TM 55-1520-238-S

TECHNICAL MANUAL

PREPARATION FOR SHIPMENT

FOR

ARMY AH-64A HELICOPTER
(NSN 1520-01-106-9519)

“Approved for public release; distribution is unlimited.”

HEADQUARTERS, DEPARTMENT OF THE ARMY
30 SEPTEMBER 1990

CHANGE
NO. 7

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 25 May 2001

TECHNICAL MANUAL
PREPARATION FOR SHIPMENT
ARMY AH-64A HELICOPTER
(NSN 1520-01-106-9519)(EIC: RHA)

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

TM 55-1520-238-S, 30 September 1990, is changed as follows:

1. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

Remove pages	Insert pages
A/(B blank)	A and B
1–1 and 1–2	1–1 and 1–2

2. Retain this sheet in front of manual for reference purposes.

By Order of the Secretary of the Army:

ERIC K. SHINSEKI
General, United States Army
Chief of Staff

OFFICIAL:

JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army
0110912

DISTRIBUTION:
To be distributed in accordance with Initial Distribution Number (IDN) 313010 requirements for TM 55–1520–238–S.

CHANGE
NO. 6

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 11 June 1999

PREPARATION FOR SHIPMENT
FOR
ARMY AH-64A HELICOPTER
(NSN 1520-01-106-9519)

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

TM 55-1520-238-S, 30 September 1990, is changed as follows:

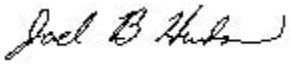
1. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

Remove pages	Insert pages
a/(b blank)	a and b
–––	A/(B blank)
H-29 and H-30	H-29 and H-30

2. Retain this sheet in front of manual for reference purposes.

By Order of the Secretary of the Army:

Official:



JOEL B. HUDSON
Administrative Assistant to the Secretary of the Army
9914402

ERIC K. SHINSEKI
General, United States Army
Chief of Staff

Distribution:
To be distributed in accordance with initial distribution number (IDN) 313010 requirements for TM 55-1520-238-S.

CHANGE NO. 5

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 13 APRIL 1998

PREPARATION FOR SHIPMENT
FOR
ARMY AH-64A HELICOPTER
(NSN 1520-01-106-9519)

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

TM 55-1520-238-S, 30 September 1990, is changed as follows:

1. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

Remove pages	Insert pages
iii and iv	iii and iv
2-49 and 2-50	2-49 and 2-50
2-63 and 2-64	2-63 and 2-64
- - - -	2-64.1/(2-64.2 blank)
2-76.1/(2-76.2 blank)	2-76.1 and 2-76.2
2-77 and 2-78	2-77/(2-78 blank)

2. Retain this sheet in front of manual for reference purposes.

By Order of the Secretary of the Army:

DENNIS J. REIMER
General, United States Army
Chief of Staff

Official:
JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army
04845

DISTRIBUTION:
To be distributed in accordance with Initial Distribution No. (IDN) 313010 requirements for TM 55-1520-238-S.

CHANGE NO. 4

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 19 December 1997

PREPARATION FOR SHIPMENT
FOR
ARMY AH-64A HELICOPTER
(NSN 1520-01-106-9519)

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

TM 55-1520-238-S, 30 September 1990, is changed as follows:

1. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

Remove pages	Insert pages
i through vi	i through vi
1-1 through 1-3/(1-4 blank)	1-1 through 1-3/(1-4 blank)
2-3 through 2-6	2-3 through 2-6
2-43 and 2-44	2-43 and 2-44
2-75 and 2-76	2-75 and 2-76
- - - -	2-76.1/(2-76.2 blank)
2-77 and 2-78	2-77 and 2-78
- - - -	2-79 through 2-102
3-7 and 3-8	3-7 and 3-8
3-15/(3-16 blank)	3-15/(3-16 blank)
4-17/(4-18 blank)	4-17/(4-18 blank)
A-1/(A-2 blank)	A-1/(A-2 blank)
D-1 and D-2	D-1 and D-2
- - - -	D-3/(D-4 blank)
H-17 and H-18	H-17 and H-18
H-27 and H-28	H-27 and H-28
Index 1 through Index 12	Index 1 through Index 12

2. Retain this sheet in front of manual for reference purposes.

TM 55-1520-238-S
C4

By Order of the Secretary of the Army:

DENNIS J. REIMER
General, United States Army
Chief of Staff

Official:

JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army
04585

DISTRIBUTION STATEMENT:

To be distributed in accordance with Initial Distribution No. (IDN) 313010 requirements for TM 55-1520-238-S.

