

TECHNICAL ORDER PAGE SUPPLEMENT

TECHNICAL MANUAL

MAINTENANCE INSTRUCTIONS

ORGANIZATIONAL

EGRESS AND SURVIVAL SYSTEMS

A-7D

THIS TOPS SUPPLEMENTS T.O. 1A-7D-2-2 DATED 1 NOVEMBER 1976.

DISTRIBUTION STATEMENT - Distribution authorized to the Department of Defense and US DOD Contractors only for administrative or operational use 21 May 1991. Other requests for this document shall be referred to Sacramento ALC/TILBE, McClellan AFB CA 95652-5990.

WARNING - This document contains technical data whose export is restricted by the Arms Export Control Act (Title 22, U.S.C., Sec 2751 et seq) or the Export Administration Act of 1979, as amended, Title 50, U.S.C., App 2401 et seq. Violations of these export laws are subject to severe criminal penalties. Disseminate in accordance with provisions of DOD Directive 5230.25.

HANDLING AND DESTRUCTION NOTICE - Handle in compliance with distribution statement and destroy by any method that will prevent disclosure of the contents or reconstruction of the document.

Published under authority of the Secretary of the Air Force

21 MAY 1991

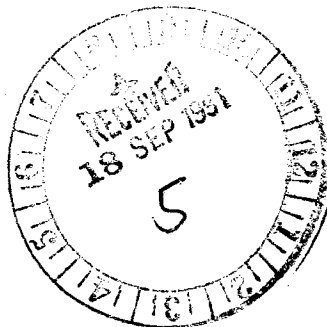
LIST OF EFFECTIVE PAGES

Dates of issue for TOPS affected herein are:

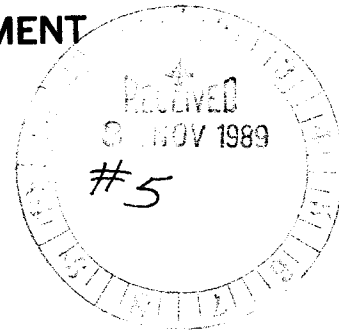
TP-6 21 May 91

NOTE: TOPS data pages do not supersede pages of basic TO. TOPS data pages shall be inserted facing amended page in basic TO. Remove superseded and deleted TOPS pages. Add new or superseding TOPS pages contained in this TOPS. Retain unchanged TOPS pages. Total number of pages in this TOPS is 4.

<u>PAGE NO.</u>	<u>TOPS NO.</u>
TOPS Title Page	TP-6
3-12	TP-6
3-15	TP-6
3-17	TP-6



TECHNICAL ORDER PAGE SUPPLEMENT
TECHNICAL MANUAL
MAINTENANCE INSTRUCTIONS
ORGANIZATIONAL
EGRESS AND SURVIVAL SYSTEMS
A-7D



THIS TOPS SUPPLEMENTS TO 1A-7D-2-2 DATED 1 NOVEMBER 1976, CHANGED 1 DECEMBER 1988.

DISTRIBUTION STATEMENT - Distribution authorized to the Department of Defense and US DOD contractors only for administrative or operational use (10 August 1989). Other requests for this document shall be referred to Sacramento ALC/MMDDCC, McClellan AFB CA 95652-5609.

WARNING - This document contains technical data whose export is restricted by the Arms Export Control Act (Title 22, U.S.C., Sec 2751 et seq) or the Export Administration Act of 1979, as amended, Title 50, U.S.C., App 2401 et seq. Violations of these export laws are subject to severe criminal penalties. Disseminate in accordance with provisions of DOD Directive 5230.25.

HANDLING AND DESTRUCTION NOTICE - Handle in compliance with distribution statement and destroy by any method that will prevent disclosure of the contents or reconstruction of the document.

Published under authority of the Secretary of the Air Force

10 AUGUST 1989

LIST OF EFFECTIVE PAGES

Dates of issue for TOPS affected herein are:

TP-5 10 Aug 89

NOTE: TOPS data pages do not supersede pages of basic TO. TOPS data pages shall be inserted facing amended page in basic TO. Remove superseded and deleted TOPS pages. Add new or superseding TOPS pages contained in this TOPS. Retain unchanged TOPS pages. Total number of pages in this TOPS is 3.

<u>PAGE NO.</u>	<u>TOPS NO.</u>
TOPS Title Page ✓	TP-5
2-14 ✓	TP-5
2-16 ✓	TP-5

SAFETY SUPPLEMENT

TECHNICAL MANUAL

MAINTENANCE INSTRUCTIONS

ORGANIZATIONAL

EGRESS AND SURVIVAL SYSTEMS

A-7D

THIS PUBLICATION SUPPLEMENTS TO 1A-7D-2-2 DATED 1 NOVEMBER 1976. Reference to this supplement will be made on the title page of the basic manual by personnel responsible for maintaining the publication in current status.

COMMANDERS ARE RESPONSIBLE FOR BRINGING THIS SUPPLEMENT TO THE ATTENTION OF ALL AFFECTED AF PERSONNEL.

DISTRIBUTION STATEMENT - Distribution authorized to the Department of Defense and US DOD contractors only for administrative or operational use (15 October 1989). Other requests for this document shall be referred to Sacramento ALC/MMDDCC, McClellan AFB CA 95652-5609.

WARNING - This document contains technical data whose export is restricted by the Arms Export Control Act (Title 22, U.S.C., Sec 2751 et seq) or the Export Administration Act of 1979, as amended, Title 50, U.S.C., App 2401 et seq. Violations of these export laws are subject to severe criminal penalties. Disseminate in accordance with provisions of DOD Directive 5230.25.

HANDLING AND DESTRUCTION NOTICE - Handle in compliance with distribution statement and destroy by any method that will prevent disclosure of the contents or reconstruction of the document.

Published under authority of the Secretary of the Air Force

20 JUNE 1990

1. PURPOSE.

To update the basic manual.

2. INSTRUCTIONS.

On page 1-21, a WARNING is added before step T to read as follows:

WARNING

Harness release actuator firing pin sear must be centered prior to installation of safety lock on harness release actuator. Failure to comply could result in firing of MK-86 during seat removal.

THE END

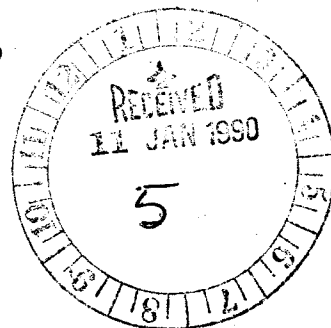
1/(2 Blank)

See 1A-7D-2

TECHNICAL MANUAL

MAINTENANCE INSTRUCTIONS

ORGANIZATIONAL



EGRESS AND SURVIVAL SYSTEMS

A-7D

VOUGHT CORPORATION

N00019-67-C-0143

F34601-88-D-1917

DISTRIBUTION STATEMENT – Distribution authorized to the Department of Defense and U.S. DoD contractors only, Administrative or Operational use, 15 October 1989. Other requests shall be referred to SM-ALC/MMDDCC, McClellan AFB, CA 95652-5609.

WARNING – This document contains technical data whose export is restricted by the Arms Export Control Act (Title 22, U.S.C., Sec 2751 et seq.) or the Export Administration Act of 1979, as amended (Title 50, U.S.C., App. 2401 et seq.). Violations of these export laws are subject to severe criminal penalties.

HANDLING AND DESTRUCTION NOTICE – Handle in compliance with the distribution statement and destroy by any method that will prevent disclosure of the contents or reconstruction of the document.

Published under authority of the Secretary of the Air Force.

1 NOVEMBER 1976
Change 37 — 15 October 1989

LIST OF EFFECTIVE PAGES

INSERT LATEST CHANGED PAGES. DESTROY SUPERSEDED PAGES.

NOTE: The portion of the text affected by the changes is indicated by a vertical line in the outer margins of the page. Changes to illustrations are indicated by miniature pointing hands. Extensively changed illustrations are indicated by a miniature pointing hand symbol pointing to the words MAJOR CHANGE.

Dates of issue for original and changed pages are:

Original 0	1 Nov 1976	Change 13	1 Jan 1981	Change 26	1 Apr 1985
Change 1	15 Dec 1976	Change 14	1 Mar 1981	Change 27	1 Sep 1985
Change 2	15 Mar 1977	Change 15	15 May 1981	Change 28	1 Oct 1985
Change 3	1 Apr 1977	Change 16	1 Oct 1981	Change 29	15 Dec 1985
Change 4	15 Apr 1977	Change 17	15 Mar 1982	Change 30	1 Apr 1986
Change 5	1 Jul 1977	Change 18	1 Jul 1982	Change 31	1 May 1986
Change 6	15 Sep 1977	Change 19	1 Oct 1982	Change 32	1 Jul 1986
Change 7	15 Feb 1978	Change 20	15 Dec 1982	Change 33	1 Oct 1986
Change 8	1 Sep 1978	Change 21	15 Jun 1983	Change 34	1 Feb 1988
Change 9	25 Jan 1979	Change 22	1 Jan 1984	Change 35	15 Jul 1988
Change 10	1 Oct 1979	Change 23	15 Feb 1984	Change 36	1 Dec 1988
Change 11	15 Jan 1980	Change 24	1 Aug 1984	Change 37	15 Oct 1989
Change 12	1 Aug 1980	Change 25	1 Nov 1984		

TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 188, CONSISTING OF THE FOLLOWING:

Page No.	*Change No.	Page No.	*Change No.	Page No.	*Change No.	Page No.	*Change No.
Title	37	1-11 . . . . .	.21	1-29 . . . . .	.32	2-9 thru 2-12	0
A	37	1-12	9	1-30 . . . . .	.32	2-13	5
B	37	1-13 . . . . .	.21	1-31 . . . . .	.21	2-14 . . . . .	.26
C Blank . . . . .	.36	1-14 . . . . .	.14	1-32 . . . . .	.21	2-15	5
i . . . . .	.30	1-15 . . . . .	.16	1-32A . . . . .	.30	2-16	5
ii	0	1-16 . . . . .	.34	1-32B Blank . . . . .	.30	2-16A . . . . .	.37
iii . . . . .	.30	1-17	1	1-33 . . . . .	.35	2-16B Blank	5
iv	5	1-18 . . . . .	.21	1-34	0	2-17 thru 2-19 . . . . .	.37
v	0	1-19 . . . . .	.16	1-35 . . . . .	.34	2-20 . . . . .	.21
vi	0	1-20 . . . . .	.18	1-36 . . . . .	.34	2-21	0
vii . . . . .	.33	1-21 . . . . .	.17	1-37 . . . . .	.27	2-22	0
viii	0	1-22 . . . . .	.16	1-38	0	2-23 . . . . .	.21
ix . . . . .	.14	1-23 . . . . .	.32	1-39 . . . . .	.17	2-24 thru 2-26	0
x Blank . . . . .	.14	1-24 . . . . .	.21	1-40	0	2-27 . . . . .	.21
1-1 . . . . .	.25	1-25 . . . . .	.36	1-41 . . . . .	.14	2-28	5
1-2 . . . . .	.21	1-26 . . . . .	.30	1-42 . . . . .	.14	2-29	0
1-3 . . . . .	.16	1-26A . . . . .	.34	1-43 thru 1-45 . . . . .	.17	2-30	5
1-4	0	1-26B . . . . .	.34	1-46 . . . . .	.14	2-31	0
1-5 . . . . .	.30	1-26C . . . . .	.19	2-1	0	2-32 thru 2-35 . . . . .	.20
1-6 . . . . .	.30	1-26D Blank . . . . .	.19	2-2	0	2-36 . . . . .	.23
1-7 . . . . .	.14	1-27 . . . . .	.16	2-3 . . . . .	.16	2-36A . . . . .	.20
1-8	0	1-28 . . . . .	.21	2-4	0	2-36B . . . . .	.23
1-9	0	1-28A . . . . .	.21	2-5	9	2-36C . . . . .	.20
1-10 . . . . .	.30	1-28B Blank . . . . .	.21	2-6 thru 2-8 . . . . .	.16	2-36D . . . . .	.20

*Zero in this column indicates an original page.

USAF

LIST OF EFFECTIVE PAGES (Continued)

Page No.	*Change No.	Page No.	*Change No.
2-36E . . . . .	.21	2-69 . . . . .	.33
2-36F Blank . . . . .	.21	2-70 . . . . .	.5
2-37 . . . . .	.23	2-71 . . . . .	.0
2-38 . . . . .	.5	2-72 . . . . .	.17
2-39 . . . . .	.5	2-73 . . . . .	.0
2-40 . . . . .	.4	2-74 . . . . .	.27
2-40A . . . . .	.4	2-75 . . . . .	.27
2-40B . . . . .	.4	2-76 . . . . .	.17
2-41 . . . . .	.5	2-77 . . . . .	.21
2-42 thru 2-44 . . . . .	.0	2-78 . . . . .	.0
2-45 . . . . .	.5	3-1 thru 3-4 . . . . .	.0
2-46 . . . . .	.0	3-5 . . . . .	.10
2-47 . . . . .	.5	3-6 . . . . .	.13
2-48 . . . . .	.0	3-7 . . . . .	.0
2-49 . . . . .	.5	3-8 . . . . .	.0
2-50 thru 2-52 . . . . .	.0	3-9 . . . . .	.29
2-53 . . . . .	.27	3-10 . . . . .	.16
2-54 thru 2-56 . . . . .	.0	3-11 . . . . .	.0
2-57 . . . . .	.16	3-12 . . . . .	.31
2-58 . . . . .	.34	3-13 . . . . .	.5
2-59 . . . . .	.14	3-14 . . . . .	.23
2-60 . . . . .	.34	3-15 . . . . .	.5
2-61 . . . . .	.16	3-16 . . . . .	.23
2-62 . . . . .	.24	3-17 . . . . .	.34
2-62A . . . . .	.24	3-18 . . . . .	.5
2-62B Blank . . . . .	.24	4-1 . . . . .	.5
2-63 . . . . .	.24	4-2 . . . . .	.5
2-64 . . . . .	.21	4-3 thru 4-6 . . . . .	.0
2-65 . . . . .	.21	Index-1 . . . . .	.0
2-66 . . . . .	.0	Index-2 . . . . .	.4
2-67 . . . . .	.0	Index-3 thru Index-6 . . . . .	.0
2-68 . . . . .	.17		

*Zero in this column indicates an original page.

TABLE OF CONTENTS

Section	Page
LIST OF ILLUSTRATIONS	iii
INTRODUCTION	v
I EJECTION SEAT SYSTEM	1-1
1-1. Description	1-1
1-17. Seat Ejection Sequence	1-10
1-27. Components	1-12
1-29. Operational Checkout	1-16
1-30. Troubleshooting	1-16
1-32. Ejection Seat Removal and Installation	1-18
1-34. M99 Prime Initiator Removal and Installation	1-18
1-37. JAU-20/A25 Time-Delay Initiator Removal Installation	1-29
1-40. CCU-58/A Delay Cartridge Removal and Installation	1-31
1-43. Mk 7 Rocket Catapult Removal and Installation	1-32A
1-46. Mk 7 Rocket Catapult Buildup	1-36
1-47. Seat Adjustment Actuator Removal and Installation	1-40
1-49. Actuator Drive Motor Removal and Installation	1-40
1-52. 40° Canopy Support Strut Installation and Removal	1-40
1-55. M53 Boost Initiator Removal and Installation	1-41
1-58. Inertia Reel Initiator Removal and Installation	1-43
1-61. Inertia Reel Quick-Disconnect Coupling Removal and Installation	1-45
II CANOPY SYSTEM	2-1
2-1. Description	2-8
2-8. Operation	2-13
2-21. Components	2-14
2-23. Operational Checkout	2-16A
2-24. Troubleshooting	2-16A
2-26. Servicing	2-19
2-28. Canopy Assembly Removal and Installation	2-20
2-31. New Canopy Installation	2-32
2-32. Canopy Assembly Rigging	2-32
2-38. Canopy Glass Removal and Installation	2-32
2-39. Removal	2-36
2-40. Installation	2-36D
2-41. Diaphragm Seal Removal and Installation	2-36E
2-44. Canopy Pivot Bolt Removal and Installation	2-39
2-47. Interior Canopy Release Handle Removal and Installation	2-39
2-48A. Exterior Canopy Release Handle Mechanism Removal and Installation	2-39
2-49. Canopy Release Hook Removal and Installation	2-40
2-52. Canopy Actuator Removal and Installation	2-41
2-55. Canopy Actuator Rod End Replacement	2-43
2-56. Canopy Counterbalance Cylinder Removal and Installation	2-45
2-59. Canopy Release Mechanism Pushrod and Bellcrank Removal and Installation	2-47

TABLE OF CONTENTS (Continued)

Section		Page
2-62.	Interior Canopy Jettison Control Assembly Removal and Installation	2-49
2-65.	Interior Canopy Jettison Control Assembly Repair . .	2-50
2-66.	Exterior Canopy Jettison Control Handle Removal and Installation	2-51
2-69.	Directional Flow Check Valve Removal and Installation (Airplanes Through AF68-8224)	2-53
2-72.	Check Tee Removal and Installation (Airplanes AF68-8225 and Subsequent)	2-54
2-75.	Canopy Jettison System and Ejection Seat System Flow Test (Airplanes Through AF68-8224)	2-56
2-76.	Canopy Jettison System and Ejection Seat System Flow Test (Airplanes AF68-8225 and Subsequent) . .	2-60
2-77.	Canopy Jettison System Purging (Airplanes Through AF68-8224)	2-64
2-78.	Canopy Jettison System Purging (Airplanes AF68-8225 and Subsequent)	2-65
2-79.	Canopy Jettison System Purging of Foreign Matter . .	2-66
2-80.	Ejection Control Bypass Valve Removal and Installation (Airplanes AF68-8225 and Subsequent)	2-66
2-83.	Canopy Lock Switch Removal and Installation	2-68
2-86.	Canopy Lock Switch Adjustment	2-69
2-87.	Canopy Caution Light Removal and Installation	2-69
2-89.	M99 Interior Canopy Jettison Initiator Removal and Installation	2-69
2-92.	M99 Exterior Canopy Jettison Initiator Removal and Installation	2-72
2-95.	Mk 14 Mod 0 Canopy Actuator Impulse Cartridge Removal and Installation	2-75
2-98.	M99 Canopy-Actuated Initiator Removal and Installation (Airplanes AF68-8225 and Subsequent)	2-76
III	PILOT'S EMERGENCY EQUIPMENT	3-1
3-1.	Description	3-1
3-12.	Operation	3-5
3-16.	Parachute and Survival Kit Removal and Installation .	3-6
3-19.	Parachute Removal and Installation	3-13
3-22.	Survival Kit Removal and Installation	3-15
3-25.	Egress System Final Inspection	3-17
3-26.	Survival Kit Cartridge Removal and Installation . . .	3-17
3-29.	Survival Kit Packing	3-18
IV	PERSONNEL EQUIPMENT	4-1
4-1.	Description	4-1
4-7.	Operational Checkout	4-1
4-8.	Pilot's Relief Horn Removal and Installation	4-2
4-11.	Vacuum Bottle Removal and Installation (Airplanes AF68-8225 and Subsequent)	4-2
	ALPHABETICAL INDEX	Index-1

INTRODUCTION

THIS MANUAL.

This manual contains descriptive material and organizational maintenance instructions for personnel to maintain the egress and survival systems of the A-7D Corsair II airplane. This manual includes maintenance instructions on the following:

Ejection Seat System	Section I
Canopy System	Section II
Pilot's Emergency Equipment	Section III
Personnel Equipment	Section IV

Each organizational maintenance manual, with the exceptions of T.O. 1A-7D-2-1, 1A-7D-2-16, 1A-7D-2-17, and 1A-7D-2-18, is arranged to present organizational system and component maintenance coverage in a standard manner. A list of A-7D organizational maintenance manuals is provided herein. Refer to T.O. 1A-7D-2-1 for the introduction to the complete series of A-7D manuals. Checklist T.O. 1A-7D-2-2CL-1 presents an abbreviated procedure for seat removal and installation.

ARRANGEMENT AND USE OF THIS MANUAL.

The material and organizational maintenance information presented in this manual are divided into sections, one section for each major system covered.

In the description paragraphs, all major components are described and a brief explanation of their primary functions is provided. All system indicators and controls necessary to operate a system are depicted and their functions described in a controls and indicators illustration. System major components not covered by this controls and indicators illustration are shown in a system arrangement illustration. Controls and indicators are not normally repeated in the system arrangement illustration.

In the operation paragraphs, a complete description of the system's operation is provided. Schematics and diagrams aid in the understanding of system theory. Where a system is complex, a block

diagram provides a simplified overview of the system to assist understanding of the detailed descriptions and schematics. Each major component of the system is listed in a components table which summarizes its function and location.

In the operational checkout paragraphs, an operational checkout is provided to determine the operational status of the system. Where reference is made in the checkout to controls and indicators, capital (upper case) letters of decal nomenclature are used for all test equipment and all airplane placard (decal) switch or control positions. All airplane system controls and indicators are referred to by their descriptive title in lowercase letters. Operational checkout procedural steps, which indicate a mandatory condition or result, are followed by a number or numbers in braces. These numbers are keyed to a system troubleshooting (malfunction) table which suggests corrective actions if a mandatory condition or result is not present. The corrective actions are in order of probable cause. When corrective actions call for the replacement of more than one component, replacement should be made in order of the listing. The operational checkout is usually repeated after each replacement until acceptable performance is obtained.

Removal and installation procedures are provided for each system component. These procedures reference access requirements with step by step instructions on how to accomplish the task. Also provided, as applicable, are repair and parts replacement, adjustment, cleaning, draining, or lubrication, extreme environmental condition procedures, and nonroutine servicing. Routine servicing instructions are in T.O. 1A-7D-2-1.

TOOLS AND TEST EQUIPMENT REQUIRED.

Tools and test equipment required for a particular maintenance procedure are listed at the beginning of the procedure. The list does not include tools and equipment needed for access and common hand tools. Support equipment, such as voltmeters and multimeters, is included in the list.

REFERENCE PUBLICATIONS.

Publications generally related to subject matter contained in this manual or specifically referenced in this manual are listed in the table of reference publications (when applicable).

in a table. The listing, in technical order numerical sequence, includes the basic date, title, ECP number, and date of the change or revision.

THIS REVISION.

This manual has been revised to incorporate formalization changes.

TIME COMPLIANCE TECHNICAL ORDERS.

Time compliance technical orders for the systems covered in this manual are listed

LIST OF SYSTEMS MAINTENANCE MANUALS

T.O. 1A-7D-2-1	General Information and Airframe Group
T.O. 1A-7D-2-1CL-1	General Information and Airframe Group - Ground Handling Checklist
T.O. 1A-7D-2-1CL-2	General Information and Airframe Group - Servicing Checklist
T.O. 1A-7D-2-2	Egress and Survival Systems
T.O. 1A-7D-2-2CL-1	Egress and Survival Systems Checklist
T.O. 1A-7D-2-3	Mechanical Accessories Systems
T.O. 1A-7D-2-4	Pneudraulic Systems
T.O. 1A-7D-2-5	Powerplant Systems
T.O. 1A-7D-2-5CL-1	Engine Removal and Installation Checklist
T.O. 1A-7D-2-5CL-2	Power Loss/Flameout Occurrences Checklist
T.O. 1A-7D-2-5CL-3	Engine Setup Procedures Checklist
T.O. 1A-7D-2-6	Fuel System
T.O. 1A-7D-2-7	Landing Gear Systems
T.O. 1A-7D-2-7CL-1	Landing Gear Systems - Rigging Checklist
T.O. 1A-7D-2-8	Flight Control Systems
T.O. 1A-7D-2-8CL-1	Flight Control Systems - Rigging Checklist
T.O. 1A-7D-2-9	Automatic Flight Control System
T.O. 1A-7D-2-9CL-1	Automatic Flight Control System Checklist
T.O. 1A-7D-2-10	Instrument Systems
T.O. 1A-7D-2-10CL-1	Statistical Accelerometer Data Collection and Reporting Checklist
T.O. 1A-7D-2-11	Electrical Power and Lighting Systems
T.O. 1A-7D-2-12	Radio Communication and Navigation Systems

LIST OF SYSTEMS MAINTENANCE MANUALS (Continued)

T.O. 1A-7D-2-13	Armament Systems
T.O. 1A-7D-2-13CL-1	Armament Systems Checklist
T.O. 1A-7D-2-13CL-2	Accessory Installation: MER-10N, TER-9A, SUU-20 Series Dispenser, LAU-88/A and LAU-117/A Missile Launcher, and AERO-3B Missile Launcher Checklist
T.O. 1A-7D-2-14	Weapon Control Systems
T.O. 1A-7D-2-14CL-1	Weapon Control Systems Checklist
T.O. 1A-7D-2-14-1	AN/APQ-126(V)8 and AN/APQ-126(V)11 Radar Sets, Theory of Operation
T.O. 1A-7D-2-14-3	AN/APQ-126(V)8 and AN/APQ-126(V)11 Radar Sets, Maintenance Procedures
T.O. 1A-7D-2-14-4	AN/APQ-126(V)8 and AN/APQ-126(V)11 Radar Sets, Diagrams
T.O. 1A-7D-2-14-5	AN/AAR-48 Forward Looking Infrared (FLIR) System
T.O. 1A-7D-2-14-6	AN/AAR-48 Forward Looking Infrared (FLIR) System - Diagrams
T.O. 1A-7D-2-15	Electronic Countermeasure Systems (U) (Confidential)
T.O. 1A-7D-2-16	General Wiring Data
T.O. 1A-7D-2-17	Wiring Diagrams
T.O. 1A-7D-2-18-1	Integrated Avionic Systems (Airplanes Before T.O. 1A-7-530), Theory of Operation
T.O. 1A-7D-2-18-1-1	Integrated Avionic System (Airplanes After T.O. 1A-7-530), Theory of Operation
T.O. 1A-7D-2-18-2	Integrated Avionic Systems, Troubleshooting Schematics
T.O. 1A-7D-2-18-3	Integrated Avionic Systems, Debriefing
T.O. 1A-7D-2-18-4	Integrated Avionic Systems Troubleshooting, Tactical Computer/HUD/FLR/TISL/FLIR/VMS
T.O. 1A-7D-2-18-5	Integrated Avionic Systems Troubleshooting, IMS/Doppler/Radar Altimeter/PMDS
T.O. 1A-7D-2-18-6	Integrated Avionic Systems, Weapon Delivery and Release Troubleshooting
T.O. 1A-7D-2-18-7	Integrated Avionic Systems Troubleshooting, HMS/ADC/AOA
T.O. 1A-7D-2-18-8	Integrated Avionic Systems, Operational Test Program Troubleshooting
T.O. 1A-7D-2-18-9	Integrated Avionic Systems, Grooming
T.O. 1A-7D-2-19	Cross Servicing Guide for A-7D Aircraft
T.O. 1A-7D-2-20	Testing and Troubleshooting Transmission Lines, Coaxial Cables, and Antennas

REFERENCE PUBLICATIONS

T.O. 00-25-172	Ground Servicing of Aircraft and Positioning of Equipment
T.O. 1-1-1	Cleaning of Aerospace Equipment
T.O. 1-1-2	Corrosion Control and Treatment for Aerospace Equipment
T.O. 1-1-300	Functional Check Flights and Maintenance Operational Checks
T.O. 1-1A-8	Engineering Manual Series, Aircraft, Missile and Related Aerospace Ground Equipment (AGE) Repair -- Structure Hardware
T.O. 1A-7D-06	Work Unit Code Manual
T.O. 1A-7D-2-2CL-1	Checklist, Egress and Survival System Seat Removal and Installation
T.O. 1A-7D-3	Structural Repair Manual
T.O. 1A-7D-4-1	Illustrated Parts Breakdown (IPB) Numerical Index
T.O. 1A-7D-4-2	Airframe IPB
T.O. 1A-7D-4-3	Mechanism Control and Ejection Seat IPB
T.O. 1A-7D-6	Inspection Requirements Manual
T.O. 11-1-33	General Safety Requirements (Explosives)
T.O. 11A-1-33	Ground Handling of Aircraft Containing Ammunition and Explosive Material
T.O. 11P-1-7	Cartridges for Cartridge Actuated Devices
T.O. 13A5-40-3	Maintenance Instructions with IPB, Intermediate/Depot, Ejection Seats P/N 5821726-1, -501
T.O. 14D1-2-296	Parachute Assemblies
T.O. 14S1-3-51	Use and Maintenance of Survival Kits
T.O. 14S3-1-3	Aircraft Survival Kit and Life Rafts
T.O. 15X11-19-12	Maintenance Instructions with IPB, Field/Depot, Survival Container, Ejection Seat, P/N 140000-75 and 140000-127 (A-7D)
T.O. 32B14-3-1-101	Operating and Service Instructions, Torque Indicating Handles
T.O. 33A1-12-2-1	Operating Instructions AN/PSM-6 Multimeter

RECORD OF TIME COMPLIANCE TECHNICAL ORDERS

T.O. Number	Date	Title	Change/Revision Date
1A-7D-782	30 May 1975	Installation of Parachute Arming Cable Retainer on ESCAPAC Ejection Seat, A-7D Aircraft and MTS	1 December 1975
1A-7D-827	6 Sep 1977	Installation of Improved Entrance Handles, A-7D Aircraft	15 February 1978
1A-7D-847	25 Jun 1979	Installation of Cock- pit FOD Trap, A-7D	1 October 1979

Section I

EJECTION SEAT SYSTEM

1-1. DESCRIPTION.

WARNING

This system incorporates Cartridge Actuated Devices/ Propellant Actuated Devices (CAD/PAD). Inadvertent firing of these devices could result in death or serious injury to personnel and/or damage to equipment. See applicable 11P series T.O. for inspection data and minor repairs, authorized on an individual device.

The disassembly, modification, or testing of these devices without prior OOAMA/MMN approval is strictly prohibited.

Accidents/incidents involving these devices will be reported in accordance with AFR 127-4.

CAUTION

Ensure that lap belts are in the seat and not hanging over edge of seat, as damage to seat and/or console may result.

1-2. ON SEAT. The upright, rocket type ejection seat is designed to support the pilot during normal conditions and provide a fully automatic and positive means of quick escape from the airplane under emergency conditions. Ejection seat systems consist of the rocket catapult ejection control, directional autoalignment of trajectory (DART), harness release, pilot-seat separation, shoulder harness control, and seat adjustment systems. Explosive devices are employed to provide hot gas

ignition for automatic seat ejection. See figure 1-1 for ejection seat system arrangement. See figures 1-2 and 1-3 for ejection seat system schematic diagram.

1-3. The ejection seat is the basic structure that supports the equipment and mechanisms necessary for pilot comfort and safety while in flight or during the ejection sequence. The seat and associated components are constructed almost entirely of aluminum. At the upper center of the seat are headrest pads which provide cushioning for the safety and comfort of the pilot. On each side of the seat are three seat rollers which allow for vertical height adjustment during normal conditions and upward travel of the seat during seat ejection. Extended seat bucket sides protect the pilot's knees from flailing during seat ejection.

1-4. ROCKET CATAPULT. The Mk 7 rocket catapult is a self-contained, gas fired, two-phase solid propellant booster and rocket designed to eject the pilot and seat from the airplane. The first phase is a gas powered piston action that starts the seat up the guide rails. The second phase is a rocket powered sustainer that provides additional boost and allows zero altitude and zero airspeed ejection capability. The rocket catapult is secured at top center of the seat back and supported at its base by the twin barrels of the seat adjustment actuator.

1-5. EJECTION HANDLES. The primary ejection control handle provides the pilot with the means of manually initiating automatic seat ejection. The primary ejection control handle is located on the lower center front frame of the seat structure. A cable connects the primary handle to the firing control disconnect assembly.

1-6. DELETED.

down as indicated by the adjusted height of the seat. As the seat is lowered, the front of the handle is raised; as the seat is raised, the front of the handle is lowered.

1-7. FIRING CONTROL DISCONNECT ASSEMBLY. The pivoted firing control disconnect assembly performs three ejection control system functions: it actuates a release mechanism to extend the flip-up canopy breakers, transmits pulling motion to the actuating linkage which pulls the firing pin from the M99 prime initiator, and disconnects the ejection control handles from the seat after ejection. If the canopy jettison system should malfunction, the spring-loaded flip-up canopy breakers permit ejection through the canopy.

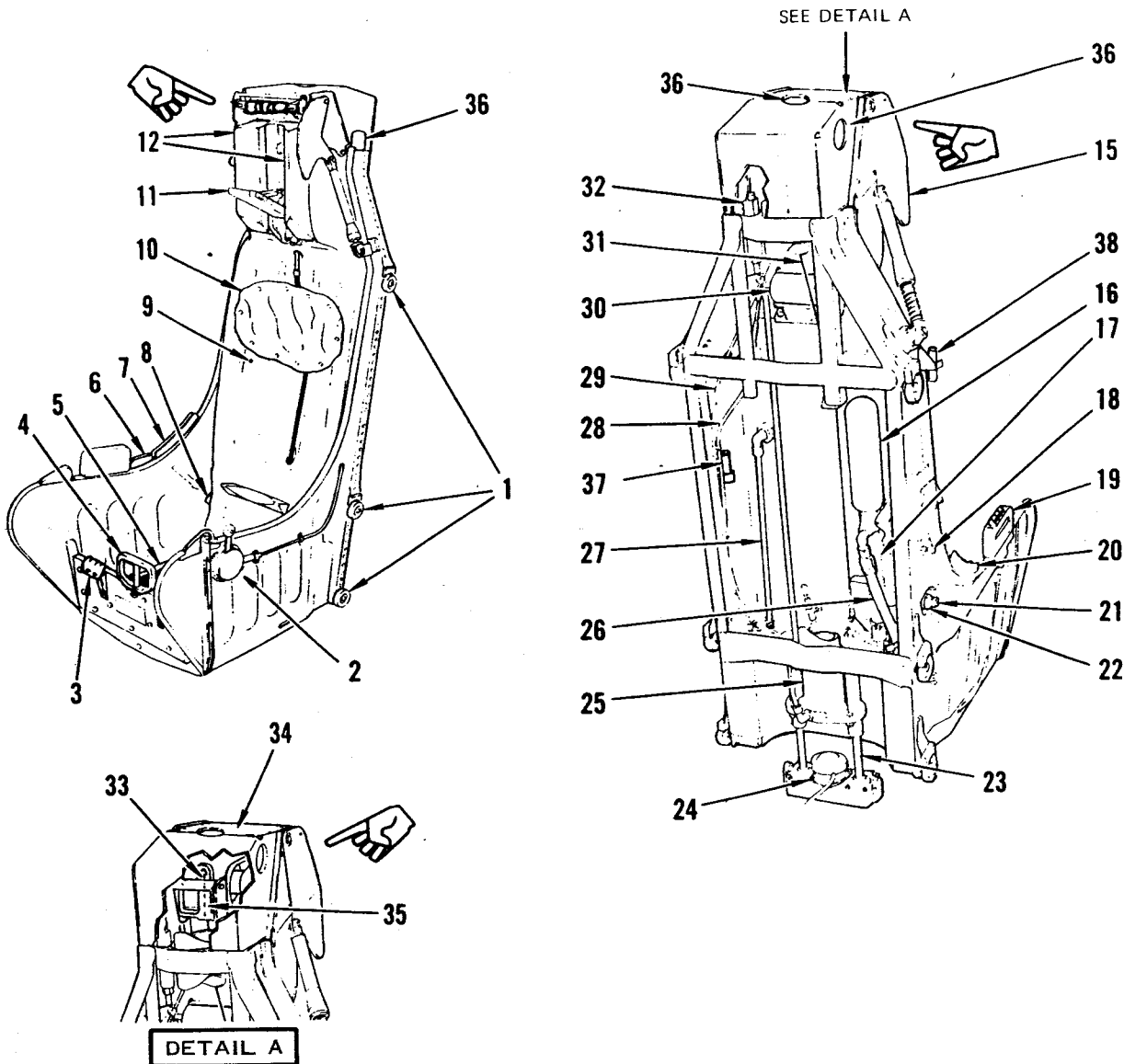
1-8. EJECTION CONTROLS SAFETY HANDLE. To prevent accidental seat ejection, an ejection controls safety handle, when placed in the down-and-locked position, prevents inadvertent actuation of all component parts of the firing control mechanism. The handle is identified by a yellow and black decal which reads: PULL OUT TO SAFETY EJECTION CONTROLS. A safety lock, incorporated in the safety handle, automatically locks the handle in the full out position; the lock must be manually depressed before the ejection controls safety handle can be returned to the up (recessed) position. The upper surface of the handle is painted in a black and yellow checkerboard pattern for visual verification that the ejection controls are locked.

1-9. DIRECTIONAL AUTOMATIC REALIGNMENT OF TRAJECTORY SYSTEM. The directional automatic realignment of trajectory (DART) system is designed to prevent tumbling, spinning, or other adverse seat movement after ejection. The system consists of a braking system, lanyard assembly, bridle, and bridle cable. The braking system is attached to the seat bottom. The lanyard assembly is stowed in pockets on each side of the bridle assembly. The DART system nylon lanyard terminates in a clevis which is secured to the cockpit floor with a quick-release pin. A nylon protective cover, attached to the bottom of the ejection seat with hooks and fasteners, provides protection for the DART system from contaminants in the cockpit and reduces the possibility of improper lanyard routing. The lanyards are routed through a slot in the

cover which allows correct deployment of the lanyards and prevents possible entanglement of the lanyards with the bridle.

1-10. HARNESS RELEASE SYSTEM. The harness release system normally restrains the pilot and the pilot's survival equipment in the seat, and provides automatic release of the shoulder harness and lap belt assemblies and the forced separation of the pilot from the seat after ejection. The survival equipment and pilot's harness are locked to the seat by three retaining pins: two through the lap belt assembly lugs and one through the shoulder harness inertia reel strap lugs. Automatic release from the seat during the ejection sequence is accomplished by the harness release actuator, utilizing an explosive CCU-58/A delay cartridge. If the system fails to function automatically, or if normal removal and installation of the survival equipment is required, the actuator can be partially operated by the manual harness release handle. During automatic release, the harness release actuator also actuates both the firing control disconnect actuating arm and the pilot-seat separation system.

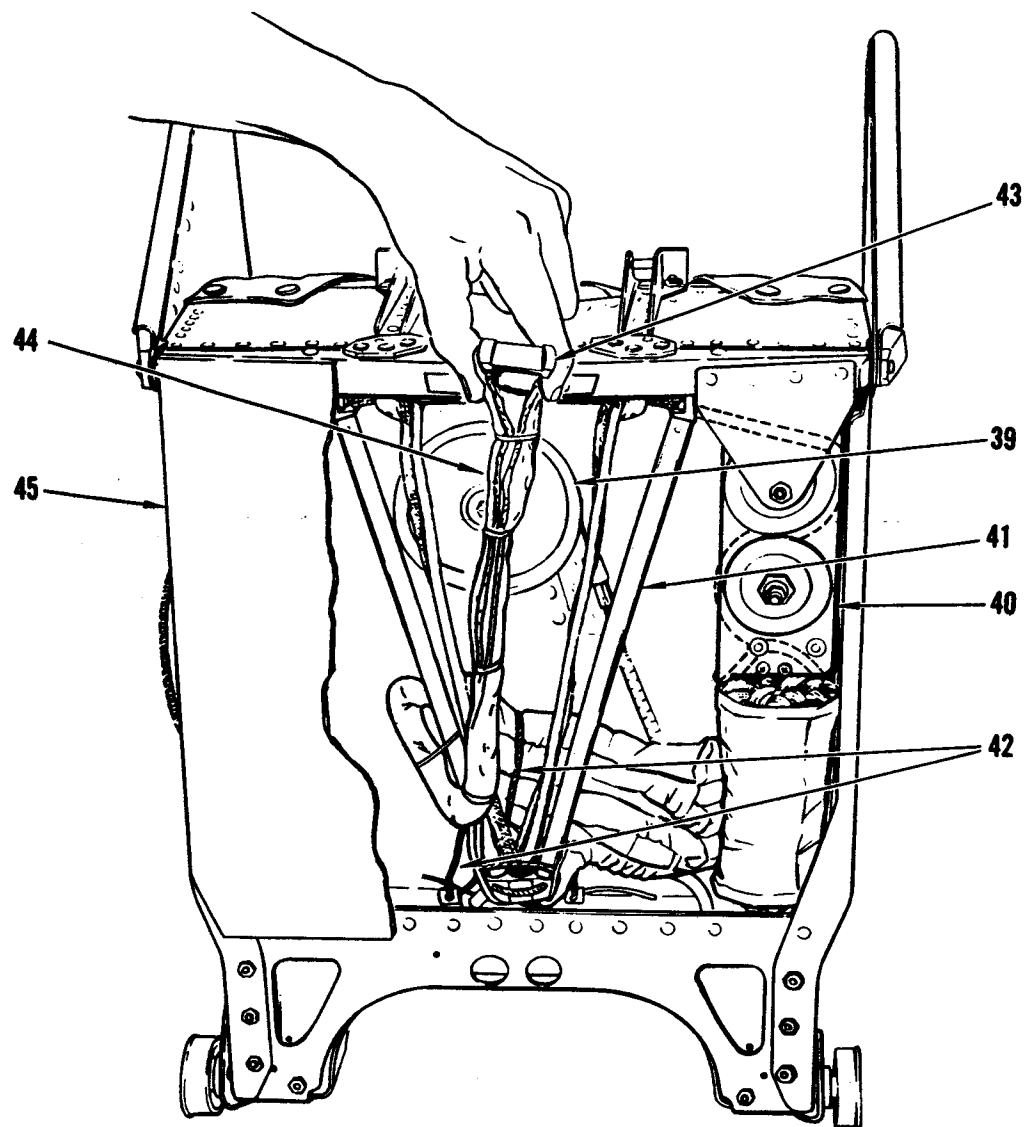
1-11. The central component of the harness release system is the harness release bellcrank. The purpose of the bellcrank is the simultaneous actuation of each component of the harness release system to allow the pilot to separate from the seat after ejection. The following components are connected to the multiple arm bellcrank: harness release actuator piston rod, right and left lap belt retaining pins, inertia reel straps retaining pin cable, harness release handle cable, and bellcrank return spring. The two lap belt retaining pins consist of long rods with one end attached to the harness release bellcrank and the other end protruding beyond the side of the seat. The shoulder harness inertia reel strap retaining pin is spring loaded to the locked position and connects to the harness release bellcrank by a cable.



- | | | |
|--|--|--|
| 1. Seat rollers | 14. Deleted | 27. Separation bladder tubing |
| 2. Shoulder harness inertia reel control lever | 15. Canopy breakers | 28. Inertia reel cable assembly |
| 3. Fabric sling | 16. Nitrogen storage bottle | 29. Primary ejection control |
| 4. Ejection control handle | 17. Harness release actuator | 30. Shoulder harness inertia reel |
| 5. Seat separation bladder | 18. Harness release actuator manual detent pin | 31. Firing control disconnect cable |
| 6. Parachute arming lanyard guard | 19. Manual harness release handle | 32. M99 prime initiator firing mechanism |
| 7. Parachute arming lanyard retaining channel | 20. Parachute arming lanyard | 33. Firing control disconnect retaining pin |
| 8. Lap-belt lug attach fitting | 21. Harness release actuator firing pin sear | 34. Face curtain cover |
| 9. Nitrogen storage bottle inspection hole | 22. Harness release actuator firing pin assembly | 35. Firing control disconnect assembly |
| 10. Back separation bladder | 23. Seat adjustment actuator | 36. Viewing window, firing control disconnect and cables |
| 11. Ejection controls safety handle | 24. Actuator drive motor | 37. Inertia reel initiator |
| 12. Headrest pads | 25. Mk 7 rocket catapult | 38. Inertia reel quick-disconnect coupling |
| 13. Deleted | 26. Separation bladder flexible hose | |

02D001-01-01-81

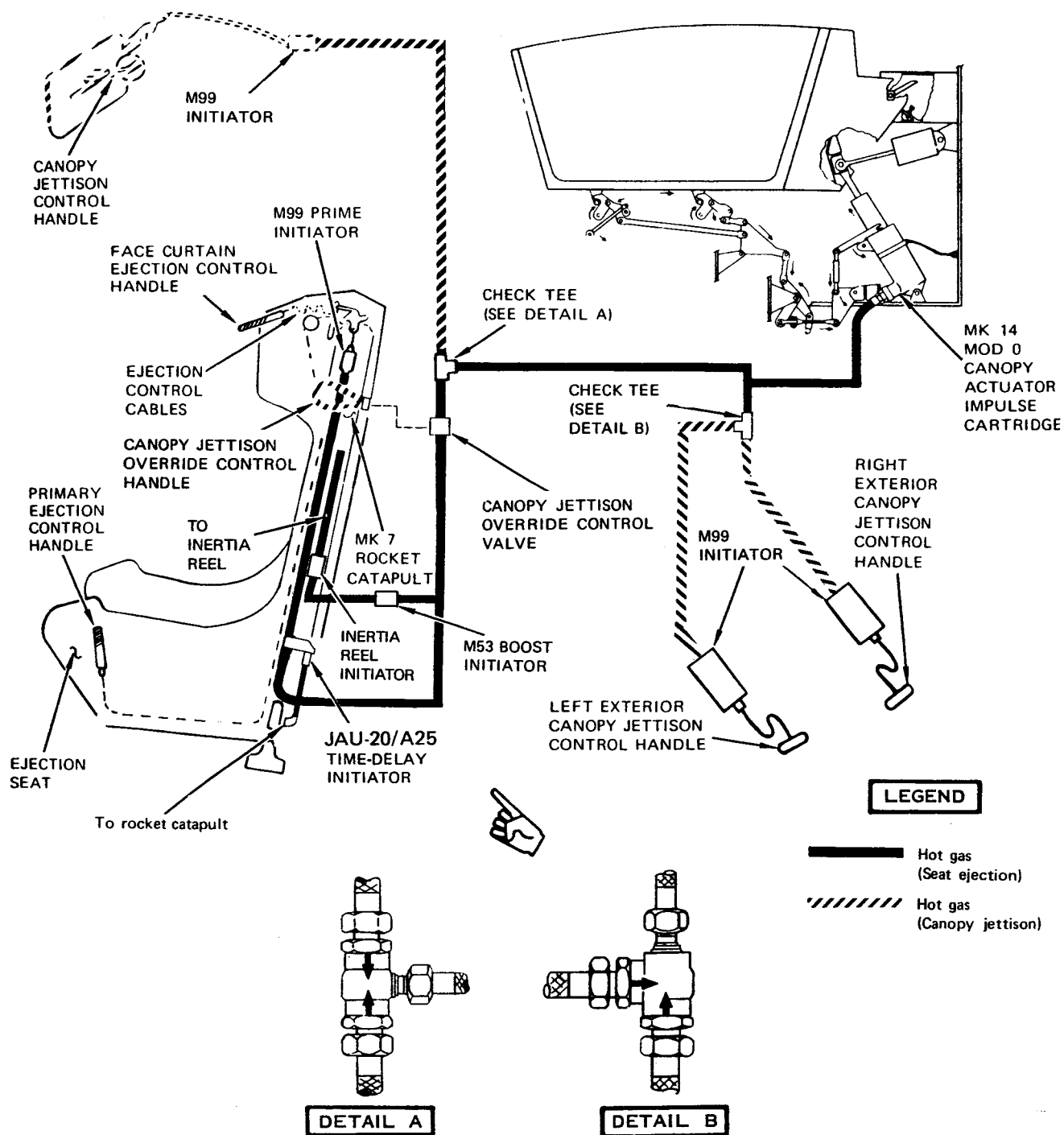
Figure 1-1. Ejection Seat System Arrangement (Sheet 1)



- 39. Primary ejection control cable
 - 40. Brake assembly
 - 41. Bridle
 - 42. Bridle cable
 - 43. Lanyard clevis
 - 44. Lanyard
 - 45. Cover
- } DART system

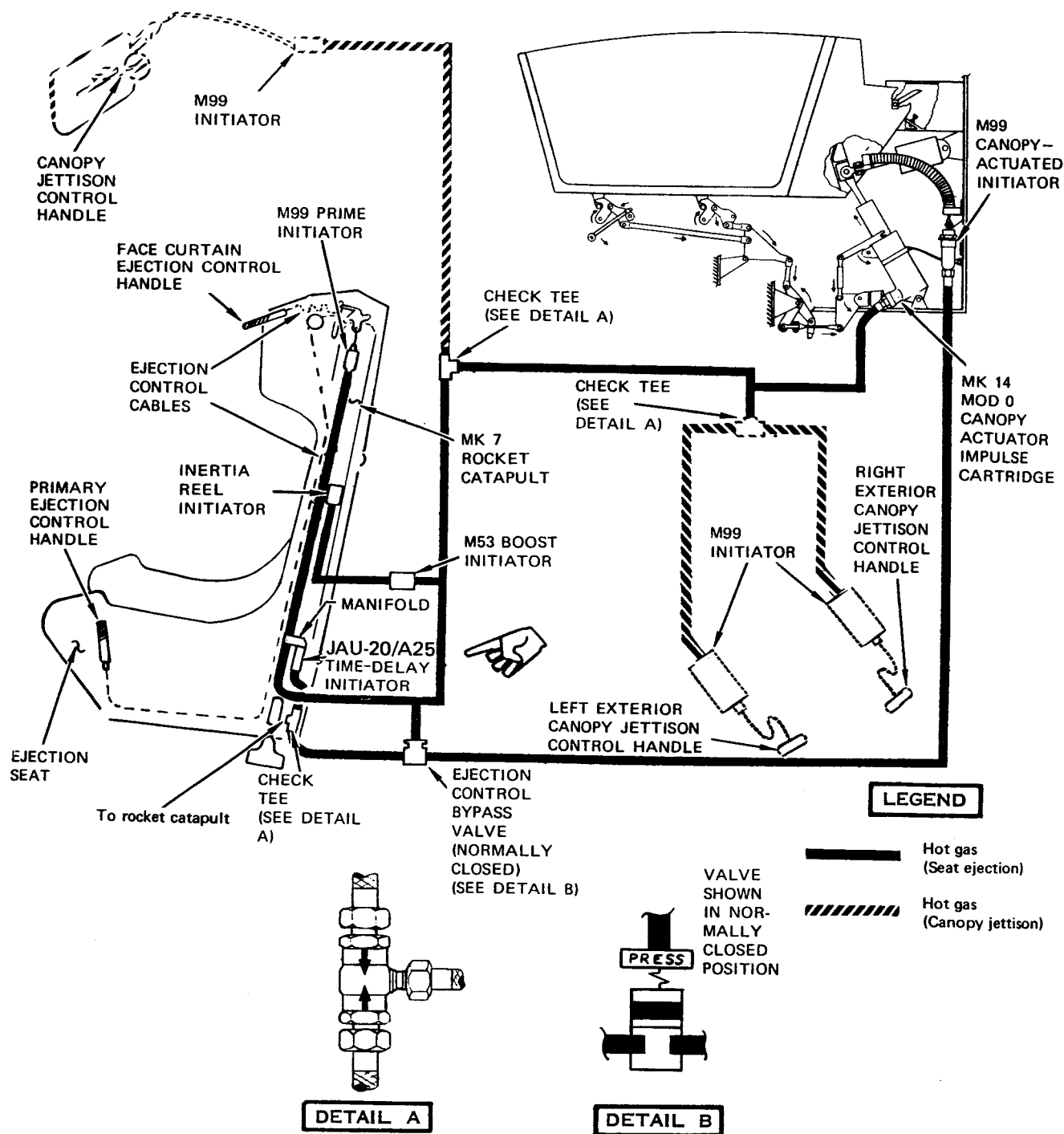
02D001-02-09-76

Figure 1-1. Ejection Seat System Arrangement (Sheet 2)



02D004-01-81

Figure 1-2. Ejection Seat System Schematic Diagram (Airplanes Through AF68-8224)



02D005-01-81

Figure 1-3. Ejection Seat System Schematic Diagram (Airplanes AF68-8225 and Subsequent)

1-12. The harness release actuator is mounted on the right back side of the seat, above the harness release bellcrank. The actuator contains a piston and rod in the vertical chamber and a time-delay cartridge and firing pin in the side chamber. The piston rod extends below the actuator where it connects to the harness release bellcrank. The nitrogen storage bottle for the pilot-seat separation system is mounted on top of the harness release actuator.

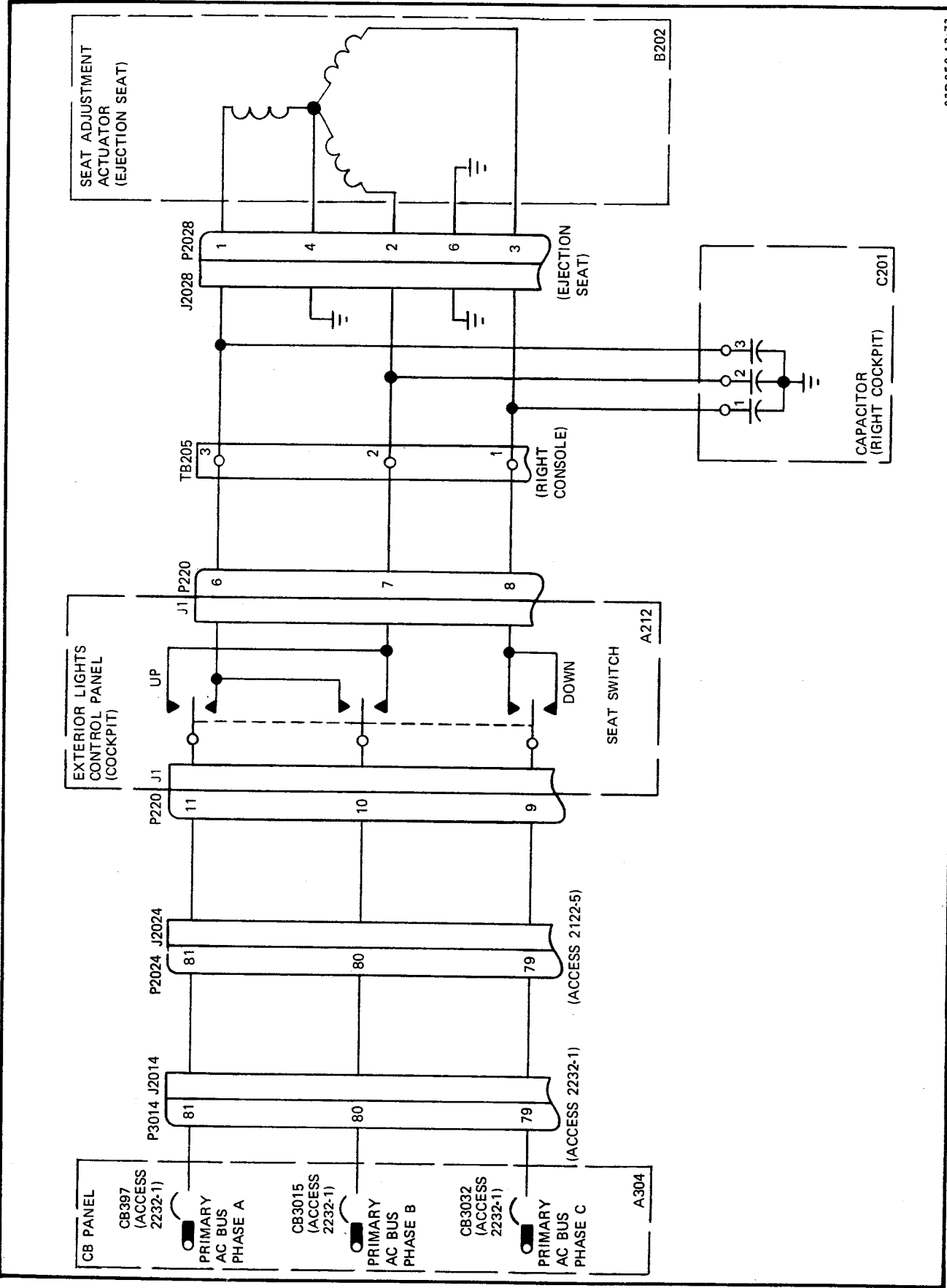
1-13. PILOT-SEAT SEPARATION SYSTEM. The pilot-seat separation system provides rapid separation of the pilot from the seat after ejection so that the parachute can be deployed to provide quick, safe escape. The system is automatically actuated following ejection by the harness release system. Two inflatable separation bladders of latex-impregnated nylon are folded against the seat pan and seat back. The bladders are covered with oval-shaped, rubberized covers which are attached to the seat with snap fasteners. Flexible hose and aluminum tubing connect the separation bladders to a nitrogen storage bottle on top of the harness release actuator. The storage bottle is pressurized with nitrogen to 1,600 psi and capped with a metal diaphragm. An inspection hole is located on the front side of the seat to allow visual verification that the nitrogen storage bottle is installed.

1-14. SHOULDER HARNESS CONTROL SYSTEM. The shoulder harness control system facilitates the voluntary forward movement of the pilot and functions as a self-compensating restraint against involuntary forward movement resulting from excessive g forces or other airframe stresses. An inertia reel control lever on the left arm of the seat can be manually unlocked or locked to allow or prevent extension of the shoulder harness

straps. Each time the pilot leans back in the seat, the spring-loaded shoulder harness inertia reel automatically rewinds and takes up slack in the straps. Each time the reel senses induced forward loads of 2g to 3g, it automatically locks, regardless of its preselected position. Once automatic locking occurs, the locked condition can be released only by cycling the control lever to locked and back to unlocked. In addition, the inertia reel is ballistically retracted and locked during the ejection sequence by an airframe mounted M53 booster initiator and a seat mounted inertia reel initiator. Expanding gases from the fired M99 prime initiator flows through tubing and detonates the M53 boost initiator. The gases from the M53 boost initiator fires the inertia reel initiator and its gases flow through grease filled tubing to retract the inertia reel. The grease within the tube hydraulically operates the reel mechanism.

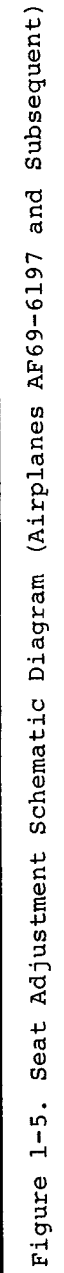
1-15. Components of the shoulder harness control system consist of a dual strap shoulder harness inertia reel, two prestretched Dacron straps and a flexible inertia reel cable assembly which couples the shoulder harness inertia reel control lever to the inertia reel. The control lever is spring tensioned and has two positions, LOCKED and UNLOCKED.

1-16. SEAT ADJUSTMENT SYSTEM. (See figure 1-4 or 1-5.) The seat adjustment system permits vertical height adjustment of the seat before and during normal flight. Phase reversal of the ac power source permits raising or lowering of the seat, corresponding to the selected UP or DCWN position of the seat adjust switch, located on the right console. The seat is raised or lowered by the seat adjustment actuator and actuator drive motor.



02D050-12-73

Figure 1-4. Seat Adjustment Schematic Diagram (Airplanes Through AF69-6196)



1-17. SEAT EJECTION SEQUENCE. (See figure 1-6.)

1-18. Pulling the ejection control handle initiates the ejection sequence. A single cable attached to the ejection control handle causes the firing control disconnect assembly to pivot forward. An attached crank transmits pulling motion to actuating linkage which pulls the firing pin from the M99 prime initiator. Simultaneously, the forward rotation of the firing control disconnect assembly causes release and rapid extension of the spring-loaded flip-up canopy breakers. Expanding gas pressure from the detonated cartridge in the M99 prime initiator flows through tubing and causes the following to occur: (1) the M53 boost initiator is fired which in turn fires the inertia reel initiator and its gases ballistically retract and lock the inertia reel; (2) Mk 14 Mod 0 canopy actuator impulse cartridge to fire and jettison the canopy; and (3) the Mk 11 Mod 0 time-delay initiator for 0.4- to 0.75-second time-delay firing of the rocket catapult. On airplanes through AF68-8224, the pilot may prevent jettisoning of the canopy in the case of underwater ejection by pulling a canopy jettison override control handle, located on the upper left seat guide rail, before initiating seat ejection. On airplanes AF68-8225 and subsequent, canopy jettison override features are not included.

1-19. For airplanes through AF68-8224, refer to paragraph 1-21 through paragraph 1-26 for continuation of seat ejection sequence.

1-20. On airplanes AF68-8225 and subsequent, use of an additional canopy-actuated initiator reduces the 0.4- to 0.75-second time delay between canopy jettisoning and the first movement of the seat. At the same time hot gas pressure from the M99 prime initiator effects canopy jettisoning and time-delay firing of the rocket catapult, it also opens the ejection control bypass valve (normally closed), in series between the rocket catapult and the canopy-actuated initiator. As the jettisoning canopy clears the path of seat ejection, an attached lanyard fires the airframe-mounted canopy-actuated initiator. Resulting hot gas flows through the opened ejection control bypass valve to fire the rocket catapult before the time delay of the JAU-20/A25 time-delay initiator has expired. In the event that the canopy fails to jettison or the canopy-actuated initiator fails to fire, the JAU-20/A25 time-delay

initiator fires (after its time delay has expired) and through-the-canopy ejection follows. Emergency canopy jettisoning or the loss of a canopy during normal flight cannot cause inadvertent firing of the rocket catapult since opening of the ejection control bypass valve (normally closed) is possible only if the pilot first pulls one of the two ejection control handles.

1-21. Following canopy jettisoning, first-phase propulsion of the Mk 7 rocket catapult starts the seat up the guide rails. When the seat has moved approximately two-thirds up the length of the guide rails, the second (or sustainer) phase of the rocket catapult ignites to provide boost for the additional height required during ejection.

1-22. Before the seat clears the guide rails, four other functions occur: (1) tension on the DART lanyard clevis actuates the IFF and emergency ECM switch; (2) pilot services are disconnected; (3) the harness release actuator hits a striker plate on the seat guide rail, knocking off the harness release actuator firing pin sear and causing a spring-tensioned firing pin to detonate the CCU-58/A delay cartridge; and (4) the parachute arming lanyard (attached to the lower right side of the seat rail) is pulled to fire the Mk 5 Mod 1/Mod 2, 2.0-second parachute actuator delay cartridge. The emergency oxygen bottle is airframe mounted and emergency/bailout oxygen is not available to the pilot following seat ejection.

1-23. Midway through burning of the rocket sustainer portion of ejection, the directional automatic realignment of trajectory (DART) system is activated to correct adverse seat pitch and roll encountered by the seat and pilot as they leave the airplane. Two braking devices in the bottom of the seat maintain constant tension on DART system nylon lanyards as they are payed out of stowage in the bottom of the seat bucket. When the lanyards have been completely payed out, seat pitch control is no longer required and the lanyards fall free.

1-24. After a 1.0-second delay, gas pressure produced by delayed firing of the CCU-58/A delay cartridge forces the harness release actuator piston upward. As the actuator piston rises, it simultaneously rotates the attached

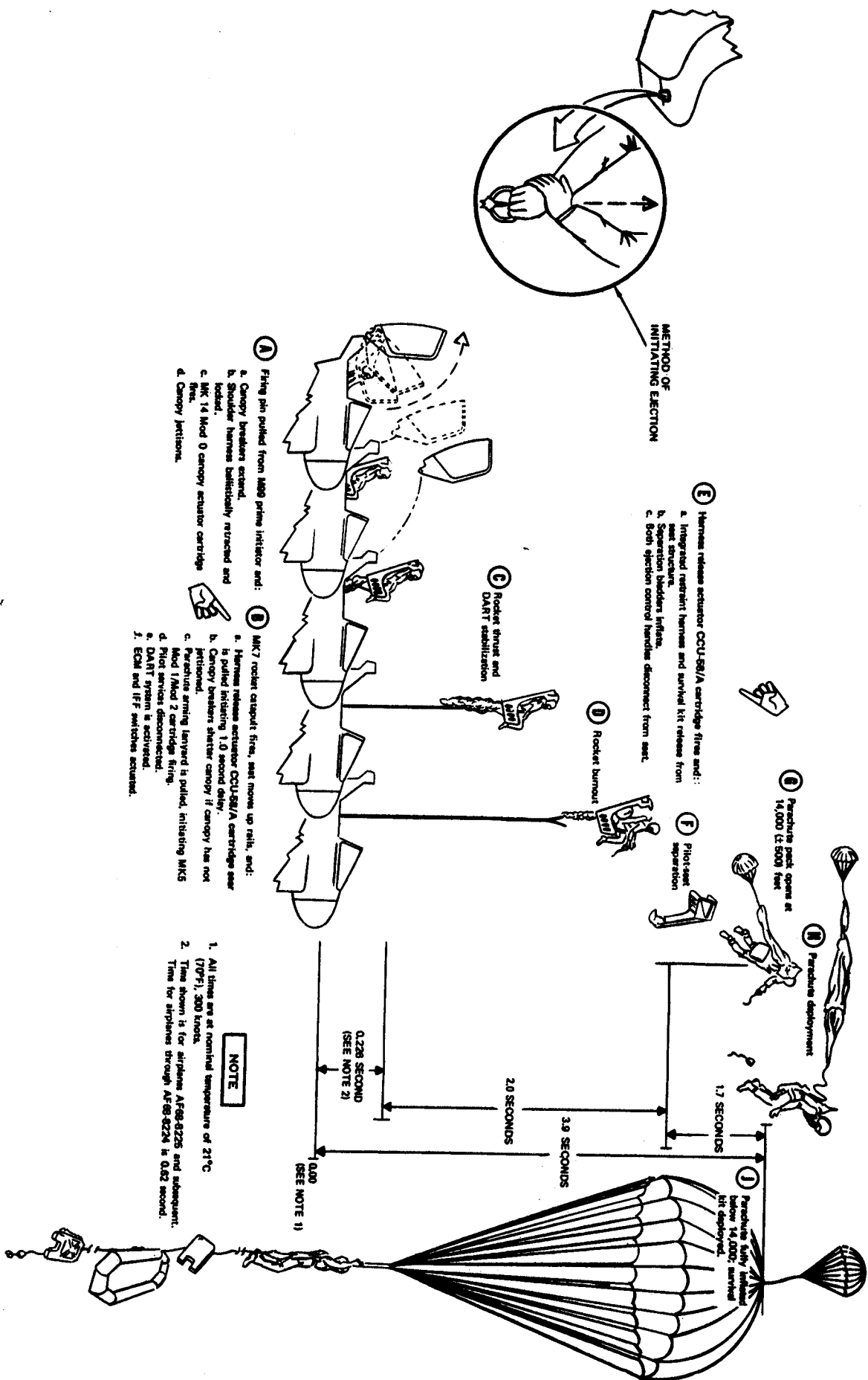


Figure 1-6. Seat Ejection Sequence

harness release bellcrank to retract the two lap belt retaining pins and the shoulder harness pin from the two inertia reel straps. Retraction of the retaining pins frees the pilot and the pilot's survival equipment from the seat. The base of the clevis on the lower end of the actuator piston also strikes the firing control disconnect actuating arm. Movement of the arm retracts a spring-loaded retaining pin from the firing control disconnect assembly and releases the ejection control handle cables from the assembly. The pilot (who may still be holding one of the ejection control handles) is now freed from any restraints that would prevent final separation from the seat.

1-25. In its detented full-up position, the sharp-pointed head of the harness release actuator piston pierces the metal diaphragm on the nitrogen storage bottle at the same time the shoulder harness straps and the lap belt lugs are released. Compressed dry nitrogen is routed from the nitrogen storage bottle through flexible hose and tubing to the two inflatable separation bladders, one under the survival kit and one behind the parachute pack. Rapid inflation of the

bladders unsnaps the bladder covers to permit full inflation. The bladder behind the parachute pack inflates more rapidly than the seat pan bladder because of an orifice in the line to the seat pan bladder. The more rapidly expanding back bladder pushes the pilot's body forward to prevent the pilot's shoulders from being pushed into the headrest pads as the seat bladder inflates, and completes pilot-seat separation. The fabric sling assembly, which is spread across the seat bladder, aids the seat bladder by distributing the expanding forces of the bladder and assuring final separation of the pilot and the pilot's survival equipment from the seat.

1-26. If the pilot is above a preset altitude of 14,000 (± 500) feet, an aneroid in the parachute actuator delays parachute deployment until the pilot has descended to the correct pressure altitude. The Mk 5 Mod 1/Mod 2, 2.0-second delay cartridge then fires, causing parachute deployment.

1-27. COMPONENTS.

1-28. For a list of ejection seat system components, their locations (accesses) and functions, refer to table 1-1.

