 required)

NOTE: Rigging pins are part of F70207-61.

(b) Cable tensiometer

(c) Ground Lock Assembly - (Ref 32-00-01)

(d) Rigging Protractor - F80184-1 (preferred), TE65-73762 (optional)

(2) Prepare to Adjust Nose Wheel Steering System

(a) Ensure ground lock assembly is installed in nose gear (Ref 32-00-01).

(b) Jack nose of airplane until nose gear tires clear ground and shock strut is fully extended (Ref Chapter 7, Jacking Airplane).

CAUTION: TAKE CARE NOT TO OPERATE STEERING WHEEL WITH SHOCK STRUT FULLY EXTENDED AND TORSION LINKS CONNECTED OR DAMAGE TO SHOCK STRUT CENTERING CAMS MAY RESULT.

(c) Ensure hydraulic system A is depressurized.

(d) Ensure right and left cable guard is 0.015 to 0.045 inch from steering collar pulley. Adjust (Ref 32-51-51 R/I) as required.

(3) Adjust Nose Wheel Steering System

(a) Disconnect piston position spring cartridge at quadrant crank (View 1, Fig. 501).

NOTE: Observe position and thickness of washers for use during installation of spring cartridge.

(b) Rotate piston position quadrant counterclockwise until stop is contacted (shock strut fully compressed direction) and secure quadrant in this position.

(c) Disconnect rudder pedal steering control rod from rudder pedal steering mechanism (View 2).

(d) Install rigging pin 1 in quadrant.

(e) Install rigging pin 2 in steering wheel drum (View 4).

(f) Install rigging pins 3 in rudder pedal arms (two places).

(g) Install rigging pin 4 in steering metering valve crank.

(h) Adjust length of rudder pedal steering control rod so that attachment bolts fit freely. Tighten jamnut and install rod (View 2).

CAUTION: END OF ROD END MUST COVER AT LEAST ONE HALF OF INSPECTION HOLES IN CONTROL ROD ASSEMBLY. A MINIMUM OF THREE THREADS MUST BE EXPOSED OUTSIDE LOCKNUT ON CONTROL ROD AT CRANK END TO PREVENT INTERFERENCE AND POSSIBLE ROD FAILURE.

NOTE: On airplanes with 3 hole steering arm, connect rod to center hole.

(i) If new NWSA and NWSB cables have been installed:
   1) Rig NWSA and NWSB cables to 120 +12 pounds at 70°F.
   2) Remove rigging pins 1, 2, 3, and 4 and cycle piston position system through 25 full cycles (stop to stop) by manually displacing disconnected end of upper torsion link horizontally.
   3) Connect torsion links temporarily with apex bolt.
   4) Install rigging pins 1, 2, 3, 4.

(j) Remove locking clips and adjust tension of all segments of cables NWSA and NWSB to 40 +10/-0 pounds at 70°F ambient temperature. See Table 1 for tension required for other ambient temperatures. Check that all rigging pins are loose.

(k) Remove bolt connecting steering metering valve rod to steering metering valve crank (Detail A).

NOTE: Steering metering valve is in neutral position when bolt connecting steering metering valve rod to steering metering valve crank fits freely. If bolt does not fit freely, metering valve piston will be held in a position to induce an increment of steering when hydraulic pressure is applied.

(l) Adjust length of valve rod so that bolt fits freely in valve crank.
   1) Loosen jamnuts to disengage locking keys.
   2) Hold loose rod end and turn coupling to change length of rod as required.
   3) Tighten jamnuts and lockwire.

(m) Install bolt and tighten nut to 12-15 pound-inches torque.

(n) On fasteners with holes, install cotter pin. Torque may be increased to 25 pound-inches for hole alignment.

(o) Install locking clips on turnbuckles of cables NWSA and NWSB.

(p) Remove all rigging pins.
  1) Check that rigging pin 1 is removed from quadrant (View 2).
  2) Check that rigging pin 2 is removed from steering wheel drum (View 4).
  3) Check that both rigging pins 3 are removed from rudder pedal arms (View 5).
  4) Check that rigging pin 4 is removed from steering metering valve crank (Detail A).

(q) Release piston position quadrant and rotate quadrant clockwise to align with rod end of piston position spring cartridge.

(r) Install piston position spring cartridge (View 1).

NOTE: When performing step (q), install washers in same position as observed when removed.

(s) Test nose wheel steering system per Par. 2.

(t) Lower airplane and remove jacks (Ref Chapter 7).

2. Nose Wheel Steering System Test

A. General

(1) The nose wheel steering system is tested to determine if steering rate, steering wheel centering, piston positioning, and angle of travel are within required limits and the system is free of malfunctions and leaks. Prior to conducting the tests, the nose wheel piston positioning and steering systems and the rudder control system must be properly adjusted.

(2) Prior to conducting the tests, the hydraulic system shall have been serviced per Chapter 12 and the nose wheel steering system properly rigged.

(3) Whenever the nose gear steering hydraulic system is opened for servicing, it is important that the system be bled completely to assure effective shimmy damping. This can be accomplished by pressurizing the A hydraulic system per Chapter 29, and exercising the steering system through at least 15 complete cycles from full left to full right.

B. Equipment and Materials

(1) Nose Gear Rigging Protractor - TE65-73762 or F80184-1
(2) Stop watch
(3) Spring scale - calibrated from 0 to 25 pounds
(4) Greased turning plates to allow nose wheels to steer
(5) Ground Lock Assembly (Ref 32-00-01)

C. Prepare to Test Nose Wheel Steering System

(1) Check that ground lock assembly is installed in nose gear (Ref 32-00-01).

(2) Center nose wheels
   (a) On airplanes without centering markers (Ref SB 32-1117), jack nose of airplane until nose gear tires clear ground and shock strut is fully extended (Ref Chapter 7).

      CAUTION: TAKE CARE NOT TO OPERATE STEERING WHEEL WITH SHOCK STRUT FULLY EXTENDED AND TORSION LINKS CONNECTED OR DAMAGE TO SHOCK STRUT CENTERING CAMS MAY RESULT. CHECK THAT SHOCK STRUT IS COMPRESSED 2.10 INCHES OR MORE BEFORE OPERATING STEERING SYSTEM. DISTANCE BETWEEN BOTTOM SURFACE OF LOWER STEERING PLATE AND TOP SURFACE OF TOWING LUG MUST BE LESS THAN 21.90 INCHES.

   (b) On airplanes with centering markers (Ref SB 32-1117) jack nose wheels of airplane using axle jack until nose gear tires clear ground (Ref Chapter 7).
(3) On airplanes without anti-rotation bolt, remove retaining bolt from upper torsion link pin.
(4) Install nose gear rigging protractor and adjust protractor to zero with shock strut centered.

   NOTE: On airplanes without centering markers, to obtain nose gear centering, shock strut may require pressurizing for extension (apply 200 psi maximum) and manual assist for centering nose gear in detent of centering cam. Cam detent may not be positive. (Interface tolerance may allow +1 degree backlash.) If backlash does exist, adjust nose gear rigging protractor to midposition of detent.

(5) Position greased turning plates under nose gear tires and lower airplane so that weight of airplane is supported by landing gear.
(6) Pressurize hydraulic system A (Ref 29-11-0, Maintenance Practices).
(7) Check that nose gear does not attempt to steer when hydraulic system A is pressurized.

D. Test Nose Wheel Steering System
(1) Check that steering wheel is in neutral (centered) position.
(2) Check that rudder pedals are in neutral position.

   NOTE: When performing steps (1) and (2), use rigging pin holes for alignment reference but do not leave any rigging pins installed.

(3) Rotate steering wheel counterclockwise to left stop position and hold.
   (a) Check that nose gear steers to left 78 (+1/-2) degrees.

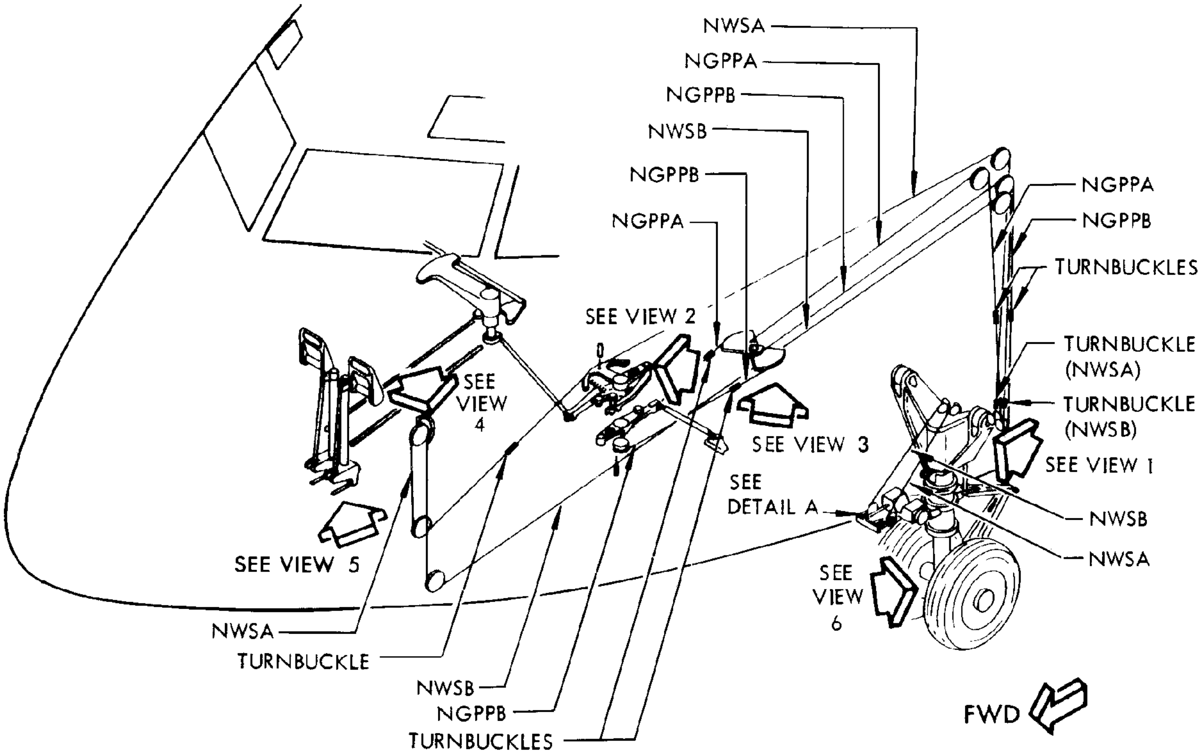


TABLE I [1]	
TEMPERATURE °F [2]	RIG LOAD (LBS) [3]
130	56
110	51
90	46
70	40
50	35
30	29
10	24
-10	18
-22	15 [4]
-30	13 [4]
-40	10 [4]

[1] RIG LOADS WHEN INSIDE AND OUTSIDE TEMPERATURES OF AIRPLANE ARE THE SAME.

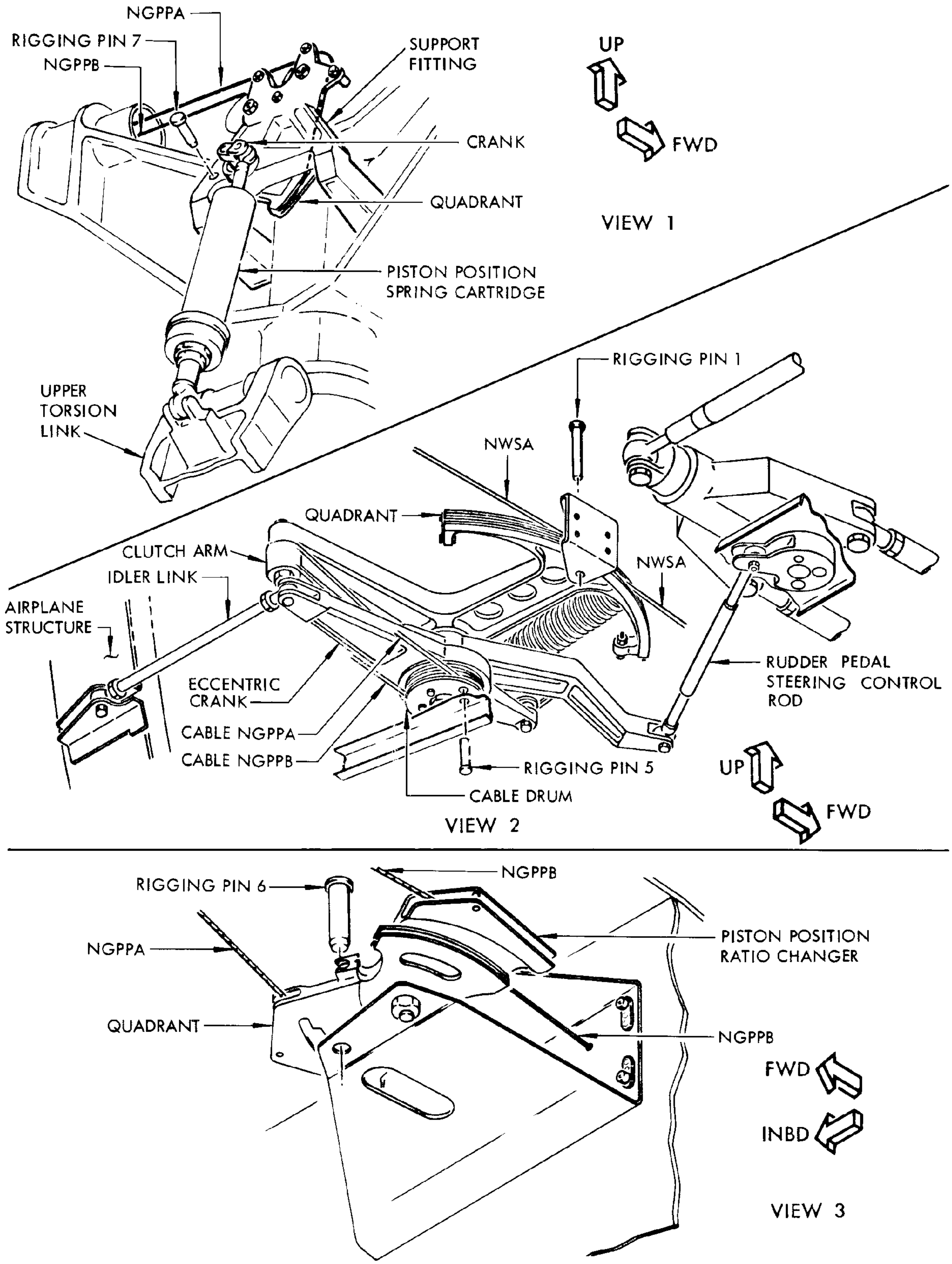
[2] AMBIENT TEMPERATURE (°F) OF AIRPLANE WITHIN ± 5°F. AMBIENT TEMPERATURE SHOULD BE STABLE FOR ONE HOUR PRIOR TO RIGGING.

[3] CABLE LOADS MUST BE WITHIN (+10/-0) POUNDS OF VALUES SHOWN WHEN SYSTEM IS BEING RIGGED. AFTER INITIAL RIGGING, ANY DEVIATION OF (+15/-5) POUNDS, AT 22°F OR ABOVE, SHALL REQUIRE THAT THE SYSTEM BE RERIGGED.

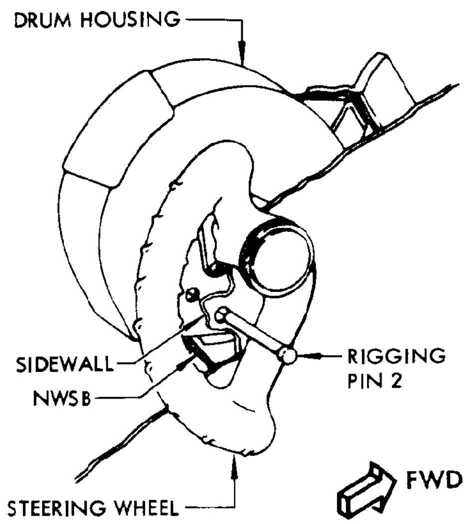
[4] AT TEMPERATURES BELOW -22°F, MINIMUM ALLOWABLE CABLE LOAD SHALL BE 10 POUNDS.

TABLE 1

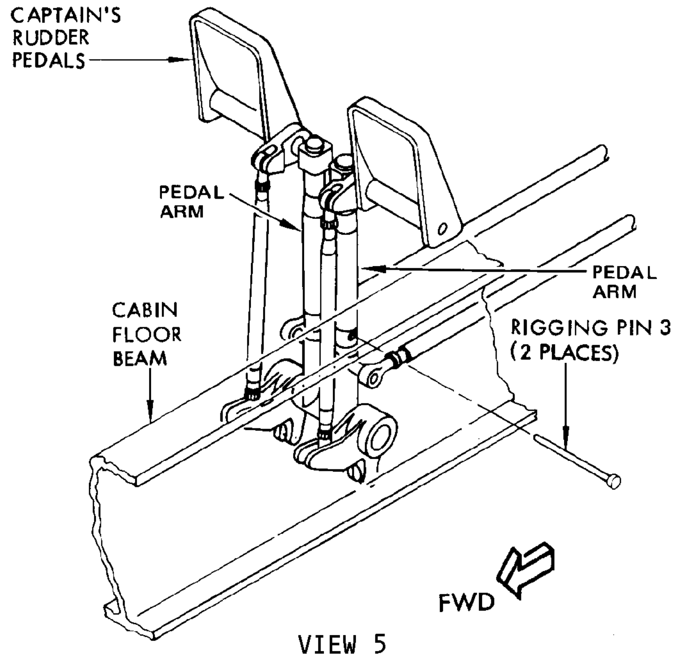
Nose Wheel Steering Adjustment
Figure 501 (Sheet 1)



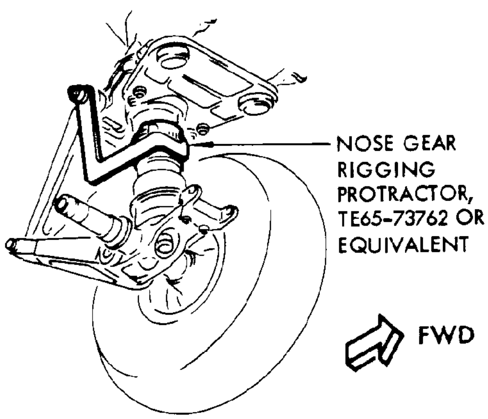
Nose Wheel Steering Adjustment
Figure 501 (Sheet 2)



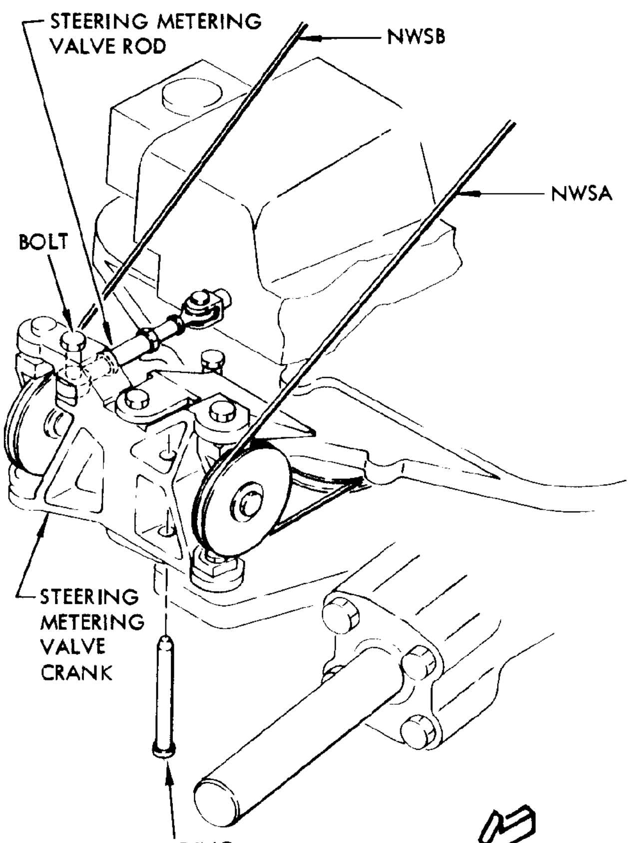
VIEW 4



VIEW 5



VIEW 6



DETAIL A

Nose Wheel Steering Adjustment
Figure 501 (Sheet 3)

(b) Check that the piston position spring cartridge clears all structure throughout travel.

NOTE: It is permissible for the spring cartridge rod ends to contact the inner surfaces of mating clevises.

(c) Check that steering piston rods clear steering collar at all nose gear piston positions.
(d) Check that all pulleys, quadrants, and components are operating freely and that there is no evidence of binding or galling throughout the system.

(4) Release steering wheel.
(a) Check that steering wheel returns to neutral position.
(b) Check that nose gear returns to centered position within + 1-1/4 degrees.

(5) Rotate steering wheel clockwise to right stop position and hold.
(a) Check that nose gear steers to right 78 (+1/-2) degrees.
(b) Repeat steps (3)(b) through (3)(d) for nose gear right.

(6) Release steering wheel.
(a) Check that steering wheel returns to neutral position.
(b) Check that nose gear returns to centered position within + 1-1/4 degrees.

(7) Rotate steering wheel counterclockwise sufficiently to steer nose gear left 70 (+ 5) degrees and hold.

(8) Attach spring scale to steering wheel and check that load on steering wheel rim required to initiate further left steering to 78 (+1/-2) degrees does not exceed 13 pounds.

(9) Repeat steps (7) and (8) but steer nose gear to right. Result should be same.
(a) Remove spring scale from steering wheel.

(10) Rotate steering wheel as rapidly as possible counterclockwise to left stop position and hold.
(a) Check that total time required for nose gear to steer from centered position to stop position does not exceed 6 seconds.
(b) Check that there is no evidence of chatter or erratic operation.

(11) Release steering wheel.

(12) Repeat steps (11) and (12) but steer nose gear to right. Results should be same.

(13) Slowly push left rudder pedal forward until nose gear steering movement is first noted. Check that rudder pedal travel does not exceed 0.85 inch.

(14) Repeat step (14) but use right rudder pedal. Result should be same.

(15) Push left rudder pedal forward until rudder quadrant stop is contacted. Check that nose gear steers left 7-1/4 +1 degrees.

(16) Release rudder pedal.
   (a) Check that rudder pedals return to neutral position.
   (b) Check that nose gear returns to centered position within + 1-1/4 degrees.
(17) Repeat steps (16) and (17) but steer nose gear to right. Results should be same.
(18) Jack nose of airplane until nose gear tires clear ground.
(19) Operate rudder pedals and check that nose gear does not steer.

E. Restore Airplane to Normal Configuration
(1) Remove nose gear rigging protractor.
(2) On airplanes without anti-rotation bolt, install retaining bolt in upper torsion link pin.
(3) Remove greased turning plates.
(4) Lower airplane and remove jacks (Ref Chapter 7, Jacking Airplane).
(5) Determine if there is further need for hydraulic power on airplane; if not, shut down source.

F. Check towing provision (airplane with steering depressurization valve)
(1) Disconnect torsion links at apex pin.
(2) Check that rudder pedal, rudder trim, upper torsion link and nose gear steering wheel are in neutral (centered) position.
(3) Pressurize hydraulic system A (Ref Chapter 29).

CAUTION: IF STEERING COLLAR (UPPER TORSION LINK) IS NOT ALIGNED WITH STEERING WHEEL, IT WILL MOVE TO POSITION DICTATED BY STEERING WHEEL.

(4) Depress steering depressurization valve and insert lockpin in tow pin hole.
(5) Using upper torsion link, rotate steering collar to left and right 15 +5 degrees. Check there is no undue resistance except for normal friction.

NOTE: Pilot's steering wheel must be free to rotate.

(6) Depressurize hydraulic system A (Ref Chapter 29).
(7) Position upper torsion link over lower torsion link.
(8) Connect torsion links at apex pin.
(9) Remove lockpin from steering depressurization valve.

STEERING METERING VALVE - REMOVAL/INSTALLATION

1. Equipment and Materials
   A. Tensiometer
   B. Rigging Pin - 5/16 inch diameter

      NOTE: Rigging pin is part of F70207-61.

   C. Greased turning plates to allow nose wheels to steer
   D. Nose Gear Rigging Protractor - F80184-1 (preferred), TE65-73762 (optional)
   E. Toluene for softening and removing silicone sealant (Ref 20-30-31)
   F. Dow Corning RTV 1200 Primer (Ref 20-30-11)
   G. Semco sealant gun
   H. Solution of 15% to 20% isopropyl alcohol and distilled water solution
   I. Polyethylene squirt bottle for dispensing alcohol-distilled water solution
   J. Silicone Sealant - RTV 3145 or RTV 162
   K. Wooden or plastic spatula for removing old and applying new sealant
   L. Small brush for applying primer
   M. Clean pieces of white cloth, new or laundered, containing less than 0.75% oil (carbon tetrachloride extraction) and free of silicone
   N. Ground Lock Assembly (Ref 32-00-01)
   O. Special Wrench C32043
2. Remove Steering Metering Valve
   A. Check that ground lock assembly is installed in nose gear (Ref 32-00-01).
   B. Remove cover (l, Fig. 401).
   C. Depressurize A hydraulic system (Ref Chapter 29).
   D. Disconnect hydraulic lines and cap both lines and valve fittings.
   E. Install rigging pin in steering metering valve crank (Detail B).
   F. Disconnect metering valve input rod (3).
   G. Remove two bracket attach bolts (12).

   H. Remove fillet of sealant from junctions of retainer nuts (5) and steering cylinder above upper trunnion locknuts (8) with toluene, to soften sealant, using a plastic or wooden spatula. Old sealant must be removed prior to priming the application of new sealant when retainer nuts are reinstalled.
   I. Remove lockwire from retainer nuts (5).
   J. Loosen retainer nuts (5).

      NOTE: On airplanes having swivel bolts and jam nuts, remove circlips and raise valve to gain access to retaining nuts.

   K. Remove three attach bolts (2) at base of valve (4).

L. Remove valve (4) and bracket (14).

CAUTION: REMOVING STEERING METERING VALVE WILL EXPOSE HYDRAULIC PASSAGES. CARE SHOULD BE TAKEN TO PREVENT CONTAMINATION, SUCH AS SAND AND DIRT, FROM ENTERING THE OPEN PASSAGES. DO NOT REMOVE SWIVELS FROM STEERING METERING VALVE.

3. Install Steering Metering Valve

A. Fill valve with hydraulic fluid and cap fittings and install new O-rings (7, Fig. 401) on sleeves (6) between metering valve (4) and cylinder (9).
B. On airplanes having swivel bolts and jamnuts (SB 32-1139), loosen metering valve swivel jamnuts and align valve ports with ports in steering cylinder trunnion.
C. Position valve (4) with bracket (14) and install three attach bolts (2) in flange at base of valve (4). On airplanes having swivel bolts and jamnuts, remove circlips and raise valve to gain access to retaining nuts (5).
D. Tighten retainer nuts (5) 50 to 100 pound-inches and lockwire.
E. On airplanes having swivel bolts and jamnuts, tighten swivel jamnuts finger tight and lockwire.
On other airplanes, install circlips.

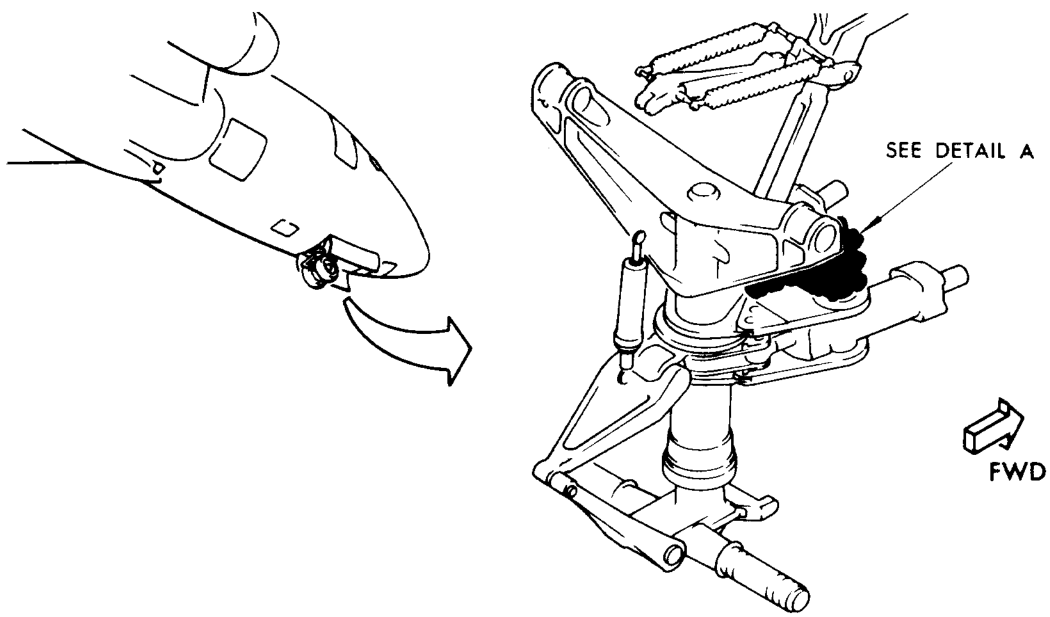
NOTE: A gap between the swivel and the valve body is normal in the metering valve installation.

F. Clean area around retainer nuts (5) for new sealant fillet using a new or laundered white cloth and toluene.
G. Apply thin brush coat of primer to seal area of retainer nuts (5) and allow a minimum of 1/2 hour drying time before applying sealant.
H. Apply sealant fillet.
(1) Apply bead of sealant around retainer nuts (5) with a sealant gun.
(2) Work fillet onto surface with spatula or sealant gun tip. Minimize bubbles as much as possible when forming fillet.

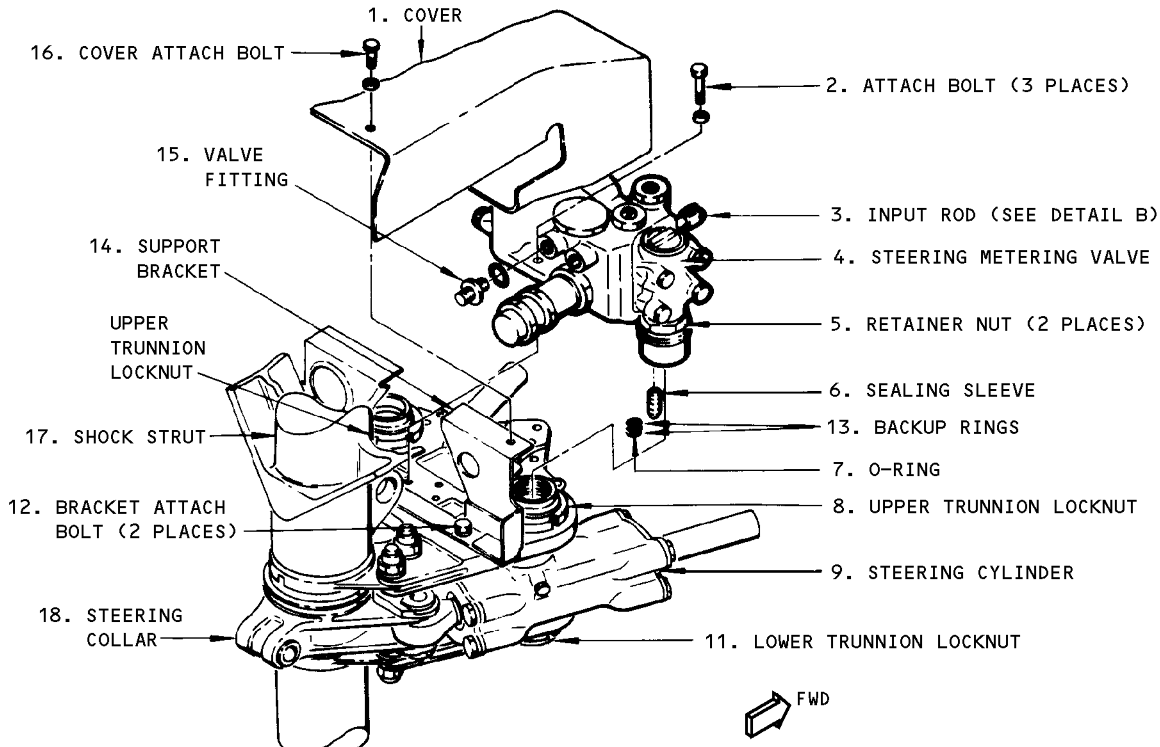
NOTE: A solution of 15 to 20% isopropyl alcohol in distilled water may be applied to the tool, used to form fillet, to prevent sealant from sticking to the tool. Water alcohol solution is to be kept free of contamination by using from polyethylene squirt bottles.