CHANGE
NO. 3

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 30 September 1996

PREPARATION FOR SHIPMENT
FOR
ARMY AH-64A HELICOPTER
(NSN 1520-01-106-9519)

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

TM 55-1520-238-S, 30 September 1990, is changed as follows:

1. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

Remove pages	Insert pages
1-1 and 1-2	1-1 and 1-2
2-55 through 2-58	2-55 through 2-58
2-75 and 2-76	2-75 and 2-76
3-7 and 3-8	3-7 and 3-8
3-11 through 3-14	3-11 through 3-14

2. Retain this sheet in front of manual for reference purposes.

By Order of the Secretary of the Army:

Official:

DENNIS J. REIMER
General, United States Army
Chief of Staff

JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army
02670

DISTRIBUTION:
To be distributed in accordance with DA Form 12-31-E, block no. 3010, requirements for TM 55-1520-238-S.

TM 55-1520-238-S
C 2

CHANGE

NO. 2

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 29 October 1993

PREPARATRION FOR SHIPMENT
FOR
ARMY AH-64A HELICOPTER
NSN 1520-01-106-9519)

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

TM 55-1520-238-S, 30 September 1990, is changed as follows:

1. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

Remove pages	Insert pages
i and ii	i and ii
1-1 and 1-2	1-1 and 1-2
2-1 and 2-2	2-1 and 2-2
2-15 and 2-16	2-15 and 2-16
	2-16.1/(2-16.2 blank)
	2-32.1 and 2-32.2
2-33 and 2-34	(2-33 blank)/2-34
2-43 and 2-44	2-43 and 2-44
2-55 and 2-56	2-55 and 2-56
2-75 and 2-76	2-75 and 2-76
3-1 through 3-4	3-1 through 3-4
4-1 through 4-4	4-1 through 4-4
4-9 and 4-10	4-9 and 4-10
4-17/(4-18 blank)	4-17/(4-18 blank)
D-1 and D-2	D-1 and D-2

2. Retain this sheet in front of manual for reference purposes.

By Order of the Secretary of the Army:

GORDON R. SULLIVAN
General, United States Army
Chief of Staff

Off icial

MILTONH.HAMILTON
Administrative Assistant to the
Secretary of the Army
05623

DISTRIBUTION:
To be distributed in accordance with DA Form 12-31-E, block no. 3010, requirements for TM 55-1520-238-S.

CHANGE NO. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C., 13 March 1992

PREPARATION FOR SHIPMENT

FOR

AH-64A HELICOPTER

(NSN 1520-01-106-9519)

TM 55-1520-238-S, 30 September 1990, is changed as follows:

1. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

Remove Pages	Insert Pages
2-1 and 2-2	2-1 and 2-2
2-5 through 2-10	2-5 through 2-10
2-15 through 2-20	2-15 through 2-20
2-23 through 2-36	2-23 through 2-36
2-39 through 2-50	2-39 through 2-50
2-55-and 2-56	2-55 and 2-56
2-61 through 2-78	2-61 through 2-78
3-1 through 3-6	3-1 through 3-6
3-9 through 3-15/3-16	3-9 through 3-15/3-16
4-1 through 4-6	4-1 through 4-6
4-9 through 4-17/4-18	4-9 through 4-17/4-18
6-1/6-2	6-1/6-2
8-1 and 8-2	8-1 and 8-2
8-5 through 8-8	8-5 through 8-8
A-1/A-2	A-1/A-2
D-1 and D-2	D-1 and D-2
G3 and G-4	G-3 and G-4
FO-1/FO-2	FO-1/FO-2
FO-3/FO-4	FO-3/FO-4

2. Retain this sheet in front of manual for reference purposes.

By Order of the Secretary of the Army:

GORDON R. SULLIVAN
General, United States Army
Chief of Staff

Official:

MILTON H. HAMILTON
Administrative Assistant to the
Secretary of the Army
01244

DISTRIBUTION:

To be distributed in accordance with DA Form 12-31-E, block no. 3010, AVUM and AVIM maintenance requirements for TM 55-1520-238-S.

INSERT LATEST CHANGED PAGES: DESTROY SUPERSEDED PAGES.

LIST OF EFFECTIVE 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. Changes to wiring diagrams are indicated by shaded areas.