Table 1-1. Ejection Seat System Components

Component	Access	Function
<u>Ejection Seat Components</u>		
Cover DART system protective	Bottom of ejection seat	Protects DART systems from contaminants and reduces possibility of lanyard entanglement.
Headrest	Upper center of seat front	Provides cushioning for pilot safety and comfort.
Rollers, seat (6)	Right and left sides of seat	Allows vertical movement of seat on guide rails.
<u>Harness Release System Components</u>		
Actuator, harness release	Right side back of seat	Actuates harness release bellcrank during ejection sequence to release pilot from seat. Powered by Mk 86 Mod 0 delay cartridge.

Table 1-1. Ejection Seat System Components (Continued)

Component	Access	Function
Arm, firing control disconnect actuating	Lower back of seat	Release ejection handle cables from firing control disconnect assembly. Actuated by base of clevis on harness release actuator piston rod during automatic harness release.
Bellcrank, harness release	Lower back of seat	Rotation of bellcrank actuates harness release system to permit retraction of the lap belt and shoulder harness retaining pins.
Cartridge, CCU-58/A delay	In harness release actuator	Supplies power in gas form to stroke harness release actuator piston fired by striker plate on right seat rail.
Cable, harness release handle	Attached to harness release handle and bellcrank assembly	Transmits pulling motion to the bellcrank, which rotates to cause retraction of lap belt and shoulder harness retaining pins.
Cable, shoulder harness	Center of seat back	Pulls a pin to release inertia reel dual strap fittings and free pilot from seat.
Handle, manual harness release	Right seat arm	Provides means of manually releasing all restraining components of ejection seat by actuating the bellcrank.
Pin, lap belt retaining (left and right)	Aft corners of seat bucket	Locks lap belt lugs to seat structure. Retracted by harness release bellcrank to release lap belt and survival kit from seat.
Pin, harness release actuator manual detent	Right side of seat	Holds harness release actuator piston and attached bellcrank in actuated position (retaining-pins retracted). Releases piston and bellcrank when pulled.
Pin, shoulder harness inertia reel strap retaining	Upper center of seat	Locks shoulder harness inertia reel straps to seat structure. Retracted by action of harness release bellcrank to release inertia reel straps from shoulder harness.
Spring, harness release cable return	Lower left side of aft seat structure	Returns harness release cable to its stowed position after cable is actuated.
Spring, harness release handle	In the harness release handle	Attaches parachute arming lanyard cable to the seat.

Table 1-1. Ejection Seat System Components (Continued)

Component	Access	Function
<u>Pilot-Seat Separation System Components</u>		
Bladder, separation (2)	Seat back, seat pan	Rapidly inflates when nitrogen storage bottle is punctured to effect pilot-seat separation.
Bottle, nitrogen storage	Right side back of seat	Provides storage for pressurized nitrogen which is used to inflate seat pan and seat back bladders.
Hose, flexible	Right side back of seat	Routes nitrogen pressure from storage bottle to tee fitting at base of back portion of seat assembly.
Sling, fabric	Spread across the seat pan separation bladder and attached to front and rear seat bucket structure.	Distributes expanding forces of the inflating seat bladder to assure proper pilot-seat separation.
Tubing	Back of seat	Routes nitrogen pressure to each separation bladder.

Shoulder Harness Control System Components

Cable assembly, inertia reel	Left side of seat	Connects the shoulder harness inertia reel control lever and the shoulder harness inertia reel to permit manual locking and unlocking of the system.
Cable assembly, shoulder harness inertia reel disconnect	Center of seat back	Retracts a retaining pin in the inertia reel to allow reeling of the inertia reel straps that restrain the pilot in the seat.
Initiator, M53 boost	Seat bulkhead	Supplies gas pressure to fire inertia reel initiator.
Initiator, inertia reel	Left side back of seat	Supplies gas pressure to retract and lock inertia reel.
Lever, shoulder harness inertia reel control	Left seat arm	Controls manual locking and unlocking of inertia reel.
Reel, ballistic inertia	Center of seat back	Stores inertia reel straps and allows normal forward movement of the pilot, but automatically prevents forward movement when airplane encounters induced forward loads of 2g to 3g. Ballistically retracts and locks during ejection sequence.

Table 1-1. Ejection Seat System Components (Continued)

Component	Access	Function
Strap, inertia reel (2)	Wound on inertia reel	Restrains pilot in seat.
Tube, grease filled	Left side back of seat	Conducts inertia reel initiator gases and grease, providing motive force for inertia reel retraction. Positive lubrication of reel mechanism is also provided by the grease.

Ejection Control System Components

Breaker, canopy	Upper front section of seat	Spring-loaded to flip up and break canopy glass during ejection sequence.
Catapult, Mk 7 rocket	Center of seat back	Provides necessary propulsion to eject seat and pilot from airplane.
Disconnect assembly, firing control	Under face curtain cover	Transmits pulling motion of ejection control handle cables to actuating linkage which pulls firing pin from M99 prime initiator to start ejection sequence. Also actuates canopy breaker release mechanism.
Handle, ejection controls safety	Between headrest pads	Prevents rotation of firing control disconnect assembly and firing of M99 prime initiator when pulled out.
Handle, ejection control	Front center of lower seat structure	Starts ejection sequence when pulled.
Initiator, M99 prime (also, see table 2-1)	Ejection seat	Supplies gas pressure to fire Mk 14 Mod 0 canopy actuator impulse cartridge and Mk 11 Mod 0 time-delay initiator. Fired by pulling ejection control handle.

Table 1-1. Ejection Seat System Components (Continued)

Component	Access	Function
<u>Seat Adjustment System Components</u>		
Actuator, seat adjustment	Base of Mk 7 rocket catapult	Raises or lowers ejection seat when seat adjust switch is actuated.
Motor, actuator drive	Base of Mk 7 rocket catapult	Drives the seat actuators up or down for vertical repositioning of seat.
Switch, seat adjust	Right console	Connects electrical power to actuator drive motor to raise or lower seat.

1-29. OPERATIONAL CHECKOUT.

Test Equipment Required

Figure & Index No.	Name	AN Type Designation	Use and Application
	Equipment required for connecting external electrical power		Adjust seat electrically TT02D001-11-68

NOTE

A number, or numbers, enclosed in braces at the end of a step in the following checkout is a reference to a corresponding number in troubleshooting table 1-2.

Operational checkout of the ejection seat system is limited to electrical seat adjustment.

a. Connect external electrical power (T.O. 1A-7D-2-1).

CAUTION

Canopy will remain in the open position during operational check out/ejection seat adjustment as damage to a closed canopy glass may occur if the seat actuator up stops fail. Ensure that lap belts are in the seat and not hanging over edge of seat, as damage to seat and/or console may result.

To prevent damage to actuator drive motor, do not hold seat adjust switch in UP or DOWN for more than 15 seconds maximum.

b. Place seat adjust switch on right console in DOWN; seat will lower. Place switch in OFF; seat will stop and hold present position. With the seat in the full down position, place a temporary straight line reference mark horizontally across the seat and seat rail for full travel dimensional check. The reference marks can be placed at any location on the seat and seat rail as long as reference marks are aligned in the full down position. (1,2)

c. Place switch in UP, seat will rise. Place switch in OFF after reaching full up; seat will stop and hold present position. Using reference marks, in step b, ensure travel did not exceed 5 1/4 inches. (1,2)

d. Disconnect external electrical power.

1-30. TROUBLESHOOTING.

Test Equipment Required

Figure & Index No.	Name	AN Type Designation	Use and Application
	Multimeter	AN/PSM-6	Check continuity and measure voltage TT02D002-07-69

1-31. Refer to table 1-2 for troubleshooting information. Malfunctions in the table are listed numerically and are related to a corresponding number, or numbers, following a step in the operational checkout.

Table 1-2. Seat Adjustment Electrical System Troubleshooting

Probable Cause	Isolation Procedure	Remedy
1. Seat will adjust in one direction only.		
Defective seat adjust switch	Remove exterior lights panel from right console and check switch for continuity.* Remove advisory-caution light panel from right console and check switch for continuity.#	Replace switch.
Electrical wiring associated with seat adjust switch defective	None.	Replace defective wiring as required.
2. Seat will not adjust in either direction.		
Open circuit breakers	Check that circuit breakers CB397, CB3015, and CB3032 are closed (access 2232-1).	Close circuit breakers.
Defective actuator drive motor	Disconnect electrical connector on actuator drive motor. Hold seat adjust switch in UP while checking for 115 volts ac at pins 1, 2, and 3 of connector.	Replace actuator drive motor.
Defective seat adjust switch	Remove exterior lights panel from right console and check switch for continuity.* Remove advisory-caution light panel from right console and check switch for continuity.#	Replace switch.
Electrical wiring associated with seat adjust switch defective	None	Replace defective wiring as required.

*Airplanes through AF69-6196

#Airplanes AF69-6197 and subsequent

1-32. EJECTION SEAT REMOVAL AND INSTALLATION.**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for connecting external electrical power	Adjust seat electrically
1-7	0013 (John Chatillon and Sons, Kew Garden, N.Y.)	Spring scale, 0 to 50 pounds	Adjust actuating linkage to prime initiator
	215-00261-1	Safety pin	Prevent pulling initiator firing pin
1-7(29)	215-00267-4	Initiator safety cap	Prevent firing of rocket catapult
1-7	215-00280-1	40° canopy support strut	Support canopy in normal open position
1-7	215-00280-2	73° canopy support strut	Support canopy in extreme open position to permit seat removal
1-7(1)	215-00327-1	Canopy breaker strut safety clamps	Prevent actuation of canopy breakers
	216-09857-101	Closure, male	Plug female half of inertia reel quick-disconnect coupling
	216-09857-103	Closure, female	Cap male half of inertia reel quick-disconnect coupling
1-7	4827489-1	Safety lock, harness actuator	Prevent actuation of delay cartridge during seat removal/installation
	AAA-S-133	Spring hook scale, 0 to 300 pounds	Check breakaway force and lifting force required to raise seat
	KD31L	Release key	Release inertia reel quick-disconnect coupling
	MIL-M-7404	Maintenance stand	For maintenance at cockpit level
1-7(15F)	7037648-10 (SA-ALC) Local fabrication	Safety block	Retract striker plate

TT02D003-03-77

1-33. For removal and installation of the ejection seat, see figure 1-7.

1-34. M99 PRIME INITIATOR REMOVAL AND INSTALLATION.**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
	215-00261-1	Safety pin	Prevent pulling initiator firing pin
	7025389-10 (OCAMA)	Protector assembly	Cap open lines, hoses, and fittings
	7025389-20 (OCAMA)	Protector assembly	Plug open lines, hoses, and fittings
	GGG-W-686	Torque wrench, 10 to 150 pound-inches	Tighten mounting nut and line connection to required torque
	GGG-W-686	Torque wrench, 0 to 250 pound-feet	Tighten mounting nut

TT02D004-11-72

WARNING

Ensure that ejection controls safety handle is in the fully down-and-locked position and that interior canopy jettison initiator, canopy-actuated initiator, and prime initiator safety pins (215-00261-1) with streamers are installed in M99 initiators (T.O. 1A-7D-2-1). This will prevent accidental firing of the initiators.

1-35. REMOVAL. (See figure 1-8.)

a. Remove ejection seat (paragraph 1-32).

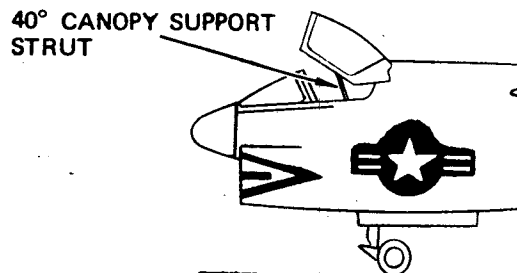
b. Disconnect outlet line (1) from outlet port of initiator. Cap open line and initiator port with protector assemblies.

CAUTION

TO PREVENT STRUCTURAL DAMAGE, ENSURE ACCESS PANEL RESTRICTIONS ARE OBSERVED BEFORE OPENING CANOPY (T.O. 1A-7D-2-1).

OPEN CANOPY SLOWLY IN COLD WEATHER TO PREVENT POSSIBLE SHEARING OF CANOPY ACTUATOR ROD END SHEAR PIN (T.O. 1A-7D-2-1).

- A. OPEN CANOPY AND INSTALL 40° CANOPY SUPPORT STRUT (PARAGRAPH 1-52).

**WARNING**

TO PREVENT PERSONNEL INJURY THROUGH ACCIDENTAL FIRING OF INITIATORS, ENSURE THAT EJECTION CONTROLS SAFETY HANDLE IS IN FULL DOWN-AND-LOCKED POSITION AND THAT INTERIOR CANOPY JETTISON INITIATOR AND PRIME INITIATOR SAFETY PINS (215-00261-1) WITH STREAMERS ARE INSTALLED (T.O. 1A-7D-2-1).

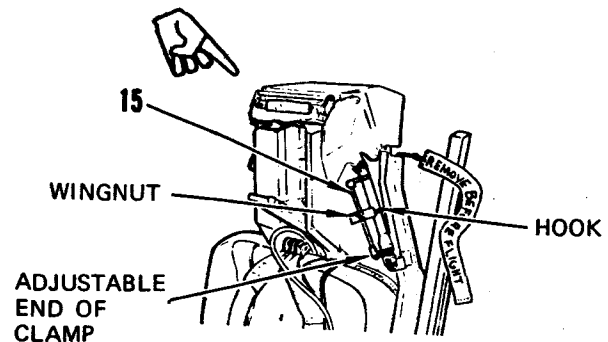
- B. PLACE EJECTION CONTROLS SAFETY HANDLE IN DOWN-AND-LOCKED POSITION.
 C. INSTALL PRIME INITIATOR SAFETY PIN (T.O. 1A-7D-2-1).
 D. INSTALL INTERIOR CANOPY JETTISON INITIATOR SAFETY PIN (T.O. 1A-7D-2-1).

WARNING

CANOPY BREAKER STRUT SAFETY CLAMPS MUST BE INSTALLED DURING SEAT REMOVAL, WHILE SEAT IS OUT OF AIRPLANE, AND DURING INSTALLATION OF SEAT TO PREVENT ACTUATION OF CANOPY BREAKERS AND POSSIBLE INJURY TO PERSONNEL.

REMOVAL

- D-1. ATTACH CANOPY BREAKER STRUT SAFETY CLAMPS (15) THROUGH CLEVIS AT EACH END OF CANOPY BREAKER STRUTS WITH ADJUSTABLE END OF SAFETY CLAMPS DOWN.



- E. INSTALL CANOPY-ACTUATED INITIATOR SAFETY PIN (T.O. 1A-7D-2-1).

NOTE

KD31L KEY WILL NOT SEPARATE FROM UPPER HALF OF COUPLING UNTIL 216-09857-101 CLOSURE HALF IS PLUGGED IN.

- F. SEPARATE QUICK DISCONNECT COUPLING ON RIGHT SIDE OF SEAT USING KD31L KEY. REMOVE KEY OR USE ALTERNATE METHOD AS FOLLOWS: DISCONNECT HOSE CVC4154-126R11 FROM ELBOW MOUNTED ON RIGHT SEAT RAIL BRACKET CAP ELBOW AND PLUG HOSE USING CAPS AND PLUGS WITH SAFETY STREAMERS INSTALLED.

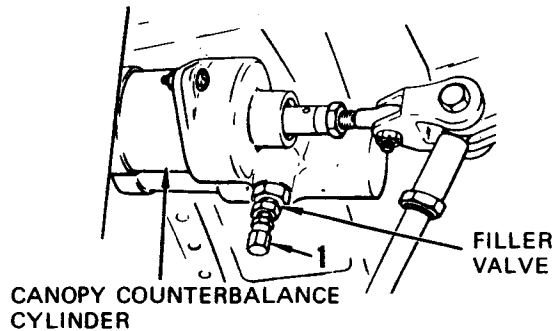
CAUTION

TO PREVENT STRUCTURAL DAMAGE TO AIRPLANE, ENSURE ACCESS PANELS SPECIFIED UNDER CANOPY COUNTERBALANCE CYLINDER SERVICING (T.O. 1A-7D-2-1) ARE INSTALLED BEFORE PRESSURIZING OR DEPRESSURIZING CANOPY COUNTERBALANCE CYLINDER.

02D006-01-01-81

Figure 1-7. Ejection Seat Removal and Installation (Sheet 1)

- G. DEPRESSURIZE CANOPY COUNTERBALANCE CYLINDER BY REMOVING FILLER CAP (1) FROM FILLER VALVE AND DEPRESSING VALVE CORE.

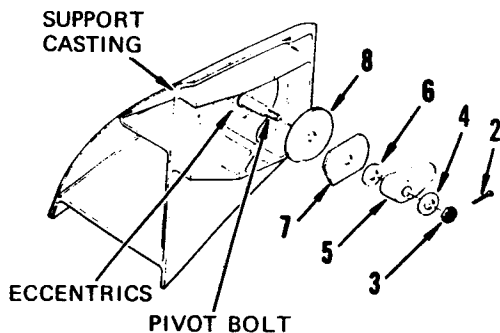


- H. REMOVE 40° CANOPY SUPPORT STRUT AND LOWER CANOPY UNTIL IT RESTS ON CANOPY SILL.
- I. OPEN ACCESS 1122-3.
- J. DELETED.

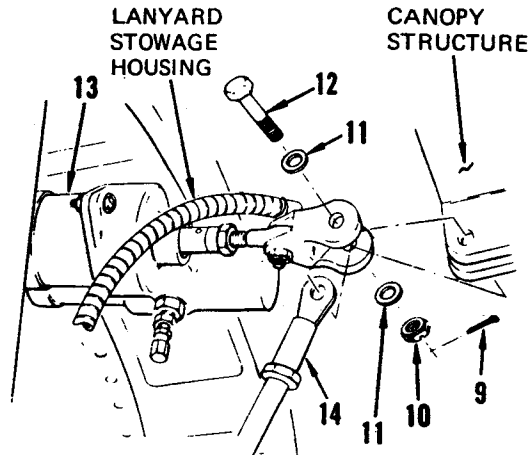
CAUTION

DO NOT REMOVE CANOPY PIVOT BOLTS. REMOVAL MAY CAUSE MISALIGNMENT OF ECCENTRICS.

- K. REMOVE COTTER PIN (2), NUT (3), WASHER (4), AND STRIKER (5), FROM LEFT AND RIGHT PIVOT BOLTS. LEAVE WASHER (6), FLAT WASHER (7), AND RETAINER (8) INSTALLED. REINSTALL WASHER (4) AND NUT (3) FINGER TIGHT.



- L. REMOVE COTTER PIN (9), NUT (10), WASHERS (11), AND BOLT (12) SECURING CANOPY COUNTERBALANCE CYLINDER (13) AND CANOPY ACTUATOR (14) TO CANOPY STRUCTURE.

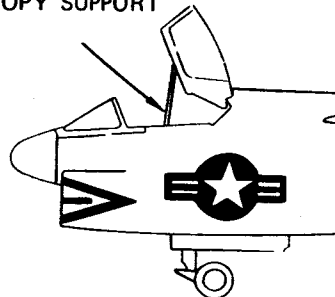


CAUTION

TO PREVENT DAMAGE TO CANOPY, RECONNECT CANOPY ACTUATOR TO CANOPY COUNTERBALANCE CYLINDER.

- M. LIFT FORWARD END OF CANOPY TO A 73° OPEN POSITION. WHILE SUPPORTING CANOPY IN OPEN POSITION, INSTALL 73° CANOPY SUPPORT STRUT AS FOLLOWS:
1. PLACE INTERIOR CANOPY RELEASE HANDLE IN OPEN POSITION.
 2. WITH FORKED END OF SUPPORT STRUT DOWN AND OPEN SIDES OF FORK FORWARD, POSITION STRUT OVER AFT CANOPY HOOK PIVOT BOLT.
 3. POSITION TOP END OF CANOPY SUPPORT STRUT AROUND AFT CANOPY ROLLER.
 4. MANUALLY PRESS AND HOLD CANOPY HOOK STOP, LOCATED AT RIGHT AFT HOOK.
 5. PLACE INTERIOR CANOPY RELEASE HANDLE IN CLOSED POSITION AND RELEASE HOOK STOP.

73° CANOPY SUPPORT STRUT



02D006-02-02-78

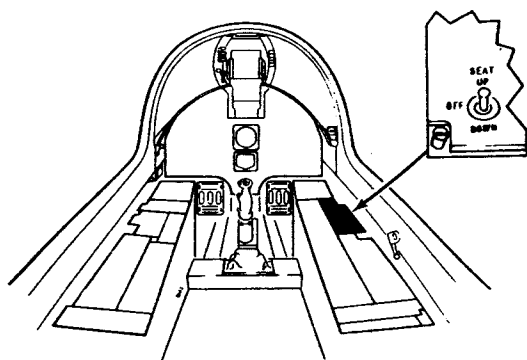
Figure 1-7. Ejection Seat Removal and Installation (Sheet 2)

- N. CONNECT AND APPLY EXTERNAL ELECTRICAL POWER (T.O. 1A-7D-2-1).

CAUTION

ENSURE THAT LAP BELTS ARE IN THE SEAT AND NOT HANGING OVER EDGE OF SEAT, AS DAMAGE TO SEAT AND/OR CONSOLE MAY RESULT.

- O. PLACE SEAT ADJUST SWITCH IN UP AND HOLD UNTIL SEAT RISES TO MAXIMUM HEIGHT. PLACE SEAT ADJUST SWITCH IN DOWN AND LOWER SEAT APPROXIMATELY 1 1/4 INCH.



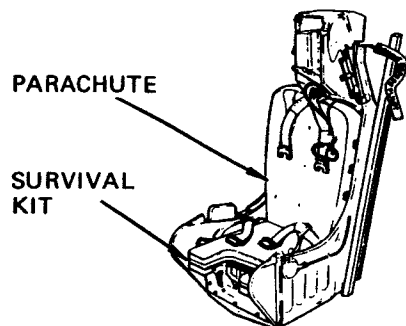
- O-1. DELETED.

- P. SHUT DOWN, BUT DO NOT DISCONNECT, EXTERNAL ELECTRICAL POWER.

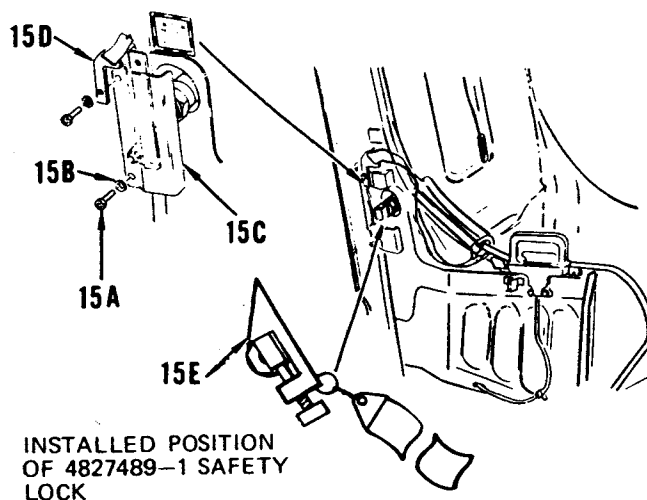
- Q. DELETED

- R. DELETED

- S. REMOVE PARACHUTE AND SURVIVAL KIT FROM SEAT (PARAGRAPH 3-16).

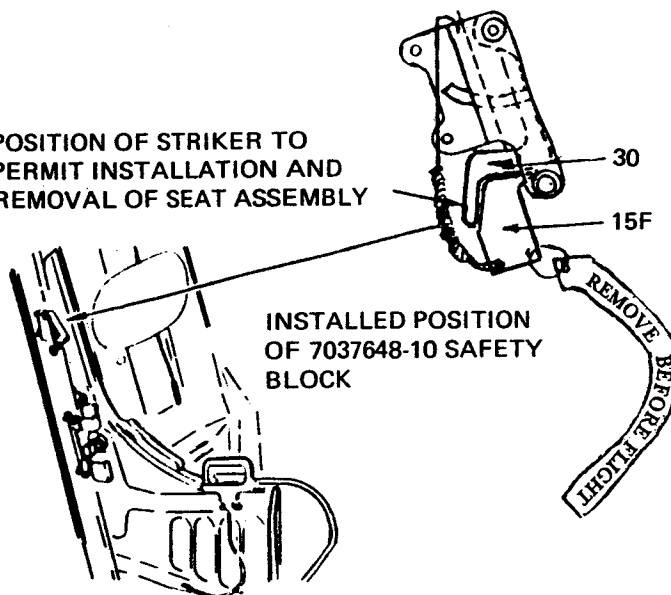


- T. REMOVE TWO BOLTS (15A) AND WASHERS (15B) SECURING GUARD (15C) AND ZERO DELAY LANYARD (15D) TO SEAT RAIL. INSTALL 4827489-1 SAFETY LOCK (15E) ON HARNESS RELEASE ACTUATOR FIRING PIN SEAR.

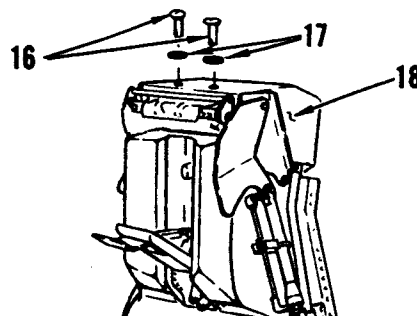


- T-1. INSTALL 7037648-10 SAFETY BLOCK (15F) ON STRIKER PLATED ASSEMBLY (30).

POSITION OF STRIKER TO PERMIT INSTALLATION AND REMOVAL OF SEAT ASSEMBLY



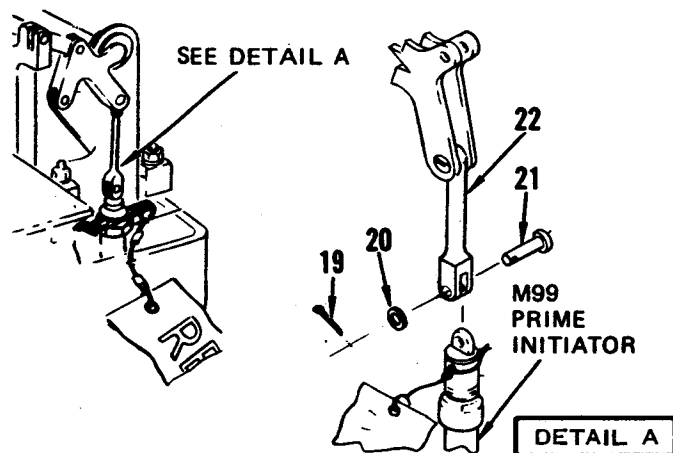
- U. REMOVE SIX SCREWS (16) AND WASHERS (17) SECURING FIRING CONTROLS COVER AND REMOVE COVER (18).



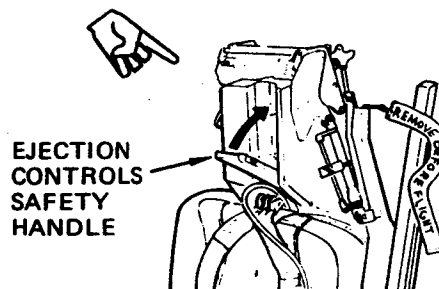
02D006-03-02-78

Figure 1-7. Ejection Seat Removal and Installation (Sheet 3)

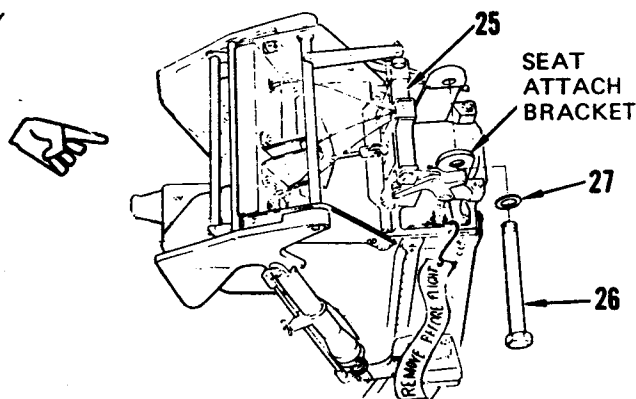
- V. REMOVE COTTER PIN (19), WASHER (20), AND PIN (21) SECURING ACTUATING LINKAGE (22) TO M99 PRIME INITIATOR.



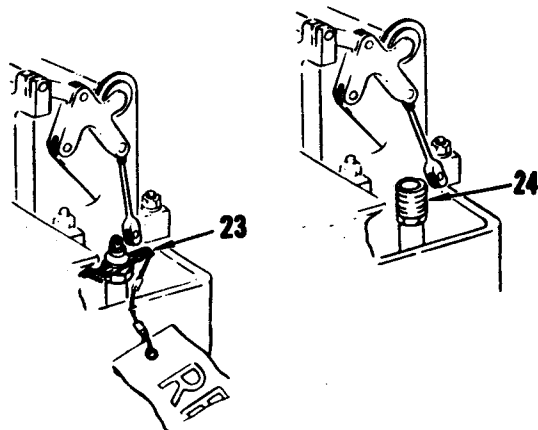
- X. PLACE EJECTION CONTROLS SAFETY HANDLE IN FULL UP POSITION.



- Y. MANUALLY ROTATE FIRING CONTROLS DISCONNECT HOUSING (25) FORWARD AND REMOVE BOLT (26) AND WASHER (27) SECURING SEAT TO ROCKET CATAPULT.



- W. REMOVE SAFETY PIN (23) FROM M99 PRIME INITIATOR AND INSTALL INITIATOR SAFETY CAP (24) FINGER-TIGHT.



- Z. MANUALLY RAISE SEAT SLIGHTLY TO CHECK FOR FREEDOM OF MOVEMENT. CONTINUE RAISING SEAT UNTIL BOLTHOLES IN SEAT ATTACH BRACKET ARE ABOVE ROCKET CATAPULT ATTACH TRUNNION AND INSTALL BOLT (26).

- AA. MANUALLY ROTATE FIRING CONTROLS DISCONNECT HOUSING (25) TO FULL AFT POSITION, AND PLACE EJECTION CONTROLS SAFETY HANDLE IN FULLY DOWN-AND-LOCKED POSITION.

02D006-04-11-76

Figure 1-7. Ejection Seat Removal and Installation (Sheet 4)

CAUTION

WHILE RAISING SEAT, MOVE CATAPULT SLIGHTLY AND CHECK FOR INTERFERENCE BETWEEN SEAT AND LINES, LINE CLAMPS, AND JAU-20/A25 DELAY INITIATOR. PAY PARTICULAR ATTENTION TO PRIME INITIATOR AND INITIATOR MOUNTING BRACKET AS THESE ITEMS MAY BE EASILY DAMAGED. IF ANY INTERFERENCE IS DETECTED, STOP RAISING SEAT AND CORRECT PROBLEM.

- AB. MANUALLY RAISE AND SUPPORT SEAT TO FACILITATE REMOVAL OF ARMOR PLATE BOLTS AND DART LANYARD QUICK-RELEASE PIN.

NOTE

RAISE FORWARD SECTION OF SEAT WELL FOD TRAP TO FACILITATE INSTALLATION OF DART LANYARD QUICK-RELEASE PIN AND ARMOR PLATE BOLTS.

- AC. REMOVE FORWARD ATTACH BOLTS SECURING ARMOR PLATE TO COCKPIT FLOOR.
- AD. REMOVE QUICK-RELEASE PIN (28) SECURING DART LANYARD CLEVIS (29) TO COCKPIT FLOOR.

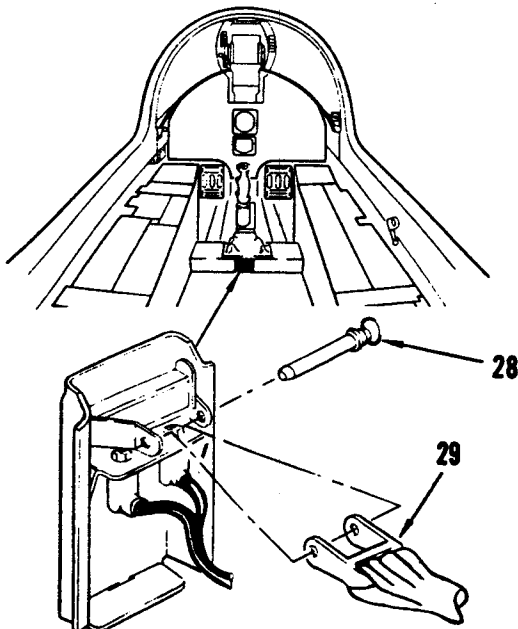


Figure 1-7. Ejection Seat Removal and Installation (Sheet 5)

- AE. TIE DART LANYARD CLEVIS TO A SURVIVAL KIT ATTACH POINT ON FRONT OF SEAT BUCKET.
- AF. LOWER SEAT UNTIL SEAT ATTACH BOLT RESTS ON TOP OF CATAPULT.
- AG. ATTACH SPRING SCALE (300-POUND RANGE) TO BOLT (26) AND RAISE SEAT. BREAK-AWAY FORCE MUST NOT EXCEED 160 POUNDS. FORCE REQUIRED TO RAISE SEAT MUST NOT EXCEED 110 POUNDS.

WARNING

HARNESS RELEASE ACTUATOR FIRING PIN SEAR STRIKER PLATE MUST BE RETRACTED WHILE SEAT IS BEING RAISED UP THE RAILS. FAILURE TO DO SO CAN RESULT IN INADVERTENT FIRING OF THE CCU-58/A CARTRIDGE, EVEN THOUGH THE SAFETY LOCK IS INSTALLED ON THE HARNESS RELEASE ACTUATOR. TO PREVENT INJURY TO PERSONNEL, ENSURE STRIKER PLATE IS RETRACTED WHILE RAISING SEAT UP OUT OF THE RAILS.

CAUTION

EXERCISE CARE WHEN LIFTING SEAT CLEAR OF GUIDE RAILS TO PREVENT DAMAGE TO CANOPY GLASS.

- AH. AFTER CHECKING SEAT FORCE, REMOVE SPRING SCALE. LIFT SEAT UNTIL CENTER ROLLERS CLEAR GUIDE RAILS AND REMOVE SEAT FROM COCKPIT.
- AI. REMOVE INITIATOR SAFETY CAP (24) AND INSTALL PRIME INITIATOR SAFETY PIN (23).
- AJ. INSTALL FIRING CONTROLS COVER (18) WITH SIX SCREWS (16) AND WASHERS (17).
- AK. CHECK SEAT CATAPULT HOSE ASSEMBLY FOR EVIDENCE OF KINKING AND SPECIFIED POSITION OF 90° ELBOW FITTING AT LOWER END OF HOSE.
- AL. CHECK FLEX HOSE FROM BYPASS VALVE TO ROCKET CATAPULT FOR DAMAGE OR IMPROPER ALIGNMENT. ENSURE HOSE SLACK IS ON OUTBOARD SIDE OF SEAT ACTUATOR ATTACHING BRACKET FEEDTHROUGH. MANUALLY SUPPORT CATAPULT AND CHECK THAT FLEX HOSE MOVES FREELY THROUGH FEEDTHROUGH DURING ACTUATOR MOVEMENT.

WARNING

CCU-58/A DELAY CARTRIDGE MUST BE REMOVED AND INSTALLED ONLY IN ACCORDANCE WITH SPECIFIC INSTRUCTIONS CONTAINED IN PARAGRAPH 1-40 OF T.O. 1A-7D-2-2. TO PREVENT INJURY TO PERSONNEL, ENSURE THAT HARNESS RELEASE ACTUATOR FIRING PIN SEAR IS NOT REMOVED FROM FIRING PIN ASSEMBLY BEFORE OR AFTER REMOVING FIRING PIN ASSEMBLY FROM ACTUATOR.

NOTE

IF SEAT REMOVAL IS FOR A SHORT PERIOD OF TIME FOR MAINTENANCE/INSPECTION ONLY, AND IF SAFETY LOCK WILL BE LEFT IN PLACE, CCU-58/A DELAY CARTRIDGE MAY BE LEFT IN SEAT.

- AM. REMOVE SAFETY LOCK AND REMOVE CCU-58/A DELAY CARTRIDGE (PARAGRAPH 1-40).
- AN. REMOVE SEAT WELL FOD TRAP, PART NO. 7827015-10, FROM COCKPIT IF OTHER THAN SEAT MAINTENANCE IS TO BE PERFORMED.

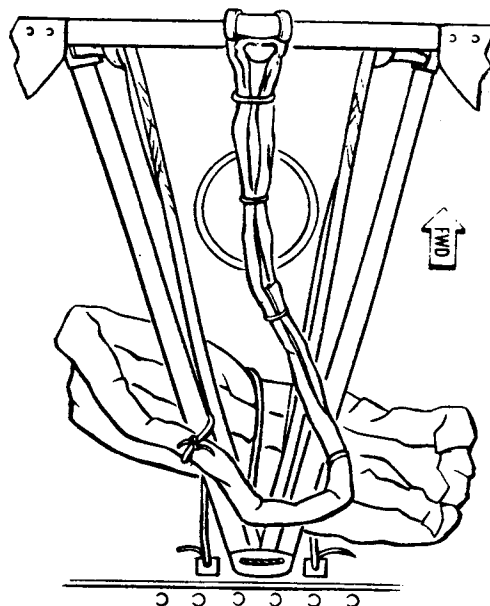
INSTALLATION

- A. BEFORE INSTALLING SEAT, INSPECT THE FOLLOWING:
 1. INSTALLATION OF 73° CANOPY SUPPORT STRUT. ENSURE THAT LAP BELTS ARE IN THE SEAT AND NOT HANGING OVER EDGE OF SEAT, AS DAMAGE TO SEAT AND/OR CONSOLE MAY RESULT.
 2. INSTALLATION OF PRIME INITIATOR, CANOPY JETTISON INITIATOR, AND CANOPY - ACTUATED INITIATOR SAFETY PINS.
- 2-1. INSTALLATION OF CANOPY BREAKER STRUT SAFETY CLAMPS.
- 2-2. PLACE EJECTION CONTROL SAFETY HANDLE IN FULL UP POSITION.

WARNING

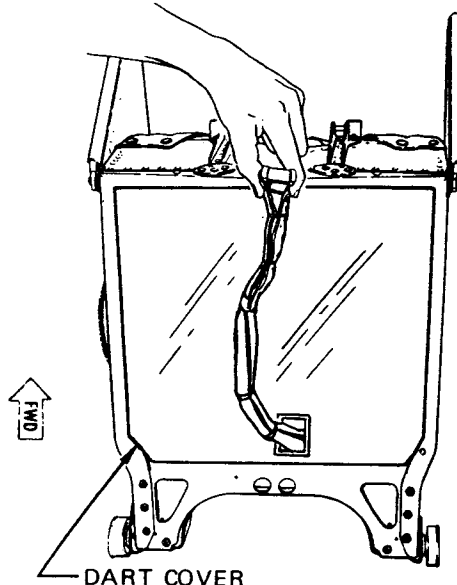
ENSURE THAT DART SYSTEM LANYARD IS PROPERLY ROUTED. IF LANYARD IS ROUTED THROUGH A-FRAME, IMPROPER OPERATION OF EJECTION SYSTEM WILL RESULT.

- 2-3. PULL UP ON EJECTION CONTROL HANDLE UNTIL FIRING CONTROL DISCONNECT ASSEMBLY ROTATES TO THE FIRED POSITION. ENSURE THAT HANDLE ASSEMBLY DOES



NOT DISENGAGE FROM DISCONNECT PULLEY.

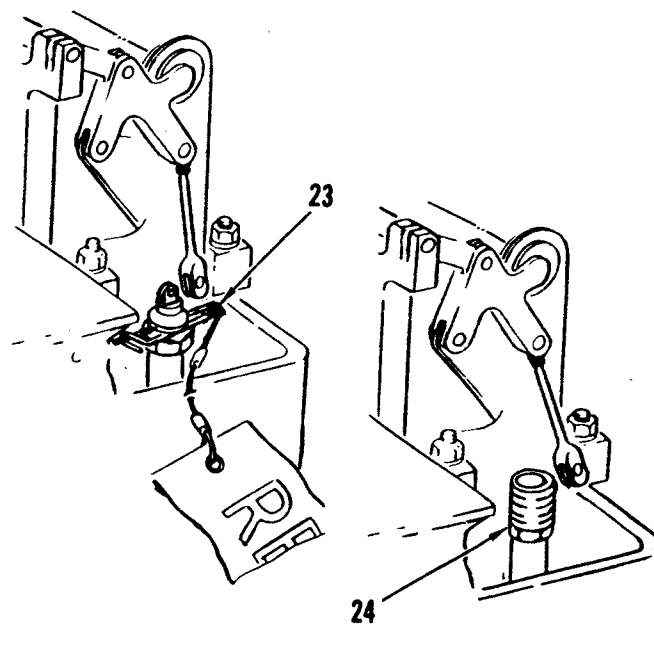
- 2-4. ROTATE FIRING CONTROL DISCONNECT HOUSING FULL AFT.
- 2-5. PLACE EJECTION CONTROL HANDLE IN DETENT CLIP.
- 2-6. PLACE EJECTION CONTROL SAFETY HANDLE IN DOWN-AND-LOCKED POSITION.
- 3. DART SYSTEM FOR PROPER ROUTING.
- 4. ENSURE DART LANYARD COVER IS PROPERLY INSTALLED.



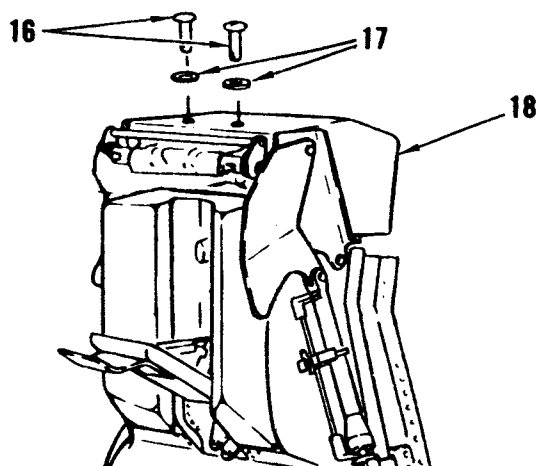
020006-06-02-78

Figure 1-7. Ejection Seat Removal and Installation (Sheet 6)

5. SEAT CATAPULT HOSE ASSEMBLY FOR EVIDENCE OF KINKING AND SPECIFIED POSITION OF 90° ELBOW FITTING AT LOWER END OF HOSE.
- 5-1. REMOVE SAFETY PIN (23) FROM M99 PRIME INITIATOR AND INSTALL INITIATOR SAFETY CAP (24) FINGER-TIGHT.
- 5-2. SEAT ADJUSTMENT ACTUATOR WIRE HARNESS FOR PROPER ROUTING, SECURITY, OBVIOUS DAMAGE, AND CORRECT CANNON PLUG CONNECTION.
6. PRIME INITIATOR MOUNTING BRACKET FOR CRACKS AND OTHER DAMAGE.
7. ROCKET CATAPULT DECAL FOR LEGIBILITY. ENSURE THAT SERIAL NUMBER AND EXPIRATION DATE ARE ENTERED ON AIRCRAFT HISTORICAL RECORDS.
8. COCKPIT FOR CLEANNESS, FREEDOM FROM FOREIGN OBJECTS, AND EVIDENCE OF HYDRAULIC LEAKS.
9. GUIDE RAILS FOR CLEANNESS.



C. DELETED



10. DART LANYARD TIED TO SURVIVAL KIT ATTACH POINT.
- B. REMOVE SIX SCREWS (16) AND WASHERS (17) SECURING FIRING CONTROLS COVER AND REMOVE COVER (18).
- B-1. INSTALL CCU-58/A DELAY CARTRIDGE (PARAGRAPH 1-40) EXCEPT DO NOT INSTALL ZERO DELAY LANYARD AND GUARD.
- B-2. INSTALL 4827489-1 SAFETY LOCK.
- B-3. INSTALL SEAT WELL FOD TRAP, PART NO. 7827015-10, IN COCKPIT IF IT HAS BEEN REMOVED.

WARNING

HARNESS RELEASE ACTUATOR FIRING PIN SEAR STRIKER PLATE MUST BE RETRACTED WHILE SEAT IS LOWERED INTO RAILS. FAILURE TO DO SO CAN RESULT IN INADVERTENT FIRING OF THE MK-86 CARTRIDGE, EVEN THOUGH THE SAFETY LOCK IS INSTALLED ON THE HARNESS RELEASE ACTUATOR. TO PREVENT INJURY TO PERSONNEL, ENSURE STRIKER PLATE IS RETRACTED WHILE LOWERING SEAT INTO RAILS.

CAUTION

EXERCISE CARE WHEN POSITIONING SEAT ABOVE GUIDE RAILS TO PREVENT DAMAGE TO CANOPY GLASS.

- D. POSITION SEAT ABOVE GUIDE RAILS AND ENGAGE LOWER ROLLERS WITH RAILS.

WARNING

USE CARE WHEN GUIDING ROCKET CATAPULT THROUGH SEAT STRUCTURE TO AVOID HAND INJURY.

Figure 1-7. Ejection Seat Removal and Installation (Sheet 7)

02D006-07-02-78

CAUTION

WHILE LOWERING SEAT, MOVE CATAPULT SLIGHTLY AND CHECK FOR INTERFERENCE BETWEEN SEAT AND LINES, LINE CLAMPS, AND JAU-20/A25 DELAY INITIATOR. PAY PARTICULAR ATTENTION TO PRIME INITIATOR AND INITIATOR MOUNTING BRACKET AS THESE ITEMS MAY BE EASILY DAMAGED. IF ANY INTERFERENCE IS DETECTED, STOP LOWERING SEAT AND CORRECT PROBLEM.

NOTE

IF LOWERING IS DIFFICULT, CHECK EACH PAIR OF ROLLER GUARDS AT TOP OF GUIDE RAILS. MAXIMUM SLIDE BLOCK CLEARANCE IS 0.030 INCH.

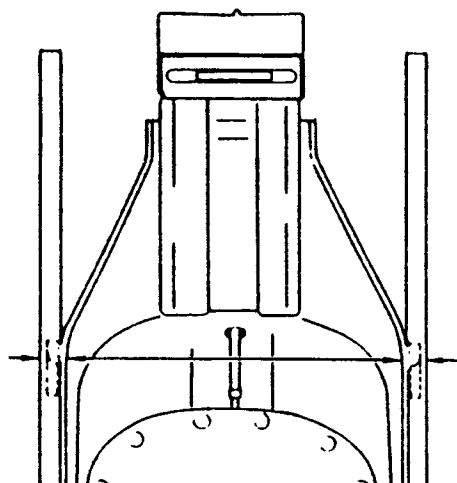
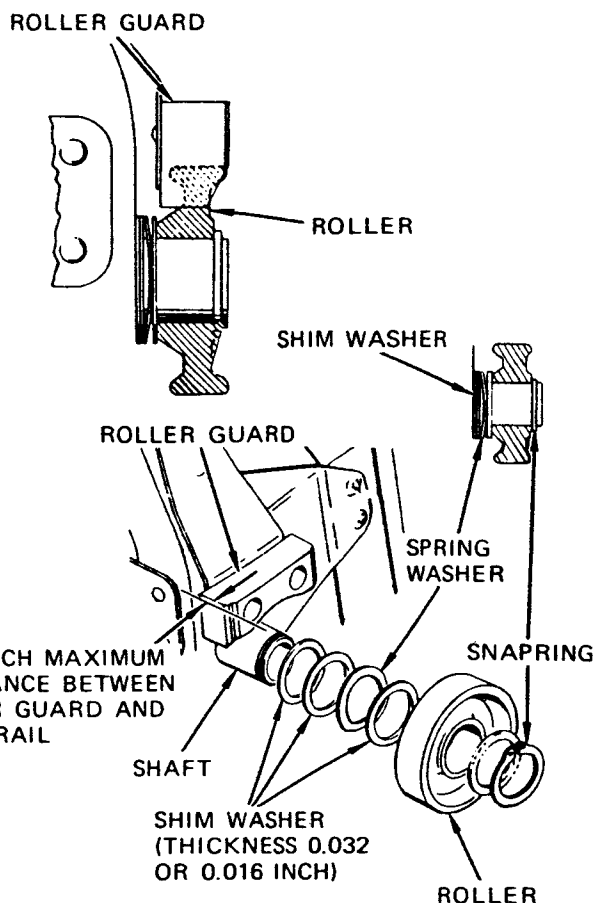
- E. GUIDE ROCKET CATAPULT THROUGH SEAT STRUCTURE WHILE ENGAGING REMAINING ROLLERS ON SEAT WITH RAILS.
- F. IF LOWERING WAS DIFFICULT, CHECK ROLLER GUARDS, AND IF SEAT IS EXCESSIVELY SLOPPY, CHECK OR ADJUST ROLLER GUARDS AND ROLLERS AS FOLLOWS:

1. CHECK ROLLER GUARDS FOR 0.030 INCH MAXIMUM CLEARANCE.
2. ADJUST ROLLERS BY REPOSITIONING SHIM WASHERS. SPRING WASHERS MUST BE ON INBOARD SIDES OF ROLLERS AND THERE MUST BE ONE OR MORE SHIMS ON EACH SIDE OF SPRING WASHERS.
3. AFTER SEAT IS LOWERED, CHECK FOR SIDE-TO-SIDE AND FORE-AND-AFT PLAY BETWEEN UPPER ROLLERS AND GUIDE RAILS. MAXIMUM ALLOWABLE SIDE PLAY IS 0.160 INCH. MAXIMUM ALLOWABLE FORE-AND-AFT PLAY IS 0.047 INCH.
4. IF NECESSARY, REPOSITION SHIMS UNTIL SPECIFIED SIDE-TO-SIDE TOLERANCE IS MET.

NOTE

TO ADJUST ROLLER INBOARD, TRANSFER SHIM(S) OUTBOARD (BETWEEN ROLLER AND SNAPRING).

5. IF FORE-AND-AFT PLAY IS NOT AS SPECIFIED INSTALL NEW ROLLERS (T.O. 13A5-40-3).

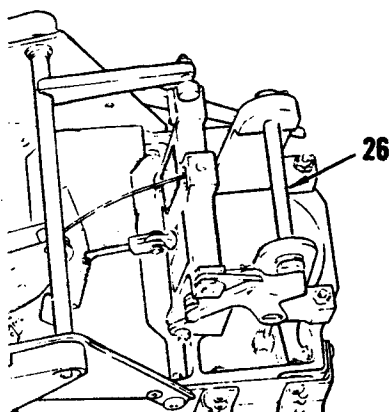


- G. WITH SEAT LOWERED, ATTACH 300 POUNDS RANGE SPRING SCALE TO BOLT (26) AND CHECK FORCE REQUIRED TO RAISE SEAT. BREAKAWAY FORCE MUST NOT EXCEED 160 POUNDS. FORCE REQUIRED TO RAISE SEAT MUST NOT EXCEED 110 POUNDS.

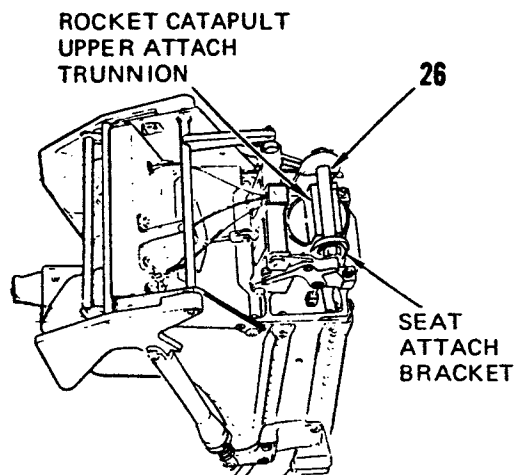
02D006-08-11-76

Figure 1-7. Ejection Seat Removal and Installation (Sheet 8)

H. REMOVE SPRING SCALE.



LOWER SEAT UNTIL CATAPULT ATTACH BOLT (26) RESTS ON ROCKET CATAPULT UPPER ATTACH TRUNNION.

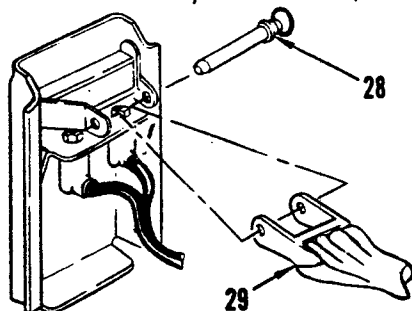
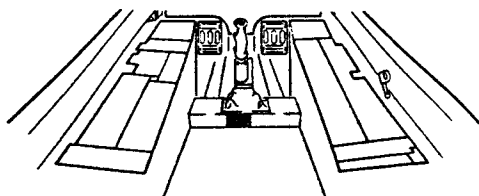


I. MANUALLY RAISE AND SUPPORT SEAT TO FACILITATE INSTALLATION OF DART LANYARD QUICK-RELEASE PIN AND ARMOR PLATE BOLTS.

NOTE

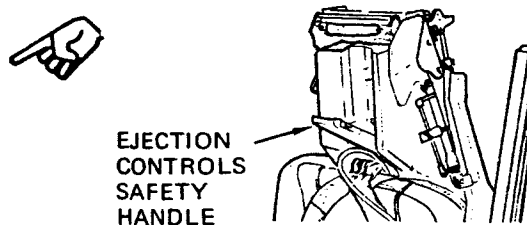
RAISE FORWARD SECTION OF SEAT WELL FOD TRAP TO FACILITATE INSTALLATION OF DART LANYARD QUICK-RELEASE PIN AND ARMOR PLATE BOLTS.

J. ROUTE DART SYSTEM LANYARD THROUGH FOD TRAP TO AIRFRAME ATTACHMENT FITTING AND SECURE LANYARD CLEVIS (29) TO FITTING WITH QUICK-RELEASE PIN (28).

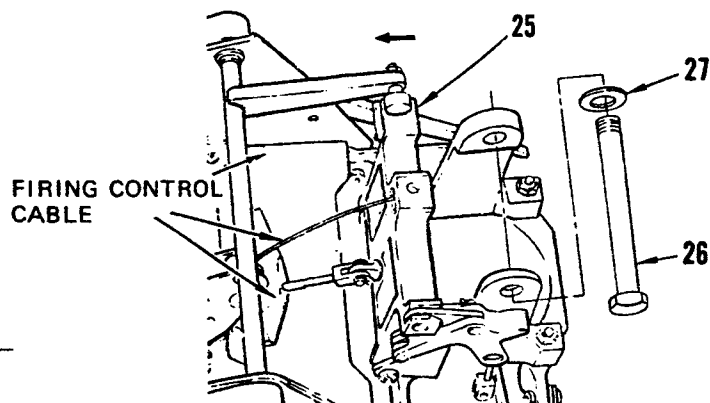


K. INSTALL FORWARD ATTACH BOLTS SECURING ARMOR PLATE TO COCKPIT FLOOR.

M. PLACE EJECTION CONTROLS SAFETY HANDLE IN FULL UP POSITION.



N. MANUALLY ROTATE FIRING CONTROL DISCONNECT HOUSING (25) FORWARD TO ALLOW REMOVAL OF BOLT (26).



02D006-09-02-78

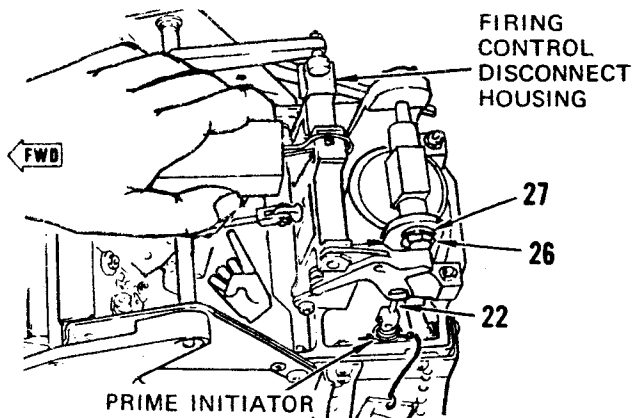
Figure 1-7. Ejection Seat Removal and Installation (Sheet 9)

- O. SUPPORT SEAT, REMOVE BOLT (26), AND LOWER SEAT. ALIGN HOLES OF ROCKET CATAPULT UPPER ATTACH TRUNNION WITH HOLES IN SEAT ATTACH BRACKET. SECURE SEAT TO CATAPULT WITH WASHER (27) AND BOLT (26).

NOTE

ROCKET CATAPULT PART NO. 1001-509, IS DESIGNED TO ALLOW THE UPPER ATTACH TRUNNION TO MOVE ENOUGH TO MAKE THIS ALIGNMENT.

- P. MANUALLY ROTATE FIRING CONTROL DISCONNECT HOUSING TO FULL AFT POSITION AND PLACE EJECTION CONTROLS SAFETY HANDLE IN FULL DOWN-AND-LOCKED POSITION. ENSURE THAT FIRING CONTROL CABLE ARE SECURED IN FIRING CONTROL DISCONNECT HOUSING.
- Q. REMOVE INITIATOR SAFETY CAP (21) FROM PRIME INITIATOR AND INSTALL SAFETY PIN (22).
- R. ATTACH 50 POUND RANGE SPRING SCALE TO FIRING CONTROL DISCONNECT HOUSING AND PULL HOUSING FORWARD EXERTING 5 TO 10 POUNDS TENSION WHILE ADJUSTING ACTUATING LINKAGE (22) TO ALIGN HOLES OF LINKAGE AND INITIATOR.

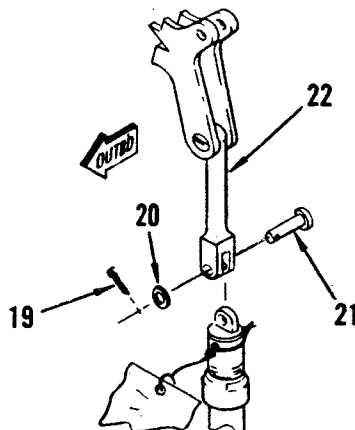


WARNING

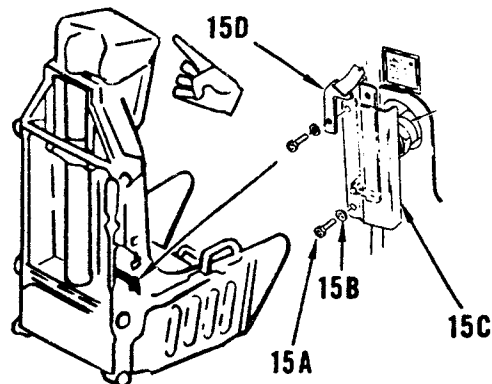
THE FIRING CONTROL CABLE SHOULD BE THROUGH THE HOLE WITH THE SWAGE BALL ON THE AFT SIDE OF THE FIRING CONTROL DISCONNECT HOUSING. ENSURE THAT THE CABLE IS NOT WEDGED BETWEEN THE TOP OF RETAINING PIN AND DISCONNECT HOUSING.

- S. CHECK THAT THE FIRING CONTROL CABLE IS PROPERLY INSTALLED IN THE FIRING CONTROL DISCONNECT HOUSING.

- T. INSTALL PIN (21) FROM INBOARD DIRECTION, WASHER (20), AND NEW COTTER PIN (19) TO SECURE ACTUATING LINKAGE (22) TO M99 PRIME INITIATOR.



- U. DELETED.
- V. INSTALL FIRING CONTROL COVER (18) AND SECURE WITH WASHERS (17) AND SCREWS (16).
- W. REMOVE SAFETY LOCK. INSTALL ZERO DELAY LANYARD (15D) AND GUARD (15C) OVER FIRING PIN ASSEMBLY WITH TWO WASHERS (15B) AND BOLTS (15A).

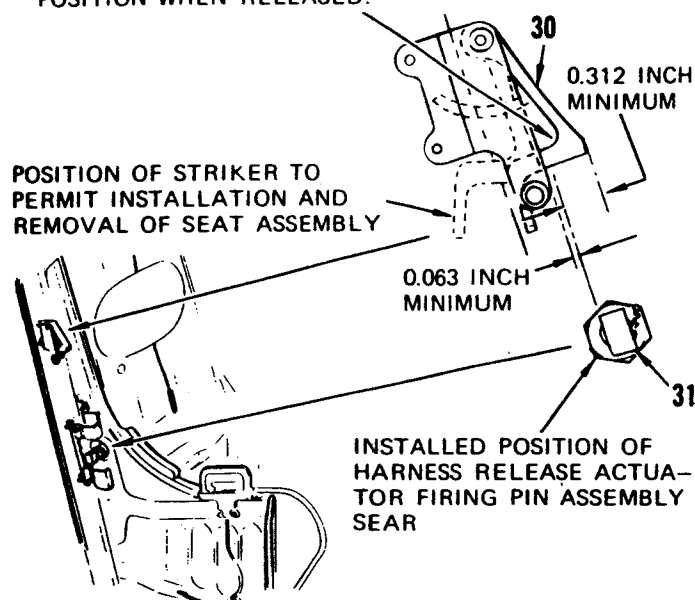


- X. REMOVE 7037648-0 SAFETY LOCK (15F) FROM STRIKER PLATE (30) AND CHECK THAT STRIKER PLATE (30) AND HARNESS RELEASE ACTUATOR FIRING PIN SEAR (31) ARE ADJUSTED AS SHOWN IN FIGURE BELOW. ENSURE THAT STRIKER PLATE HAS EXTENDED TO POSITION FOR ACTUATOR FIRING. CHECK PROPER CONNECTION PILOT'S COMMUNICATION LEAD.

02D006-10-02-78

Figure 1-7. Ejection Seat Removal and Installation (Sheet 10)

STRIKER PLATE ASSEMBLY EXTENDED FOR ACTUATOR FIRING. STRIKER SHOULD RETURN FREELY TO THE EXTENDED POSITION WHEN RELEASED.



Y. REMOVE CLOSURE ASSEMBLIES USING KD31L KEY. CONNECT QUICK DISCONNECT COUPLINGS AND REMOVE KD31L KEY. ENSURE QUICK DISCONNECT IS CONNECTED BY PULLING ON MALE PORTION (LOWER PORTION) OF DISCONNECT. FORCE SHOULD BE APPROXIMATELY 30 POUNDS AND SHALL BE APPLIED STRAIGHT DOWN AXIS OF DISCONNECT BY HAND ONLY. IF ALTERNATE METHOD WAS USED, REMOVE CAP AND PLUGS FROM ELBOW AND HOSE. CONNECT HOSE TO ELBOW AND TIGHTEN TO 95 (\pm 25) POUND-INCHES TORQUE.

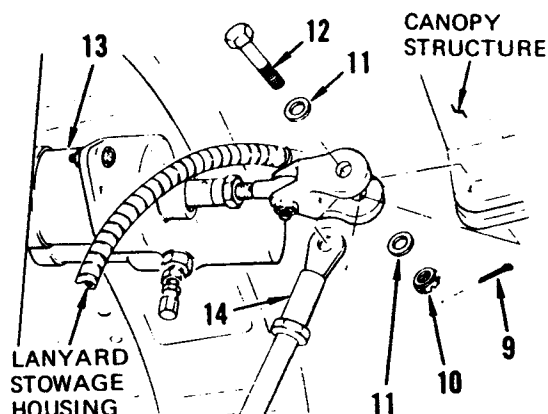
Z. LIFT FORWARD END OF CANOPY AND REMOVE 73° CANOPY STRUT AS FOLLOWS:

1. ENSURE THAT STRAIN IS OFF CANOPY SUPPORT STRUT.
2. PLACE CANOPY RELEASE HANDLE IN OPEN POSITION.
3. PULL LOCK PIN DOWN AT TOP OF STRUT AND REMOVE STRUT FROM CANOPY ROLLER.
4. SUPPORT CANOPY BY HAND, TAP BOTTOM OF STRUT AFT, AND REMOVE STRUT FROM AIRPLANE.

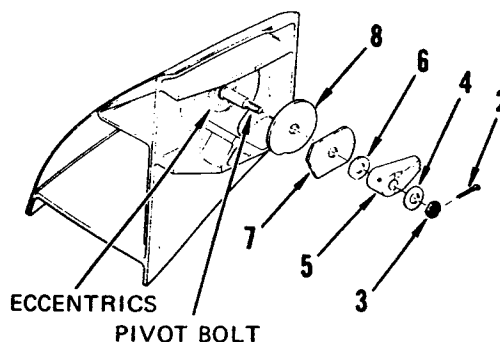
AA. LOWER FORWARD END OF CANOPY UNTIL CANOPY RESTS ON CANOPY SILL.

AB. REMOVE NUT, WASHERS, AND BOLT SECURING CANOPY ACTUATOR TO CANOPY COUNTERBALANCE CYLINDER.

AC. POSITION COUNTERBALANCE CYLINDER (13) AND CANOPY ACTUATOR (14) TO CANOPY STRUCTURE. SECURE WITH BOLT (12), WASHERS (11), NUT (10), AND NEW COTTER PIN (9).



AD. INSTALL RETAINERS (8), FLAT WASHERS (7), AND WASHERS (6) ON CANOPY PIVOT BOLTS. ALIGN INDEX MARKS ON PIVOT BOLTS AND STRIKERS, AND INSTALL STRIKERS (5) ON PIVOT BOLTS. SECURE STRIKERS WITH WASHERS (4), NUTS (3), AND NEW COTTER PINS (2).



AE. DELETED.

AF. CLOSE ACCESS 1122-3.

AG. RAISE CANOPY AND INSTALL 40° CANOPY SUPPORT STRUT (PARAGRAPH 1-52).

AH. CHECK SEAT FOR COMPLETE INSTALLATION.

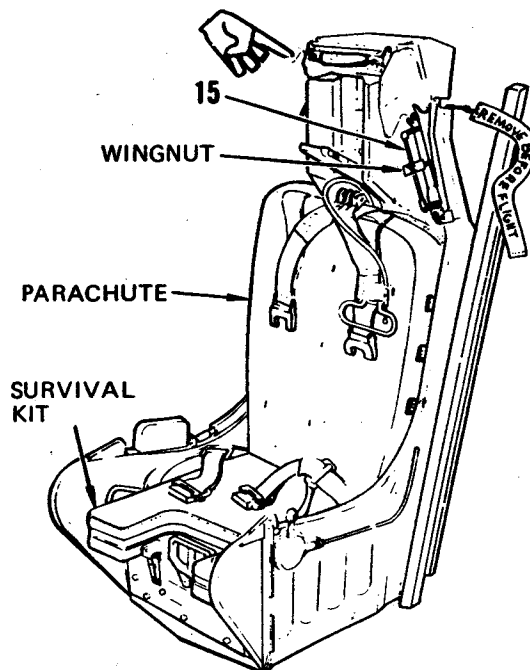
02D006-11-01-81

Figure 1-7. Ejection Seat Removal and Installation (Sheet 11)

CAUTION

TO PREVENT STRUCTURAL DAMAGE TO AIRPLANE, ENSURE THAT ACCESS PANELS SPECIFIED UNDER CANOPY COUNTERBALANCE CYLINDER SERVICING (T.O. 1A-7D-2-1) ARE INSTALLED BEFORE PRESSURIZING CANOPY COUNTERBALANCE CYLINDER.

- AI. SERVICE CANOPY COUNTERBALANCE CYLINDER (T.O. 1A-7D-2-1).
- AJ. REMOVE 40° CANOPY SUPPORT STRUT (PARAGRAPH 1-52).
- AK. OPEN AND CLOSE CANOPY SEVERAL TIMES AND CHECK FOR PROPER OPERATION AND ALIGNMENT.
- AL. INSTALL PARACHUTE AND SURVIVAL KIT (PARAGRAPH 3-16).
- AM. LOOSEN WINGNUT AND REMOVE CANOPY BREAKER STRUT SAFETY CLAMPS (15) FROM CANOPY BREAKER STRUTS.
- AN. REMOVE CANOPY-ACTUATED INITIATOR SAFETY PIN.
- AO. PERFORM SEAT ADJUSTMENT SYSTEM OPERATIONAL CHECKOUT (PARAGRAPH 1-29).
- AP. PERFORM EGRESS SYSTEM FINAL INSPECTION (PARAGRAPH 3-25).