I. Form fillet a minimum of 0.08 inch thick at junction of retainer nuts (5) and steering cylinder above upper trunnion locknuts (8).

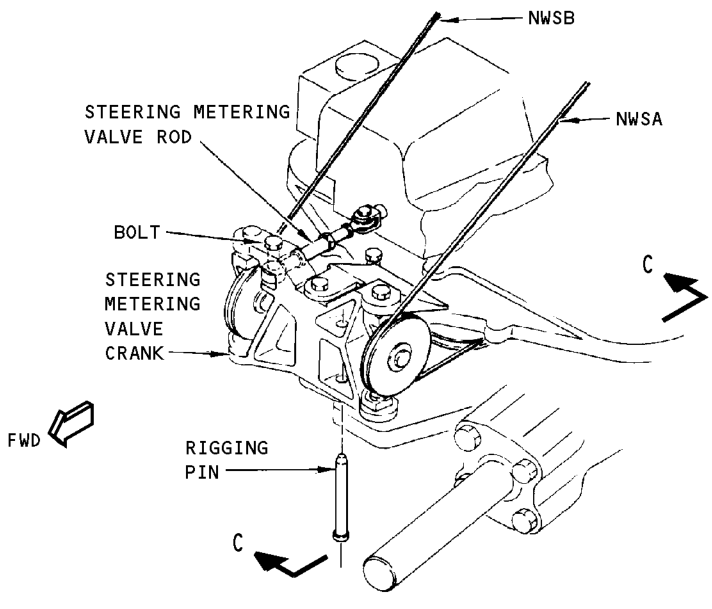
NOTE: A surface skin forms on sealant a few minutes after sealant is exposed so forming of fillet must be done immediately after sealant is applied.



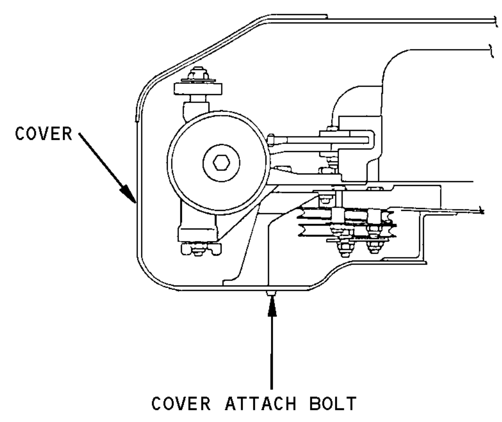
Steering Metering Valve Installation
Figure 401 (Sheet 1)



DETAIL A



DETAIL B



VIEW C-C

Steering Metering Valve Installation
Figure 401 (Sheet 2)

J. Connect metering valve input rod attach bolt (3). Input rod attach bolt (3) should be free to move indicating steering system is rigged to valve neutral position.
K. Adjust length of valve rod so that bolt fits freely in valve crank.
   (1) Loosen jamnuts to disengage locking keys.
   (2) Hold loose rod end and turn coupling to change length of rod as required.
   (3) Tighten jamnuts and lockwire.
L. Install bolt and tighten nut to 12-15 pound-inches torque.
M. On fasteners with holes, install cotter pin. Torque may be increased to 25 pound-inches for hole alignment.
N. Remove rigging pin from steering metering valve crank.
O. Remove caps and fittings and connect hydraulic lines to metering valve.
P. Test nose wheel steering system per 32-51-0 and check for leaks.
Q. Install cover (1).

RUDDER PEDAL STEERING MECHANISM - REMOVAL/INSTALLATION

1. Equipment and Materials
   A. Ground Lock Assembly - F72735 (Ref 32-00-01)
2. Remove Rudder Pedal Steering Mechanism
   A. Ensure ground lock assembly is installed in nose gear (Ref 32-00-01).
   B. Reduce tension to zero on cables NWSA, NGPPA and NGPPB at the turnbuckles. Gain access to NWSA cable through access panel 1103 and to NGPPA and NGPPB through access panel 3124 (Ref Chapter 12, Access Doors and Panels).
   C. Disconnect rod assembly A (18, Fig. 401) at structure.
   D. Disconnect rod assembly B (10) at steering arm (5).
   E. Remove cable retainer bolt (22) on end of quadrant (Fig. 401, View 2).
   F. Remove retainer (21) from cable end and reinstall retainer (21) and bolt (22) on quadrant (23).
   G. Disconnect cables NGPPA and NGPPB at the turnbuckles (A, Fig. 401).
   H. Remove cotter key (1) and remove nut (20) from mount bolt (13) on upper mounting (19) bracket.
   I. Support mount bolt (13), straighten tabs on inverted bolt retainer (12) and remove bolt (13).
   J. Remove rudder pedal steering mechanism complete with cables NGPPA and NGPPB.
   K. Remove inverted bolt retainer (12) and discard.
3. Install Rudder Pedal Steering Mechanism
   A. Position a new inverted bolt retainer (12, Fig. 401, View 1).
   B. Position rudder pedal steering mechanism complete with cables NGPPA and NGPPB.

      NOTE: Check that there is sufficient clearance between clutch crank and end of bolt securing rudder pedal steering quadrant to clutch arm.

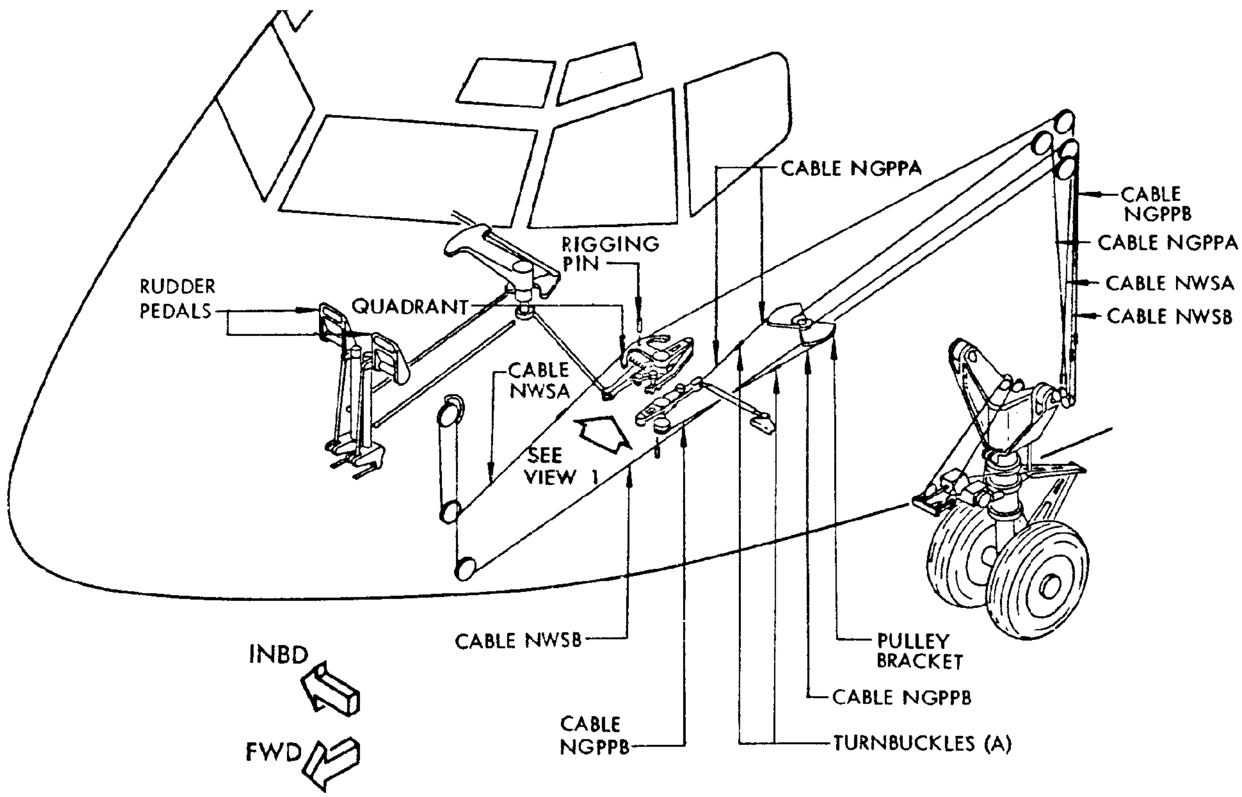
   C. Install mount bolt (13), nut (20), and cotter key (1).
   D. Bend retainer tabs to retain mount bolt (13).
   E. Thread cables NGPPA and NGPPB through fairleads and connect at turnbuckle.
   F. Remove cable retainer bolts (22) and cable retainers (21).
   G. Position NWSA cables in cable retainers (21) and install cable retainers.
   H. Tighten locknuts and connect rod assembly A (18) to structure.

I. Tighten jamnuts and connect rod assembly B (10) to steering arm.

CAUTION: END OF ROD END MUST COVER AT LEAST ONE HALF OF INSPECTION HOLES IN CONTROL ROD ASSEMBLY. A MINIMUM OF THREE THREADS MUST BE EXPOSED OUTSIDE LOCKNUT ON CONTROL ROD AT CRANK END TO PREVENT INTERFERENCE AND POSSIBLE ROD FAILURE.

NOTE: On airplanes with 3 hole arm, connect rod assembly to center hole.

J. Tension cables and adjust system per 32-51-0, Nose Wheel Steering - Adjustment Test.
K. Check operation per 32-51-0, Nose Wheel Steering System - Adjustment/Test.
L. Install access panel 3124.



Rudder Pedal Steering Mechanism Installation
Figure 401 (Sheet 1)

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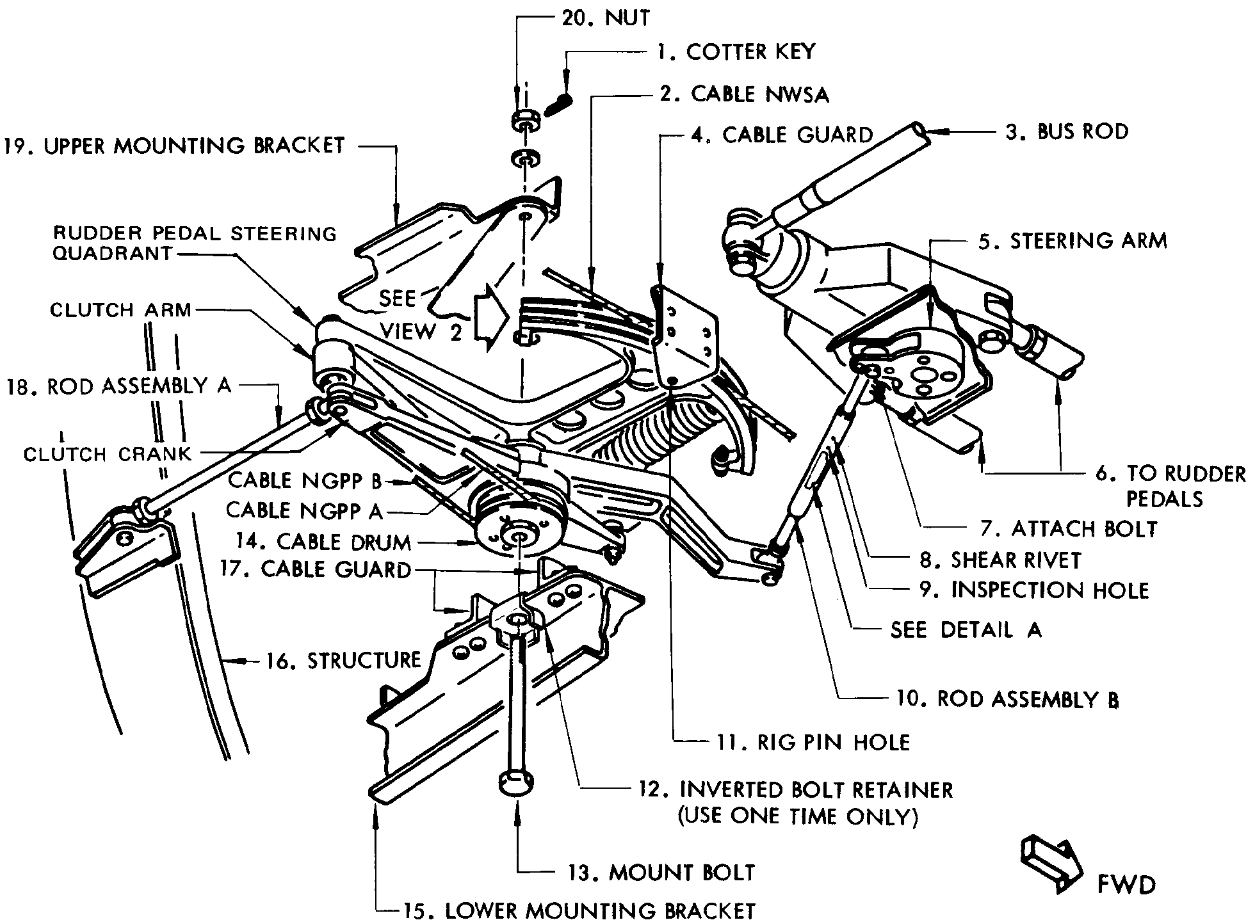
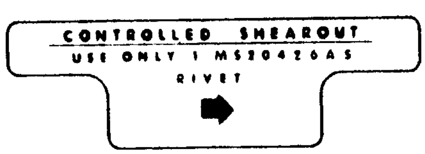
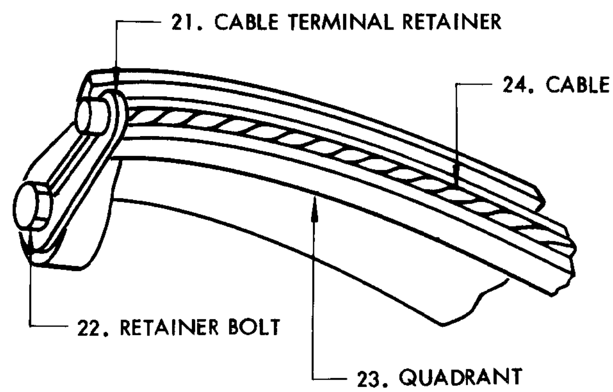


VIEW 1



DETAIL A



VIEW 2

Rudder Pedal Steering Mechanism Installation
Figure 401 (Sheet 2)

STEERING SYSTEM CABLES - REMOVAL/INSTALLATION

1. General
   A. All piston position cables can be removed according to this section except for NGPPA(E) and NGPPB(C). These are cables attached to the drum which must be removed by removing the complete rudder pedal steering assembly per AMM 32-51-21. Refer to Overhaul Manual for disassembly of rudder pedal steering assembly.
   B. The correct orientation of the nosewheel steering pulley bolt can be verified in this section.
2. Removal/Installation Piston Position Cables
   A. Equipment and Materials
      (1) Rigging Pins - MS20392, 5/16-inch diameter (2 required)
      (2) Ground Lock Assemblies - F72735 (AMM 32-00-01)
      (3) G02166 Lockwire - Nickel-Copper Alloy (Monel)(0.020 inch diameter) (NASM20995NC20)

         NOTE: Rigging pins are part of F70207-3.

      (4) Spanner Wrench - AN8514-7
   B. Prepare Piston Position Cables for Removal (Fig. 402)
      (1) Check that nose and main ground lock assemblies are installed (AMM 32-00-01).
      (2) Jack nose of airplane until nose gear tires clear ground (Chapter 7, Jacking).
      (3) Remove aft access panel from left nose wheel well bulkhead to gain access to nose gear piston position cable (NGPPA, NGPPB) turnbuckles (42).
      (4) Install rigging pins in cable drum (32) and piston position cable quadrant (24).
   C. Remove Piston Position Cables (Fig. 402)
      (1) Loosen piston position cables (NGPPA and NGPPB) at their respective turnbuckles (42) outside the wheel well left bulkhead.
      (2) Disconnect nose gear piston position cables NGPPA(M) and NGPPB(N).
         (a) Remove cotter pins at ends of cable terminals (25) on each side of the piston position cable quadrant (24).
         (b) Remove cable guards (27, 23) and detach cable ends from quadrant at the shock strut.

            NOTE: Terminal (25) is shown removed from its groove in quadrant (24) as cable turnbuckles (42) have been loosened. Removal is typical on each side of quadrant.

      (3) Remove cap screw (10) and nut lock (9).
      (4) Remove left trunnion pin nut (7) using spanner wrench.

(5) Pull pressure seal (14) inboard from inboard end of left trunnion pin (8).

NOTE: The eye of the eyebolt (16) which holds pressure seals segments (14) together may be used to pull seal from trunnion pin (8).

(6) Remove ring (17) and eyebolt (16) to remove pressure seal retainers (13, 15) from pressure seal segments (14) and separate segments from around piston position cables.
(7) Pull cables through left trunnion pin (8).
(a) Remove NGPPA and NGPPB cable guards outside of wheel well left bulkhead, so cables can be pulled through pulley bracket.
(8) Pull cables through nut (7), ring (17), trunnion pin.
(9) Remove cotter keys (26) from upper and lower groove flanges in the forward piston position quadrant (27).

D. Install Piston Position Cables
(1) String replacement cables through fairleads.

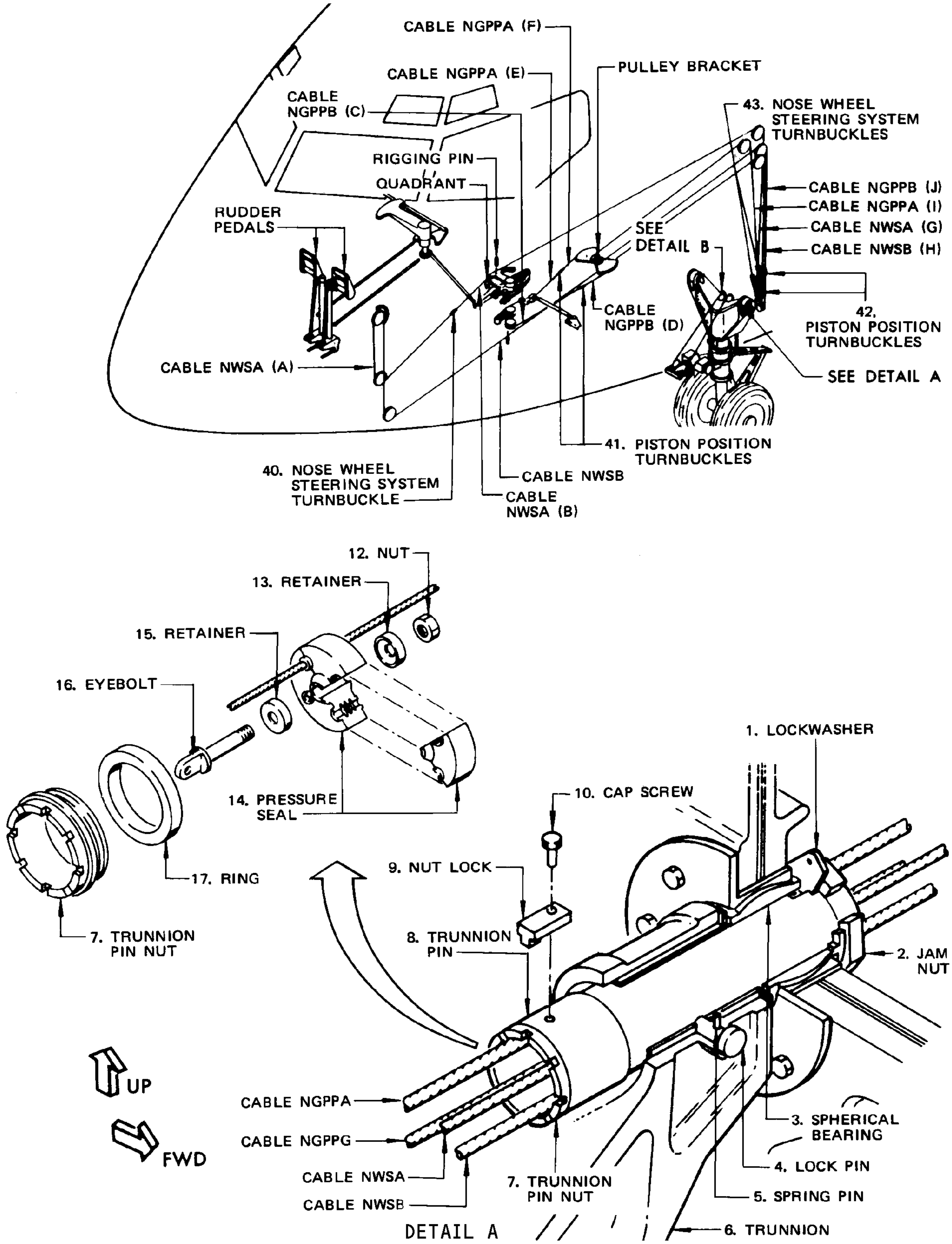
NOTE: For cable length and fittings, see chart on Fig. 403. For general cable installation information, refer to control cables, Chapter 27.

(2) Connect nose gear piston position cables NGPPA, NGPPB.
(a) Feed piston position cables NGPPA(M) and NGPPB(N) through left trunnion pin, each half of pressure seal retainer ring (13, 15), inboard left trunnion pin nut (7), and through their respective cable pulley brackets to the piston position cable quadrant on aft side of shock strut (37).
(b) Install cable guards (22, 23) which were removed when cables were disconnected.
(c) Insert cable terminals (25) in their respective recesses in quadrant (27) and install terminal retaining cotter pins in holes at end of recesses.
(3) Connect cables to their respective turnbuckles (41, 42).
(4) Adjust piston position system per AMM 32-51-0/501, Nose Wheel Steering System.
(5) Install locking clips in turnbuckles.

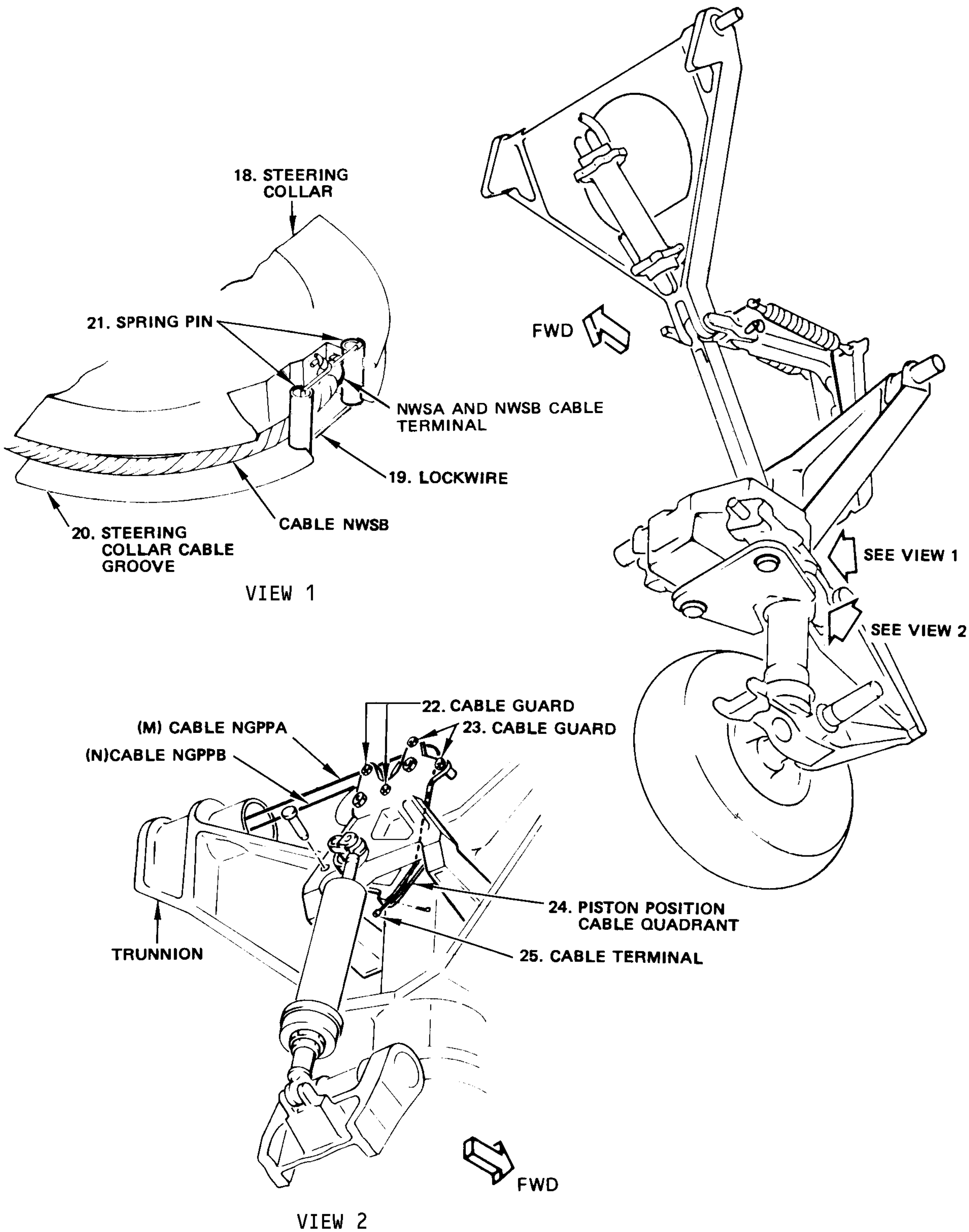
3. Removal/Installation Steering System Cables

A. Equipment and Materials
(1) Refer to par. 2A.

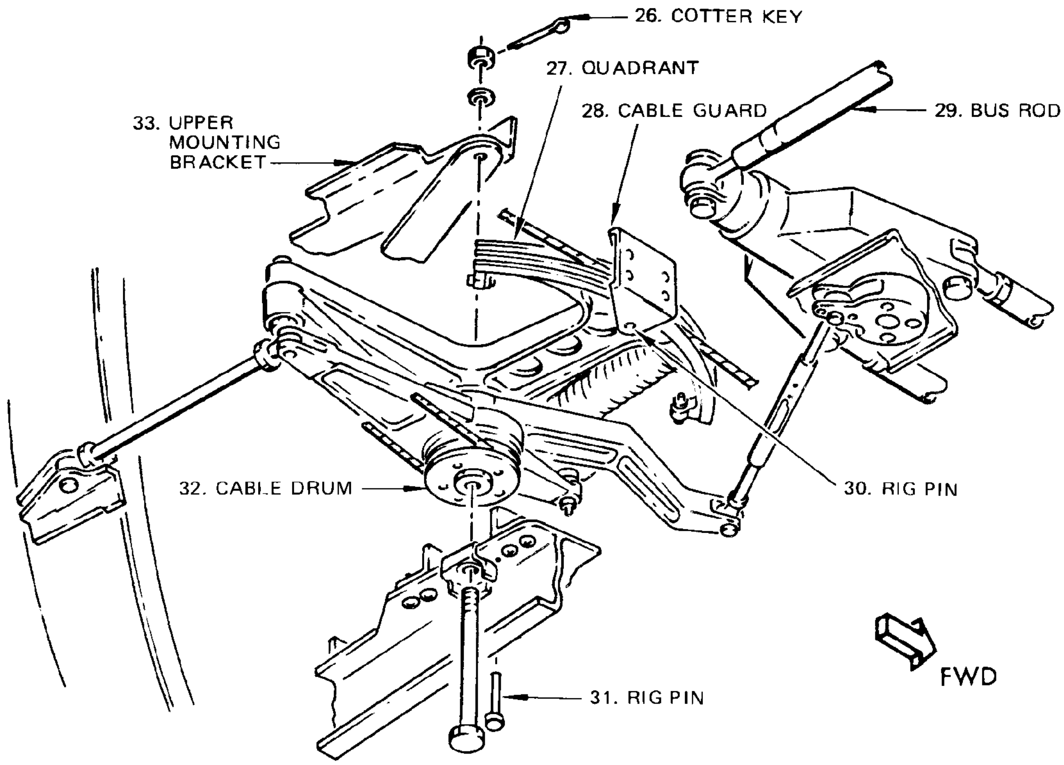
B. Prepare Steering System Cables (NWSA, NWSB) for Removal (Fig. 402)
(1) Check that nose and main ground lock assemblies are installed (AMM 32-00-01).
(2) Install rigging pins in quadrant (27) and in steering wheel.



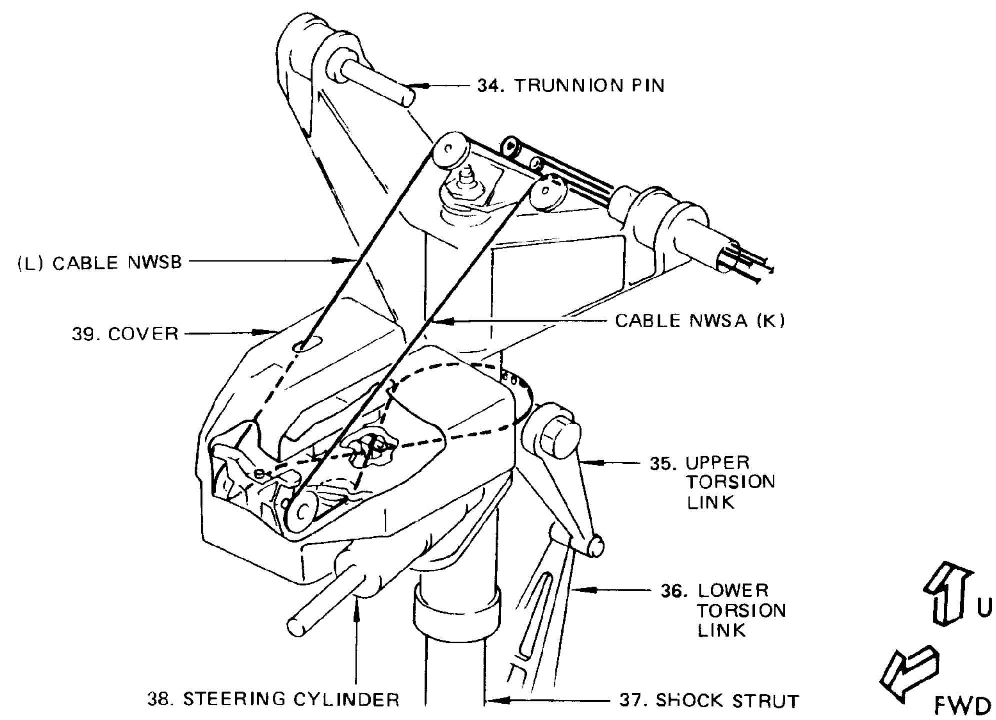
Steering System Cables Installation
Figure 401 (Sheet 1)



Steering System Cables Installation
Figure 401 (Sheet 2)



VIEW 3



DETAIL B

Steering System Cables Removal/Installation
Figure 402

(3) Remove aft access panel from left nose wheel well bulkhead to gain access to nose wheel steering (NWSA, NWSB) turnbuckles (40, 43).
(4) Check that the right and left cable guards are 0.015 to 0.045 inch from steering collar pulley. Adjust if necessary (AMM 32-51-51/401).
(5) Loosen turnbuckles (40, 43).

C. Remove Steering System Cables (Fig. 402)
(1) Disconnect nose wheel steering cables.
(2) Remove lockwire (19) from spring pins (21) at NWSA and NWSB cable terminal ends which lie in groove in the steering collar (18).
(3) Remove spring pins (21).
(4) Remove NWSA and NWSB cable terminals from groove in steering collar (18).
(5) Remove left trunnion pin nut (7) using spanner wrench.
(6) Pull pressure seal (14) inboard from inboard end on left trunnion pin (8).
(7) Remove ring (17) and eyebolt (16) to remove pressure seal retainers (13, 15) from pressure seal segments and separate segments from around steering cables.
(8) Pull cables through left trunnion pin (8).
(9) Remove NWSA, NWSB cable guards (22, 23) outside of wheel well left bulkhead, so cables can be pulled through pulley bracket.
(10) Pull cables NWSA(G), NWSB(H) through nut (7), ring (17) trunnion pin.
(11) Remove cable end fittings on upper plate.
(12) Remove cable guard (28) on quadrant (27) and remove cables.
(13) Remove steering cables NWSA(A), NWSB(H) from steering wheel.

D. Install Steering System Cables (NWSA, NWSB) (Fig./401 and /404)
(1) Verify that the outboard steering pulley bolt head is facing outboard.
(2) String replacement cables through fairleads.

NOTE: For cable length and fittings see chart on Fig. 403. For general cable installation information, refer to Chapter 27, Control Cables.