Date of issue for original and change pages are:

Original . . . . . 0 . . . 30 September 1990
Change . . . . . 1 . . . . . 13 March 1992
Change . . . . . 2 . . . . . 29 October 1993
Change . . . . . 3 . . . 30 September 1996
Change . . . . . 4 . . . . 19 December 1997
Change . . . . . 5 . . . . . 13 April 1998
Change . . . . . 6 . . . . . 11 June 1999
Change . . . . . 7 . . . . . 25 May 2001

TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 249, CONSISTING OF THE FOLLOWING:

Page No.	*Change No.
Cover	0
Blank	0
A – B	7
a – b	6
i	4
ii – iii	0
iv	5
v – vi	4
1-1	4
1-2	7
1-3	4
1-4 Blank	4
2-1	0
2-2	2
2-3 – 2-6	4
2-7	1
2-8 – 2-10	1
2-11 – 2-14	0
2-15	2
2-16	2
2-16.1	2
2-16.2 Blank	2
2-17 – 2-20	1
2-21 – 2-22	0
2-23 – 2-25	1
2-26	0
2-27 – 2-28	1
2-29	0
2-30 – 2-32	1
2-32.1 – 2-32.2	2
2-33 Blank	2
2-34	2
2-35	1
2-36 – 2-39	0
2-40	1
2-41	0
2-42	1
2-43 – 2-44	4
2-45 – 2-46	1
2-47	0
2-48 – 2-49	1
2-50	5
2-51 – 2-54	0
2-55	2
2-56 – 2-57	3
2-58 – 2-61	0
2-62	1
2-63 – 2-64	5
2-64.1	5
2-64.2 Blank	5
2-65	1
2-66	0
2-67 – 2-68	1
2-69	0
2-70	1
2-71	0
2-72 – 2-74	1
2-75 – 2-76	4
2-76.1 – 2-76.2	5
2-77	5
2-78 Blank	5
2-79 – 2-102	4
3-1	1
3-2 – 3-4	2
3-5	0
3-6	1
3-7	4
3-8	0
3-9 – 3-11	1
3-12 – 3-13	3
3-14	1
3-15	4
3-16 Blank	4
4-1 – 4-2	0
4-2 – 4-3	2
4-4 – 4-5	0
4-6	1
4-7 – 4-8	0
4-9	1
4-10	2
4-11 – 4-16	1
4-17	4
4-18 Blank	4
5-1	0

***Zero in this column indicates an original page.**

INSERT LATEST CHANGED PAGES: DESTROY SUPERSEDED PAGES.

LIST OF EFFECTIVE PAGES

***Zero in this column indicates an original page.**

ENVIRONMENTAL/HAZARDOUS MATERIAL INFORMATION

THIS DOCUMENT HAS BEEN REVIEWED FOR THE PRESENCE OF CLASS 1 OZONE DEPLETING CHEMICALS (ODCS) AS DEFINED BY THE US ENVIRONMENTAL PROTECTION AGENCY AS OF 1 JANUARY 1996. ALL REFERENCES TO CLASS 1 ODCS HAVE BEEN ELIMINATED. JUSTIFICATION: CLASS 1 ODCS HAVE BEEN REMOVED FROM THIS MANUAL.

WARNING

Personnel performing instructions involving operations, procedures and practices which are included, or implied in this technical manual, shall observe the following instructions. Disregard of these warnings and precautionary information can cause serious injury or death.

WARNING

Center of Balance locations and shipping weights of helicopters and equipment must be accurately determined. Inaccurate balance locations or incorrect shipping weights will cause inaccurate cargo aircraft weight and balance computations, which will endanger cargo aircraft, crewmembers, and cargo.

WARNING

During main rotor head and mast unit removal or installation procedure, helicopter must be on a level surface, with landing gear in normal static condition (not kneeled). If helicopter is tilted, main rotor head and mast unit may swing wide, causing possible injury of personnel or equipment damage.

WARNING

Safeties condition of armament, fire extinguishing, canopy jettison, fuel, and electrical systems must be verified before loading helicopters to avoid injury or death from fire or explosion.

WARNING

During loading and unloading operations, the helicopter will be restrained at all times with winching cable or tiedowns. An improperly restrained helicopter may roll free causing injury to personnel and equipment damage.

WARNING

Personnel handling insecticides or rodenticides must be properly qualified and instructed. They will wear protective clothing, gloves, and respirators as recommended by the surgeon or safety officer.