02D006-12-11-76

Figure 1-7. Ejection Seat Removal and Installation (Sheet 12)

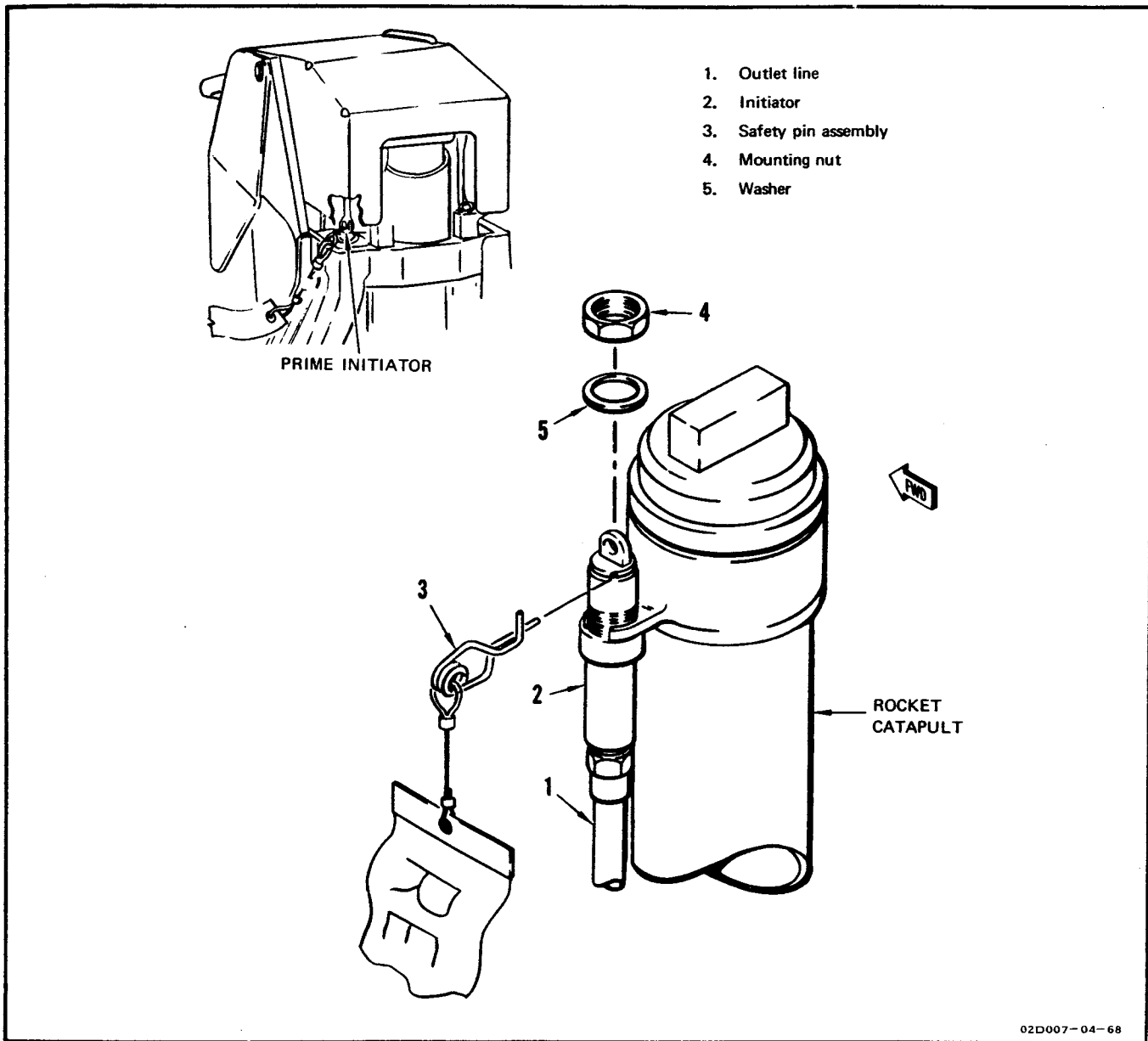


Figure 1-8. M99 Prime Initiator Removal and Installation

CAUTION

To avoid breaking mounting bracket from rocket-catapult casing when removing initiator mounting nut, hold bracket slot with wrench to prevent twisting bracket.

On 1001-509 catapult to avoid breaking initiator mounting bracket and/or shearing roll pins when removing mounting nut, securely hold initiator mounting

bracket with a strap wrench or place in a copper or bronze faced vise (to avoid surface damage). Unless initiator mounting bracket is securely held, roll pins will shear when torque is applied.

c. Loosen mounting nut (4) approximately two turns and remove initiator (2) from slot in mounting bracket.

d. Carefully remove safety pin assembly (3), remove mounting nut (4) and washer (5) from initiator, and reinstall safety pin assembly.

1-36. INSTALLATION. (See figure 1-8.)

WARNING

Do not install an initiator having an expired service life or shelf life. Installation of an expired initiator may result in malfunctioning of the ejection seat jettison system or loss of life.

CAUTION

The initiator is a sealed device. It shall not be opened for inspection or any other reason. If dropped or if firing pin is disturbed, the initiator shall be replaced.

a. Carefully remove safety pin assembly (3), loosely install washer (5) and mounting nut (4) on initiator, and reinstall safety pin assembly.

CAUTION

To avoid breaking mounting bracket when tightening mounting nut, hold bracket slot with wrench to prevent twisting bracket.

■ On 1001-509 catapult to avoid breaking initiator mounting bracket and/or shearing roll pins when tightening mounting nut, securely hold initiator mounting bracket with a strap wrench or place in a copper or bronze faced

vise (to avoid surface damage). Unless initiator mounting bracket is securely held, roll pins will shear when torque is applied.

NOTE

Torque value of mounting nut (4) depends on mounting bracket material. Check rocket catapult for presence of decal that states: Torque initiator mounting nut to 45 to 50 pound-feet.

b. On all catapults, except 1001-509 ■ catapult, position initiator (2) in mounting bracket slot with safety pin hole on outboard side. Ensure washer (5) is between mounting bracket and mounting nut. If decal does not exist on rocket catapult, tighten mounting nut to 150 (+20, -0) pound-inches torque. If decal does exist, tighten mounting nut to 45 to 50 pound-feet torque.

b-1. On 1001-509 catapult, position ■ initiator (2) in mounting bracket slot. Ensure washer (5) is between mounting bracket and mounting nut (4). Tighten nut so that initiator flange is positioned firmly against bottom surface of mounting bracket before applying torque. Tighten nut to 150 (+20, -0) pound-inches torque.

c. Remove cap from line and initiator outlet port. Connect outlet line (1) to initiator.

d. Tighten outlet line connection to 95 (+0, -25) pound-inches torque and apply torque stripe.

e. Install ejection seat (paragraph 1-32).

1-37. JAU-20/A25 TIME-DELAY INITIATOR REMOVAL AND INSTALLATION.

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
	7025389-10 (OCAMA)	Protector assembly	Cap open lines, hoses, and fittings
	7025389-20 (OCAMA)	Protector assembly	Plug open lines, hoses, and fittings
	MIL-H-4034	Torque wrench, 10 to 150 pound-inches	Tighten line connection to required torque TT02D005-12-70

WARNING

Ensure that ejection controls safety handle is in the fully down-and-locked position and that canopy initiator and prime initiator safety pins (215-00261-1) with streamers are installed in M99 initiators (T.O. 1A-7D-2-1). This will prevent accidental firing of the initiators.

Do not insert objects into ports of JAU-20/A25 cartridge as cart-ridge could be damaged.

1-38. REMOVAL. (See figure 1-9.)

- a. Remove ejection seat (paragraph 1-32).

CAUTION

To prevent damaging the two-piece JAU-20/A25 time-delay initiator, use a back-up wrench when removing the flexible hose on the initiator outlet port.

- b. Disconnect flexible hose (1) from lower end of delay initiator. Cap open end of flexible hose with protector assembly.

CAUTION

To prevent damaging the two manifold clamp assembly, use a back-up wrench to hold the manifold in place when removing the JAU-20/A25 time-delay initiator.

- c. Remove initiator (2) and O-ring (3) from reducer in clamp assembly.

- d. Cap inlet and outlet ports of initiator and plug reducer with protector assemblies.

1-39. INSTALLATION. (See figure 1-9.)

WARNING

Do not install an initiator having an expired service life or shelf life. Installation of an expired initiator may result in malfunctioning of the ejection seat jettison system or loss of life.

CAUTION

The initiator is a sealed device. It shall not be opened for inspection or any other reason. If dropped or if firing pin is disturbed, the initiator shall be replaced.

- a. Verify that initiator contains a cartridge by removing cap and inspecting with flashlight.

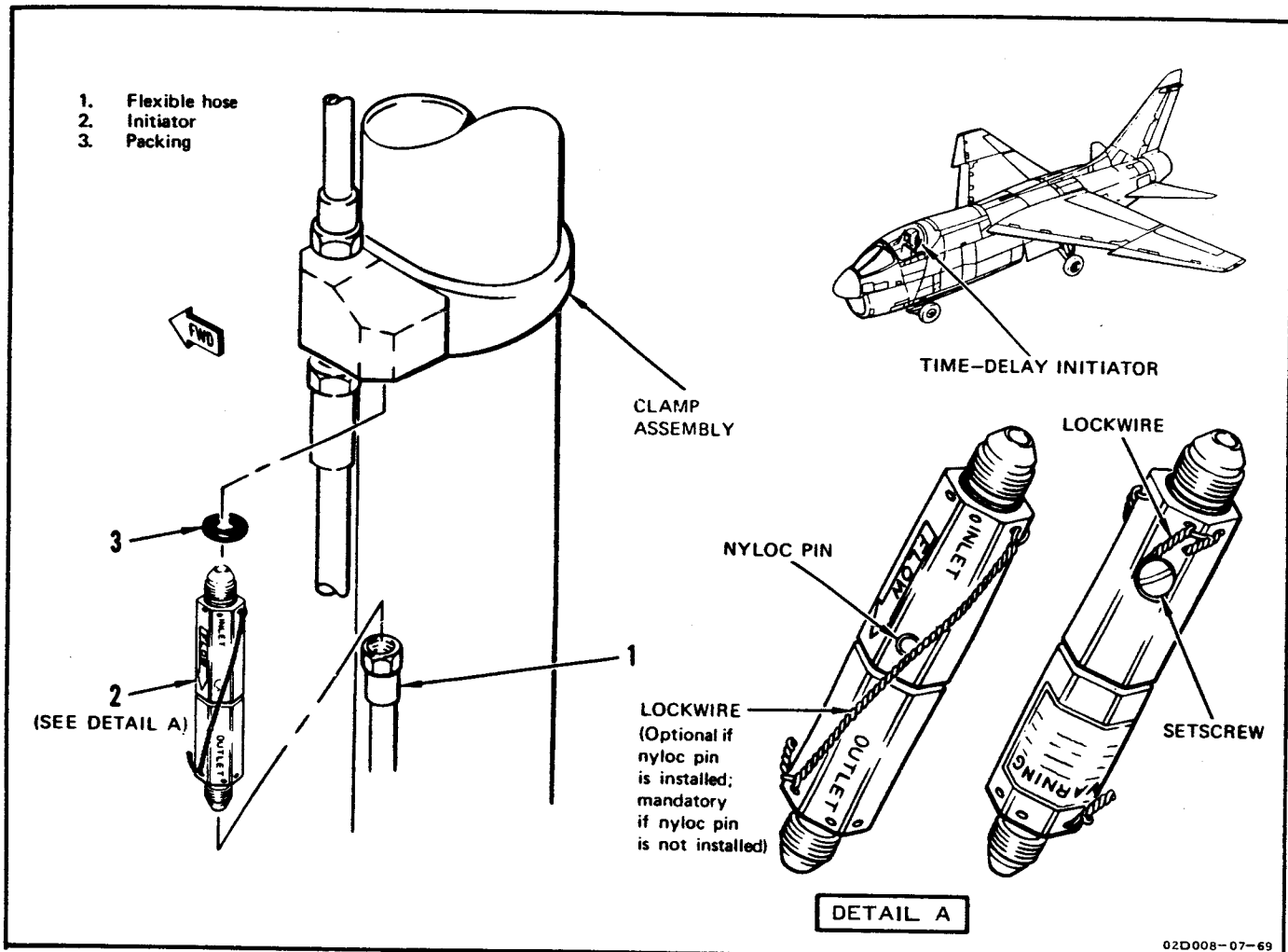


Figure 1-9. JAU-20/A25 Time-Delay Initiator Removal and Installation

WARNING

Ensure that initiator is installed with inlet port toward the M99 prime initiator and the outlet port toward the rocket catapult (flow arrow pointing down). If installation is reversed, rocket catapult will fail to fire.

CAUTION

To prevent damaging the two manifold clamp assembly, use a back-up wrench to hold the manifold in place when installing the JAU-20/A25 time-delay initiator.

b. Remove plug from clamp assembly and cap from initiator. Install new packing (3) on inlet port and install end of initiator (2) in clamp assembly. Tighten initiator to 100 (+0, -15) pound-inches torque and apply torque stripe. Check security of initiator.

CAUTION

To prevent damaging the two-piece JAU-20/A25 time-delay initiator, use a back-up wrench when installing the flexible hose on the initiator outlet port.

c. Remove cap and connect flexible hose (1) to initiator outlet port. Tighten flexible hose connection to 95 (+0, -25) pound-inches torque holding initiator with a back-up wrench. Apply torque stripe.

d. Install ejection seat (paragraph 1-32).

1-40. CCU-58/A DELAY CARTRIDGE REMOVAL AND INSTALLATION.

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
	GGG-W-886	Equipment required for connecting external electrical power Torque wrench, 10 to 150 pound-inches	Electrical seat adjustment Tighten firing pin assembly hex nut to required torque TT02D006-09-71

WARNING

Ensure that ejection controls safety handle is in the fully down-and-locked position and that the canopy initiator and prime initiator safety pins (215-00261-1) with streamers are installed in M99 initiators (T.O. 1A-7D-2-1).

Do not perform maintenance on equipment associated with explosive devices except in the presence of other personnel capable of rendering aid.

CAUTION

If cartridge has been fired, seat must be taken to seat shop for corrective action in accordance with T.O. 13A5-40-3 and T.O. 13A5-48-2.

1-41. REMOVAL. (See figure 1-10.)

a. Connect external electrical power (T.O. 1A-7D-2-1).

b. Raise ejection seat to highest position by placing seat adjust switch in UP.

NOTE

To facilitate removal of CCU-58/A delay cartridge, adjust

seat to maximum height; then lower approximately 1 1/4 inches.

c. Place seat adjust switch in DOWN and lower seat approximately 1 1/4 inch to permit removal of firing pin assembly from harness release actuator (steps e through i).

d. Shut down and disconnect external electrical power.

e. Remove two bolts (1) and washers (2) securing guard (3) and zero delay lanyard (4) over firing pin assembly on right seat rail.

WARNING

Do not remove firing pin sear from firing pin before or after removal of firing pin assembly from harness release actuator. Firing of cartridge or high spring tension on firing pin can cause injury.

f. Cut lockwire (5) on firing pin assembly (6) and remove firing pin assembly from harness release actuator (7).

g. Pull manual harness release handle (8) until harness release actuator manual detent pin (9) is engaged.

WARNING

Cartridge is percussion type. Do not allow cartridge to strike objects during removal from harness release actuator.

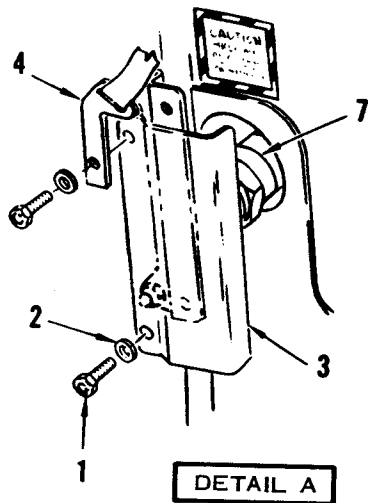
NOTE

When manual detent pin is pulled, air pressure created by downward movement of piston forces cartridge out of horizontal chamber.

h. Hold hand in position over end of harness release actuator cartridge chamber to receive cartridge as it is discharged. Pull manual detent pin outboard to release cartridge (10).

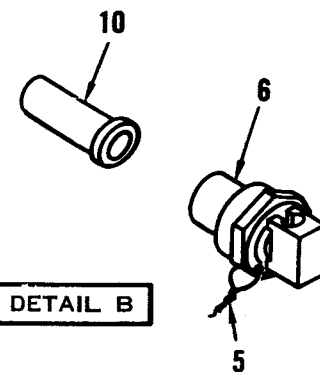
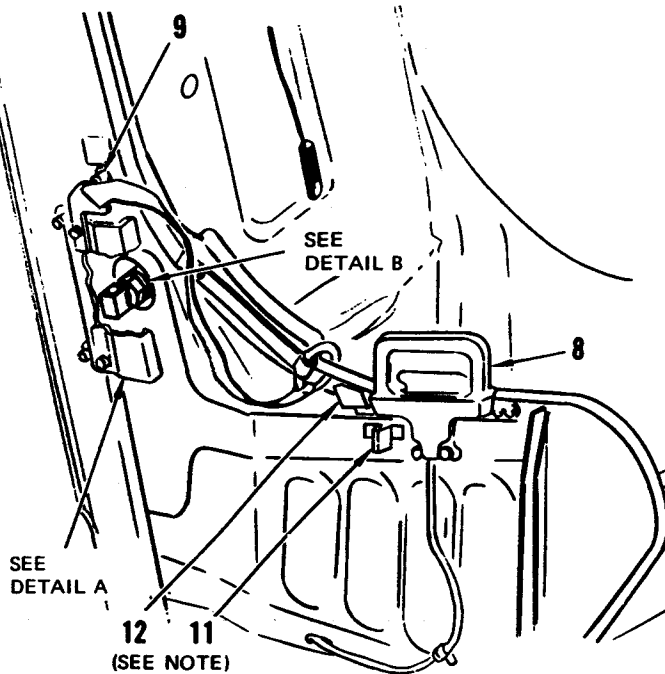
i. Cover harness release actuator cartridge chamber with masking tape to prevent entry of foreign objects.

1. Bolt
2. Washer
3. Guard
4. Zero-delay lanyard
5. Lockwire
6. Firing pin assembly
7. Harness release actuator
8. Manual harness release handle
9. Harness release actuator manual detent pin
10. Cartridge
11. Guard
12. Retainer clip



NOTE

Guard (11) and retainer clip (12) are installed on airplanes after T.O. 1A-7D-782.



02D009-09-76

Figure 1-10. CCU-58/A Delay Cartridge Removal and Installation

1-42. INSTALLATION. (See figure 1-10.)

WARNING

Do not install an initiator having an expired service life or shelf life. Installation of an expired initiator may result in malfunctioning of the ejection seat jettison system or loss of life.

CAUTION

To prevent damage to equipment, do not apply oil or grease to cartridge or any part of firing pin assembly.

a. Remove masking tape and position cartridge (10), case first, into

cartridge chamber of the harness release actuator (7).

b. Install firing pin assembly (6).

c. Tighten hex nut. Ensure no gap greater than 0.05 inch exists between hex nut and housing collar.

d. Tighten hex nut to 50 (± 10) pound-inches torque.

e. Secure firing pin assembly hex nut with MS20995C20 lockwire (5).

NOTE

Zero delay lanyard is secured by upper bolt.

f. Install zero delay lanyard (4) and guard (3) over firing pin assembly with two washers (2) and bolts (1).

1-43. MK 7 ROCKET CATAPULT REMOVAL AND INSTALLATION.

Tools Required

<i>Figure & Index No.</i>	<i>Part Number</i>	<i>Nomenclature</i>	<i>Use and Application</i>
	0013 (John Chatillon and Sons, Kew Garden, N.Y.)	Spring scale, 0 to 50 pounds	Check force required to center upper end of catapult
	7025389-10 (OCAMA)	Protector assembly	Cap open lines, hoses, and fittings
	7025389-20 (OCAMA)	Protector assembly	Plug open lines, hoses, and fittings
	MIL-H-4034	Torque wrench 10 to 150 pound-inches	Tighten fittings to required torque
			TT02D007-12-70

1-44. REMOVAL. (See figure 1-11.)

WARNING

Do not perform maintenance on equipment associated with explosive devices except in the presence of personnel capable of rendering aid.

NOTE

If rocket catapult is to be removed to facilitate other maintenance, only steps a through i need be performed.

- a. Remove ejection seat (paragraph 1-32).

WARNING

Ensure that 215-00261-1 safety pins are installed in prime initiator and interior canopy jettison initiator (T.O. 1A-7D-2-1). This will prevent inadvertent firing of rocket catapult or jettisoning of canopy.

- b. Disconnect M99 prime initiator hose (paragraph 1-34). Cap initiator port and hose with protector assemblies.

- c. Disconnect canopy jettison hose from seat bulkhead fitting. Cap hose and fitting with protector assemblies.

- d. On airplanes AF68-8225 and subsequent, disconnect ejection control bypass valve hose (6) at tee on catapult. Cap hose and tee fitting with protector assemblies.

- e. On airplanes through AF69-6196, remove nut (7), washer (8), screw (9), and clamp (10) securing seat actuator wiring to structure.

- f. Disconnect seat adjustment actuator electrical connector (11).

- g. Remove nuts (12), washers (13), bolts (14), and clamp (15); on airplanes AF69-6197 and subsequent, remove lug (16) securing rocket catapult and seat adjustment actuator to mounting bracket. Remove catapult and actuator.

- h. Remove M99 prime initiator (paragraph 1-34).

- i. Remove Mk11 Mod 0 time-delay initiator (paragraph 1-37).

- j. Disconnect canopy jettison hose from rocket catapult. Cap hose and fitting with protector assemblies.

- k. Remove nut (2), washer (3), screw (4), and clamp (5) securing canopy jettison hose to clip on catapult.

- l. Remove Mk11 Mod 0 time-delay hose from rocket catapult fitting (check tee or elbow,

as applicable). Cap hose and fitting with protector assemblies.

- m. Remove MS17821-3-9 cable strap from seat adjustment actuator.

- n. Remove rocket catapult fitting (check tee or elbow, as applicable). Cap fitting and rocket catapult with protector assemblies.

- o. Remove nut (8, figure 1-12), washer (7), and screw (6) securing clamp assembly (5) to rocket catapult.

- p. Remove nut (12), washer (11), and screw (10) securing clamp assembly (9) to rocket catapult.

CAUTION

Take care to not turn catapult screws as damage to catapult and seat raise/lower mechanism may result.

- q. On airplanes AF69-6197 and subsequent (see alternate view), remove nuts (12), washers (13), bolts (14), and clamp (15) securing rocket catapult and seat adjustment actuator to mounting bracket. Remove catapult and actuator.

1-45. INSTALLATION. (See figure 1-11 and figure 1-12.)

WARNING

See figure 1-12. Inside tube is designed to turn approximately 1/16 inch (with moderate hand pressure) for alignment purposes. Assure part of tube marked "AFT" is positioned aft.

NOTE

If removal of the rocker catapult was to facilitate other maintenance (paragraph 1-44 note), ensure clamp assembly alignment and measurements are in accordance with paragraph 1-46, steps e., f. and g.

- a. Perform rocket catapult buildup (paragraph 1-46).

CAUTION

Take care to not turn catapult screws as damage to catapult and seat raise/lower mechanism may result.

- b. Install rocket catapult and seat adjustment actuator on airplane mounting bracket with clamp (15), bolts (14), washers (13), and nuts (12). (Airplanes AF6-6197 and subsequent. See figure 1-11, alternate view.)

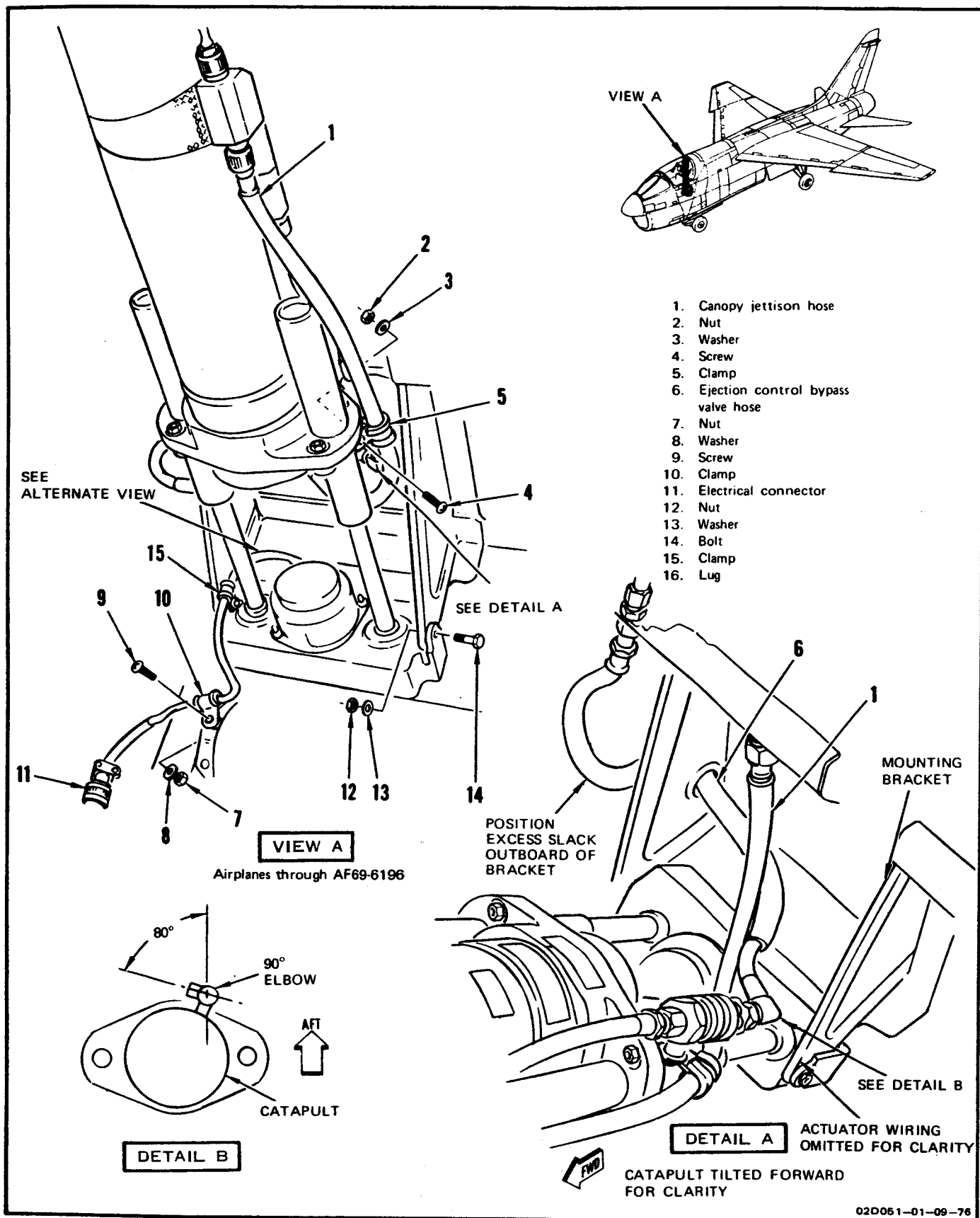
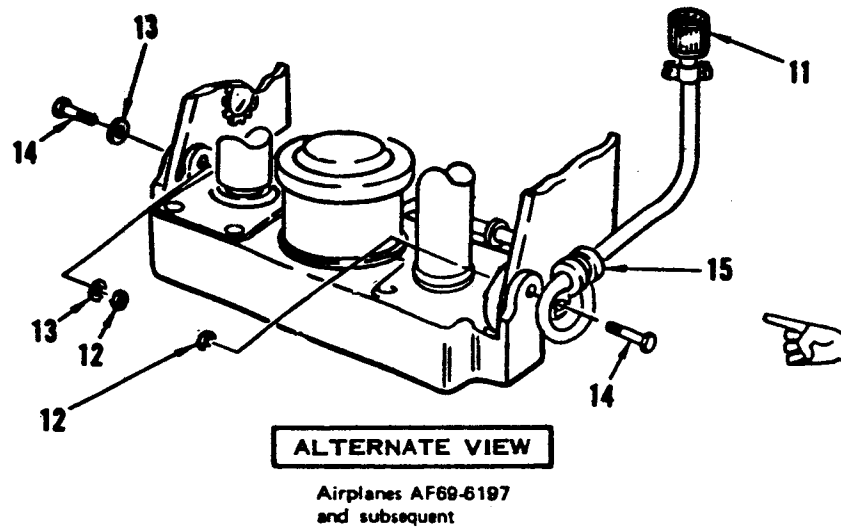


Figure 1-11. Mk 7 Rocket Catapult Removal and Installation (Sheet 1)



02D061-02-00-76

Figure 1-11. Mk 7 Rocket Catapult Removal and Installation (Sheet 2)

c. Remove cap from hose and fittings.

CAUTION

Ensure that canopy jettison hose is routed as shown in detail A, figure 1-11, to prevent damage to hose during electrical seat adjustment.

Ensure that hoses are not twisted when tightening hose fittings. Twisted hoses may fail during system actuation or electrical seat adjustment.

d. Connect canopy jettison hose (1) to rocket catapult. Tighten hose fitting to 95 (+0, -25) pound-inches torque and apply torque stripe.

e. On airplanes AF68-8225 and subsequent, connect ejection control bypass valve hose (6) to rocket catapult check tee as follows:

1. Remove cap from hose and tee fitting.

2. Route ejection control bypass valve hose (6) between canopy jettison hose and seat bulkhead, as shown in detail A, figure 1-11. Position 90° hose end fitting, from a straight aft

position, approximately 80° toward the hose feedthrough (detail B).

3. Tighten hose fitting to 95 (+0, -25) pounds-inches torque and apply torque stripe.

4. If hose does not move freely during seat adjustment, adjust 90° hose end fitting as required.

f. Install clamp (5) on canopy jettison line and secure to clip on rocket catapult with screw (4), washer (3), and nut (2).

g. Connect seat adjustment actuator electrical connector (11).

h. Manually support catapult and perform operational checkout (paragraph 1-29). On airplanes AF68-8225 and subsequent, ensure all slack in hose, from ejection control bypass valve to rocket catapult, is on outboard side of seat actuator attaching bracket feedthrough and does not bind during actuator movement. Reposition hose if hose does not move freely through feedthrough.

i. Secure seat actuator wiring to structure with clamp (10), screw (9), washer (8), and nut (7) (airplanes through AF69-6196).

j. Install ejection seat (paragraph 1-32).

k. Check that upper end of rocket catapult is exactly midway between ejection seat guide rails. Assure part of inside tube marked "AFT" is positioned aft.

1. If more than a 5-pound force is required to center upper end of rocket catapult, shim under catapult barrel by installing AN960D816L washers as required.

1-46. MK 7 ROCKET CATAPULT BUILDUP. (See figure 1-12.)

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
	MIL-M-7404	Maintenance stand	For maintenance at cockpit level
	MIL-H-4034B	Torque wrench, 10 to 150 pound-inches	To tighten applicable fittings to required torque
	GGG-W-686	Torque wrench, 0 to 250 pound-feet	Apply torque
TT02D008-11-72			

a. Check that service life of rocket catapult has not expired.

b. Inspect rocket catapult for defects. See T.O. 11P1-15-7, Section IV for drop data and table 5-1, classification of visual defects for repairs authorized on rocket catapult Part No. 1001 series. A catapult that cannot be repaired in accordance with an applicable corrective action shall be removed from service and reported in accordance with AFM 67-1.

WARNING

Do not install an initiator having an expired service life or shelf life. Installation of an expired initiator may result in malfunctioning of the ejection seat system and loss of life.

CAUTION

The initiator is a sealed device. It shall not be opened for inspection or any other reason. If dropped or if firing pin is disturbed, initiator shall be replaced.

c. Carefully remove safety pin assembly (1). Loosely install washer (2)

and mounting nut (3) on M99 prime initiator (4), and reinstall safety pin assembly.

CAUTION

To avoid breaking mounting bracket when tightening mounting nut, secure bracket with wrench to prevent twisting.

When installing M-99 initiator (4) on 1001-509 rocket catapult, hold initiator mounting bracket with strap wrench or place bracket in copper or bronze-faced vice. Over torque of mounting nut (3) can cause initiator bracket to break loose from front body housing and/or set screws to shear.

NOTE

Torque value of mounting nut (3) depends on mounting bracket material. Check rocket catapult for presence of decal that states: Torque initiator mounting nut to 45 to 50 pound-feet.

d. On all catapults, except 1001-509 catapult, position M99 prime initiator (4) in mounting bracket slot. Ensure washer (2) is between mounting bracket and mounting nut (3). If decal does not exist on rocket catapult, tighten mounting nut (3) to 150 (+20, -0) pound-inches torque. If decal does exist, tighten mounting nut to 45 to 50 pound-feet torque.

d-1. On 1001-509 rocket catapult, position initiator (4) in mounting bracket slot. Ensure washer (2) is between mounting bracket and mounting nut (3). Tighten nut so that initiator flange is positioned firmly against bottom surface of mounting bracket before applying torque. Tighten nut to 150 (+20, -0) pound-inches torque.

e. Position clamp assembly (5) 19 1/4 (±1/2) inches from center of bolt-hole at top of rocket catapult to center of clamp bolthole. Align clamp to 90° (±3°) from forward as shown in figure 1-12. Secure clamp with screw (6), washer (7), and nut (8).

e-1. As an alternate method when replacement of clamp assembly (5) is required, secure hose assembly (15) to rocket catapult with strap, Part No. MS3367-2-9 at dimensions and positions illustrated.

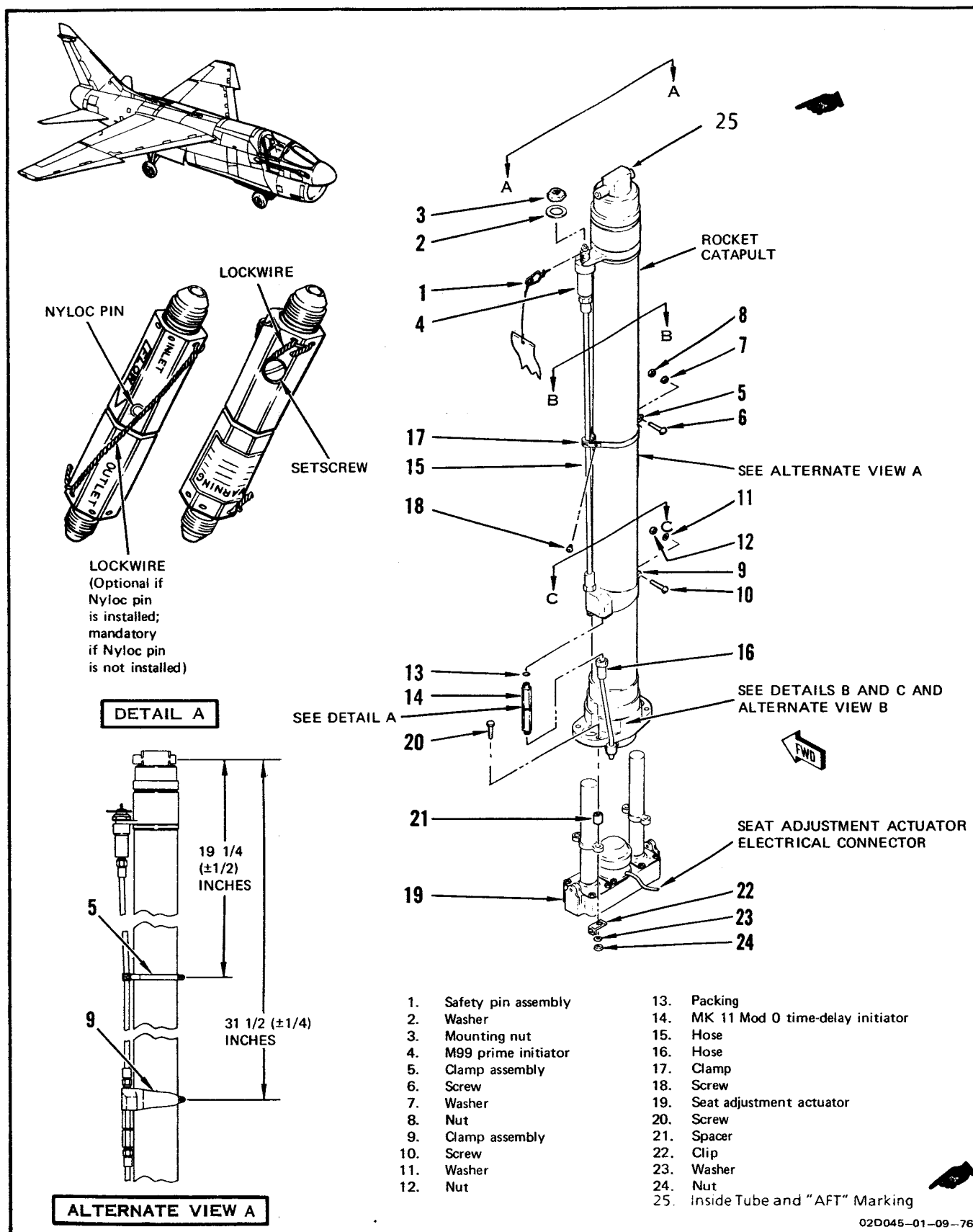
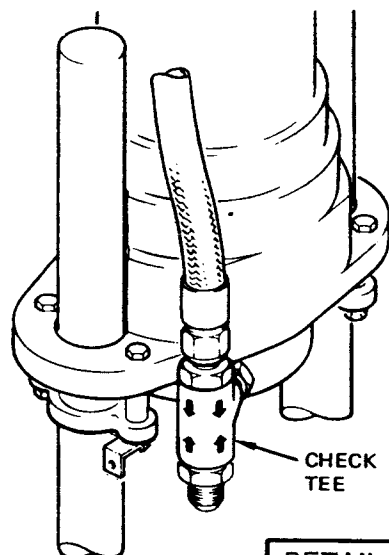
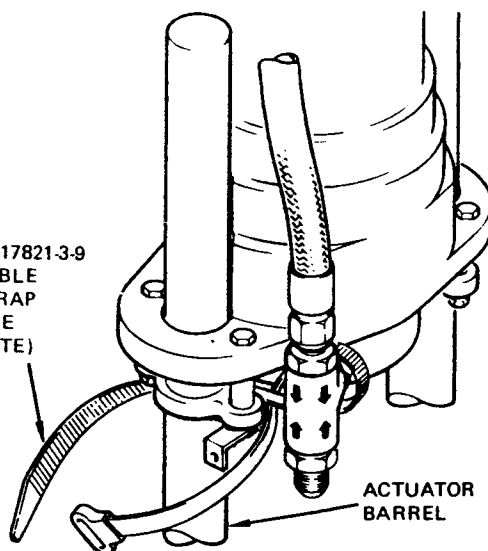


Figure 1-12. Rocket Catapult Buildup (Sheet 1)

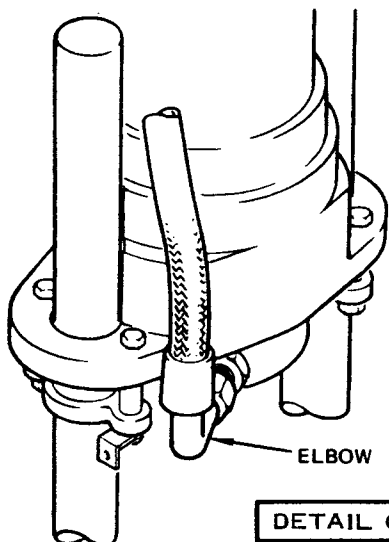


DETAIL B
Airplanes AF68-8225
and subsequent

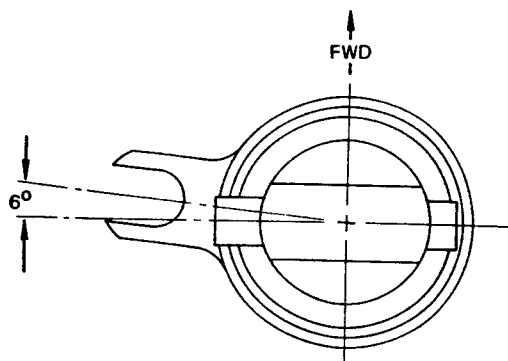
MS17821-3-9
CABLE
STRAP
(SEE
NOTE)



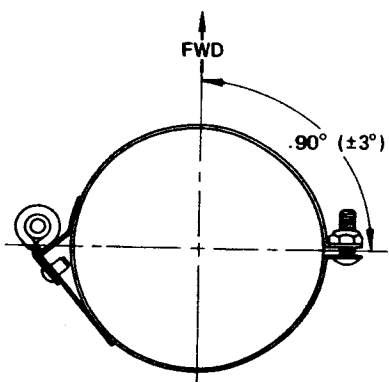
ALTERNATE VIEW B



DETAIL C
Airplanes through AF68-8224



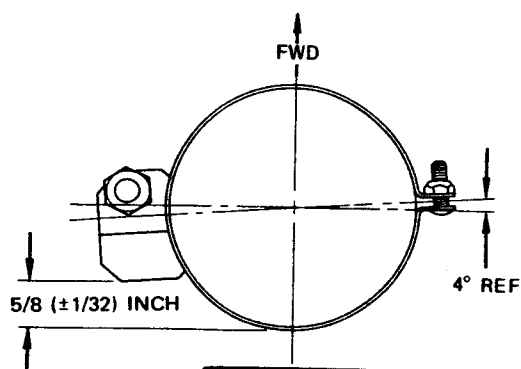
VIEW A-A



VIEW B-B

NOTE

Install cable strap so that locking surface of cable strap grips barrel of seat adjustment actuator but does not grip "B" nut at catapult junction.



VIEW C-C

02D045-02-09-76

Figure 1-12. Rocket Catapult Buildup (Sheet 2)

f. Position clamp assembly (9) 31 1/2 ($\pm 1/4$) inches from center of bolthole at top of rocket catapult to center of clamp bolthole. Align clamp to 5/8 ($\pm 1/32$) inch from aft side of housing as shown in figure 1-12. Secure clamp with screw (10), washer (11), and nut (12).

g. Check clamp assemblies for security. If loose, remove and apply sufficient turns of MIL-T-7798 electrical insulating tape to keep clamps from rotating on catapult when secured. Repeat steps e and f.

WARNING

Do not install an initiator having an expired service life or shelf life. Installation of an expired initiator may result in malfunctioning of the ejection seat system and loss of life.

CAUTION

The initiator is a sealed device. It shall not be opened for inspection or any other reason. If dropped or if firing pin is disturbed, initiator shall be replaced.

h. Remove cap, install new packing (13) on inlet end of MK 11 MOD 0 time-delay initiator (14), and install inlet end of initiator in clamp assembly. Tighten initiator to 100 (+0, -15) pound-inches torque and apply torque stripe. Check security of initiator.

CAUTION

To prevent damaging the two-piece MK-11 MOD 0 time-delay initiator, use a back-up wrench when installing the flexible hose on the initiator outlet port.

i. Remove cap from hose (15) and plug from prime initiator outlet port. Connect hose to initiator. Tighten hose connection to 95 (+0, -25) pound-inches torque and apply torque stripe.

j. Remove cap from hose (15) and clamp assembly, and connect hose to clamp assembly. Tighten hose connection to 95 (+0, -25) pound-inches torque and apply torque stripe.

k. Remove cap and connect hose (16) to Mk 11 Mod 0 time-delay initiator outlet port. Do not tighten hose connection.

l. Remove cap from hose and rocket catapult fitting (check tee or elbow, as applicable) and connect hose (16). Do not tighten hose connection.

m. Install clamp (17) on hose and secure to clamp assembly with screw (18).

NOTE

Seat adjustment actuator electrical lead shall be on aft side of rocket catapult. The rocket catapult has engraved legend THIS FACE AFT to indicate direction.

n. Position seat adjustment actuator (19) to base of rocket catapult. Manually extend outer barrels of twin barrel actuator to fully extended position and secure with four screws (20), spacers (21), clip (22), washers (23), and nuts (24).

o. Rotate catapult barrel in clockwise direction to place any excess length in hose (16) to left side of rocket catapult.

p. Tighten hose connections to 95 (+0, -25) pound-inches torque and apply torque stripe.

NOTE

Cable strap is installed to prevent rotation of catapult barrel and possible interference between hoses, fittings, and airframe during electrical seat adjustment.

Install cable strap so that serrated side of cable strap grips barrel of seat adjustment actuator but does not grip B nut at catapult junction.

Cable strap is not required on 1001-509 catapult. On this catapult, omit step q.

q. Install MS17821-3-9 cable strap as follows:

1. Rotate catapult housing approximately 30° counterclockwise to provide access for installing strap.

2. Loop strap over B nut at rocket catapult junction.

3. Cross ends of strap and loop around barrel of seat adjustment actuator, forming a figure-eight. Tighten strap snugly.

CAUTION

Damage to M99 prime initiator mounting bracket, during ejection seat installation may result from excessive tightening of strap.

4. On airplanes not configured with check tee, reposition hose as described in step 3 and secure strap. A properly installed strap will permit approximately 1/8 inch housing rotation, measured at housing mounting flange, after tightening of strap. Trim excess length of strap.

5. On airplanes configured with check tee, rotate catapult housing in clockwise direction until check tee is 0.18 (± 0.03) inch from edge of catapult mounting flange. Tighten strap until counterclockwise hand pressure rotation of housing will not increase dimension more than 0.08 (± 0.03) inch. Remove excess length of strap.

1-47. SEAT ADJUSTMENT ACTUATOR REMOVAL AND INSTALLATION.

1-48. REMOVAL AND INSTALLATION. Remove and install seat adjustment actuator by performing applicable steps of rocket catapult removal and installation (paragraph 1-43).

1-49. ACTUATOR DRIVE MOTOR REMOVAL AND INSTALLATION.

1-50. REMOVAL. (See figure 1-13.)

- a. Remove seat adjustment actuator (paragraph 1-47).
- b. Remove mounting screws (1) securing gear housing plate (2).
- c. Remove bearings (3) and reduction gears (4). Clean gear housing of grease.
- d. Disconnect electrical connector (5).
- e. Remove motor mounting screws (6), nuts (7), washers (8), and motor (9).

1-51. INSTALLATION. (See figure 1-13.)

- a. Position motor (9) and secure with motor-mounting screws (6), washers (8), and nuts (7).
- b. Connect electrical connector (5).
- c. Install reduction gears (4) and bearings (3).
- d. Pack gear housing using MIL-G-23827 grease.
- e. Position gear housing plate (2) and secure with mounting screws (1).
- f. Install seat adjustment actuator (paragraph 1-47).

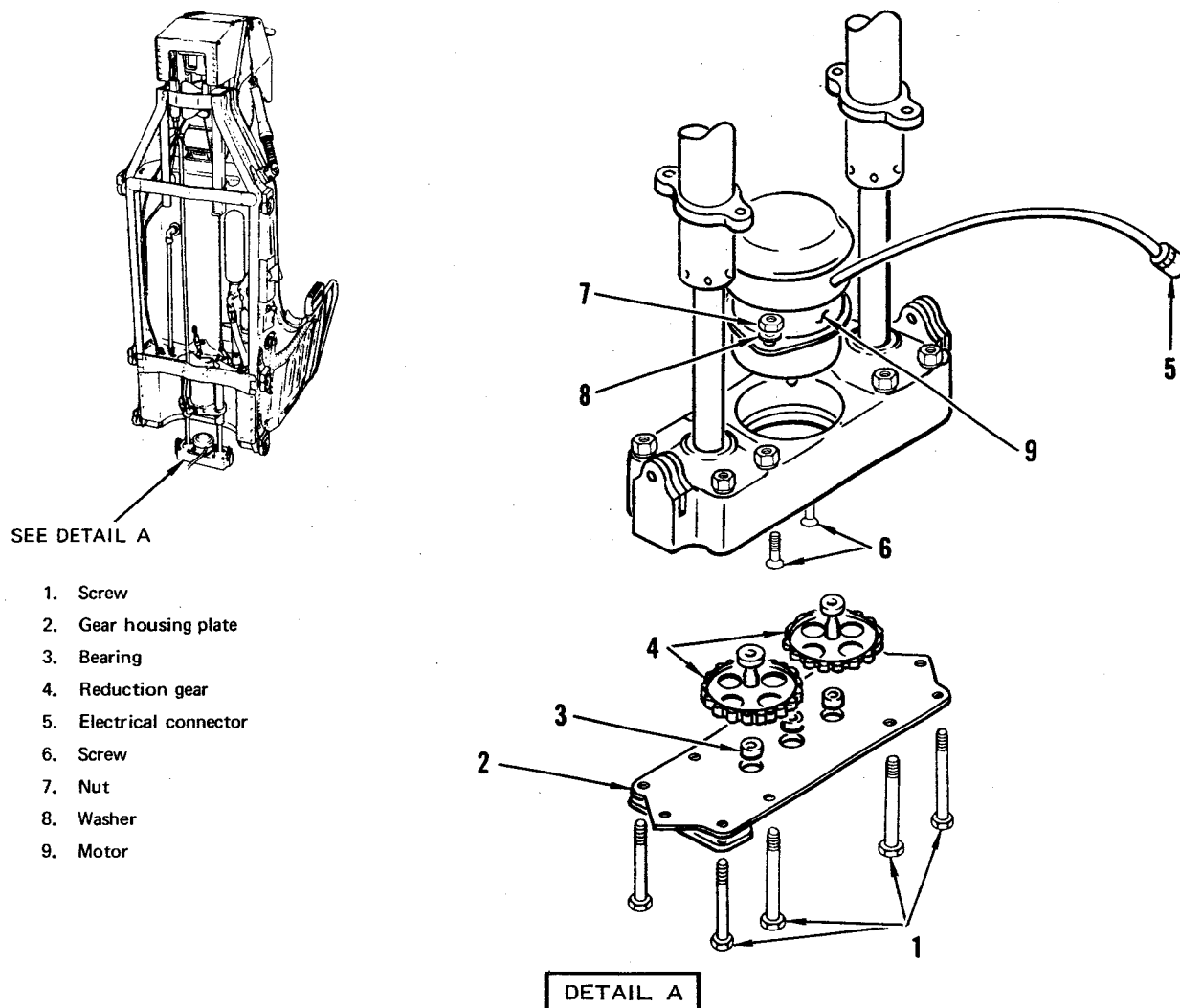
1-52. 40° CANOPY SUPPORT STRUT INSTALLATION AND REMOVAL.

1-53. INSTALLATION.

- a. Open canopy.
- b. Place interior canopy release handle in open position.
- c. With forked end of support strut down, and open side of fork forward, position strut over aft canopy hook pivot bolt.
- d. Support canopy by hand in 40° open position.
- e. Position top end of canopy support strut around aft canopy roller.
- f. Manually press and hold canopy hook stop, located at right aft hook.
- g. Place interior canopy release handle in closed position and release hook stop.

1-54. REMOVAL.

- a. Ensure that strain is off canopy support strut.
- b. Place canopy release handle in open position.
- c. Pull lockpin down at top of strut and remove strut from canopy roller.
- d. Support canopy by hand, tap bottom of strut aft, and remove strut from airplane.



02D010-04-68

Figure 1-13. Actuator Drive Motor Removal and Installation

1-55. M53 BOOST INITIATOR REMOVAL AND INSTALLATION.

1-56. REMOVAL. (See figure 1-14.)

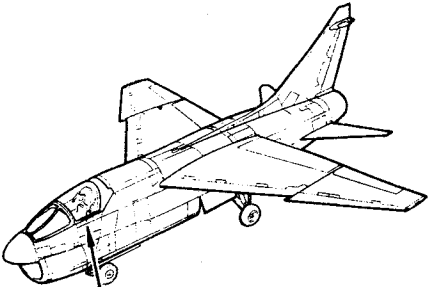
Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
	7025389-10 (OCAMA)	Protector assembly	Cap open lines, hoses, and fittings
	7025389-20 (OCAMA)	Protector assembly	Plug open lines, hoses, and fittings
			TT02D053-02-76.

WARNING

Do not perform maintenance on equipment associated with explosive devices except in the presence of personnel capable of rendering aid.

a. Remove ejection seat (paragraph 1-32).



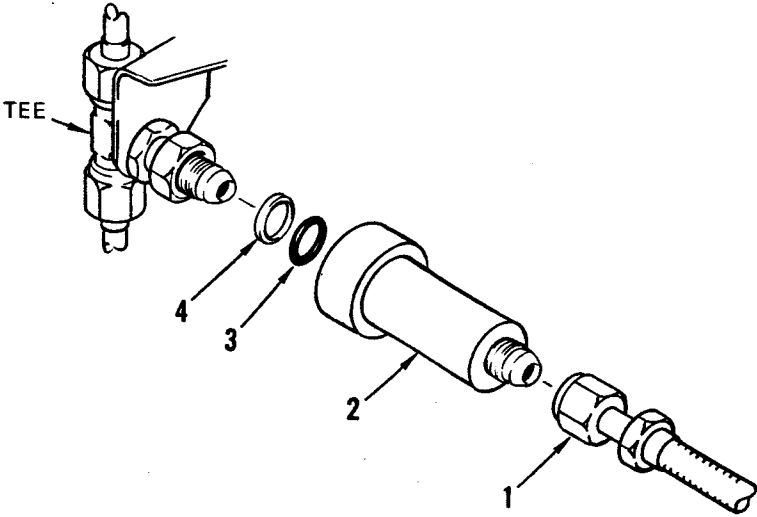
SEE VIEW A

SEAT RAIL



SEE DETAIL A

VIEW A



- 1. Hose
- 2. Initiator
- 3. O-ring
- 4. Gasket

DETAIL A

02D053-02-76

Figure 1-14. M53 Boost Initiator Removal and Installation

WARNING

Ensure that safety pins (215-00261-1) are installed in prime initiator and interior canopy jettison initiator (T.O. 1A-7D-2-1). This will prevent inadvertent firing of rocket catapult or jettisoning of canopy.

b. Disconnect hose (1) from initiator. Cap hose and fitting with protector assemblies.

c. Loosen jamnut and remove initiator (2) from tee.

d. Remove and discard C-ring (3) and gasket (4).

1-57. INSTALLATION. (See figure 1-14.)

a. Install new gasket (4) and new O-ring (3) on tee.

b. Install initiator on tee (2) and tighten jamnut to 95 (± 25) pound-inches torque and apply torque stripe.

c. Remove protector assemblies from initiator and hose.

d. Connect hose (1) to initiator and tighten to 95 (± 25) pound-inches torque and apply torque stripe.

e. Install ejection seat (paragraph 1-32).

1-58. INERTIA REEL INITIATOR REMOVAL AND INSTALLATION.

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
	7025389-10 (OCAMA)	Protector assembly	Cap open lines, fittings, and hoses
	7025389-20 (OCAMA)	Protector assembly	Plug open lines, fittings, and hoses
TT02D054-02-76			

1-59. REMOVAL. (See figure 1-15.)

a. Remove ejection seat (paragraph 1-32).

b. Disconnect pneumatic lines (1 and 2). Cap lines and fittings with protector assemblies.

c. Remove nuts (3), washers (4), screws (5), and clamps (6) securing initiator (7) to seat.

d. Remove reducer (8) and O-ring (9) from initiator inlet port.

e. Remove union (10) and O-ring (11) from initiator outlet port.

1-60. INSTALLATION. (See figure 1-15.)

WARNING

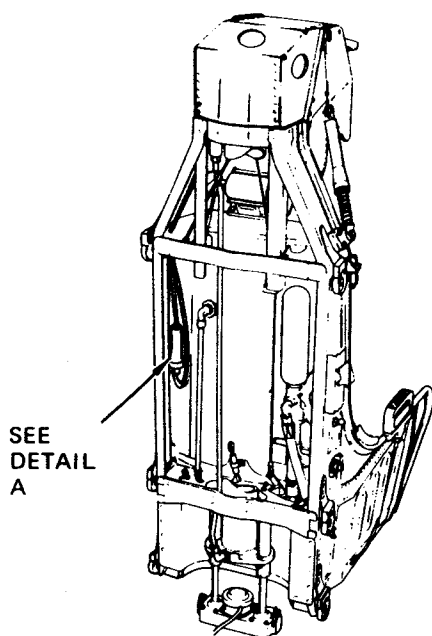
Do not install an initiator having an expired life or shelf life. Installation of an expired initiator may result in malfunctioning of the ejection seat system and loss of life.

CAUTION

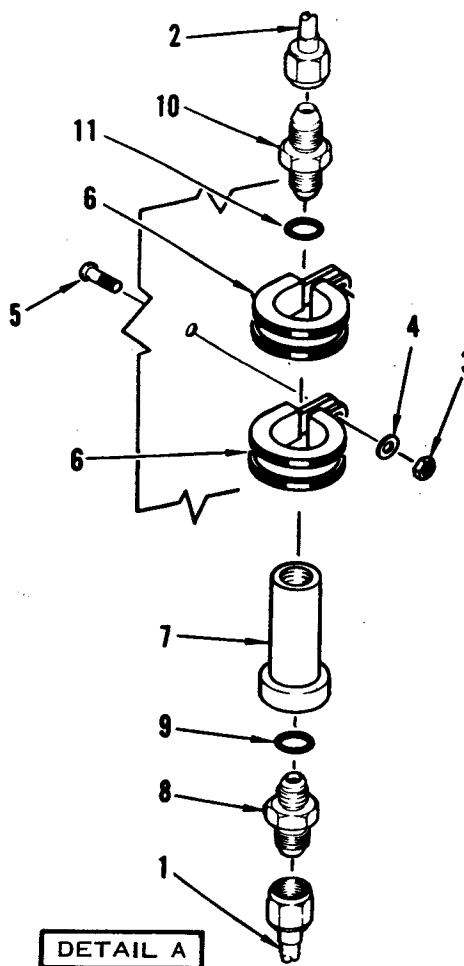
The initiator is a sealed device. It shall not be opened for inspection or any other reason. If dropped or if firing pin is disturbed, initiator shall be replaced.

a. Remove protector assembly and install new O-ring (11) and union (10) in initiator outlet port.

b. Remove protector assembly and install new O-ring (9) and reducer (8) in initiator inlet port.



- | | |
|-------------------|--------------|
| 1. Pneumatic line | 7. Initiator |
| 2. Pneumatic line | 8. Reducer |
| 3. Nut | 9. O-ring |
| 4. Washer | 10. Union |
| 5. Screw | 11. O-ring |
| 6. Clamp | |



DETAIL A

02D054-02-76

Figure 1-15. Inertia Reel Initiator Removal and Installation

CAUTION

Pneumatic line (2) is filled with Hi-vacuum grease. To ensure proper operation of inertia reel during ejection sequence, do not remove grease.

c. Check that pneumatic line (2) is filled with Hi-vacuum grease to within 1/4 inch of end of tubing end. Add grease if required.

NOTE

In event same inertia reel initiator is used after adding grease to tube, carefully swab or remove excess grease from outlet end of initiator.

NOTE

Leakage of grease from tube into outlet end of initiator will not affect operation of ballistic powered inertia reel.

d. Position initiator (7) on seat with flow arrow pointing up and secure with clamps (6), screws (5), washers (4), and nuts (3).

e. Connect pneumatic lines (1 and 2) to initiator and tighten to 95 (± 25) pound-inches torque and apply torque stripe.

f. Install ejection seat (paragraph 1-32).

**1-61. INERTIA REEL QUICK-DISCONNECT
COUPLING REMOVAL AND INSTALLATION.**

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
	7025389-10 (Oklahoma City ALC)	Protector assembly	Cap open lines, hoses, and fittings
	7025389-20 (Oklahoma City ALC)	Protector assembly	Plug open lines, hoses, and fittings
	KD31L	Release Key	Release inertia reel quick- disconnect coupling
	MIL-H-4034	Torque wrench, 10 to 150 pound- inches	Tighten line connections to required torque
TT02D055-09-76			

1-62. REMOVAL. (See figure 1-16.)

WARNING

To prevent personnel injury, ensure that ejection controls safety handle is in full down-and-locked position and that interior canopy jettison initiator and prime initiator safety pins (215-00261-1) with streamers are installed (T.O. 1A-7D-2-1).

- a. Disconnect coupling halves using KD31L key.

NOTE

A force of 5 to 30 pounds is required to separate coupling halves. Key assembly will remain in female half of coupling until coupling is remated.

- b. Hold male half of coupling with wrench and disconnect airplane-attached hose (1) connection. Install protector assembly in hose.

- c. Remove male half (2) of coupling.

- d. Hold female half of coupling with wrench and disconnect pneumatic line (3).

- e. Remove snapping (4) from lower end of female half (5) and remove half from seat bracket.

- f. Connect coupling halves together and remove key.

1-63. INSTALLATION. (See figure 1-16.)

- a. Disconnect coupling halves using key.

- b. Place female half (5) of coupling in seat bracket and secure with snapping (4).

- c. Apply a thin coat of MIL-T-5542 antiseize compound to threads of female half.

- d. Remove protector assembly and connect pneumatic line (3) to female half finger-tight.

- e. Hold female half with wrench and tighten line fitting to 95 (± 25) pound-inches torque and apply torque stripe.

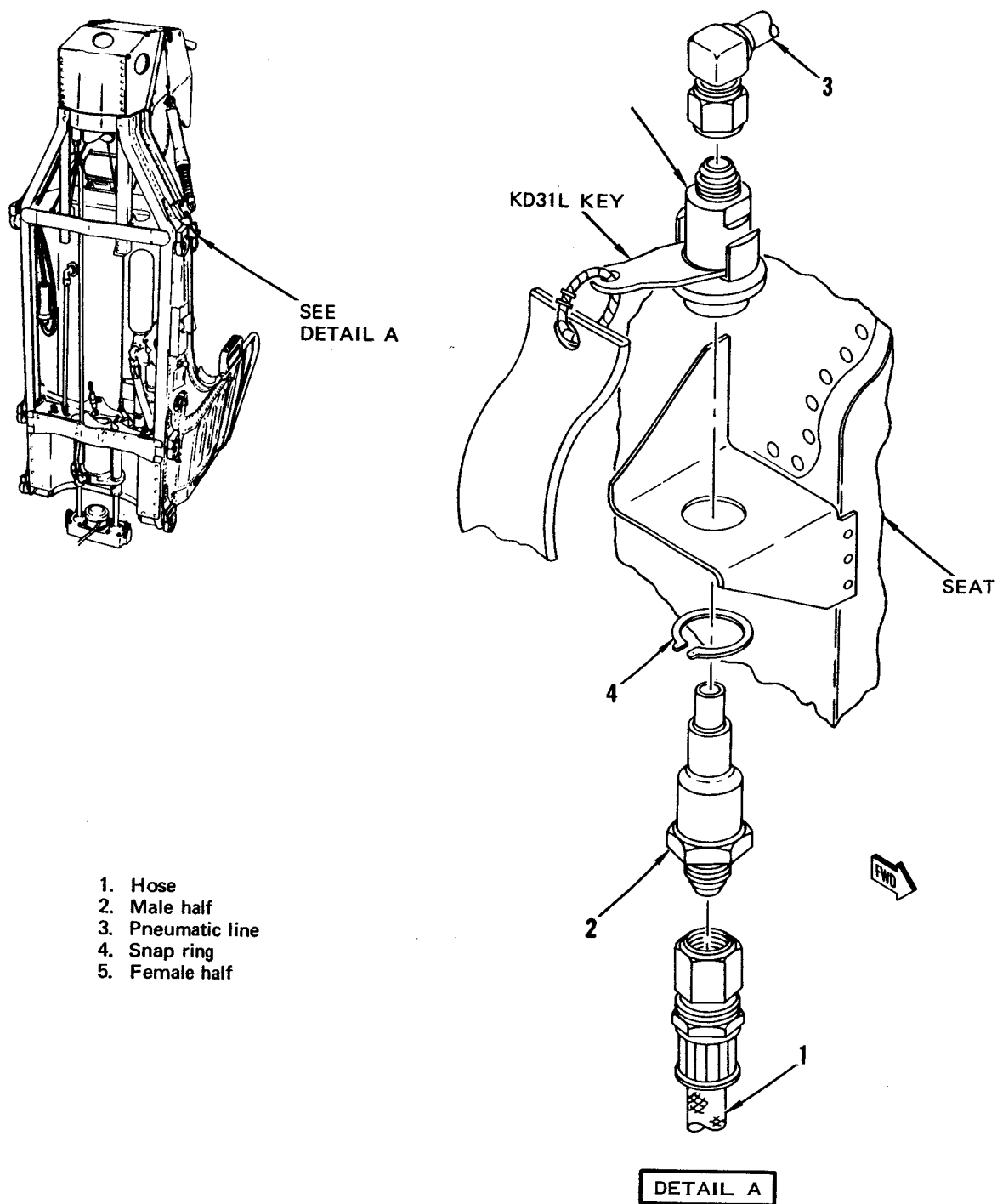
- f. Remove protector assembly from airplane-attached pneumatic hose (1).

- g. Apply a thin coat of MIL-T-5542 antiseize compound to threads of male half (2).

- h. Connect pneumatic hose (1) to male half finger-tight.

- i. Hold male half with wrench and tighten hose fitting to 95 (± 25) pound-inches torque and apply torque stripe.

- j. Connect coupling halves and remove key assembly.



02D055-02-76

Figure 1-16. Inertia Reel Quick-Disconnect Coupling Removal and Installation

Section II

CANOPY SYSTEM

2-1. DESCRIPTION.

WARNING

This system incorporates Cart-ridge/Propellant Actuated Devices (CAD/PAD). Inadvertent firing of these devices could result in death or serious injury to personnel and/or damage to equipment.

The disassembly, modification, or testing of these devices without prior OOMA/MMN approval is strictly prohibited.

Accidents/incidents involving these devices will be reported in accordance with AFR 127-4.

CAUTION

When opening canopy in headwinds, manually restrain canopy to prevent airloads from lifting canopy beyond actuator travel limits.

2-2. The canopy system provides for the pilot's normal entrance and exit by means of the canopy release system, as well as emergency canopy jettisoning complementary to, or independent of, seat ejection. An unlocked canopy is indicated by a yellow caution light on the caution indicator panel and the master caution light.

2-3. The canopy is a transparent enclosure consisting of a clear, multiaxially stretched acrylic plastic panel in a metal frame, which is normally opened and closed manually. A pressure seal on the canopy frame mates with a striker on the canopy sill for cockpit pressurization. Three rearview mirrors are mounted on the forward canopy frame. The canopy is attached to the airframe by two pivot bolts, immediately aft of the ejection seat.

2-4. The canopy release system includes an arrangement of interconnected pushrods and bellcranks, four canopy release hooks and canopy rollers, and interior and exterior canopy release handles. A

pneumatic canopy counterbalance cylinder, mounted to the bulkhead adjoining the canopy deck and attached to the canopy by a piston rod, aids in manually opening the canopy. Attached to the canopy at the same point as the counterbalance cylinder is the canopy actuator which damps rapid movement of the canopy during opening and closing.

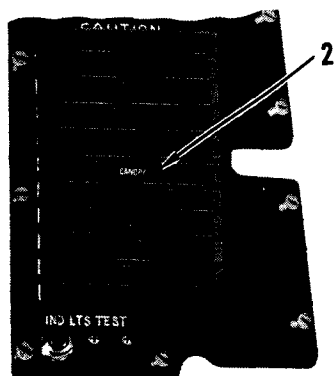
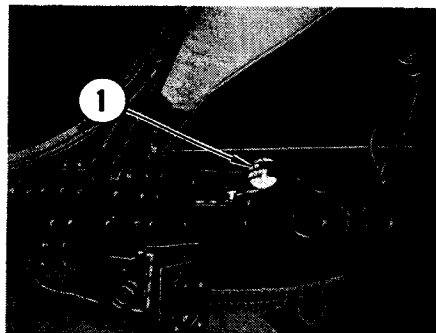
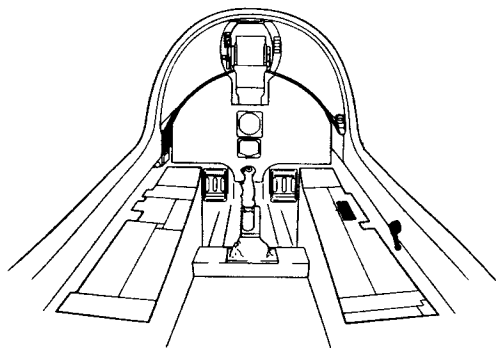
2-5. The canopy jettison system provides for canopy jettisoning in landing emergencies, ditching, ground rescue, and as part of the ejection sequence. Hot gas pressure for the canopy actuator to jettison the canopy is provided by an explosive Mk 14 Mod 0 canopy actuator impulse cartridge. Canopy jettison control handles (two exterior and one in the cockpit), attached to explosive M99 initiators, control firing of the canopy actuator cartridge. The M99 prime initiator on the ejection seat initiates canopy jettisoning at the beginning of normal seat ejection. On airplanes through AF68-8224, the canopy jettison override control handle, located on the left seat guide rail, is provided to actuate the canopy jettison override control valve to prevent canopy jettisoning during seat ejection. This permits underwater escape through the canopy. On airplanes AF68-8225 and subsequent, canopy jettison override features are not included.