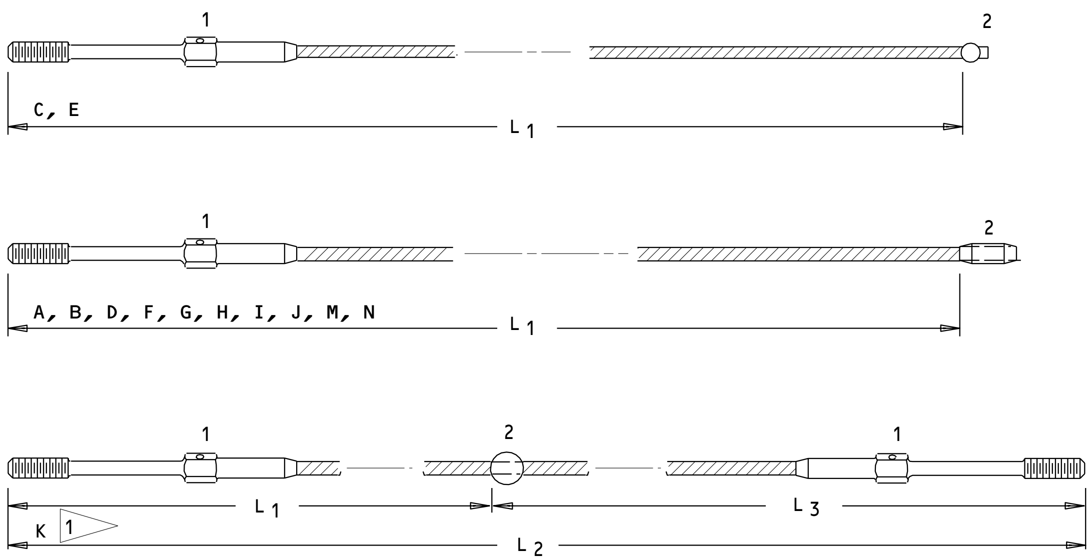
(3) Connect nose wheel steering system cables (NWSA, NWSB).
(4) Feed steering cables NWSA(K), NWSB(L) through left trunnion pin, each half pressure seal retainer ring (13, 15), inboard left trunnion pin nut (8), and through their respective cable pulley brackets to steering collar (18).
(5) Install cable guards which were removed when cables were disconnected.
(6) Insert steering cable terminal for NWSA(K), NWSB(L) in either recess groove on aft side of steering collar (18).
(7) Install spring pins (21) in holes provided in steering collar (18).
(8) Lockwire spring pins.
(9) Install cable end fittings on upper plate.
(10) Install cables on quadrant (27).

(11) Install cables on steering wheel.
(12) Connect cables to their respective turnbuckles (40, 43) and adjust nose wheel steering system per AMM 32-51-0/501, Nose Wheel Steering System.
(13) Install locking clips in turnbuckles.

CABLE REF	FUNCTION	NO. REQ	LENGTH (INCHES) 2	CABLE SIZE	FITTINGS 1	FITTINGS 2
A	NWSA	1	L_1 52.5	3/32, 7X7	MS21260L3LH	BACT14A3
B	NWSA	1	L_1 17.3	3/32, 7X7	MS21260L3RH	BACT14A3
C	NGPPB	1	L_1 11.0	3/32, 7X7	MS21260L3RH	BACT14B3
D	NGPPB	1	L_1 10.0	3/32, 7X7	MS21260L3LH	BACT14A3
E	NGPPA	1	L_1 9.7	3/32, 7X7	MS21260L3LH	BACT14B3
F	NGPPA	1	L_1 9.5	3/32, 7X7	MS21260L3RH	BACT14A3
G	NWSA	1	L_1 77.6	3/32, 7X7	MS21260L3LH	BACT14A3
H	NWSB	1	L_1 137.1	3/32, 7X7	MS21260L3RH	BACT14A3
I	NGPPA	1	L_1 44.5	3/32, 7X7	MS21260L3RH	BACT14A3
J	NGPPB	1	L_1 46.3	3/32, 7X7	MS21260L3LH	BACT14A3
K	NWSB NWSA	1	L_1 87.7 * L_2 166.3 L_3 78.6	3/32, 7X7	MS21260L3LH MS21260L3RH	BACT14B3
M	NGPPA	1	L_1 51.1 *	3/32, 7X7	MS21260L3LH	BACT14A3
N	NGPPB	1	L_1 48.8 *	3/32, 7X7	MS21260L3RH	BACT14A3

CABLE MATERIAL: CARBON STEEL PER MIL-W-83420, TYPE I, COMPOSITION A
* STAINLESS STEEL PER MIL-W-83420, TYPE I, COMPOSITION B
OPTIONAL - CARBON STEEL PER MIL-W-1511

NOTE: DO NOT MIX TIN-ZINC (TZ) COVERED CABLES WITH OTHER TYPE CABLES ON THE SAME AIRPLANE BECAUSE TZ CABLES HAVE A DIFFERENT STRETCH RATE THAN OTHER CABLES.



1 SINGLE TERMINAL CABLE

2 REFERENCE ONLY. FOR SPECIFIC PART NUMBER, LENGTH, MATERIAL, AND END FITTINGS, REFER TO CURRENT IPC

Steering System Cables
Figure 403

STEERING CABLES - INSPECTION/CHECK

1. Steering Cables Inspection
   A. Examine Steering Cables
      (1) Check steering cables for fraying and corrosion.
      (2) Examine cable seals for deterioration, out-of-round wear, and insecurity of mounting rings.
      (3) Check pulley brackets for cracks, distortion and loose mounting bolts.
      (4) Check pulleys and fairleads for cracks, looseness and misalignment.
      (5) Check cables for specified rigging.
      (6) Examine steering cables for wear.

      NOTE: Cable wear conditions are illustrated in AMM 27-09-111.

CABLE	CABLE SIZE	ALLOWABLE PERCENT WEAR OF OUTER WIRES BEFORE REPLACEMENT
STEERING CABLES NWSA, NWSB, NGPPA AND NBPPB	3/32 7x7	50

NOTE: Do not mix tin-zinc (TZ) covered cables with other type cables on the same airplane because TZ cables have a different stretch rate than other cables.

STEERING WHEEL AND CABLE DRUM - REMOVAL/INSTALLATION

1. Equipment and Material
   A. Cable tensiometer
   B. Rigging pin - 5/16 inch diameter

      NOTE: Rigging pin is part of F70207-3.

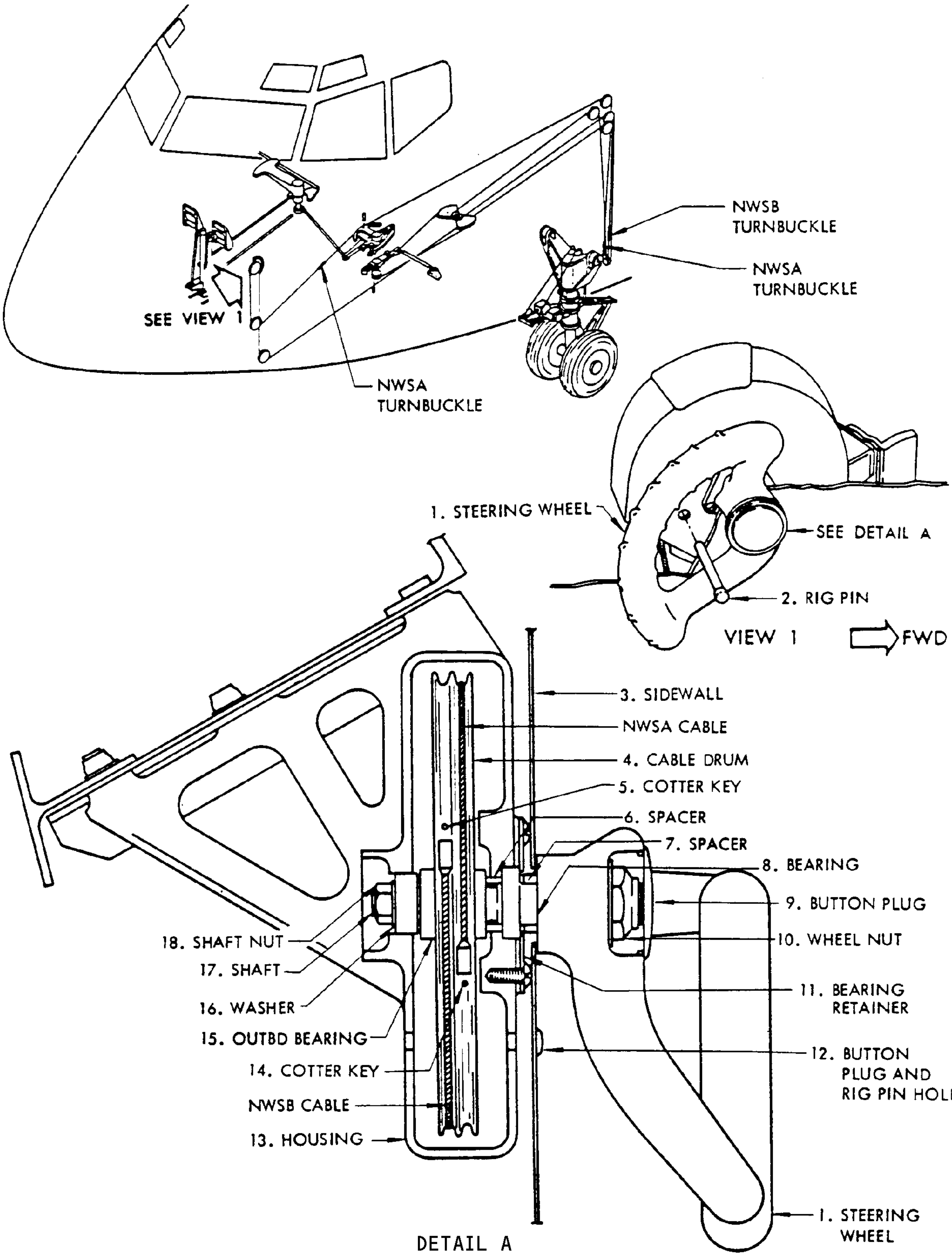
   C. Ground Lock Assembly - F72735 (Ref 32-00-01)
2. Remove Steering Wheel and Cable Drum
   A. Ensure ground lock assembly is installed in nose gear (Ref 32-00-01).
   B. Loosen cable tension at turnbuckles in cables NWSA and NWSB. Gain access through panel 1103 (Fig. 401).
   C. Remove button plug (9) in steering wheel (1).
   D. Remove wheel nut (10).
   E. Remove steering wheel (l) and spacer (7).
   F. Remove sidewall (3) (Ref Chapter 25).
   G. Remove three screws and bearing retainer (11).
   H. Remove cotter key and shaft nut (18).
   I. Support cable drum (4) and pull shaft (17) out sufficient to remove inboard bearing (8) and spacer (6) then remove shaft (17).
   J. Remove cable drum (4).
   K. Remove cotter keys (5 and 14) in cable drum (4) and remove cables NWSA, NWSB.

      NOTE: If necessary to remove housing (13), remove insulation around three bolts and remove bolts.

   L. Remove outboard bearing (15) from housing (13).
3. Install Steering Wheel and Cable Drum
   A. Install outboard bearing (15) in housing (13) (Fig. 401).
   B. Position cables in cable drum (4) and install cotter keys (5, 14).
   C. Position cable drum (4), spacers (6,7), bearing (8), and install shaft (11). Line up index points on splines.
   D. Install washer (16) and shaft nut (18).
   E. Align cotter pin holes and install cotter key.
   F. Install bearing retainer (11) with three screws.
   G. Install sidewall (3) (Ref Chapter 25, Passenger Cabin Lining and Insulation).
   H. Install rig pin (2).
   I. Install steering wheel (1).

      NOTE: The arrow or pointer on the steering wheel should align with arrow on sidewall when rigging pin is installed.

J. Install washer, wheel nut (10) and button plug (9). Tighten to 50-75 lb-in above run-on torque (375 lb-in max).
K. Tension cables as required per adjustment test section 32-51-0.
L. Remove rig pin (2).
M. Check operation of steering system per 32-51-0, steering system adjustment test.



Steering Wheel and Cable Drum Installation
Figure 401

STEERING CYLINDER - REMOVAL/INSTALLATION

1. Equipment and Materials
   A. Grease - BMS 3-33 (Preferred)
   B. Grease - MIL-PRF-23827 (Supercedes MIL-G-23827) (Alternate)
   C. Grease - MIL-G-21164 (Alternate)
   D. Corrosion Preventive Compound - MIL-C-16173C, Grade 2
   E. Rigging pin - .311/.309 -inch diameter

      NOTE: Rigging pin is part of F70207-61.

   F. Ground Lock Assembly (Ref 32-00-01)
   G. Sealant - BMS 5-95 (Ref 20-30-11)
2. Remove Steering Cylinders
   A. Check that ground lock assembly is installed in nose gear (Ref 32-00-01).
   B. Depressurize hydraulic system A (Ref 29-11-0, Maintenance Practices).
   C. Remove metering valve cover (l, Fig. 401).
   D. Remove metering valve (Ref 32-51-11, Removal/Installation).
   E. Disconnect steering cables:
      (1) Install rigging pin in cable drum in sidewall behind cockpit steering wheel.
      (2) Loosen cable NWSA and NWSB tension at turnbuckles. Gain access through panel 1103.

         NOTE: NWSA turnbuckles are located between steering wheel and rudder pedal steering quadrant. The other NWSA turnbuckle is outboard of nose wheel well opposite upper part of shock strut. NWSB turnbuckle is also outboard of nose wheel well.

      (3) Remove torsion link apex bolt.
      (4) Turn torsion link and steering collar approximately 55 degrees left. Remove right hand cable guard (42). Turn steering collar approximately 55 degrees right and remove left cable guard.
      (5) Remove two spring pins (41) in steering collar cable groove (40) on aft side of nose gear shock strut (28).
      (6) Disconnect cables and put cables aside.
   F. Remove steering collar:
      (1) Turn collar (38) approximately 55 degrees left.
      (2) Remove right steering cylinder attach bolt (23) and two steering collar bolt bushings (19, 22).
      (3) Turn collar (38) approximately 110 degrees right.
      (4) Remove left steering cylinder attach bolt and two steering collar bolt bushings.
      (5) Remove forward and aft steering collar halves (21 and 32).
      (6) Remove upper torsion link pin (36) and remove upper torsion link (35).

(7) Remove support plates (9 and 13).
(8) Support steering cylinder assembly and remove upper and lower support plate attach bolts (11 and 17). Remove as unit.
  (a) Remove upper and lower trunnion locknuts (6 and 16).
  (b) Remove steering cylinder assembly (12).
  (c) Separate the steering cylinders (12) from support plates (9 and 13).
(9) Remove forward and aft bearing halves (20 and 30).

NOTE: These bearings are matched pairs. Forward bearing half (20) has a slot fitting onto bracket (20A) key, or aft bearing half (30) has a key (31) fitting into shock strut (28), to prevent bearing from rotating. See Fig. 401 for effectivity.

3. Install Steering Cylinders
A. Clean support plates (9 and 13, Fig. 401) and apply a light coat of grease to all mating or bearing surfaces.

NOTE: Support plates are matched sets. If only one plate is replaced, it must be machined to match the existing plate.

B. Install upper and lower bearings (8 and 14).
C. Position steering cylinders (12) in lower support plates (13).
D. Pack cavities between steering cylinder lower trunnions and lower support plate with corrosion preventive compound.
E. Install washers (15) and start lower trunnion locknuts (16) but do not tighten.
F. Position steering cylinders (12) in upper support plate (9) and pack cavities between upper trunnions and support plate with corrosion preventive compound.
G. Install washers (7) and start upper trunnion locknuts (6) but do not tighten.
H. Thoroughly clean all mating surfaces between outer cylinder and bearing halves and apply a light coat of grease.
I. Install forward and aft bearing halves (20 and 30).

NOTE: Bearings are matched pairs. Serial numbers on forward and aft bearing flanges should be located together.

J. Install upper and lower support plates and steering cylinders (loosely fitted) as a unit. Install and tighten support plate attach bolts (11 and 17) to 1000-1300 pound-inches.
K. Install Steering Collars
(1) Thoroughly clean all mating surfaces and apply a light coat of grease.

(2) Check that steering collars (21 and 32) to be installed are a matched set and laminated shims bonded to aft collar are intact.
(3) Position forward and aft collar halves (21 and 32) on shock strut (28).
(4) Install upper flanged bushing (22).
(5) Check gap between forward and aft collar halves is 0.02 +0.01 inch.
(6) Pack and fillet seal gap with sealant.

CAUTION: THE CURING OF THE SEALANT IS CRUCIAL TO THE LUBRICATION OF THIS BEARING. IMPROPER CURING MAY RESULT IN STEERING COLLAR BEARING FAILURE.

(7) Lubricate steering collar (Ref 12-21-21).

L. Connect upper torsion link to steering collar. Do not connect torsion links at apex.
M. Check steering collar for freedom of movement.
(1) Apply a maximum force of 5 pounds horizontally to apex end of upper torsion link with torsion link held horizontal.
(2) Check that steering collar is free to rotate 90 degrees in either direction.
N. Turn steering collar approximately 55 degrees left and install right steering collar bolt (23) and steering collar bolt bushings (19 and 22).
O. Tighten nut to 600-700 pound-inches lube torque.
P. Turn collar approximately 110 degrees right and install left steering collar bolt and steering collar bolt bushings (19 and 22).
Q. Tighten nut to 600-700 pound-inches lube torque.
R. Tighten trunnion locknuts (6 and 16) finger-tight (35 in-lbs) (vertical looseness removed) and advance to nearest position where a washer tab can be pressed into a nut lock-slot. Spray nuts, trunnion threads, and tag washer with LPS-3.

NOTE: Check clearances prior to locking. Readjust if necessary.

S. Turn torsion link and steering collar approximately 55 degrees left. Install right hand cable guard and adjust to clear pulley by 0.015 to 0.045 inch.

NOTE: Use BACW10P635 washers as required (2 maximum) to flush bottom of cable guard with bottom of cable quadrant.

T. Turn torsion link and steering collar approximately 110 degrees right and install left cable guard as in step (s).
U. Install and adjust metering valve (4) (Ref 32-51-11 R/I).
V. Install cable retainer spring pins (41).
W. Install torsion link apex bolt.
X. Remove rig pin installed in steering drum in control cabin.

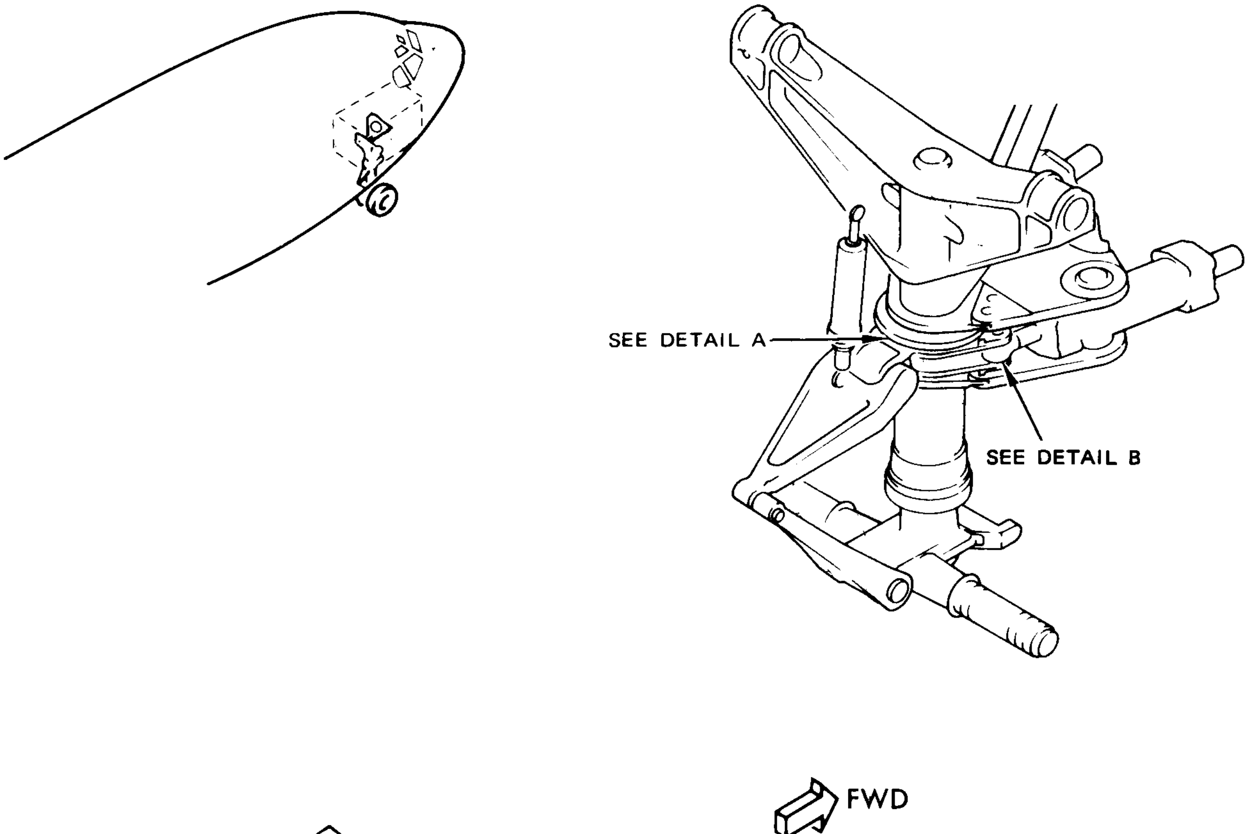
Y. Check and adjust cable tension as necessary (Ref 32-51-0 A/T).
Z. Install metering valve cover (1).

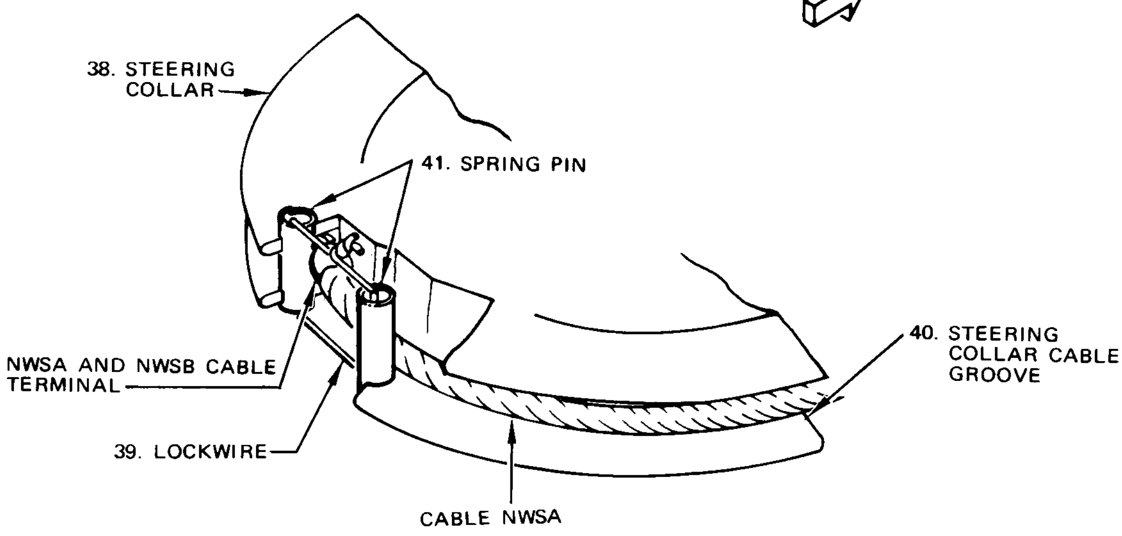
AR LV--JMW THRU LV--JMZ, LV--JMD, LV--JNE
ALL EXCEPT
NOT ON ALL AIRPLANES

AA. Jack nose of airplane until nose gear tires clear ground (Ref Chapter 7, Jacking Airplane).

CAUTION: TAKE CARE NOT TO OPERATE STEERING WHEEL WITH SHOCK STRUT FULLY EXTENDED AND TORSION LINKS CONNECTED OR DAMAGE TO SHOCK STRUT CENTERING CAMS MAY RESULT. ENSURE SHOCK STRUT IS COMPRESSED 2.10 INCHES OR MORE BEFORE OPERATING STEERING SYSTEM. DISTANCE BETWEEN BOTTOM SURFACE OR LOWER STEERING PLATE AND TOP SURFACE OF TOWING LUG MUST BE LESS THAN 21.90 INCHES.

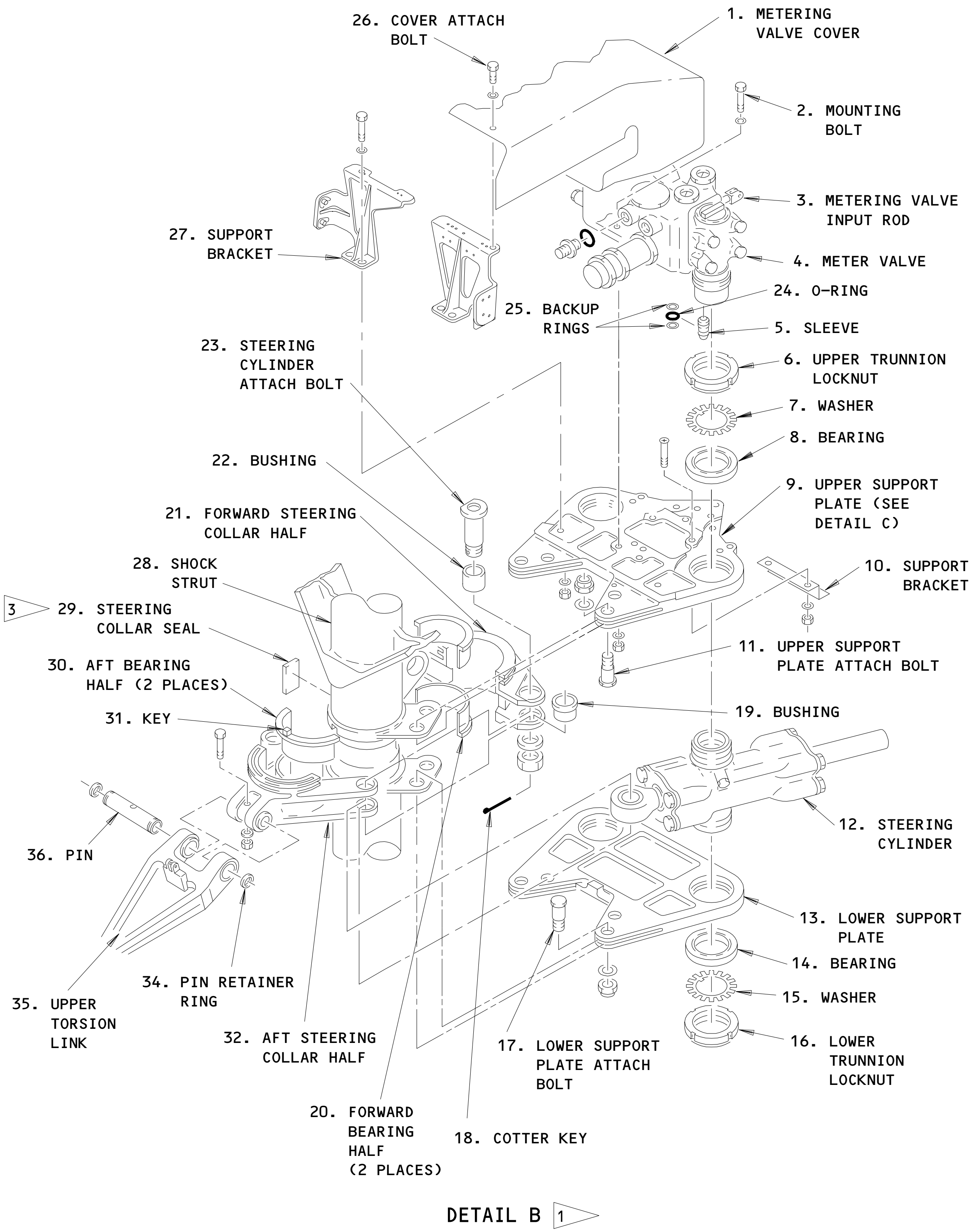
AB. Position greased turning plates under nose gear tires and lower airplane so weight of airplane is supported by landing gear.
AC. Pressurize hydraulic system A (Ref 29-11-0, Maintenance Practices).
AD. Ensure nose gear does not attempt to steer when hydraulic system A is pressurized.
AE. Ensure steering wheel is in neutral (centered) position.
AF. Ensure rudder pedals are in neutral position.
AG. Rotate steering wheel counterclockwise to left stop position and hold.
    (1) Ensure nose gear steers to left approximately 78 degrees.
    (2) Check for hydraulic leaks at actuator swivel.
AH. Rotate steering wheel clockwise to right stop position and hold.
    (1) Ensure nose gear steers to right approximately 78 degrees.
    (2) Check for hydraulic leaks at actuator swivel.
AI. Release steering wheel.
    (1) Ensure steering returns to neutral position.
    (2) Ensure nose gear returns to centered position.
AJ. Jack nose of airplane until nose gear tires clear ground (Ref Chapter 7, Jacking Airplanes) and remove grease turning plates.
AK. Lower airplane jacks (Ref Chapter 7, Jacking Airplane) and remove jacks from under airplane.
AL. Remove system A hydraulic power (Ref 29-11-0, Maintenance Practices) if no longer required.