WARNING

Installation of heat shrink film protective covering on the helicopter must be accomplished in accordance with safety procedures in Appendix G. Disregard of these procedures and precautionary information can cause injury and damage to the helicopter.

WARNING

Ensure that helicopter is electrically bonded to ground during preparation for shipment operations to prevent injury or death from fire and explosion.

WARNING

The helicopter and Hydraulic Kneeling and Erecting cart produce dangerously high hydraulic pressure. Use extreme care when working on hydraulic systems to prevent injury to personnel.

WARNING

When hydraulic fluid is decomposed by heating, toxic gases are released. If prolonged contact with mist is likely, wear an appropriate respirator. For contact of fluid with skin, wash area with soap and water. If fluid contacts eyes, flush immediately with clear water and get immediate medical attention.

PREPARATION FOR SHIPMENT
OF
AH–64A HELICOPTERS

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes, or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual directly to: Commander, U.S. Army Aviation and Missile Command, ATTN: AMSAM–MMC–MA-NP, Redstone Arsenal, AL 35898-5000. A reply will be furnished directly to you.

You may also submit your recommended changes by E–mail directly to 2028@redstone.army.mil or by fax 256–842–6546/DSN 788–6546. Instructions for sending an electronic 2028 may be found at the end of this manual immediately preceding the hard copy 2028.

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

TABLE OF CONTENTS

TABLE OF CONTENTS (cont)

LIST OF ILLUSTRATIONS

LIST OF ILLUSTRATIONS (cont)

LIST OF ILLUSTRATIONS (cont)

LIST OF TABLES

CHAPTER 1
INTRODUCTION

Section I. PURPOSE AND SCOPE OF MANUAL

1–1 PURPOSE.

This manual is provided for instruction of personnel preparing **AH-64A** helicopters for shipment by Air Force Cargo aircraft, seagoing vessel, and tractor–trailer truck transport methods.

NOTE

- The self–ferry method of helicopter shipment is not covered in this manual.
- Crated shipment of AH-64A helicopters is not applicable.
- Shipment of the helicopter by rail is not authorized.

1–2 SCOPE.

a. Chapter 2 of this manual provides instructions for shipment of **AH-64A** helicopters by Air Force C-5, C-17 and C-141B cargo aircraft; Chapter 3 covers shipment by seagoing vessel; and Chapter 4 covers shipment by truck. Detailed instructions are provided within Chapters 2 through 4, covering required helicopter disassembly (component removal or stowage) for each shipment method; preservation and packaging; helicopter loading and tiedown; offloading; and preparation for use after shipment.

NOTE

Procedures are provided for both front and rear door C-5 loading and unloading. Rear door loading requires the use of a hydraulic kneeling cart and is intended as an alternate procedure to be used only when front door loading or unloading is not possible.

b. Appendices A through H provide reference data, material and special tool lists, and additional information related to helicopter preparation and shipment procedures. An alphabetical index is included.

Section II. SHIPMENT CHARACTERISTICS AND GENERAL REQUIREMENTS

1–3 TACTICAL SHIPMENT.

NOTE

Tactical shipment is defined as transport and delivery of the maximum quantity of helicopters which can be shipped in near–flyable condition.

1–3.1 Tactical Deployment by Cargo Aircraft. Tactical shipment of helicopters by cargo aircraft requires the use of C-5 or C-17 cargo aircraft.

1–3.2 Tactical Deployment of Seagoing Vessel. Maximum quantities of helicopters which can be loaded for tactical shipment will vary with the size of the vessel to be used.

NOTE

Logistical movement of large quantities of helicopters for resupply purposes, can be accomplished by vessel shipment, loading maximum, density condition helicopters on both topside and main decks.

1–4 HELICOPTER DIMENSIONAL REQUIREMENTS.

a. See figure 1–1 for dimensions of the AH-64A helicopter in assembled, ready–to–fly condition.

b. See applicable Preloading Condition illustrations provided in Chapter 2 through 4 (fig. 2–1, 2–22, 3–1, 3–2, 4–1, and 4–2) for disassembled (shipment) condition.