2-6. A canopy breaker tool, installed as a safety factor for cockpit evacuation in the event the canopy cannot be raised or jettisoned, is located on the canopy rail in the front lower left corner and is secured in a retainer with a quick-release pin for easy access. During landing emergencies or ditching, the canopy breaker tool can be used by the pilot to break the canopy if other exit methods fail.

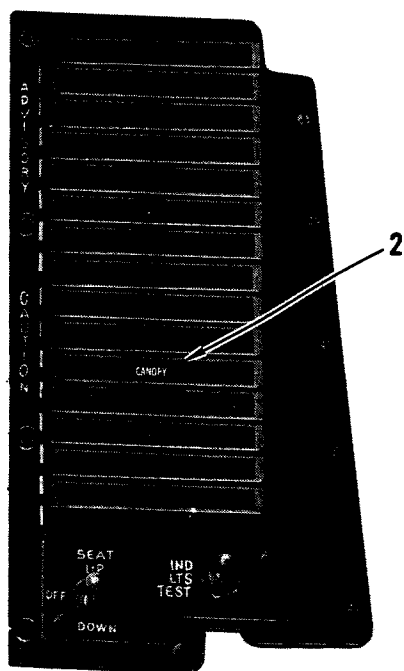
2-7. For system controls and indicators, see figure 2-1.

2-8. OPERATION.

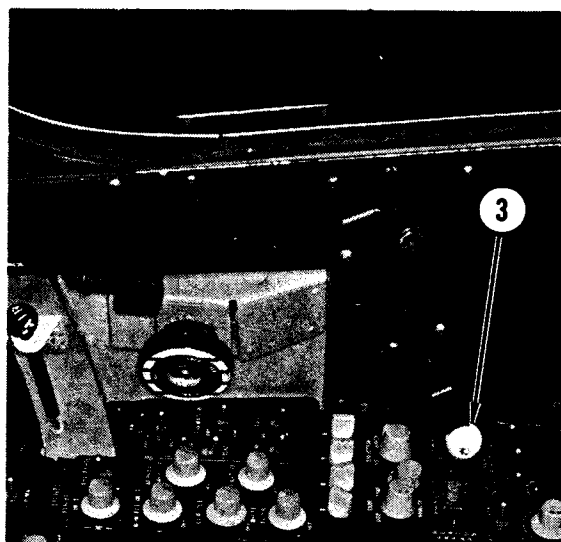
2-9. CANOPY RELEASE SYSTEM. (See figure 2-2.) The canopy is locked in the closed position by four release hooks in the fuselage canopy sill which engage rollers



Airplanes through AF69-6196

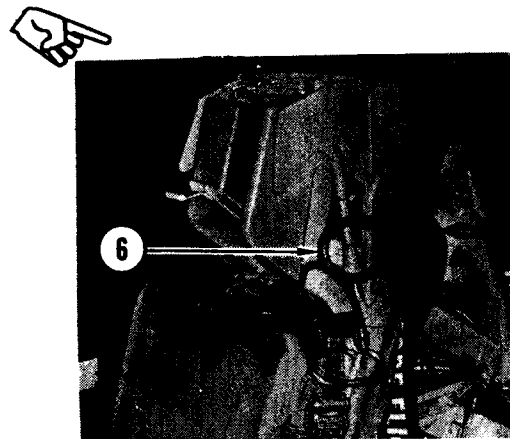
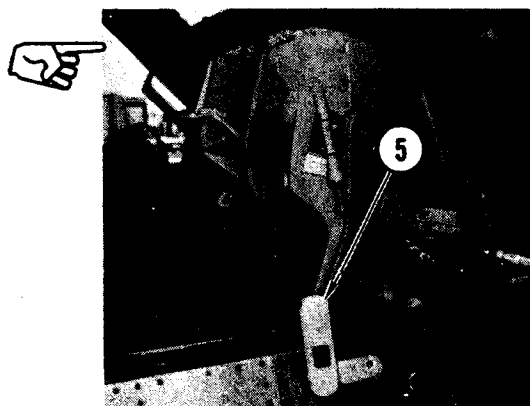
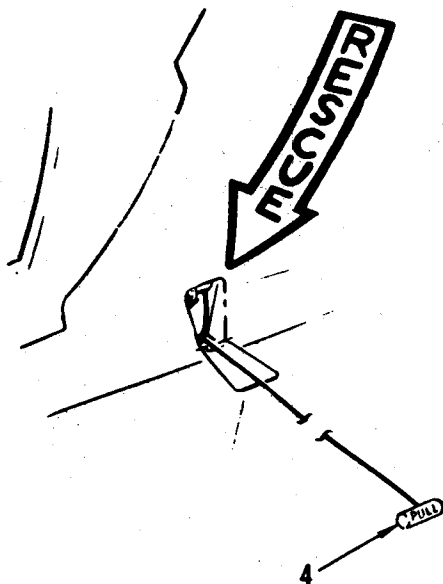
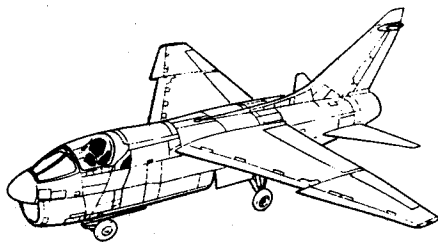


Airplanes AF69-6197 and subsequent



02D011-01-09-76

2-1. Canopy System Controls and Indicators (Sheet 1)



INDEX NO.	CONTROL/INDICATOR	FUNCTION
1	Canopy emergency jettison control handle	For emergency use only. Push forward, move down, and pull aft-fires canopy jettison initiator which fires canopy actuator impulse cartridge and jettisons canopy.
2	Canopy closed warning light	On (CANOPY) – indicates canopy locking hooks are not fully engaged and canopy is not locked. Off – indicates canopy locking hooks are fully engaged and canopy is locked.
3	Interior canopy release handle	Aft position - retracts canopy locking hooks. Forward position – locks canopy locking hooks.
4	External canopy emergency jettison control handle (RESCUE)	For emergency use only. Pull – fires canopy jettison initiator which fires canopy actuator impulse cartridge and jettisons canopy.
5	Exterior canopy release handle	Rotated counterclockwise – unlocks canopy locking hooks. Rotated clockwise – locks canopy locking hooks.
*6	Canopy jettison override control handle	Operates canopy jettison override control valve.

*Airplanes through AF68-8224

02D011-02-03-70

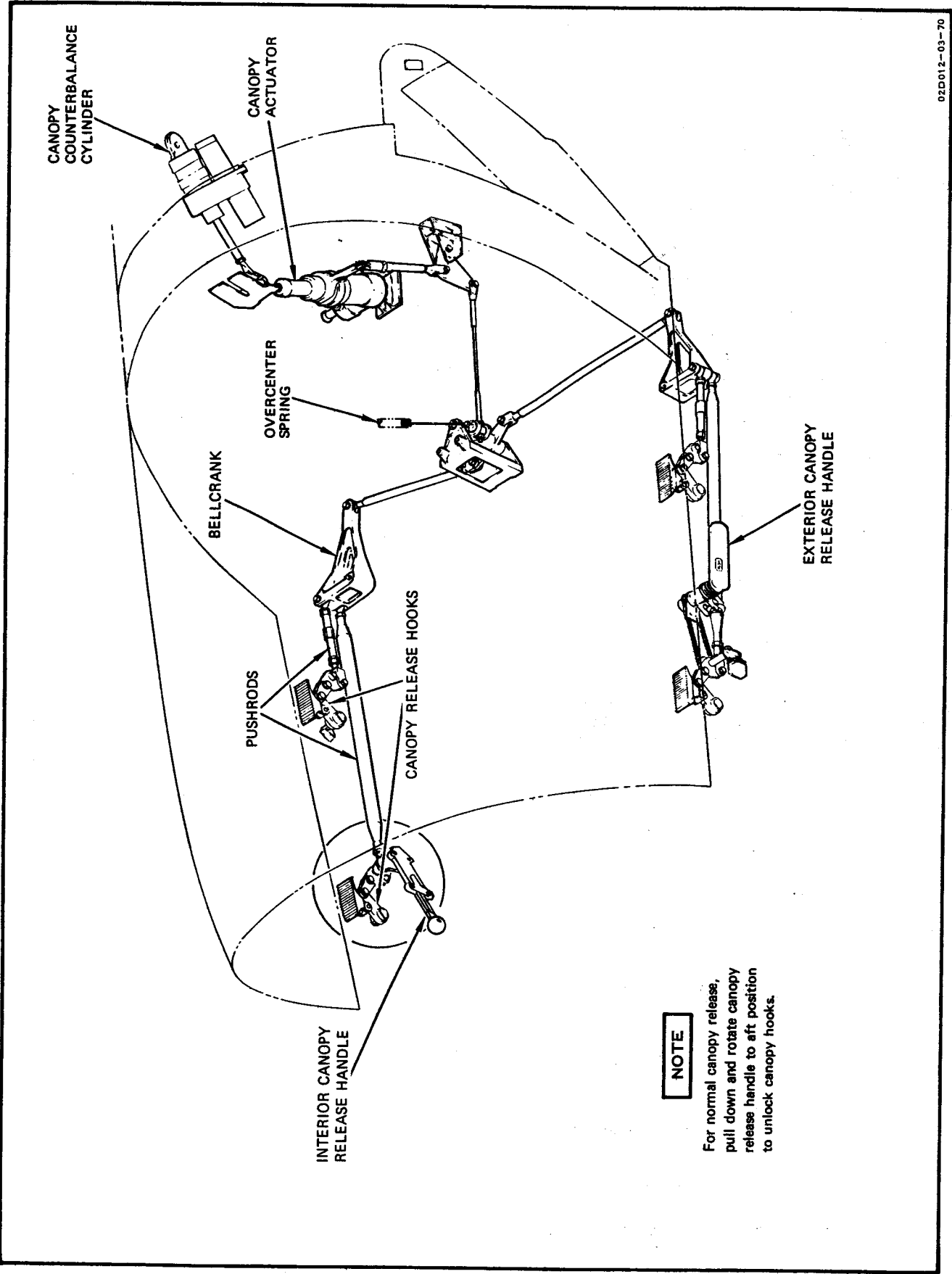


Figure 2-2. Canopy Release System Arrangement

in the canopy frame. Pushrods and bellcranks interconnect the four hooks, two canopy release handles, and the canopy actuator. The canopy release hooks are locked and unlocked manually from inside the cockpit by means of the interior canopy release handle, mounted above the right console. Pulling the handle aft retracts the four release hooks, unlocking the canopy. Pushing the handle forward extends the release hooks which engage the rollers on the canopy frame, locking the canopy closed. To prevent inadvertent placement of the interior canopy release handle to the closed position before the canopy is fully down, a spring-loaded canopy hook stop blocks movement of the canopy release mechanism. As the canopy is closed, the right aft canopy roller rotates the canopy hook stop out of the path of hook movement to allow locking of the canopy. When not in use, the interior canopy release handle may be shortened by telescoping to the stowed position. This position provides better access to the right console mounted controls and prevents inadvertent actuation of the handle to the open position.

2-10. An exterior canopy release handle, located below the canopy on the left side and flush with the airplane, permits manual locking or unlocking of the canopy from outside the cockpit. The spring-loaded handle pops out when its trigger button is first pushed and then released. Turning the handle counterclockwise approximately 100° retracts the canopy release hooks, unlocking the canopy. Turning the handle to the horizontal position locks the canopy release hooks. The handle is disengaged from the release mechanism when stowed. An overcenter spring is used in the canopy release system to keep the canopy release hooks engaged during normal flight and to provide enough force to prevent the canopy from unlocking due to excessive g loads.

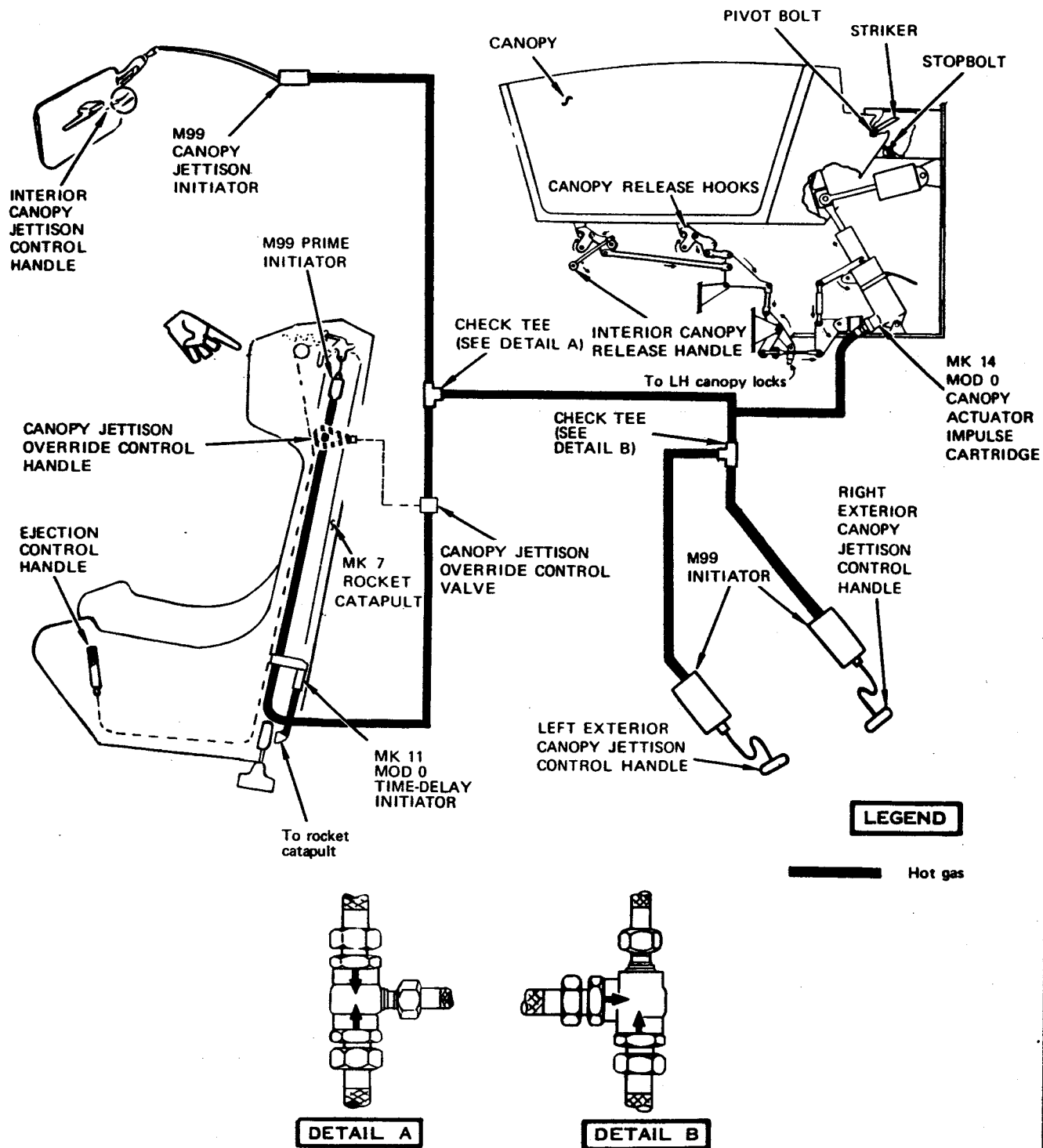
2-11. With the canopy release hooks unlocked, manual opening of the canopy is aided by a canopy counterbalance cylinder. The cylinder is pressurized to 250 (\pm 25) psi (with canopy in the open position) depending on ambient temperature. The piston rod end is connected to the canopy so that the air

pressure on the piston pushes up on the canopy, counterbalancing its weight.

2-12. As the canopy is raised or lowered, the canopy actuator provides a damping effect to protect the canopy against rapid opening or closing, and prevent slamming in high winds. The damping portion of the actuator is filled with hydraulic fluid and contains a piston which is attached to the canopy at the same point as the counterbalance cylinder. A small orifice in the piston permits equalization of pressure on both sides of the piston. Opening and closing the canopy strokes the piston, and the limited oil flow through the orifice damps rapid piston and canopy movement.

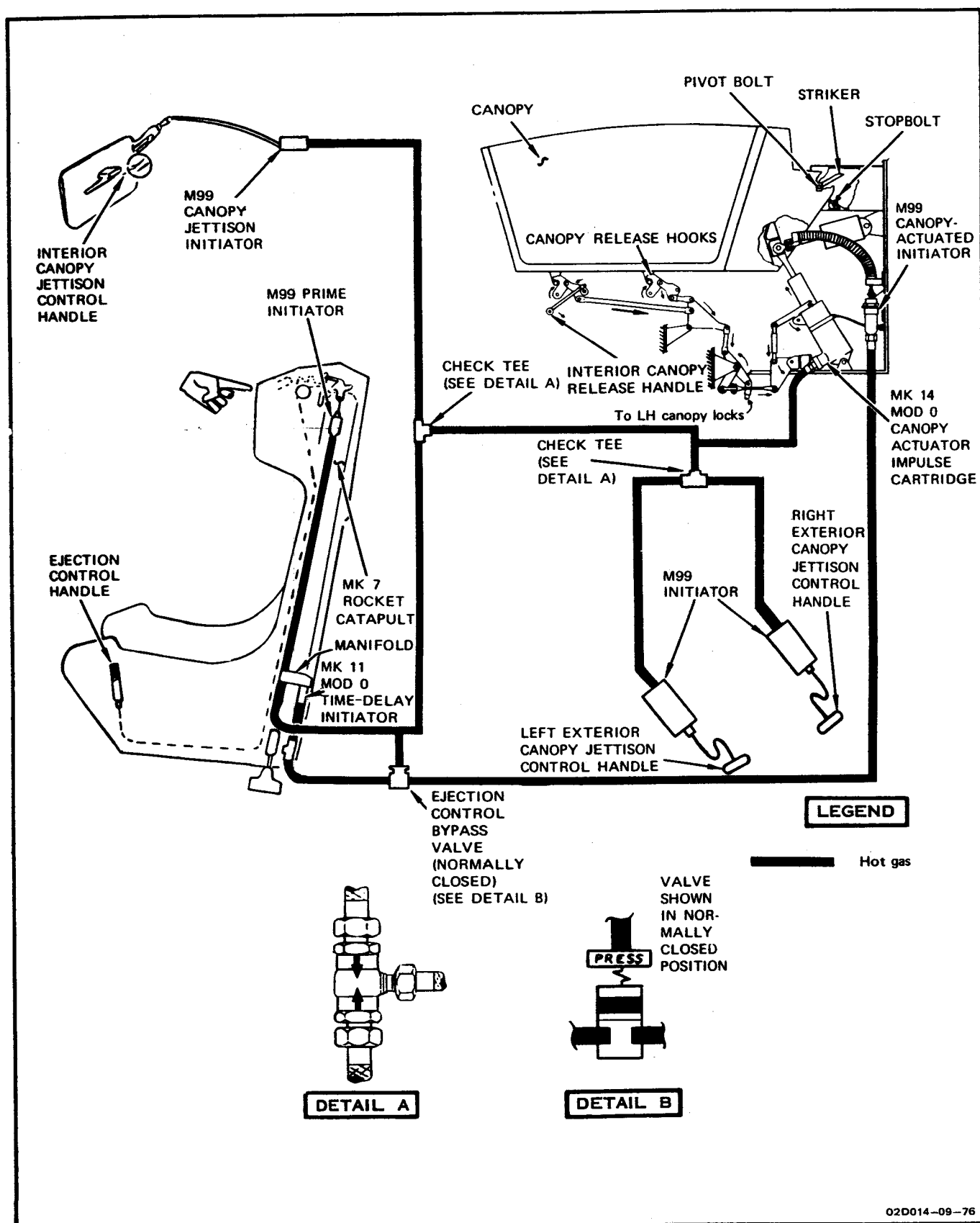
2-13. CANOPY JETTISON SYSTEM. (See figures 2-3 and 2-4.) Pulling the interior canopy jettison control handle (installed above the left console) or pulling either the left or right exterior canopy jettison control handle fires the applicable M99 canopy jettison initiator connected to each handle. The M99 prime initiator in the ejection seat system is also connected to the canopy jettisoning system. Each initiator contains an explosive cartridge which, when fired, routes high-pressure gas through tubing to the canopy actuator. At the actuator, the gas pressure is applied to a firing pin. The pressure breaks a shear pin restraining the firing pin and drives the firing pin into the Mk 14 Mod 0 canopy actuator impulse cartridge, detonating the cartridge.

2-14. Gas pressure from the fired Mk 14 Mod 0 canopy actuator impulse cartridge first strokes the outer and then the middle of the telescoped canopy actuator pistons. Initial movement of the outer piston forces pushrods to unlock the four canopy release hooks. At the end of the outer piston stroke, a rim on the piston engages the middle piston, causing it to stroke. The combined stroke of both pistons forces the canopy open past its normal position. Strikers on the canopy pivot bolts contact stopbolts, shearing off the pivot bolts. Continued upward motion shears the canopy counterbalance cylinder rod end from the cylinder and breaks a shear pin through the canopy actuator rod end, freeing the rod end. Upward momentum carries the canopy clear of the airplane. In flight, canopy jettisoning is aided by airstream loads.



02D013-10-72

Figure 2-3. Canopy Jettison System Schematic Diagram (Airplanes Through AF68-8224)



02D014-09-76

Figure 2-4. Canopy Jettison System Schematic Diagram (Airplanes AF68-8225 and Subsequent)

2-15. During seat ejection, the M99 prime initiator is fired by pulling the ejection control handle. Gas generated by the detonated cartridge is routed to both the ejection seat system and the canopy jettison system. Hot gas flows to and fires the Mk 14 Mod 0 canopy actuator impulse cartridge to jettison the canopy. The Mk 11 Mod 0 time-delay initiator allows a 0.4- to 0.75-second delay for canopy jettisoning before firing the rocket catapult. On airplanes through AF68-8224, the seat is ejected after the time delay has expired.

2-16. On airplanes AF68-8225 and subsequent, use of an additional canopy-actuated M99 initiator reduces the 0.4- to 0.75-second time delay between canopy jettisoning and the first movement of the seat. At the same time that hot gas pressure from the M99 prime initiator effects canopy jettisoning and time-delay firing of the rocket catapult, it also opens the ejection control bypass valve (normally closed), in series between the rocket catapult and the canopy-actuated initiator. As the jettisoning canopy clears the path of seat ejection, an attached lanyard fires the airframe-mounted canopy-actuated initiator. Resulting hot gas flows through the opened ejection control bypass valve to fire the rocket catapult before the 0.4- to 0.75-second time delay of the Mk 11 Mod 0 initiator has expired. If the canopy fails to jettison or the canopy-actuated initiator fails to fire, the Mk 11 Mod 0 time-delay initiator fires the rocket catapult after its time delay has expired and through-the-canopy ejection follows. Emergency canopy jettisoning or the loss of a canopy during normal flight cannot cause inadvertent firing of the rocket catapult since opening of the ejection control bypass valve (normally closed) and initiation of the Mk 11 Mod 0 time delay initiator is possible only if the pilot first pulls one of the two ejection control handles.

2-17. On airplanes through AF68-8224, the pilot may pull the canopy jettison override control handle to close the canopy jettison override control valve between the ejection seat system and the canopy jettison system. This blocks the line to the Mk 14 Mod 0 canopy actuator impulse cartridge. When the ejection

seat system is actuated, gas is blocked at the valve, preventing canopy jettisoning. The seat ejection sequence continues normally except that the seat is ejected through the canopy. The canopy jettison override control valve must be actuated prior to pulling the ejection control handle; otherwise, normal seat ejection sequence occurs. On airplanes AF68-8225 and subsequent, canopy jettison override features are not included.

2-18. On airplanes through AF68-8224, a check valve is installed in the line from each M99 initiator. The check valve prevents pressure from a fired initiator from entering the line of an unfired initiator. The check valve in the line from the M99 prime initiator prevents gas from entering the Mk 11 Mod 0 time-delay initiator line and firing the Mk 7 rocket catapult, causing seat ejection.

2-19. On airplanes AF68-8225 and subsequent, each of the two M99 exterior canopy jettison initiators is connected to a check tee which prevents the flow of gas pressure from a fired M99 initiator from entering the line of an unfired initiator. A second check tee prevents gas pressure from a fired M99 canopy jettison initiator from entering the line of the Mk 11 Mod 0 time-delay initiator, firing the Mk 7 rocket catapult, and causing seat ejection. The same check tee also prevents gas pressure from a fired M99 exterior canopy jettison initiator from entering the line of the unfired M99 interior canopy jettison initiator.

2-20. CANOPY INDICATING SYSTEM. (See figure 2-5 or 2-6.) An unlocked canopy is indicated by a yellow caution light on the caution indicator panel and the master caution light. A switch mounted near the left forward canopy release hook connects 28 volts from the primary dc bus to the canopy caution light when the canopy release hooks are not fully engaged. The switch contacts open, turning off the caution light when the hook fully engages the hook roller and actuates the switch plunger.

2-21. COMPONENTS.

2-22. For a list of system components, their locations (accesses) and functions, refer to table 2-1.

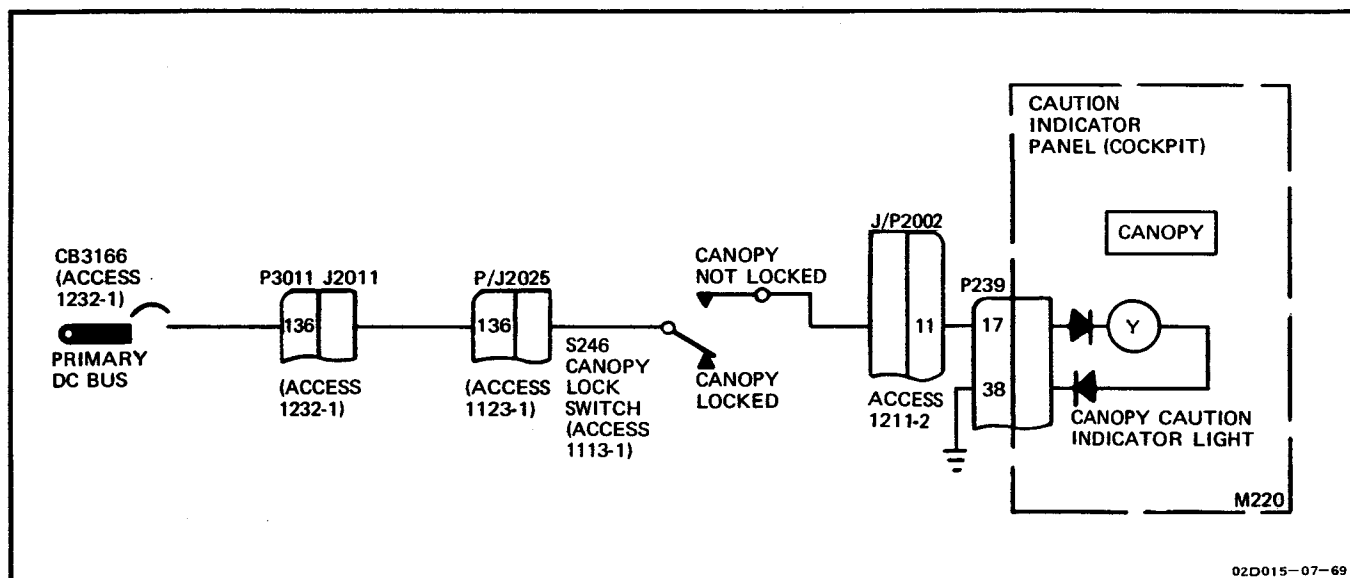


Figure 2-5. Canopy Indicating System Schematic Diagram (Airplanes Through AF69-6196)

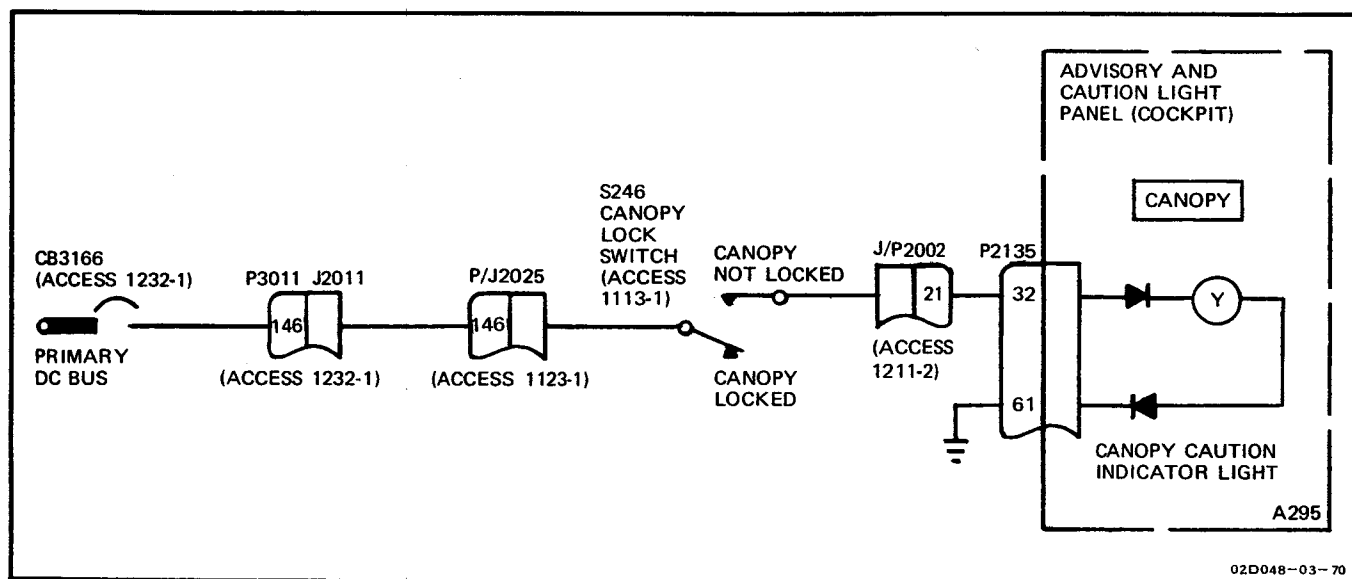


Figure 2-6. Canopy Indicating System Schematic Diagram (Airplanes AF69-6197 and Subsequent)

Table 2-1. Canopy System Components

Component	Access	Function
<u>Canopy and Release System Components</u>		
Bolts, canopy pivot (right and left)	Aft end of canopy	Attach canopy to fuselage, pivot with canopy, and shear when canopy is jettisoned.
Cylinder, canopy counterbalance	1122-3	Counterbalances weight of canopy and aids canopy opening.
Glass, canopy	Canopy	Provides a transparent enclosure for pilot protection during flight.
Handle, exterior canopy release	Left forward fuselage	Locks and unlocks canopy release hooks from outside airplane.
Handle, interior canopy release	Cockpit	Locks and unlocks canopy release hooks from inside cockpit.
Hooks, canopy release (2 left and 2 right)	1113-1, 1122-1, 2113-1, 2122-1	Engages rollers in canopy frame, locking canopy closed.
Mirrors (3)	Cockpit	Allows pilot to see aft.
Seal, diaphragm	Canopy	Provides the canopy to airframe seal required for cockpit pressurization.
Spring, over-center	1123-1	Provides positive pressure to keep canopy release hooks engaged.
Stop, canopy hook	2113-1	Prevents inadvertent placement of interior canopy release handle to closed position unless canopy is fully down.
Tool, canopy breaker	Canopy rail	Provides an additional means of emergency exit from airplane.
<u>Canopy Jettison System Components</u>		
Actuator, canopy	Canopy deck	Damps rapid canopy movement during raising and lowering; unlocks and jettisons canopy when Mk 14 Mod 0 canopy actuator impulse cartridge is fired.
Cartridge, canopy actuator impulse, Mk 14 Mod 0	Canopy deck	Supplies power to actuator pistons to unlock and jettison canopy. Fired by gas pressure from fired M99 initiator.

Table 2-1. Canopy System Components (Continued)

Component	Access	Function
Handle, interior canopy jettison control	Cockpit	Fires M99 canopy jettison initiator to start canopy jettisoning sequence from inside cockpit.
Handle, canopy jettison override control *	Left seat rail	Operates canopy jettison override control valve which blocks line to Mk14 Mod 0 canopy actuator impulse cartridge.
Handle, exterior canopy jettison control (right and left)	Forward fuselage	Fires M99 canopy jettison initiator attached to handle to start jettisoning sequence from outside airplane.
Initiator, M99 canopy jettison (3)	Cockpit	Supplies gas pressure to fire Mk 14 Mod 0 canopy actuator impulse cartridge. Initiators are fired by canopy jettison control handles.
Initiator, M99 prime (Also see table 1-1.)	Ejection seat	Supplies gas pressure to fire the Mk 14 Mod 0 canopy actuator impulse cartridge and Mk 11 Mod 0 time-delay initiator and actuate the normally closed ejection control bypass valve. Fired by pulling primary or face curtain ejection control handle.
Initiator, M99 canopy-actuated #	Bulkhead to rear of canopy	Supplies gas pressure to fire Mk 7 rocket catapult during seat ejection. Fired by lanyard attached to canopy as canopy jettisons clear of path of seat ejection.
Tee, check #	1123-1	Prevents pressure from fired M99 canopy jettison initiator from entering line of an unfired M99 canopy jettison initiator.
Tee, check #	Ejection seat bulkhead	Prevents pressure from fired M99 canopy jettison initiator from firing Mk 7 rocket catapult; also prevents pressure from fired M99 exterior canopy jettison initiator from entering line of unfired M99 interior canopy jettison initiator.
Valve, canopy jettison override control *	Behind ejection seat	When closed prevents canopy from being jettisoned during seat ejection sequence.

Table 2-1. Canopy System Components (Continued)

Component	Access	Function
Valve, directional flow check (4) *	Ejection seat bulk-head and 1123-1	One check valve prevents gas pressure from any fired M99 canopy jettison initiator from firing Mk 11 Mod 0 time-delay initiator and ejection seat. Three check valves prevent pressure from fired M99 canopy jettison initiator from entering line of an unfired M99 canopy jettison initiator.
Valve, ejection control bypass # (normally closed)	Ejection seat bulk-head	During seat ejection, valve is pressure actuated to open configuration (by gas from M99 prime initiator) to permit flow of hot gas from M99 canopy actuated initiator to fire Mk 7 rocket catapult. In normally closed configuration, valve prevents inadvertent seat ejection from occurring as a result of loss of canopy or canopy jettisoning.

Canopy Indicating System Components

Circuit breaker CB3166	1232-1	Connects power to canopy caution light.
Light, canopy caution	Caution indicator panel	Indicates unlocked canopy.
Switch, canopy lock	1113-1	Connects power to canopy caution light whenever canopy release hooks are not fully engaged.

*Airplanes through AF68-8224

#Airplanes AF68-8225 and subsequent

2-23. OPERATIONAL CHECKOUT.**CAUTION****Test Equipment Required**

<i>Figure & Index No.</i>	<i>Name</i>	<i>AN Type Designation</i>	<i>Use and Application</i>
	Equipment required for connecting external electrical power		Check canopy caution light indication
	Push-pull spring scale, 0 to 5 pounds	719-5 (John Chatillon and Sons, Scale and Spring Division, New York, N.Y.)	Check force required to overcome static friction
	Spring scale, 0 to 50 pounds	0013 (John Chatillon and Sons, Kew Garden, N.Y.)	Check force required to close canopy
	Torque wrench, 100 to 750 pound-inches	413-900-020 (American Tool and Engineering Co., Kalamazoo, Mich.)	Check force required to lock canopy
	Rigging pin	215-00110-3 (End item 215-00110-1)	Check system rigging
TT02D009-09-76			

WARNING

Ensure that ejection controls safety handle is in the fully down-and-locked position and safety pins (215-00261-1) are installed in prime initiator, interior canopy jettison initiator, and canopy-actuated initiator (T.O. 1A-7D-2-1). This will prevent inadvertent canopy jettison or seat ejection and possible serious injury to personnel.

To prevent structure damage, ensure that access panel restrictions are observed before opening canopy (T.O. 1A-7D-2-1).

Open canopy slowly in cold weather to prevent possible shearing of canopy actuator rod end shear pin (T.O. 1A-7D-2-1).

NOTE

A number, or numbers, enclosed in braces at the end of a step in the following checkout is a reference to a corresponding number in troubleshooting table 2-2.

a. Unlock and open canopy using exterior canopy release handle.

b. Connect external electrical power (T.O. 1A-7D-2-1). Canopy caution light should come on. {1}

c. Stow exterior canopy release handle.

d. Attach spring scale to interior canopy pulldown handle. Close canopy, checking that pulldown force does not exceed 40 pounds. {2}

NOTE

With canopy unlocked, canopy counterbalance cylinder will automatically raise canopy to normal 40° open position. An initial force may be required to overcome static friction.

e. With canopy in closed and unlocked position, release canopy and check that canopy opens automatically to normal 40° position. If canopy fails to open when released, attach spring scale to exterior handle on forward left side of lower canopy frame and check that friction load does not exceed 4 pounds. {3}

- f. Open accesses 1113-1, 1122-1, 2123-4, 2113-2, and 2122-1.
- g. Close and lock canopy. Canopy caution light should go off. Ensure that switch plunger does not bottom (fully compress). {4}
- h. Unlock and open canopy.
- i. Remove interior canopy release handle and attach torque wrench to canopy release handle shaft.
- j. Close canopy. Using torque wrench, check that force required to lock canopy does not exceed 260 pound-inches. {5}
- k. Unlock and open canopy. Release mechanism must operate smoothly without binding. {5}
- l. Close and lock canopy.
- m. Check that stopface gaps on overcenter links do not exceed 0.030 inch at each of any three links with remaining link not to exceed 0.010 inch. Zero clearance is permissible. {6}

NOTE

Canopy roller and hook gap in the following step is based on allowable engineering tolerances. If excessive gap is noted, adjust to dimensions provided in paragraph 2-32.

- n. Check release hook throat gaps by alternately inserting shank end of No. 56 (0.0465-inch diameter) and No. 46 (0.0810-inch diameter) new or measured drills between throat of hook and canopy rollers. Use drills as go/no go gages. {6}
- o. Unlock and open canopy.
- p. Perform tape test in accordance with paragraph 2-32 and check that engagement of hooks and canopy rollers is as specified. {6}

NOTE

In order to perform step g, the spring-loaded canopy hook stop (at right aft canopy release hook) must be manually rotated out of way of hook movement and retained in position. This permits closing of canopy release mechanism with canopy up.

- q. With canopy open, close and reopen latching mechanism with torque wrench. Torque required to open latching mechanism must exceed 25 pound-inches. {7}

- r. Remove torque wrench from handle shaft.
- s. Disconnect external electrical power.
- t. Install interior canopy release handle.
- u. Deleted.
- v. Close and lock canopy.

NOTE

If rigging pin cannot be easily inserted in rigging pin hole, sweep generator may be removed in accordance with T.O. 1A-7D-2-14-3 to provide access. Paint buildup may be removed from rigging pin hole using No. 11 hand reamer.

- w. Insert rigging pin (9, figure 2-9) through central bellcrank (10) and bracket immediately below canopy deck in access 2123-4.

- x. Check to ensure canopy jettison cable (11) is slack. {8}

- y. Remove rigging pin.

NOTE

If sweep generator was removed to insert rigging pin, reinstall sweep generator in accordance with T.O. 1A-7D-2-14-3.

- z. Deleted.

- aa. Close accesses 1113-1, 1122-1, 2123-4, 2113-2, and 2122-1.

2-24. TROUBLESHOOTING.

Test Equipment Required

Figure & Index No.	Name	AN Type Designation	Use and Application
	Multimeter	AN/PSM-6	Check continuity and measure voltage TT02D045-07-70

2-25. Refer to table 2-2 for troubleshooting information. Malfunctions in the table are listed numerically and are related to a corresponding number, or numbers, following a step in the operational checkout.

- m. Remains the same.

NOTE

Canopy roller and hook gap in the following step is based on allowable engineering tolerances. If excessive gap is noted, adjust to dimensions provided in paragraph 2-35.

Table 2-2. Canopy System Troubleshooting

Probable Cause	Isolation Procedure	Remedy
1. Canopy caution light does not come on.		
Defective indicator lamp	Press indicator lights test switch to test.	Replace defective indicator lamp.
Defective switch or adjusted incorrectly	Check for 28 volts dc between pins 17* and 38* of connector P239* or pins 32# and 61# of connector P2135#.	Replace or adjust switch.
2. Force required to close canopy exceeds 40 pounds.		
Canopy pivot bolts and eccentrics improperly lubricated	Check canopy pivot bolts and eccentrics for proper lubrication.	Lubricate canopy pivot bolts and eccentrics with MIL-G-23827 grease.
Interference between canopy skirt and fuselage	Check that canopy eccentrics are correctly adjusted and canopy skirt is properly trimmed for minimum interference between canopy and fuselage.	Adjust eccentrics or trim canopy skirt as required.
Improper engagement of canopy rail seals	With canopy closed, check that compressed height of left and right canopy rail seals (located on canopy deck) is within tolerance specified in T.O. 1A-7D-2-3.	Adjust canopy rail seals until required dimension is obtained (T.O. 1A-7D-2-3).
Incorrect diaphragm seal and striker engagement	Check diaphragm seal and striker engagement for correct tolerance.	Adjust diaphragm seal and striker as required.
Canopy counterbalance cylinder improperly serviced or defective	Check that canopy counterbalance cylinder is properly serviced (T.O. 1A-7D-2-1) and free of defects.	Service canopy counterbalance cylinder (T.O. 1A-7D-2-1) or replace, as applicable.
Canopy counterbalance cylinder bottomed out	With canopy closed, check canopy counterbalance cylinder for bottomed out condition.	Adjust or replace canopy counterbalance cylinder.
Canopy actuator improperly adjusted or defective	Check adjustment of actuator. Open and close canopy several times checking for damping effect of actuator.	Adjust canopy actuator or replace.
3. With canopy unlocked for automatic opening, force required to overcome static friction exceeds 4 pounds.		
Canopy pivot bolts and eccentrics improperly lubricated	Check canopy pivot bolts and eccentrics for proper lubrication.	Lubricate canopy pivot bolts and eccentrics with MIL-G-23827 grease.
Canopy counterbalance cylinder improperly serviced	Check the canopy counterbalance cylinder is properly serviced.	Service canopy counterbalance cylinder (T.O. 1A-7D-2-1).

Table 2-2. Canopy System Troubleshooting (Continued)

Probable Cause	Isolation Procedure	Remedy
Interference between canopy skirt and fuselage	Check that canopy skirt is trimmed for minimum interference between canopy and fuselage.	Trim canopy skirt, as required.
4. Canopy caution light does not go off after canopy is closed and locked.		
Canopy lock switch adjustment incorrect	None	Perform canopy lock switch adjustment.
Defective canopy lock switch	None	Replace switch.
5. Force required to lock canopy exceeds 260 pound-inches.		
Same probable causes as listed under malfunction number 2	None	Repeat applicable remedy, or remedies, listed under 2.
6. Latching mechanism improperly rigged.		
Stopface gaps on over-center links exceed tolerances specified in operational checkout	None	Perform canopy roller and release mechanism adjustment.
Release hook throat gaps less than 0.0350 inch or greater than 0.1015 inch	None	Perform canopy roller and release mechanism adjustment.
Improper engagement of release hooks and rollers	None	Perform canopy roller and release mechanism adjustment.
7. Torque required to open latching mechanism is less than 25 pound-inches.		
Canopy lock switch adjustment incorrect	None	Perform canopy lock switch adjustment.
Canopy jettison cable improperly rigged	None	Perform canopy roller and release mechanism adjustment.
8. No slack in canopy jettison cable.		
Canopy jettison cable improperly rigged	None	Perform canopy roller and release mechanism adjustment.

*Airplanes through AF69-6196

#Airplanes AF69-6197 and subsequent

6. Latching mechanism improperly rigged.

Stopface gaps on overcenter links exceed tolerances specified in op- erational checkout	None
--	------

Release hook throat gaps less than 0.0415 inch or greater than 0.0810 inch	None
--	------

2-26. SERVICING.

2-27. Refer to T.O. 1A-7D-2-1 for servicing of canopy actuator or canopy counterbalance cylinder.

2-28. CANOPY ASSEMBLY REMOVAL AND INSTALLATION.

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
2-6A	215-00280-1	40° canopy support strut	Support canopy in normal open position
	MIL-M-7404	Maintenance stand (2)	For maintenance at cockpit level
	MIL-T-26772	Nitrogen trailer	Remove dust from canopy
	215-01346-1	Canopy handling sling assembly	Support canopy for removal and installation
	Local fabrication (optional)	Thread protector	Protect threads of canopy pivot bolts during removal/installation
TT02D011-07-77			

2-29. REMOVAL.

a. Cover canopy with heavy paper and secure with tape.

CAUTION

To prevent structure damage, ensure that access panel restrictions are observed before opening canopy (T.O. 1A-7D-2-1).

Open canopy slowly in cold weather to prevent possible shearing of canopy actuator rod end shear pin (T.O. 1A-7D-2-1).

b. Open access 1122-3.

c. Open canopy and install 40° canopy support strut (paragraph 1-52).

WARNING

Ensure that ejection controls safety handle is in the fully down-and-locked position and safety pins (215-00261-1) are installed in prime initiator,

interior canopy jettison initiator, and canopy-actuated initiator (T.O. 1A-7D-2-1). This will prevent inadvertent canopy jettison or seat ejection and possible serious injury to personnel.

d. Completely depressurize canopy counterbalance cylinder. Remove valve core.

e. Remove cotter pin, nut, washers, and bolt securing counterbalance cylinder and canopy actuator to canopy. Tie cylinder and actuator together and secure to airplane structure.

f. Remove cotter pin, nut, and washer from each canopy pivot bolt.

g. Remove strikers and washers, but not eccentrics.

NOTE

Use of thread protector is optional.

g-1. To prevent possible thread damage, install locally fabricated thread protectors (figure 2-6A) on canopy pivot bolts.

WARNING

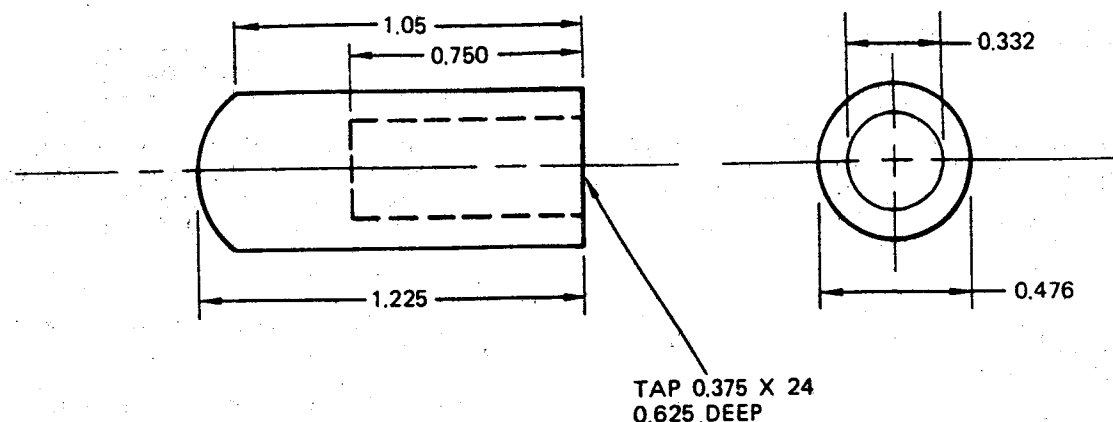
Before removal of pivot bolts, check that canopy is adequately supported to prevent injury to personnel.

h. Remove pivot bolts and washers. Using soft lead pencil, mark position of eccentrics and secure both sides with tape.

NOTE

When a crane/hoist assembly is not available, the canopy may be lifted manually off the airframe, provided five personnel are used for the procedure.

i. Remove 40° canopy strut and hold canopy in position while installing canopy handling sling assembly.

**NOTE**

1. ALL DIMENSIONS IN INCHES.
2. MATERIAL: 4130 STEEL ROUND STOCK.

02D058-02-77

Figure 2-6A. Canopy Pivot Bolt Thread Protector Fabrication

j. Position frame of canopy handling sling under canopy so that spring pins are aft and canopy rollers are in slots of frame. Ensure spring pins are locked in place to retain canopy to frame.

CAUTION

Use care when installing canopy sling handle to prevent damage to canopy glass.

k. Tip canopy sling handle forward and insert in canopy hoisting frame and lock in place with quick-release pins.

l. Attach hoist or crane hook to canopy sling handle.

CAUTION

Guide aft section of canopy clear of seat to prevent canopy damage.

m. Raise hoist or crane slowly and remove canopy from airplane.

n. Place tape over outside of eccentrics.

o. If new canopy is to be installed, remove attached components from defective canopy.

2-30. INSTALLATION.

NOTE

This procedure is to be used when removed canopy is being installed. For installation of a new canopy, refer to paragraph 2-31.

a. To prevent pulling eccentrics from position, carefully remove tape from outer face.

b. Lubricate pivot bolts and eccentrics with MIL-G-23827 grease.

c. Remove remaining tape on eccentrics. Position eccentrics as noted during removal.

NOTE

When a crane/hoist assembly is not available, the canopy may be lifted manually onto the airframe, provided five personnel are used for the procedure.

d. Position frame of canopy handling sling under canopy so that spring pins are aft and canopy rollers are in slots of frame. Ensure spring pins are locked in place to retain canopy to frame.

CAUTION

Use care when installing canopy sling handle to prevent damage to canopy glass.

e. Tip canopy sling handle forward and insert in canopy hoisting frame and lock in place with quick-release pins.

f. Attach hoist or crane hook to canopy sling handle.

g. Guide canopy into position for attachment to airframe.

h. Position canopy on airframe in open position and align pivot bolts.

i. Install washers between canopy and airframe lugs and install pivot bolts.

CAUTION

Use care when removing sling assembly to prevent damage to canopy glass. Hold canopy in position until 40° support strut is installed.

j. Disconnect hoist from canopy sling handle.

k. Release quick-release pins and remove canopy sling handle.

l. Release spring pins and remove canopy handling sling frame.

m. Install 40° canopy support strut (paragraph 1-52).

n. Secure canopy counterbalance cylinder and canopy actuator to canopy bracket with bolt, washers, nut, and new cotter pin.

o. Install valve core and service canopy counterbalance cylinder (T.O. 1A-7D-2-1).

o-1. If used, remove thread protectors from canopy pivot bolts.

p. Install washers on pivot bolts, align index marks, and install strikers, washers, nuts, and new cotter pin.

q. Remove 40° canopy support strut (paragraph 1-52).

r. Alternately lower, mark, raise, and trim canopy skirt until contour of canopy matches that of fuselage. Canopy-to-fuselage aerodynamic smoothness shall be within tolerances specified in T.O. 1A-7D-3.

s. Perform canopy assembly rigging (paragraph 2-32).

t. Perform cockpit leakage test (T.O. 1A-7D-2-1).

u. Remove protective covering from canopy and remove dust with light stream of compressed air.

v. Clean and polish canopy (T.O. 1A-7D-2-1).

2-31. NEW CANOPY INSTALLATION.

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
	215-00280-1	40° canopy support strut	Support canopy in normal open position
	MIL-M-7404	Maintenance stand (2)	Maintenance at cockpit level
	MIL-T-26772	Nitrogen trailer	Remove dust from canopy
	215-01346-1	Canopy handling sling assembly	Support canopy for installation

a. If required, install counterbalance cylinder and canopy actuator, but do not service or adjust at this time.

NOTE

When a crane/hoist assembly is not available, the canopy may be lifted manually onto the airframe, provided five personnel are used for the procedure.

b. Position frame of canopy handling sling under canopy so that spring pins are aft and canopy rollers are in slots of frame. Ensure spring pins are locked in place to retain canopy to frame.

CAUTION

Use care when installing canopy sling handle to prevent damage to canopy glass.

c. Tip canopy sling handle forward and insert in canopy hoisting frame and lock in place with quick-release pins.

d. Attach hoist or crane hook to canopy sling handle.

e. Guide canopy into position for attachment to airframe.

f. Set canopy eccentrics to neutral position (figure 2-8).

g. Temporarily secure canopy in place using pivot bolts.

CAUTION

Use care when removing sling assembly to prevent damage to canopy glass. Hold canopy in position until 40° support strut is installed.

h. Install 40° canopy support strut (paragraph 1-52).

i. Disconnect hoist from canopy sling handle.

j. Release quick-release pins and remove canopy sling handle.

k. Release spring pins and remove canopy handling sling frame.

l. Secure canopy counterbalance cylinder and canopy actuator to canopy bracket with bolt, washers, and nut.

WARNING

To prevent personnel injury and damage to canopy, be careful when lowering and raising canopy when counterbalance cylinder is depressurized.

CAUTION

Lower canopy slowly while observing skin clearance between canopy and fuselage to avoid structural damage.

m. Alternately lower, mark, raise, and trim canopy fairing until diaphragm seal and striker engagement can be checked.

n. Perform canopy eccentrics adjustment (paragraph 2-34) and diaphragm seal and striker engagement check (paragraph 2-33).

o. Perform canopy actuator and counterbalance cylinder adjustment (paragraph 2-37).

p. Trim canopy fairing until contour of canopy matches that of fuselage. Canopy-to-fuselage aerodynamic smoothness must be within tolerance specified in T.O. 1A-7D-3.

q. Perform canopy roller and release mechanism adjustment (paragraph 2-35).

r. Perform canopy stopbolt and striker adjustment (paragraph 2-36).

s. Install components on new canopy (i.e., data plates, etc).

t. Perform cockpit leakage test (T.O. 1A-7D-2-1).

u. Remove protective covering from canopy and remove dust with light stream of compressed air.

v. Clean and polish canopy (T.O. 1A-7D-2-1).

2-32. CANOPY ASSEMBLY RIGGING.

2-33. DIAPHRAGM SEAL AND STRIKER ENGAGEMENT CHECK. (See figure 2-7.)

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
	MIL-M-7404	Maintenance stand	For maintenance at cockpit level TT02D012-11-68

WARNING

Ensure that ejection controls safety handle is in the fully down-and-locked position and safety pins (215-00261-1) are installed in prime initiator, interior canopy jettison initiator, and canopy-actuated initiator (T.O. 1A-7D-2-1). This will prevent inadvertent canopy jettison or seat ejection and possible serious injury to personnel.

CAUTION

To prevent structure damage, ensure that access panel restrictions are observed before opening canopy (T.O. 1A-7D-2-1).

Open canopy slowly in cold weather to prevent possible shearing of canopy actuator rod end shear pin (T.O. 1A-7D-2-1).

a. To check canopy diaphragm seal and striker engagement, open canopy and apply No. 2130 talcum powder (Whitaker, Clark, and Daniels) or equivalent to striker.

b. Carefully close and lock canopy, checking for evidence of binding.

c. Open canopy.

d. Transfer of powder from striker should indicate contact with diaphragm seal at approximate center of seal.

e. Apply strips of 0.048 gage (approximately 2 inches long) solder wire (FSN 3439-00-133-1108 or equivalent) at approximately 8-inch intervals around canopy seal.

f. Close and lock canopy.

g. Open canopy and check diaphragm seal striker engagement by measuring depression in solder wire. Depression in wire should be 0.12 (+0.12, -0.06) inch.

h. If proper fit of diaphragm seal is not indicated, adjust canopy eccentrics (paragraph 2-34).

2-34. CANOPY ECCENTRICS ADJUSTMENT. (See figure 2-8.)

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
	MIL-M-7404	Maintenance stand	For maintenance at cockpit level TT02D013-11-68

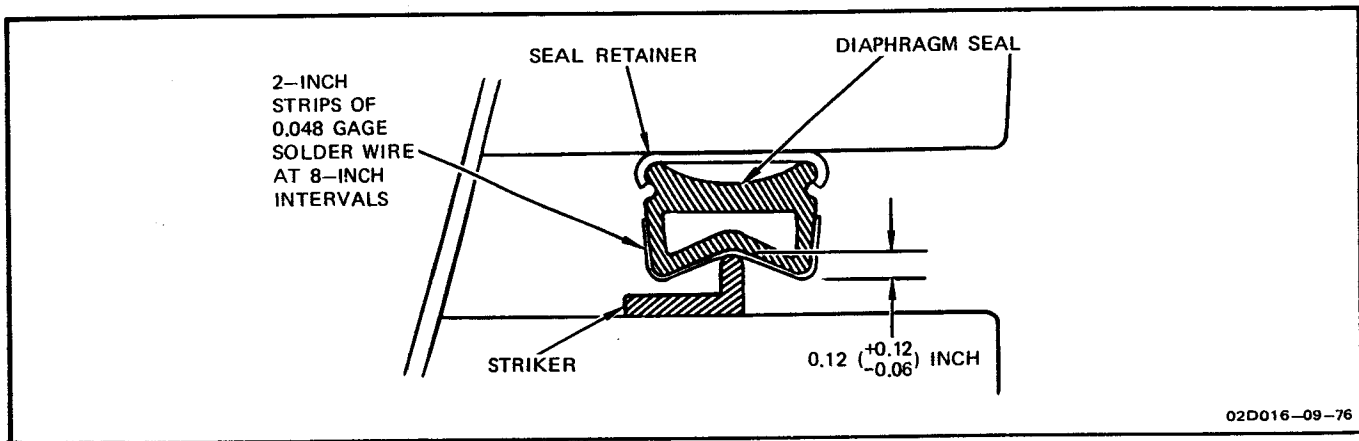


Figure 2-7. Diaphragm Seal and Striker Engagement

WARNING

Ensure that ejection controls safety handle is in the fully down-and-locked position and safety pins (215-00261-1) are installed in prime initiator, interior canopy jettison initiator, and canopy-actuated initiator (T.O. 1A-7D-2-1). This will prevent inadvertent canopy jettison, or seat ejection and possible serious injury to personnel.

NOTE

If canopy diaphragm seal does not engage striker or alignment is required for a new canopy, the

canopy eccentrics shall be adjusted.

- a. Remove canopy pivot bolts (paragraph 2-44).
- b. Adjust eccentrics as shown in figure 2-8 to obtain proper diaphragm seal and striker engagement and canopy alignment (paragraph 2-33).
- c. Install canopy pivot bolts (paragraph 2-44).
- d. Open and close canopy and check that canopy frame does not strike support structure at step on either side of fuselage (figure 2-9). If necessary, file structure to obtain clearance. Refinish filed area.
- e. Perform canopy system operational checkout (paragraph 2-23).

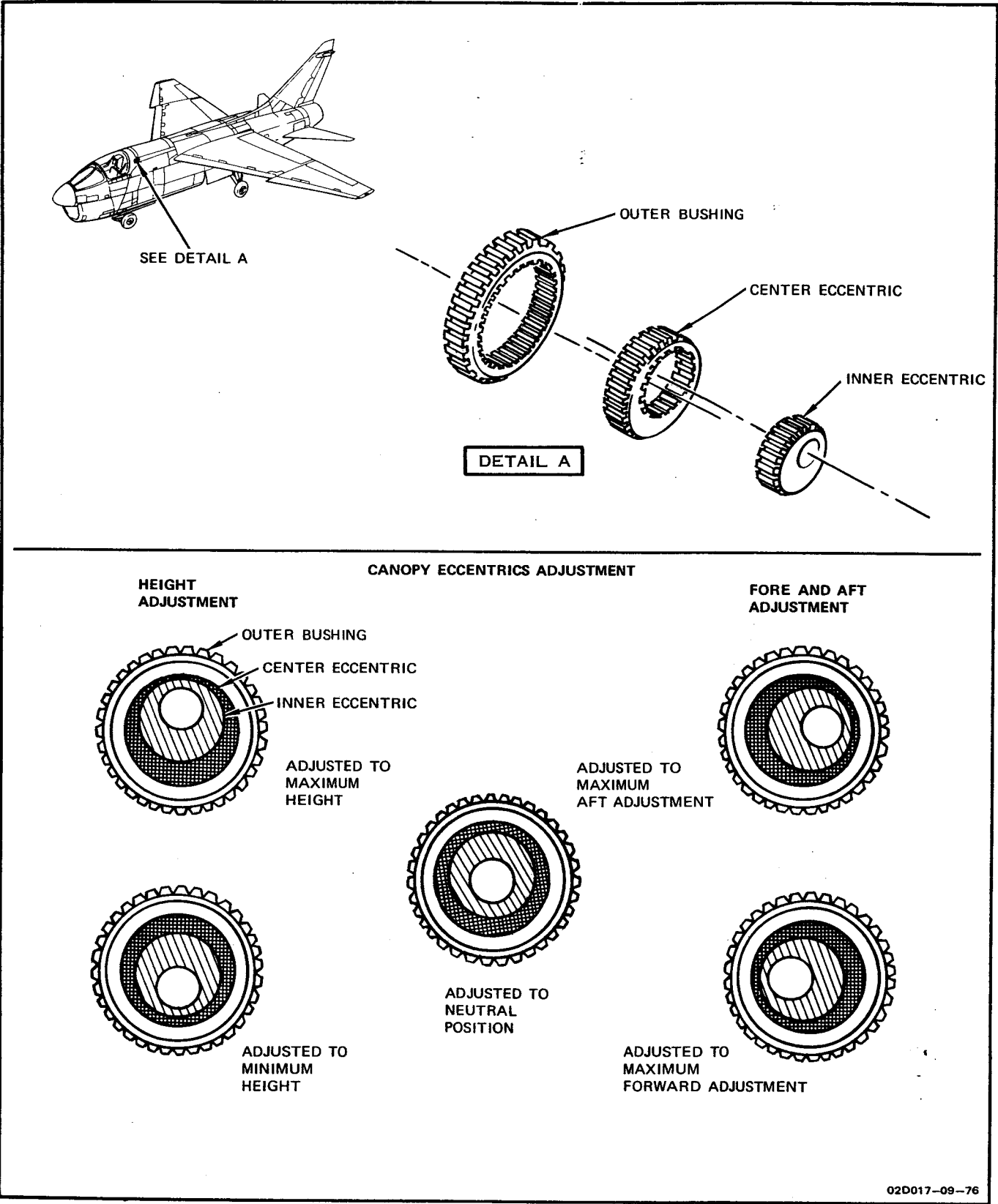


Figure 2-8. Canopy Eccentrics Adjustment

2-35. CANOPY ROLLER AND RELEASE MECHANISM ADJUSTMENT. (See figure 2-9.)

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
2-9(1,9)	215-00110-3 (End item 215-00110-1)	Rigging pins (2)	Rig canopy
	GGG-W-886	Torque wrench, 10 to 150 pound- inches	Tighten bolts to required torque
	MIL-M-7404	Maintenance stand	For maintenance at cockpit level
TT02D014-09-76			

WARNING

Ensure that ejection controls safety handle is in the fully down-and-locked position and safety pins (215-00261-1) are installed in prime initiator, interior canopy jettison initiator, and canopy-actuated initiator (T.O. 1A-7D-2-1). This will prevent inadvertent canopy jettison, or seat ejection and possible serious injury to personnel.

CAUTION

To prevent structure damage, ensure that access panel restrictions are observed before opening canopy.

Open canopy slowly in cold weather to prevent possible shearing of canopy actuator rod end shear pin (T.O. 1A-7D-2-1).

- a. Open canopy.
- b. Open accesses 1113-1, 2113-2, 1122-1, 2122-1, 2122-5, and 1122-4.
- c. Open access 1123-1 and remove sweep generator (T.O. 1A-7D-2-14).

NOTE

If rigging pins cannot be easily inserted in rigging pin holes, remove paint buildup from holes using No. 11 hand reamer.

d. Insert rigging pin (1) through aft bellcrank (2) and bracket just below canopy actuator.

e. Check adjustment of canopy release control rod as follows:

1. Remove cotter pin (3), nut (4), washers (5), and bolt (6) securing canopy release control rod (7) to actuator control fork (8).

2. Check that bolt (6) can be inserted to connect release control rod (7) to control fork (8) without deflecting control fork. If bolt holes are not in alignment, loosen locknut and adjust canopy release control rod to mate with fork. Tighten locknut.

3. Secure canopy release control rod to actuator control fork with bolt (6), washers (5), nut (4), and new cotter pin (3).

f. Remove rigging pin.

g. Close and lock canopy.

h. Insert rigging pin (9) through central bellcrank (10) and bracket immediately below canopy deck in access 1123-1.