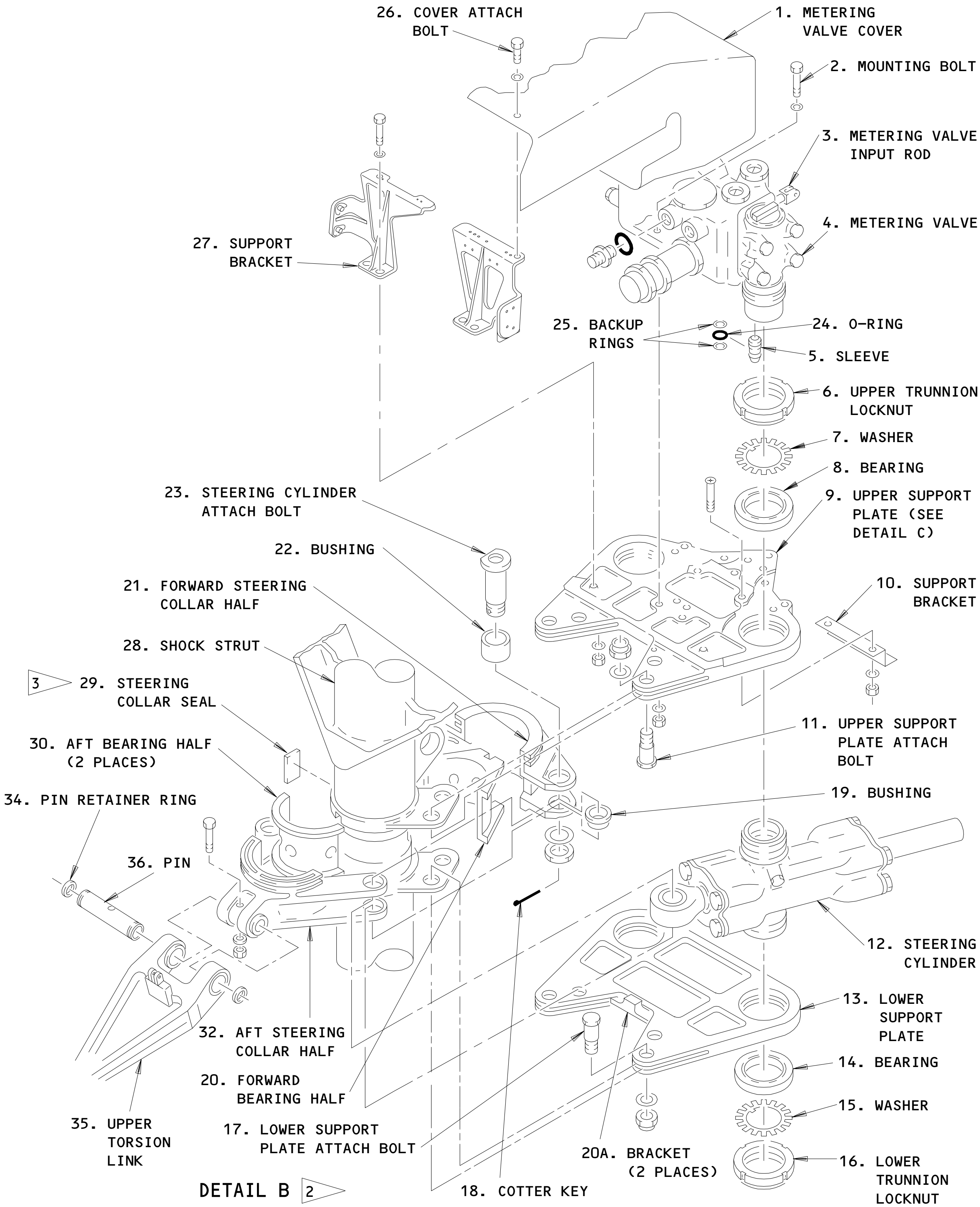


DETAIL A

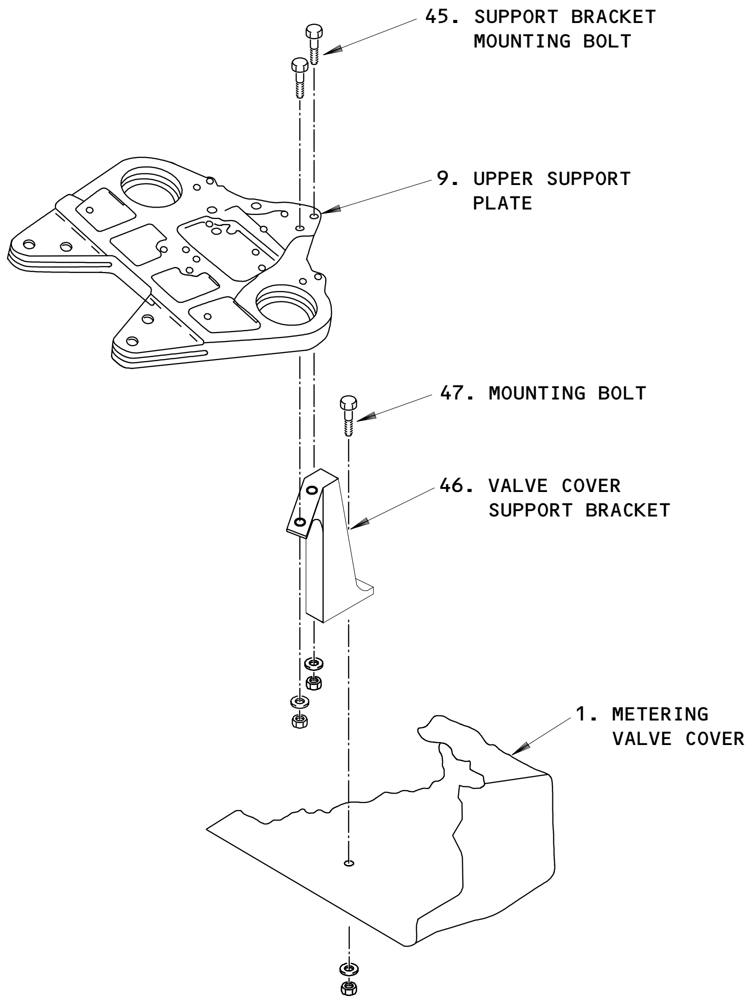
Steering Cylinder Installation
Figure 401 (Sheet 1)



Steering Cylinder Installation
Figure 401 (Sheet 2)



Steering Cylinder Installation
Figure 401 (Sheet 3)



DETAIL C
(AIRPLANES WITH SB32-1289)

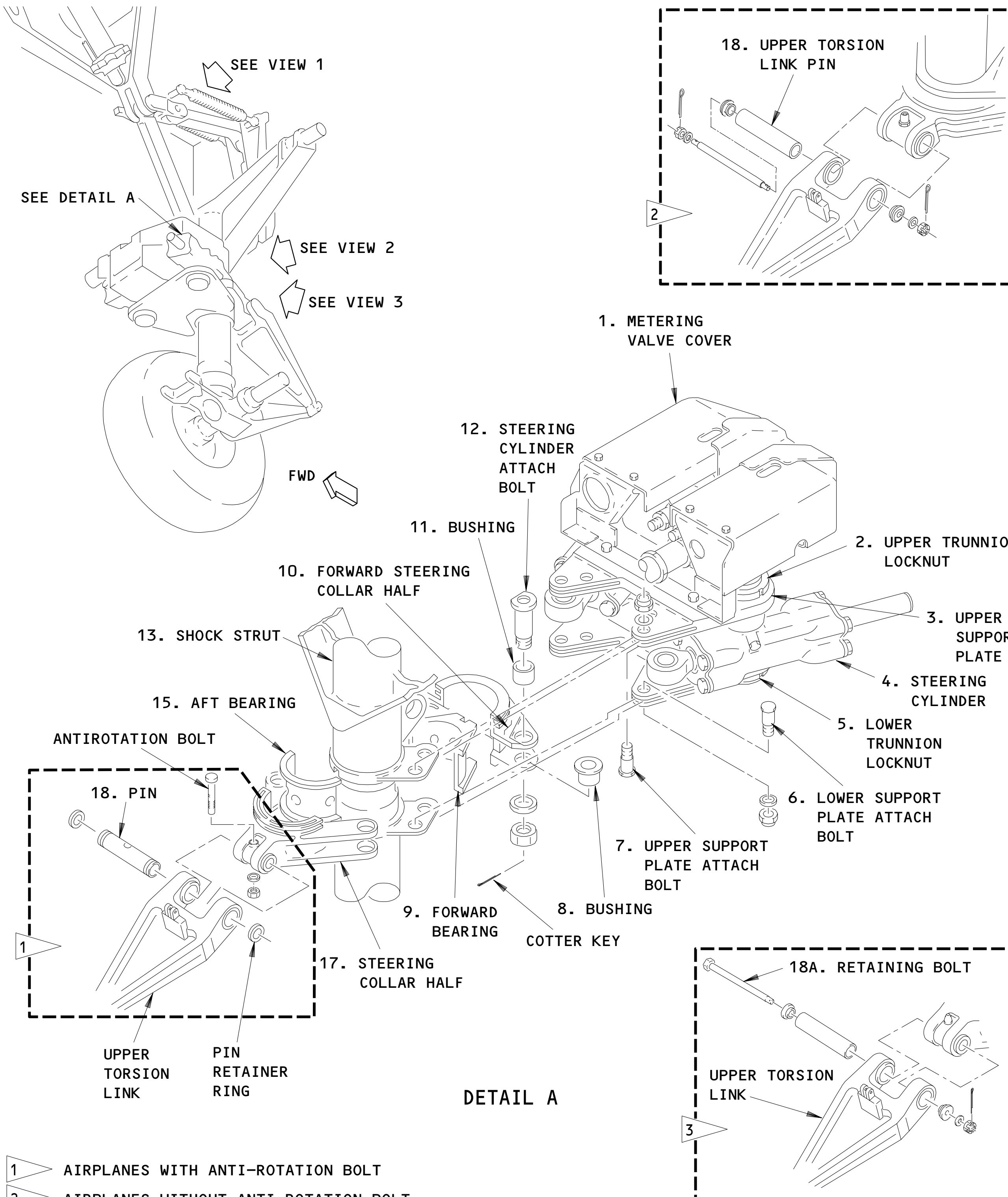
Steering Cylinder Installation
Figure 401 (Sheet 4)

STEERING COLLAR - REMOVAL/INSTALLATION

1. Equipment and Material
   A. Grease - BMS 3-33 (Preferred)
   B. Grease - MIL-PRF-23827 (Supercedes MIL-G-23827) (Alternate)
   C. Grease - MIL-C-21164 (Alternate)
   D. Ground Lock Assemblies - (Ref 32-00-01)
   E. Sealant - BMS 5-95
2. Prepare to Remove Steering Collar
   A. Check that ground lock assembly is installed in nose gear (Ref 32-00-01).
   B. Depressurize hydraulic system A (Ref 29-11-0, Maintenance Practices).
   C. Remove aft access panel from left nose wheel well bulkhead to gain access to nose wheel steering (NWSA, NWSB) turnbuckles.
3. Remove Steering Collar
   A. Loosen turnbuckles.
   B. Disconnect cables.
      (1) Disconnect nose wheel steering cables from aft side of steering collar (20, Fig. 401).
      (2) Remove lockwire (21) from spring pins (22) at NWSA and NWSB cable terminal ends in groove on aft side of steering collar (20).
      (3) Remove spring pins.
   C. Do the steps below to remove the upper torsion link pin.
      (1) On airplanes without SB 32-1129, remove retaining pin (18) (Ref 32-21-31, R/I).
      (2) On airplanes with SB 32-1129, remove retaining bolt (18A) (Ref 32-21-31, R/I).
   D. Turn collar (20) approximately 55 degrees left.
   E. Remove right steering cylinder attach bolt (12) and two steering collar bolt bushings (8, 11).
   F. Turn collar (20) approximately 110 degrees right.
   G. Remove left steering cylinder attach bolt and two steering collar bolt bushings.
   H. Remove forward and aft steering collar halves (10, 17).
      (1) Remove aft steering collar half (17) in aft direction.
      (2) Remove forward steering collar half (10) by rotating collar half around the oleo.
      (3) Remove forward and aft bearing halves (9, 15).
         (a) Remove four upper (7) and four lower (6) steering support plate bolts.
         (b) Move steering support plates forward.
         (c) Slip the bracket key off the slot of the forward bearing half to enable the bearing to rotate off.

            NOTE: These bearings are matched pairs. Forward bearing half (9) has a slot which fits onto bracket key to prevent bearing from rotating.

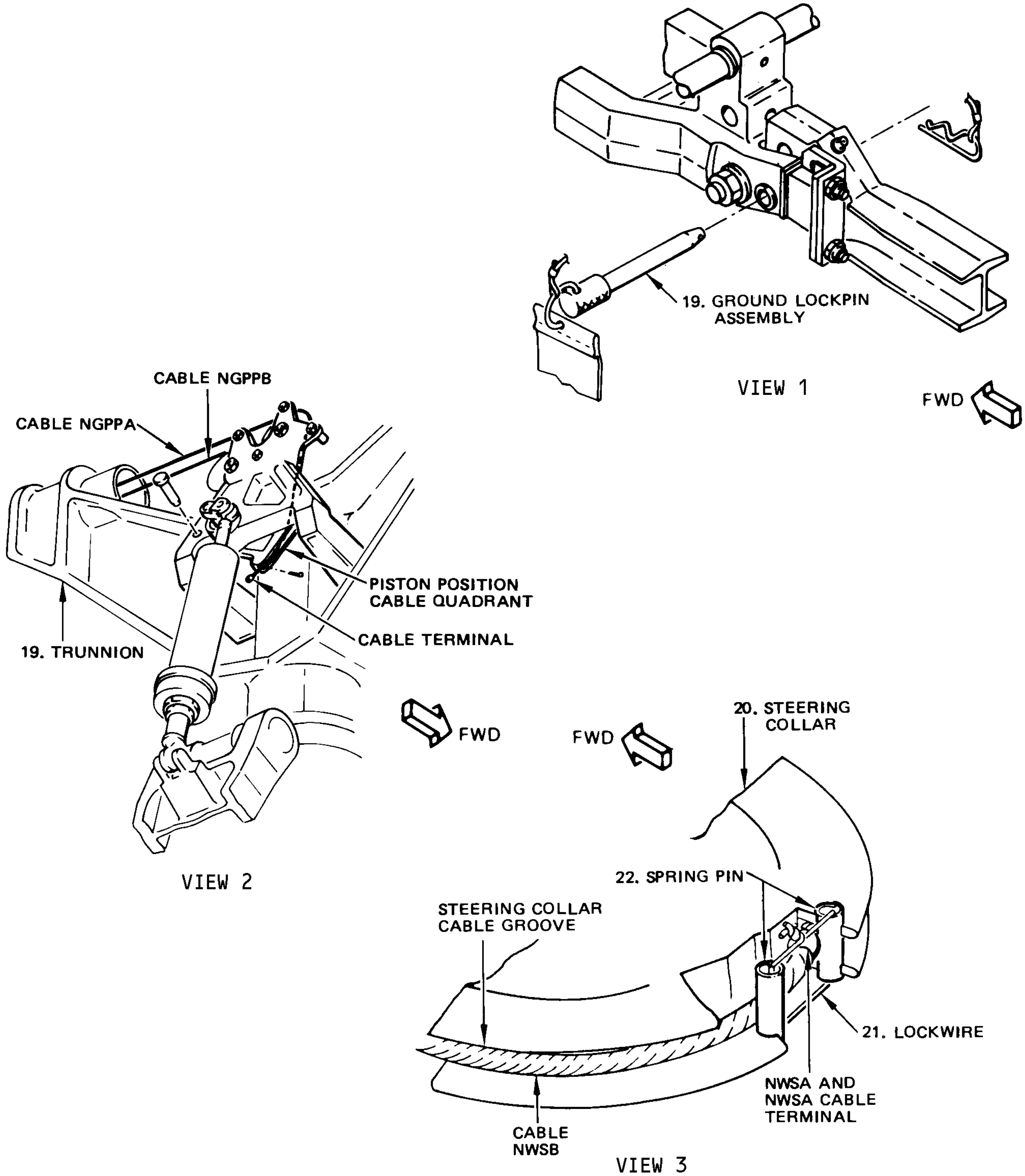
         (d) Support the metering valve if necessary.



1 AIRPLANES WITH ANTI-ROTATION BOLT
2 AIRPLANES WITHOUT ANTI-ROTATION BOLT
3 ON AIRPLANES WITH SB 32-1129

Steering Collar Installation
Figure 401 (Sheet 1)

446183



Steering Collar Installation
Figure 401 (Sheet 2)

4. Install Steering Collar
   A. Thoroughly clean all mating surfaces between outer cylinder and bearing halves and apply a light coat of grease.
   B. Install forward and aft bearing halves (9 and 15).

      NOTE: Bearings are matched pairs. Serial numbers on forward and aft bearing flanges should be located together.

   C. Install Steering Collars
      (1) Thoroughly clean all mating surfaces and apply a light coat of grease.
      (2) Check that steering collars (10 and 17) to be installed are a matched set and that laminated shims bonded to aft collar are intact.
      (3) Position forward and aft collar halves (10 and 17) on shock strut (13).
      (4) Install lower flanged bushing (8).
      (5) Deleted.
      (6) Pack and fillet seal gap with sealant.

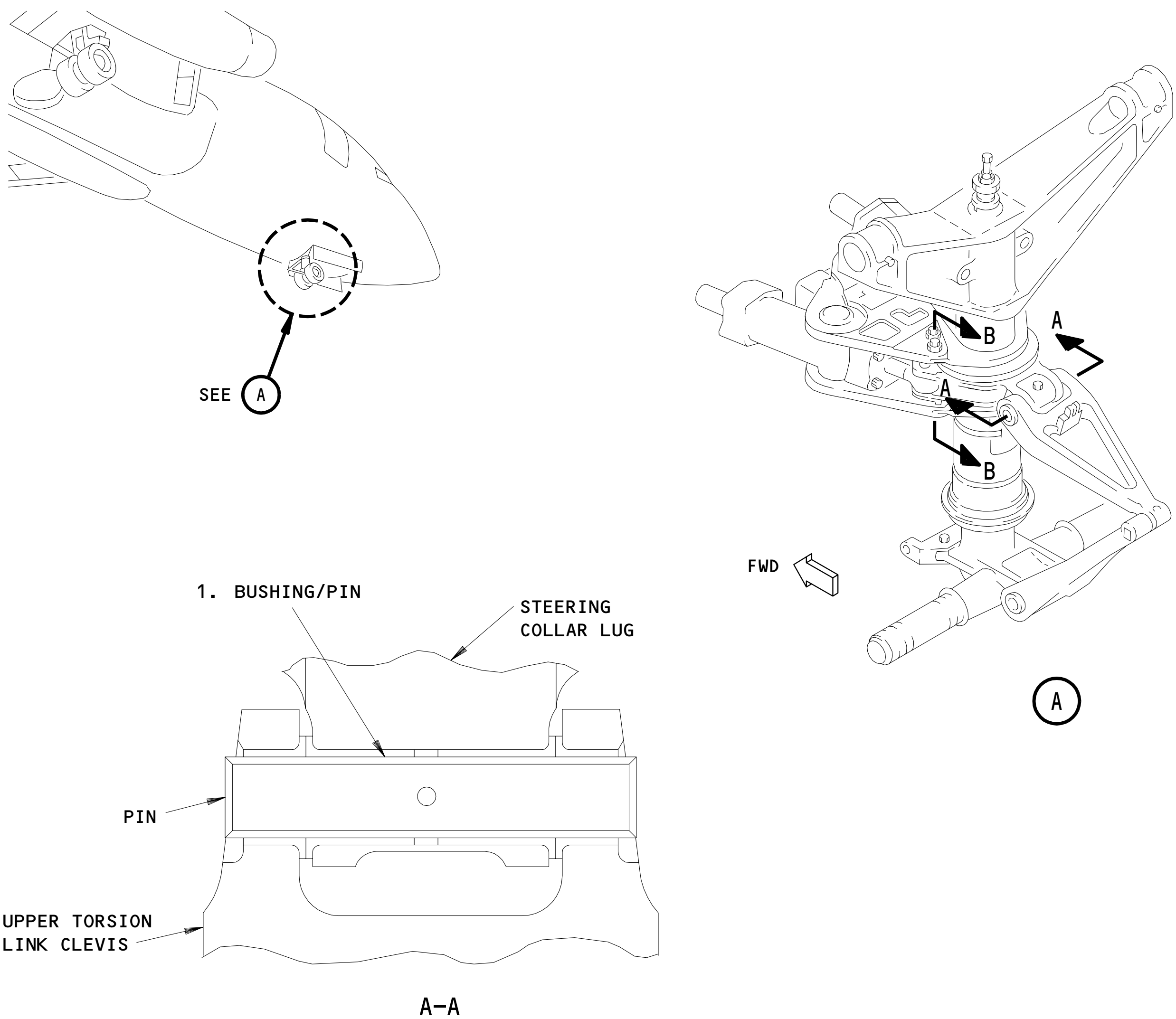
         CAUTION: THE CURING OF THE SEALANT IS CRUCIAL TO THE LUBRICATION OF THIS BEARING. IMPROPER CURING MAY RESULT IN STEERING COLLAR BEARING FAILURE.

      (7) Lubricate steering collar (Ref 12-21-21).
   D. Connect upper torsion link to steering collar. Do not connect torsion links at apex.
   E. Check steering collar for freedom of movement.
      (1) Apply a maximum force of 5 pounds horizontally to apex end of upper torsion link with torsion link held horizontal.
      (2) Check that steering collar is free to rotate 90 degrees in either direction.
   F. Turn steering collar approximately 55 degrees left and install right steering collar bolt (23) and steering collar bolt bushings (8 and 11).
   G. Tighten nut to 600-700 pound-inches lube torque.
   H. Turn collar approximately 110 degrees right and install left steering collar bolt and steering collar bolt bushings (8 and 11).
   I. Tighten nut to 600-700 pound-inches lube torque.
   J. Install steering system cables.
      (1) Remove tape from cables coiled to trunnion.
      (2) Insert steering cable terminals (NWSA, NWSB) in recess in grooves on aft side of steering collar (20).
      (3) Install spring pins (22) in holes provided in steering collar (20) (view 2).
      (4) Lockwire spring pins (22) with lockwire (21).
   K. Lubricate steering collar and torsion link fittings (Ref Chapter 12).

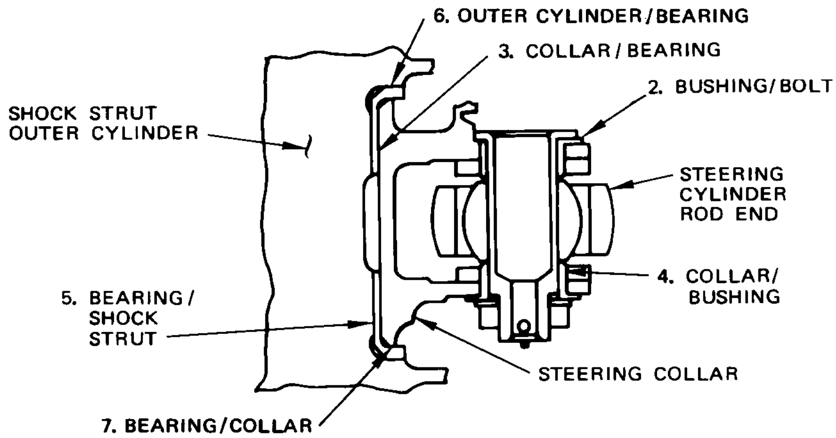
L. Adjust cable tension (Ref 31-51-0 A/T).
M. Install torsion link apex bolt.
N. Check steering system operation (Ref 32-51-0 A/T).

STEERING COLLAR - INSPECTION/CHECK

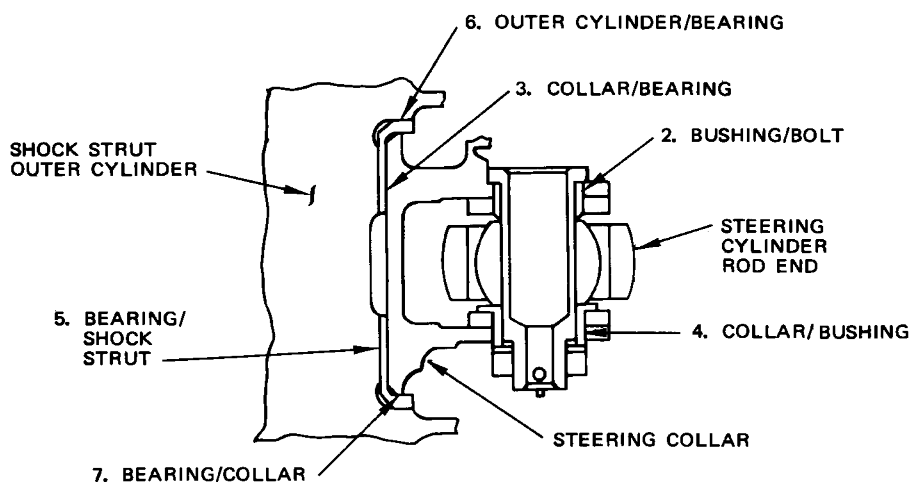
1. General
   A. This procedure only has illustrations and wear limits charts.
      (1) For access data, refer to AMM/32-51-61/401.
2. Steering Collar Wear Limits (Fig. 601)



Steering Collar Wear Limits
Figure 601 (Sheet 1)



SECTION B-B [6]



SECTION B-B [7]

[6] AQ N21SW, N22SW
AR LV-JMW, LV-JMX, LV-JMY
BU LN-SUG, LN-SUP, LN-SUS
LH D-ABEA THRU D-ABED, D-ABEF THRU D-ABEI, D-ABEK THRU D-ABEW, D-ABEY, D-ABBE THRU D-ABDE, D-ABFE

[7] AQ ALL EXCEPT N21SW, N22SW
AR ALL EXCEPT LV-JMW, LV-JMX, LV-JMY
BU ALL EXCEPT LN-SUG, LN-SUP, LN-SUS
LH ALL EXCEPT D-ABEA THRU D-ABED, D-ABEF THRU D-ABEI, D-ABEK THRU D-ABEW, D-ABEY, D-ABBE THRU D-ABDE, D-ABFE

Steering Collar Wear Limits
Figure 601 (Sheet 2)

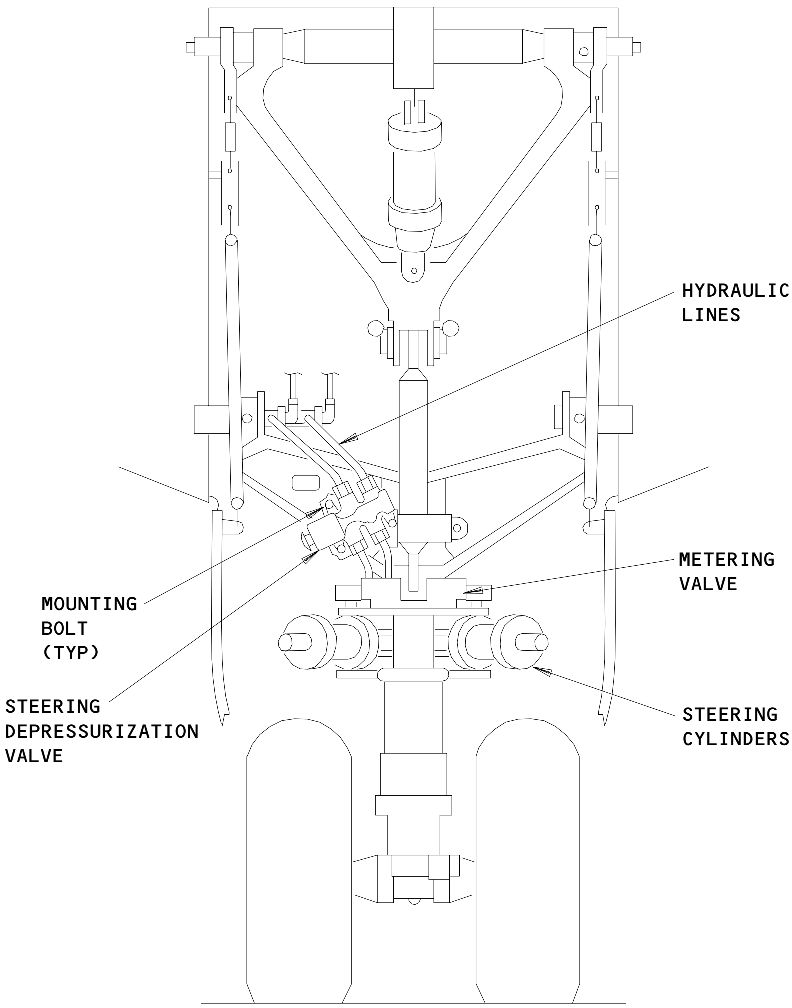
INDEX NO.	PART NAME	DIM.	DESIGN LIMITS DIAMETER MIN	DESIGN LIMITS DIAMETER MAX	WEAR LIMITS MAX WEAR DIM.	WEAR LIMITS MAX DIAM CLEAR- ANCE	REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR.
1	BUSHING	ID	1.2500	1.2510	1.260	0.010	X		
	PIN	OD	1.2490	1.2498	1.245			X	*[7]
2	BUSHING	ID	1.0000	1.0010	1.0080	0.010	X		
	BOLT	OD	0.9991	0.9998	0.995			X	*[7]
3 *[1]	COLLAR	ID	4.8820	4.8840	4.8880	0.010		X	*[7]
	BEARING	OD	4.8793	4.8800	4.874		X		
3 *[2]	COLLAR	ID	4.9970	4.9990	5.003	0.010		X	*[7]
	BEARING	OD	4.9943	4.9950	4.991		X		
4	COLLAR	ID	1.2000	1.2010	1.2010	0.003		X	*[7]
	BUSHING	OD	1.1990	1.1998	1.1980		X		
5 *[5]	BEARING	ID	4.6838	4.6848	4.6868	0.003		X	*[7]
	SHOCK STRUT	OD	4.6838	4.6848	4.6838			X	*[7]
5 *[6]	BEARING	ID	4.7940	4.7950	4.7970	0.003		X	*[7]
	SHOCK STRUT	OD	4.7940	4.7950	4.7940			X	*[7]
6	OUTER CYLINDER	ID	3.9000	3.9020	3.906	0.015		X	*[7]
	BEARING	OD	3.8950	3.8990	3.887		X		
7 *[2] *[4]	BEARING	ID	3.5180	3.5200	3.530	0.015	X		
	COLLAR	OD	3.5150	3.5170	3.511			X	*[7]

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS DIAMETER MIN	DESIGN LIMITS DIAMETER MAX	WEAR LIMITS MAX WEAR DIM.	WEAR LIMITS MAX DIAM CLEAR- ANCE	REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR.
7 *[1] *[3]	BEARING	ID	3.5180	3.5200	3.530	0.015	X		
	COLLAR	OD	3.5150	3.5170	3.511			X	*[7]

*[1] 65-46203-3, -9, OR -11 COLLAR ASSEMBLY WITH 69-61785-1 BEARING ASSEMBLY
*[2] 65-46203-13 OR -21 COLLAR ASSEMBLY WITH 69-61785-7 BEARING ASSEMBLY
*[3] 65-46203-5, -7, -10 OR -12 COLLAR ASSEMBLY WITH 69-36626-8 OR 69-61785-2 BEARING ASSEMBLY
*[4] 65-46203-14 OR SUBSEQUENT COLLAR ASSEMBLY WITH 69-61785-8 BEARING ASSEMBLY
*[5] 65-46211-3 OR -5 SHOCK STRUT OUTER CYLINDER WITH 60-36626-7, 69-61785-1 OR -7 BEARING ASSEMBLY
*[6] 65-46211-4 OR -6 SHOCK STRUT OUTER CYLINDER WITH 69-36626-8, 69-61785-2 OR -8 BEARING ASSEMBLY
*[7] REFER TO OVERHAUL MANUAL FOR REPAIR INSTRUCTIONS

NOSE GEAR STEERING DEPRESSURIZATION VALVE - R/I

1. Equipment and Material
   A. Ground Lock Assemblies (Ref 32-00-01)
   B. Steering Lockout Pin
2. Remove Depressurization Valve (Fig. 401)
   A. Check ground lock assembly is installed in nose gear.
   B. Depressurize hydraulic system (A (Ref Chapter 29).
   C. Disconnect hydraulic lines and cap both lines and valve fittings.
   D. Remove three mounting bolts and remove valve.
3. Install Depressurization Valve (Fig. 401)
   A. Position valve on mounting bracket and install three mounting bolts.
   B. Remove caps from hydraulic lines and fittings. Connect hydraulic lines to valve.
   C. Pressurize hydraulic system A and check valve installation for hydraulic leaks.
   D. Remove hydraulic power if no longer required.