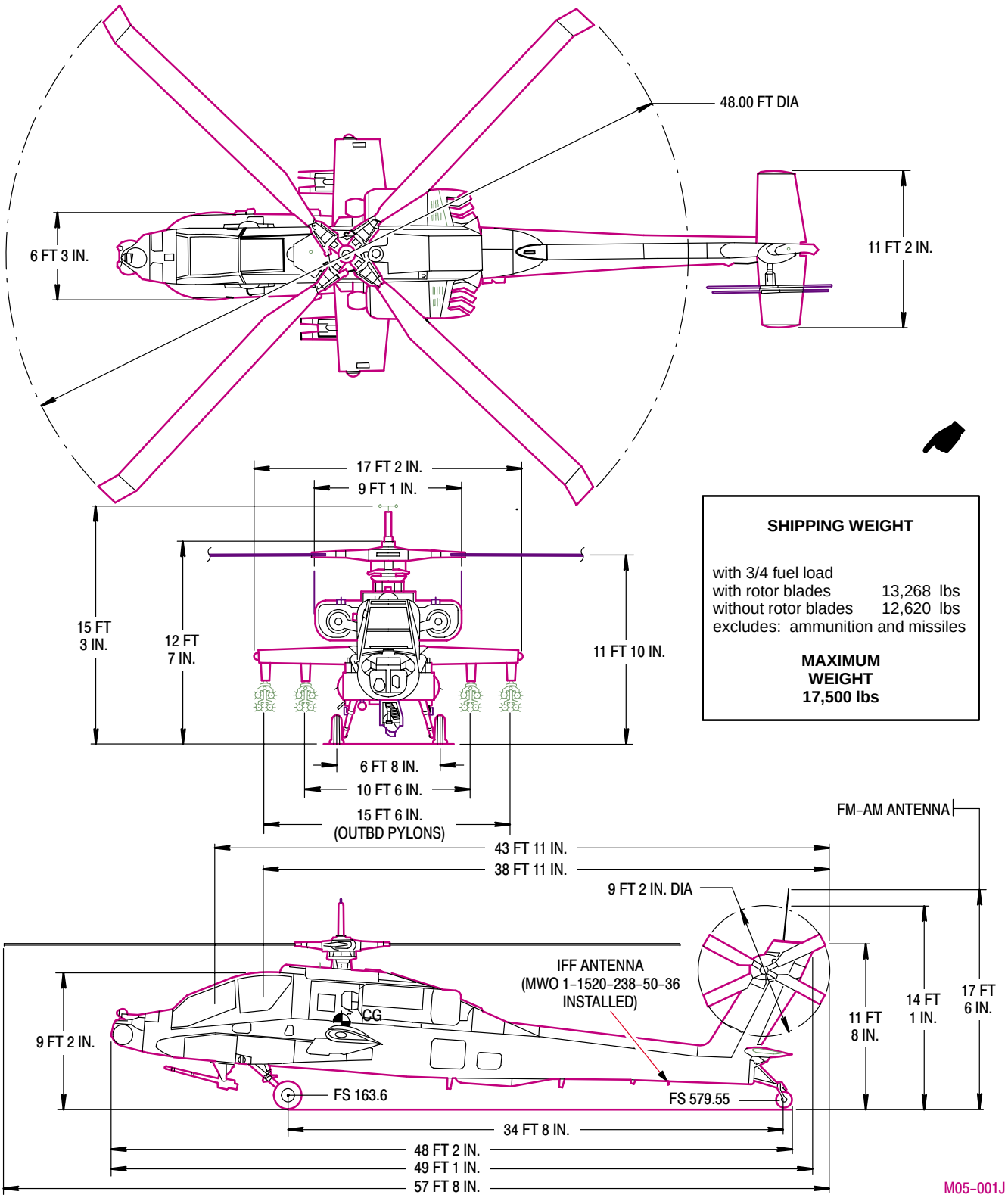


Figure 1–1. Basic Dimensions of AH-64A Helicopter

1–5 CHARACTERISTICS OF SHIPMENT BY CARGO AIRCRAFT.

Cargo aircraft shipment provides a safe rapid method of helicopter delivery. A maximum of six **AH-64A** helicopters can be shipped on a C-5 cargo aircraft, a maximum of three on a C-17, and maximum of two on a C-141B. Moderate helicopter disassembly is required for C-5 or C-17 shipment. Extensive disassembly and critical helicopter height adjustment (kneeling) is required for C-141B shipment.

1–6 CHARACTERISTICS OF SHIPMENT BY SEAGOING VESSEL.

Vessel shipment requires the least disassembly of any delivery method except helicopter self–ferry. When both topside and main decks are loaded top capacity, vessel shipment will deliver the greatest quantity of helicopters of any method covered in this manual. Shipment on a topside deck of a vessel is not recommended. Helicopters may be subjected to damage from gale force winds and heavy seas, even when properly prepared.