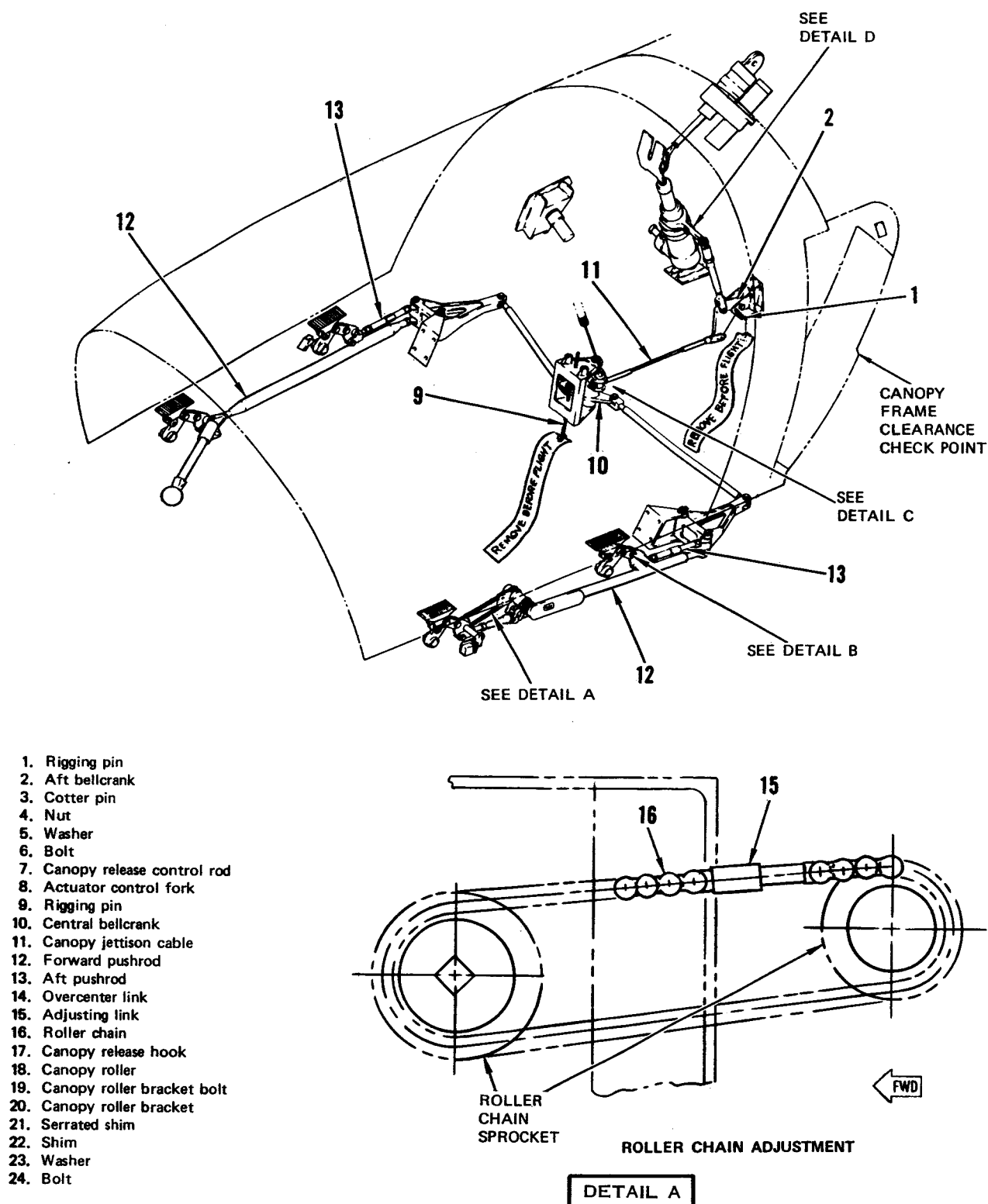
i. Cut lockwire on cable clevis and loosen locknut.

j. Remove cotter pin, nut, and washer from clevis bolt. Remove bolt from cable clevis at central bellcrank. Rig canopy jettison cable (11) as follows:

1. Tighten cable clevis until bolt cannot be installed.

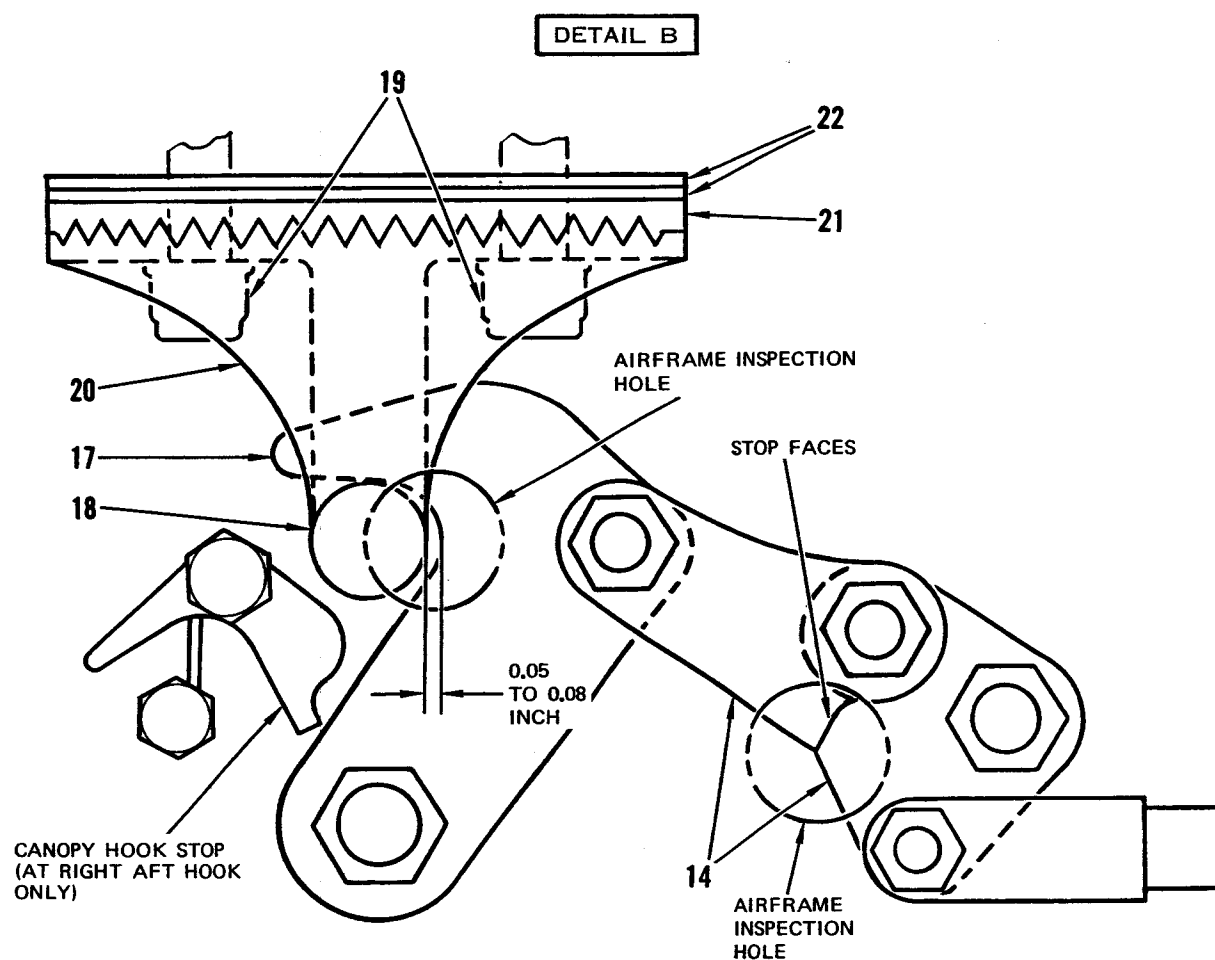
2. Lengthen cable in 1/2 turn increments until bolt can be installed, then lengthen cable three additional turns.

3. Tighten locknut on cable and secure with MS20995C20 lockwire. Do not transmit twisting motion to cable when tightening locknut.

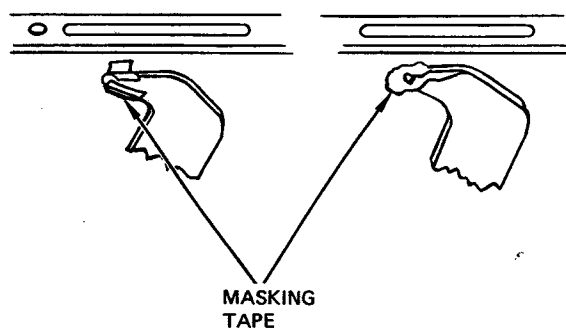


02D018-01-09-76

Figure 2-9. Canopy Roller and Release Mechanism Adjustment (Sheet 1)



CANOPY ROLLER AND HOOK ADJUSTMENT



VERTICAL CLEARANCE CHECK

02D018-02-09-76

Figure 2-9. Canopy Roller and Release Mechanism Adjustment (Sheet 2)

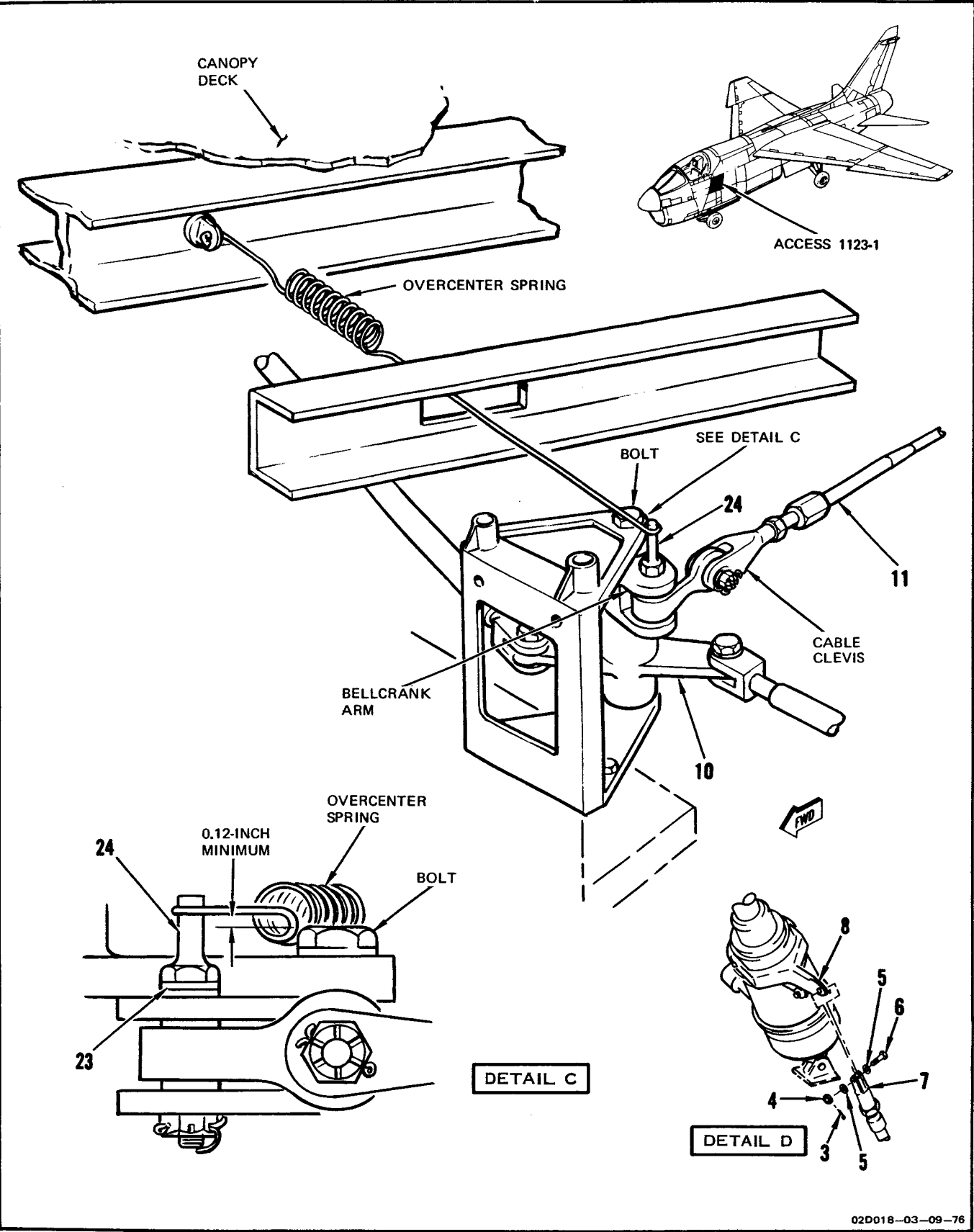


Figure 2-9. Canopy Roller and Release Mechanism Adjustment (Sheet 3)

CAUTION

Ensure that both cable clevises are free to rotate on bellcranks. Overtightening of clevis bolts and nuts will prevent normal clevis movement during canopy release system operation and result in damage or failure of cable. Cable may be turned end for end to facilitate rigging.

4. Connect cable to bellcrank with bolt, washer, nut, and new cotter pin.

k. Remove rigging pin (9).

l. Open canopy.

m. Rotate spring-loaded canopy hook stop, located at right aft canopy release hook, out of way to permit closing canopy release mechanism and place release mechanism in closed position.

n. Insert rigging pin (1) through aft bellcrank (2) and bracket just below canopy actuator.

o. Insert rigging pin (9) through central bellcrank (10) and bracket immediately below canopy deck in access 1123-1.

p. Ensure that gap at each stopface does not exceed 0.003 inch with rigging pin installed. Zero clearance is permissible. If gaps meet tolerance, proceed to step q. If gap do not meet tolerance, perform the following:

1. Remove interior canopy release handle.

2. Remove left and right interior panels enclosing canopy roller, hooks, and pushrods within cockpit sills.

3. Install interior canopy release handle.

CAUTION

Exert special care when adjusting stopface clearances. Excessive tightening at one stopface can cause other stopfaces to exceed the maximum allowable gap.

4. Cut lockwire, loosen locknuts, and adjust two forward pushrods (12) and two aft pushrods (13) to close gap between stopfaces on overcenter links (14) attached to hooks. Ensure that maximum allowable gap of 0.003 inch at each stopface is not exceeded.

CAUTION

Exercise care when tightening pushrod locknuts to prevent misalignment of pushrod end bearings. Interference between pushrods and bellcranks will cause an improper rigging indication.

5. Tighten locknuts on pushrods and secure with MS20995C20 lockwire.

6. Replace any panels or equipment removed in substeps 1 through 5.

g. Extend exterior canopy release handle and align with airframe stowage slot.

NOTE

Check that interior canopy release handle is still positioned to close.

r. To adjust canopy roller chain, check that adjusting link (15) is positioned as shown in figure 2-9.

s. Disconnect roller chain adjusting link and adjust link until chain is just tight enough so that it cannot be connected; then back off on adjusting link 1/2 turn and connect roller chain (16).

t. Remove rigging pins (1 and 9).

u. Position canopy release mechanism to the open and closed positions. Check that there is no interference between the roller chain adjusting link and roller chain sprockets.

v. Close and lock canopy.

w. Check canopy release hooks and canopy rollers for proper longitudinal clearance by alternately inserting shank end of No. 56 (0.0465-inch diameter) and No. 46 (0.081-inch diameter) new or measured drills between throat of hook (17) and canopy roller (18).

x. If proper clearance is not indicated, loosen canopy roller bracket bolts (19) and adjust canopy roller bracket (20) forward or aft as required to obtain clearance. Tighten bracket bolts to 70 (+15, -10) pound-inches torque.

y. Check hooks and canopy rollers for proper vertical clearance by applying piece of masking tape to face of each hook. Close and lock canopy.

z. Open canopy and check appearance of tape. Proper engagement of hooks will cause tape to tear or abrade. If tape is not torn or abraded, adjust canopy roller as follows:

1. Remove canopy roller bracket bolts (19) and serrated shim (21).

2. Add or remove shims (16) as required and install bracket bolts (19).

3. Tighten bracket bolts to 70 (+15, -10) pound-inches torque.

aa. Check overcenter spring movement for proper operation. If necessary, adjust washer(s) (23) on bolt (24) to maintain required 0.12-inch clearance between spring and head of bolt through bellcrank.

NOTE

If new canopy has been installed, a horizontal adjustment of the canopy release hooks and canopy eccentrics will be required to prevent the hooks from binding or striking the canopy roller brackets. This is accomplished by adding or removing special washers as necessary (paragraph 2-51).

ab. If no further adjustments are required, perform canopy system operational checkout (paragraph 2-23).

ac. If stopface gaps were adjusted, perform the following:

1. Remove interior canopy release handle (paragraph 2-47) at right side of cockpit to permit installation of interior panels.

2. Remove old sealant from interior panel mounting surfaces along cockpit sill and apply MIL-S-8802 sealing compound.

3. Install left and right interior panels along cockpit sills.

4. Install interior canopy release handle (paragraph 2-47).

ad. Install sweep generator (T.O. 1A-7D-2-14).

ae. Close accesses 1113-1, 2113-2, 1122-1, 2122-1, 1123-1, 2122-5, and 1122-4.

2-36. CANOPY STOPBOLT AND STRIKER ADJUSTMENT. (See figure 2-10.)

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
2-10(6)	215-00181-1	Canopy striker gage assembly	Adjust canopy stop-bolt and striker
	MIL-M-7404	Maintenance stand	For maintenance at cockpit level
	215-00280-1	40° canopy support strut	Support canopy in open position
TT02D015-09-76			

WARNING

Ensure that ejection controls safety handle is in the fully down-and-locked position and safety pins (215-00261-1) are installed in prime initiator, interior canopy jettison initiator and canopy-actuated initiator (T.O. 1A-7D-2-1). This will prevent inadvertent canopy jettison or seat ejection and possible serious injury to personnel.

CAUTION

To prevent structure damage, ensure that access panel restrictions are observed before opening canopy (T.O. 1A-7D-2-1).

Open canopy slowly in cold weather to prevent possible shearing of canopy actuator rod end shear pin (T.O. 1A-7D-2-1).

a. Open access 1122-3.

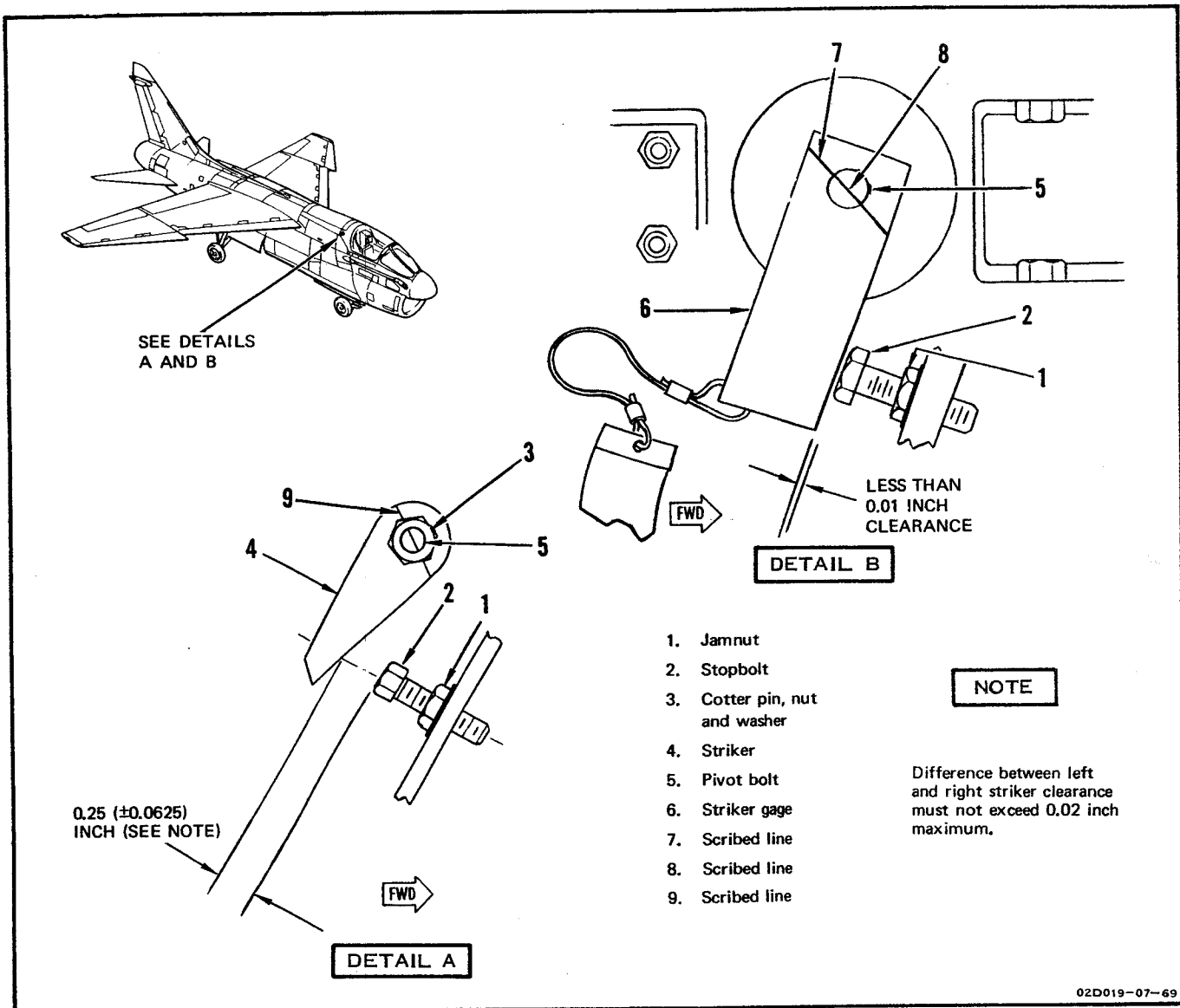


Figure 2-10. Canopy Stopbolt and Striker Adjustment

b. Open canopy and install 40° canopy support strut (paragraph 1-52).

c. Cut lockwire securing jamnuts (1) on left and right stopbolts.

d. Loosen jamnuts and turn stopbolts (2) in two complete turns.

e. Remove cotter pin, nut, and washer (3) and striker (4) from left pivot bolt (5).

f. Place canopy striker gage (6) down and pointing aft, align scribed

lines (7) on the gage with scribed lines (8) on pivot bolt, and slide gage onto pivot bolt (5).

g. Turn left stopbolt (2) out toward face of gage (6) until a 0.01-inch feeler gage cannot be slipped between gage and stopbolt. Tighten stopbolt jamnut (1).

h. Remove canopy striker gage (6) and install striker (4), ensuring that striker scribed line (9) is aligned with pivot bolt scribed line (8).

i. Install washer, nut, and new cotter pin (3) on canopy pivot bolt (5).

j. Secure jamnut on left stopbolt with MS20995C32 lockwire.

k. Repeat steps e through j for right stopbolt adjustment.

l. With canopy in normal open position (40°), check that both stopbolts are 0.25 (± 0.0625) inch from strikers. Check that clearance between stopbolts and strikers does not vary more than 0.020 inch.

m. If no further adjustments are required, perform the following:

1. Close canopy and access 1122-3.

2. Perform canopy system operational check (paragraph 2-23).

2-37. CANOPY ACTUATOR AND COUNTERBALANCE CYLINDER ADJUSTMENT. (See figure 2-11.)

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
	215-00280-1	40° canopy support strut	Support canopy in normal open position
	MIL-M-7404	Maintenance stand	For maintenance at cockpit level

TT02D016-11-68

WARNING

Ensure that ejection controls safety handle is in the fully down-and-locked position and safety pins (215-00261-1) are installed in prime initiator, interior canopy jettison initiator, and canopy-actuated initiator (T.O. 1A-7D-2-1). This will prevent inadvertent canopy jettison or seat ejection and possible serious injury to personnel.

CAUTION

To prevent structure damage, ensure that access panel restrictions are observed before opening canopy (T.O. 1A-7D-2-1).

Open canopy slowly in cold weather to prevent possible shearing of canopy actuator rod end shear pin (T.O. 1A-7D-2-1).

Misrigging of canopy actuator or counterbalance cylinder can cause cracking of aft former forward of actuator attach fitting.

a. Open access 1122-3.

b. Open canopy and install 40° canopy support strut (paragraph 1-52).

c. Completely depressurize canopy counterbalance cylinder. Remove valve core.

d. Remove cotter pin (1), nut (2), washers (3), and bolt (4) securing actuator rod end and counterbalance cylinder fork to canopy attach bracket.

e. With actuator piston fully extended, adjust actuator rod end to allow insertion of bolt (4) through canopy attach bracket and rod end. Turn rod end counterclockwise, if required, to align slot in rod end with lockwasher tang. Do not exceed 180° additional rotation.

f. Tighten locknut (6) and secure with MS20995C32 lockwire.

CAUTION

With canopy actuator and counterbalance disconnected, canopy must not be rotated past 40°. Damage to canopy pivot bolts will result.

g. Support canopy and remove 40° strut. Lower canopy slowly to fully closed and locked position.

h. Check for a minimum of 0.050-inch clearance between shoulder on actuator rod and top of cylinder housing. If clearance cannot be obtained, canopy eccentrics must be adjusted.

i. With counterbalance cylinder piston fully extended, adjust counterbalance cylinder rod end (7) to allow insertion of bolt (4) through canopy attach bracket and fork (8). Do not install bolt at this time.

j. Turn counterbalance cylinder rod end out of piston three complete turns. Continue turning, if required, to align slot in piston rod with lockwasher tang. Do not exceed 180° additional rotation. Tighten locknut (9) and secure with MS20995C32 lockwire.

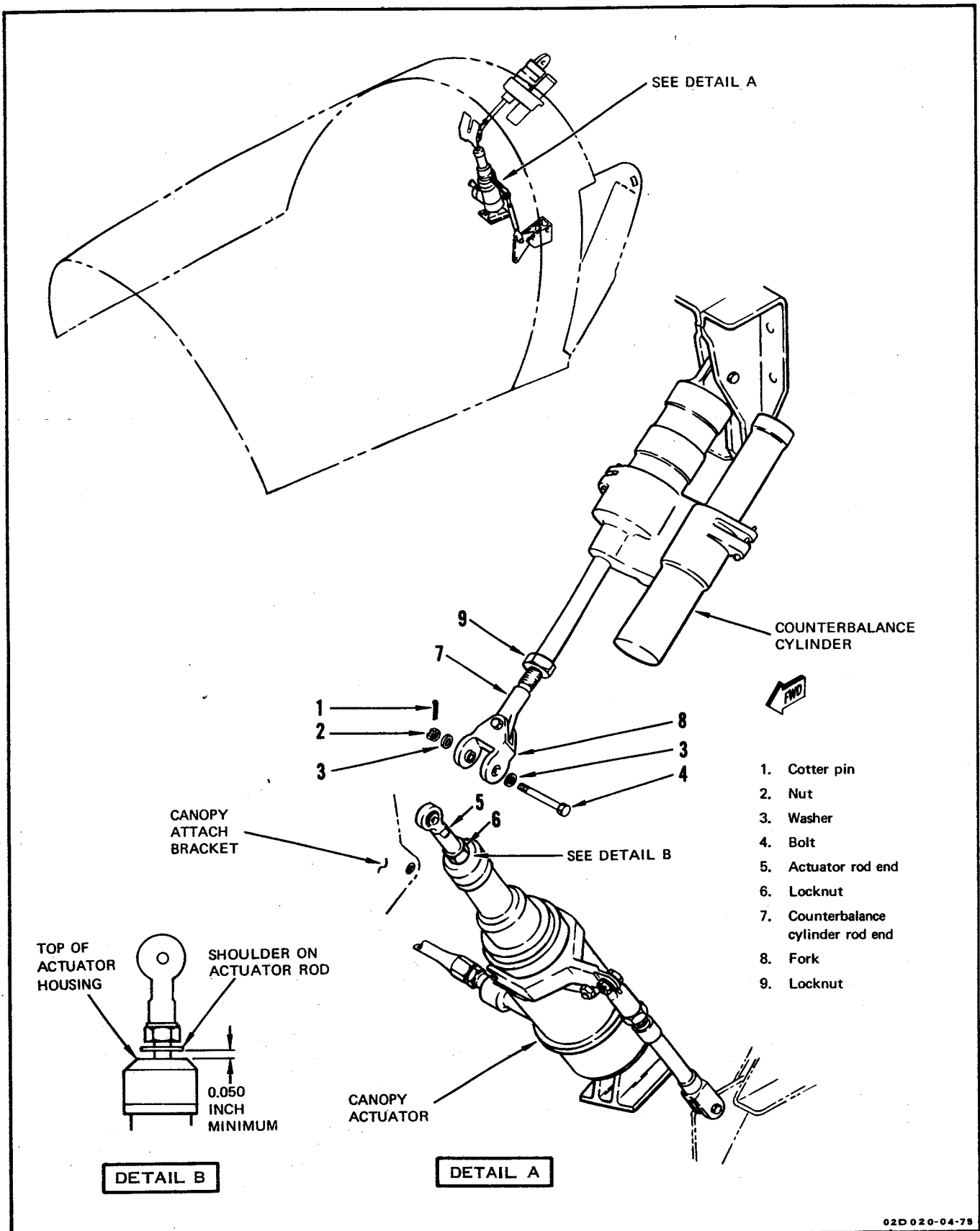


Figure 2-11. Canopy Actuator and Counterbalance Cylinder Adjustment

k. Position canopy counterbalance cylinder fork (8) together with actuator rod end (5) to canopy attach bracket and secure with bolt (4), washers (3), nut (2), and new cotter pin (1).

l. Close access 1122-3.

m. Open canopy and install 40° canopy support strut (paragraph 1-52).

n. Install valve core and service canopy counterbalance cylinder (T.O. 1A-7D-2-1).

o. If required, service canopy actuator (T.O. 1A-7D-2-1).

p. Remove 40° canopy support strut (paragraph 1-52).

q. Close and open canopy several times, checking that actuator and counterbalance cylinder operate properly with no evidence of binding.

2-38. CANOPY GLASS REMOVAL AND INSTALLATION.

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
2-12	218-09887-102	Canopy glass drill fixture set	Provide improved method for drilling and clamping canopy glass
		Standard 0.213-inch reamer with pilot	Ream holes in canopy glass
	TS-112.062-1681 (Cleveland Twist Drill Co. Cleveland, Ohio)	Double margin drill bit (0.187-inch diameter)	Drill holes in canopy glass
	5130-00177-6977 (preferred)	Drill motor, 1/4-inch pneumatic, 4,500 rpm	Provide energy for drilling operation
	5130-00914-4556 (suitable substitute)	Drill motor, 1/4 inch, 115 V ac electric, 4,500 rpm	Provide energy for drilling operation
	GGG-W-686	Torque wrench, 0 to 15 pound-inches	Tighten canopy glass retaining screws to specified torque

Tools Required (Continued)

Figure & Index No.	Part Number	Nomenclature	Use and Application
	850-2 1/2 (Semco Sales and Service, Inc., Los Angeles, Calif.)	Sealant gun	Seal canopy to canopy frame
	MIL-C-9834	Vacuum cleaner	Clean shavings from canopy
	MIL-M-7404	Maintenance stand	For maintenance at cockpit level
			TT02D017-11-82

2-39. REMOVAL. (See figure 2-12.)

a. Remove canopy (paragraph 2-28), and place on felt-covered work bench.

b. Remove diaphragm seal (paragraph 2-41).

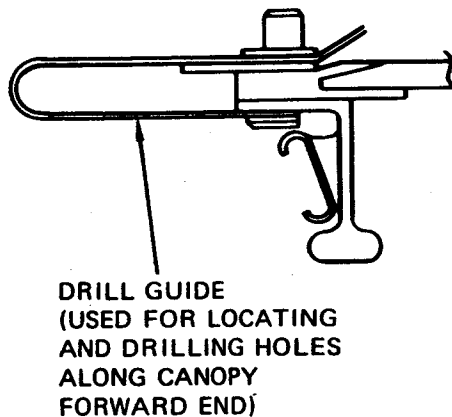
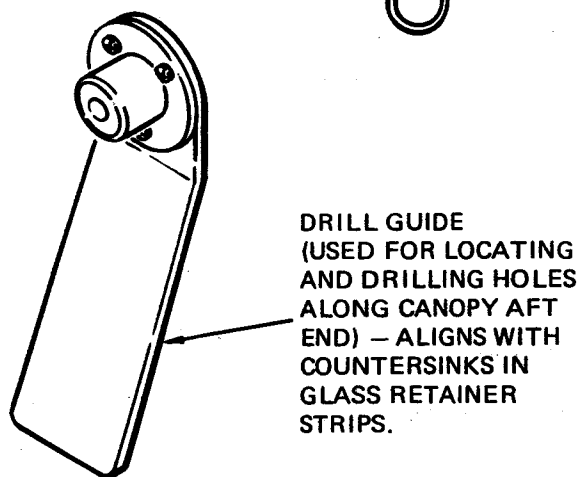
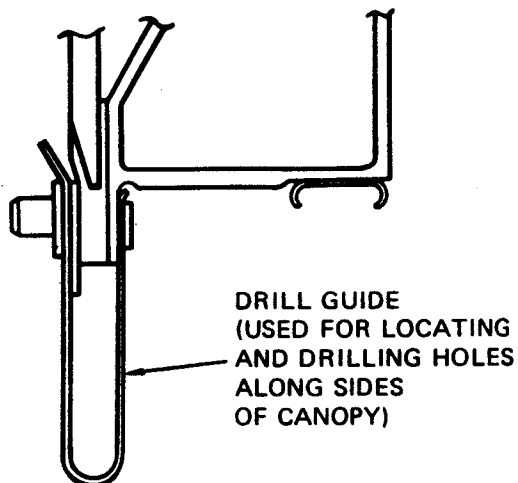
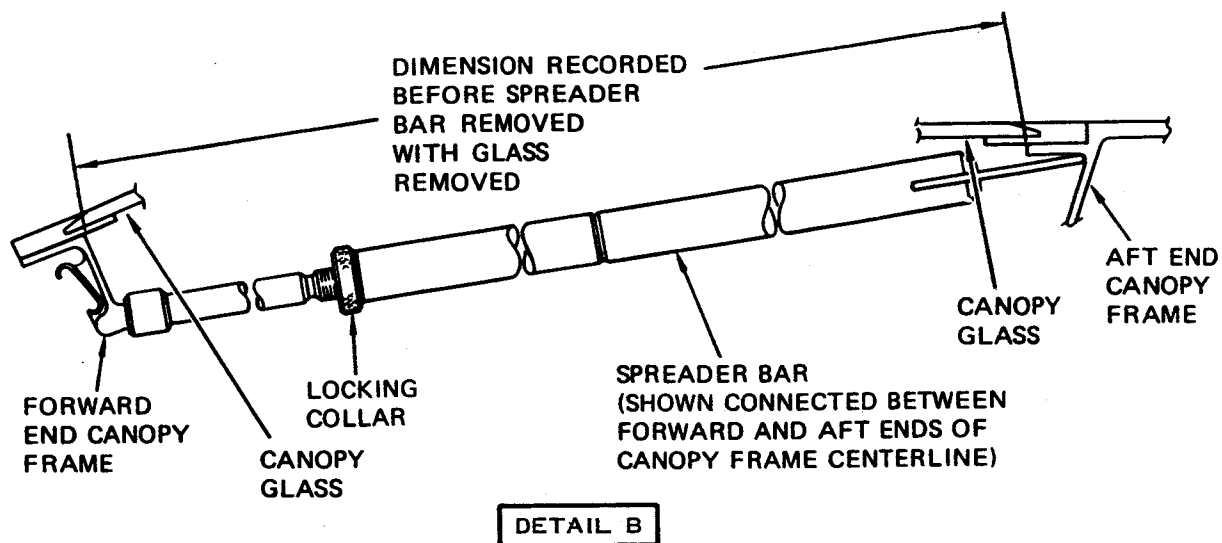
c. Remove pilot's mirrors.

d. Remove screw from centerline of aft canopy frame to provide clearance for drill fixture set spreader bar.

e. Assemble spreader bar and position between forward and aft ends of canopy frame at canopy centerline.

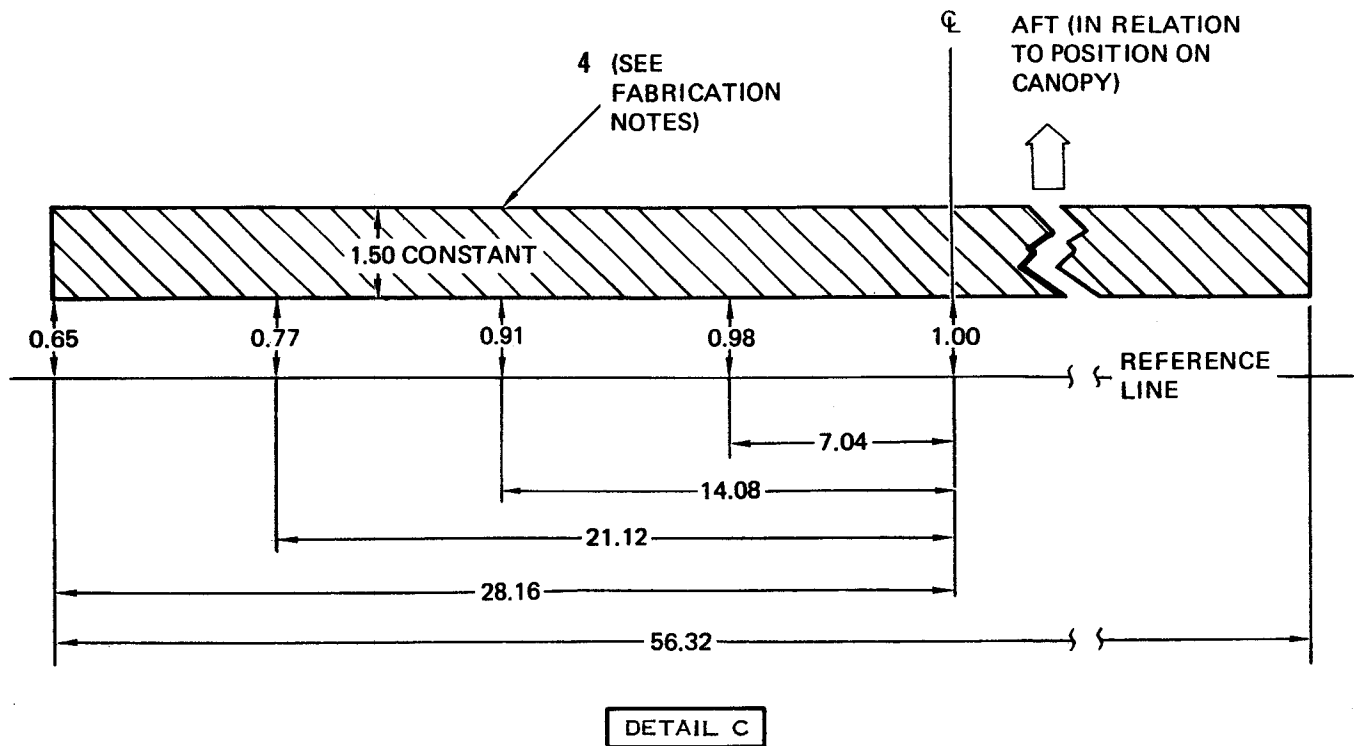
f. Adjust length of spreader bar to restrain canopy frame securely and prevent frame warpage after canopy glass is removed.

g. Tighten locking collar on spreader bar to prevent inadvertent change to spreader bar adjustment.



02D021-02-01-83

Figure 2-12. Canopy Glass Removal and Installation. (Sheet 2)



FABRICATION NOTES

1. All dimensions are in inches.
2. Make from 0.050 thick, 7075-T6 aluminum sheet.
3. Leading and trailing edges are contoured.
Establish contour using dimensions from reference line or straight edge of aluminum sheet.
4. Left and right sides are symmetrical.

02D021-03-01-83

Figure 2-12. Canopy Glass Removal and Installation (Sheet 3)

NOTE

Dimension between centerline screws at forward and aft ends of canopy frame must be maintained within 0.1 inch during installation of new canopy glass.

h. Measure and record dimension between centerline screws at forward and aft ends of canopy frame.

i. Remove nuts (1), washers (2), and screws (3) securing forward retainer strip (4) to canopy frame. Remove retainer strip.

j. On airplanes after T.O. 1A-7D-827, remove entrance handle (14) by removing nuts (5), washers (6), and screws (13).

k. Remove nuts (5), washers (6), and screws (7) securing left and right side retainer strips (8) to canopy frame. Remove right and left side retainer strips.

l. Remove nuts, washers, and screws (9 and 10) securing aft retainer strips (11) and aft corner retainer strips (8) to canopy frame. Remove retainer strips.

m. Remove canopy glass (12) from canopy frame.

CAUTION

To prevent damage to canopy frame and retainer strips, use care when removing sealant.

Ensure all previously applied sealant is removed and canopy frame surface is smooth in areas of canopy glass contact.

n. Remove sealant from retainer strips and canopy frame.

NOTE

Spreader bar may be removed to facilitate canopy frame maintenance provided dimension is known between forward and aft bows of canopy frame. Same dimension must be established before replacement glass can be drilled or fitted.

o. If required, remove spreader bar. Install and adjust spreader bar to same dimension recorded, following canopy frame maintenance.

2-40. INSTALLATION. (See figure 2-12.)

CAUTION

The canopy glass requires exceptional care when handling. Do not handle or carry glass by its sides. Scratches and most solvents will cause the glass to deteriorate and impair optical qualities of the glass. Do not force-fit the canopy glass. Cracks and premature failures can result from stress induced during installation. Do not attempt to heat or reform glass. All fitting, trimming and installation shall be done at room temperature (approximately 70°F).

a. Correct any roughness of canopy frame mating surfaces that would affect fit of canopy glass (12).

b. Visually check replacement canopy glass for defects. Pay special attention to nylon edging for voids, delamination, or other unbonded conditions.

c. Inspect internal surface of canopy nylon edging. Correct imperfections by sanding lightly with No. 50 to 80 grit sandpaper.

d. Deleted

NOTE

Edge A is defined as the inner edge of the nylon edging on the outside surface of the canopy (detail A).

e. With soft pencil, mark line on outside surface of nylon edging 1-3/16 inch out from edge A at forward and aft ends of glass.

f. Trim aft end of glass flush with established line.

g. Verify that spreader bar is installed and adjusted to provide same dimension between forward and aft canopy frames as recorded during glass removal.

h. Place canopy glass on frame and check fit.

i. Center glass by ensuring right and left sides of glass extend equally below sides of frame.

j. Mark location.

k. Remove canopy glass and bevel aft edge to fit frame detent.

l. Realign glass on frame.

CAUTION

When clamping glass to frame, use only sufficient pressure on clamps to pull glass to frame.

NOTE

Three drill guides are provided for locating holes to be drilled. The drill guides are also used for positioning the canopy glass retainer strips to align retainer strip screw holes with holes in the canopy frame. The drill guides are used as shown in figure 2-12. A 0.187-inch drill bit is used in conjunction with all three drill guides.

Start clamping operation at canopy centerline, working to left and right sides and from aft to forward end.

m. Using clamps provided with drill fixture set, secure glass and retainer strips (8 and 11) to canopy frame.

n. Using drill guides, ensure holes in retainer strips align with holes in canopy frame. A flashlight may be used from inside area of canopy to ensure that retainer strips align with holes in frame at aft end of canopy.

NOTE

If line protrudes beyond frame, additional trimming is required on aft edge of canopy glass.

o. Check that pencil line on forward end of glass (step e) is aft of or flush with frame.

NOTE

Even though within tolerance, thickness of the replacement glass may be different, through area of nylon edging, than glass being replaced. This thickness variance may require replacement

of the forward retainer strip because of misalignment of retainer strip holes with holes in the canopy frame.

Holes in the canopy frame and retainer strip are aligned properly if the drill guide seats perfectly in the countersink recess of the retainer strip.

p. Using drill guide and clamps, check that holes in forward retainer strip (4) align with holes in canopy frame. If holes align, proceed to step q. If holes do not align, fabricate and drill new retainer strip as follows:

1. Fabricate new retainer strip (4) in accordance with instructions shown in detail C.

2. Clamp retainer strip in place on canopy. Ensure proper fit.

3. Using drill guide and standard 3/16-inch drill bit, mark holes in retainer strip. Do not drill through retainer strip.

4. Remove retainer strip from canopy.

5. Using No. 11 drill bit and 1000 countersink, drill and countersink holes in retainer strip.

6. Apply protective primer coat to new retainer strip (T.O. 1A-7D-3).

7. Use drill guide to ensure alignment, and clamp retainer strip in place on canopy.

8. Continue with following procedures.

CAUTION

Two nutplates are installed at aft corner retainer strips (8) on left and right sides of canopy. Use care to avoid drilling into nutplates. It is recommended that these holes be only partially drilled. Final drilling will be completed after glass removal.

q. While exerting special care to avoid damaging canopy glass and frame, drill holes through canopy glass as follows:

1. Use drill guides as shown in figure 2-12.

NOTE

Double margin drills provide a much improved quality of hole compared to standard twist drills. The use of standard twist drills is not recommended even when the drilled hole is finished with a reamer.

2. Use 0.187-inch double margin drill bit.

3. Measure overall thickness of canopy glass, canopy frame, and retainer strip at forward end of canopy. Use measurement to adjust drill stop for purpose of limiting drill penetration through canopy glass.

4. Operate drill motor at 4,500 rpm.

5. Use only sharp, good condition drills.

6. Best results will be obtained by coating drill with drilling wax (Johnsons Stik-Wax No. 140, or equivalent), drilling a single hole (maximum), cleaning drill, and repeating with next hole.

- r. Mark nylon edging along lower side of frame, left and right sides, and along forward edge of forward former.

- s. Remove retainers and glass from canopy frame.

- t. Complete drilling procedure for four holes where nutplates are used.

- u. Trim forward and side edges of glass to marked lines.

- v. Using 0.213-inch reamer, ream holes in canopy glass.

- w. Deburr all attachment holes and vacuum clean area of canopy frame to remove chips and foreign matter.

NOTE

Seal edge around entire periphery of acrylic with MIL-S-8802. Care should be taken to insure that edge is completely sealed. Reinspect edges to verify sealing after installation of acrylic.

- x. Apply MIL-S-8802 sealing compound to canopy glass mating area of canopy frame and to retainers. Sealant shall be applied evenly to form pressurized seal.

- y. Peel back protective covering approximately 6 inches from edge of canopy glass.

NOTE

Initial tightening of screws should only be such as to begin to force the sealant from between the assembled components. Final screw torquing shall be accomplished after all screws have been installed and initially secured.

- z. Position glass on canopy frame. Position aft retainer strips (11) and secure retainer strips to canopy frame with screws (10).

- aa. Position and clamp forward and side retainer strips (4 and 8) in several places.

- ab. Fill holes with MIL-S-8802 sealing compound, and place attaching screws (3, 7, and 9) in holes.

- ac. Secure attaching screws with washers (2 and 6) and nuts (1 and 5).

- ad. On airplanes after T.O. 1A-7D-827, secure entrance handle (14) with screws (13), washers (6), and nuts (5).

- ae. Tighten all screws to 7 - 8 pound-inches torque.

- af. Clean excess sealing compound from canopy glass and frame. Use sealing compound squeezeout to form aerodynamic seal.

- ag. Remove spreader bar.

- ah. Install pilot's mirrors.

- ai. Install canopy diaphragm seal (paragraph 2-41).

- aj. Install canopy (paragraph 2-28).

ak. Check for out-of-tolerance conditions (T.O. 1A-7D-3) resulting from glass installation.

al. If required, touch up inside and outside of canopy with paint (T.O. 1A-7D-3).

am. Remove protective covering from canopy glass.

an. Clean canopy (T.O. 1A-7D-2-1).

ao. Perform canopy system operational checkout (paragraph 2-23).

CAUTION

To prevent damage to sealant, allow sealant to cure thoroughly before performing cockpit leakage test. Normal cure of sealant requires 72 hours at 72°F. Heat, not to exceed 120°F, may be used to accelerate curing time to approximately 40 hours. Heat exceeding 120°F may damage canopy glass.

ap. Perform cockpit leakage test (T.O. 1A-7D-2-1).

2-41. DIAPHRAGM SEAL REMOVAL AND INSTALLATION.**Tools Required**

<i>Figure & Index No.</i>	<i>Part Number</i>	<i>Nomenclature</i>	<i>Use and Application</i>
	215-00280-1	40° canopy support strut	Support canopy in normal open position
	MIL-M-7404	Maintenance stand	For maintenance at cockpit level
	Local Manufacture	Spatula	Press diaphragm seal in place
TT02D018-06-74			

2-42. REMOVAL.**CAUTION**

To prevent structure damage, ensure that access panel restrictions are observed before opening canopy (T.O. 1A-7D-2-1).

Open canopy slowly in cold weather to prevent possible shearing of canopy actuator rod end shear pin (T.O. 1A-7D-2-1).

a. Open canopy and install 40° canopy support strut (paragraph 1-52).

b. Hold seal between thumb and forefinger, and remove seal from retainer with slight outboard to inboard twisting motion.

2-43. INSTALLATION.

a. Check for any defects in striker or seal retainer before installing new diaphragm seal.

CAUTION

Use care to avoid damaging seal during installation.

b. Install diaphragm seal in retainer with holes to inside of cockpit.

c. Press seal into retainer with smooth blunt-nosed spatula made of 2 15/16-inch-wide phenolic or aluminum.

d. Remove canopy support strut (paragraph 1-52).

e. Apply No. 2130 talcum powder (Whitaker, Clark and Daniels) or equivalent to striker.

f. Carefully close and lock canopy, checking for evidence of binding.

CAUTION

To prevent structure damage, ensure that access panel restrictions are observed before opening canopy (T.O. 1A-7D-2-1).

Open canopy slowly in cold weather to prevent possible shearing of canopy actuator rod end shear pin (T.O. 1A-7D-2-1).

g. Open canopy.

h. Transfer of talcum powder from striker diaphragm seal should indicate contact with diaphragm seal at approximate center of seal.

i. Apply strips of 0.048 gage (approximately 2 inches long) solder wire (FSN 3439-00-133-1108 or equivalent) at approximately 8-inch intervals around canopy seal.

j. Close and lock canopy.

k. Open canopy and check diaphragm seal striker engagement by measuring depression in solder wire. Depression in wire should be 0.12 (+0.12, -0.06) inch.

l. If clearance or proper fit is not indicated, adjust canopy eccentrics (paragraph 2-34).

m. Perform cockpit leakage test (T.O. 1A-7D-2-1).

2-44. CANOPY PIVOT BOLT REMOVAL AND INSTALLATION.

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
2-6A	215-00280-1	40° canopy support strut	Support canopy in normal open position
	GGG-W-886	Torque wrench, 10 to 150 pound-inches	Tighten canopy pivot bolt
	MIL-M-7404	Maintenance stand	For maintenance at cockpit level
	Local fabrication (optional)	Thread protector	Protect threads of canopy pivot bolts during removal/installation.
TT02D018-07-77			

2-45. REMOVAL. (See figure 2-13.)

CAUTION

To prevent structure damage, ensure that access panel restrictions are observed before opening canopy (T.O. 1A-7D-2-1).

Open canopy slowly in cold weather to prevent possible shearing of canopy actuator rod end shear pin (T.O. 1A-7D-2-1).

NOTE

Canopy pivot bolts will be replaced as a matched set. Matched sets are identified by like numbers.

a. Open canopy and install 40° canopy support strut (paragraph 1-52).

b. Completely depressurize canopy counterbalance cylinder. Remove valve core.

c. Support canopy, remove support strut (paragraph 1-52) and close canopy.

d. Open access 1122-3.

e. Remove cotter pins (1), nuts (2), washers (3), strikers (4), washers (5 and 6), and retainers (7) from left and right canopy pivot bolts.

NOTE

Use of thread protector is optional.

e-1. To prevent possible thread damage, install locally fabricated thread protectors on canopy pivot bolts (figure 2-6A).

f. Remove old sealant from canopy pivot bolt head and airframe sill.

g. Remove canopy pivot bolts (8) and washers (9). Using soft lead pencil,

mark position of eccentrics and secure in place with tape.

2-46. INSTALLATION. (See figure 2-13.)

a. Coat bearing surfaces of replacement bolts and washers with MIL-G-23827 grease. Wipe off excess grease.

b. Carefully remove tape from eccentrics and align to position noted during removal.

c. Insert washers (9) and canopy pivot bolts (8). Ensure canopy pivot bolts (8) and airframe sill are sealed (T.O. 1A-7D-23).

c-1. If used, remove thread protectors from canopy pivot bolts.

d. Install retainers (7), washers (5 and 6), and strikers (4), aligning scribe lines on strikers with scribe lines on bolts.

e. Raise canopy and check that both strikers are approximately 0.25 inch from stopbolts. Check that clearance between stopbolts and strikers does not vary more than 0.020 inch.

f. Remove 40° canopy support strut (paragraph 1-52).

g. Close canopy.

h. Install washers (3) and nuts (2) on canopy pivot bolts. Tighten nuts as follows:

1. Tighten nuts to 50 (± 25) pound-inches torque.

2. Reduce torque to zero.

3. Tighten nuts finger-tight and loosen to align with next cotter pin hole.

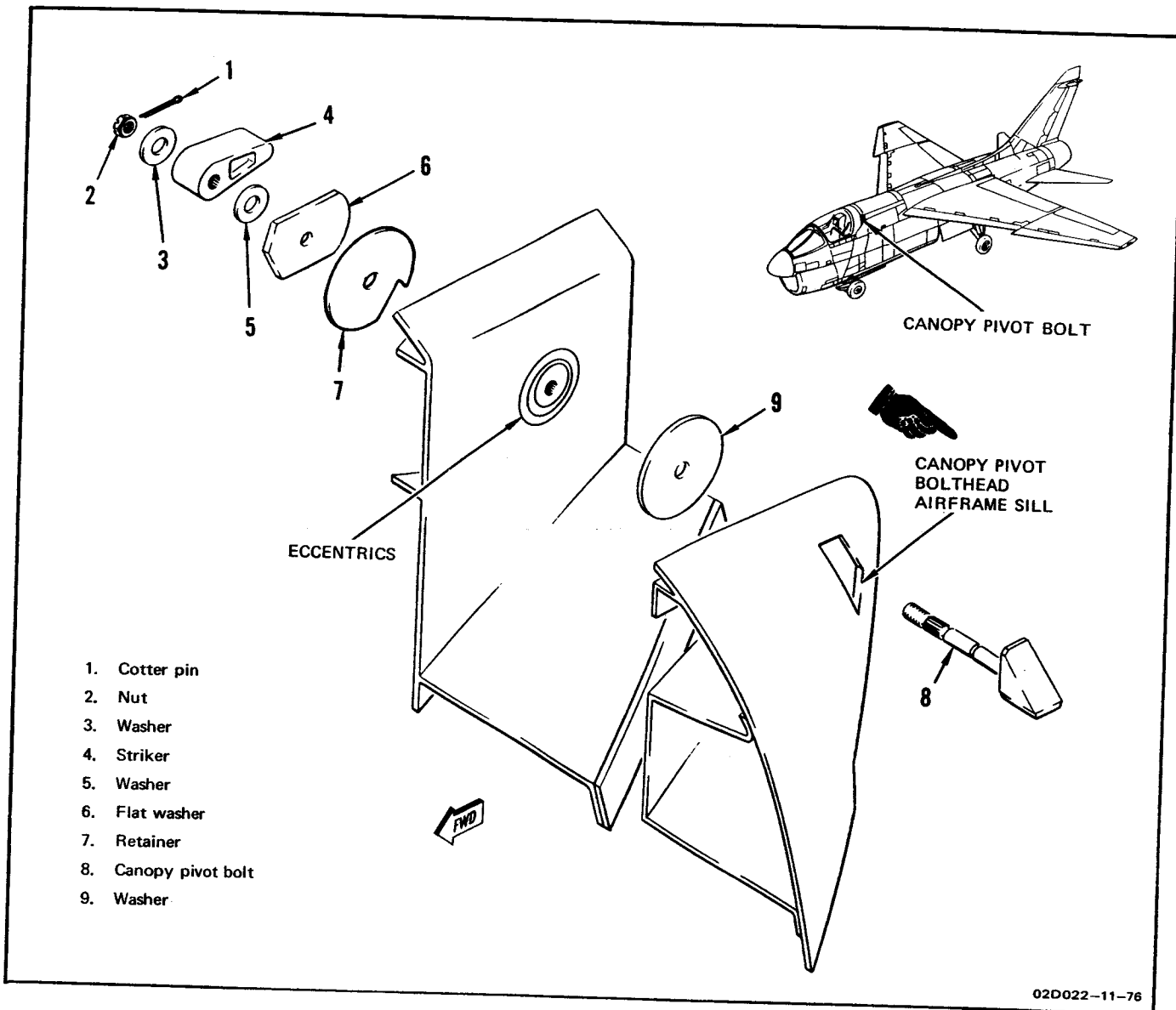


Figure 2-13. Canopy Pivot Bolt Removal and Installation

i. Install new cotter pins (1).

j. Close access 1122-3.

CAUTION

Open canopy slowly in cold weather to prevent possible shearing of canopy actuator rod end shear pin (T.O. 1A-7D-2-1).

k. Install valve core and service canopy counterbalance cylinder (T.O. 1A-7D-2-1).

l. Open and close canopy; check for binding and proper alignment.

m. Seal canopy pivot bolthead in airframe sill with MIL-S-8802 sealant. (Refer to T.O. 1A-7D-23, Airframe Sealing Section.)

**2-47. INTERIOR CANOPY RELEASE HANDLE
REMOVAL AND INSTALLATION.****Tools Required**

<i>Figure & Index No.</i>	<i>Part Number</i>	<i>Nomenclature</i>	<i>Use and Application</i>
	215-00280-1	40° canopy support strut	Support canopy in normal open posi- tion TT02D020-11-68

2-48. Remove and install interior canopy release handle at right side of cockpit, observing the following.

WARNING

Ensure that ejection controls safety handle is in the fully down-and-locked position and safety pins (215-00261-1) are installed in prime initiator and interior canopy jettison initiator (T.O. 1A-7D-2-1). This will prevent inadvertent canopy jettison, or seat ejection and possible serious injury to personnel.

CAUTION

To prevent structure damage, ensure that access panel restrictions are observed before opening canopy (T.O. 1A-7D-2-1).

Open canopy slowly in cold weather to prevent possible shearing of canopy actuator rod end shear pin (T.O. 1A-7D-2-1).

- a. Open canopy and install 40° canopy support strut (paragraph 1-52).
- b. Remove support strut following installation of handle.

**2-48A. EXTERIOR CANOPY RELEASE HANDLE
MECHANISM REMOVAL AND INSTALLATION.****Tools Required**

<i>Figure & Index No.</i>	<i>Part Number</i>	<i>Nomenclature</i>	<i>Use and Application</i>
	215-00280-1	40° canopy support strut	Support canopy in normal open position. TT02D056-04-77

WARNING

Ensure that ejection controls safety handle is in down-and-locked position and safety pins (215-00261-1) are installed in seat and interior canopy jettison initiators (T.O. 1A-7D-2-1). This will prevent inadvertent seat ejection or canopy jettison.

2-48B. REMOVAL. (See figure 2-13A.)

WARNING

To prevent injury to personnel or damage to canopy release system components, the 40° canopy support strut must be installed in accordance with specific instructions provided in T.O. 1A-7D-2-1.

CAUTION

Manually restrain canopy when opening to prevent damage to canopy actuator rod end shear pin and canopy pivot bolts.

NOTE

If removing handle only, perform only steps a and b.

- a. Open canopy and install 40° canopy support strut (T.O. 1A-7D-2-1).
- b. Drill out rivets (1) attaching handle (2) to shaft (7), and remove handle and spring (3).
- c. Remove screws from left interior panel enclosing release handle mechanism in cockpit sill. Remove panel.
- d. Remove shaft (7) from sprocket (17).
- e. Check that chain adjusting link (8) is positioned as shown in figure 2-9; then disconnect chain (9) at adjusting link.
- f. Remove bolts (10), washers (11 and 12), shim (13), and nuts (14) attaching bracket (15) to airframe bracket.
- g. Remove bushing (16).

h. Remove sprocket (17, bracket (15) and shim (18) from cockpit sill.

2-48C. INSTALLATION. (See figure 2-13A.)

NOTE

Lightly lubricate all friction surfaces with MIL-G-21164 grease prior to installation.

If installing handle only, proceed to step d.

a. Preassemble sprocket (17), bushing (16), bracket (15), and shim (18).

b. Install preassembled parts through cockpit sill into housing, and attach bracket (15) to airframe bracket with bolts (10), washers (11 and 12), shim (13), and nuts (14).

c. Install shaft (7) into sprocket (17) as far as possible, ensuring pin in shaft engages slot in sprocket.

d. Install spring (3) against shim (18).

e. Holding shaft (7) in sprocket, position handle (2) on shaft.

f. Install rivets (1). Both ends of rivets should be flush with handle.

g. Check that trigger (6) latches properly in housing.

h. Connect chain (9) to sprocket.

i. Perform canopy roller and release mechanism adjustment (paragraph 2-35).

j. Perform canopy system operational checkout (paragraph 2-23).

2-49. CANOPY RELEASE HOOK REMOVAL AND INSTALLATION.

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
	MIL-M-7404	Maintenance stand	For maintenance at cockpit level
TT02D021-11-68			

2-50. REMOVAL. (See figure 2-14.)

a. Open accesses 1113-1, 1122-1, and 1123-1 or 2113-1, 2122-1, and 2123-1.

b. Remove applicable cockpit sill enclosing canopy hook.

c. Remove cotter pin (1), nut (2), washer (3), and bolt (4) securing linkage (5) to hook.

d. Note position and number of special washers on hook pivot bolt, and remove cotter pin (6), nut (7), special washers (8), and hook pivot bolt (9) securing hook to mount. Remove hook (10).

2-51. INSTALLATION. (See figure 2-14.)

a. Install hook pivot bolt (9), special washers (8), nut (7), and new cotter pin (6) to secure hook (10) to mount.

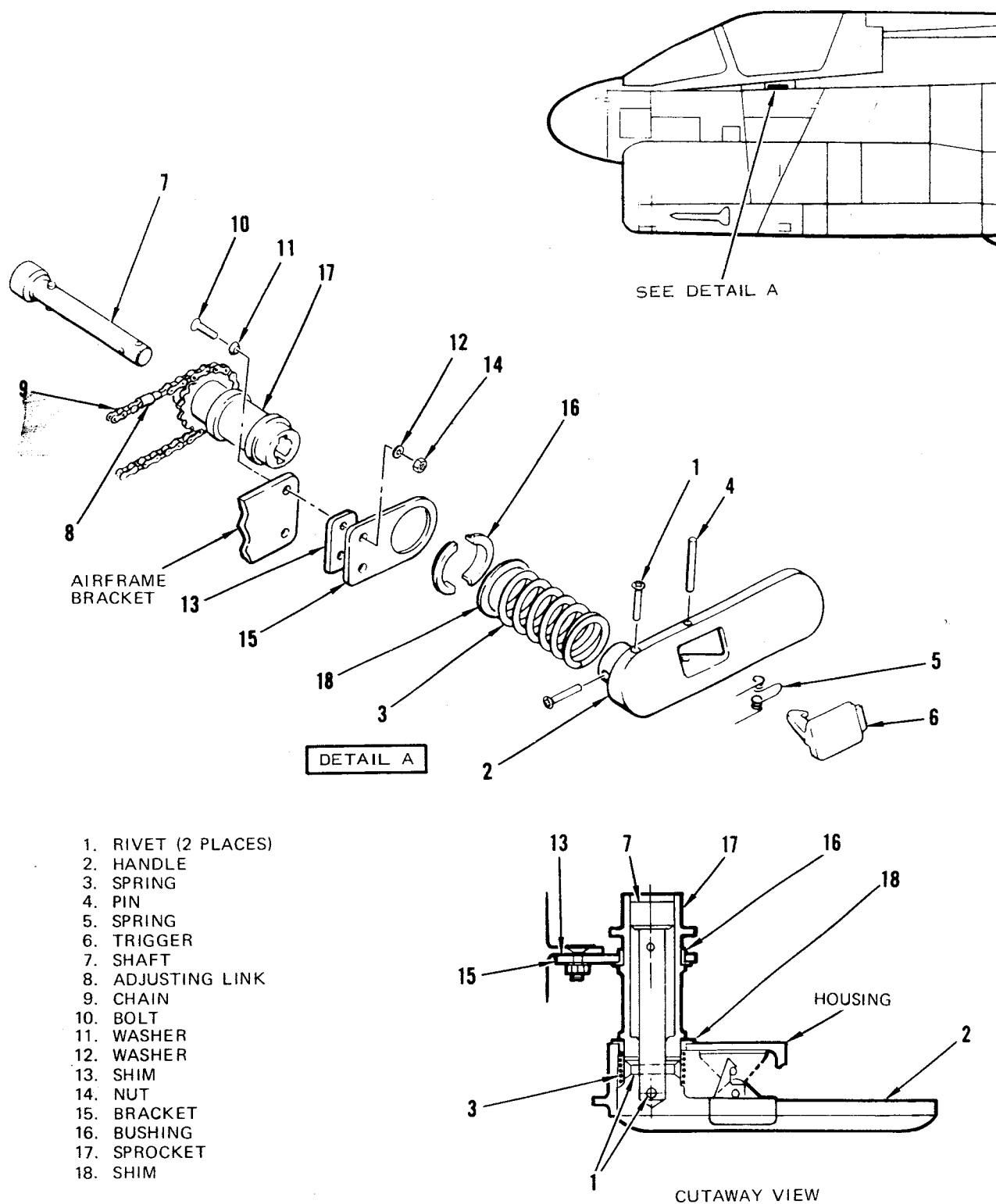
b. Install bolt (4), washer (3), nut (2), and new cotter pin (9) securing hook to linkage (5).

c. Adjust canopy roller and release mechanism (paragraph 2-35).

d. Remove old sealant from cockpit sill and apply MIL-S-8802 sealing compound.

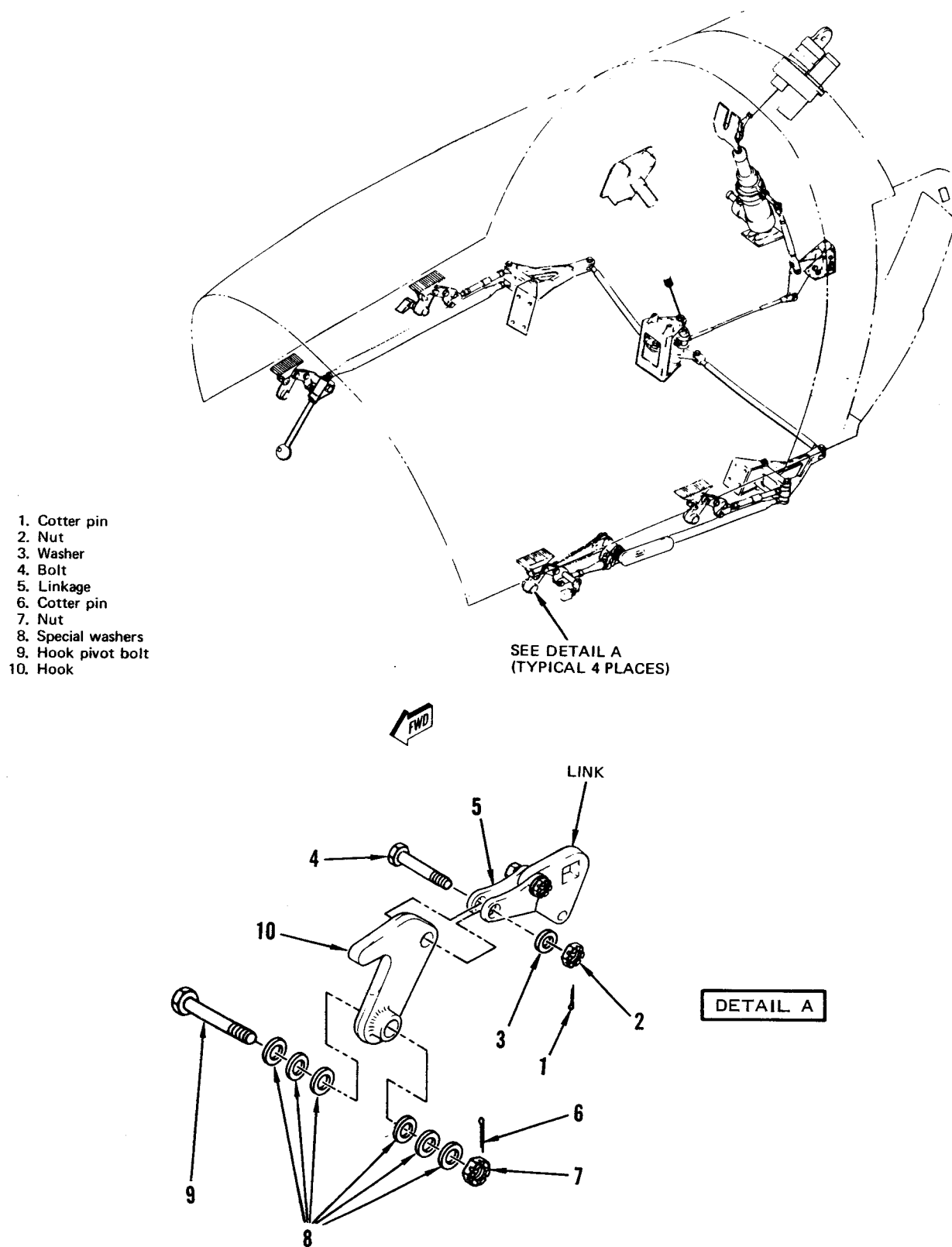
e. Install cockpit sill.

f. Close opened accesses.



02D059-04-77

Figure 2-13A. Exterior Canopy Release Handle Mechanism
 Removal and Installation



02D023-07-69

Figure 2-14. Canopy Release Hook Removal and Installation

2-52. CANOPY ACTUATOR REMOVAL AND INSTALLATION.

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
	215-00280-1	40° canopy support strut	Support canopy in normal open position
	215-00110-3 (End item 215-00110-1)	Rigging pin	Retain bellcrank and canopy release system cables in position while performing removal and installation of canopy actuator
TT02D022-11-68			

2-53. REMOVAL. (See figure 2-15.)

WARNING

Ensure that ejection controls safety handle is in the fully down-and-locked position and safety pins (215-00261-1) are installed in prime initiator, interior canopy jettison initiator (T.O. 1A-7D-2-1). This will prevent inadvertent canopy jettison or seat ejection and possible serious injury to personnel.

CAUTION

To prevent structure damage, ensure that access panel restrictions are observed before opening canopy (T.O. 1A-7D-2-1).

Open canopy slowly in cold weather to prevent possible shearing of canopy actuator rod end shear pin (T.O. 1A-7D-2-1).

a. Open canopy and install 40° support strut (paragraph 1-52).

b. Insert rigging pin through bellcrank and bracket just below canopy actuator.

NOTE

Cartridge may remain installed if actuator is being removed to facilitate other maintenance.

If a new actuator is to be installed, cartridge must be removed.

c. Remove Mk 14 Mod 0 canopy actuator impulse cartridge (paragraph 2-95).

d. Completely depressurize canopy counterbalance cylinder. Remove valve core.

e. Remove cotter pin (1), nut (2), washer (3), and bolt (4) securing canopy release control rod to actuator control fork.

f. Remove cotter pin (5), nut (6), washers (7), and bolt (8) that secure rod end of actuator and canopy counterbalance cylinder to canopy attach bracket. Tie canopy counterbalance cylinder to airplane structure.

g. Remove nut (9), washer (10), and screw (11) securing clamp (12) and lanyard to canopy actuator. Remove clamp from actuator.

h. Remove cotter pin (13), nut (14), washers (15), and bolt (16) securing actuator to canopy deck.

i. Remove actuator (17) from airplane.