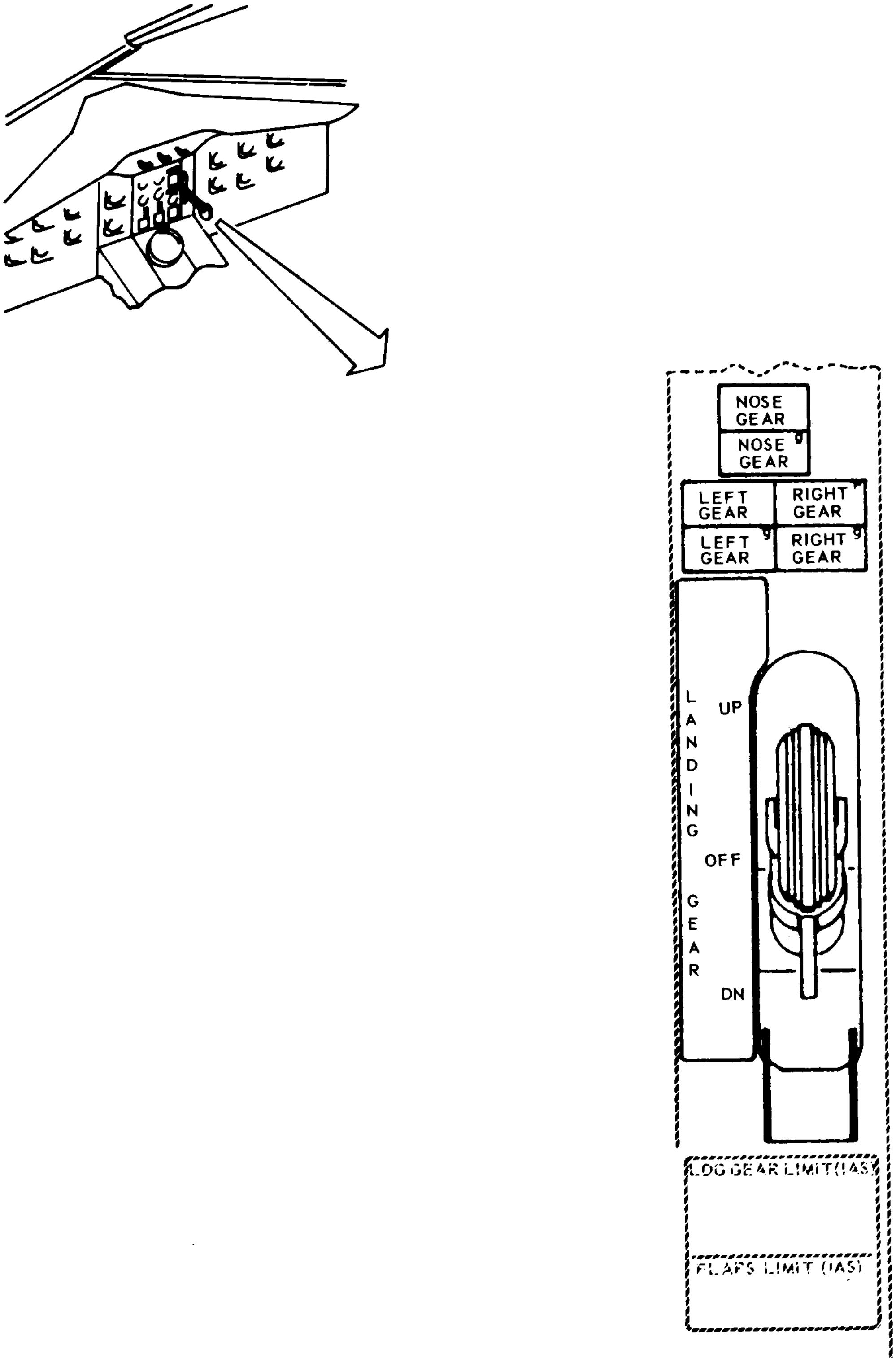


VIEW LOOKING AFT

Steering Depressurization Valve
Figure 401

LANDING GEAR POSITION INDICATING AND WARNING SYSTEM - DESCRIPTION/OPERATION

1. General
   A. The landing gear position indicating and warning system provides warning and indication for landing gear down and locked, landing gear not locked, and landing gear position not in accordance with control lever position. In addition, the down and locked position of each landing gear can be observed through inspection viewers. Green indicator lights come on when the landing gear are down and locked and the airplane is safe to land. Red warning lights come on and a warning horn sounds when the landing gear are not down and locked (Chapter 31). The landing gear position indicating and warning system consists of the following:
   B. The landing gear position indicating and warning system provides warning and indication for landing gear down and locked, landing gear not locked, and landing gear position not in accordance with control lever position. In addition, the down and locked position of each landing gear can be observed through inspection viewers. Green indicator lights come on when the landing gear are down and locked and the airplane is safe to land. Red warning lights come on and a warning horn sounds when the landing gear are not down and locked (Chapter 31). The landing gear position indicating and warning system consists of the following:
      (1) On Standard Passenger Airplanes, three green indicator lights, one for each main gear, and one for the nose gear indicate gear down and locked. The indicator lights are controlled by the landing gear lock and position sensors, in conjunction with solid-state circuits, to come on when the respective landing gear is down and locked. The indicator lights are mounted on the pilots' landing gear panel above the landing gear control lever (Fig. 1). A dimmer switch on the center panel is provided to reduce the indicator light intensity during night operations.
      (2) On Passenger/Cargo Convertible Airplanes, five green indicator lights, two for each main gear, and one for the nose gear indicate gear down and locked. The indicator lights are controlled by the landing gear lock and position sensors, in conjunction with solid-state circuits, to come on when the respective landing gear is down and locked. The nose gear indicator light and the main gear primary indicator lights are mounted on the pilot's landing gear panel above the landing gear control lever (Fig. 1). The main gear secondary indicator lights are located on the aft overhead panel. A dimmer switch on the center panel is provided to reduce the indicator light intensity during night operations.
      (3) A test switch which tests the landing gear indicator and warning lights is mounted near the dimmer switch on the center panel.



Indicator and Warning Lights
Figure 1

(4) Three red warning lights, one for each main gear, and one for the nose gear indicate an unsafe-to-land condition (Fig. 1). The warning lights come on when the landing gear and control lever positions do not coincide, when any landing gear is unlocked, or when the engine thrust levers are in idle range and the landing gear are not down and locked. The lights are controlled by the landing gear control lever position switch. Additional control of the lights is provided by the landing gear lock and position sensors on the landing gear and the solid state circuits in the landing gear electrical module. The lights will remain on and cannot be turned off if the landing gear and control lever positions do not coincide or any landing gear is unlocked. A dimmer switch on the center panel is provided to reduce the indicator light intensity during night operations.

(5) A warning horn sounds when the landing gear position is incorrect for the current operating conditions. For more information on the warning horn, refer to Chapter 31, Aural Warning and Call Devices.

2. Landing Gear Mechanical Downlock Indication (Standard Passenger Airplanes)

A. Mechanical downlock indication of the landing gear is provided by observing the alignment of red paint stripes or arrows located on locking components of the landing gear (Fig. 2 and 3). The down and locked position of the landing gear can be observed from inside the airplane through landing gear downlock viewers. For more information on the viewers, refer to Chapter 56, Viewers and Observation Windows.

(1) Red paint stripes are applied to the nose gear lock brace and lock link. When the nose gear is down and locked, the red arrow on the lock link will align with the red arrow on the lock brace (Fig. 2).

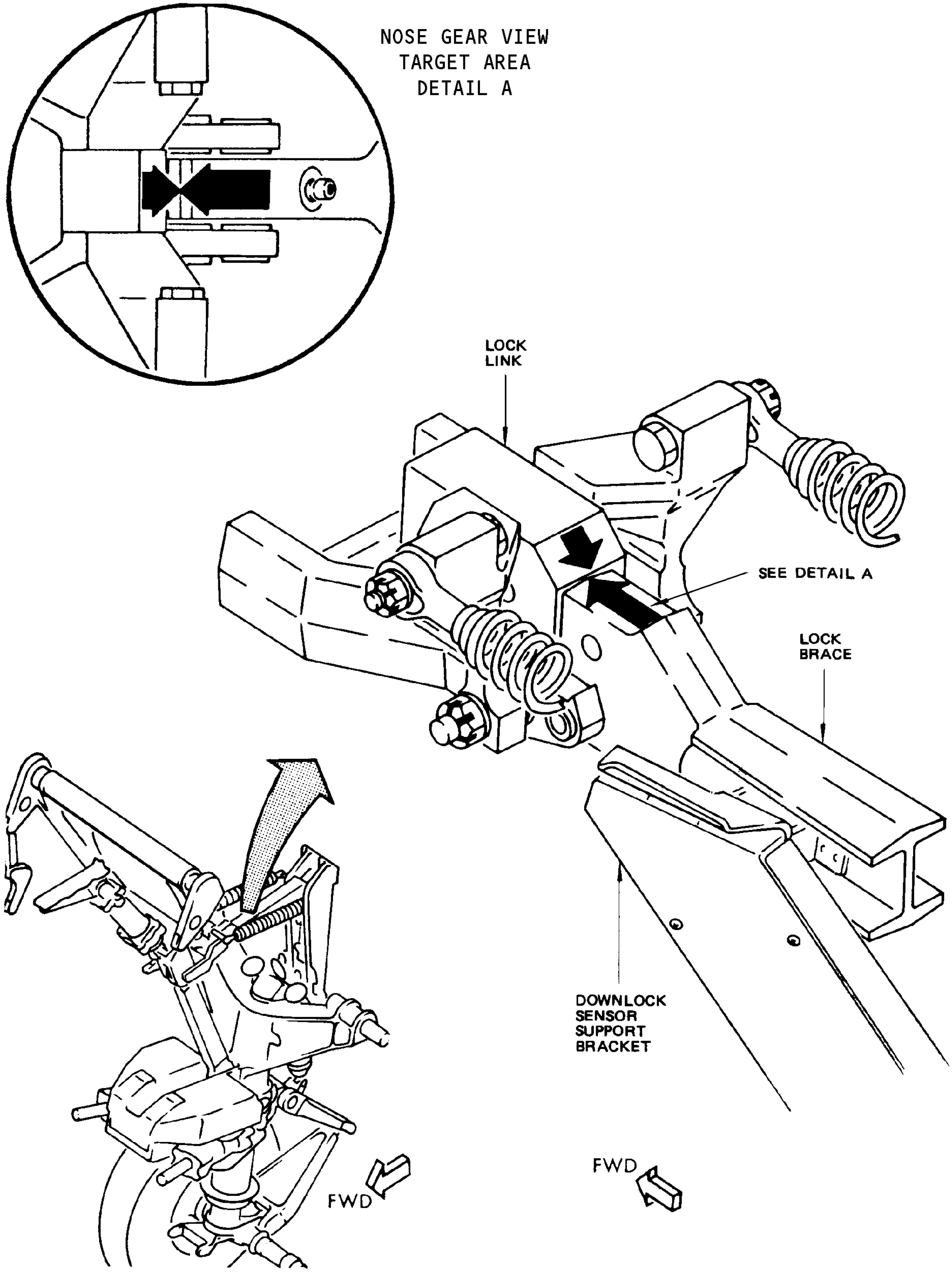
(2) Red paint stripes are applied to the main gear lower side strut and the lower downlock link. When a main gear is down and locked, the red paint stripes on the lower side strut will align with the red paint stripe on the lower downlock link (Fig. 3).

3. Control Lever Position Switch

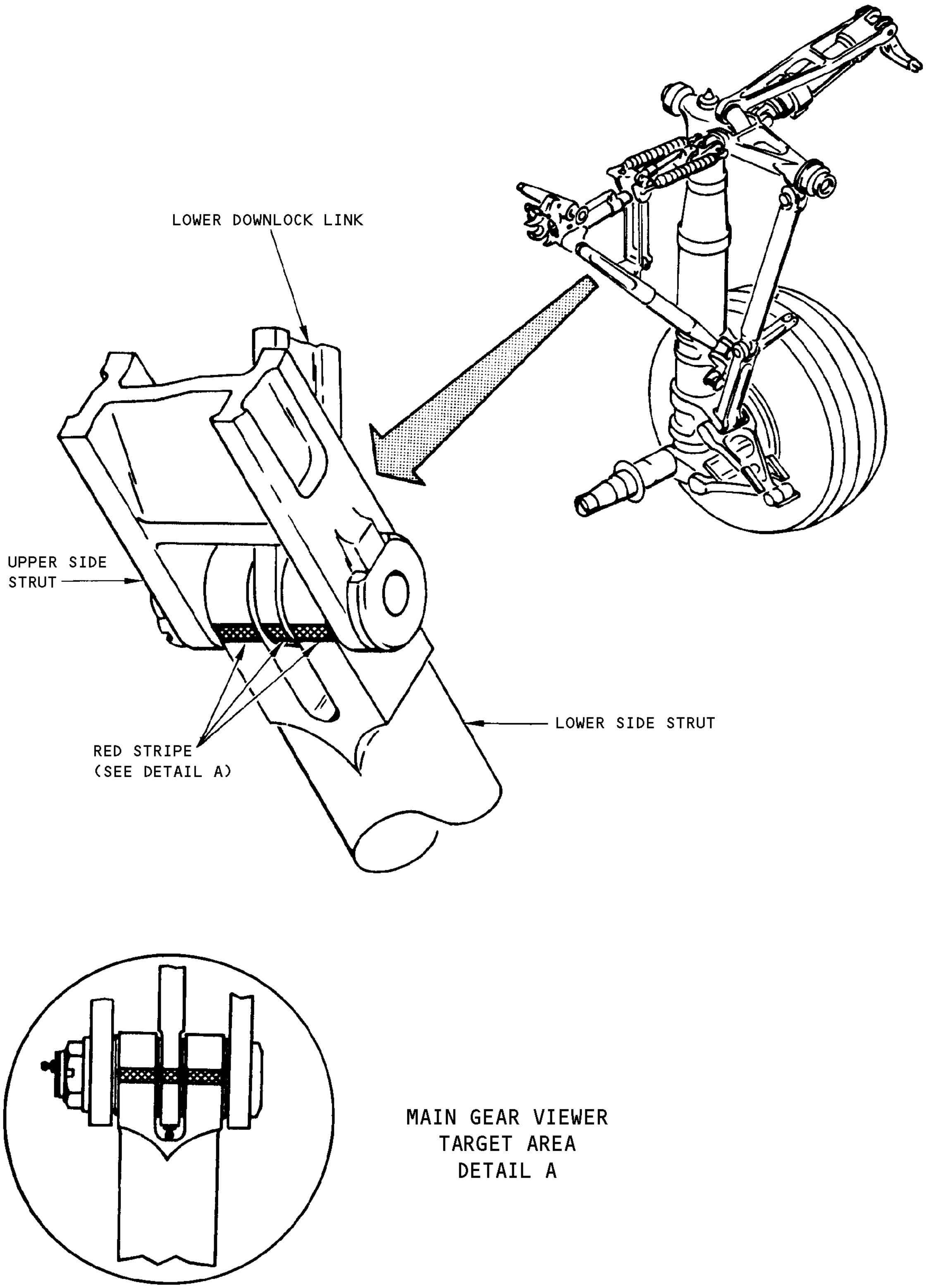
A. The control lever position switch closes to complete a circuit to the landing gear electrical module when the control lever is moved to DN position (Fig. 4). The position switch is mounted within the control lever support structure. The switch assembly consists of a low-travel microswitch and roller-type switch actuator. The roller on the actuator contacts the inner end of the control lever to operate the switch when the lever enters the DN detent.

4. Landing Gear Uplock and Downlock Sensors (Standard Passenger Airplanes)

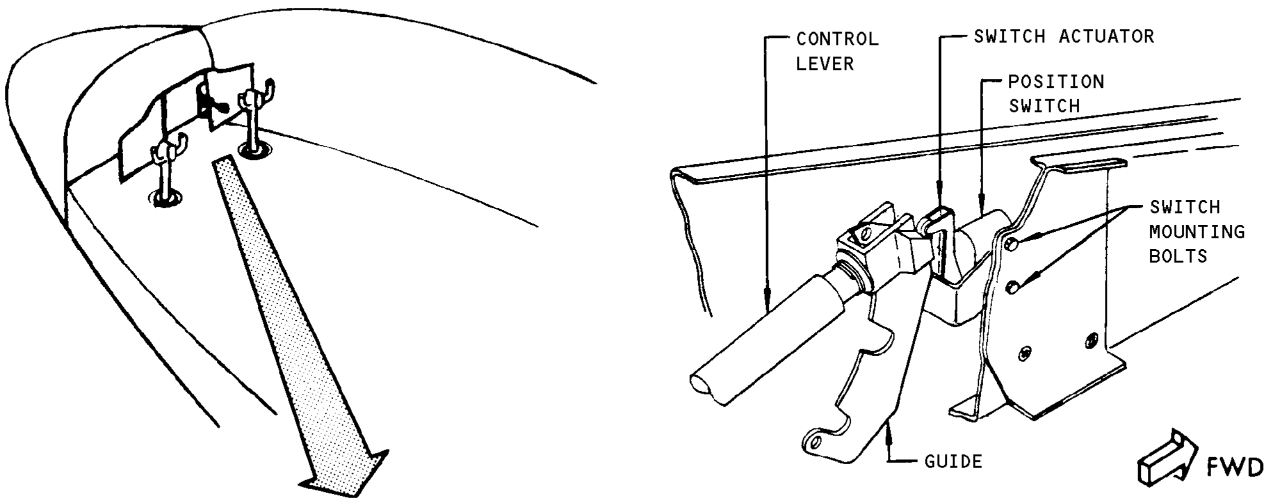
A. Six lock sensors (proximity switches) provide signals to the landing gear warning system. The sensors are two main gear downlock sensors, two main gear uplock sensors, a nose gear uplock sensor, and a nose gear downlock sensor.



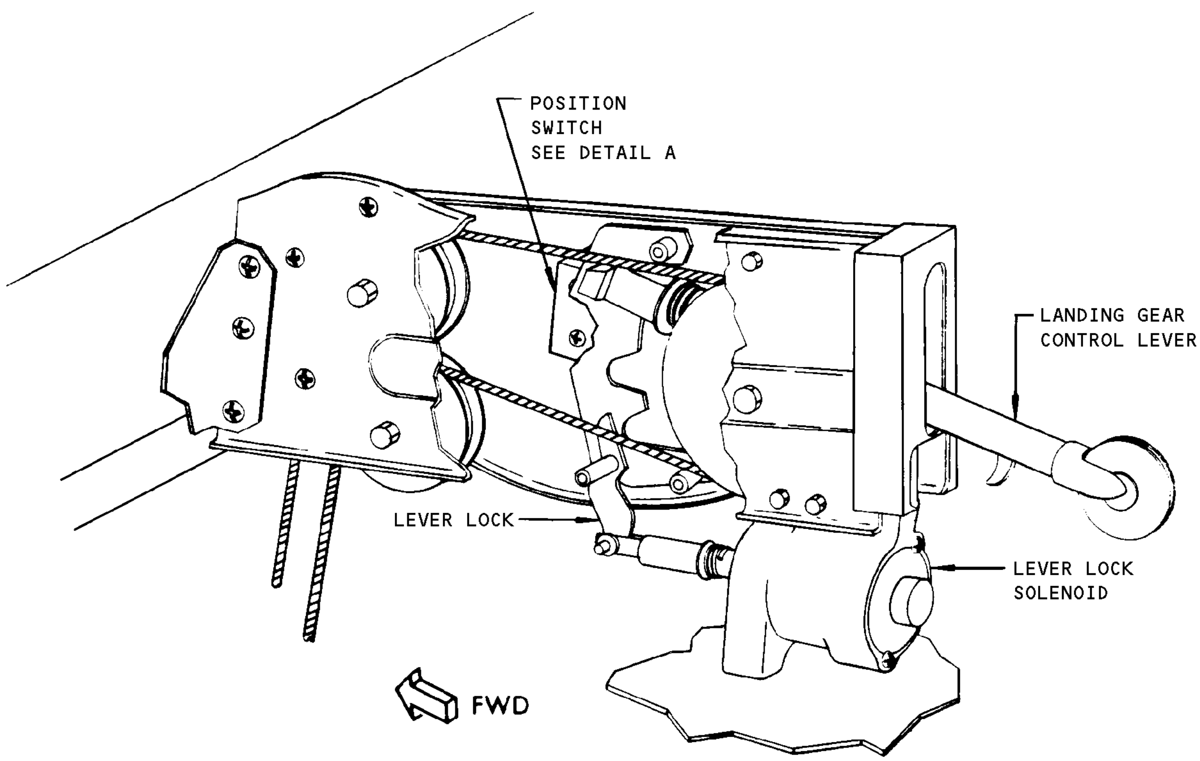
Nose Landing Gear Mechanical Downlock Indication
Figure 2



Main Landing Gear Mechanical Downlock Indication
Figure 3



DETAIL A



Control Lever Position Switch
Figure 4

B. Each main gear uplock sensor nit is mounted on the forward side of the uplock hook with the actuator attached to the uplock links. Each main gear downlock sensor unit is mounted on the outboard side of the side strut and utilizes an actuator fastened to the lock strut for an actuator (Fig. 5). The main landing gear downlock sensors provide signals to the corresponding solid-state circuits in the landing gear module when the main landing gear is down and locked. The solid-state circuits will switch to a grounding condition when furnished a signal from the downlock sensor and thus provide a ground to illuminate the green indicator light for the individual main gear. The downlock and uplock sensors provide signals to the solid-state circuits so that the appropriate circuit will provide a ground to illuminate the red warning light when the individual main gear is not locked or until the main gear position agrees with the landing gear control lever position.

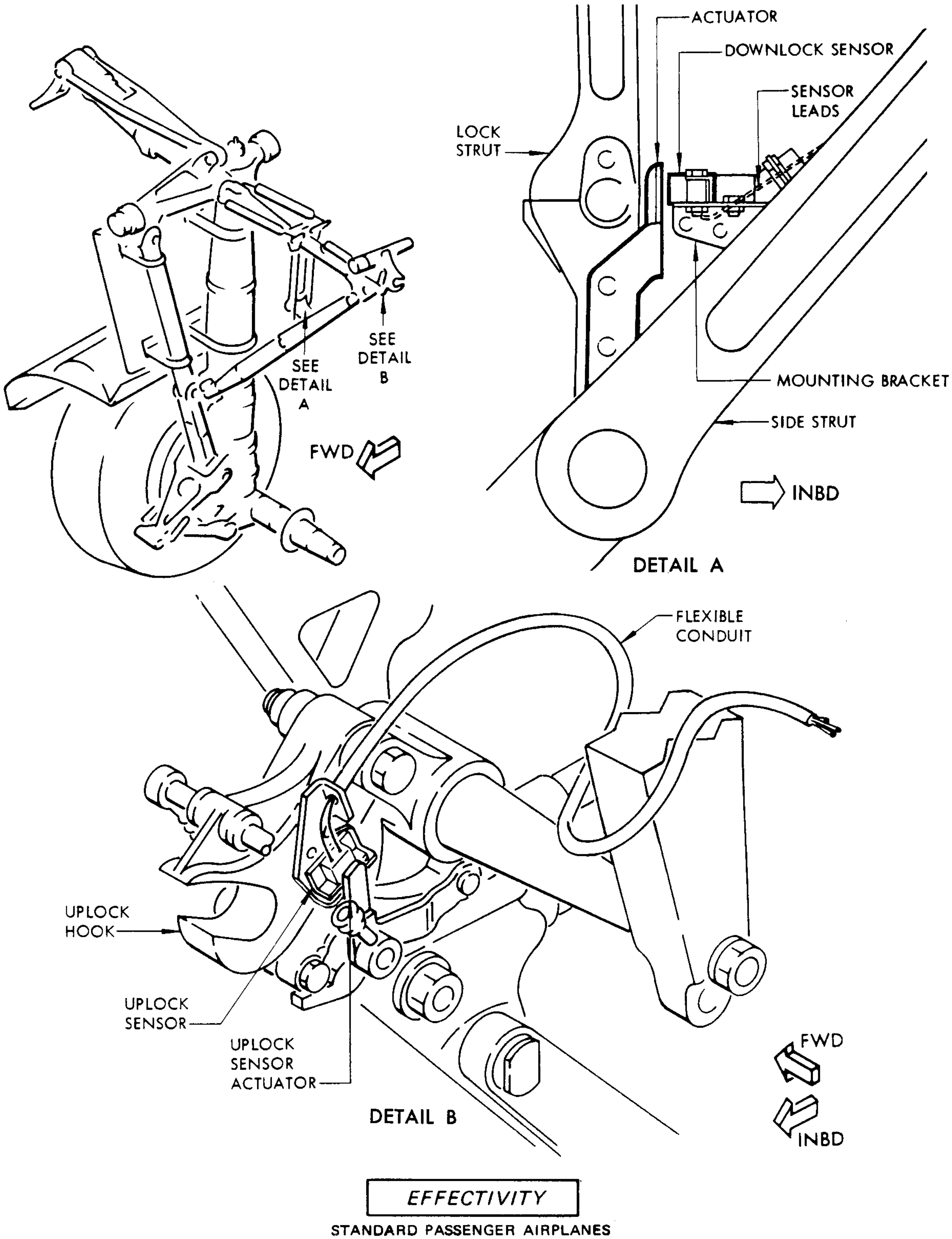
C. The nose gear uplock sensor is installed on the nose gear wheel well ceiling near the manual extension mechanism and the actuator is mounted on the lock link. The nose gear downlock sensor is installed on a sensor support beam with the actuator fastened to the lock brace (Fig. 6). The sensors provide a signal to solid-state circuits in the landing gear electrical module when the nose gear is either up and locked or down and locked. The sensor signal will cause the circuit to remove ground from a red warning light and the light will go off. The absence of a signal from a nose gear sensor (nose gear not up and locked, or down and locked) will cause the circuit to provide a ground to illuminate the red warning light. The nose gear downlock circuit also provides a ground to illuminate a green indicator light when the nose gear is down and locked.

5. <u>Landing Gear Uplock and Downlock Sensors (Passenger/Cargo Convertible Airplanes)</u>

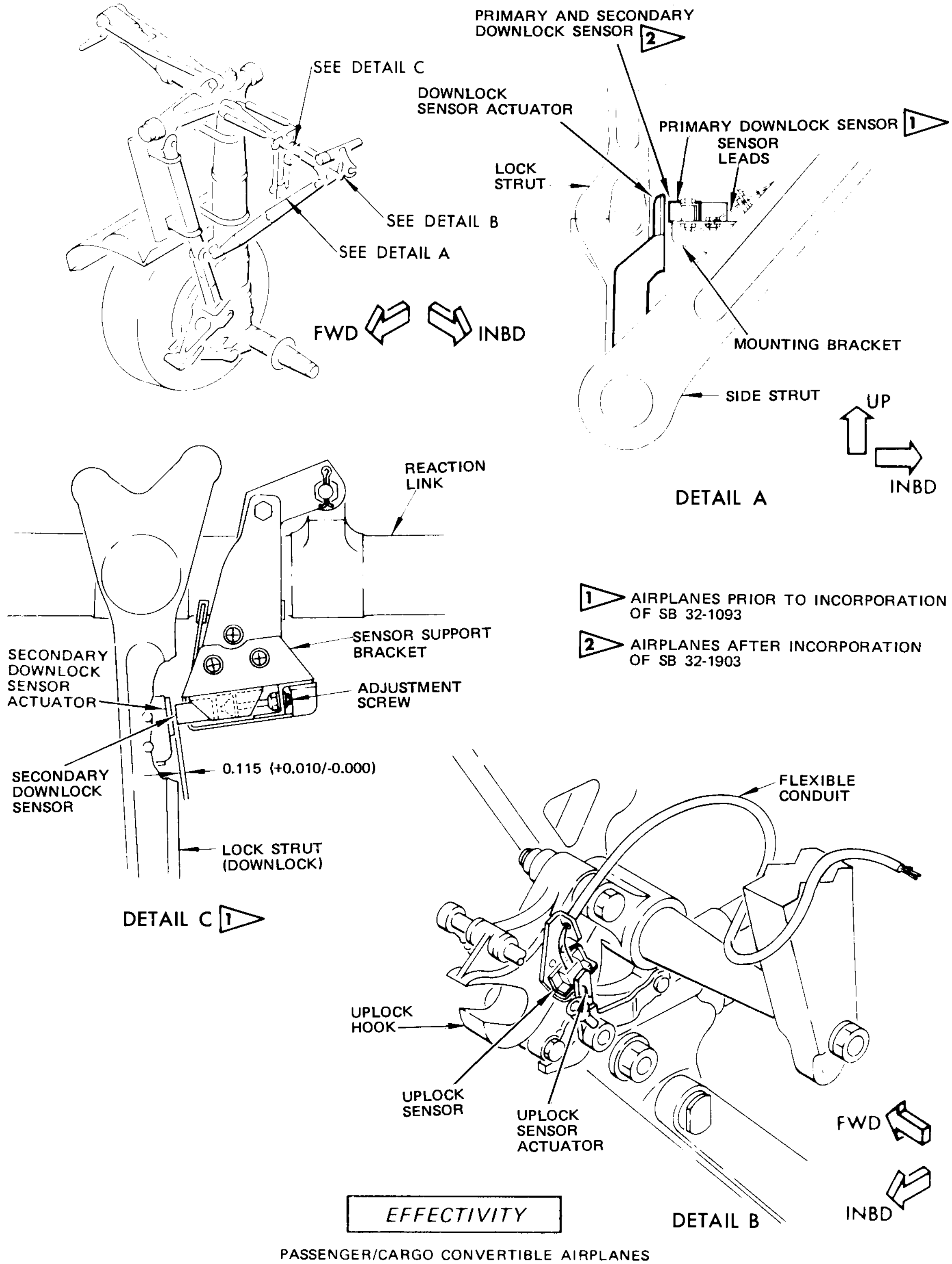
A. Eight landing gear lock sensors (proximity switches) provide signals to the landing gear warning system. The sensors are: two main gear primary downlock sensors, two main gear secondary downlock sensors, two main gear uplock sensors, a nose gear downlock sensor, and a nose gear uplock sensor.

B. Each main gear uplock sensor is mounted on the forward side of the uplock hook with the actuator attached to the uplock links. The main gear primary downlock sensors are mounted on the outboard side of the side strut. The main gear secondary downlock sensors are mounted underneath the reaction link or are installed in tandem with the primary downlock sensors. Both primary and secondary downlock sensors utilize actuators mounted on the lock strut (Fig. 5).

C. The nose gear uplock sensor is mounted on the nose wheel well ceiling near the manual extension mechanism. The actuator is mounted on the lock link. The nose gear downlock sensor is installed on a sensor support beam. The nose gear sensor actuator is fastened to the lock brace (Fig. 6).