1–7 CHARACTERISTICS OF SHIPMENT BY TRUCK.

Shipment by tractor–trailer provides delivery of one helicopter per transport trailer; moderate helicopter disassembly is required. Helicopters shipped by truck are vulnerable to shipping damage caused by road hazards, loss of trailer stability, or any breakdown of the trailer running gear. Truck transport will normally be used for retrieval of downed helicopters.

1–8 DESIGNATION OF CONSUMABLE MATERIALS.

Refer to Appendix D for identification of consumable materials required for procedures covered in this manual.

1–9 USE OF PRESERVATIVES AND PACKAGING MATERIALS.

Preservative (corrosion preventive compound) functions to shield components from moisture and/or corrosive materials. Barrier and cushioning materials are used to mechanically protect and shield the areas to which they are applied. Plastic sheeting is primarily used as an outer wrapper and covering for components. Tape is used to seal and/or secure covered or wrapped components.

1–10 HANDLING OF CLASSIFIED MATERIALS.

Handle all classified materials in accordance with local procedures. The shipper will determine the Security Classification of the helicopter based upon the installed mission equipment and will provide escort, if appropriate. For information on the Security protection required for various modes of shipment, contact the Supporting Security Office.

1–11 PRESERVATION/DEPRESERVATION CHECKSHEETS (APPENDIX B).

The organization preparing the helicopter for shipment shall prepare the Preservation/Depreservation Checksheet on DA Form 2408-13-2 in accordance with DA PAM 738-751. Items that apply only to depreservation will be included on the form, and the appropriate status symbol will be entered at the time the helicopter is prepared for shipment. Entries will be signed off in accordance with DA PAM 738-751 when the helicopter is depreserved and made ready for flight.

1–12 PRESERVATION.

The preservation procedures presented in this manual are the minimum acceptable for helicopters that will remain inactive for periods not to exceed 45 days. If helicopters are projected to remain inactive for more than 45 days, they will be placed in Intermediate Storage in accordance with TM 1-1500-204-23 and Appendix E of TM 1-1520-238-23. After preservation, the preparation for shipment procedures contained in this manual will be applied.

1–13 WARNINGS, CAUTIONS, AND NOTES.

Warnings, Cautions, and Notes are used throughout this manual. They are used to highlight information as follows:

1–13.1 Warning. An operating procedure, practice, etc., which, if not correctly followed, could result in personal injury or loss of life.

1–13.2 Caution. An operating procedure, practice, etc., which, if not correctly followed, could result in damage to or destruction of equipment.

1–13.3 Note. An operating procedure, practice, etc., which it is essential to highlight.

CHAPTER 2
SHIPMENT BY CARGO AIRCRAFT

Section I. RESPONSIBILITIES AND GENERAL PROCEDURES FOR SHIPMENT BY CARGO AIRCRAFT

2–1 RESPONSIBILITIES OF CARGO AIRCRAFT CREWS.

2–1.1 Preparation of Cargo Aircraft. Crewmembers will prepare cargo aircraft for helicopter loading, tiedown, and offloading.

2–1.2 Aircraft Balance and Tiedown Requirements. The cargo aircraft loadmaster will determine cargo aircraft balance and tiedown requirements.

NOTE

Determining cargo aircraft balance and tiedown requirements are functions of cargo aircraft loadmaster. In case of conflict, Air Force requirements found in T.O. –9 Series take precedence.

2–1.3 Loading, Tiedowns, and Offloading Assistance. The cargo aircraft loadmaster and crewmembers will provide technical advice and assistance to the responsible Army loading team during helicopter loading, tiedown, and offloading operations. In addition, crewmembers will perform the following related functions:

a. Rig and operate all loading and offloading aids which are part of the cargo aircraft.

b. Designate on–board helicopter locations.

c. Determine restraint requirements.

d. Provide tiedown devices.

e. Inspect and verify all tiedowns.

f. Direct placement of shoring during loading.

g. Direct kneeling and erecting operations as required.

2–2 RESPONSIBILITIES OF ARMY LOADING TEAM

See FM 55-12, Movement of Units in Air Force Aircraft.

2–2.1 Preparation of Helicopters. The loading team will prepare each helicopter for shipment.