2-54. INSTALLATION. (See figure 2-15.)

a. Remove bleed and filler port plug from replacement actuator and check that actuator is properly serviced (T.O. 1A-7D-2-1).

b. Screw bleed and filler port plug into actuator.

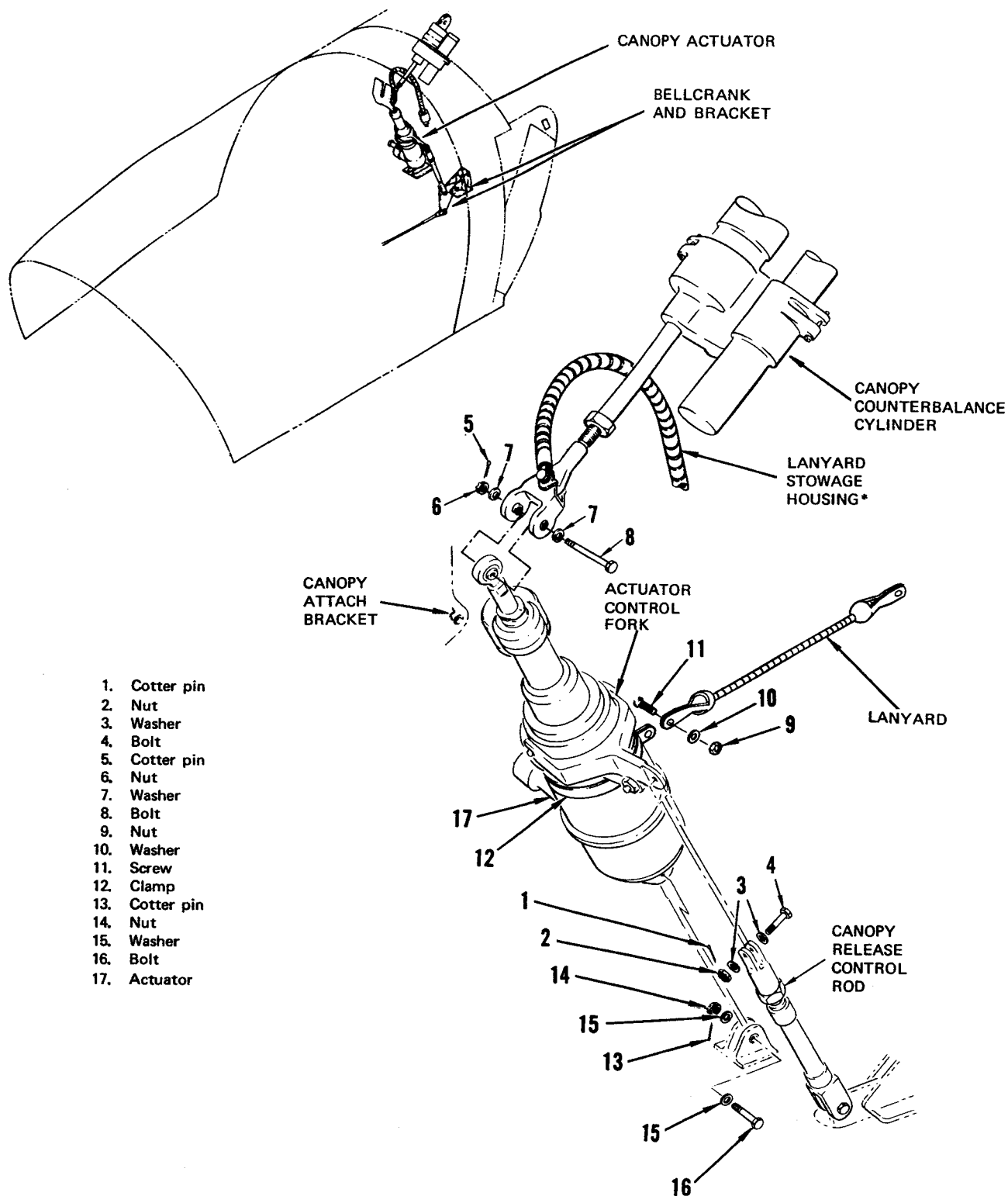
c. Secure actuator (17) to canopy deck with bolt (16), washers (15), nut (14), and new cotter pin (13).

d. Position clamp (12) on canopy actuator and secure to airframe-attached lanyard by installing screw (11), washer (10), and nut (9).

CAUTION

Misrigging of canopy actuator and/or counterbalance cylinder can cause cracking of canopy aft former forward of actuator/cylinder attach fitting.

e. Loosen jamnut and adjust canopy release control rod to mate with actuator control fork. Secure rod end with jamnut.



*Airplanes AF68-8225
and subsequent

02D024-11-69

Figure 2-15. Canopy Actuator Removal and Installation

f. Secure canopy release control rod to actuator control fork with bolt (4), washer (3), nut (2), and new cotter pin (1).

g. Remove rigging pin.

NOTE

Cotter pin (5), nut (6), washers (7), and bolt (8) are installed when performing canopy actuator and counterbalance cylinder adjustment.

h. Perform canopy actuator and counterbalance cylinder adjustment (paragraph 2-37).

i. If removed, install Mk 14 Mod 0 canopy actuator impulse cartridge (paragraph 2-95).

2-55. CANOPY ACTUATOR ROD END REPLACEMENT. (See figure 2-16.)

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
	215-00280-1	40° canopy support strut	Support canopy in normal open position
TT 02D044-12-69			

WARNING

Ensure that ejection controls safety handle is in the fully down-and-locked position and that safety pins (215-00261-1) are installed in prime initiator, interior canopy jettison initiator, and canopy-actuated initiator (T.O. 1A-7D-2-1). This will prevent inadvertent canopy jettison or seat ejection and possible serious injury to personnel.

CAUTION

To prevent structure damage, ensure that access panel restrictions are observed before opening canopy (T.O. 1A-7D-2-1).

a. Open canopy and install 40° canopy support strut (paragraph 1-52).

b. Disconnect line from Mk 14 Mod 0 firing head. Cap open line and port.

c. Completely depressurize canopy counterbalance cylinder and remove valve core.

d. Remove cotter pin (1), nut (2), washers (3), and bolt (4) securing canopy release control rod to actuator control fork.

e. Remove cotter pin (5), nut (6), washers (7), and bolt (8) securing canopy actuator rod end to bracket and counterbalance cylinder.

f. Secure counterbalance cylinder clear of work area.

g. Cut lockwire and loosen jamnut (9) and tab washer (10).

h. Remove rod end (11) from piston rod (12).

i. Install new rod end (11) on piston rod (12).

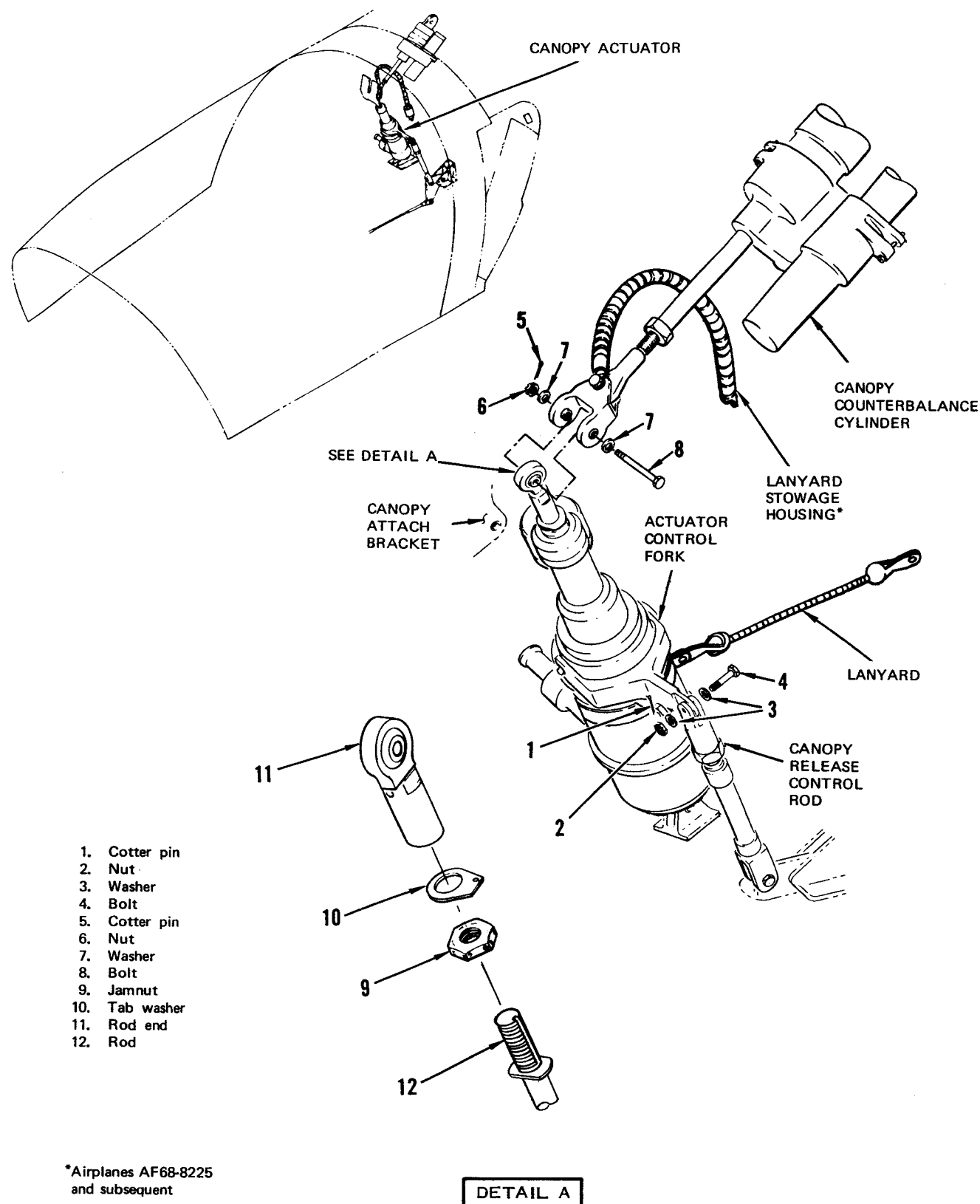
NOTE

When adjusting actuator rod end, ensure that tab on tab washer seats firmly in detent on rod end before tightening jamnut.

j. Perform canopy actuator and counterbalance cylinder adjustment (paragraph 2-37).

k. Secure canopy release control rod to canopy actuator with bolt (4), washers (3), nut (2), and new cotter pin (1).

l. Remove caps and connect line to Mk 14 Mod 0 firing head.



02D046-11-69

Figure 2-16. Canopy Actuator Rod End Replacement

2-56. CANOPY COUNTERBALANCE CYLINDER REMOVAL AND INSTALLATION.

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
	215-00280-1	40° canopy support strut	Support canopy in normal open position
	215-00261-1	Safety pin	Prevent pulling initiator firing pin
TT02D023-07-69			

2-57. REMOVAL. (See figure 2-17.)

WARNING

Ensure that ejection controls safety handle is in the fully down-and-locked position and safety pins (215-00261-1) are installed in prime initiator, interior canopy jettison initiator, and canopy-actuated initiator (T.O. 1A-7D-2-1). This will prevent inadvertent canopy jettison or seat ejection and possible serious injury to personnel.

CAUTION

To prevent structure damage, ensure that access panel restrictions are observed before opening canopy (T.O. 1A-7D-2-1).

Open canopy slowly in cold weather to prevent possible shearing of canopy actuator rod end shear pin (T.O. 1A-7D-2-1).

a. Open canopy and install 40° canopy support strut (paragraph 1-52).

b. Install safety pin in M99 canopy-actuated initiator to prevent inadvertent firing of canopy-actuated initiator and contamination of canopy jettison system lines.

c. Depressurize canopy counterbalance cylinder and remove valve core.

d. Remove support strut assembly; close and lock canopy.

e. Open access 1122-3.

f. Remove cotter pin (1), nut (2), washers (3), and bolt (4) securing counterbalance cylinder and canopy actuator to canopy attach bracket.

CAUTION

On airplanes AF68-8225 and subsequent, handle canopy-actuated initiator lanyard and lanyard stowage housing carefully to prevent pulling lanyard from housing.

g. On airplanes through AF68-8224, proceed to step j. On airplanes AF68-8225 and subsequent, proceed to step h.

h. Remove cotter pin (5), nut (6), washers (7), and bolt (8) securing lanyard stowage housing (9) and fork (10) to cylinder rod end. Tie lanyard stowage housing to airplane structure.

i. Install fork (10) on cylinder rod end with bolt (8), washers (7), and nut (6).

j. Remove cotter pin (11), nut (12), washers (13), bolt (14), and washers (15) securing cylinder to aft bulkhead. Remove counterbalance cylinder (16).

2-58. INSTALLATION. (See figure 2-17.)

a. If new cylinder is being installed, remove valve core and check that cylinder is properly serviced (T.O. 1A-7D-2-1).

b. Position lug end of cylinder (16) to aft bulkhead and secure with washers (15), bolt (14), washers (13), nut (12), and new cotter pin (11).

CAUTION

On airplanes AF68-8225 and subsequent, handle canopy-actuated initiator lanyard and lanyard stowage housing carefully to prevent pulling lanyard from housing.

c. On airplanes through AF68-8224, proceed to step g. On airplanes AF68-8225 and subsequent, proceed to step d.

d. Untie lanyard stowage housing (9).

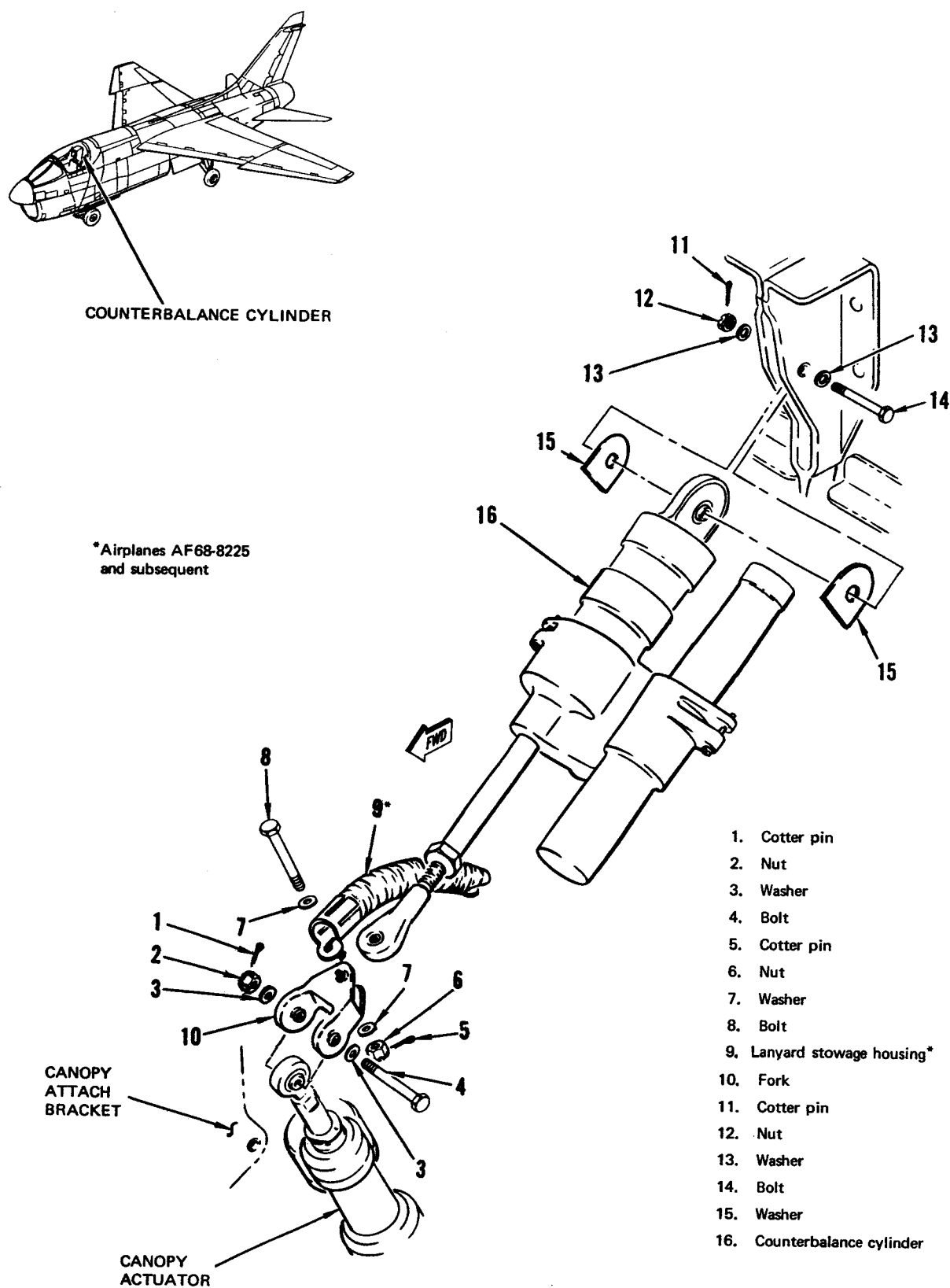


Figure 2-17. Canopy Counterbalance Cylinder Removal and Installation

e. Position fork (10) on counterbalance cylinder rod end and secure lanyard stowage housing (9) and fork (10) to rod end by installing bolt (8), washers (7), nut (6), and new cotter pin (5).

CAUTION

Misrigging of canopy actuator and/or counterbalance cylinder can cause cracking of canopy aft former forward of actuator/cylinder attach fitting.

NOTE

When same counterbalance cylinder is reinstalled and there was no repair action to change rod end adjustment, it is not necessary to do the adjustment check.

f. If required, perform canopy counterbalance cylinder adjustment (paragraph 2-37). If adjustment is not required, secure counterbalance cylinder and canopy actuator to attach bracket with bolt (4), washers (3), nut (2), and new cotter pin (1).

g. Remove safety pin from M99 canopy-actuated initiator.

h. Close access 1122-3.

2-59. CANOPY RELEASE MECHANISM PUSHROD AND BELLCRANK REMOVAL AND INSTALLATION.

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for connecting external electrical power	Extend air refueling probe
	215-00280-1	40° canopy support strut	Support canopy in normal open position
TT02D024-11-68			

2-60. REMOVAL. (See figure 2-18.)

CAUTION

To prevent structure damage, ensure that access panel restrictions are observed before opening canopy (T.O. 1A-7D-2-1).

Open canopy slowly in cold weather to prevent possible shearing of

canopy actuator rod end shear pin (T.O. 1A-7D-2-1).

a. Open canopy and install 40° canopy support strut (paragraph 1-52).

b. If removal and installation is to be performed on left side of cockpit, open accesses 1122-4 and 1123-1 and proceed to step e.

c. On airplanes through AF69-6196, if removal and installation is to be performed on right side of cockpit, the following shall first be accomplished:

1. Connect and apply external electrical power (T.O. 1A-7D-2-1).

2. Place air refueling probe switch in EXTEND and extend air refueling probe with hydraulic hand pump (T.O. 1A-7D-2-1).

3. Open accesses 2122-1 and 2123-1.

4. Remove interior canopy release handle (paragraph 2-47).

d. On airplanes AF69-6197 and subsequent, if removal and installation is to be performed on the right side of cockpit, perform the following:

1. Open accesses 2122-1 and 2123-9.

2. Remove interior canopy release handle (paragraph 2-47).

e. Remove applicable interior panel enclosing canopy roller, hooks, and pushrods within cockpit sill.

f. Remove cotter pin (1), nut (2), bolt (3), and washer (4) securing pushrod to forward release mechanism.

g. Remove cotter pin (5), nut (6), bolt (7), and washers (8) securing pushrods to bellcrank. Remove pushrod (9) from airplane.

h. Remove cotter pin (10), nut (11), bolt (12), and washer (13) securing pushrod (14) to aft release mechanism. Remove pushrod from airplane.

i. Remove cotter pin (15), nut (16), washer (17), and bolt (18) securing pushrod (19) to bellcrank.

j. Remove lockwire, cotter pin (20), nut (21), bolt (22), and washers (23) securing bellcrank (24) to bulkhead bracket. Remove bellcrank from airplane.

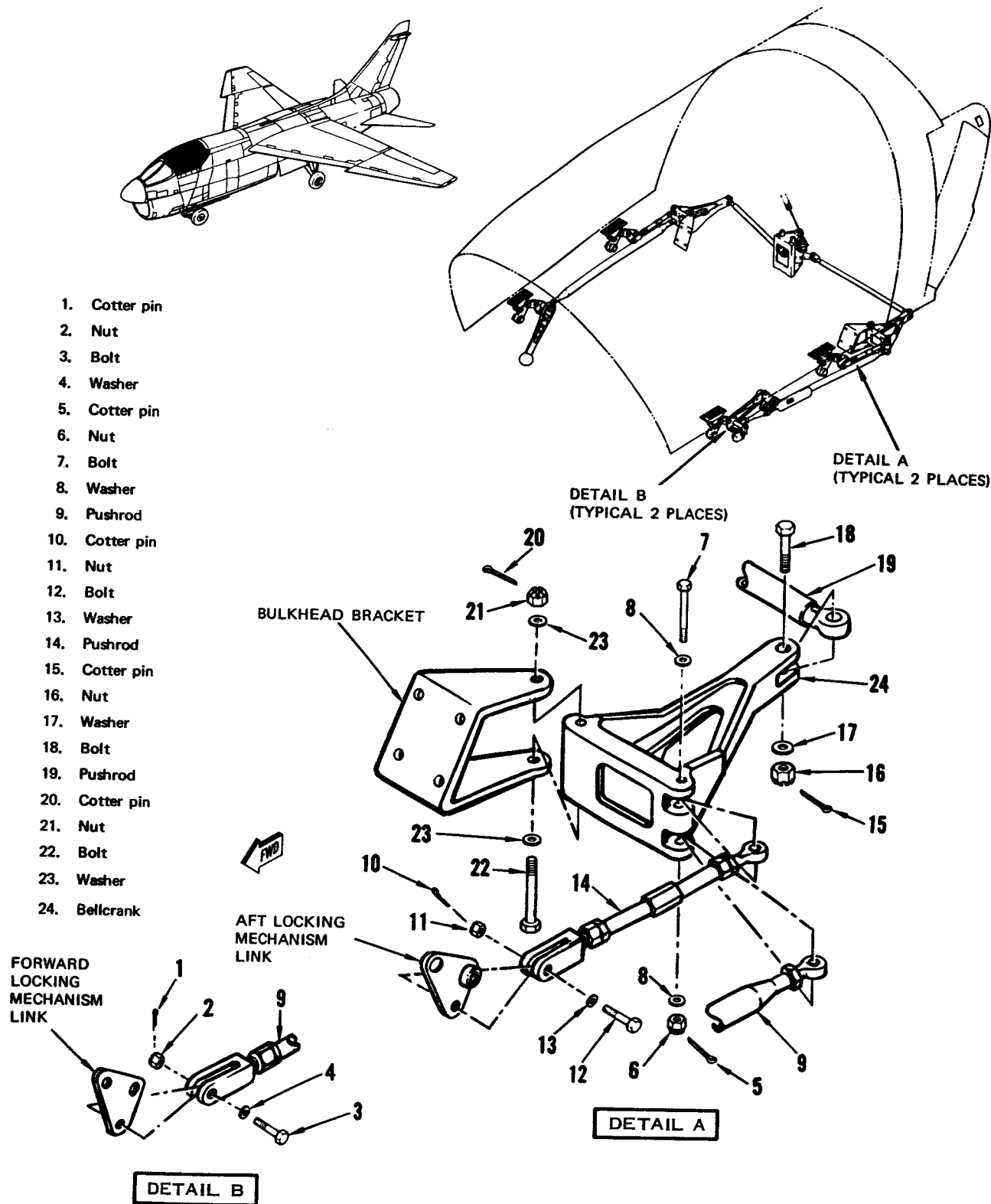


Figure 2-18. Canopy Release Mechanism Pushrod and Bellcrank Removal and Installation

02D026-05-68

2-61. INSTALLATION. (See figure 2-18.)

NOTE

Lubricate all mating surfaces with MIL-G-21164 grease before installation.

a. Position bellcrank (24) to bulkhead bracket and secure with washers (23), bolt (22), nut (21), and new cotter pin (20). Secure with MS20995C32 lockwire.

b. Position pushrod (19) to bellcrank and secure with bolt (18), washer (17), nut (16), and new cotter pin (15).

c. Position pushrod (14) to aft release mechanism link and secure with washer (13), bolt (12), nut (11), and new cotter pin (10).

d. Position pushrods (9 and 14) to bellcrank and secure with washers (8), bolt (7), nut (6), and new cotter pin (5).

e. Position pushrod (9) to forward release mechanism and secure with washer (4), bolt (3), nut (2), and new cotter pin (1).

f. If removal and installation has been accomplished on left side of cockpit, proceed to step j.

g. On airplanes through AF69-6196, if removal and installation has been accomplished on the right side of cockpit, perform the following:

1. Close access 2123-1.

2. Place air refueling switch in RETRACT and hold. Retract air refueling probe using hydraulic hand pump.

3. Disconnect external electrical power.

h. On airplanes AF69-6197 and subsequent, close access 2123-9.

NOTE

The applicable interior panels and, as applicable, accesses 1122-4, 2122-1 and 1123-1 are installed following adjustment of canopy roller and release mechanism (step j).

i. Remove 40° canopy support strut (paragraph 1-52).

j. Perform canopy roller and release mechanism adjustment (paragraph 2-35).

2-62. INTERIOR CANOPY JETTISON CONTROL ASSEMBLY REMOVAL AND INSTALLATION.**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
	215-00280-1	40° canopy support strut	Support canopy in normal open position
	MIL-M-7404	Maintenance stand	For maintenance at cockpit level
TT02D025-11-68			

2-63. REMOVAL.

WARNING

Ensure that ejection controls safety handle is in the fully down-and-locked position and safety pins (215-00261-1) are installed in prime initiator and interior canopy jettison initiator (T.O. 1A-7D-2-1). This will prevent inadvertent canopy jettison, or seat ejection and possible serious injury to personnel.

CAUTION

To prevent structure damage, ensure that access panel restrictions are observed before opening canopy (T.O. 1A-7D-2-1).

Open canopy slowly in cold weather to prevent possible shearing of canopy actuator rod end shear pin (T.O. 1A-7D-2-1).

a. Open canopy and install 40° canopy support strut (paragraph 1-52).

b. Remove nut, washer, and screw securing initiator cable clevis to jettison control handle.

c. Remove six screws securing control assembly to left forward canopy rail.

d. Remove control assembly.

WARNING

Ensure that ejection controls safety handle is in the fully down-and-locked position and safety pins (215-00261-1) are installed in prime initiator and interior canopy jettison initiator (T.O. 1A-7D-2-1). This will prevent inadvertent canopy jettison or seat ejection and possible serious injury to personnel.

CAUTION

To prevent structure damage, ensure that access panel restrictions are observed before opening canopy (T.O. 1A-7D-2-1).

Open canopy slowly in cold weather to prevent possible shearing of canopy actuator rod end shear pin.

- a. Open canopy and install 40° canopy support strut (paragraph 1-52).
- b. Remove interior canopy jettison control assembly from airplane (paragraph 2-62).
- c. Remove screw (1) securing control handle knob halves to control handle. Remove knob halves (2).
- d. Remove cotter pin (3), nut (4), bolt (5), spacer (6), and washer (7) which secure control handle assembly to bracket. Remove control handle assembly.
- e. Remove cotter pin (8), nut (9), bolt (10), and spacers (11) that secure control handle assembly together.
- f. Remove spring (12), lever (13), and handle (14).
- g. Inspect parts for cracks, hole elongation, warpage or other distortion. Replace parts found defective.
- h. Position handle (14), lever (13), and spring (12) together and secure with spacers (11), bolt (10), nut (9), and new cotter pin (8).
- i. Place control handle assembly in bracket with washer (7) and spacer (6).
- j. Position control handle knob halves (2) to handle and secure with screw (1).
- k. Install interior canopy jettison control assembly (paragraph 2-62).

1. Remove 40° canopy support strut (paragraph 1-52) and close canopy.

2-66. EXTERIOR CANOPY JETTISON CONTROL HANDLE REMOVAL AND INSTALLATION.

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
	215-00261-1	Safety pin	Prevent pulling initiator firing pin
TT02D027-11-68			

- 2-67. REMOVAL. (See figure 2-20.)

WARNING

Ensure that ejection controls safety handle is in the fully down-and-locked position and safety pins (215-00261-1) are installed in prime initiator and interior canopy jettison initiator (T.O. 1A-7D-2-1). This will prevent inadvertent canopy jettison or seat ejection and possible serious injury to personnel.

Do not perform maintenance on equipment associated with explosive devices except in presence of other personnel capable of rendering aid.

- a. Open access 1123-1 and left exterior canopy jettison control handle door to remove left handle. Cut copper wire securing control handle (1).
- b. Open access 2123-1 and right exterior canopy jettison control handle door to remove right handle. Cut copper wire securing control handle (1).

WARNING

To avoid injury to personnel, ensure safety pin or lockwire is installed in the initiator where specified in this procedure.

- c. Install safety pin (2) in M99 initiator.

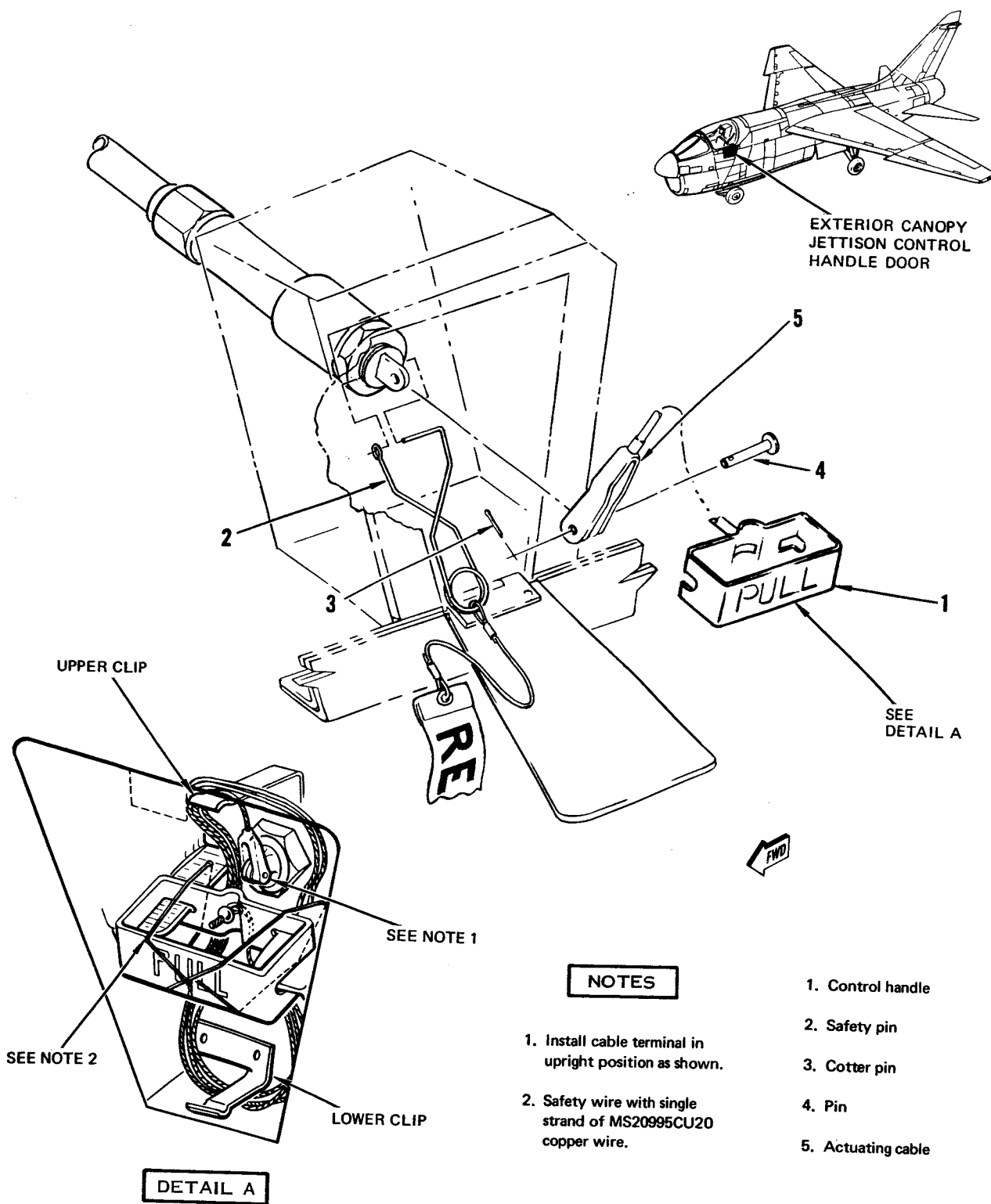


Figure 2-20. Exterior Canopy Jettison Control Handle Removal and Installation

02D 047-12-73

d. Remove cotter pin (3) and pin (4) connecting actuating cable (5) to initiator. Remove control handle and cable from storage cavity.

2-68. INSTALLATION. (See figure 2-20.)

a. Position actuating cable (5) to initiator.

b. Install pin (4) and cotter pin (3).

CAUTION

When installing cable insure clevis is not crossed over or through other cable stands.

c. With cable clevis in upright position, store actuating cable in storage cavity by wrapping cable around upper and lower storage clips

d. Secure handle with single strand of MS20995CU20 copper wire as shown.

e. Remove safety pin (2) from initiator.

f. Close access 1123-1 and left exterior canopy jettison control handle door.

g. Close access 2123-1 and right exterior canopy jettison control handle door.

2-69. DIRECTIONAL FLOW CHECK VALVE REMOVAL AND INSTALLATION. (Airplanes Through AF68-8224.)

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
	7025389-10 (OCAMA)	Protector assembly	Cap open lines, hoses, and fittings
	7025389-20 (OCAMA)	Protector assembly	Plug open lines, hoses, and fittings
			TT02D047-12-70

2-70. REMOVAL. (See figure 2-21.)

a. Remove directional flow check valves from controls and equipment access as follows:

1. Open access 1123-1.

2. Disconnect lines (1) from check valves. Cap lines with protector assemblies.

3. Remove check valves (2) from tee. Cap tee with protector assembly.

4. Remove packings (3) from check valves.

b. Remove directional flow check valves from ejection seat bulkhead as follows:

1. Remove ejection seat (paragraph 1-32).

2. Disconnect hoses (4) from directional flow check valves. Cap lines with protector assemblies.

3. Remove check valves (5) from tee. Cap tee with protector assembly.

4. Remove packings (6) from check valves. Discard packings.

2-71. INSTALLATION. (See figure 2-21.)

WARNING

Observe directional flow arrows on cylindrical portion of valve. Improper installation may cause inadvertent ejection of seat and possible injury to personnel.

a. Install directional flow check valves on ejection seat bulkhead as follows:

1. Remove caps from tee and install new packings (6) on check valves.

2. Install check valves (5) on tee.

3. Remove caps and install hoses (4) on check valves.

b. Install check valves in controls and equipment access as follows:

1. Remove caps from tee and install new packings (3) on check valves.

2. Install check valves (2) on tee.

3. Remove caps and install lines (1) on check valves.

c. Perform canopy jettison system flow test (paragraph 2-75).

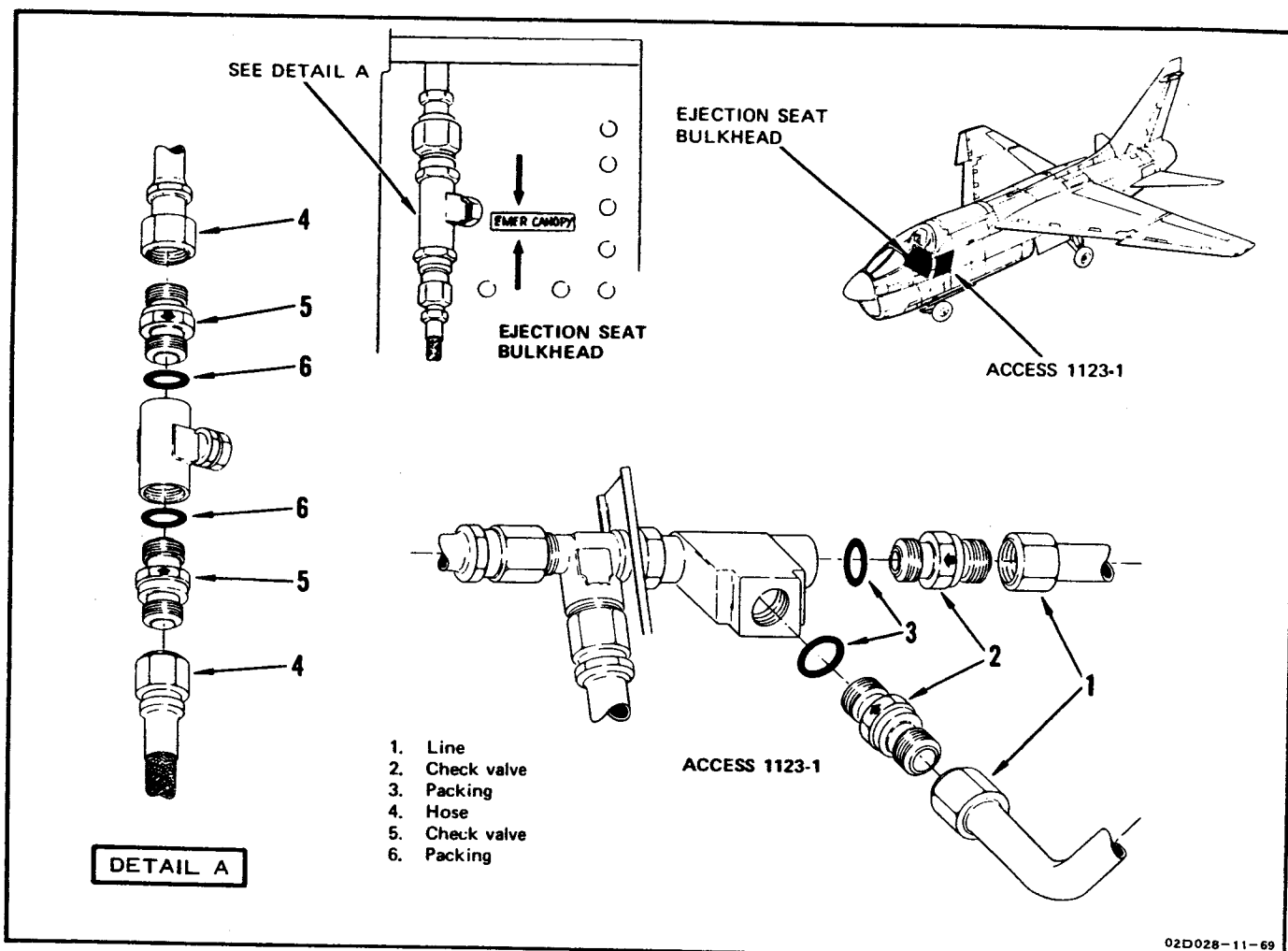


Figure 2-21. Directional Flow Check Valve Removal and Installation
(Airplanes Through AF68-8224)

2-72. CHECK TEE REMOVAL AND INSTALLATION. (Airplanes AF68-8225 and Subsequent.)

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
	7025389-10 (OCAMA)	Equipment required for connecting external electrical power	Extend air refueling probe
	7025389-20 (OCAMA)	Protector assembly	Cap open lines, hoses, and fittings
		Protector assembly	Plug open lines, hoses, and fittings
			TT02D028-12-70

2-73. REMOVAL. (See figure 2-22.)

a. To remove check tee from controls and equipment access, proceed as follows:

1. Open access 1123-1.
2. Remove sweep generator (T.O. 1A-7D-2-14).
3. Remove lines (1) from check tee. Cap check tee and lines with protector assemblies.
4. Loosen jamnut (3) securing check tee to airframe mounting bracket and remove check tee (2), jamnut (3), split ring (4), and packing (5).

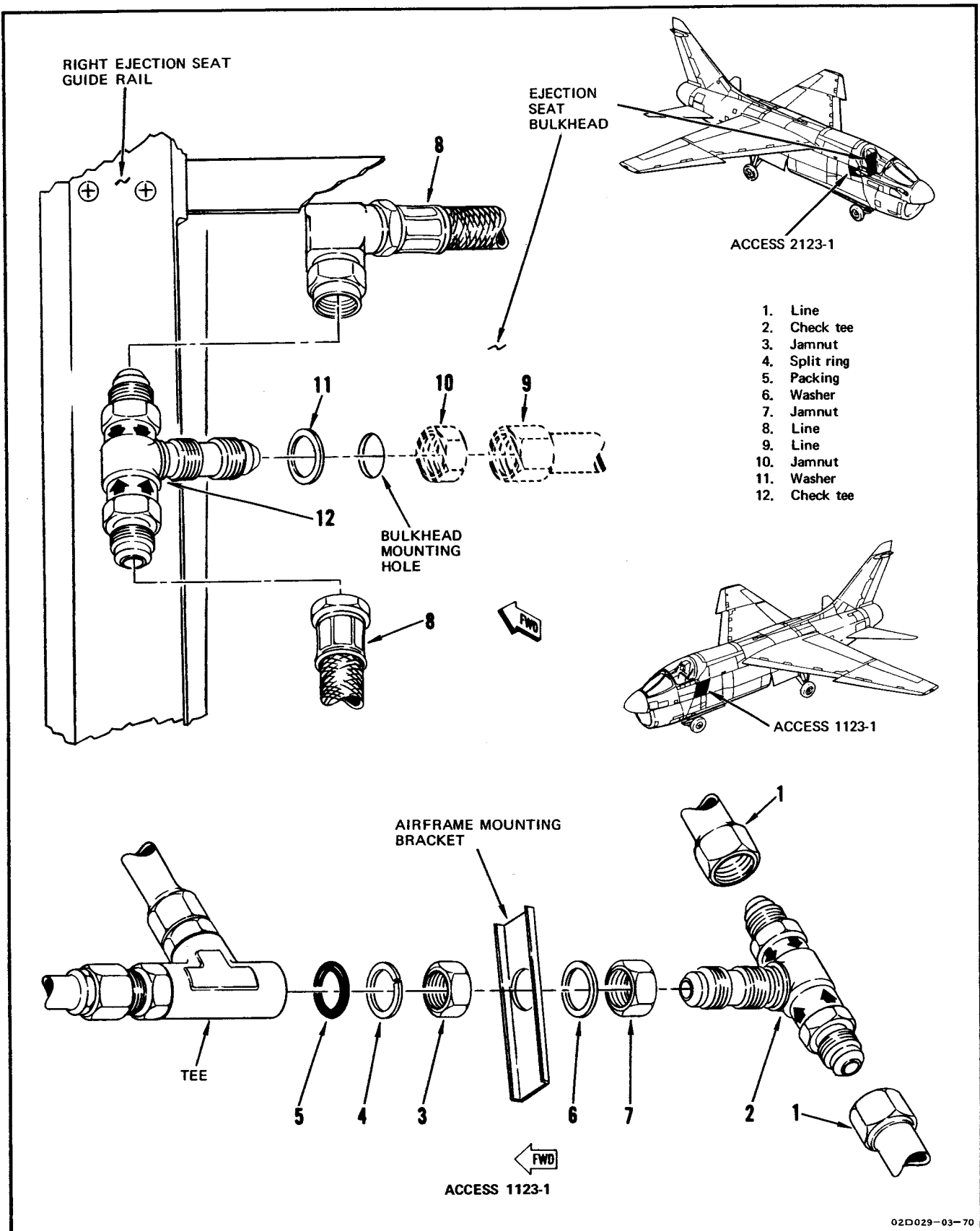


Figure 2-22. Check Tee Removal and Installation (Airplanes AF68-8225 and Subsequent)

5. Remove washer (6) and jamnut (7) from check tee.
- b. To remove check tee from ejection seat bulkhead, proceed as follows:

1. Remove ejection seat (paragraph 1-32).
2. Remove lines (8) from check tee. Cap check tee and lines with protector assemblies.
3. On airplanes through AF69-6196, connect external electrical power (T.O. 1A-7D-2-1).

NOTE

Air refueling probe is completely extended when yellow probe light on advisory lights panel goes off.

4. On airplanes through AF69-6196, place air refueling probe switch on left console in EXTEND and operate hand pump until probe locks in extended position.
 5. On airplanes through AF69-6196, open access 2123-1. On airplanes AF69-6197 and subsequent, open access 2123-9.
 6. Remove line (9). Cap line with protector assembly.
 7. Remove jamnut (10) securing check tee to ejection seat bulkhead.
 8. Remove washer (11) and check tee (12) from ejection seat bulkhead. Cap check tee with protector assemblies.
- 2-74. INSTALLATION. (See figure 2-22.)

WARNING

Installation of any tee other than a check tee will result in malfunction of the canopy jettison system and inadvertent seat ejection. To prevent serious injury to personnel or loss of life, ensure that only a check tee is installed.

- a. To install check tee on ejection seat bulkhead, proceed as follows:
 1. Install washer (11) on check tee; remove cap and position check tee (12) in bulkhead mounting hole.
 2. Working through access 2123-1 or 2123-9, install jamnut (10) on check tee. Tighten jamnut.

3. Install line (9).
4. Install lines (8).
5. Close access 2123-1 or 2123-9.

NOTE

Air refueling probe is completely retracted and locked when probe advisory light goes off.

6. On airplanes through AF69-6196, place air refueling probe switch in RETRACT and hold. Operate hand pump to retract air refueling probe.
7. On airplanes through AF69-6196, disconnect external electrical power.
 - b. To install check tee in controls and equipment access, proceed as follows:
 1. Remove caps from check tee.
 2. Install jamnut (7) on check tee as close to body of check tee as threads will permit.
 3. Place washer (6) over nipple of check tee and position against jamnut.
 4. Position check tee (2) in airframe mounting bracket and loosely install jamnut (3), split ring (4), and packing (5) on nipple of check tee.
 5. Install check tee on tee, aligning check tee with lines (1).
 6. Install lines (1) on check tee. Tighten line fittings.
 7. Tighten jamnut (3).
 8. Secure check tee to airframe mounting bracket by tightening jamnut (7).
 - c. Perform canopy jettison system and ejection seat system flow test (paragraph 2-76).

2-75. CANOPY JETTISON SYSTEM AND EJECTION SEAT SYSTEM FLOW TEST.
(Airplanes Through AF68-8224.) (See figure 2-23.)

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
	MIL-T-26772	Nitrogen trailer	Perform flow test TT 02D029-11-69

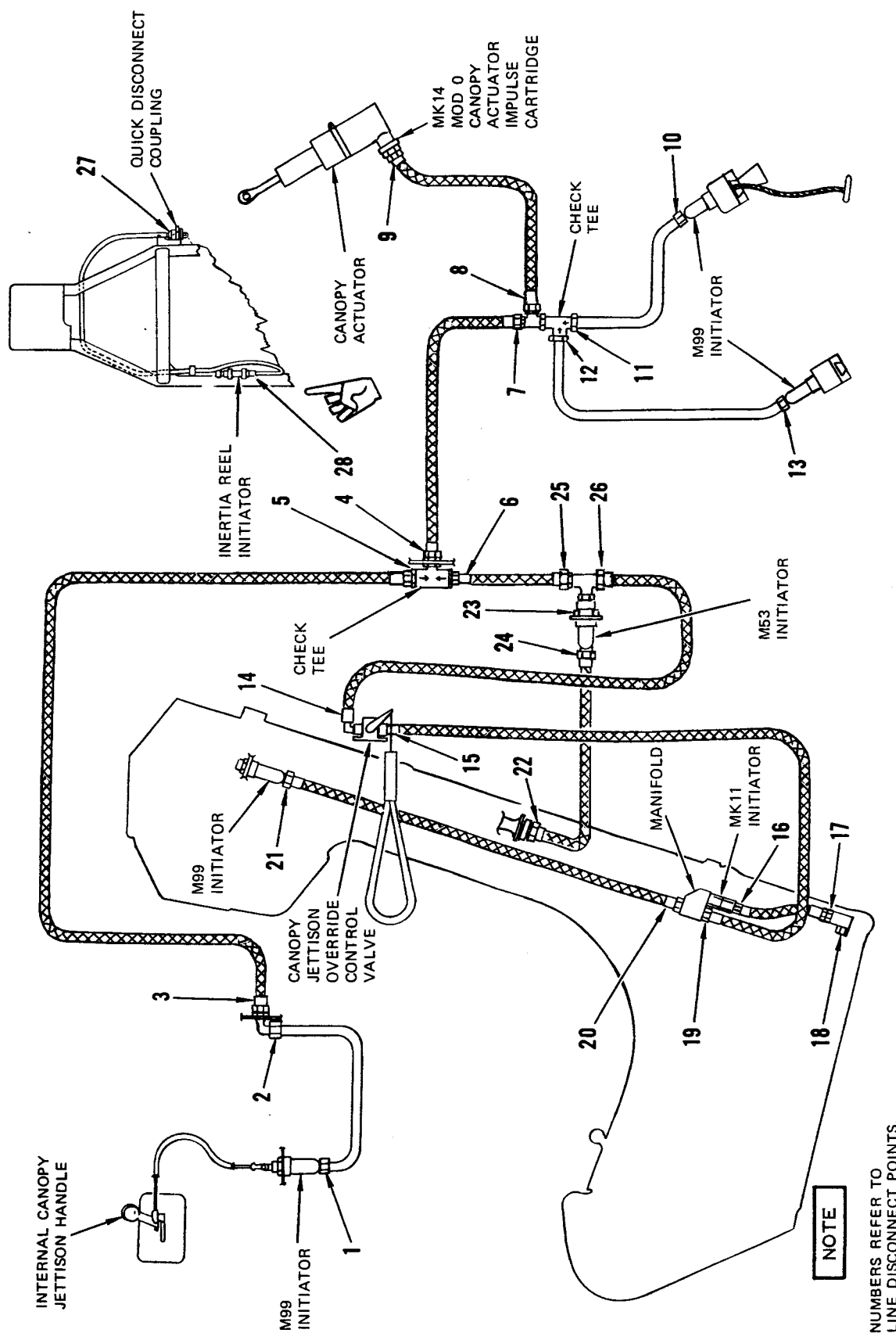


Figure 2-23. Canopy Jettison System and Ejection Seat System Flow Test Diagram (Airplanes Through AF68-8224)

WARNING

Do not apply nitrogen pressure to rocket catapult as this could initiate the rocket and cause injury to personnel. To prevent serious injury or loss of life, ensure that time-delay initiator is removed and the following initiators are disconnected: left and right exterior canopy jettison initiators, interior canopy jettison initiator, and prime initiator.

NOTE

This test shall be accomplished when maintenance has been performed which requires disassembly of system lines of time elapse beyond immediate removal/reinstallation/replacement of the ejection seat and/or system components.

a. Remove ejection seat (paragraph 1-32).

b. Disconnect line from the M99 prime initiator at point (21).

c. Disconnect line from right and left M99 exterior canopy jettison initiators at points (10 and 13).

d. Disconnect line from M99 canopy jettison initiator at point (1).

e. Remove Mk 11 Mod 0 time-delay initiator (paragraph 1-37).

e-1. Remove M53 initiator (paragraph 1-55).

f. Disconnect line from Mk 14 Mod 0 firing head at point (9). Cap open firing head port.

NOTE

The lines disconnected at points (21), (10), (13), (1), (16), (24), (23), and (9) in steps b through f must remain disconnected until the flow tests are completed.

g. Connect nitrogen source to line at point (1).

WARNING

Serious injury can occur while high pressure testing. While

testing personnel will be protected by a shield or be a safe distance from the unit to prevent injury.

h. Apply 45 to 50 psi nitrogen pressure to line at point (1).

i. Check for free flow from line at point (9). If free flow is not present, reduce pressure to zero and disconnect lines at points (8), (7), (4), (5), (3), and (2) in turn. Repeat step h after disconnecting each line until defective component is located.

j. Replace defective component.

k. Disconnect nitrogen source.

l. Connect any lines disconnected in step i.

m. Disconnect lines at points (5), (6), (11), and (12).

n. Connect nitrogen source to line at point (9).

o. Apply 45 to 50 psi nitrogen pressure to line at point (9).

p. Check that flow from check tees at points (5), (6), (11), and (12) is not detected by audible or tactile means.

q. If flow is detected, replace defective check tee.

r. Disconnect nitrogen source.

s. Connect lines at points (5), (6), (11), and (12).

t. Connect nitrogen source to line at point (10).

u. Apply 45 to 50 psi nitrogen pressure to line at point (10).

v. Check for free flow from line at point (9). If free flow is not present, reduce pressure to zero, disconnect line at point (11), and repeat step u. If free flow is present at point (11), replace check tee. If free flow is not present, replace line.

w. Disconnect nitrogen source.

x. Connect line at point (11).

y. Connect nitrogen source to line at point (13).

z. Apply 45 to 50 psi nitrogen pressure to line at point (13).

aa. Check for free flow from line at point (9). If free flow is not present, reduce pressure to zero, disconnect line at point (12), and repeat step z. If there is free flow at point (12), replace check tee. If free flow is not present, replace line.

ab. Disconnect nitrogen source.

ac. Connect line at point (12).

ad. Disconnect line at point (19).

ae. Connect nitrogen source to line at point (19).

af. Ensure that the canopy jettison override control valve is in the open position.

ag. Apply 45 to 50 psi nitrogen pressure to line at point (19).

ah. Check for free flow at point (9) and point (23). If free flow is not present, reduce pressure to zero and disconnect lines at points (4), (14), (15), (25), and (26) in turn. Repeat step ag after disconnecting each line until defective component is located.

ai. Replace defective component.

aj. Connect lines at points (4), (25), (26), (14), and (15) if disconnected in step ah.

aj-1. Disconnect line at point (22).

aj-2. Connect nitrogen source to line at point (22).

aj-3. Apply 45 to 50 psi nitrogen pressure to line at point (22).

aj-4. Check for free flow at point (24). If free flow is not present, reduce pressure to zero, disconnect nitrogen source, and replace defective line.

aj-5. Connect line at point (22).

ak. Disconnect line at point (17) and remove elbow. Reconnect line to elbow.

al. Connect nitrogen source to line at point (16).

am. Apply 45 to 50 psi nitrogen pressure to line at point (16).

an. Check for free flow from line at point (18). If free flow is not present, reduce pressure to zero, disconnect line at point (17), and repeat step am. If free flow is present at point (17), replace elbow. If free flow is not present, replace line.

ao. Install elbow at point (18) and connect line at point (17).

ap. Connect nitrogen source to line at point (21).

aq. Apply 45 to 50 psi nitrogen pressure to line at point (21).

ar. Check for free flow from manifold. If free flow is not present, reduce pressure to zero, disconnect line at point (20), and repeat step aq. If free flow is present from line at point (20), replace manifold. If free flow is not present, replace line.

as. Disconnect nitrogen source.

at. Connect lines at points (19) and (20).

at-1. Disconnect line at points (27) and (28).

at-2. Connect nitrogen source to line at point (27).

at-3. Apply 45 to 50 psi nitrogen pressure to line at point (27).

at-4. Check for free flow at point (28). If free flow is not present, replace line.

at-5. Disconnect nitrogen source.

at-6. Connect line at points (27) and (28).

au. Disconnect lines from canopy jettison override control valve at points (14) and (15).

av. Remove copper breakout wire from canopy jettison override control valve lever.

aw. Pull handle to actuate valve to the closed position.

ax. Connect nitrogen source to valve at point (15).

ay. Apply 45 to 50 psi nitrogen to valve at point (15).

az. Check that flow from canopy jettison override control valve at point (14) is not detected by audible or tactile means.

ba. If flow is detected, replace canopy jettison override control valve.

bb. If valve is not defective, move handle to open position and safety with copper breakout wire.

bc. Disconnect nitrogen source.

bd. Connect lines to valve at points (14) and (15).

be. Connect lines to M99 prime initiator at point (21).

bf. Connect lines to right and left M99 exterior canopy jettison initiators at points (10 and 13).

bg. Connect line to M99 canopy jettison initiator at point (1).

bh. Install Mk 11 Mod 0 time-delay initiator (paragraph 1-37).

bi. Install M53 initiator (paragraph 1-55).

bj. Remove cap from firing head port and connect line at point (9).

bk. Install ejection seat (paragraph 1-32).

2-76. CANOPY JETTISON SYSTEM AND EJECTION SEAT SYSTEM FLOW TEST.
(Airplanes AF68-8225 and Subsequent.)
(See figure 2-24.)

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
	MIL-T-26772	Nitrogen trailer	Perform flow test
TT02D030-11-68			

WARNING

Do not apply nitrogen pressure to rocket catapult as this could initiate the rocket and cause injury to personnel. To prevent serious injury or loss of life, ensure that time-delay initiator is removed and the following initiators disconnected: left and right exterior canopy jettison initiators, canopy-actuated initiator, interior canopy jettison initiator, and prime initiator.

NOTE

This test shall be accomplished when maintenance has been performed which requires disassembly of system lines or time elapse beyond immediate removal/reinstallation/replacement of the ejection seat and/or system components.

a. Remove ejection seat (paragraph 1-32).

b. Disconnect line from M99 prime initiator at point (33).

c. Disconnect line from M99 interior canopy jettison initiator at point (1).

c-1. Remove panels 1123-1 and 2123-9.

d. Disconnect line from right and left M99 exterior canopy jettison initiators at points (9 and 14).

e. Remove Mk 11 Mod 0 time-delay initiator (paragraph 1-37).

e-1. Remove M53 initiator (paragraph 1-55).

f. Disconnect line at point (8). Cap firing head port.

NOTE

All lines disconnected at points (33), (1), (9), (14), (26), (8), and (7) in steps b through g must remain disconnected until flow tests are completed.

g. Disconnect line from M99 canopy-actuated initiator at point (7).

h. Connect nitrogen source to line at point (1).

02D031-01-81

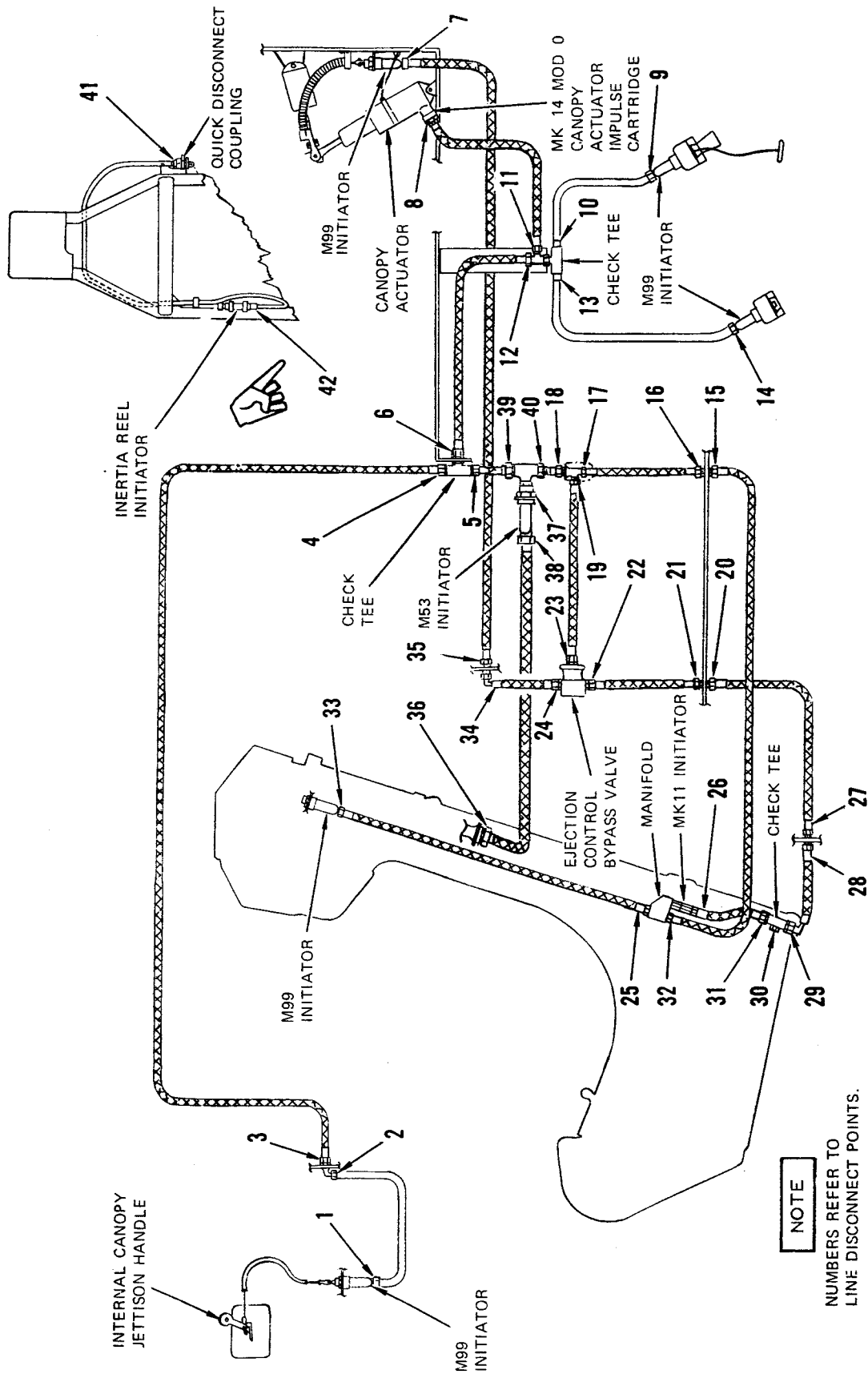


Figure 2-24. Canopy Jettison System and Ejection Seat System Flow Test Diagram (Airplanes AF68-8225 and Subsequent)

i. Apply 45 to 50 psi nitrogen pressure to line at point (1).

j. Check for free flow from line at point (8). If free flow is not present, reduce pressure to zero and disconnect lines at points (11), (12), (6), (4), (3), and (2) in turn. Repeat step i after disconnecting each line until defective component is located.

k. Replace defective component.

l. Disconnect nitrogen source.

m. Connect any lines disconnected in step j.

n. Disconnect lines at points (4) and (5).

o. Connect nitrogen source to line at point (8).

p. Apply 45 to 50 psi nitrogen pressure to line at point (8).

q. Check that flow from check tees at points (4), (5), (9), and (14) is not detected by audible or tactile means.

q-1. If flow is detected at points (9) and (14), perform test of check tee (paragraph 2-76A).

r. If flow is detected at points (4) or (5), replace defective check tee.

s. Disconnect nitrogen source.

t. Connect lines at points (4) and (5).

u. Connect nitrogen source to line at point (9).

v. Apply 45 to 50 psi nitrogen pressure to line at point (9).

w. Check for free flow from line at point (8). If free flow is not present, reduce pressure to zero, disconnect line at point (10), and repeat step v. If free flow is present at point (10), replace check tee. If flow is not present, replace line.

x. Disconnect nitrogen source.

y. Connect line at point (10).

z. Connect nitrogen source to line at point (14).

aa. Apply 45 to 50 psi nitrogen pressure to line at point (14).

ab. Check for free flow from line at point (8). If free flow is not present, reduce pressure to zero, disconnect line at point (13), and repeat step aa. If free flow is present at point (13), replace check tee. If flow is not present, replace line.

ac. Disconnect nitrogen source.

ad. Connect line at point (13).

ae. Disconnect line at point (24).

af. Connect nitrogen source to line at point (7).

ag. Apply 45 to 50 psi nitrogen pressure to line at point (7).

ah. Check for free flow from line at point (24). If free flow is not present, reduce pressure to zero and disconnect lines at points (34) and (35) in turn. Repeat step ag after disconnecting each line, until defective component is located.

ai. Replace defective component.

aj. Disconnect nitrogen source.

ak. Connect lines at points (34) and (35) if disconnected in step ah.

al. Disconnect line at point (22).

am. Connect nitrogen source to ejection control bypass valve at point (22).

an. Apply 45 to 50 psi nitrogen to ejection control bypass valve at point (22).

ao. Check that flow from ejection control bypass valve at point (24) is not detected by audible or tactile means.

ap. If flow is detected, replace ejection control bypass valve.

aq. Disconnect nitrogen source.

ar. Connect line at point (24).

as. Disconnect lines at points (23) and (32).

at. Connect nitrogen source to line at point (32).

au. Apply 45 to 50 psi nitrogen to line at point (32).

av. Check for free flow from lines at points (8), (23), and (37). If free flow is not present, reduce pressure to zero and disconnect lines at points (6), (5), (19), (18), (17), (16), (15), (39), and (40) in turn. Repeat step au after disconnecting each line until defective component is located.

aw. Replace defective component.

ax. Disconnect nitrogen source.

ay. Connect line at point (23) and any lines disconnected in step av.

ay-1. Disconnect line at point (36).

ay-2. Connect nitrogen source to line at point (36).

ay-3. Apply 45 to 50 psi nitrogen pressure to line at point (36).

ay-4. Check for free flow at point (38). If free flow is not present, reduce pressure to zero, disconnect nitrogen source, and replace defective line.

ay-5. Connect line at point (36).

ay-6. Disconnect line at points (41) and (42).

ay-7. Connect nitrogen source to line at point (41).

ay-8. Apply 45 to 50 psi nitrogen pressure to line at point (41).

ay-9. Check for free flow at point (42). If free flow is not present, replace line.

ay-10. Disconnect nitrogen source.

ay-11. Connect line at points (41) and (42).

az. Disconnect line at point (29).

ba. Connect nitrogen source to line at point (29).

bb. Apply 45 to 50 psi nitrogen pressure to line at point (29).

bc. Check for free flow from line at point (22). If free flow is not present, reduce pressure to zero and disconnect lines at points (21), (20), (27), and (28) in turn. Repeat step bb after disconnecting each line until defective component is located.

bd. Replace defective component.

be. Disconnect nitrogen source.

bf. Connect line at point (22) and any lines disconnected in step bc.

bg. Disconnect line at point (31) from check tee.

bh. Remove check tee by disconnecting line at point (30).

bi. Connect nitrogen source to check tee at point (30).

bj. Apply 45 to 50 psi of nitrogen to check tee at point (30).

bk. Check that flow from check tee at points (29) and (31) is not detected by audible or tactile means.

bl. If flow is detected, remove check tee and perform leakage test (paragraph 2-76A.)

bm. Disconnect nitrogen source.

bn. Alternately connect and apply pressure to check tee at points (29) and (31). Check for free flow from point (30). If free flow is not present, replace check tee.

bo. Connect nitrogen source to line at point (26).

bp. Apply 45 to 50 psi nitrogen pressure to line at point (26).

bq. Check for free flow from line at point (31). If free flow is not present, replace line.

br. Disconnect nitrogen source.

bs. Install check tee and connect line at points (29) and (30).

bt. Connect line to check tee at point (31).

bu. Connect nitrogen source to line at point (33).

bv. Apply 45 to 50 psi nitrogen pressure to line at point (33).

bw. Check for free flow from manifold. If free flow is not present, reduce pressure to zero, disconnect line

at point (25), and repeat step bu. If there is free flow from line at point (25), replace manifold. If free flow is not present, replace line.

bx. Disconnect nitrogen source.

by. Connect lines to manifold at points (25) and (32).

bz. Connect line to M99 prime initiator at point (33).

ca. Connect line to M99 interior canopy jettison initiator at point (1).

cb. Connect lines to right and left M99 exterior canopy jettison initiators at points (9 and 14).

cc. Install Mk 11 Mod 0 time-delay initiator (paragraph 1-37).

cc-1. Install M53 initiator (paragraph 1-55).

cd. Remove cap from firing head port and connect line at point (8).

ce. Connect line to M99 canopy-actuated initiator at point (7).

cf. Install ejection seat (paragraph 1-32).

2-76A. CHECKOUT OF EJECTION SEAT CHECK TEES (AIRPLANES AF 68-8225 AND SUBSEQUENT).