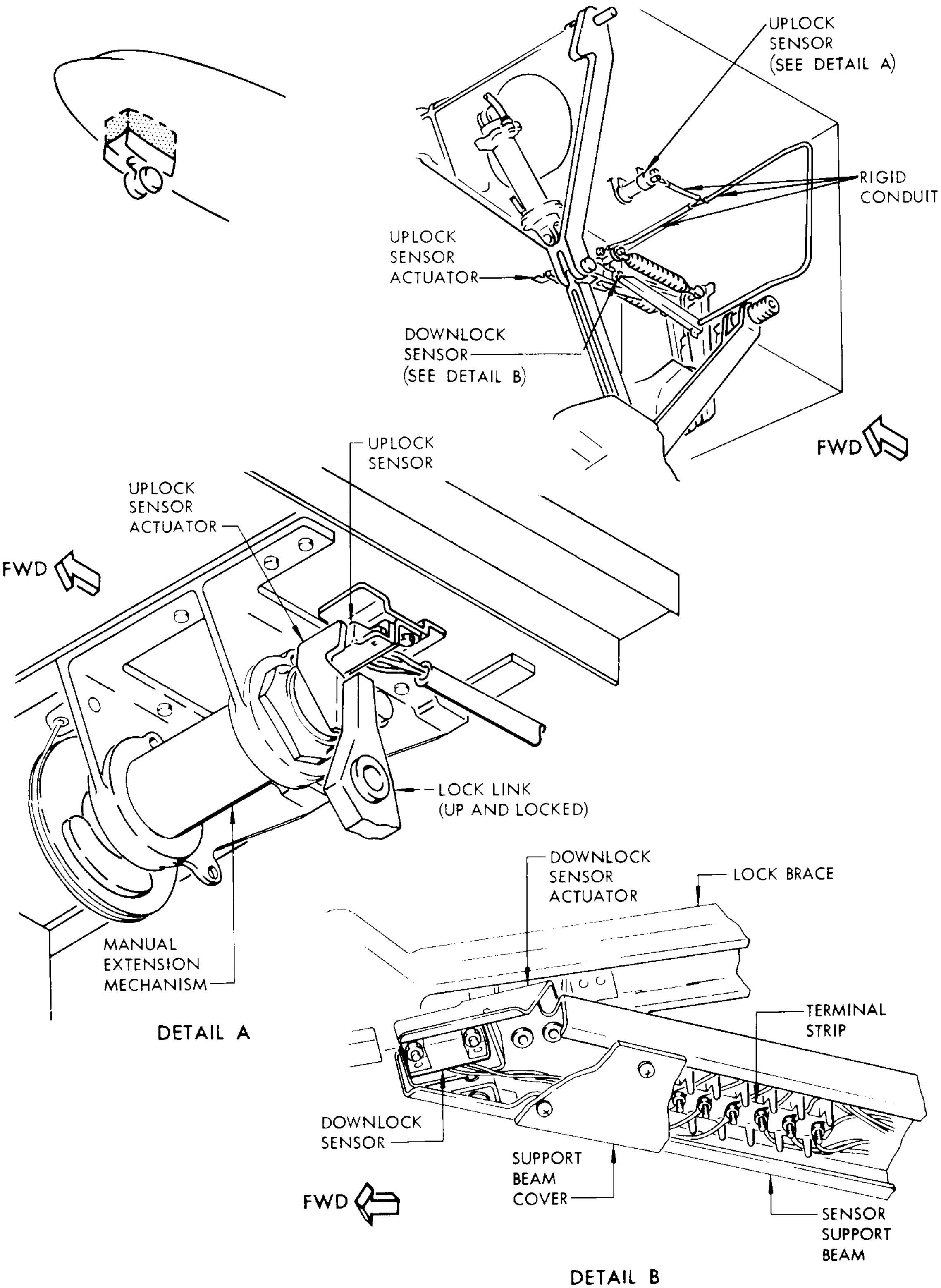


Main Gear Sensors
Figure 5 (Sheet 1)

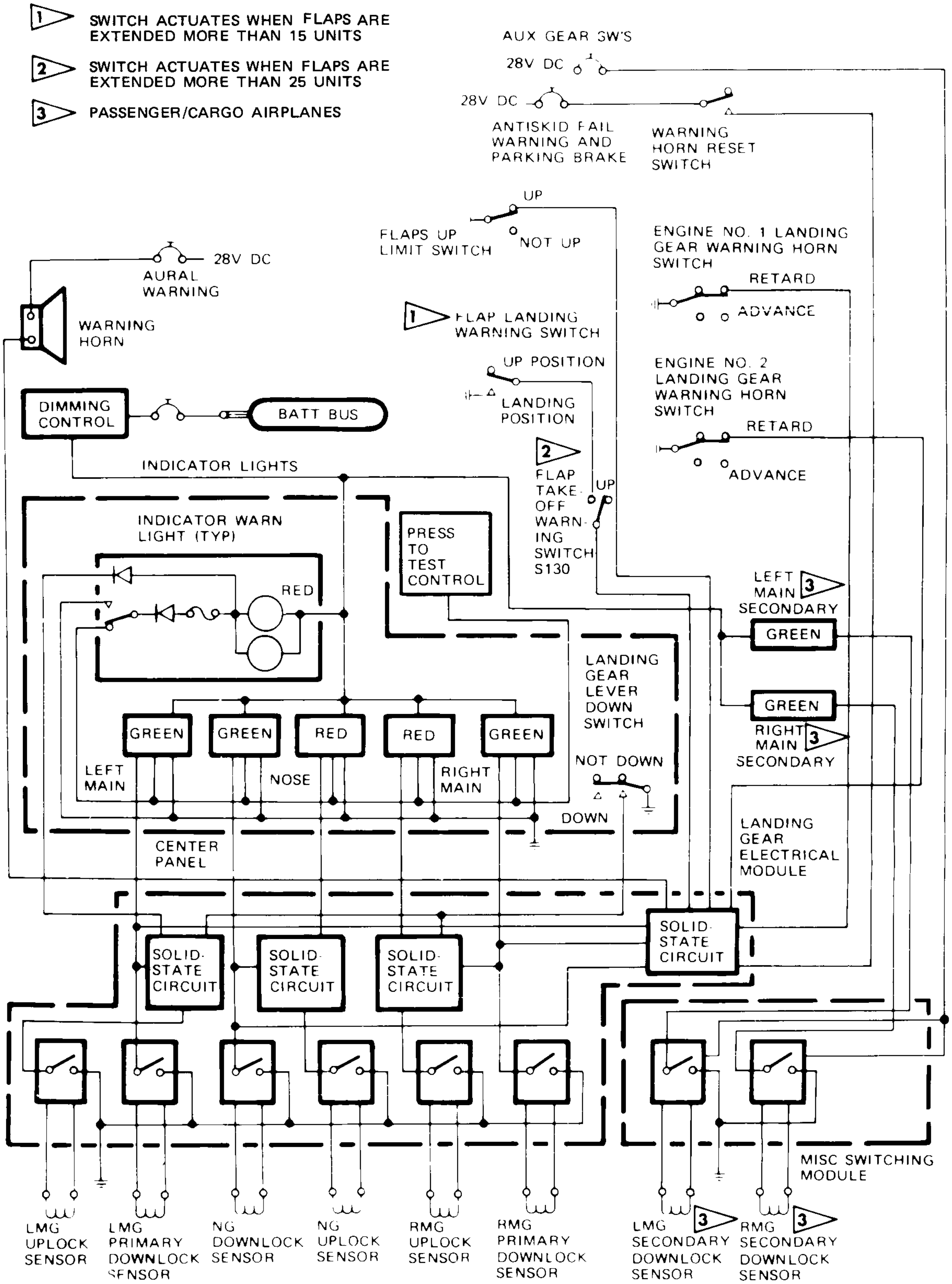


Main Gear Sensors
Figure 5 (Sheet 2)

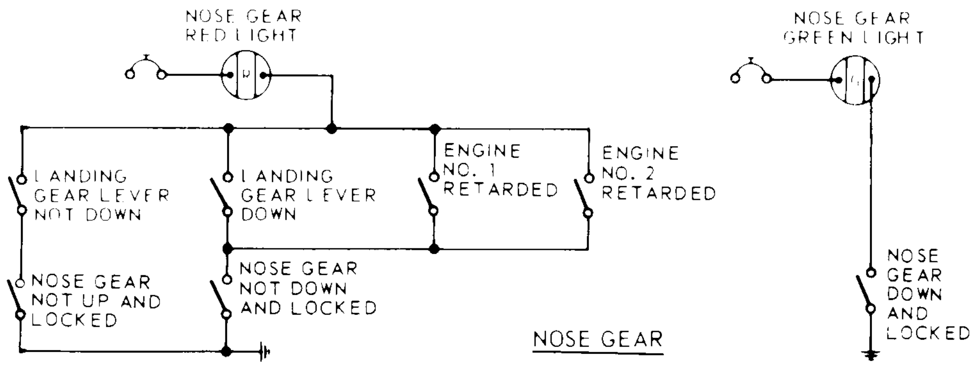
6. Operation
   A. Control of the indicator and warning lights with respect to landing gear and control lever position is accomplished by solid-state circuits in the landing gear electrical module (Fig. 7 and 8). With the landing gear down and locked, the green indicator lights will come on. When the control lever is placed in UP position, the landing gear will unlock in preparation to retract and the green indicator lights will go off while the red warning lights will come on. The red warning lights will remain on while the gear are in transit until the gear position agrees with the control lever position (gear up and locked) at which time the lights will go off. With all landing gear up and locked, all warning lights will be off.
   B. With the landing gear up and locked, the indicator and warning lights will be off if the landing gear control lever is in UP or OFF position. When the control lever is placed in DN position, the red warning lights will come on and remain on while the gear unlock and extend to down and locked. As the gear lock in down position, the red warning lights will go off and the green indicator lights will come on and remain on until power is removed from the circuit.
   C. If the flaps are extended beyond the minimum approach and climb configuration before the landing gear are down and locked, the flap landing warning switch will close to complete the circuit through a solid-state circuit in the landing gear electrical module to sound the warning horn. When the airplane configuration is changed either by extending the gear or retracting the flaps, a circuit is opened through the solid-state circuit to silence the warning horn.
   D. If an engine thrust lever is moved into idle range, the landing gear warning horn switch will close and, if the landing gear are not down and locked, complete the circuit through a solid-state circuit in the landing gear electrical module causing the warning horn to sound and the red warning lights to come on. Advancing the engine thrust lever or extending the landing gear will silence the warning horn and turn off the warning lights. The warning horn reset switch may be used to silence the warning horn.

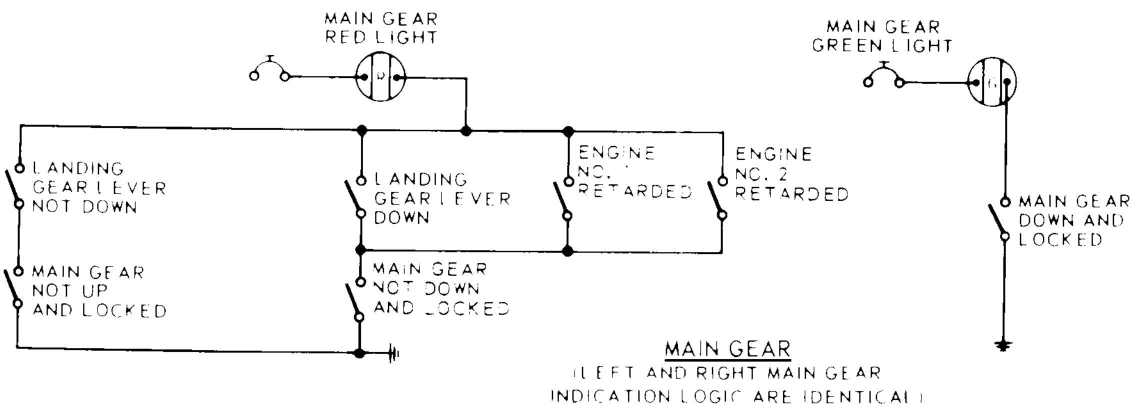


Nose Gear Sensors
Figure 6



Landing Gear Position Indicating and Warning Schematic
Figure 7

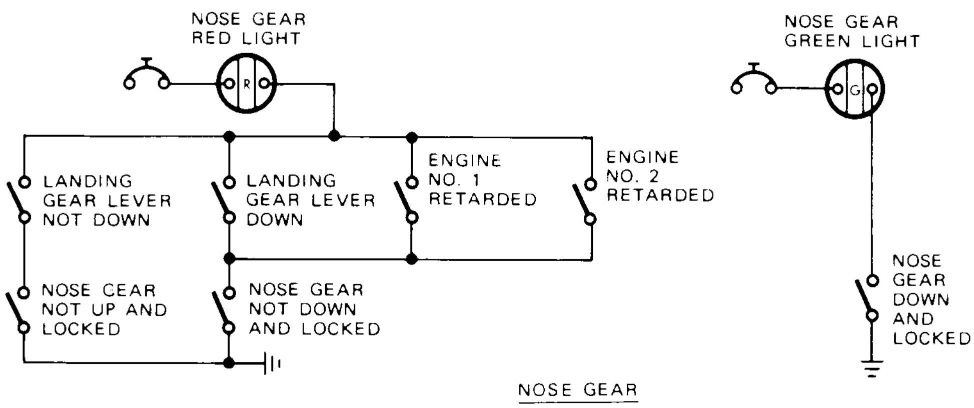


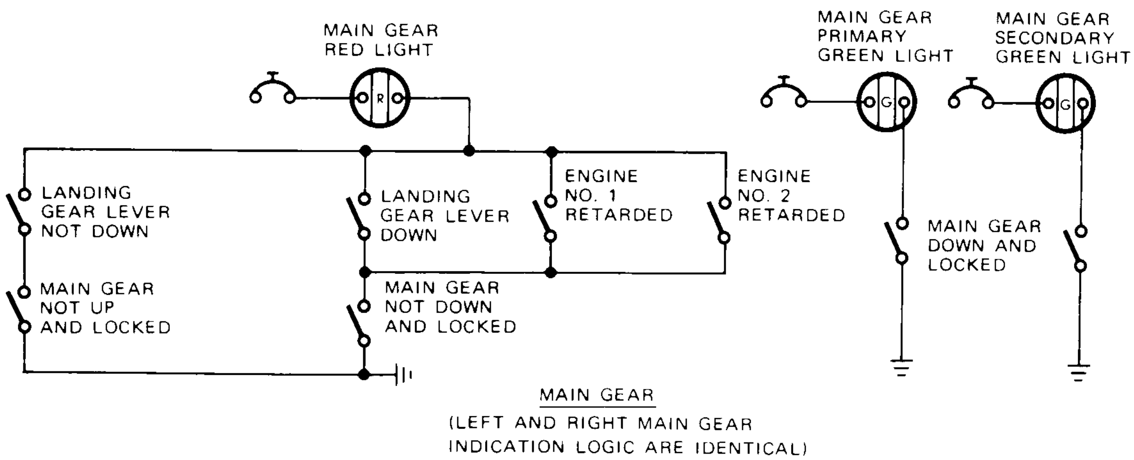


EFFECTIVITY

STANDARD PASSENGER AIRPLANES

Landing Gear Position Indicating and Warning Functional Schematic Diagrams
Figure 8 (Sheet 1)





EFFECTIVITY

PASSENGER/CARGO CONVERTIBLE AIRPLANES

Landing Gear Position Indicating and Warning Functional Schematic Diagrams
Figure 8 (Sheet 2)

LANDING GEAR POSITION INDICATING AND WARNING SYSTEM - TROUBLESHOOTING

1. General
   A. The troubleshooting charts in the following pages are designed as an aid for locating causes of troubles that may appear in the landing gear position indicating and warning system. The charts are arranged so that by starting at the top and proceeding downward the trouble may be isolated and corrected. These charts do not cover every possible trouble, however they may be used as a guide for isolating troubles not covered. No attempt has been made to give detailed instructions for measuring voltages or continuity. These may vary for different airplane configurations. Therefore, the applicable wiring diagrams must necessarily be used in conjunction with the trouble shooting charts. Prior to troubleshooting, the engine pressure ratio function of the engine indicating system must be functioning properly (Ref Chapter 77).
   B. The proximity sensors used in this system fail to the normal nonenergized condition. Therefore if a sensor is shorted or open, the related switch is in its normal nonenergized condition. This condition may be simulated by disconnecting the sensor at the disconnect nearest the sensor or by jumpering the sensor at this point. The position switch circuits may be actuated by placing a strip of ferrous material against the face of the sensor or by replacing the sensor with a 1000-ohm resistor. Sensors may be checked for malfunction by measuring dc resistance between sensor leads. The resistance between the blue and yellow leads should be 350 ±35 ohms. The resistance between the red and yellow leads should be 30 ±6 ohms.
   C. In the following charts, the airplane will be in one of the following conditions unless specified otherwise:
      (1) Airplane on ground; electrical power on; all circuit breakers closed; gear down and locked; lockpins installed; hydraulic system depressurized; throttles advanced; landing gear lever in OFF position.

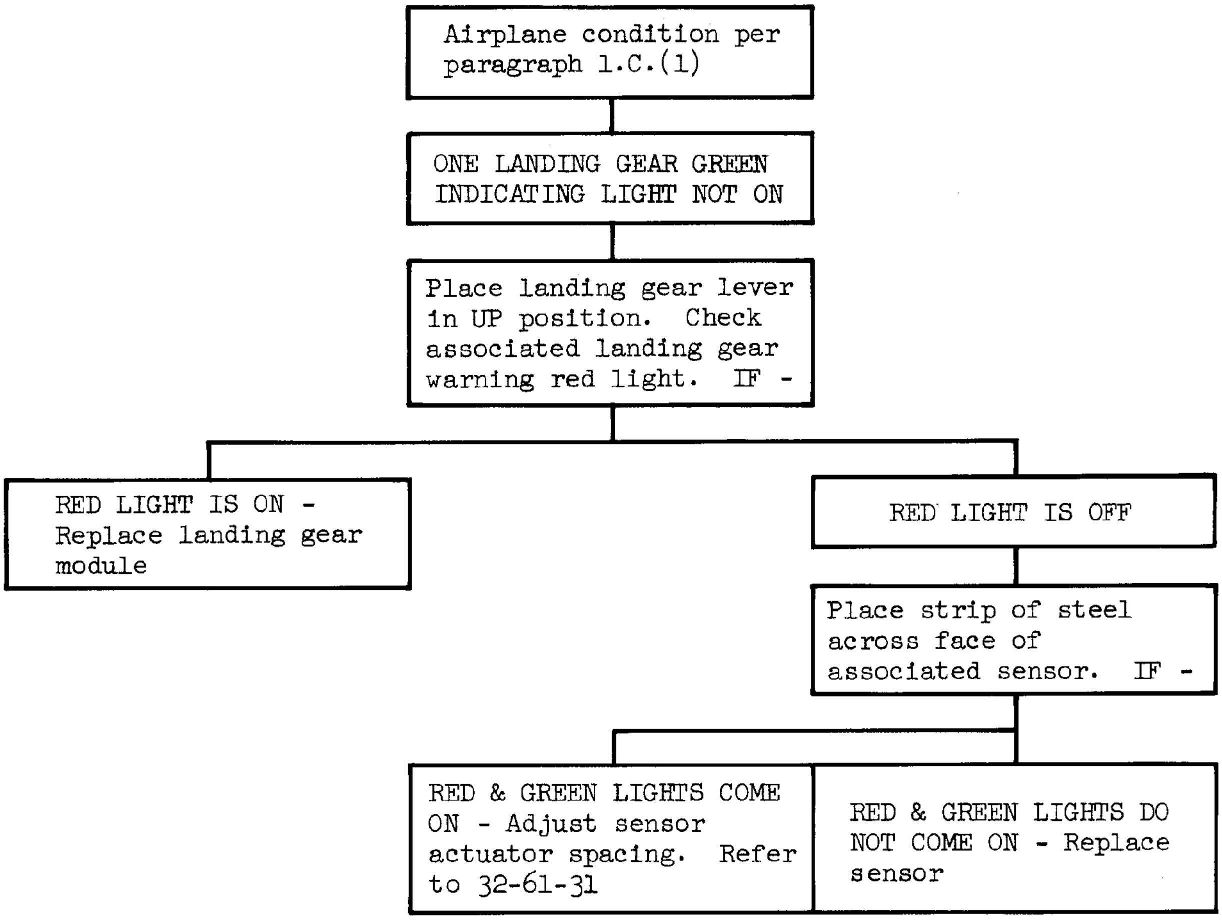
         WARNING: CHECK THAT GROUND LOCK ASSEMBLIES ARE INSTALLED IN ALL LANDING GEAR TO PREVENT INADVERTENT OPERATION OF GEAR. INJURY TO PERSONNEL AND/OR EQUIPMENT COULD RESULT IF GEAR RETRACTS.

      (2) Airplane on jacks; electrical power on; all circuit breakers closed; gear up and locked; hydraulic system depressurized; throttles advanced; landing gear lever in OFF position.

         NOTE: It may be necessary to pressurize the hydraulic system momentarily to obtain flap position called for (Ref 29-11-0 MP and 29-12-0 MP).

D. Landing gear position indicating and warning system trouble symptoms are best identified by performing a test of the system (Ref Landing Gear Position Indicating and Warning System - A/T). If the system does not react as specified, proceed to the following charts.

2. Troubleshooting Charts



Landing Gear Position Indicating/Warning System - Troubleshooting
Figure 101 (Sheet 1)

Airplane condition per paragraph 1.C.(1) place landing gear lever in UP position. IF -

ONE LANDING GEAR WARNING RED LIGHT DOES NOT COME ON

Jumper or disconnect uplock sensor. IF -

LIGHT COMES ON - Replace sensor

LIGHT REMAINS OUT - Replace landing gear module

Airplane condition per paragraph 1.C.(1). Place landing gear lever in UP position. IF -

NO LANDING GEAR WARNING RED LIGHT COMES ON

Jumper landing gear lever position switch. IF -

LIGHT COMES ON - Check landing gear lever position switch for open circuit. Adjust or replace switch or repair or replace defective wiring. Refer to 32-61-11

LIGHT REMAINS OUT - Replace landing gear module

Landing Gear Position Indicating/Warning System - Troubleshooting
Figure 101 (Sheet 2)

Airplane condition per paragraph 1.C.(2). Landing gear up and locked, place landing gear lever in DOWN position

ONE LANDING GEAR WARNING RED LIGHT DOES NOT COME ON

Jumper or disconnect downlock sensor. IF -

LIGHT COMES ON - Replace sensor

LIGHT DOES NOT COME ON - Replace landing gear module

Airplane condition per paragraph 1.C.(2) with landing gear up and locked. Place landing gear lever in DOWN position. IF -

NO LANDING GEAR WARNING RED LIGHT COMES ON

Retard a throttle, IF -

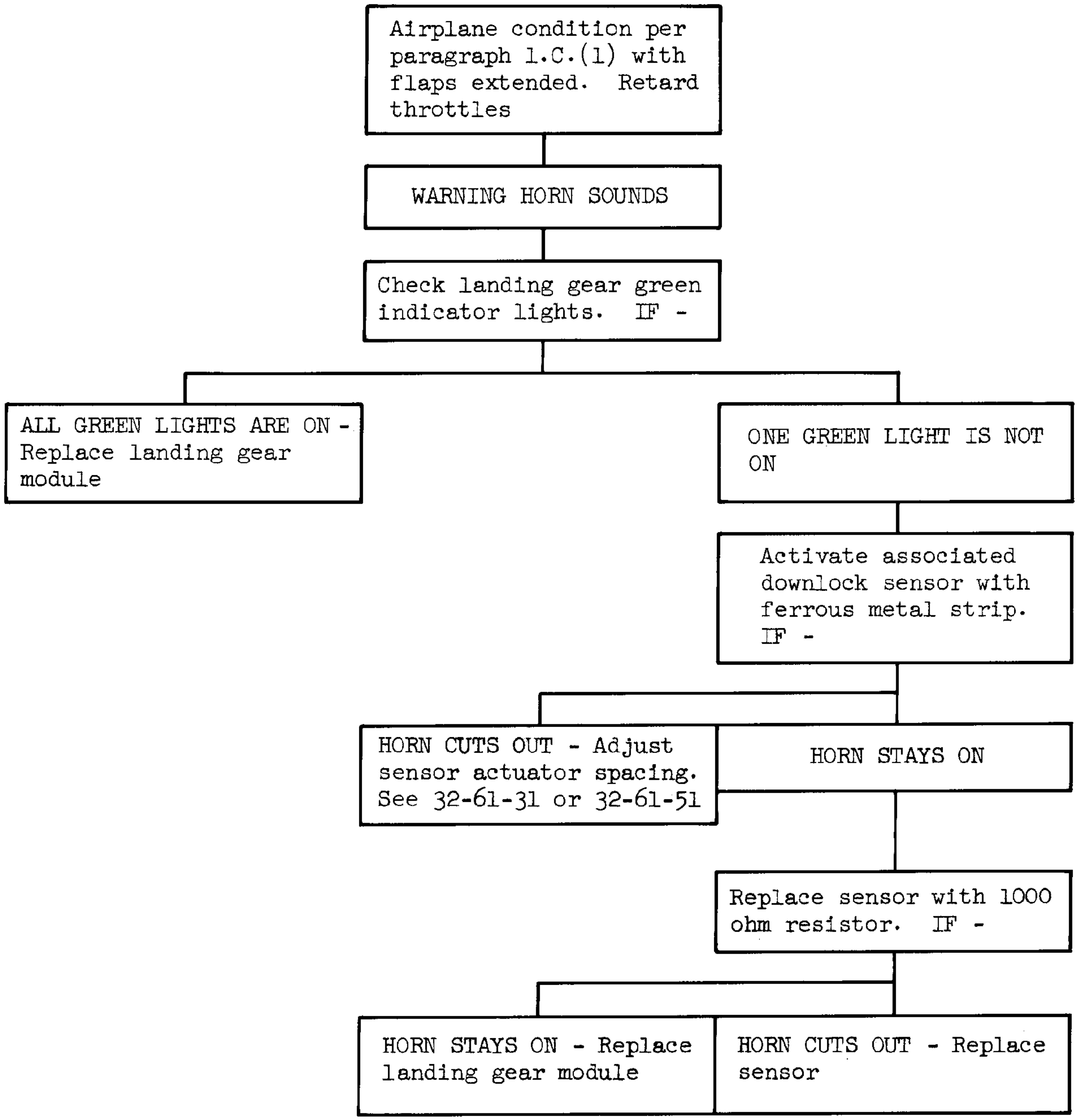
RED WARNING LIGHTS COME ON - Check landing gear position switch circuit for continuity. IF -

RED WARNING LIGHTS DO NOT COME ON - Replace landing gear module

OK - Replace landing gear module

NOT OK - Isolate trouble to either switch or wiring. Adjust or replace switch or repair wiring as required

Landing Gear Position Indicating/Warning System - Troubleshooting
Figure 101 (Sheet 3)



Landing Gear Position Indicating/Warning System - Troubleshooting
Figure 101 (Sheet 4)

LANDING GEAR POSITION INDICATING AND WARNING SYSTEM - ADJUSTMENT/TEST

1. Landing Gear Position Indicating and Warning System Test
   A. General
      (1) The landing gear position indicating and warning system should be tested after maintenance has been performed on a component to ensure that the system is functioning properly.
      (2) For tests which require positioning of thrust levers, the thrust lever position is given in approximate degrees from idle stop. This procedure assumes that a rigging check has already been successfully completed, and it is therefore unnecessary to recheck throttle positions accurately.

          NOTE: For system rig position, refer to 31-26-11 A/T.

      (3) If it is desirable to use linear dimensions (arc length at control stand cover top) for positioning thrust levers, refer to Chapter 76, Engine Control Cables - MP, for conversion data.
   B. Equipment and Materials
      (1) Airplane Jacks (Ref 07-11-11)
      (2) Ground Lock Assemblies (Ref 32-00-01)
      (3) Hydraulic test bench capable of delivering 20 gpm at 3000 psi (optional)

          NOTE: You can also use airplane hydraulic power, but you cannot control the hydraulic pressure.

   C. Prepare to Test
      (1) Jack airplane until all tires clear ground (Ref 07-11-11).
      (2) Check that external electrical power supply is connected.
      (3) If you use an external source for hydraulic power, connect the source to system A (Ref 29-
          11-0 MP).
          (a) Do not pressurize the system at this time.
      (4) Check that all circuit breakers on landing gear circuit breaker panel (P6) are closed.
      (5) Check that press-to-test and all indicator lights circuit breakers on circuit breaker panel (P6) are closed.
   D. Test Indicator Light and Warning Horn Responses
      (1) Advance both engine throttles to a position greater than 17 degrees.
      (2) Place landing gear control lever in DN position and check that green indicator light for each gear on pilot's center panel comes on.
      (3) With hydraulic system A depressurized (Ref 29-11-0), place landing gear control lever in UP position. Check that red warning lights on landing gear control panel come on and green indicator lights remain on.

(4) Place master test switch in DIM position and check that green indicator lights and red warning lights dim.
(5) Remove ground lock assemblies from all landing gear (Ref 32-00-01).
(6) Do the steps that follow to retract the landing gear:
(a) If you use an external hydraulic source, do this step:
1) Supply and control the hydraulic pressure to the hydraulic system A until you get slow gear operation (Ref 29-11-0).
(b) If you use the hydraulic system on the airplane to supply the hydraulic power, do these steps:

NOTE: Since you cannot control the pressure in the system, the gear will retract and extend faster. You will have to monitor the indicator lights more carefully.

1) Move the control lever for the landing gear to the DN position.
2) Supply hydraulic power to system A (Ref 29-11-0).
3) Move the control lever to the UP position.
(7) Look at the indicator lights for the landing gear:
(a) Check that respective green indicator light goes off as each landing gear unlocks.
(b) Check that respective red warning light goes off as each landing gear retracts to up and locked position.
(8) Place LIGHTS switch on panel P2 in TEST position. Check that main and nose landing gear green and red lights come on.
(9) Release LIGHTS switch. Check that main and nose landing gear green and red lights go off.
(10) Press nose, right main, and left main landing gear green and red lights individually. Check that each light comes on when pressed and each light goes off when released.
(11) Place landing gear control lever in OFF position and check that red warning lights remain off.
(12) Place landing gear control lever in DN position.
(a) Check that red warning lights for all three landing gear come on as control lever is placed in DN position.
(b) Check that respective red warning light goes off and green indicator light comes on when each landing gear extends to down and locked position.
(13) Test aural warning response to landing gear position indication (Ref 31-26-0).

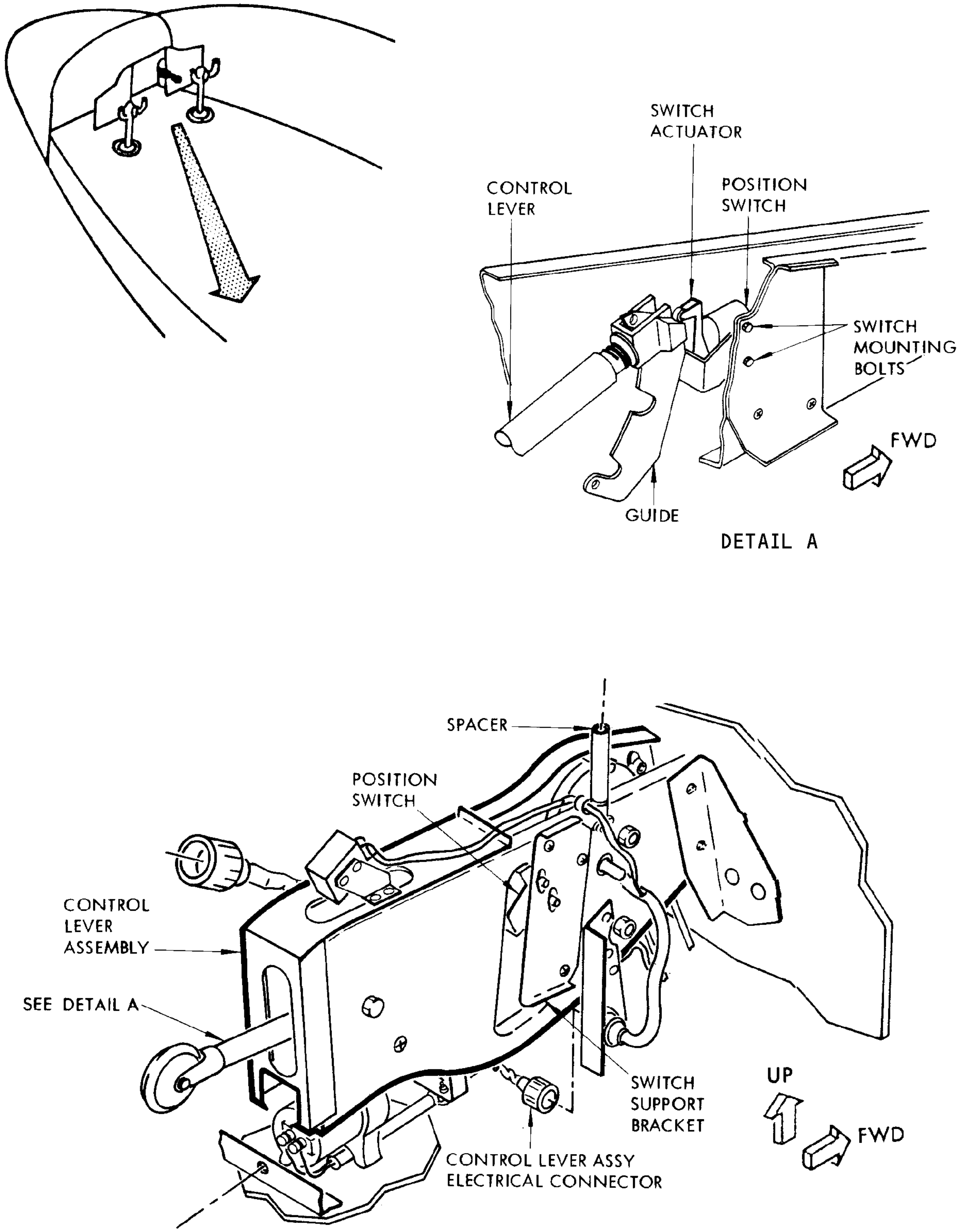
E. Restore Airplane to Normal
(1) Install ground lock assemblies in all landing gear (Ref 32-00-01).
(2) Remove electrical power if no longer required (Ref 24-22-00 MP).
(3) Remove System A hydraulic power if no longer required (Ref 29-11-0).
(4) Lower airplane and remove jacks (Ref 07-11-11).

CONTROL LEVER POSITION SWITCH - REMOVAL/INSTALLATION

1. Equipment and Materials
   A. Ground Lock Assemblies (Ref 32-00-01)
2. Prepare Control Lever Position Switch for Removal
   A. Check that all ground lock assemblies are installed (Ref 32-00-01).
   B. Open all circuit breakers on landing gear circuit breaker panel P6-2.
   C. Depressurize hydraulic system A (Ref 29-11-0, Maintenance Practices).
3. Remove Control Lever Position Switch
   A. Release and lower first officer's instrument panel.
   B. Remove screws attaching switch support bracket to control lever assemble (Fig. 401).
   C. Remove screws attaching switch assembly to support bracket.
   D. Disconnect switch wiring at switch terminals. Note terminal to which each wire is attached.
   E. Remove switch from switch assembly.
4. Install Control Lever Position Switch
   A. Assemble switch on switch assembly and install assembly on support bracket (Fig. 401).

      CAUTION: SWITCH INSTALLATION BOLTS MUST BE INSTALLED WITH HEADS FACING INBOARD TO AVOID INTERFERENCE WITH CONTROL LEVEL LOCK MECHANISM.

   B. Attach wires to switch terminals (Ref step 3.D).
   C. Position switch and support bracket assembly in place on control lever assembly and install mounting bolts. Do not tighten.
   D. Move control lever to DN position and adjust support bracket position until the position switch is actuated.
   E. Close all circuit breakers on landing gear circuit breaker panel P-6.
   F. Test operation of position switch as follows:
      (1) Connect external electrical power.
      (2) With landing gear lever in OFF position, check that landing gear red warning lights are on.
      (3) Place landing gear lever in DN position, check that landing gear red warning lights go out.
      (4) Remove electrical power if no longer required.



Control Lever Position Switch Installation
Figure 401

MAIN GEAR UPLOCK SENSOR - REMOVAL/INSTALLATION

1. General
   A. The following procedure applies to both left and right main gear uplock sensors.
2. Equipment and Materials
   A. Ground Lock Assemblies - F72735 (Ref 32-00-01)
   B. Actuator bar for proximity sensors
      (1) Material: 1020 steel per MIL-S-7952, 15-5 ph steel, or 17-4 ph steel per AMS 5643
      (2) Size: For use on rectangular sensors - 1.5 x 0.75 x 0.050 inches
   C. Deactuator bars for proximity sensors
      (1) Material: 5052, 6061, 7075, or 2024 aluminum or sheet copper (0.05 inches thick)
3. Prepare Main Gear Uplock Sensor for Removal
   A. Open all circuit breakers on landing gear circuit breaker panel P6-2.
   B. Check that ground lock assemblies are installed in all landing gear (Ref 32-00-01).
4. Remove Main Gear Uplock Sensor
   A. Remove the two nuts and all washers.
   B. Make a note of the locations and tag the spacers so you can install the spacers in the same location.