2–2.2 Center of Balance Identification. The loading team will mark center of balance locations as follows:

WARNING

Center of Balance locations and shipping weights of helicopters and equipment must be accurately determined. Inaccurate balance locations or incorrect shipping weights will cause inaccurate cargo aircraft weight and balance computations, which will endanger cargo aircraft, crewmembers, and cargo.

a. Center of balance location will be marked on both sides of helicopter fuselage (fig. 2–1 for front door loading and fig. 2–22 for rear door loading).

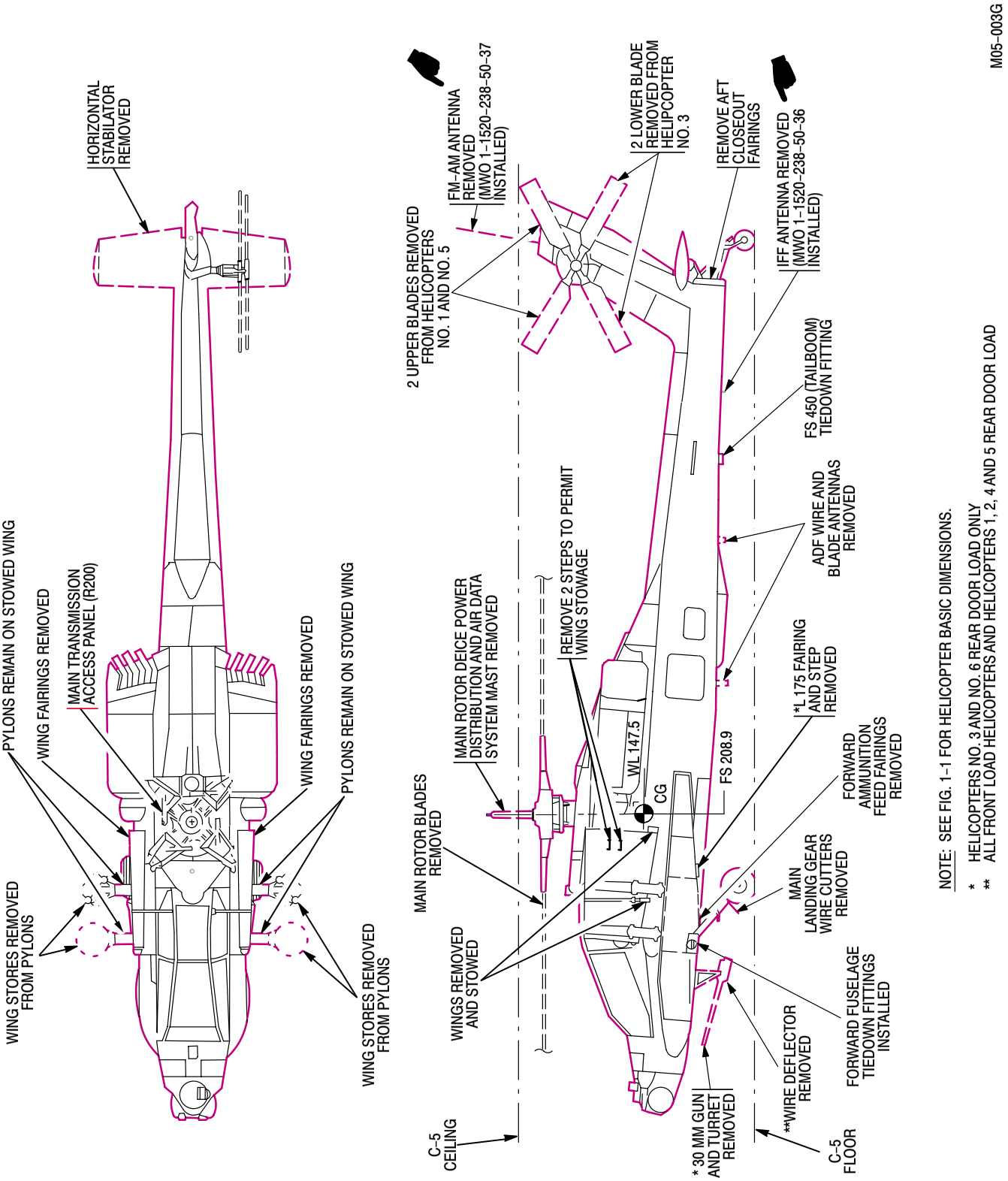
b. The center of balance of each separately loaded major component (not stowed on or within a helicopter) will be marked on the component or package outer surface.