Figure & Index No.	Part Number	Nomenclature	Use and Application
	MIL-T-26772 Local Manufacturer	Nitrogen Trailer Flow Tester - Check Valve	Perform Flow Test to Flow Test, Check Tees

a. With check valve removed from the system, apply 100 psi nitrogen air to the outlet port of the checkvalve. If leakage still can be heard or felt, reverse the air through the valve several times and recheck for leaks.

b. If no leak is discovered at 100 psi, the valve is acceptable for use.

c. If the above procedure fails to stop leaks, proceed as follows:

1. Fill a measuring container (measurement increments up to 200 cc's) with water.

2. Partially fill a large container with water.

3. Attach a length of flexible hose to inlet port of valve that is leaking.

4. Attach pressure source to outlet port of valve.

5. Invert measuring device and submerge mouth below water level of large container. Do not allow water to escape from measurement container.

6. Submerge loose end of flexible hose in large container.

7. Apply 50 psi nitrogen to outlet port of valve.

8. A small stream of bubbles will escape from the hose into the measuring container, displacing the water.

9. If more than 200 cc's of water is displaced within one minute, the valve is unserviceable and should be replaced.

10. These procedures apply only to the canopy emergency release T.O. 1A-7D-4-18 (20, figure 18-11) and catapult T.O. 1A-7D-4-18 (13, figure 18-22) check tees.

2-77. CANOPY JETTISON SYSTEM PURGING.
(Airplanes Through AF68-8224.)

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
	MIL-G-952	Air-operated cleaning gun	Force flushing solution through contaminated gas pressure line
	MIL-T-26772	Nitrogen trailer	Force flushing solution from gas pressure line
	MIL-M-7404	Maintenance stand	For maintenance at a required height
TT02D031-12-69			

CAUTION

This procedure shall be accomplished immediately following firing of canopy jettison system to prevent permanent corrosion of gas pressure lines.

- a. Remove fired M99 canopy jettison initiator (paragraph 2-89 or 2-92, as applicable).
- b. Remove all canopy jettison system check valves (paragraph 2-69).
- c. Remove contaminated flexible hoses and related fittings, as applicable, and discard.
- d. Connect an extension tube to end of contaminated gas pressure line where initiator was disconnected and direct open end of extension tube out of fuselage.
- e. Connect a second extension tube to other end of contaminated gas pressure line. Place open end of extension tube in container suitable for catching flushing solutions.
- f. Insert suction hose of air-operated cleaning gun into container of soapy water solution (P-S-600).
- g. Place cleaning gun nozzle into protruding end of extension tube and force soapy water solution through tube. Repeat flushing of gas pressure line until line is completely free of contamination.

WARNING

While forcing nitrogen through line, pressure shall not exceed 30 psi.

- h. Remove suction tube from soapy water solution. Connect nitrogen source and force BB-N-411 dry nitrogen through gas pressure line until line is free of water solution.

WARNING

Isopropyl alcohol is flammable and toxic to eyes, skin and respiratory tract. Use in well ventilated area. Avoid prolonged breathing of vapors. Avoid eye and repeated skin contact. Keep away from sparks and open flame.

- i. Place suction end of cleaning gun hose in container filled with MIL-F-5566 isopropyl alcohol and flush tube.
- j. Remove alcohol container and force dry nitrogen through gas pressure line until line is free of alcohol odor.
- k. Disconnect nitrogen source and extension tubes.

CAUTION

Ensure that only new flexible hoses, check valves, and fittings are installed to prevent failure of canopy jettison system.

- l. Install new flexible hoses, new directional flow check valves (paragraph 2-69), and new fittings.
- m. Install replacement canopy assembly (paragraph 2-28).
- n. Install replacement canopy actuator (paragraph 2-52) and canopy counterbalance cylinder (paragraph 2-56).
- o. Install replacement M99 canopy jettison initiator (paragraph 2-89 or 2-92, as applicable).

p. Perform canopy jettison system and ejection seat system flow test (paragraph 2-75).

q. Perform canopy system operational checkout (paragraph 2-23).

2-78. CANOPY JETTISON SYSTEM PURGING. (Airplanes AF68-8225 and Subsequent.)

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
	MIL-G-952	Air-operated cleaning gun	Force flushing solution through contaminated gas pressure line
	MIL-T-26772	Nitrogen trailer	Force flushing solution from gas pressure line
	MIL-M-7404	Maintenance stand	For maintenance at required height

TT02D032-11-68

CAUTION

This procedure shall be used immediately following firing of canopy jettison system to prevent corrosion of gas pressure lines.

a. Remove M99 canopy-actuated initiator (paragraph 2-98) and applicable fired M99 canopy jettison initiator (paragraph 2-89 or 2-92).

b. Remove lanyard stowage housing assembly from airplane (on bulkhead adjoining canopy deck).

c. Remove two check tees from canopy jettison system (paragraph 2-72).

d. Remove contaminated flexible hoses, as applicable.

e. Remove contaminated inlet port fitting from ejection control bypass valve. Retain union.

f. Connect an extension tube to end of contaminated gas pressure line where initiator was disconnected.

g. Connect a second extension tube to other end of contaminated gas pressure line. Place open end of extension tube in container suitable for catching flushing solutions.

h. Insert suction hose of air-operated cleaning gun into container of soapy water solution.

i. Place cleaning gun nozzle into protruding end of extension tube and force soapy water solution through gas pressure line. Repeat flushing of gas pressure line until line is completely free of contamination.

j. Remove suction tube from soapy water solution. Connect nitrogen source and force BB-N-411 dry nitrogen through gas pressure line until line is free of water solution.

k. Place suction end of cleaning gun hose in container filled with MIL-F-5566 isopropyl alcohol and flush gas pressure line.

l. Remove alcohol container and force dry nitrogen through gas pressure line until line is free of alcohol odor.

m. Discard ejection control bypass valve and install new valve (paragraph 2-80).

n. Disconnect nitrogen source and extension tubes.

CAUTION

Ensure that only new flexible hoses, check tees, and unions are installed to prevent failure of canopy jettison system.

o. Install new flexible hoses, new check tees (paragraph 2-72), and new unions.

p. Install replacement canopy assembly (paragraph 2-28).

q. Install replacement canopy-actuated initiator lanyard and lanyard stowage housing assembly.

r. Install replacement canopy actuator (paragraph 2-52) and canopy counterbalance cylinder (paragraph 2-56).

s. Install replacement M99 canopy-actuated initiator (paragraph 2-98) and applicable M99 canopy jettison initiator (paragraph 2-89 or 2-92).

t. Perform canopy jettison system and ejection seat system flow test (paragraph 2-76).

u. Perform canopy system operational checkout (paragraph 2-23).

2-79. CANOPY JETTISON SYSTEM PURGING OF FOREIGN MATTER.

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
	MIL-T-26772	Nitrogen trailer	Purge canopy jettison system TT02D046-12-70

WARNING

Use 0 to 15 psi nitrogen source to prevent contamination of lines and possible malfunction of canopy and seat ejection system. Do not apply nitrogen pressure to rocket catapult as this could initiate the rocket and cause injury to personnel. To prevent serious injury or loss of life, do not apply nitrogen pressure to canopy actuator impulse cartridge, initiators, or time delay initiators; ensure that both ends of hose are disconnected before purging.

NOTE

This procedure shall be used to purge the canopy jettison system contaminated with dust, metal chips, or filings.

- a. Remove ejection seat (paragraph 1-32).
- b. Disconnect both ends of contaminated hoses and lines from initiators check valves, check tees, or fittings as applicable.
- c. Connect nitrogen source to disconnected hoses or lines.

NOTE

Flow of nitrogen pressure shall be alternately directed through each end of hoses or lines to flush contamination.

- d. Apply 15 psi maximum pressure to hoses or lines forcing nitrogen through line until foreign matter has cleared.
- e. Disconnect nitrogen source.
- f. Blow out contaminated fittings, check valve, and bypass valve ports with a stream of free nitrogen.

CAUTION

Ensure that hoses are not twisted or kinked when tightening hose fittings. Twisted or kinked hoses may fail during system actuation or electrical seat adjustment.

- g. Connect hoses and lines to initiators, check valves, check tees or fittings as applicable.
- h. Perform canopy jettison system and ejection seat system flow test (paragraph 2-75 or 2-76).

2-80. EJECTION CONTROL BYPASS VALVE REMOVAL AND INSTALLATION. (Airplanes AF68-8225 and Subsequent.)

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
	7025389-10 (OCAMA)	Protector assembly	Cap open lines, hoses, and fittings
	7025389-20 (OCAMA)	Protector assembly	Plug open lines, hoses, and fittings TT02D048-12-70

2-81. REMOVAL. (See figure 2-25.)

- a. Remove ejection seat (paragraph 1-32).
- b. Disconnect hoses (1) from bypass valve. Cap lines with protector assemblies.
- c. Remove bolts (2) and washers (3) securing bypass valve to bracket and remove ejection control bypass valve (4) from airplane.

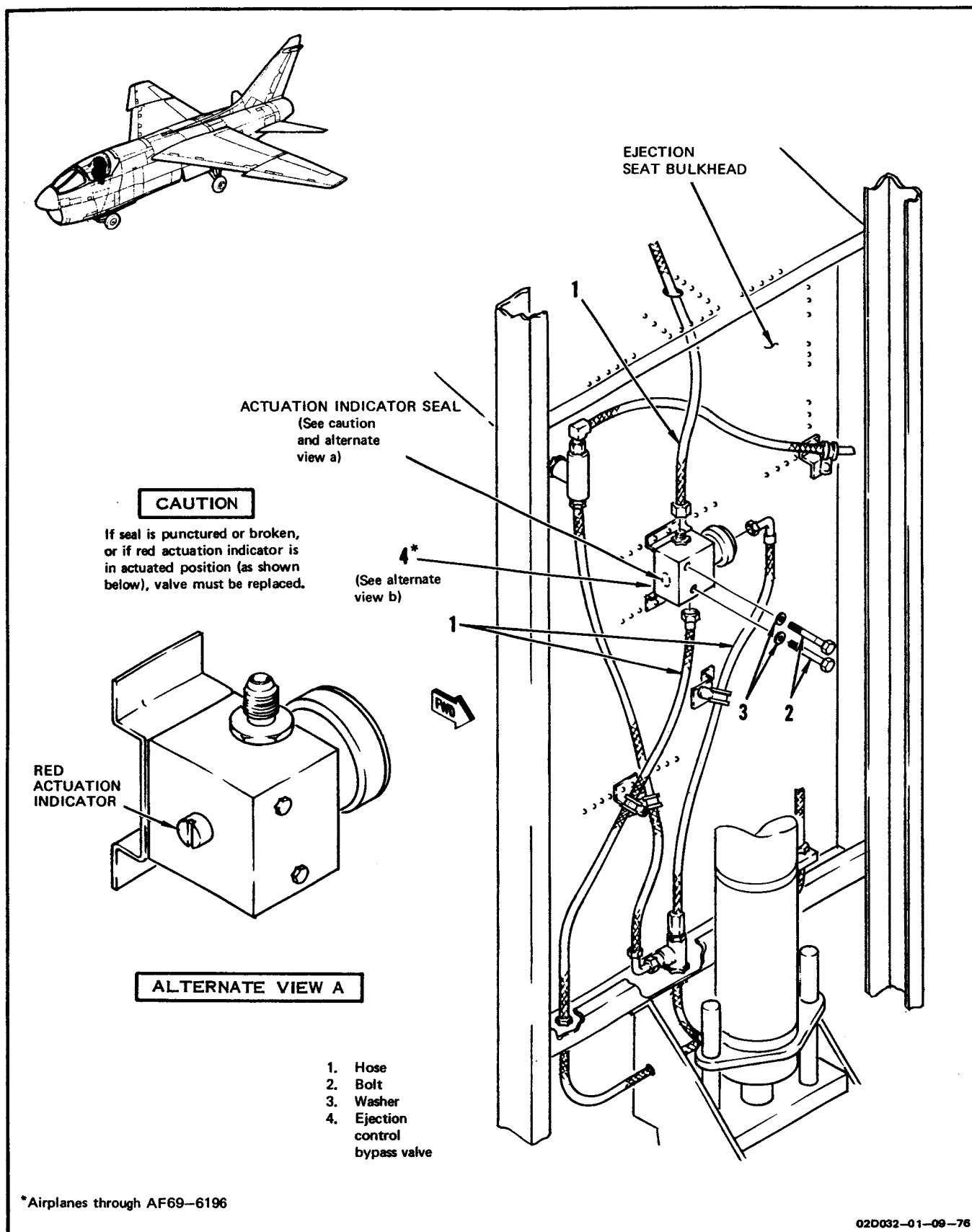


Figure 2-25. Ejection Control Bypass Valve Removal and Installation (Sheet 1)

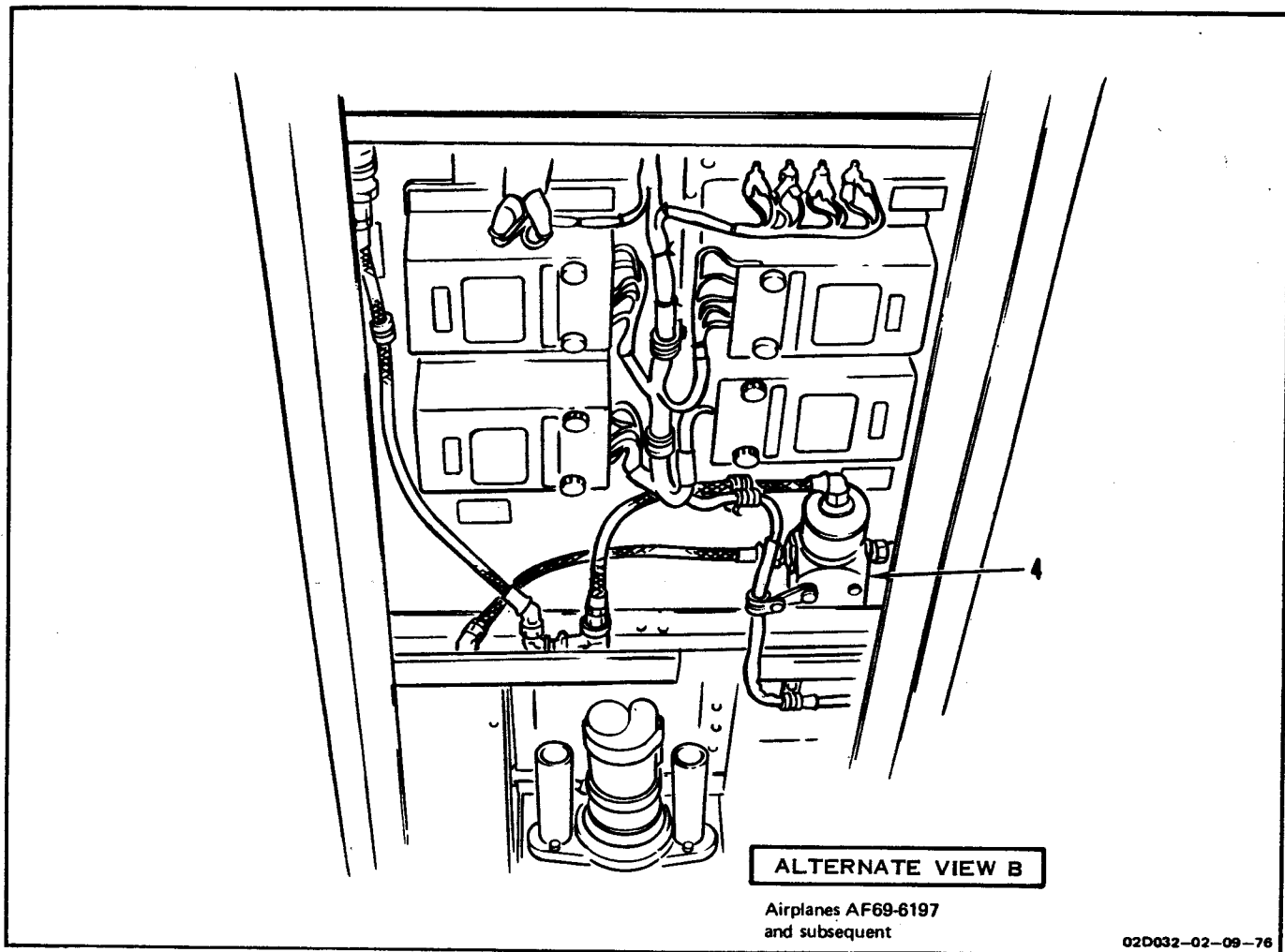


Figure 2-25. Ejection Control Bypass Valve Removal and Installation (Sheet 2)

2-82. INSTALLATION. (See figure 2-25.)

CAUTION

Exercise care when handling ejection control bypass valve to prevent puncturing or breaking actuation indicator seal. If seal is broken before or during installation of valve or if actuator indicator is protruding, valve shall be replaced.

a. Position ejection control bypass valve (4) to bracket on bulkhead and secure with washers (3) and bolts (2).

b. Perform canopy jettison system and ejection seat system flow test (paragraph 2-76).

c. Uncap and connect hoses (1) to bypass valve as shown on figure 2-25. Tighten hoses that connect to top and bottom of bypass valve to 95 (±25) pound-inches torque and apply torque stripe.

d. Install ejection seat (paragraph 1-32).

2-83. CANOPY LOCK SWITCH REMOVAL AND INSTALLATION.

2-84. REMOVAL.

a. Open access 1113-1 and cut lockwire securing lockswitch jamnuts.

b. Identify switch electrical leads and cut at convenient splicing point.

c. Remove aft jamnut and remove switch from bracket.

2-85. INSTALLATION.

- a. Position replacement switch in bracket and secure with jamnut.
- b. Splice switch electrical leads to airplane wires.
- c. Adjust canopy lock switch (paragraph 2-86).

2-86. CANOPY LOCK SWITCH ADJUSTMENT.
(See figure 2-26.)

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
		Equipment required for connecting external electrical power	Check canopy caution light indication
	215-00280-1	40° canopy support strut	Support canopy in normal open position
	215-00110-3	Rigging pin	Isolate opening load of canopy from switch plunger during adjustment
TT02D033-11-68			

CAUTION

To prevent structure damage, ensure that access panel restrictions are observed before opening canopy (T.O. 1A-7D-2-1).

Open canopy slowly in cold weather to prevent possible shearing of canopy actuator rod end shear pin (T.O. 1A-7D-2-1).

- a. Open canopy and install 40° canopy support strut (paragraph 1-52).
- b. Open accesses 1113-1 and 1123-1.
- c. Remove radar signal data converter (T.O. 1A-7D-2-14).
- d. Connect external electrical power (T.O. 1A-7D-2-1).
- e. Rotate spring-loaded canopy hook stop, located at right aft canopy release hook, out of way and position canopy release hooks to locked position using interior canopy release handle.

f. Insert rigging pin through bellcrank and bracket immediately below canopy deck (access 1123-1).

g. Cut lockwire securing jamnuts (1) and adjust canopy lock switch (2) until canopy caution light goes off.

h. Adjust aft jamnut an additional 1-1/4 (+1/8) turns to provide switch plunger overtravel.

i. Disconnect external electrical power.

j. Tighten forward jamnut and secure jamnuts (1) with MS20995C32 lockwire.

k. Remove rigging pin.

l. Install radar signal data converter (T.O. 1A-7D-2-14).

m. Close accesses 1113-1 and 1123-1.

n. Remove 40° canopy support strut (paragraph 1-52) and close canopy.

2-87. CANOPY CAUTION LIGHT REMOVAL AND INSTALLATION.

2-88. For removal and installation of the canopy caution light, refer to T.O. 1A-7D-2-10.

2-89. M99 INTERIOR CANOPY JETTISON INITIATOR REMOVAL AND INSTALLATION.

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
	215-00261-1	Safety pin	Prevent pulling initiator firing pin
	215-00280-1	40° canopy support strut	Support canopy in normal open position
	7025389-10 (OCAMA)	Protector assembly	Cap open lines, hoses, and fittings
	7025389-20 (OCAMA)	Protector assembly	Plug open lines, hoses, and fittings
	MIL-H-4034	Torque wrench, 10 to 150 pound-inches	Tighten initiator mounting nut
TT02D034-12-70			

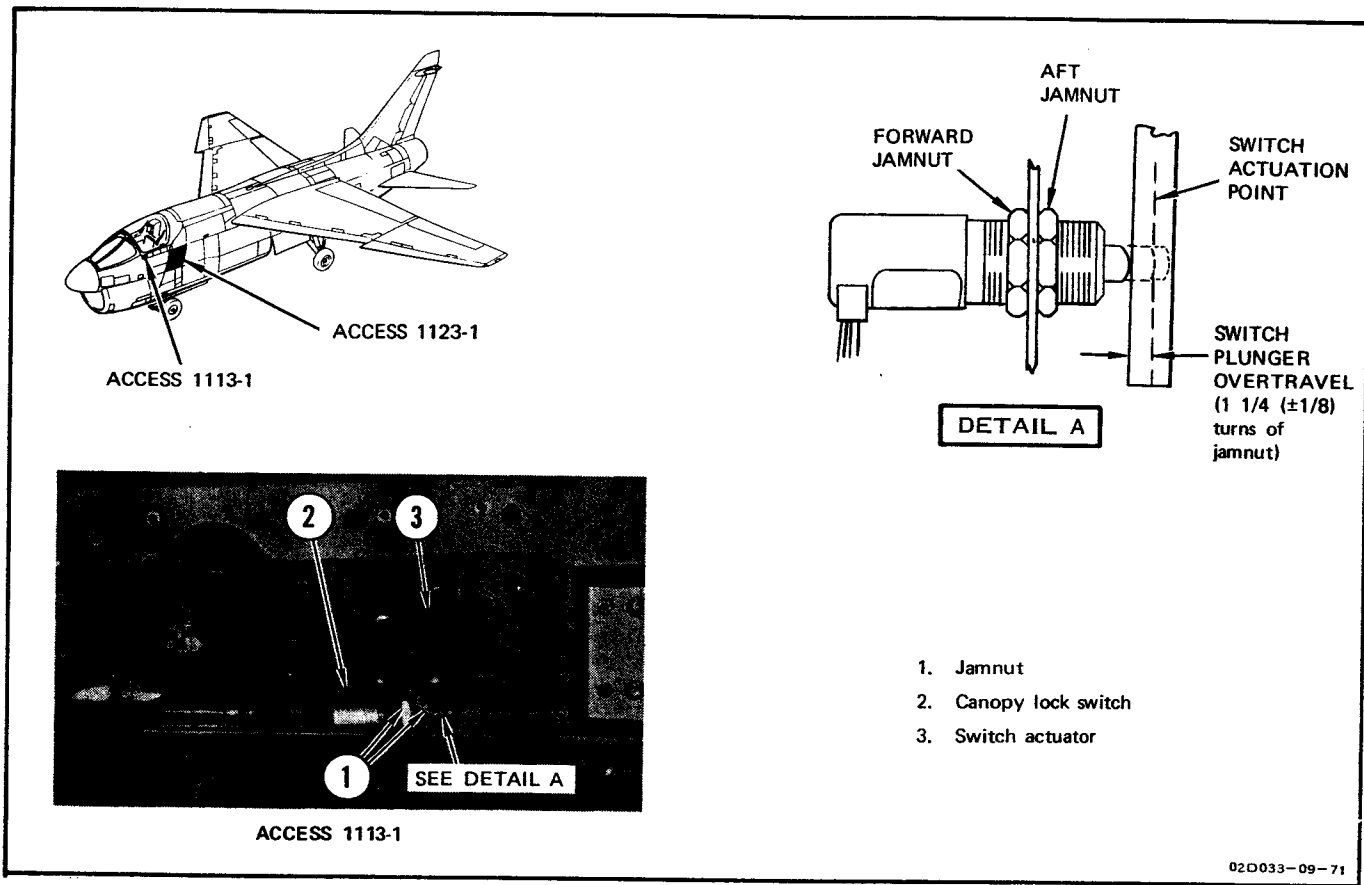


Figure 2-26. Canopy Lock Switch Adjustment

WARNING

Ensure that ejection controls safety handle is in the fully down-and-locked position and safety pins (215-00261-1) are installed in prime initiator and interior canopy jettison initiator (T.O. 1A-7D-2-1). This will prevent inadvertent canopy jettison or seat ejection and possible serious injury to personnel.

Do not perform maintenance on equipment associated with explosive devices except in presence of other personnel capable of rendering aid.

2-90. REMOVAL. (See figure 2-27.)

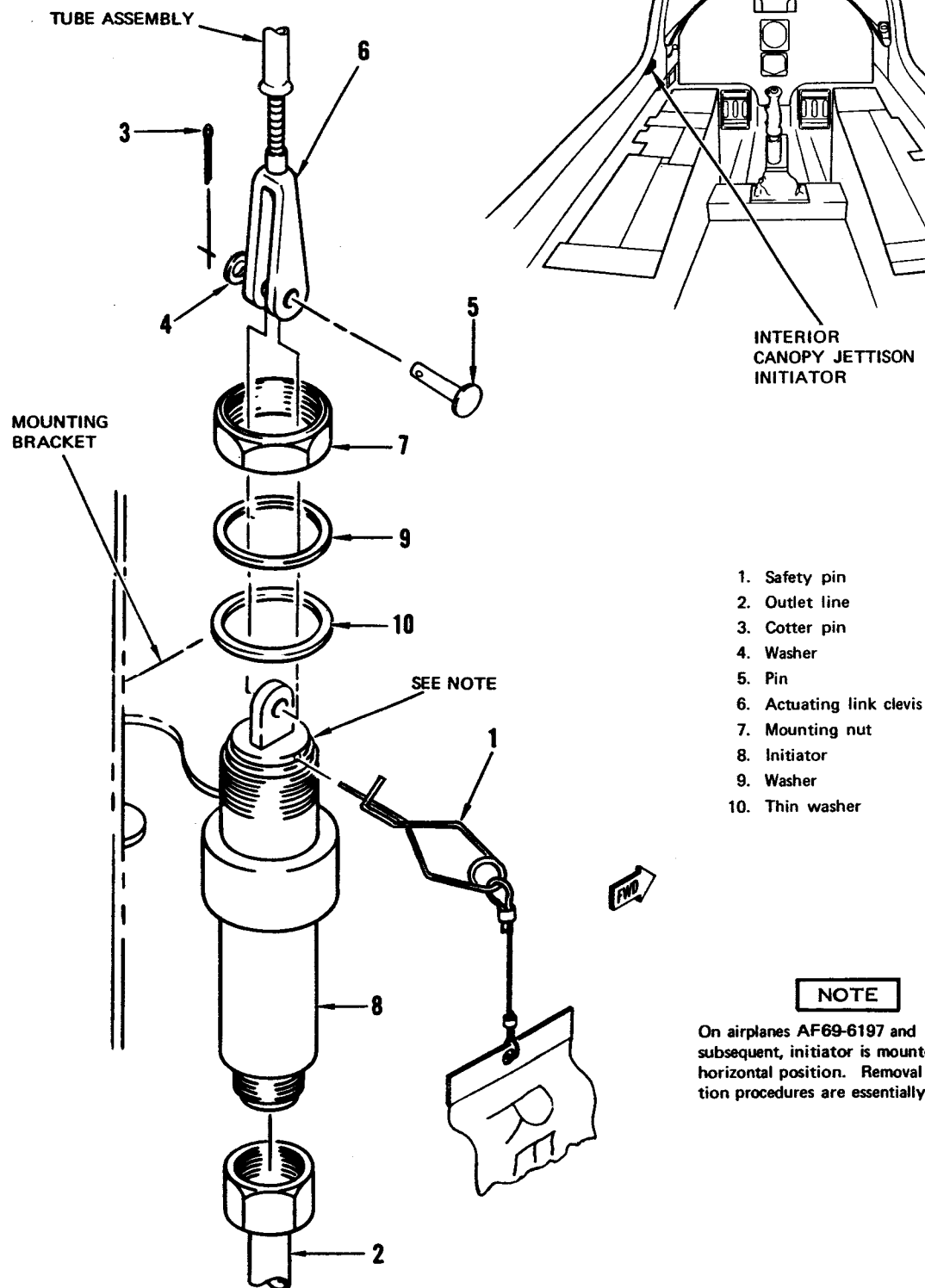
CAUTION

To prevent structure damage, ensure that access panel

restrictions are observed before opening canopy (T.O. 1A-7D-2-1).

Open canopy slowly in cold weather to prevent possible shearing of canopy actuator rod end shear pin (T.O. 1A-7D-2-1).

- a. Open canopy and install 40° canopy support strut (paragraph 1-52).
- b. Insert safety pin (1) in interior canopy jettison initiator.
- c. Tie cord around line (2) at bottom of B nut to prevent nut from slipping to bottom of line.
- d. Disconnect outlet line (2) from outlet port of initiator. Cap open line and plug initiator port with protector assemblies.
- e. Remove cotter pin (3), washer (4), and pin (5) and disconnect actuating linkage from initiator.
- f. Remove actuating link clevis (6) from initiator firing pin.



02D034-09-76

Figure 2-27. M99 Interior Canopy Jettison Initiator Removal and Installation

g. Cut lockwire, loosen initiator mounting nut (7) approximately two turns, and remove initiator (8) from slot in mounting bracket.

h. Carefully remove safety pin assembly. Remove mounting nut (7) and washers (9 and 10) from initiator and install safety pin.

2-91. INSTALLATION. (See figure 2-27.)

WARNING

Do not install an initiator having an expired service life or shelf life. Installation of an expired initiator may result in malfunctioning of the canopy jettison system or loss of life.

CAUTION

The initiator is a sealed device. It shall not be opened for inspection or any other reason. If dropped or if firing pin is disturbed, the initiator is defective and shall be replaced.

a. Carefully remove safety pin (1), loosely install thin washer (10), washer (9), and mounting nut (7) on initiator, and install safety pin (1). On airplanes through AF69-6196, two washers (9) are installed above thin washer (10).

b. Remove plug from initiator outlet port.

c. Position initiator (8) in mounting bracket slot and tighten mounting nut to 120 (± 20) pound-inches torque. Secure nut with MS20995C32 lockwire.

d. Hold actuating link clevis taut, move interior canopy jettison control handle out of detent and pull full aft.

e. Measure actuating distance between hole in actuating link clevis and attachment hole in initiator. Distance shall be minimum of 0.50 inch.

f. Place handle in forward detented position and check that actuating link clevis and cable assembly are properly aligned with initiator. If necessary, reposition tube clamps to align clevis and tube assembly and repeat steps d through f.

g. Connect actuating link clevis (6) to initiator firing pin with pin (5), washer (4), and new cotter pin (3). Ensure that cable tension is not present when installing pin (5). If tension is present, reposition tube and cable assembly and repeat steps d through g.

h. Check that safety pin (1) is installed.

i. Remove plug and connect outlet line (2) to initiator. Tighten line fitting to 95 (± 25) pound-inches torque and apply torque stripe.

j. Cut and remove cord from line.

k. Remove 40° canopy support strut (paragraph 1-52) and close canopy.

2-92. M99 EXTERIOR CANOPY JETTISON INITIATOR REMOVAL AND INSTALLATION.

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
	215-00261-1	Safety pin	Prevent pulling initiator firing pin
	7025389-10 (OCAMA)	Protector assembly	Cap open lines, hoses, and fittings
	7025389-20 (OCAMA)	Protector assembly	Plug open lines, hoses, and fittings
	MIL-H-4034	Torque wrench, 10 to 150 pound-inches	Tighten initiator mounting nut to required torque
			TT02D035-12-70

2-93. REMOVAL. (See figure 2-28.)

WARNING

Ensure that ejection controls safety handle is in the fully down-and-locked position and safety pins (215-00261-1) are installed in prime initiator and interior canopy jettison initiator (T.O. 1A-7D-2-1). This will prevent inadvertent canopy jettison or seat ejection and possible serious injury to personnel.

Do not perform maintenance on equipment associated with explosive devices except in presence of other personnel capable of rendering aid.

a. Remove canopy jettison control handle (paragraph 2-66).

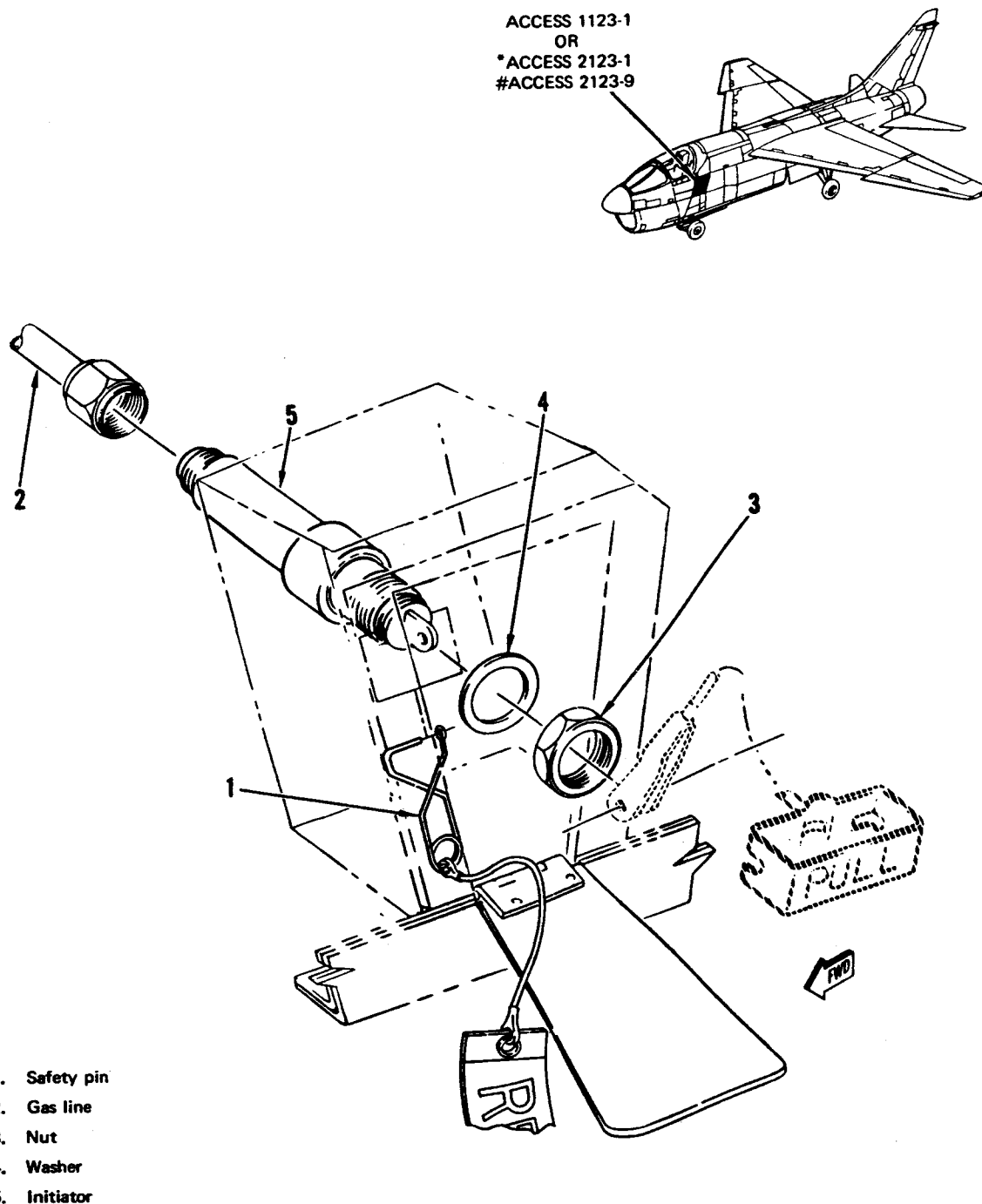


Figure 2-28. M99 Exterior Canopy Jettison Initiator Removal and Installation

WARNING

To avoid injury to personnel, ensure safety pin or lockwire is installed in the initiator where specified in this procedure.

b. On airplanes through AF69-6196, to remove right initiator, perform the following:

WARNING

Voltages used can cause arcing, which may result in severe burns. Remove watches, rings, and other jewelry which can cause a severe shock/burn hazard.

1. Connect external electrical and hydraulic power (T.O. 1A-7D-2-1).

2. Extend air refueling probe.

3. Shut down external electrical and hydraulic power.

4. Disconnect air refueling probe actuator (T.O. 1A-7D-2-6).

5. Open access 2123-1 and inner access.

c. On airplanes AF69-6197 and subsequent, open access 2123-9 to remove right initiator.

d. Open access 1123-1 to remove left initiator.

e. Install safety pin (1) in initiator and disconnect line (2) from initiator. Cap line with protector assembly.

f. Remove safety pin (1) from initiator and install MS20995C32 lockwire through safety pin hole to prevent pulling initiator firing pin and detonating cartridge.

NOTE

Airframe mounting nut cannot be removed from initiator and initiator cannot be removed from airframe mounting bracket with safety pin installed.

g. Cut lockwire and remove nut (3) and washer (4) from initiator. Remove initiator (5) from airplane.

h. Install safety pin.

i. Plug initiator opening.

2-94. INSTALLATION. (See figure 2-28.)

WARNING

Do not install an initiator having an expired service life or shelf life. Installation of an expired initiator may result in malfunctioning of the canopy jettison system or loss of life.

CAUTION

The initiator is a sealed device. It shall not be opened for inspection or any other reason. If dropped or if firing pin is disturbed, the initiator is defective and shall be replaced.

a. Remove safety pin from initiator and install MS20995C32 lockwire.

b. Remove plug from initiator opening. Position initiator (5) on mounting bracket and secure with nut (3) and washer (4).

c. Tighten nut (3) to 120 (± 20) pound-inches torque and secure with MS20995C32 lockwire.

d. Remove lockwire and install safety pin.

e. Install canopy jettison control handle (paragraph 2-66).

f. Remove cap from line (2) and connect line to initiator. Tighten line fitting to 95 (± 25) pound-inches torque and apply torque stripe.

g. After left initiator replacement, close access 1123-1.

h. On airplanes AF69-6197 and subsequent, after right initiator replacement, close access 2123-9.

i. On airplanes through AF69-1696, after right initiator replacement, perform the following:

1. Close inner access and access 2123-1.

2. Connect and secure actuator to air refueling probe (T.O. 1A-7D-2-6).

3. Apply external electrical and hydraulic power (T.O. 1A-7D-2-1).

4. Retract air refueling probe.

5. Disconnect external electrical and hydraulic power.

i. Deleted.

**2-95. MK 14 MOD Q CANOPY ACTUATOR
IMPULSE CARTRIDGE REMOVAL AND
INSTALLATION.**

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
	215-00280-1	40° canopy support strut	Support canopy in normal open position
	7025389-10 (OCAMA)	Protector assembly	Cap open lines, hoses, and fittings
	7025389-20 (OCAMA)	Protector assembly	Plug open lines, hoses, and fittings
	GGG-W-686	Torque wrench, 10 to 150 pound-inches	Tighten firing head to required torque
TT02D036-12-70			

2-96. REMOVAL. (See figure 2-29.)

WARNING

Ensure that ejection controls safety handle is in the fully down-and-locked position and safety pins (215-00261-1) are installed in prime initiator, interior canopy jettison initiator, and canopy-actuated initiator (T.O. 1A-7D-2-1). This will prevent inadvertent canopy jettison or seat ejection and possible serious injury to personnel.

Do not perform maintenance on equipment associated with explosive devices except in presence of other personnel capable of rendering aid.

CAUTION

To prevent structure damage, ensure that access panel restrictions are observed before opening canopy (T.O. 1A-7D-2-1).

Open canopy slowly in cold weather to prevent possible shearing of canopy actuator end rod shear pin (T.O. 1A-7D-2-1).

a. Open canopy and install 40° canopy support strut (paragraph 1-52).

b. Disconnect hose (1). Cap reducer with protector assembly.

c. Cut lockwire and remove firing head (2) and packing (3).

d. Remove cartridge (4) from canopy actuator cartridge chamber.

e. Install plug in actuator port.

2-97. INSTALLATION. (See figure 2-29.)

WARNING

Do not install a cartridge having an expired service life or shelf life. Installation of expired cartridge may result in malfunctioning of the canopy jettison system or loss of life.

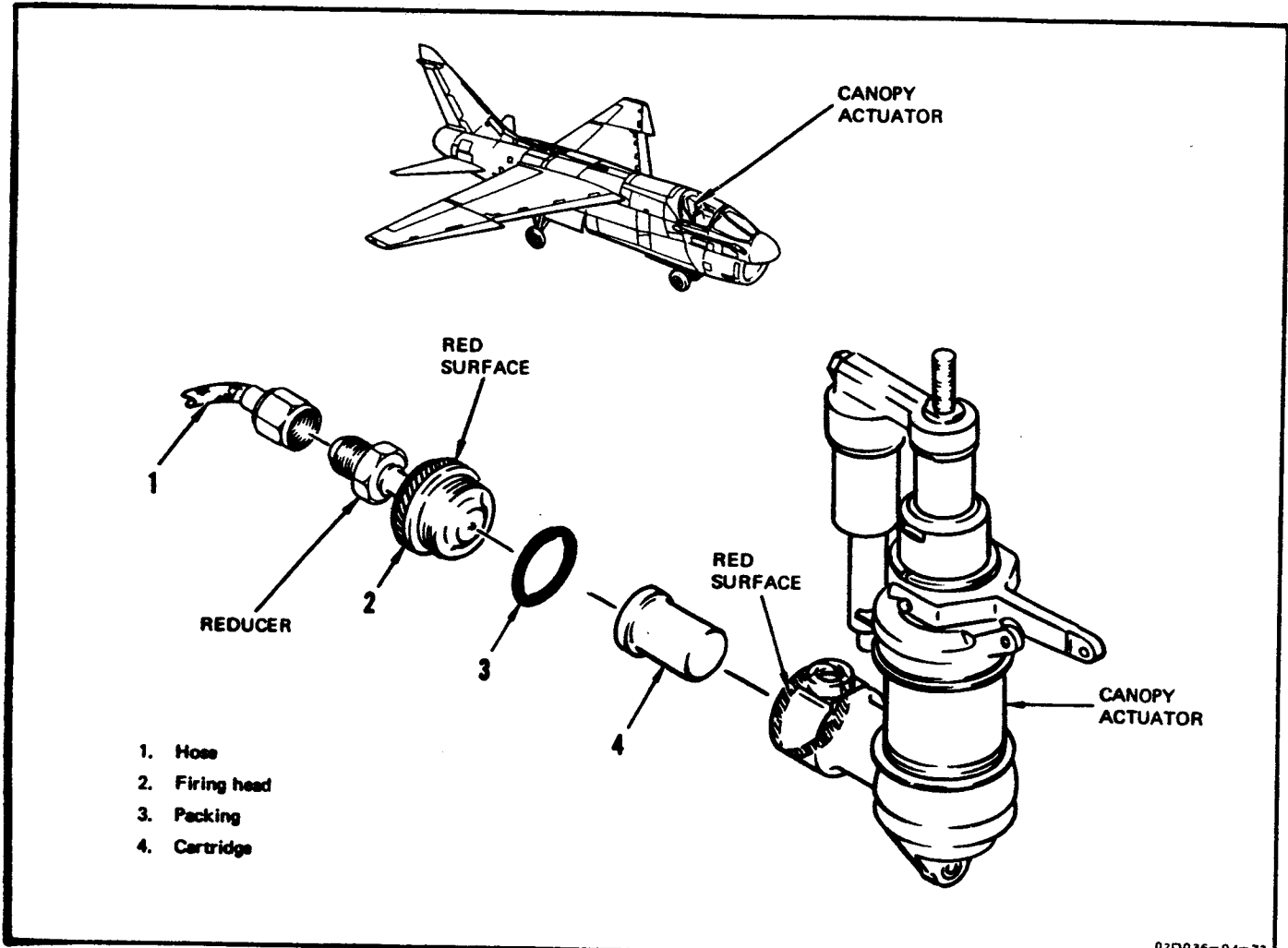
a. Remove plug from actuator port and insert cartridge (4) in canopy actuator cartridge chamber.

CAUTION

To prevent damage to equipment, grease or oil shall not be applied to cartridge.

If firing head is difficult to install, check that cartridge is fully seated in actuator cartridge chamber.

b. Install new MS28775-130 packing (3) on firing head and screw firing head (2) into canopy actuator cartridge chamber.



02D036-04-73

Figure 2-29. Mk 14 Mod 0 Canopy Actuator Impulse Cartridge Removal and Installation

NOTE

Firing head is seated when red surfaces are flush within ± 0.110 inch.

c. Tighten firing head to 140 (± 10) pound-inches torque.

d. Secure firing head with 8320995C32 lockwire.

e. Remove cap from reducer and connect hose (1). Tighten line fitting to 85 (± 15) pound-inches torque and apply torque stripe.

f. Remove 40° canopy support strut (paragraph 1-52) and close canopy.

2-98. M99 CANOPY-ACTUATED INITIATOR REMOVAL AND INSTALLATION. (Airplanes AF68-8225 and Subsequent.)

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
	215-00261-1	Safety pin	Prevent pulling initiator firing pin
	215-00280-1	40° canopy support strut	Support canopy in normal open position
	7025389-10 (OCAMA)	Protector assembly	Cap open lines, hoses, and fittings

Tools Required (Continued)

Figure & Index No.	Part Number	Nomenclature	Use and Application
	7025389-20 (OCAMA)	Protector assembly	Plug open lines, hoses, and fittings
	GGG-W-686	Torque wrench, 10 to 150 pound-inches	Tighten initiator mounting nut to required torque
	GGG-W-686	Torque wrench, 0 to 250 pound-feet	Apply torque
TT02D037-11-72			

WARNING

Ensure that ejection controls safety handle is in the fully down-and-locked position and safety pins (215-00261-1) are installed in prime initiator, interior canopy jettison initiator, and canopy-actuated initiator (T.O. 1A-7D-2-1). This will prevent inadvertent canopy jettison or seat ejection and possible serious injury to personnel.

Do not perform maintenance on equipment associated with explosive devices except in presence of other personnel capable of rendering aid.

2-99. REMOVAL. (See figure 2-30.)

CAUTION

To prevent structure damage, ensure that access panel restrictions are observed before opening canopy (T.O. 1A-7D-2-1).

Open canopy slowly in cold weather to prevent possible shearing of canopy actuator rod end shear pin (T.O. 1A-7D-2-1).

a. Open canopy and install 40° canopy support strut (paragraph 1-52).

b. Disconnect outlet line (1) from outlet port of initiator. Cap open line and plug initiator port with protector assemblies.

c. Cut lockwire and remove cotter pin (2) and pin (3) securing initiator lanyard to M99 initiator (located just below canopy counterbalance cylinder on bulkhead).

d. Cut lockwire, loosen mounting nut approximately two turns, and remove M99 canopy-actuated initiator (4) from slot in mounting bracket.

e. Carefully remove safety pin (5), mounting nut (6), two washers (7), and washer (8) from initiator and install safety pin.

2-100. INSTALLATION. (See figure 2-30.)

WARNING

Do not install an initiator having an expired service life or shelf life. Installation of an expired initiator may result in malfunctioning of the canopy jettison system or loss of life.

CAUTION

The initiator is a sealed device. It shall not be opened for inspection or any other reason. If dropped or if firing pin is disturbed, the initiator is defective and shall be replaced.

a. Carefully remove safety pin (5) and install three AN960D1216 washers (7) and one AN960D1216L washer (8). Loosely install mounting nut (6) on initiator.

b. Install safety pin (5).

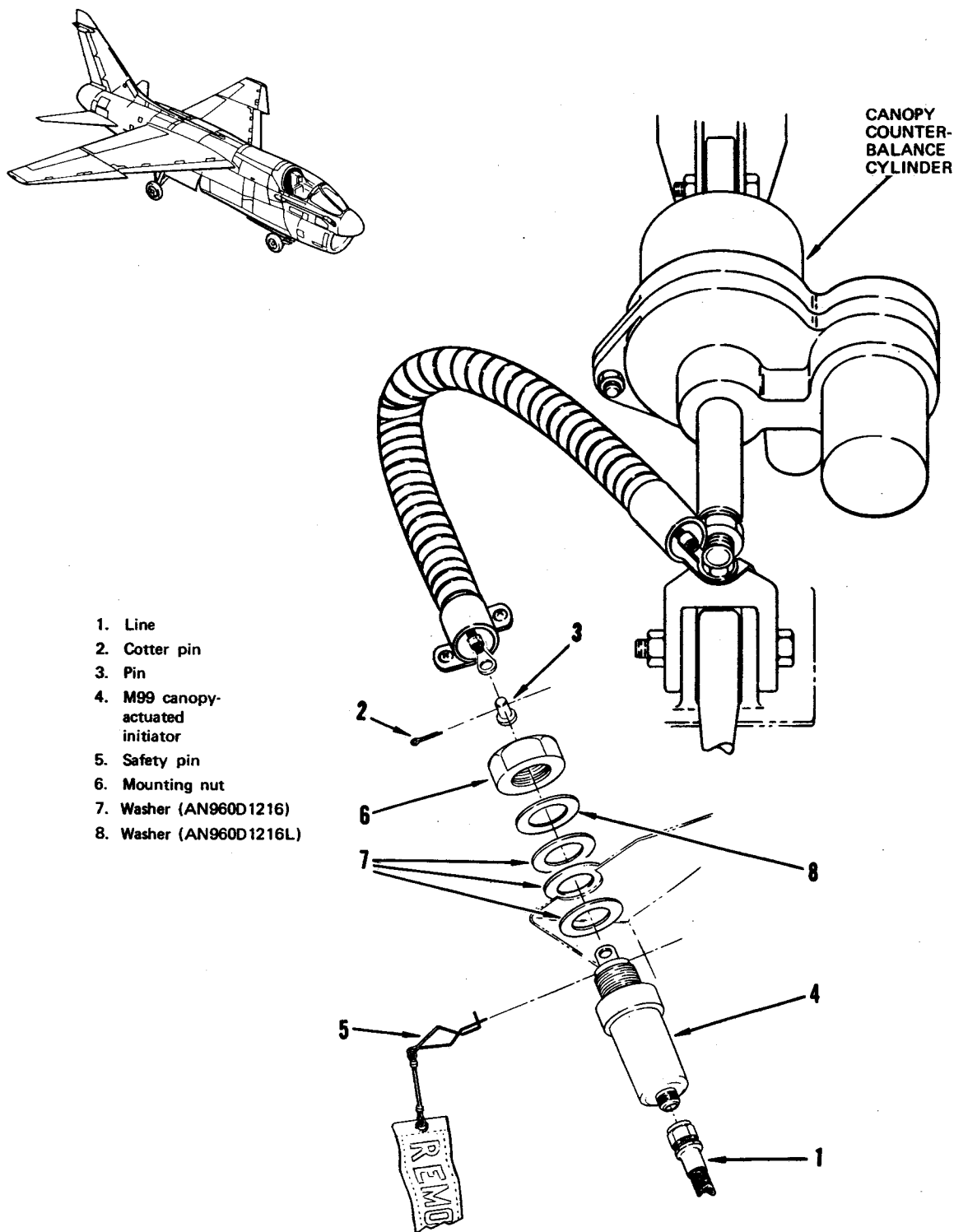
c. Position initiator (4) on mounting bracket with one AN960D1216 washer between bracket and initiator and two AN960D1216 washers above bracket. One AN960D1216L washer will be installed under mounting nut. Tighten mounting nut (6) to 120 (±20) pound-inches torque and secure with MS20995C32 lockwire.

d. Connect initiator lanyard to M99 initiator with pin (3) and new cotter pin (2).

e. Remove cap from line and plug from initiator outlet port. Connect outlet line (1) to initiator. Tighten line fitting to 95 (±25) pound-inches torque and apply torque stripe.

f. Remove safety pin.

g. Remove 40° canopy support strut (paragraph 1-52) and close canopy.



02D037-04-78

Figure 2-30. M99 Canopy-Actuated Initiator Removal and Installation
(Airplanes AF68-8225 and Subsequent)

Section III

PILOT'S EMERGENCY EQUIPMENT

3-1. DESCRIPTION. (See figure 3-1).**WARNING**

This system incorporates Cartridge/Propellant Actuated Devices (CAD/PAD). Inadvertent firing of these devices could result in death or serious injury to personnel and/or damage to equipment.

The disassembly, modification, or testing of these devices without prior OAMA/MMN approval is strictly prohibited.

Accidents/incidents involving these devices will be reported in accordance with AFR 127-4.

3-2. The pilot's emergency equipment consists of a parachute assembly and survival kit. The parachute provides the pilot with basic survival capability following seat ejection. An assortment of gear stored in the survival kit is included to sustain the pilot if ejection is necessary over water or unfamiliar or hazardous terrain.

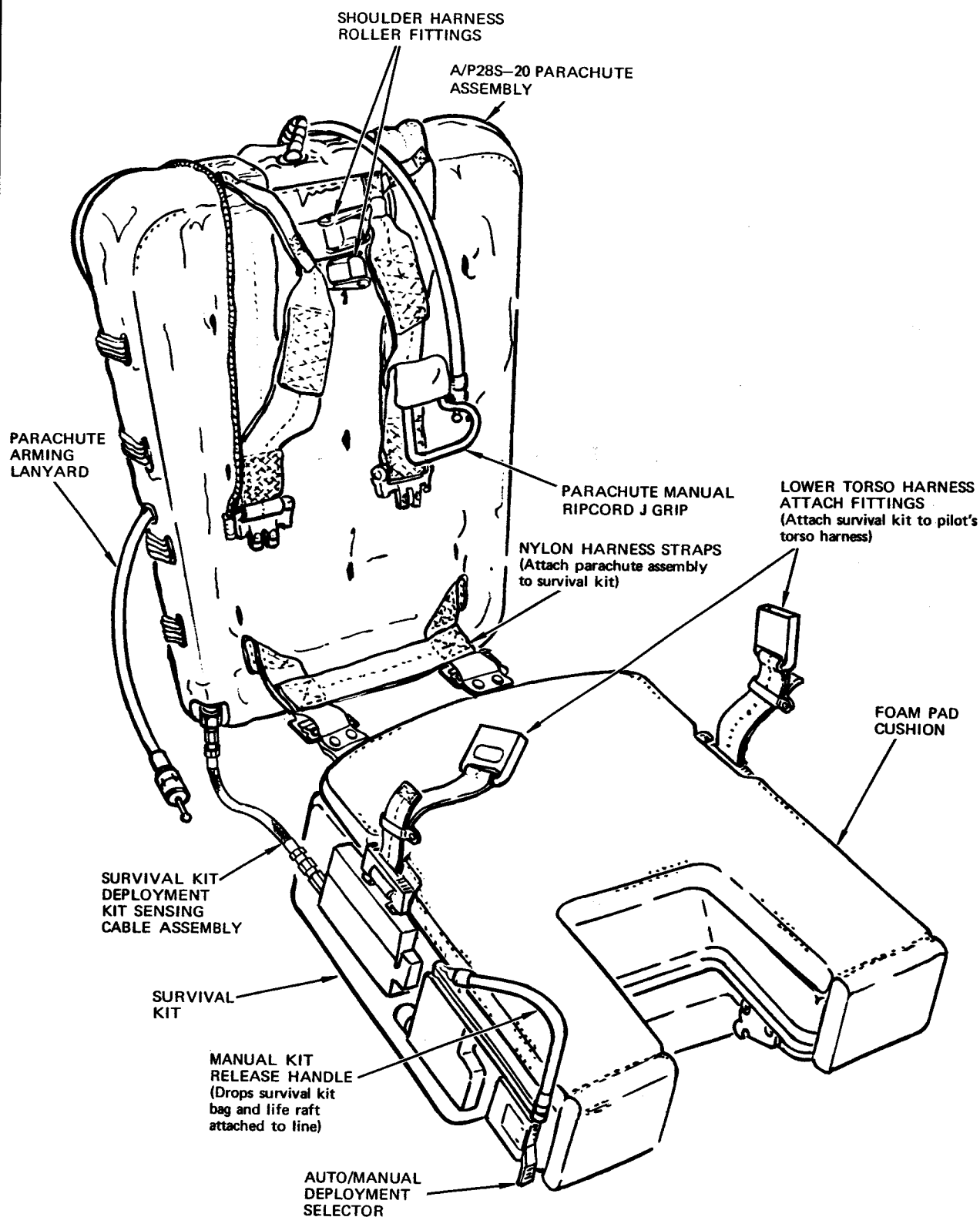
3-3. PARACHUTE ASSEMBLY. The A/P28S-20 parachute assembly, designed for use with the rocket catapult ejection seat, is a back-pack type parachute which opens automatically following the pilot-seat separation phase of seat ejection. Manual deployment is possible by means of a J-style ripcord grip.

3-4. The parachute assembly consists of a contoured, semirigid fiber glass frame; a cover assembly; a 28-foot, four-color C-9 canopy; PA-7 pilot chute, an integrated riser-harness assembly; an automatic actuator; a URT-33 locator beacon antenna assembly; and a survival kit deployment sensing cable assembly.

3-5. The parachute is connected to the survival container by two kit-to-parachute straps and the survival kit deployment sensing cable assembly. The kit-to-parachute straps contain quick-disconnect buckles to allow independent installation and removal of parachute or survival kit. The two kit-to-parachute straps run from the bottom of the parachute container to the parting line at the aft portion of the survival kit. They are designed to provide restraint for the bottom portion of the parachute during free-fall before parachute deployment. The survival kit deployment sensing cable runs from the right side of the survival kit and attaches to the parachute at a service connector located at the lower right corner of the parachute. The sensing cable assembly is engaged by a grab collet assembly located inside the parachute and attached to the right parachute riser.

3-6. Slots are provided in the frame sides of the parachute assembly for routing of the pack opening bands and the automatic release actuator cable housing. The cover assembly incorporates closing flaps and a false bottom on which the suspension line retaining loops, a pocket for the automatic release actuator, and webbing tunnels for the pack opening bands are located. The conventional top and bottom closing flaps are reinforced for greater pullout resistance; the reinforced top and bottom corners of the frame produce a closed corner and provide improved windblast resistance.

3-7. The parachute is supplied with and uses an automatic release actuator incorporating a 2.0-second Mk 5 Mod 1/Mod 2 delay cartridge. An actuator arming lanyard and housing extend from the actuator through the frame and attach to the manual harness release handle on the right side of the ejection seat bucket. A power cable and housing, also attached to the actuator, extend through the top of the frame and attach to the ripcord



02D042-01-09-76

Figure 3-1. Pilot's Emergency Equipment (Sheet 1)

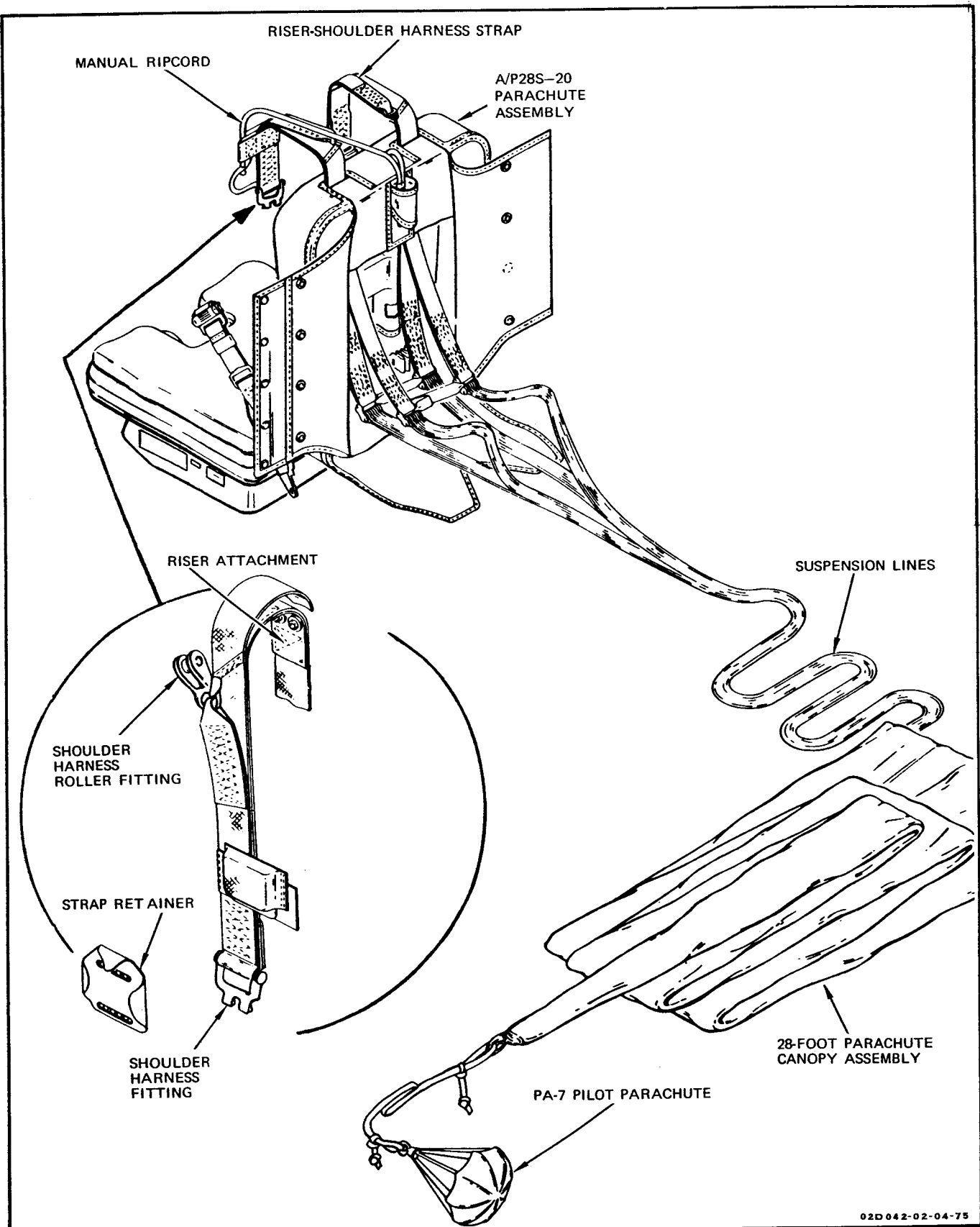
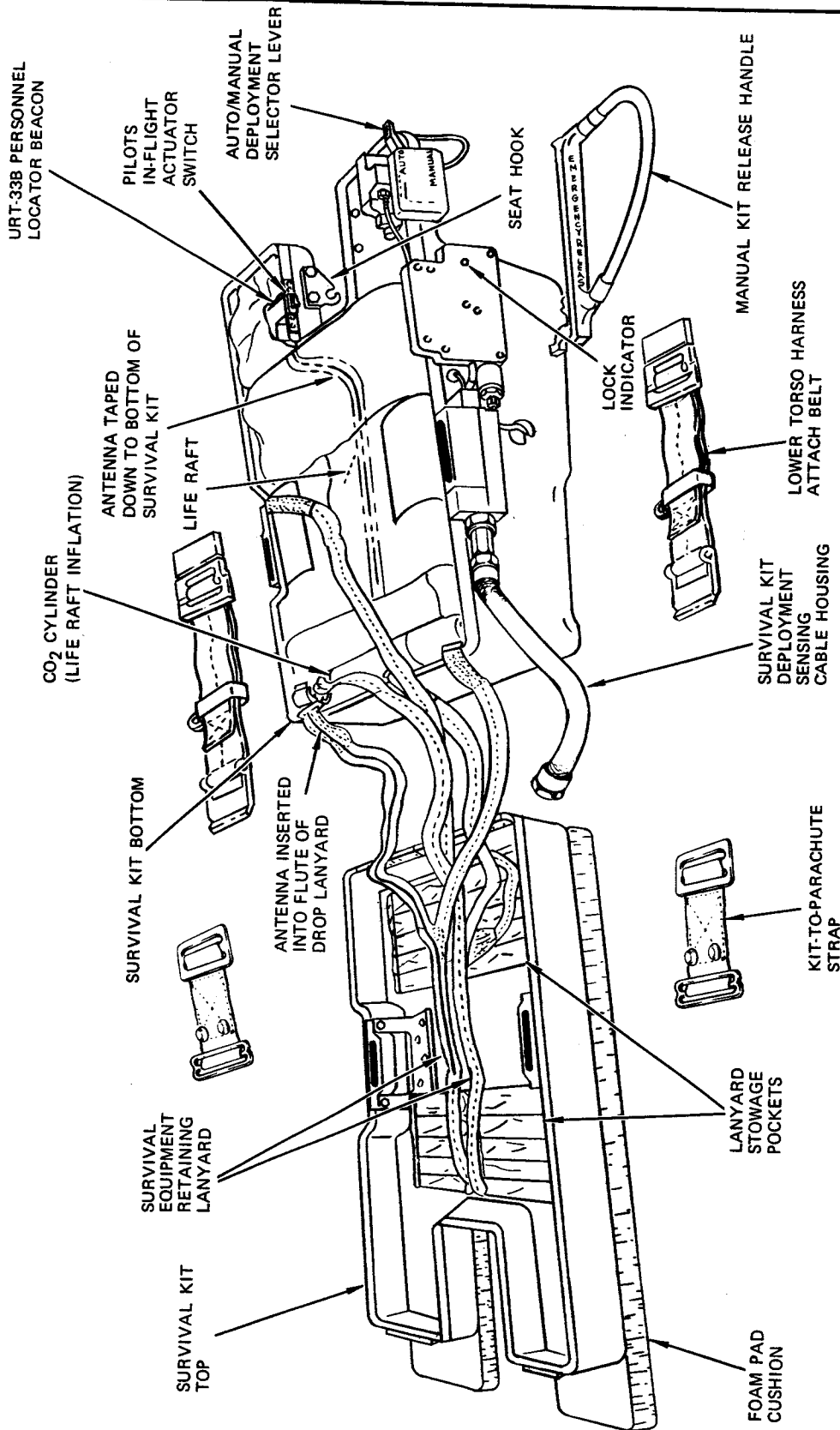


Figure 3-1. Pilot's Emergency Equipment (Sheet 2)



02D042-03-09-76

Figure 3-1. Pilot's Emergency Equipment (Sheet 3)

locking pin to automatically open the parachute when actuated. A manual ripcord, housing, and retainer clip are provided in the left riser-shoulder harness assembly.

3-8. For control of the pilot's forward movement, the riser-shoulder harness assembly is provided with end roller fittings, through which the ejection seat inertia reel straps are routed. Lower torso restraint is provided by a lap belt secured directly to the seat by the lap belt release pins. The lap belt halves are fastened by a single connector in the center of the belt; and care must be taken to see that lap belt ends do not hang over edge of seat, as damage to seat and/or console may result.

3-9. Release of the riser-shoulder harness from ejection seat inertia reel straps and release of lap belt from ejection seat is accomplished automatically during the ejection sequence by actuation of the harness release actuator. Manual release may be accomplished during pilot escape from the cockpit, without initiating ejection sequence, by pulling the manual harness release handle upward. The handle also serves as a ground maintenance aid in removal and installation of parachute and survival kit.

3-10. SURVIVAL KIT. The pilot's survival equipment consists of all equipment used by the pilot after release from the ejection seat for permitting a safe return to ground level and, if ejection occurs at sea, for sustaining the pilot until rescue is accomplished.

3-11. A deployment selector, located at the forward right thigh support of the kit, permits the pilot to select either manual or automatic deployment of kit. Within the bottom section of the survival kit is a bag containing a radic, compass, knife, shark repellent, drinking water, rations, sea water desalter, first aid kit, signal mirror, flares, personnel locator beacon, and a survival kit manual.

3-12. OPERATION.

3-13. PARACHUTE ASSEMBLY. Parachute deployment occurs following the pilot-seat separation phase of normal seat ejection. If the pilot is above a preset pressure altitude of 14,000 ($\pm 1,000$) feet, an aneroid in the parachute barometric actuator delays parachute deployment until the pilot has descended to the correct pressure altitude. The Mk 5 Mod 1/Mod 2 2.0-second delay cartridge then fires, causing parachute deployment. The survival kit deployment sensing cable assembly is pulled to arm the survival kit actuator during deployment of the parachute. Parachute deployment can also be accomplished by pulling a J-style ripcord grip.

3-14. SURVIVAL KIT. With the survival kit deployment selector in AUTO, the parachute-attached survival kit deployment sensing cable assembly actuates the survival kit actuator, and the kit automatically deploys within 4.0 (± 1.0) seconds after full parachute inflation. With the deployment selector in MANUAL, the pilot must pull the manual kit release handle on the right side of the kit during parachute descent. Upon deployment of the kit, the top and bottom halves separate, both still connected to the pilot by a retaining lanyard. The survival kit gear remains with the bottom half of the container, stowed in a zippered bag, while the life raft separates from the container. A self-contained pneumatic bottle automatically inflates the life raft which remains attached to the pilot, also by means of the retaining lanyard. In case of an emergency ground egress, the pilot must pull the handle to obtain release from the kit.