      NOTE: If you change the spacer configuration, the clearance between the sensor and the target can change. Adjustment of the sensor clearance requires an uplock sensor adjustment.

   C. Remove the sensor and the spacers from the mounting bracket.
   D. Examine the sensor, the mounting bracket, and the adjacent area for possible damage.

      NOTE: Damage to the sensor is an indication of an incorrect clearance between the sensor and the target.

      (1) If you find damage, make a note of the damage for the installation procedure.
   E. Remove the sensor electrical connector found on the wheel well ceiling.
   F. Make a note of the pin locations and the lead wire colors for the new sensor installation.
   G. Remove the sensor pins from the connector.
   H. Make a note of the ground point location.
   I. Remove the third wire (yellow) from the ground point.

J. Prepare a line that is longer than the flexible conduit.

NOTE: This line will help to install the sensor leads in the flexible conduit.

K. Attach the line to the sensor electrical leads.
L. Carefully remove the sensor leads from the flexible conduit.
(1) Do not pull the line fully out from the conduit.
M. Remove the line from the sensor leads.
N. Remove the sensor from the airplane.

5. Install Main Gear Uplock Sensor

A. If you found damage to the sensor or the adjacent area during the removal procedure, do these steps:
(1) Examine the target for the sensor and the adjacent area for signs of possible damage.
(2) If you found damage, repair or replace all damaged components or areas.

NOTE: Damage to the sensor, the target, or the adjacent areas is an indication of an incorrect sensor clearance.

(3) If you found damage, do the adjustment procedure for the sensor clearance after you make the repairs (Ref 32-61-21/501).

B. Twist the sensor leads together.
C. Attach the line in the flexible conduit (used during the removal procedure) to the end of the sensor leads.
D. Carefully pull the sensor leads through the flexible conduit.
E. Install the mounting bolts on the sensor.
F. Install the spacers as tagged during the removal procedure.

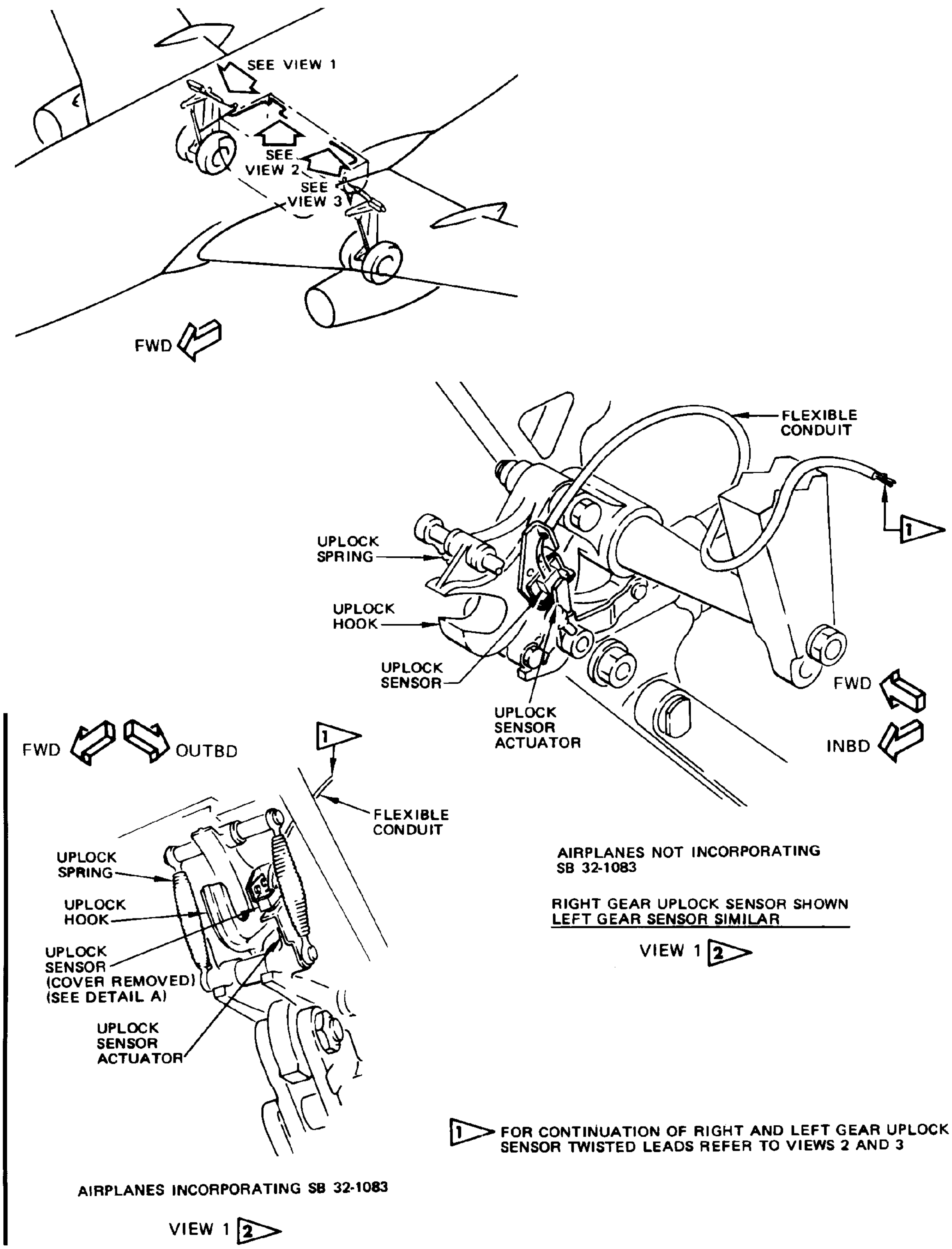
CAUTION: INSTALL THE SPACERS AS TAGGED. IF YOU DO NOT INSTALL THE SPACERS AS TAGGED IN THE REMOVAL PROCEDURE, THE SENSOR CLEARANCE CAN CHANGE. AN INCORRECT CLEARANCE CAN CAUSE SENSOR DAMAGE OR INCORRECT SENSOR OPERATION.

NOTE: If you change the installation of the spacers, a gear retraction and extension procedure can be necessary.

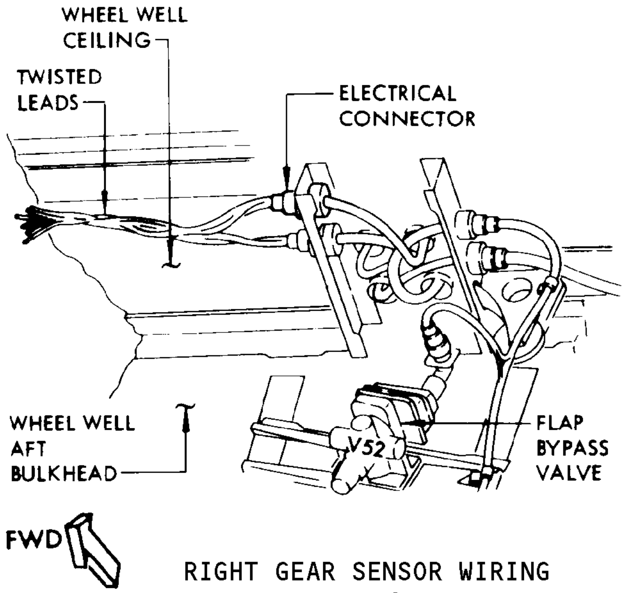
G. Install the sensor on the mounting bracket.

NOTE: On airplanes incorporating SB 32-1083, ensure that sensor actuator is riding on the major diameter (shoulder) of the lower spring shaft.

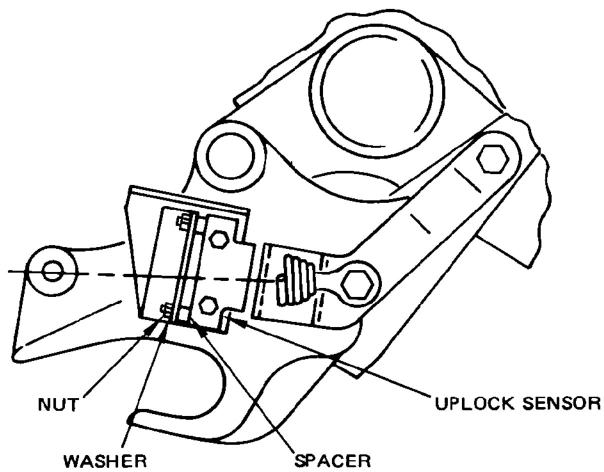
H. Put the sensor in the correct position on the mounting bracket.



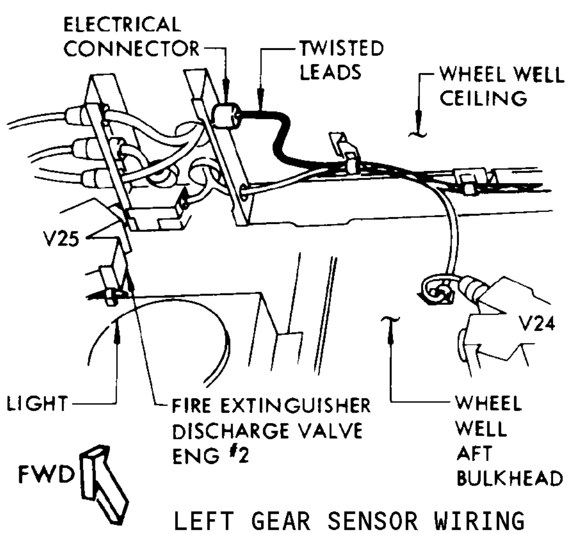
Main Gear Uplock Sensor Installation
Figure 401 (Sheet 1)



RIGHT GEAR SENSOR WIRING
VIEW 2



DETAIL A



LEFT GEAR SENSOR WIRING
VIEW 3

Main Gear Uplock Sensor Installation
Figure 401 (Sheet 2)

I. Install the washers and nuts on the mounting bolts and tighten the nuts.

NOTE: If you replace the spacers or install them differently, do not tighten the nuts.

J. Put the twisted sensor leads into the wire bundle.
K. Attach the sensor wires to the wire bundle with a wiring clamp.
L. If it is necessary, cut the sensor leads to the correct length.
M. Replace the pins on the sensor lead ends.
N. Install the lead pins in the electrical connector.
(1) Make sure that you installed the pins in the correct location.
O. Connect the third wire (yellow) at the ground point.
P. Connect the electrical connector.

6. Adjustment and Test

A. If you have one of more of the conditions that follow, you must adjust (Ref 32-61-21/501), and do a test of the uplock sensor (Ref 32-61-0/501):
(1) Damage to the sensor
(2) Damage to the sensor mounting bracket or adjacent structure
(3) Damage to the sensor target
(4) If you changed the spacers

B. If you do not have the conditions given before, do these steps to do a test of the uplock sensor:
(1) Remove the DO-NOT-CLOSE tags and close all circuit breakers for the landing gear on the circuit breaker panel, P6-2.
(2) Supply electrical power (Ref 24-22-0/201).
(3) Make sure that hydraulic systems A and B are not pressurized (Ref 29-11-0/201 and 29-12-0/201).
(4) Put the control lever for the landing gear in the DN position.
(5) Make sure the green lights for the main gear are on.

NOTE: These lights are above the control lever for the landing gear.

(6) Move the throttle fully forward.
(7) Move the control lever for the landing gear to the UP position.
(8) Put the actuator on the uplock sensor.

NOTE: It is only necessary to put the actuator and deactuator on the sensors you replace.

(9) Put a deactuator on the downlock sensor.
(10) Make sure the green light for the left gear or the right gear is not on.
(11) Make sure the red light for the left gear or the right gear is not on.
(12) Remove the actuator from the uplock sensor.

(13) Make sure the red light for the left gear or the right gear is on.
(14) Remove the deactuator from the downlock sensor.
(15) Move the control lever for the landing gear to the OFF position.

C. Remove electrical power if it is not necessary (Ref 24-22-00/201).

MAIN GEAR UPLOCK SENSOR - ADJUSTMENT/TEST

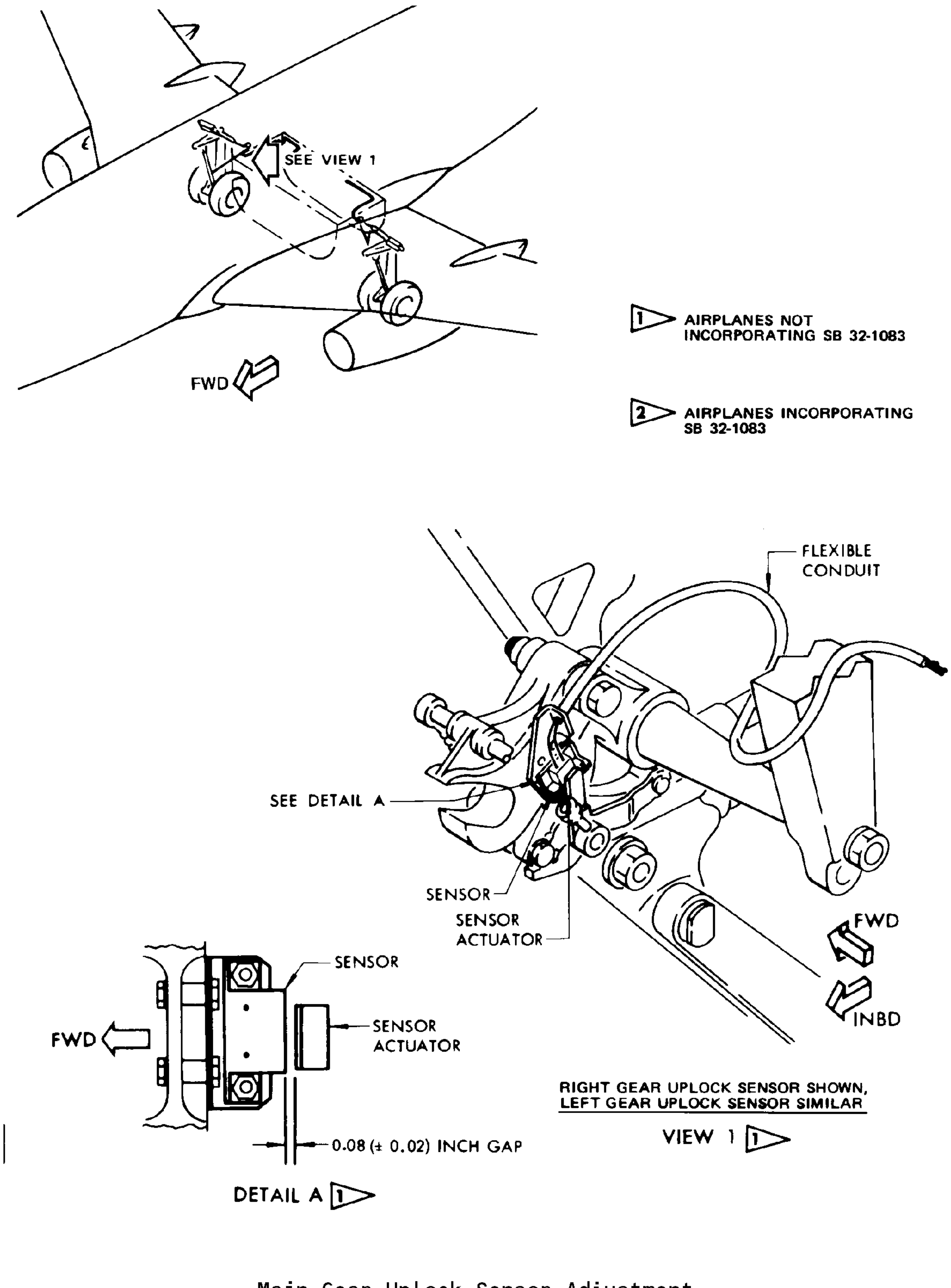
1. General
   A. The main gear uplock sensor must be in the up and locked condition before the sensor can be adjusted. With the gear up and locked, the uplock sensor is not accessible without removing the shock strut doors. Even when this is done, the working space is restricted.
   B. The alternative to the above procedure is to place the uplock mechanism in the up and locked condition without fully retracting the gear. This is accomplished in the following procedure which applies to both left and right gear uplock sensors.
2. Main Gear Uplock Sensor Adjustment
   A. Equipment and Materials
      (1) Ground Lock Assemblies (Ref 32-00-01)
   B. Prepare Main Gear Uplock Sensor for Adjustment
      (1) Check that all ground lock assemblies are installed (Ref 32-00-01).
      (2) Jack airplane until all wheels are clear of ground (Ref Chapter 7, Jacking).
      (3) Check that hydraulic system A and B are depressurized, (Ref 29-11-0, Maintenance Practices and 29-12-0, Maintenance Practices).
      (4) Check that landing gear control lever is in OFF position.
   C. Adjust Main Gear Uplock Sensor
      (1) Remove ground lock assembly from gear (Ref 32-00-01).
      (2) Manually unlock gear.
      (3) Manually retract gear about 45 degrees and support gear in this position with block under wheel.

         NOTE: Gear must be blocked well enough to support weight of man working on top of gear.

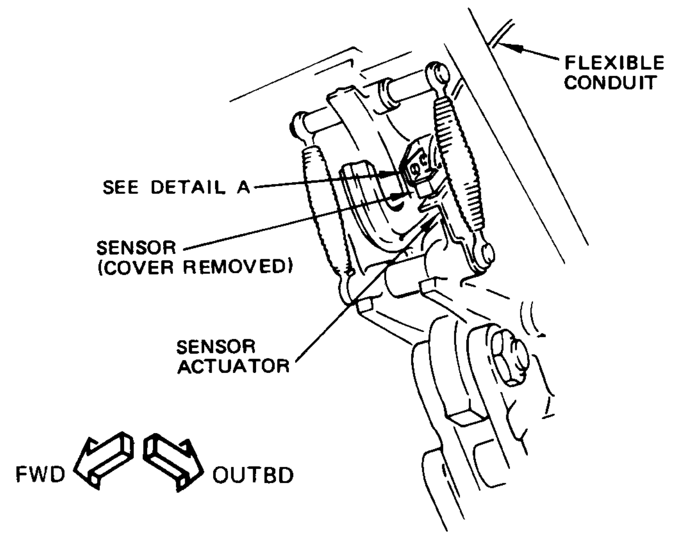
      (4) Climb through other wheel well and manually rotate uplock mechanism of partially retracted gear to the up and locked condition.

         NOTE: Gear position may have to be adjusted slightly to accomplish this.

      (5) On airplanes NOT incorporating SB 32-1083, loosen uplock sensor mounting bolts slightly and move sensor until proper gap between sensor and sensor actuator is obtained (Fig. 501). Tighten sensor mounting bolts.

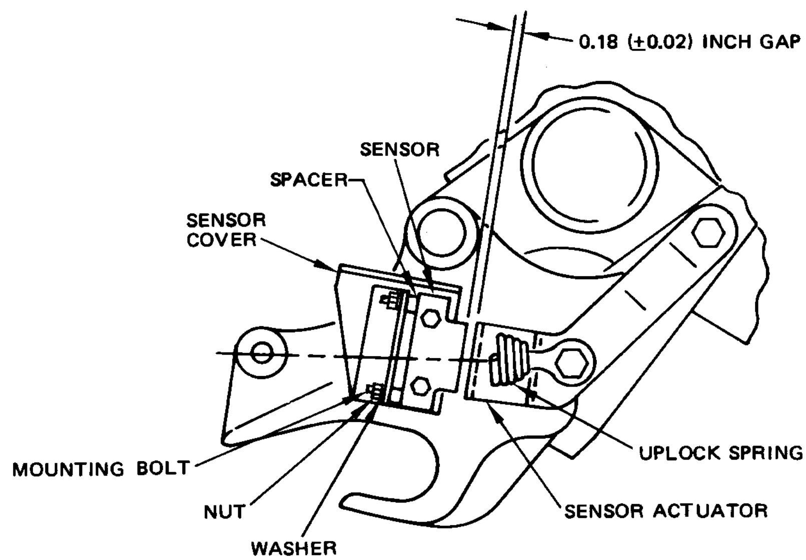


Main Gear Uplock Sensor Adjustment
Figure 501 (Sheet 1)



RIGHT GEAR UPLOCK SENSOR SHOWN,
LEFT GEAR UPLOCK SENSOR SIMILAR

VIEW 1 2



DETAIL A 2

Main Gear Uplock Sensor Adjustment
Figure 501 (Sheet 2)

(6) On airplanes incorporating SB 32-1083, change spacers as necessary for length to obtain required gap between sensor and sensor actuator (Fig. 501). Tighten sensor mounting bolts.

NOTE: Ensure that sensor actuator is riding in the major diameter (shoulder) of the lower spring shaft.

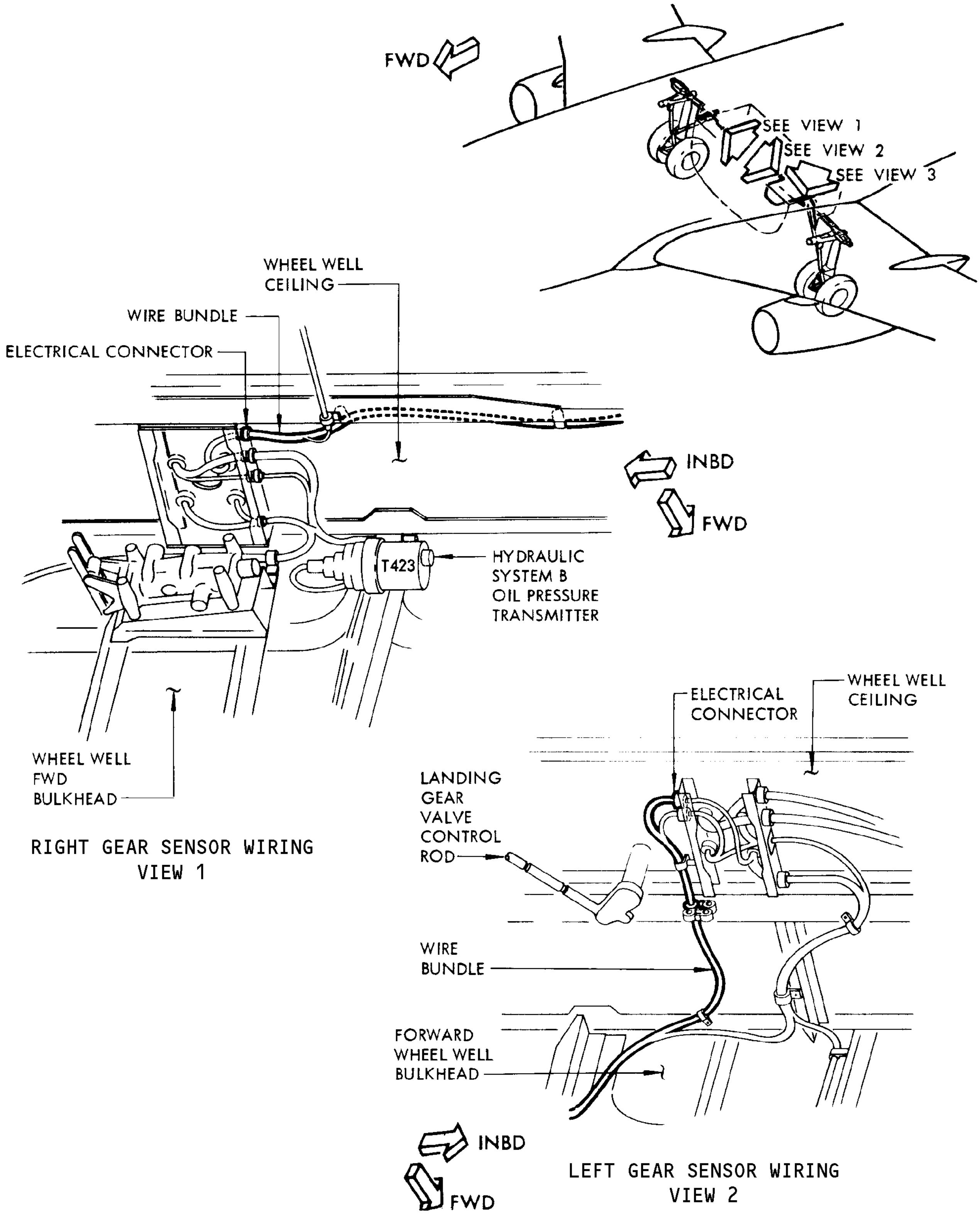
(7) Return uplock mechanism to unlocked condition.
(8) Remove support block from gear.
(9) Manually extend gear to the down and locked position.
(10) Install ground lock assemblies (Ref 32-00-01).
(11) Test uplock sensor (Ref 32-61-0, Adjustment/Test).
(12) Lower airplane and remove jacks (Ref Chapter 7, Jacking).

MAIN GEAR DOWNLOCK SENSOR - REMOVAL/INSTALLATION

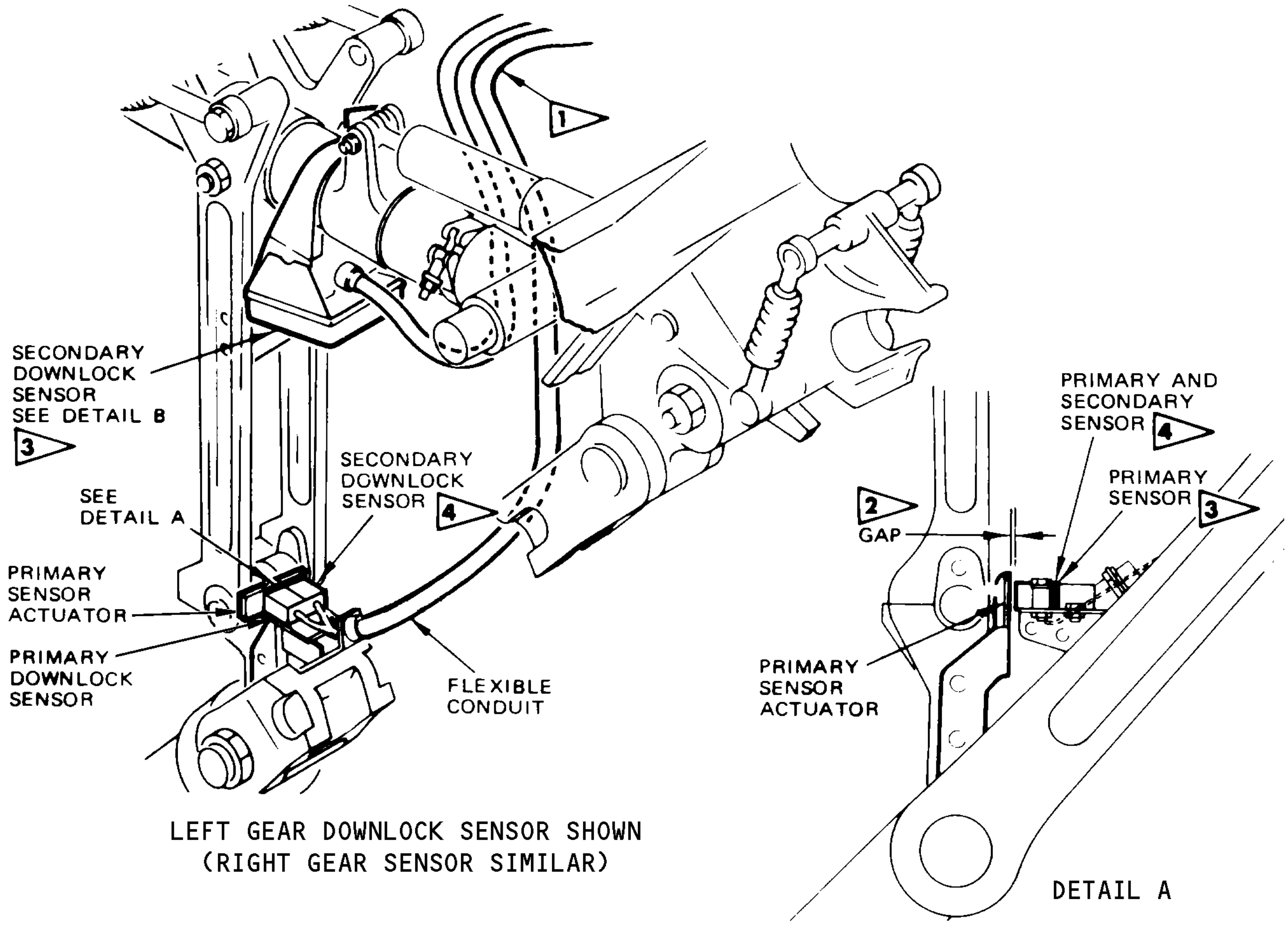
1. General
   A. The following procedure applies to both left and right gear downlock sensors.
2. Equipment and Materials
   A. Ground Lock Assemblies (Ref 32-00-01)
3. Prepare Main Gear Downlock Sensor for Removal
   A. Check that external electrical power supply is shut down.
   B. Open all circuit breakers on landing gear circuit breaker panel P6.
   C. Check that ground lock assemblies are installed in all landing gear (Ref 32-00-01).
4. Remove Main Gear Downlock Sensor
   A. Remove sensor and sensor cover from mounting bracket (Fig. 401).
   B. Disconnect electrical connector on wheel well ceiling. Remove sensor pin contacts from connector insert.

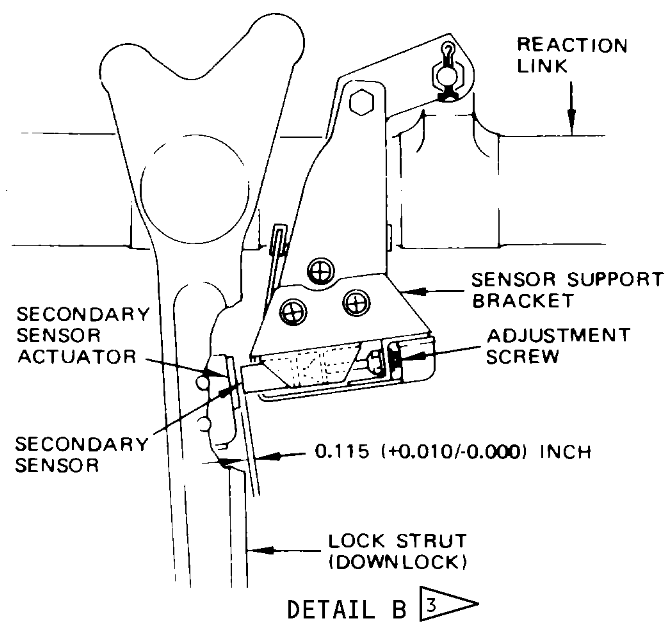
      NOTE: Mark or record pin location of color coded leads for installation of new sensor.

   C. Remove third wire from ground point.
   D. Tie a line to electrical leads to facilitate installation and pull leads out of flexible conduit. Do not pull line out of conduit.
   E. Untie line and remove sensor from airplane.
5. Install Main Gear Downlock Sensor
   A. Twist sensor leads together, tie a line to the end and thread them through the flexible conduit (Fig. 401).
   B. Position sensor and sensor cover in place on mounting bracket. Instal1 mounting bolts but do not tighten.
   C. Slide sensor on mounting bracket to obtain gap between sensor and sensor actuator as shown on detail A, Fig. 401. Tighten mounting bolts.
   D. Insert twisted sensor leads in wire bundle. Tie and clamp wire bundle.
   E. Trim sensor leads to length, install pin contacts on lead ends, and install pin contacts in connector insert in correct pin locations as noted in Par. 4.B.
   F. Ground third (yellow) sensor wire at ground point. Refer to Par. 4.C. for location.
   G. Check that landing gear lever is in the DN position.
   H. Connect electrical connector.
   I. Close all circuit breakers on landing gear circuit breaker panel P6.
   J. Apply electrical power to airplane.
   K. Check that all landing gear green lights are illuminated, that no landing gear red lights are illuminated and that landing gear aural warning is silent.
   L. Determine if there is a further need for electrical power on airplane; if not, shut down source.