3-15. A personnel locator beacon is located in the left thigh support. With pilot's inflight actuator switch in A (automatic), the beacon is actuated by a plunger on the bottom of the support which extends when kit separates from seat. With pilot's inflight actuator switch in M (manual), beacon is unarmed.

3-16. PARACHUTE AND SURVIVAL KIT REMOVAL AND INSTALLATION.**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
3-3	68C41208 (or equivalent)	Parachute arming lanyard ground safety cover	Prevent inadvertent actuation of parachute actuator cartridge
	68D110033-1001 or local fabrication	Seat separation bladder protective cover	Protect separation bladder when survival kit is removed

TT02D0039-07-77

NOTE

The following procedure includes removal and installation instructions for parachute and survival kit as an assembly. This is considered to be the preferred method when maintenance to parachute or survival kit is not required. If maintenance is to be performed on either the parachute or survival kit, they must be removed and installed separately in accordance with instructions contained in paragraph 3-19 or 3-21, respectively.

3-17. REMOVAL. (See figure 3-2.)**CAUTION**

To prevent structure damage, ensure that access panel restrictions are observed before opening canopy (T.O. 1A-7D-2-1).

Open canopy slowly in cold weather to prevent possible shearing of canopy actuator rod end shear pin (T.O. 1A-7D-2-1).

a. Open canopy.**WARNING**

Ensure that ejection controls safety handle is in the fully

down-and-locked position and safety pins (215-00261-1) are installed in prime initiator and interior canopy jettison initiator (T.O. 1A-7D-2-1). This will prevent inadvertent canopy jettison or seat ejection. Ensure survival kit lever is in MANUAL to prevent firing of cartridge.

CAUTION

A pull force in excess of 10 pounds will remove arming lanyard from actuator and result in inadvertent cartridge firing.

b. Squeeze trigger of manual harness release handle (1) and pull parachute arming lanyard swaged ball end fitting (2) of parachute arming lanyard (3) from hole aft of handle.

CAUTION

To prevent false distress radio signals, inflight switch should be in M and safety pin installed in switch.

c. Ensure that inflight switch on survival kit is in M and install ground safety pin in switch.

d. Pull manual harness release handle upward. A sharp click indicates that shoulder harness inertia reel strap retaining pin (4) and lap belt retaining pins (5) are latched in the disengaged position.

e. Remove independent lap belt (6).

f. Press manual harness release handle down until it latches in position.

g. Carefully remove parachute arming lanyard from retaining channel on right side of seat.

CAUTION

Do not pull and/or snag the parachute actuator arming cable/lanyard swagged ball and fitting. Exercise additional care when handling arming lanyard when not utilizing appropriate locally manufactured protective cover.

h. Remove zero-delay lanyard ring from parachute arming lanyard.

i. Install locally manufactured 68C41208 ground safety cover, or equivalent, over exposed end of parachute arming lanyard to prevent inadvertent actuation of actuator.

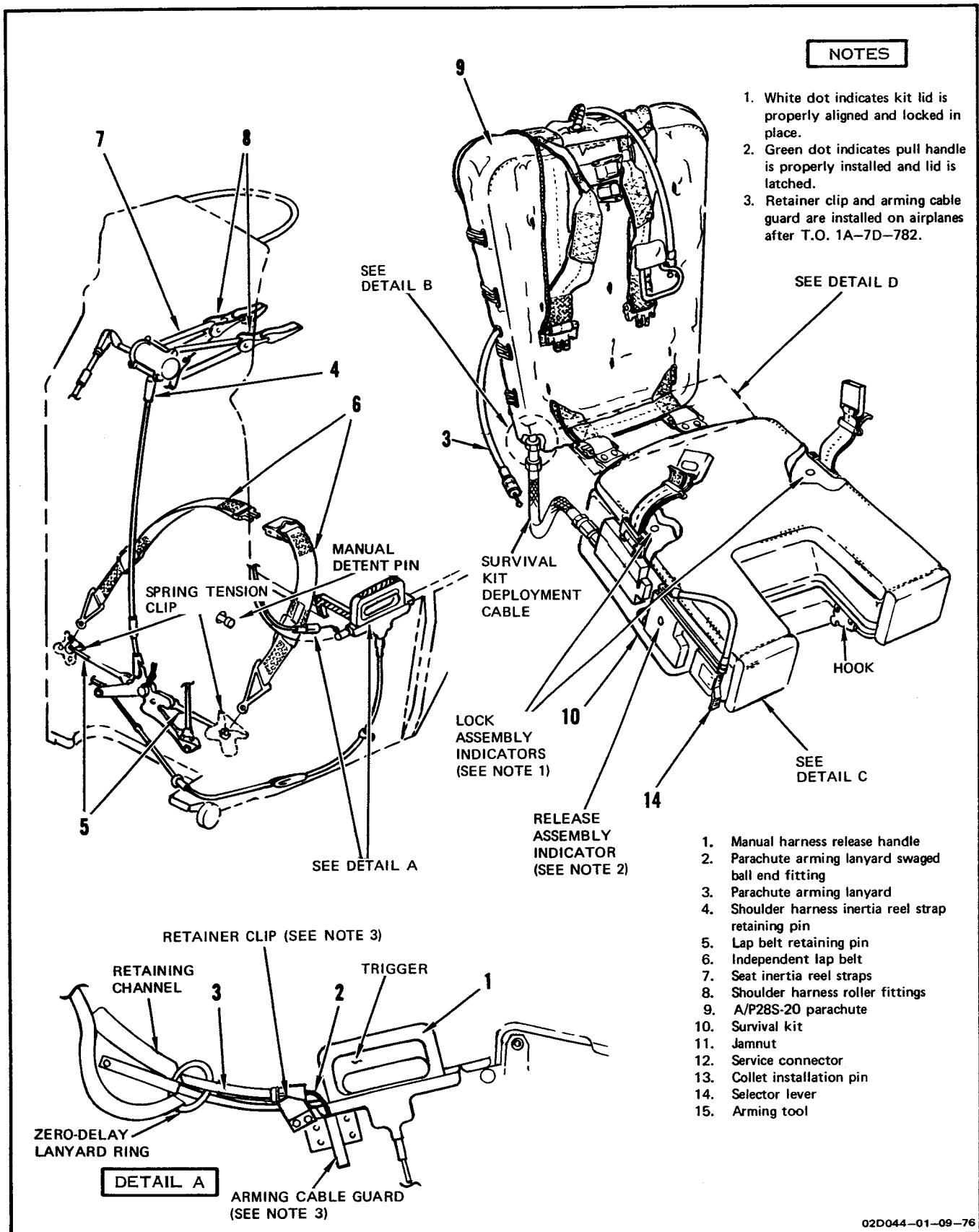
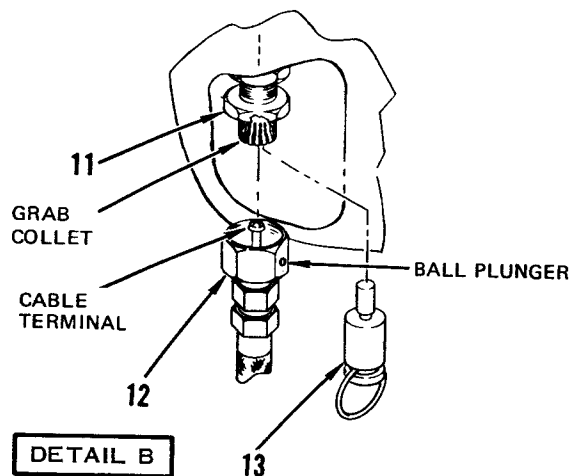
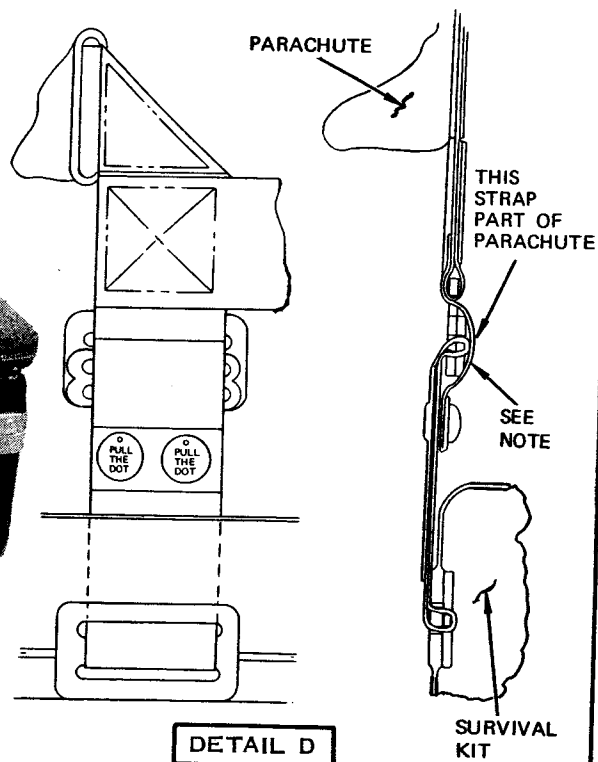
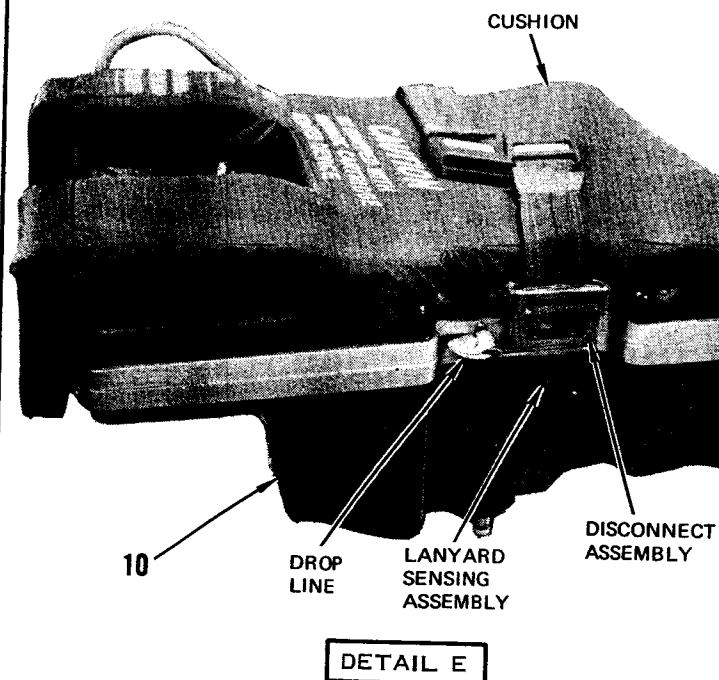
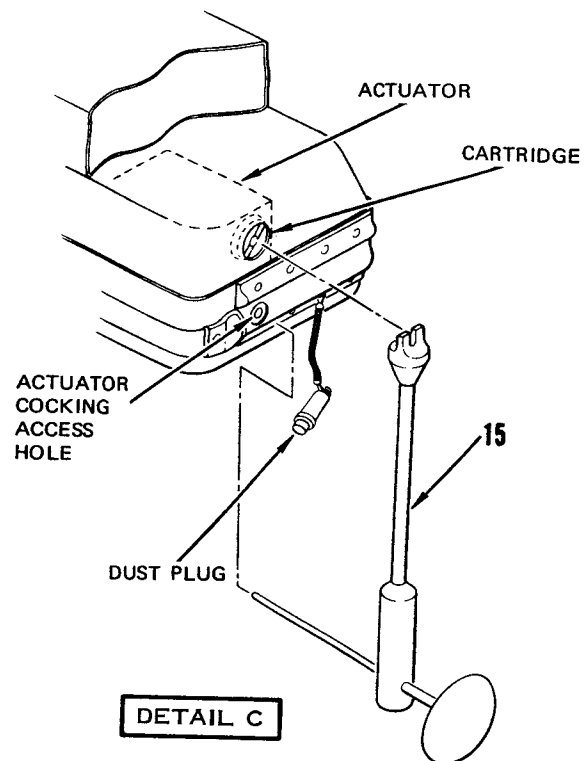


Figure 3-2. Parachute and Survival Kit Removal and Installation
(Sheet 1)



NOTE

Survival kit straps must be routed as shown. For kit-to-parachute connection see Detail D.



07D044-02-10-75

Figure 3-2. Parachute and Survival Kit Removal and Installation
(Sheet 2)

j. Carefully stow arming lanyard underneath second lower right parachute opening band, forming a U-shaped configuration.

k. Disconnect seat inertia reel straps (7) from shoulder harness roller fittings (8).

l. Stow both harness straps, including J-handle rip cord grip, underneath upper second parachute opening bands, being careful that a sharp 90° angle of rip cord housing is not formed above dual housing clamp.

m. Pull parachute down and forward on top of survival kit.

CAUTION

Parachute shall not be lifted by pulling on parachute arming lanyard. Pulling on lanyard will release parachute from pack.

n. Remove A/P285-20 parachute assembly (9) and survival kit (10) from cockpit.

NOTE

If parachute and survival kit were removed to facilitate other maintenance and will be reinstalled within a short period of time, removal of survival kit cartridge is not required.

o. If parachute and survival kit are to remain out of airplane for an extended period of time or if maintenance is to be performed on survival kit, remove survival kit cartridge (paragraph 3-26).

p. If ejection seat is not to be removed from airplane, install seat separation bladder protective cover in seat bucket (figure 3-3).

3-18. INSTALLATION. (See figure 3-2.)

WARNING

Ensure that ejection controls safety handle is in the fully down-and-locked position and safety pins (215-00261-1) are installed in prime initiator and interior canopy jettison initiator (T.O. 1A-7D-2-1). This will prevent inadvertent canopy jettison or seat ejection and possible serious injury to personnel.

CAUTION

To ensure proper kit hook engagement, inspect hooks for damage and wear.

a. Using two new drill bits (11/32 and 13/32), as go/no go gages, inspect hook throat openings. The 11/32 bit should fit into throat opening of hooks and 13/32 bit should not. Kits with hooks that do not meet above inspection shall not be installed in airplane.

b. If survival kit cartridge has been removed, install cartridge (paragraph 3-26).

c. Ensure that ground safety cover is installed over exposed end of parachute arming lanyard and lanyard is stowed underneath parachute opening band.

d. Ensure that survival kit is securely closed as follows:

1. Lift cushion and check for white indicator dots through holes above each lock assembly.

2. Check for green indicator through hole on release assembly.

e. Ensure that survival kit drop lanyard is installed with lanyard stop (doubled and stitched webbing) inside container as shown.

f. Ensure that kit-to-parachute straps are properly routed and that all four snaps are closed.

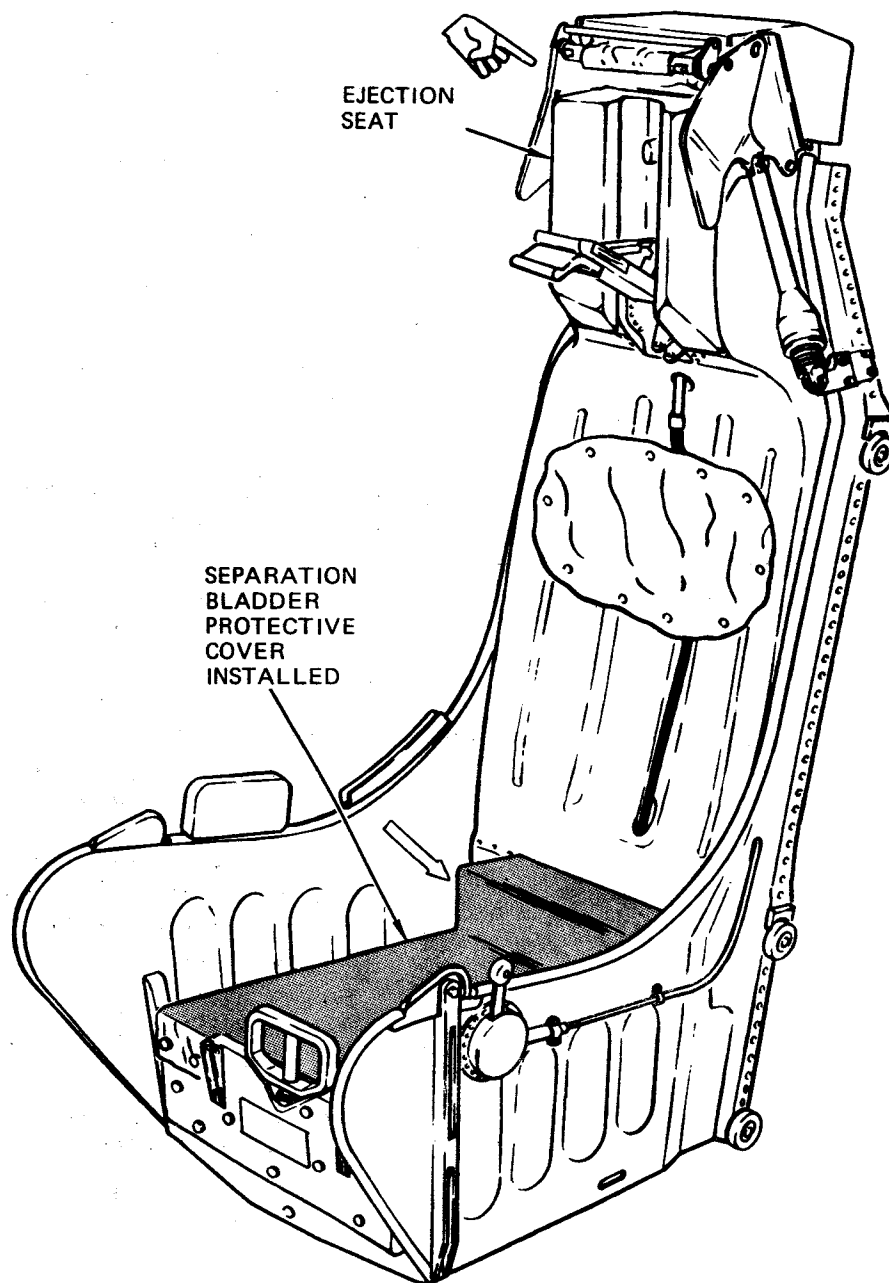
g. Ensure that service connector (12) is properly connected.

h. Remove separation bladder protective cover from seat bucket and check seat for cleanliness and freedom from foreign objects.

CAUTION

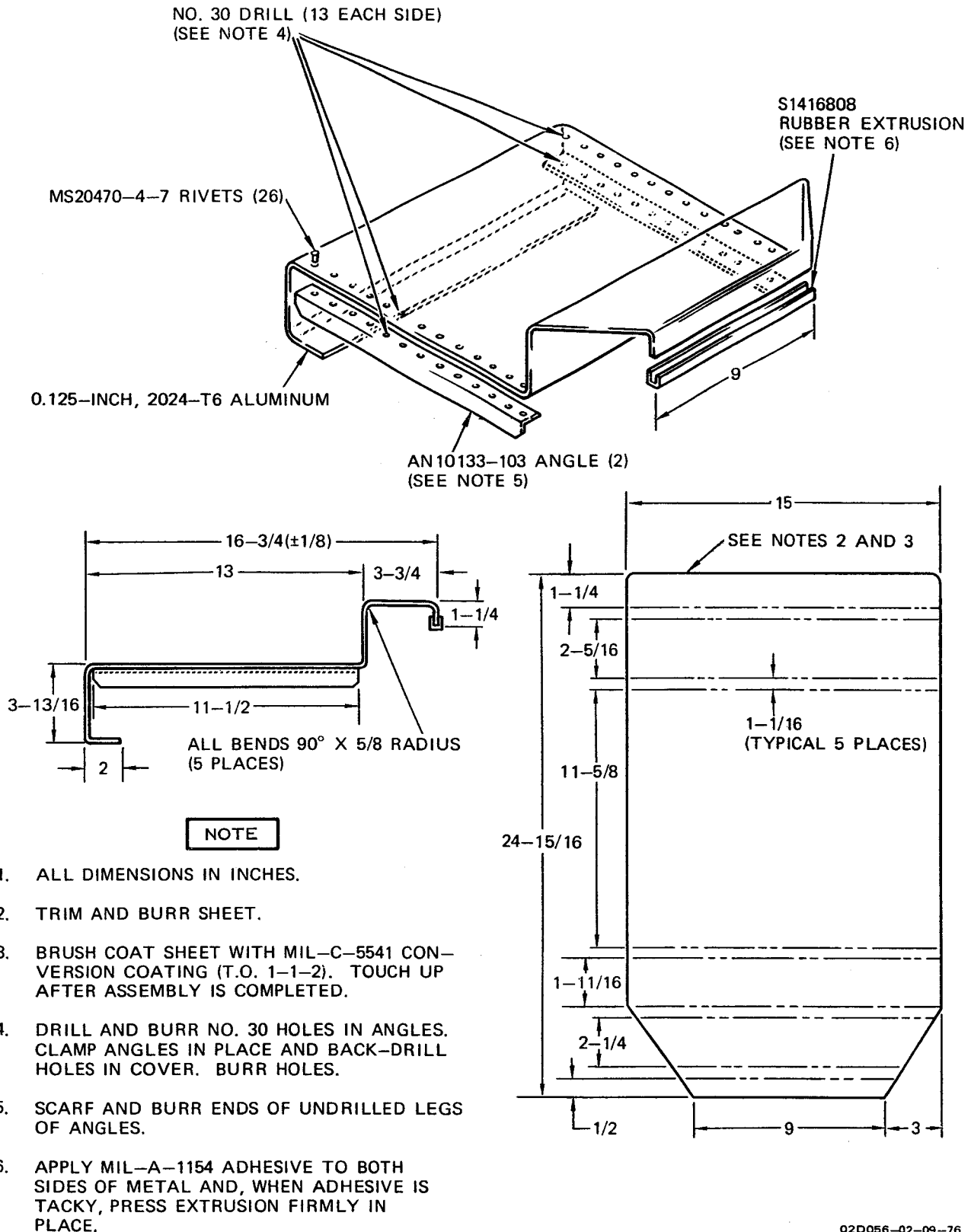
Parachute shall not be lifted by pulling on parachute arming lanyard. Pulling on lanyard will release parachute from pack.

i. Install A/P285-20 parachute and survival kit in airplane.



02D056-01-09-76

Figure 3-3. Seat Separation Bladder Protective Cover (Sheet 1)



02D056-02-09-76

Figure 3-3. Seat Separation Bladder Protective Cover (Sheet 2)

CAUTION

Care must be taken to ensure survival kit hooks are not overstressed or jammed. Do not use force to engage hooks. Visually ensure hooks remain fully seated (engaged) under retaining pins while rotating survival kit back down into seat bucket.

j. Engage survival kit hooks with retainer rollers by rotating kit upward and forward approximately 45° and then rotating back down into seat bucket. Visually inspect hooks for proper engagement.

k. Ensure that AN/URT-33B actuator plunger on bottom of survival kit rides directly on top of front seat panel.

l. Position survival kit deployment cable inboard behind survival kit.

NOTE

If chaffing of the ejection seat occurs, wrap wire braided shield cable with insulation sleeving NSN 5470-01-060-0974.

m. Remove both harness straps from underneath parachute opening bands.

n. Position parachute against seat back.

NOTE

Install lap belts (male half connected to left side of seat) as shown in figure 3-2.

Ensure right belt is not installed between survival kit and kit deployment cable.

o. Position end fittings of independent lap belt (6) for attachment.

NOTE

When extending or retracting inertia reel straps, both straps shall be extended and/or retracted together.

p. Position manual ripcord housing outboard of left inertia reel strap and insert inertia reel straps (7) through parachute shoulder harness roller fittings (8).

q. Insert inertia reel strap end fittings into position between guide pins at back of seat.

r. Pull out on manual detent pin and engage shoulder harness inertia reel strap retaining pin (4) through reel strap end fittings and lap belt retaining

pins (5) through lap belt end fittings. Check that lap belt retaining pins extend a minimum of 1/16 inch through sides of seat (tapered point of pin not included).

s. Carefully pull on lap belt to ensure retaining pins have engaged lap belt end fittings. Ensure that lap belts are in the seat and not hanging over edge of seat, as damage to seat and/or console may result.

CAUTION

To prevent inadvertent activation of the parachute, special care should be exercised when the parachute arming lanyard is removed from underneath parachute opening band.

t. Remove parachute arming lanyard (3) from underneath parachute opening band.

u. Remove ground safety cover from parachute arming lanyard.

v. Install parachute arming lanyard (3) in retaining channel on seat.

CAUTION

To prevent possible fouling of zero-delay lanyard and improper ejection system operation, ensure parachute arming lanyard (3) is routed through zero-delay lanyard ring.

w. Insert parachute arming lanyard through zero-delay lanyard ring and route lanyard along outboard side of guard.

x. On airplanes after T.O. 1A-7D-782, ensure end of parachute arming lanyard is engaged in retainer clip.

y. Squeeze trigger of manual harness release handle (1) and insert parachute arming lanyard swaged ball end fitting (2) through hole aft of handle. Release trigger and ensure that ball is below forked part of handle. On airplanes before T.O. 1A-7D-782, swaged ball can be felt by placing fingers around and under handle release bracket if cable is properly installed.

z. Place mode selector lever (14) in AUTO position.

aa. Perform egress system final inspection (paragraph 3-25).

ab. Close canopy.

T.O. 1A-7D-2-2TP-6

CAUTION

NOTE

AIRCRAFT MODIFIED BY TCTO 1A-7-606, ROUTE PARACHUTE ZERO DELAY LANYARD RETAINER STRAP IN THE FOLLOWING MANNER. WITH RETAINER STRAP POSITIONED INBOARD OF THE SEAT, ROUTE STRAP OVER THE TOP OF LANYARD AND DOWN TO THE ORIGINAL SNAP LOCATION. PERFORM SEAT ADJUSTMENT OPERATIONAL CHECKOUT (REF: 1A-7D-2-2 PARA 1-29, PAGE 1-16), AND CHECK FOR PROPER CLEARANCE.

W.

3-19. PARACHUTE REMOVAL AND INSTALLATION.**Tools Required**

Figure & Index No.	Part Number	Nomenclature	Use and Application
3-2	T-782-9	Collet installation pin	Seat collet of parachute sensing cable
	68C41208 (or equivalent)	Parachute arming lanyard ground safety cover	Prevent inadvertent actuation of parachute actuator cartridge TT02D049-07-77

NOTE

The following procedures are to be utilized if maintenance to parachute is required. If parachute is being removed to facilitate other maintenance, both parachute and survival kit must be removed and installed as an assembly (paragraph 3-16).

3-20. REMOVAL. (See figure 3-2.)**CAUTION**

To prevent structural damage, ensure that access panel restrictions are observed before opening canopy (T.O. 1A-7D-2-1).

Open canopy slowly in cold weather to prevent possible shearing of canopy actuator rod end shear pin (T.O. 1A-7D-2-1).

a. Open canopy.**WARNING**

Ensure that ejection controls safety handle is in the fully down-and-locked position and 215-00261-1 safety pins are installed in prime initiator and interior canopy jettison initiator (T.O. 1A-7D-2-1). This will prevent inadvertent canopy jettison or seat ejection.

CAUTION

A pull force in excess of 10 pounds will remove arming lanyard from actuator and result in inadvertent cartridge firing.

b. Squeeze trigger of manual harness release handle (1) and pull parachute arming lanyard swaged ball end fitting (2) of parachute arming lanyard (3) from hole aft of handle.

c. Carefully remove parachute arming lanyard from retaining channel on right side of seat.

d. Remove zero-delay lanyard ring from parachute arming lanyard.

e. Install locally manufactured 68C41208 ground safety cover, or equivalent, over exposed end of parachute arming lanyard to prevent inadvertent actuation of actuator.

f. Carefully stow arming lanyard underneath second lower right parachute opening band, forming an S-shape configuration.

g. Using two wrenches, loosen jamnut (11) from service connector (12). Using a thin wrench, hold shoulder on collet sleeve while loosening service connector. Disconnect service connector. Cap open fittings.

h. Pull manual harness release handle upward. A sharp click indicates that shoulder harness inertia reel strap retaining pin (4) and lap belt retaining pins (5) are latched in the disengaged position.

i. Remove independent lap belt (6).

j. Press manual harness release handle down until it latches in position.

k. Disconnect seat inertia reel straps (7) from shoulder harness roller fittings (8).

l. Stow both harness straps, including J-handle rip cord grip, underneath upper second parachute opening bands, being careful that a sharp 90° angle of rip cord housing is not formed above dual housing clamp.

CAUTION

Parachute shall not be lifted by pulling on parachute arming lanyard. Pulling on lanyard will release parachute from pack.

m. Disconnect parachute (9) from survival kit (10) by releasing quick-disconnect buckles. Remove parachute from airplane.

3-21. INSTALLATION. (See figure 3-2.)

CAUTION

Parachute shall not be lifted by pulling on parachute arming lanyard. Pulling on lanyard will release parachute from pack.

a. Place parachute in airplane and connect parachute to survival kit straps as follows:

1. Insert buckles on survival kit straps through buckles on parachute straps. Ensure that buckles are locked together.

2. Secure buckles by engaging snaps. Ensure that all four snaps are closed.

CAUTION

To ensure automatic deployment capability of survival kit, grab collet shall be properly seated in lower opening of parachute service connector fitting.

b. Position collet installation pin (13) against grab collet inside parachute sensing cable.

c. Push collet installation pin firmly until collet snaps into place. This correctly seats the collet.

d. Remove collet installation pin from grab collet.

e. Visually inspect parachute service connector fitting; grab collet shall be properly seated in lower end of fitting.

1. To insure proper alignment of cable terminal into the grab collet, turn set screw (ball plunger) clockwise until cable terminal is secured.

f. Position cable terminal in opening of grab collet. Using a thin wrench, hold shoulder on collet sleeve while tightening service connector (12).

g. Using two wrenches, tighten jamnut (11) onto service connector.

1. Turn set screw counterclockwise $\frac{1}{2}$ turn.

h. Position survival kit deployment cable inboard behind survival kit.

i. Remove both harness straps from underneath parachute opening bands.

j. Position parachute against seat back.

NOTE

Ensure right belt is not installed between survival kit and kit deployment cable.

k. Position end fittings of independent lap belt (6) for attachment.

NOTE

When extending or retracting inertia reel straps, both straps shall be extended and/or retracted together.

1. Position manual ripcord housing outboard of left inertia reel strap and insert inertia reel straps (7) through parachute shoulder harness roller fittings (8).

m. Insert inertia reel strap end fittings into position between guide pins at back of seat.

n. Pull out on manual detent pin and engage shoulder harness inertia reel strap retaining pin (4) through reel strap end fittings and lap belt retaining pins (5) through lap belt end fittings. Check that lap belt retaining pins extend a minimum of $\frac{1}{16}$ inch through sides of seat (tapered point of pin not included).

o. Carefully pull on lap belt to ensure retaining pins have engaged lap belt end fittings. Ensure that lap belts are in the seat and not hanging over edge of seat, as damage to seat and/or console may result.

CAUTION

To prevent inadvertent activation of parachute, special care should be exercised when parachute arming lanyard is removed from underneath parachute opening band.

p. Remove parachute arming lanyard (3) from underneath parachute opening band.

CAUTION

NOTE

AIRCRAFT MODIFIED BY TCTO
1A-7-606, ROUTE PARACHUTE
ZERO DELAY LANYARD RETAINER
STRAP IN THE FOLLOWING MAN-
MANER. WITH RETAINER STRAP
POSITIONED INBOARD OF THE SEAT,
ROUTE STRAP OVER THE TOP OF
LANYARD AND DOWN TO THE ORI-
GINAL SNAP LOCATION. PER-
FORM SEAT ADJUSTMENT OPER-
ATIONAL CHECKOUT (REF:
1A-7D-2-2 PARA 1-29, PAGE
1-16), AND CHECK FOR PRO-
PER CLEARANCE.

s.

g. Remove ground safety cover from parachute arming lanyard.

r. Install parachute arming lanyard in retaining channel on seat.

CAUTION

To prevent possible fouling of zero-delay lanyard and improper ejection system operation, ensure parachute arming lanyard is routed through zero-delay lanyard ring.

s. Insert parachute arming lanyard through zero-delay lanyard ring and route lanyard along outboard side of guard.

t. On airplanes after T.O. 1A-7D-782, ensure end of parachute arming lanyard is engaged in retainer clip.

u. Squeeze trigger of manual harness release handle (1) and insert parachute arming lanyard swaged ball end fitting (2) through hole aft of handle. Release trigger and ensure that ball is below forked part of handle. On airplanes before T.O. 1A-7D-782, swaged ball can be felt by placing fingers around and under handle release bracket if cable is properly installed.

v. Place mode selector lever (14) in AUTO position.

w. Perform egress system final inspection (paragraph 3-25).

x. Close canopy.

3-22. SURVIVAL KIT REMOVAL AND INSTALLATION.

Tools Required

Figure & Index No.	Part Number	Nomenclature	Use and Application
3-2	T-782-9	Collet installation pin	Seat collet of parachute sensing cable
3-3	68D110033-1001 or local fabrication	Seat separation bladder protective cover	Protect separation bladder when survival kit is removed
TT02D050-07-77			

NOTE

The following procedures are to be utilized if maintenance to survival kit is required. If survival kit is being removed to facilitate other maintenance, both parachute and survival kit must be removed and installed as an assembly (paragraph 3-16).

3-23. REMOVAL. (See figure 3-2.)

CAUTION

To prevent structure damage, ensure that access panel restrictions are observed before opening canopy (T.O. 1A-7D-2-1).

Open canopy slowly in cold weather to prevent possible shearing of canopy actuator rod end shear pin (T.O. 1A-7D-2-1).

a. Open canopy.

WARNING

Ensure that ejection controls safety handle is in the fully down-and-locked position and safety pins (215-00261-1) are installed in prime initiator and interior canopy jettison initiator (T.O. 1A-7D-2-1). This will prevent inadvertent canopy jettison or seat ejection. Ensure survival kit lever is in MANUAL to prevent firing of cartridge.

CAUTION

To prevent false distress radio signals, inflight switch should be in M and safety pin installed in switch.

b. Ensure that inflight switch is in M and install ground safety pin in switch.

c. Using two wrenches, loosen jamnut (11) from service connector (12). Using a thin wrench, hold shoulder on collet sleeve while loosening service connector. Cap open fittings.

d. Disconnect survival kit (10) from parachute (9) by releasing quick-disconnect buckles..

e. Lift upward on aft end of survival kit and disengage seat engagement hooks from retainer.

f. Lift survival kit from airplane.

g. Remove survival kit cartridge (paragraph 3-26).

h. If ejection seat is not to be removed from airplane, install seat separation bladder protective cover in seat bucket (figure 3-3).

3-24. INSTALLATION. (See figure 3-2.)

CAUTION

To ensure proper kit hook engagement, inspect hooks for damage and wear.

a. Using two drill bits (11/32 and 13/32) as go/no go gages, inspect hook throat openings. The 11/32 bit should fit into throat opening of hooks and 13/32 bit should not. Kits with hooks that do not meet the above inspection shall not be installed in airplane.

b. Install survival kit cartridge (paragraph 3-26).

c. Ensure that survival kit is securely closed as follows:

1. Lift cushion and check for white indicator dots through holes above each lock assembly.

2. Check for green indicator through hole on release assembly.

d. Ensure that survival kit drop line is installed as shown.

e. Remove seat separation bladder protective cover and check seat for cleanness and freedom from foreign objects.

CAUTION

Care must be taken to ensure survival kit hooks are not overstressed or jammed. Do not use force to engage hooks.

f. Engage survival kit hooks with retainer rollers by rotating kit upward and forward approximately 45° and then rotating back down into seat bucket. Visually inspect hooks for proper engagement.

g. Insert buckles on survival kit straps through buckles on parachute straps. Ensure buckles are locked together.

h. Secure buckles by engaging snaps. Ensure all four snaps are closed.

CAUTION

To ensure automatic deployment capability of survival kit, grab collet shall be properly seated in lower opening of parachute service connector fitting.

i. Position collet installation pin (13) against grab collet inside parachute sensing cable.

j. Push collet installation pin firmly until collet snaps into place. This correctly seats the collet.

k. Remove collet installation pin from grab collet.

l. Visually inspect parachute service connector fitting; grab collet shall be properly seated in lower end of fitting.

m. Unscrew ball plunger (figure 3-2). Fully seat cable terminal into service connector (12) and tighten ball plunger until cable terminal is secure. Position service connector onto collet sleeve. Hold sleeve while tightening service connector.

n. Using two wrenches, tighten jamnut (11) onto service connector. Loosen ball plunger (approximately 1/4 turn) until cable terminal snaps into place.

o. Place mode selector lever in AUTO position.

p. Perform egress system final inspection (paragraph 3-25).

q. Close canopy.

T.O. 1A-7D-2-2TP-6

NOTE

AIRCRAFT MODIFIED BY TCTO
1A-7-606, ROUTE PARACHUTE ZERO
DELAY LANYARD RETAINER STRAP
IN THE FOLLOWING MANNER.
WITH RETAINER STRAP POSI-
TIONED INBOARD OF THE SEAT,
ROUTE STRAP OVER THE TOP OF
LANYARD AND DOWN TO THE ORI-
GINAL SNAP LOCATION. PER-
FORM SEAT ADJUSTMENT OPER-
ATIONAL CHECKOUT (REF:
1A-7D-2-2 PARA 1-29, PAGE 1-16),
AND CHECK FOR PROPER CLEARANCE.

P.

3-25. EGRESS SYSTEM FINAL INSPECTION.**NOTE**

Steps annotated with an asterisk must be performed following installation of only the parachute and survival kit. All items must be performed following installation of the ejection seat.

*a. Ejection control safety handle in full down-and-locked position.

*b. M99 prime initiator safety pin installed.

*c. M99 interior canopy jettison initiator safety pin installed.

d. M99 canopy-actuated initiator safety pin removed.

e. Check ejection control cable is properly installed in firing control disconnect housing.

f. Check actuating linkage is properly installed on M-99 initiator.

g. Canopy breaker strut clamps removed.

*h. Shoulder harness inertia reel straps properly routed and secured. Inertia reel strap retaining pin must extend a minimum of 1/16 inch through shoulder harness release support.

*i. Survival kit to parachute harness straps secured.

*j. Left lap belt secured and properly installed. Retaining pin must extend a minimum of 1/16 inch through side of seat structure. Ensure that lap belt is not hanging over edge of seat.

*k. AN/URT-33B emergency locator beacon safety pin removed.

*k-1. Survival kit deployment cartridge for installation and that red indicator is not extended.

*k-2. Survival kit mode selector lever in AUTO position.

*l. Survival kit holddown hooks engaged in retainers.

m. Primary ejection control handle properly stowed.

n. DART lanyard clevis secured to airframe attach point.

*o. Survival kit deployment sensing cable assembly secured.

*p. Parachute arming lanyard properly routed through zero-delay lanyard ring and secured to manual release handle.

*q. Right lap belt secured and properly installed. Retaining pin must extend a minimum of 1/16 inch through side of seat structure. Ensure right lap belt is not installed between survival kit and kit deployment cable and is not hanging over edge of seat.

q-l. Safety block-removed.

r. Harness release actuator firing pin assembly secured and hex nut lock-wired.

s. Mk 86 striker plate and firing pin sear correctly aligned and striker plate free from binding.

s-1. Ensure quick-disconnect coupling is connected.

t. Emergency oxygen bottle properly serviced and properly secured; check hose for cuts or kinks.

u. Canopy actuator firing head secured. Firing head is seated when red surfaces are flush within +0.110 inch.

v. All visible gas lines and B-nuts secured.

w. Entire cockpit area free of unaccountable tools, material, or other possible foreign objects.

3-26. SURVIVAL KIT CARTRIDGE REMOVAL AND INSTALLATION.**Tools Required**

<i>Figure & Index No.</i>	<i>Part Number</i>	<i>Nomenclature</i>	<i>Use and Application</i>
	GGG-W-686	Torque wrench, 10 to 150 pound-inches	Apply proper torque to cartridge
	T-782-31	Cartridge installation/arming tool	Remove and install survival kit cartridge and cock automatic actuator.
TT02D043-07-77			

3-27. REMOVAL. (See figure 3-2.)

CAUTION

To prevent structural damage, ensure that access panel restrictions are observed before opening canopy (T.O. 1A-7D-2-1).

Open canopy slowly in cold weather to prevent possible shearing of canopy actuator rod end shear pin (T.O. 1A-7D-2-1).

NOTE

Cartridge may be removed and installed with survival kit installed or removed from airplane. If survival kit has been removed from airplane, proceed to step b.

a. Open canopy.

WARNING

Ensure that ejection controls safety handle is in the fully down-and-locked position and safety pins (215-00261-1) are installed in prime initiator and interior canopy jettison initiator (T.O. 1A-7D-2-1). This will prevent inadvertent canopy jettison or seat ejection and possible serious injury to personnel. If cartridge has not been fired, ensure survival kit lever is in MANUAL to prevent firing. Do not perform maintenance on equipment associated with explosive devices except in presence of other personnel capable of rendering aid.

NOTE

A fired cartridge will have red indicator extending from exposed end. If cartridge has been fired, immediate corrective maintenance action on survival kit must be taken (T.O. 15X11-19-12).

b. Place survival kit selector lever in MANUAL if an unfired cartridge is being removed.

c. Using installation/arming tool, remove cartridge from survival kit.

3-28. INSTALLATION. (See figure 3-2.)

a. Ensure actuator is fully cocked by placing selector lever in MANUAL. If lever cannot be moved to MANUAL, actuator is not cocked. Cock actuator as follows:

1. Place selector lever in AUTO.

2. Remove dust plug and install arming tool through cocking hole. Push tool into actuator until it bottoms out. At this point, approximately 1/16 inch of overtravel will be available.

3. Press dust plug firmly into cocking access hole.

WARNING

To prevent firing of cartridge during cartridge installation, ensure selector lever is in MANUAL.

4. Place selector lever in MANUAL.

NOTE

A fired cartridge will have red indicator extending from exposed end. If cartridge is inadvertently fired, immediate corrective maintenance action on survival kit must be taken (T.O. 15X11-19-12).

To help prevent deterioration of cartridge O-ring and to aid in installation and removal, apply small amount of MIL-G-4343 (NSN 9150-00-269-8255) grease to the O-ring. Wipe off excess grease and proceed with cartridge installation.

b. Using installation/arming tool, install cartridge. Tighten cartridge to 80 (±5) pound-inches torque.

c. If applicable, install survival kit (paragraph 3-22).

3-29. SURVIVAL KIT PACKING.

3-30. Instructions for packing the survival kit are provided in T.O. 14S1-3-51.

Section IV

PERSONNEL EQUIPMENT

4-1. DESCRIPTION. (See figures 4-1, 4-2, and 4-3.)

4-2. ANTI-G HOSE. The anti-g hose is a flexible hose which interconnects the airplane antiblackout system and the anti-g suit. The hose is connected to the anti-g suit by a manual position lock connector.

4-3. VENT AIR HOSE. The vent air hose is a flexible hose used to interconnect the vent garment. The hose quick-disconnects at the navel position on the antiexposure suit.

4-4. PILOT'S RELIEF SYSTEM. (See figure 4-2.) The pilot's relief system consists of a plastic horn and tubing routed from the horn to the fuselage exterior. The horn is mounted on the cockpit floor immediately forward of the control stick. A spring-loaded valve is mounted in the base of the horn to maintain cockpit pressurization. The valve opens when a lever on the front of the horn is depressed and automatically closes when the lever is released. A hose connected to the base of the horn is routed to an opening in an area of negative pressure on the lower right side of the fuselage, below the cockpit.

4-5. INFLIGHT SUSTENANCE SYSTEM. (Airplanes AF68-8225 and Subsequent.) The inflight sustenance system (figure 4-3) provides liquid containers (two insulated vacuum bottles) for use during extended flights. Each vacuum bottle is secured by quick-release brackets at a position immediately aft of the pilot, near the ejection seat guide rails and slightly above console level. When a nozzle valve at the lower end of either vacuum bottle is turned on, liquid flows through a flexible feeding tube attached to the valve. By releasing a spring-loaded button on the feeding tube probe, located at the free end of each feeding tube, the pilot releases the flow of liquid. When the pilot wishes to discontinue feeding, the button on the feeding tube probe is pressed; oral pressure is then applied to the tube to force the liquid remaining in the tube back into the bottle. Once the tube is clear of liquid, the nozzle valve

is turned off, and the feeding tube probe is placed in a plastic pouch, located in the console below each vacuum bottle. Placement of the feeding tube probe in the pouch assembly allows for draining of residual fluid from the feeding tube probe. The A-7D airplane utilizes the CNU-3A type vacuum bottle since it does not contain an internal pickup tube and can be used in a vertical position. Type CNU-4/A vacuum bottle may be installed or may be received as replacement. This bottle will not function properly when installed in the vertical position because of the internal pickup tube. Removal of the tube will allow the CNU-4/A bottle to be used in the A-7D airplane.

4-6. PERSONNEL EQUIPMENT MAINTENANCE. Except for the pilot's relief system and inflight sustenance system, personnel equipment maintenance consists of regularly scheduled inspections and tests. Refer to applicable technical order for personnel equipment repair.

4-7. OPERATIONAL CHECKOUT.

CAUTION

To prevent structure damage, ensure that access panel restrictions are observed before opening canopy (T.O. 1A-7D-2-1).

Open canopy slowly in cold weather to prevent possible shearing of canopy actuator rod end shear pin (T.O. 1A-7D-2-1).

a. Open canopy.

b. Flush pilot's relief system with clear water, and check that water flows freely from exit port.

c. Check system for leaks and cleanness.

d. Close canopy.

4-8. PILOT'S RELIEF HORN REMOVAL AND INSTALLATION.

4-9. REMOVAL.

CAUTION

To prevent structure damage, ensure that access panel restrictions are observed before opening canopy (T.O. 1A-7D-2-1).

Open canopy slowly in cold weather to prevent possible shearing of canopy actuator rod end shear pin (T.O. 1A-7D-2-1).

a. Open canopy.

b. Remove clamp from junction at lower end of horn and rubber tubing.

c. Release clip holding horn and remove horn from airplane.

4-10. INSTALLATION.

a. Position horn in airplane and secure in clip.

b. Connect rubber tube to horn and secure with clamp.

c. Perform personnel equipment operational checkout (paragraph 4-7).

4-11. VACUUM BOTTLE REMOVAL AND INSTALLATION. (Airplanes AF68-8225 and Subsequent.)

4-12. REMOVAL.

CAUTION

To prevent structure damage, ensure that access panel restrictions are observed before opening canopy (T.O. 1A-7D-2-1).

Open canopy slowly in cold weather to prevent possible shearing of canopy actuator rod end shear pin (T.O. 1A-7D-2-1).

a. Open canopy.

b. Loosen upper and lower bracket latches on left or right vacuum bottle, as applicable.

c. Lift bottle assembly up and out of mounting and remove from airplane.

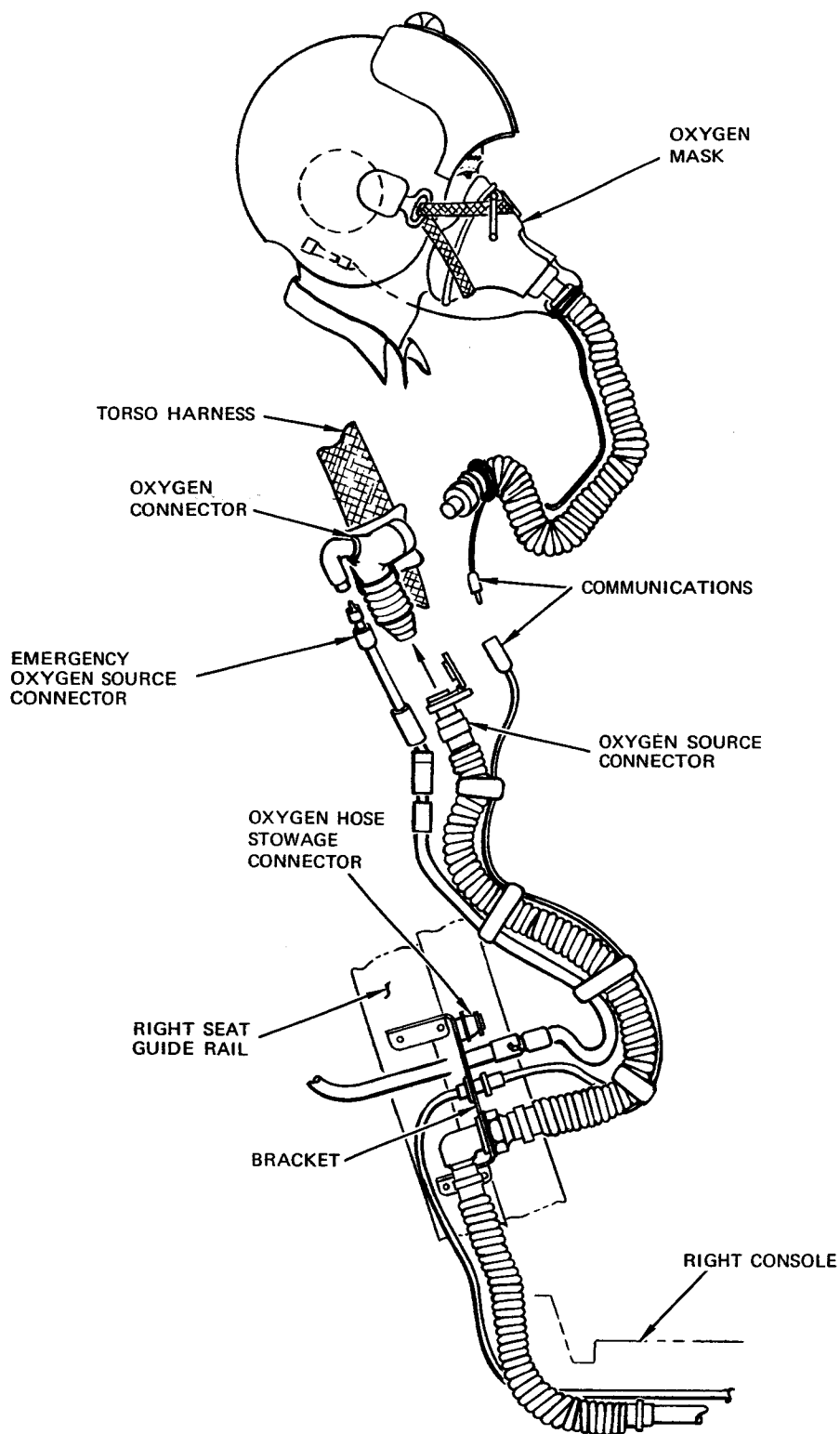
4-13. INSTALLATION.

a. Position vacuum bottle assembly in mounting brackets on left or right side of cockpit aft bulkhead, as applicable.

b. Secure upper and lower bracket latches.

c. Stow feeding probe in stowage pouch.

d. Close canopy.



02D038-02-09-71

Figure 4-1. Personnel Equipment Arrangement (Sheet 1)

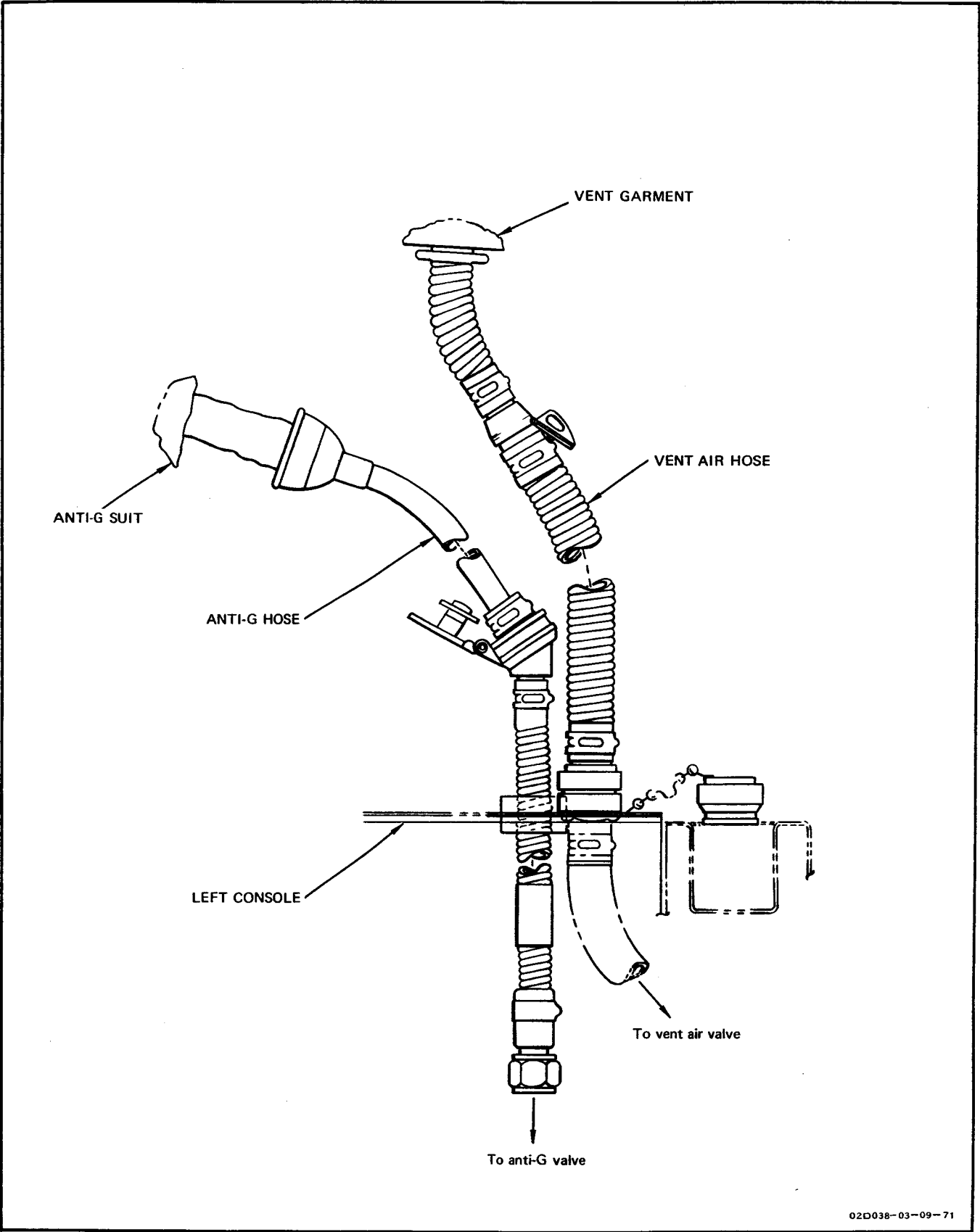


Figure 4-1. Personnel Equipment Arrangement (Sheet 2)

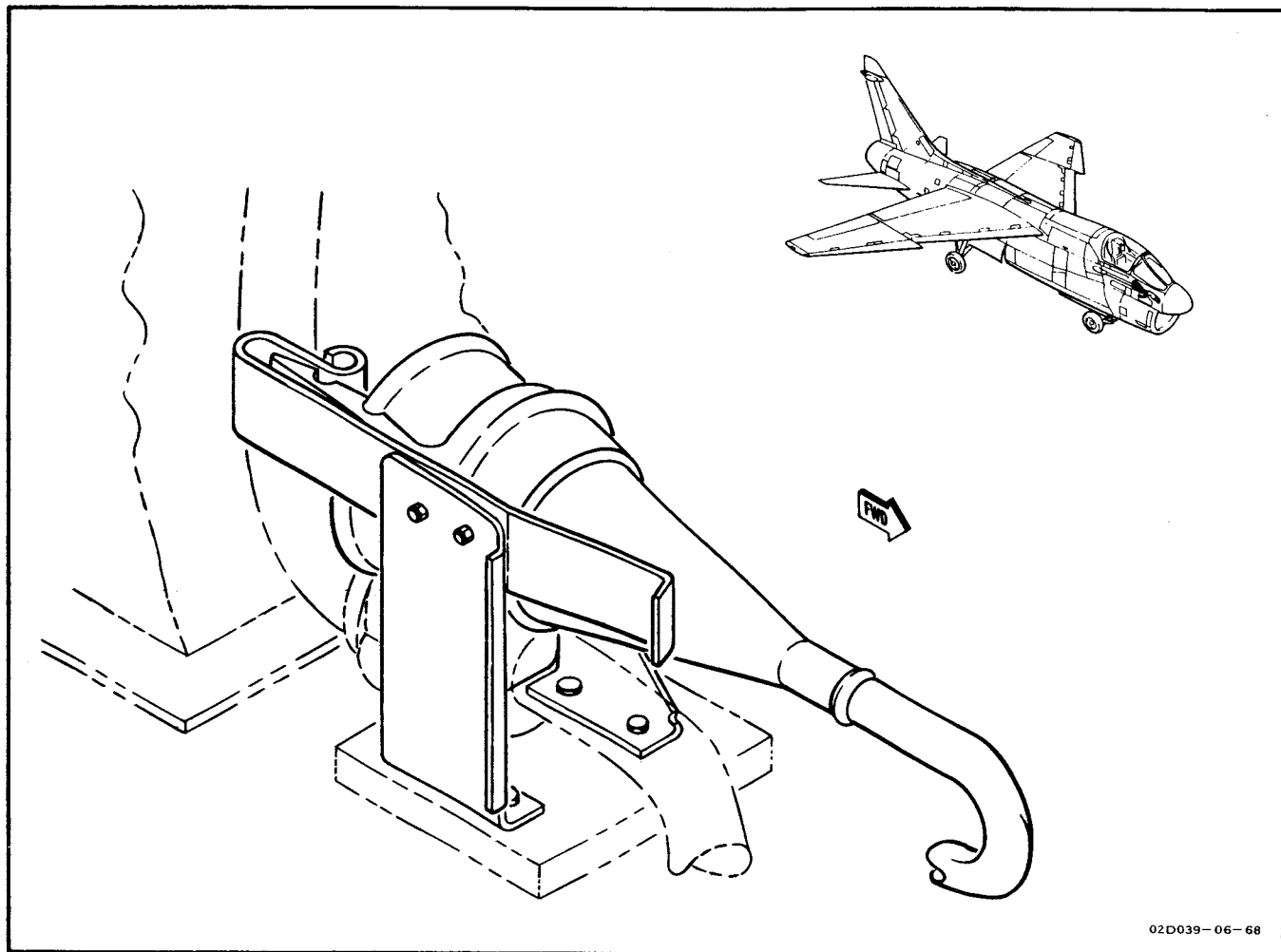
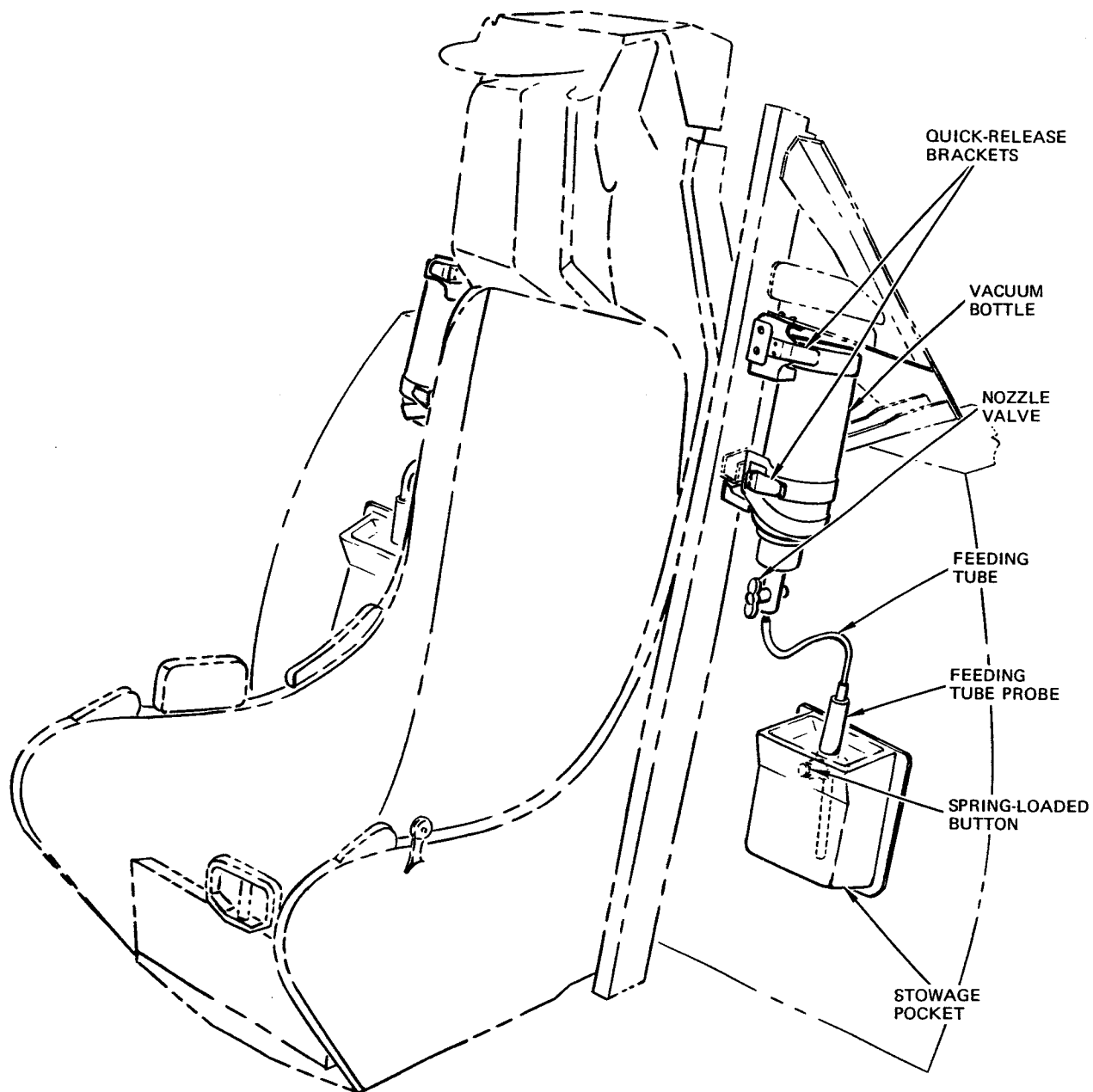


Figure 4-2. Pilot's Relief System



02D040-06-68

Figure 4-3. Inflight Sustenance System

ALPHABETICAL INDEX

NOTE *INDICATES FIGURE NUMBER †INDICATES TABLE NUMBER ALL OTHER NUMBERS INDICATE PARAGRAPH NUMBERS												
	General	Description	Operation	Components	Checkout	Troubleshooting	Rigging/Adjustment	Removal/Installation	Testing	Purging	Buildup	Repair
Actuator, Canopy							2-37	2-52 *2-15				
Actuator, Seat Adjustment								1-47				
Bellcrank and Pushrod, Canopy Release Mechanism								2-59				
Bolt, Canopy Pivot								2-44 *2-13				
Bottle, Vacuum								4-11				
Canopy Actuator and Counterbalance Cylinder Adjustment							2-37 *2-11					
Canopy Assembly							2-32	2-28 2-31				
Canopy Indicating System		2-20										
Canopy Indicating System Schematic Diagram			*2-5 *2-6									
Canopy Jettison System		2-13							2-75 2-76 *2-23 *2-24	2-77 2-78 2-79		
Canopy Jettison System Schematic Diagram			*2-3 *2-4									
Canopy Release System Arrangement		*2-2										
Canopy System		2-1	2-8	2-21 †2-1	2-23	2-24 †2-2						
Canopy System Controls and Indicators		*2-1										
Cartridge, Mk 14 Mod 0 Canopy Actuator Impulse								2-95 *2-29				
Cartridge, Mk 86 Mod 0 Delay								1-40 *1-10				
Cartridge, Survival Kit								3-26 *3-2				

ALPHABETICAL INDEX

NOTE

*INDICATES FIGURE NUMBER
 †INDICATES TABLE NUMBER
 ALL OTHER NUMBERS INDICATE
 PARAGRAPH NUMBERS

	General	Description	Operation	Components	Checkout	Troubleshooting	Rigging/Adjustment	Removal/Installation	Testing	Purging	Buildup	Repair
Catapult, Mk 7 Rocket		1-4						1-43 *1-11			1-46 *1-12	
Control Assembly, Interior Canopy Jettison								2-62				2-65 *2-19
Cylinder, Canopy Counterbalance							2-37	2-56 *2-17				
DART System		1-9										
Diaphragm Seal and Striker Engagement							2-33 *2-7					
Directional Automatic Realignment of Trajectory (DART) System		1-9										
Disconnect Assembly, Firing Control		1-7										
Eccentrics, Canopy							2-34 *2-8					
Ejection Seat System		1-1	1-17	1-27 †1-1	1-29	1-30 *1-4 *1-5			2-75 2-76 *2-23 *2-24			
Ejection Seat System Arrangement		*1-1										
Ejection Seat System Schematic Diagram			*1-2 *1-3									
Ejection Sequence, Seat			1-17 *1-6									
Final Inspection, Egress System					3-25							
Glass, Canopy								2-38 *2-12				
Handle, Ejection Controls Safety		1-8										
Handle, Exterior Canopy Jettison Control								2-66 *2-20				
Handle, Interior Canopy Release								2-47				
Handle Mechanism, Exterior Canopy Release								2-48A *2-13A				

ALPHABETICAL INDEX

NOTE *INDICATES FIGURE NUMBER †INDICATES TABLE NUMBER ALL OTHER NUMBERS INDICATE PARAGRAPH NUMBERS												
	General	Description	Operation	Components	Checkout	Troubleshooting	Rigging/Adjustment	Removal/Installation	Testing	Purging	Buildup	Repair
Handles, Ejection		1-5										
Harness Release System		1-10										
Hook, Canopy Release								2-49 *2-14				
Horn, Pilot's Relief								4-8				
Hose, Anti-G		4-2										
Hose, Vent Air		4-3										
Inflight Sustenance System		4-5 *4-3										
Initiator, Inertia Reel								1-58 *1-50				
Initiator, MK 11 Mod 0 Time-Delay								1-37 *1-9				
Initiator, M53 Boost								1-55 *1-14				
Initiator, M99 Canopy-Actuated								2-98 *2-30				
Initiator, M99 Exterior Canopy Jettison								2-92 *2-28				
Initiator, M99 Interior Canopy Jettison								2-89 *2-27				
Initiator, M99 Prime								1-34 *1-8				
Kit, Survival		3-10	3-14					3-16 3-22 *3-2			3-29	
Light, Canopy Caution								2-87				
Motor, Actuator Drive								1-49 *1-13				
Parachute		3-3	3-13					3-16 3-19 *3-2				

ALPHABETICAL INDEX

NOTE

*INDICATES FIGURE NUMBER
 †INDICATES TABLE NUMBER
 ALL OTHER NUMBERS INDICATE
 PARAGRAPH NUMBERS

	General	Description	Operation	Components	Checkout	Troubleshooting	Rigging/Adjustment	Removal/Installation	Testing	Purging	Buildup	Repair
Personnel Equipment	4-6	4-1 *4-1										
Pilot's Emergency Equipment		3-1 *3-1 *3-2										
Pilot's Relief System		4-4 *4-2			4-7			4-8				
Pilot-Seat Separation System		1-13										
Pushrod and Bellcrank, Canopy Release Mechanism								2-59 *2-18				
Quick-Disconnect Coupling, Inertia Reel							1-61 *1-16					
Rod End, Canopy Actuator								2-55 *2-16				
Roller and Release Mechanism, Canopy							2-35 *2-9					
Seal, Diaphragm								2-41				
Seal and Striker, Diaphragm							2-33 *2-7					
Seat, Ejection		1-2						1-32 *1-7				
Seat Adjustment Electrical System Troubleshooting						†1-2 *1-4 *1-5						
Seat Adjustment System		1-16										
Seat Separation Bladder Protective Cover		*3-3										
Shoulder Harness Control System		1-14										
Stopbolt and Striker, Canopy							2-36 *2-10					

ALPHABETICAL INDEX

NOTE

*INDICATES FIGURE NUMBER
†INDICATES TABLE NUMBER
ALL OTHER NUMBERS INDICATE
PARAGRAPH NUMBERS

[illegible]

14-7D-2-3