Main Gear Downlock Sensor Installation
Figure 401 (Sheet 1)





1 FOR CONTINUATION OF RIGHT AND LEFT GEAR DOWNLOCK SENSOR FLEXIBLE CONDUIT REFER TO VIEWS 1 AND 2

2 0.22 (±0.01) INCH FOR AIRPLANES PRIOR TO INCORPORATION OF SB32-1093

0.085 (+0.015/-0.000) INCH FOR AIRPLANES INCORPORATING SB 32-1093

3 CARGO AIRPLANES PRIOR TO INCORPORATION OF SB 32-1093

4 CARGO AIRPLANES INCORPORATING SB 32-1093

Main Gear Downlock Sensor Installation
Figure 401 (Sheet 2)

NOSE GEAR UPLOCK SENSOR - REMOVAL/INSTALLATION

1. General
   A. The following procedure applies to the nose gear uplock sensor.
2. Equipment and Materials
   A. Ground Lock Assemblies - F72735 (Ref 32-00-01)
   B. Actuator bar for proximity sensors
      (1) Material: 1020 steel per MIL-S-7952, 15-5 ph steel, or 17-4 ph steel per AMS 5643
      (2) Size: For use on rectangular sensors - 1.5 x 0.75 x 0.050 inches
   C. Deactuator bars for proximity sensors
      (1) Material: 5052, 6061, 7076, or 2024 aluminum or sheet copper (0.05 inches thick)
3. Prepare Nose Gear Uplock Sensor For Removal
   A. Open all circuit breakers on landing gear circuit breaker panel P6-2.
   B. Check that ground lock assemblies are installed in all landing gear (Ref 32-0-01).
4. Remove Nose Gear Uplock Sensor
   A. Remove cover from the downlock sensor support beam.
   B. Remove the uplock sensor mounting bolts.
   C. Make a note of the locations and tag the spacers so you can install the spacers in the same location.

      NOTE: If you change the spacer configuration, the clearance between the sensor and the target can change. Adjustment of the sensor clearance requires an uplock sensor adjustment.

   D. Remove the sensor and the spacers from the mounting bracket.
   E. Examine the sensor, the mounting bracket, and the adjacent area for possible damage.

      NOTE: Damage to the sensor is an indication of an incorrect clearance between the sensor and the target.

      (1) If you find damage, make a note of the damage for the installation procedure.
   F. Disconnect uplock sensor leads from the terminal strip in the downlock sensor support beam. Note the terminal and lead wire colors for the new sensor installation.
   G. Remove terminal lugs from the leads.
   H. Prepare a line that is longer than the flexible conduit.

      NOTE: This line will help to install the sensor leads in the flexible conduit.

   I. Attach the line to the sensor electrical leads.

J. Carefully remove the sensor leads from the flexible conduit.
   (1) Do not pull the line fully out from the flexible conduit.
K. Remove the line from the sensor leads.
L. Remove the sensor from the airplane.

5. Install Nose Gear Uplock Sensor

A. If you found damage to the sensor or the adjacent area during the removal procedure, do these steps:
   (1) Examine the target for the sensor and the adjacent area for signs of possible damage.
   (2) If you found damage, repair or replace all damaged components or areas.

   NOTE: Damage to the sensor, the target, or the adjacent areas is an indication of an incorrect sensor clearance.

   (3) If you found damage, do the adjustment procedure for the sensor clearance after you make the repairs (Ref 32-61-41/501).
B. Twist the sensor leads together.
C. Attach the line in the flexible conduit (used during the removal procedure) to the end of the sensor leads.
D. Carefully pull the sensor leads through the flexible conduit.
E. Install the mounting bolts on the sensor.
F. Install the spacers as tagged during the removal procedure.

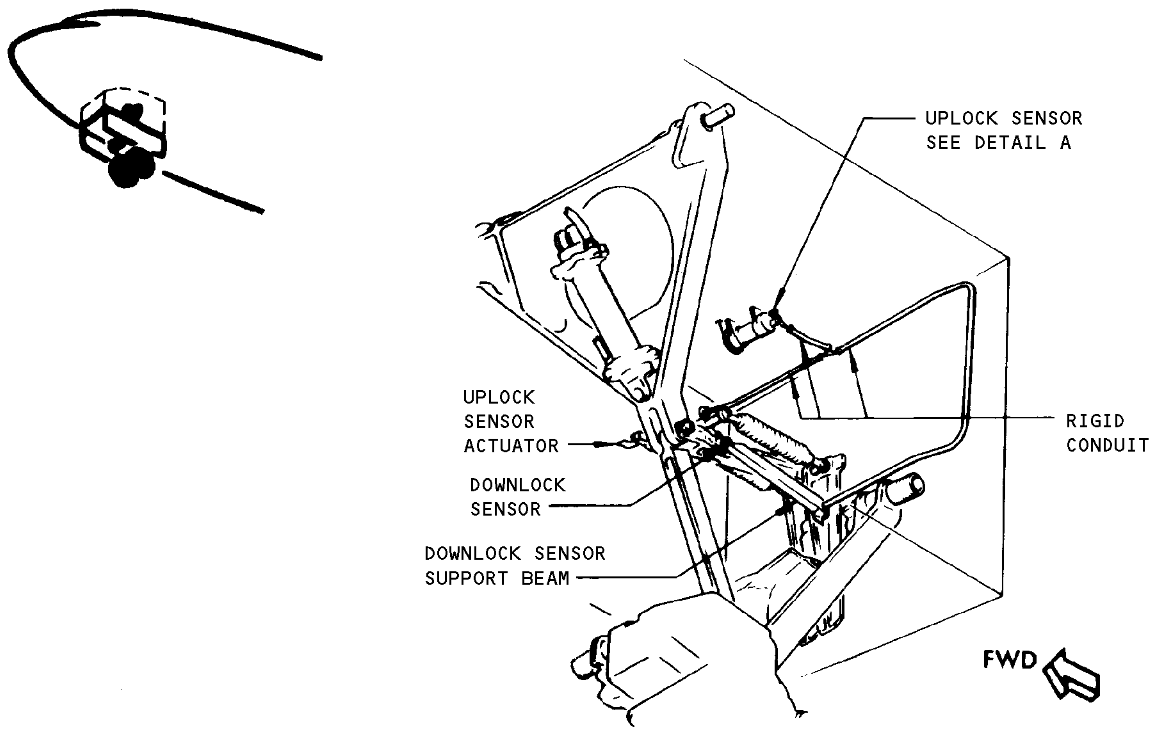
CAUTION: INSTALL THE SPACERS AS TAGGED. IF YOU DO NOT INSTALL THE SPACERS AS TAGGED IN THE REMOVAL PROCEDURE, THE SENSOR CLEARANCE CAN CHANGE. AN INCORRECT CLEARANCE CAN CAUSE SENSOR DAMAGE OR INCORRECT SENSOR OPERATION.

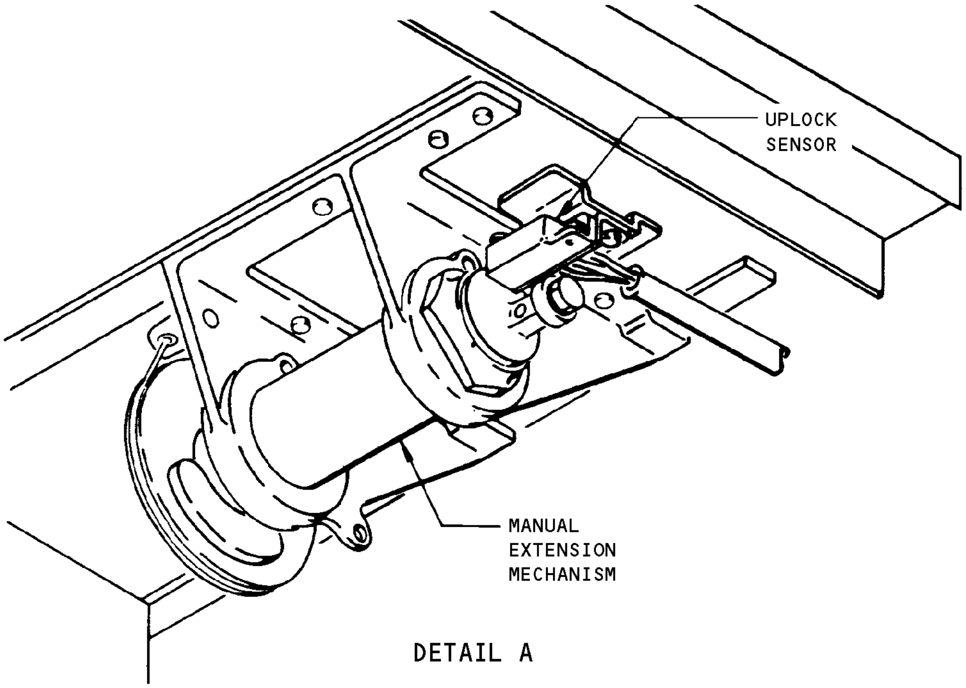
NOTE: If you change the installation of the spacers, a gear retraction and extension procedure can be necessary.

G. Install the sensor on the mounting bracket.
H. Put the sensor in the correct position on the mounting bracket.
I. Tighten the sensor attaching hardware.

NOTE: If you replace the spacers or install them differently, do not tighten the mounting bolts.

J. Put the twisted sensor leads into the wire bundle.
K. If it is necessary, cut the sensor leads to the correct length.
L. Replace the terminal lugs on the sensor lead ends.
M. Connect sensor leads to the terminal strip.





DETAIL A

Nose Gear Uplock Sensor Installation
Figure 401

6. Adjustment and Test
   A. If you have one of more of the conditions that follow, you must adjust (Ref 32-61-41/501), and do a test of the uplock sensor (Ref 32-61-0/501):
      (1) Damage to the sensor
      (2) Damage to the sensor mounting bracket or adjacent structure
      (3) Damage to the sensor target
      (4) If you changed the spacers
   B. If you do not have the conditions given before, do these steps to do a test of the uplock sensor:
      (1) Remove the DO-NOT-CLOSE tags and close all circuit breakers for the landing gear on the circuit breaker panel, P6-2.
      (2) Supply electrical power (Ref 24-22-0/201).
      (3) Make sure that hydraulic systems A and B are not pressurized (Ref 29-11-0/201 and 29-12-0/201).
      (4) Put the control lever for the landing gear in the DN position.
      (5) Make sure the green lights for the nose gear are on.

         NOTE: These lights are above the conrol lever for the landing gear.

      (6) Move the throttle fully forward.
      (7) Move the control lever for the landing gear to the UP position.
      (8) Put the actuator on the uplock sensor.

         NOTE: It is only necessary to put the actuator and deactuator on the sensors you replace.

      (9) Put a deactuator on the downlock sensor.
      (10) Make sure the green light for the nose gear is not on.
      (11) Make sure the red light for the nose gear is not on.
      (12) Remove the actuator from the uplock sensor.
      (13) Make sure the red light for the nose gear is on.
      (14) Remove the deactuator from the downlock sensor.
      (15) Move the control lever for the landing gear to the OFF position.
      (16) Install the cover on the downlock sensor support beam.
   C. Remove electrical power if it is not necessary (Ref 24-22-00/201).

NOSE GEAR UPLOCK SENSOR - ADJUSTMENT/TEST

1. Nose Gear Uplock Sensor Adjustment
   A. General
      (1) The nose gear must be in the up and locked position with the landing gear lever in the OFF position before making adjustments.
   B. Equipment and Materials
      (1) Ground Lock Assemblies (Ref 32-00-01)
   C. Prepare for Adjustment
      (1) Check that all ground lock assemblies are installed (Ref 32-00-01).
      (2) Jack nose of airplane until nose wheel is clear of ground (Ref Chapter 7, Jacking).
      (3) Provide external electrical power to airplane.
      (4) Disconnect both nose gear door actuating rods.
      (5) Pressurize hydraulic system A (Ref 29-11-0 MP).
      (6) Remove nose gear ground lock assembly (Ref 32-00-01).

      WARNING: CHECK THAT GROUND LOCK ASSEMBLIES ARE INSTALLED IN MAIN LANDING GEAR TO PREVENT INADVERTENT OPERATION OF GEAR. INJURY TO PERSONNEL AND/OR EQUIPMENT COULD RESULT IF GEAR RETRACTS.

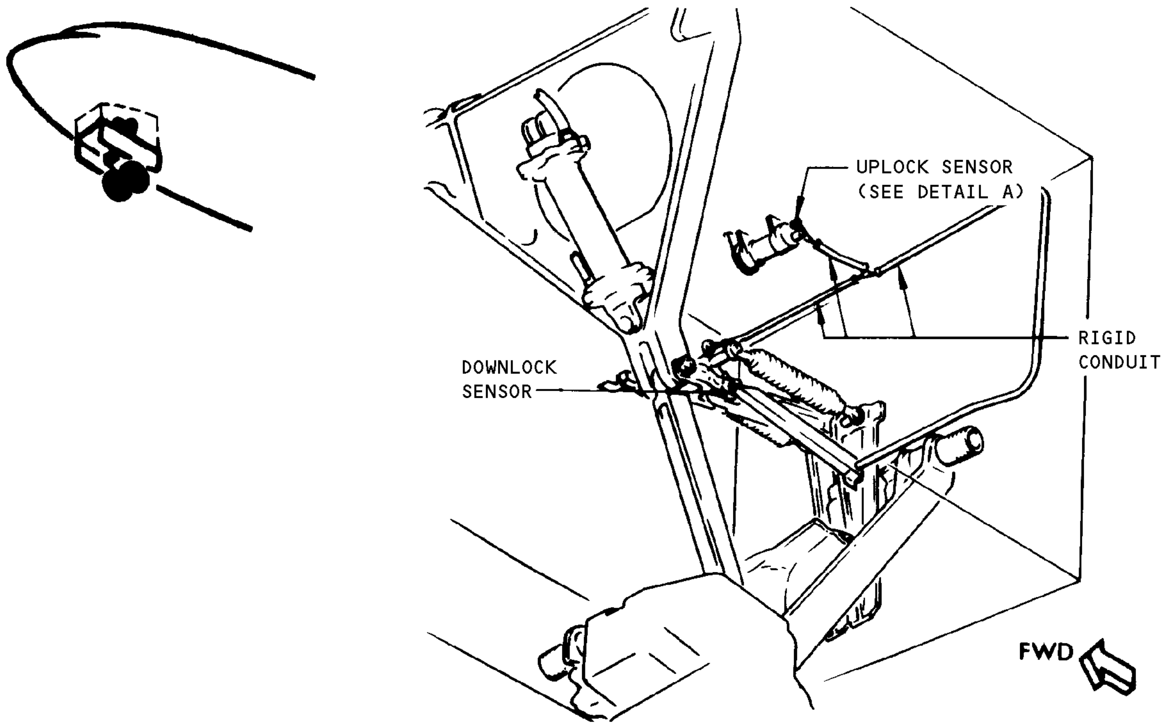
      (7) Operate override trigger and place landing gear lever in UP position and retract nose gear.

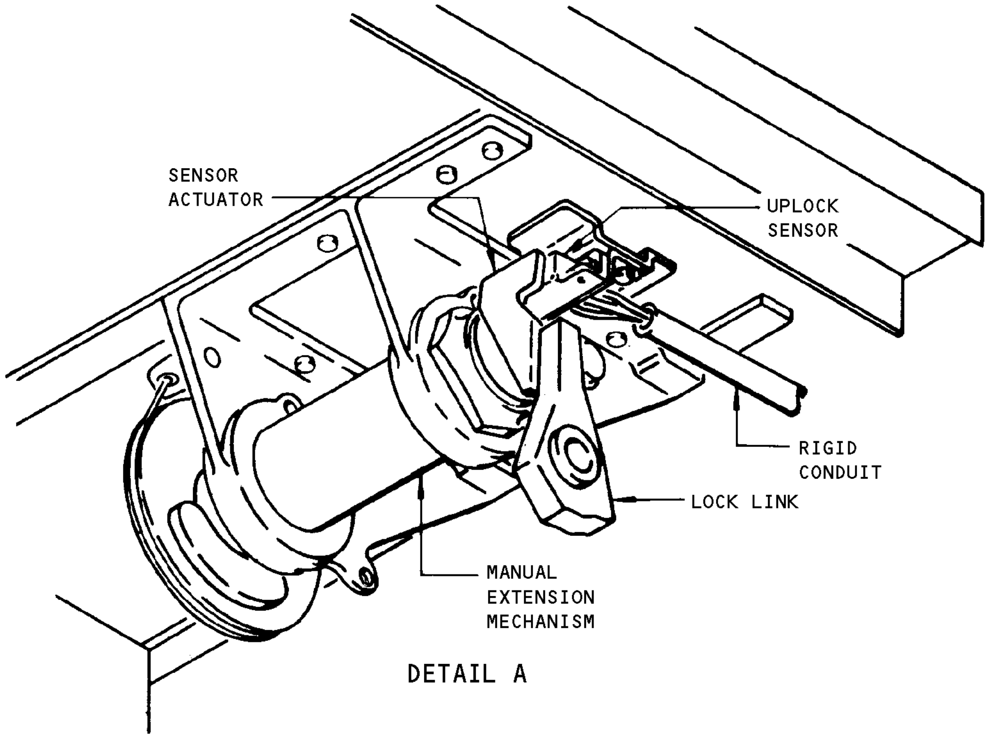
      WARNING: MAKE CERTAIN PERSONNEL AND EQUIPMENT ARE CLEAR OF NOSE GEAR PATH.

      (8) Place landing gear lever in OFF position.

      NOTE: Nose gear must be in normal flight position before adjusting sensor. Normal flight position is with no pressure on the actuator. (Landing gear lever in OFF position).

   D. Adjust Nose Gear Uplock Sensor
      (1) Loosen uplock sensor mounting bolts.
      (2) Adjust sensor position for a gap between sensor face and sensor actuator as indicated on Fig. 501.
      (3) Tighten sensor mounting bolts.
      (4) Test nose gear uplock sensor (Ref 32-61-0, Adjustment/Test).



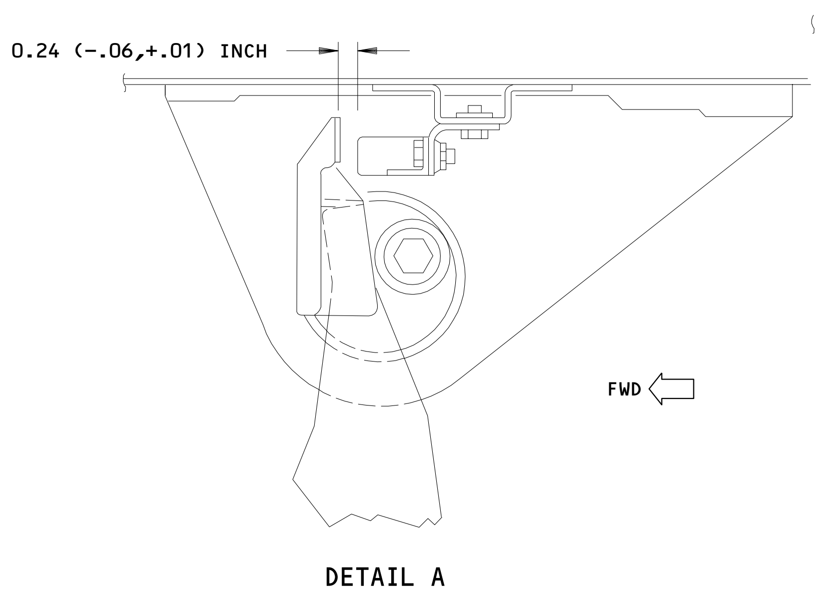


Nose Gear Uplock Sensor Adjustment
Figure 501 (Sheet 1)

E. Restore Airplane to Normal Configuration
  (1) Extend nose gear and install gear ground lock assembly (Ref 32-00-01).

WARNING: MAKE CERTAIN PERSONNEL AND EQUIPMENT ARE CLEAR OF NOSE GEAR PATH.

  (2) Connect nose gear door actuating rods.
  (3) Lower airplane nose and remove jacks (Ref Chapter 7, Jacking).
  (4) Check requirement for external electrical power; if none, remove external electrical power.
  (5) Check requirement for System A hydraulic power; if none, remove System A hydraulic power (Ref 29-11-0).

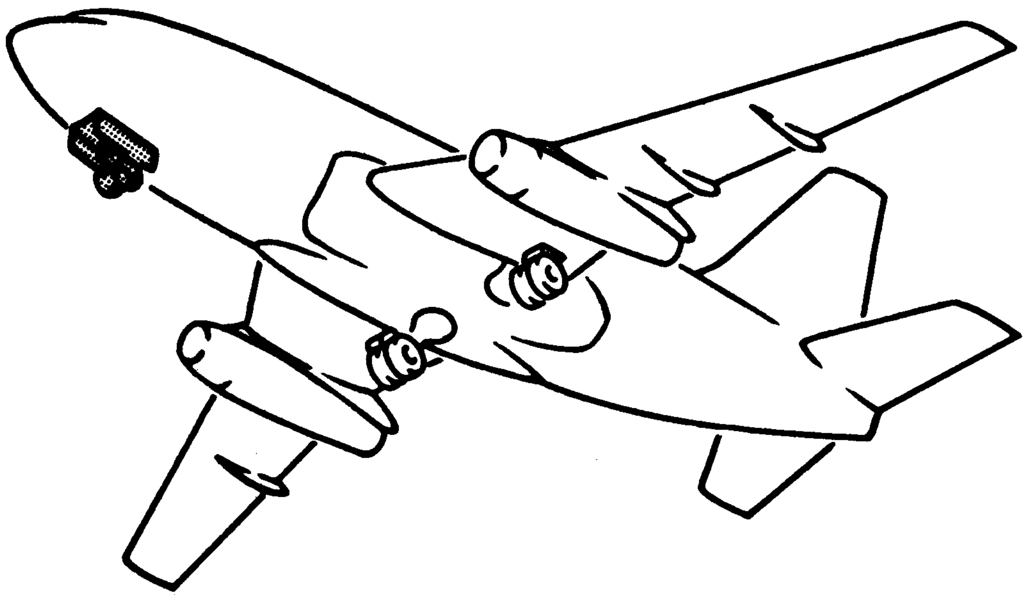


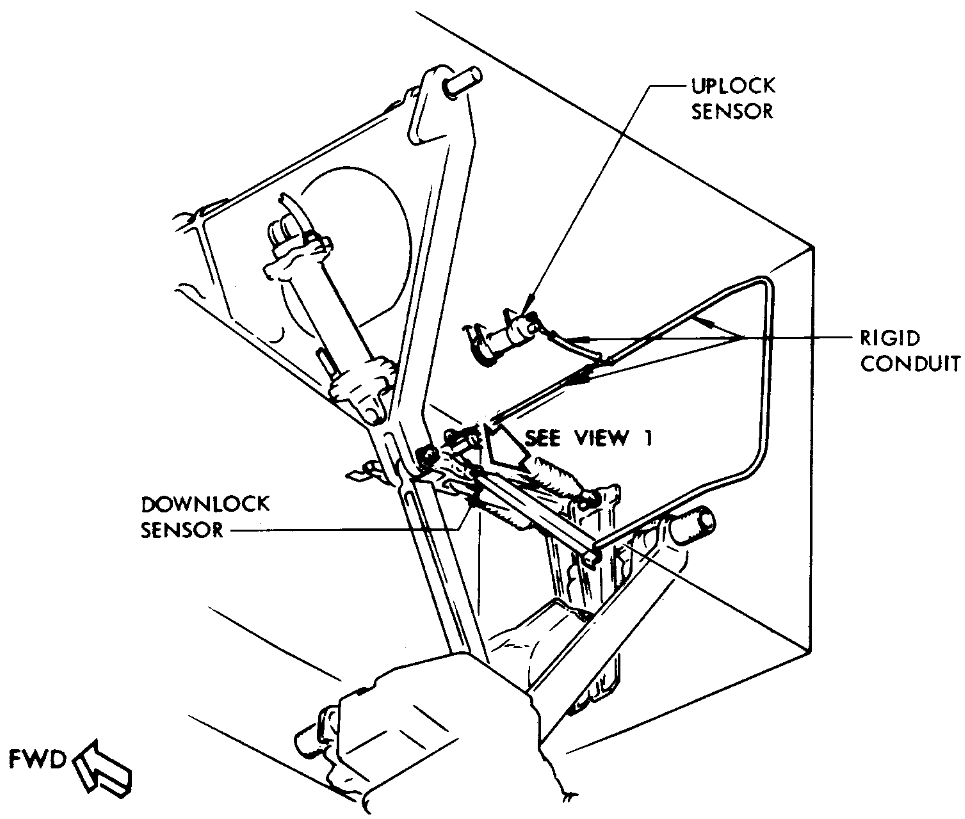
DETAIL A

Nose Gear Uplock Sensor Adjustment
Figure 501 (Sheet 2)

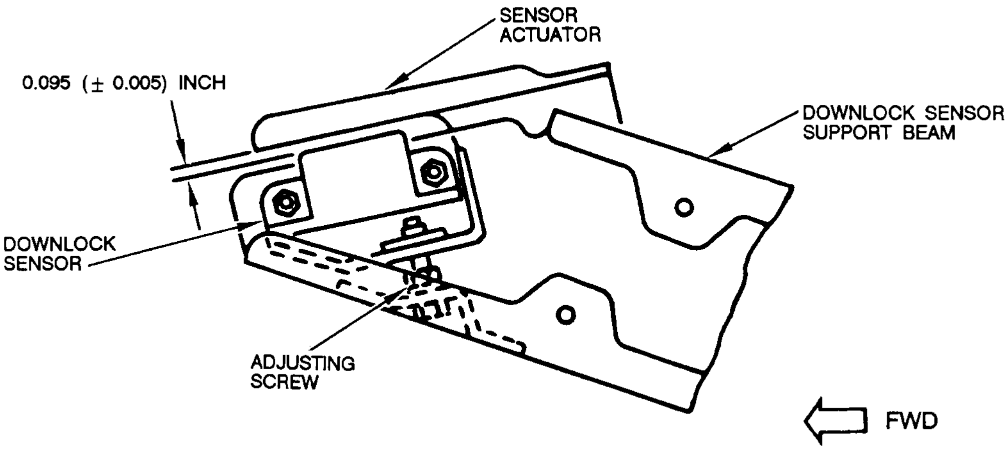
NOSE GEAR DOWNLOCK SENSOR AND SENSOR ACTUATOR - REMOVAL/INSTALLATION

1. General
   A. The positioning of the nose gear downlock sensor and sensor actuator is quite critical. The following procedure must be followed to ensure proper positioning of the sensor and sensor actuator.
2. Removal/Installation Nose Gear Downlock Sensor
   A. Equipment and Materials
      (1) Ground Lock Assemblies (Ref 32-00-01)
   B. Remove Nose Gear Downlock Sensor
      (1) Open LIGHTS, GEAR SWITCH & ANTI-SKID TEST and AURAL WARNING circuit breakers on panel P6.
      (2) Check that ground lock assemblies are installed (Ref 32-00-01).
      (3) Remove cover from downlock sensor support beam (Fig. 401).
      (4) Disconnect downlock sensor leads from terminal strip. Note terminal and wire color.
      (5) Remove sensor mounting bolts and remove sensor.
   C. Install Nose Gear Downlock Sensor
      (1) Position downlock sensor in place and install mounting bolts. Do not tighten (Fig. 401).
      (2) Twist sensor leads, trim to length and install terminal lugs.
      (3) Connect electrical leads to terminal strip as noted in step 2.B.(4).
      (4) Check that landing gear control lever is in DN position.
      (5) Adjust sensor adjusting screw for a gap between sensor face and sensor actuator as indicated on Fig. 401. Tighten sensor mounting blots.
      (6) Install downlock sensor support beam cover.
      (7) Close all circuit breakers opened in 2.B.(1).
      (8) Apply electrical power to airplane.
      (9) Check that all landing gear green lights are illuminated, that no landing gear red lights are illuminated, and that landing gear aural warning is silent.
      (10) Determine if there is a further need for electrical power on airplane; if not, shut down source.
3. Removal/Installation Nose Gear Downlock Sensor Actuator
   A. General
      (1) Whenever a nose gear lock brace, a downlock sensor support beam or a sensor actuator is replaced, the following procedure must be followed to position or reposition the downlock sensor actuator.
   B. Equipment and Material
      (1) Ground Lock Assemblies (Ref 32-00-01)
      (2) Nose Gear Sensor Actuator Locating Tool - SE 32-6001 or F80191-1
   C. Remove Nose Gear Downlock Sensor Actuator
      (1) Check that ground lock assemblies are in place (Ref 32-00-01).
      (2) Drill out four rivets holding actuator mounting bracket to nose gear lock brace. Remove sensor actuator assembly (Fig. 401).

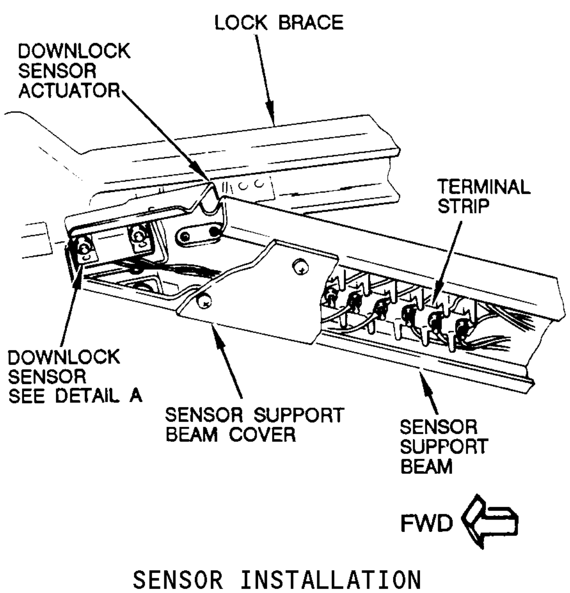




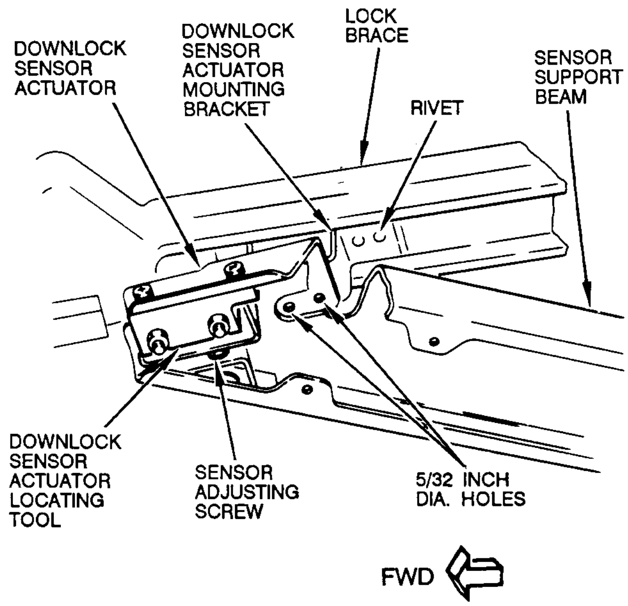
Downlock Sensor and Sensor Actuator Installation
Figure 401 (Sheet 1)



DETAIL A



SENSOR INSTALLATION
VIEW 1



SENSOR ACTUATOR INSTALLATION
VIEW 1

Downlock Sensor and Sensor Actuator Installation
Figure 401 (Sheet 2)

D. Install Nose Gear Sensor Actuator
   (1) Remove cover from downlock sensor support beam (Fig. 401).
   (2) Remove sensor mounting bolts and allow sensor to hang on electrical leads.
   (3) Position nose gear sensor actuator locating tool in place of sensor and install mounting bolts, do not tighten.
   (4) Adjust sensor adjusting tool midpoint of travel using adjusting screw. Tighten mounting bolts.
   (5) Rivet sensor actuator mounting bracket to nose gear lock brace.
   (6) Install sensor actuator on sensor actuator locating tool.
   (7) Drill two 5/32 inch holes through sensor actuator and sensor actuator mounting bracket.
   (8) Remove sensor actuator from locating tool.
   (9) Remove locating tool.
   (10) Install downlock sensor. Do not tighten mounting bolts.
   (11) Jack nose of airplane until nose wheel is clear of ground (Ref Chapter 7, Jacking).
   (12) Remove nose gear ground lock assembly (Ref 32-00-01).
   (13) Manually unlock nose gear.
   (14) Manually retract gear far enough so that lock brace is clear of downlock sensor support beam.
   (15) Rivet downlock sensor actuator to sensor actuator support bracket using two holes drilled in step (7).
   (16) Extend gear and install ground lock assemblies (Ref 32-00-01).
   (17) Check that landing gear control lever is in OFF position.
   (18) Adjust sensor adjusting screw for a gap between sensor face and sensor actuator as indicated on Fig. 401. Tighten sensor mounting bolts.
   (19) Install cover on downlock sensor support beam.
   (20) Test downlock sensor (Ref 32-61-0, Adjustment/Test).
   (21) Lower airplane and remove jacks (Ref Chapter 7, Jacking).