2–2.3 Verification and Marking of Shipping Weights. Weights of shipment–ready helicopters and separately loaded major components will be checked by the loading team. Helicopter fuselage will be tagged to indicate shipping weight. Component weight will be marked on the component or package outer surface. All weights will be recorded on the manifest.

2–2.4 Preparation of Manifest (FM 55-12). A manifest will be prepared by the loading team. The weight, location, and center of gravity of each helicopter (as configured for shipment)and each separately loaded component will be itemized.

2–2.5 Demonstration of Stowed Item Security. The loading team will be prepared to demonstrate to the cargo aircraft commander, that all removed components are adequately packaged and restrained in accordance with the applicable Air Force –9 Series Technical Order.

2–2.6 Notification of Hazardous Materials. The loading team will submit a list of hazardous materials to the cargo aircraft commander. The list will itemize all hazardous or dangerous materials as defined in TM 38-250, which will be shipped with or within helicopters.



NOTE: SEE FIG. 1-1 FOR HELICOPTER BASIC DIMENSIONS.

* HELICOPTERS NO. 3 AND NO. 6 REAR DOOR LOAD ONLY

** ALL FRONT LOAD HELICOPTERS AND HELICOPTERS 1, 2, 4 AND 5 REAR DOOR LOAD

Figure 2–1. Helicopter Preloading Condition for C-5 Cargo Aircraft Shipment

2–2.7 Loading, Tiedown, and Offloading. Under direction of the loadmaster, the loading team will load, tiedown, and offload helicopters, and will perform the following related functions:

a. Furnish necessary construction materials, and install required shoring, auxiliary loading ramps, and ramp extensions.

b. Furnish, rig, and operate all loading and offloading aids which are not part of the cargo aircraft.

c. Furnish and operate auxiliary lighting, when required for low–light or night operations.

2–2.8 Coordination. The Army activity responsible for preparing and loading helicopters will coordinate its operations with the Military Airlift Command (MAC) to obtain helicopter load–ready conditions as follows:

a. Concerned personnel will be informed of quantity and type of helicopters to be shipped and type of cargo aircraft to be used.

b. Required handling and stowage equipment, shoring and cushioning material will be obtained and made ready for immediate use.

c. Helicopter preparation and extent of parts removal (helicopter disassembly) will be planned in advance.

d. Helicopters being shipped will be ready to load on arrival of the cargo aircraft.

2–3 EQUIPMENT REQUIREMENTS.

Equipment items required for helicopter preparation and cargo aircraft shipment are listed and described in tables 2–1 (C-5 and C-17 shipment) and 2–2 (C-141B shipment). Special tools and equipment are identified in Appendix E.

NOTE

Equipment item numbers listed in tables 2–1 and 2–2 are referenced elsewhere in Chapter 2 for identification of required equipment. For all other purposes, item (reference) numbers will be disregarded, and NSN or part number and CAGE will be used for equipment identification.

2–4 CONSUMABLE MATERIAL REQUIREMENTS.

Refer to Appendix D for identification of consumable materials and bulk items required during helicopter preparation and shipment procedures. Shoring material requirements are shown in the loading instructions for each specific load.

2–5 FACILITY REQUIREMENTS.

2–5.1 Foul–Weather Shelter. A hangar or other enclosure will be available for operations in poor weather.

2–5.2 Fire Protection. Fire fighting equipment shall be on–site and ready for use.

2–5.3 Electrical Grounding. A good electrical ground will be available.

2–5.4 Area Clearance. Area of operations will be cleared of all unneeded equipment and vehicles to allow free movement of helicopters; cleared area must accommodate a helicopter turning a radius of at least 40 feet (80–foot turning circle).

NOTE

A towbar (item 15, table 2–1 and table 2–2) or equivalent, will be used for towing and maneuver of helicopters on the ground.

2–6 HELICOPTER PREPARATION FOR CARGO AIRCRAFT SHIPMENT.

Preparation of the **AH-64A** helicopter consists of preliminary safety procedures (grounding, explosives deactivation, fuel level adjustment, etc.); helicopter disassembly (removal, folding, or stowage of certain helicopter components) to obtain required shipment preloading condition, and cleaning, preservation, packaging, and marking of helicopters and components.

CAUTION

- **Each removed component will be colorcoded, tagged or otherwise identified to indicate the helicopter from which it was removed, and exact installed position. Rotor blades for each helicopter must be kept as sets, match–marked with mating hub components, to maintain blade balance and calibration of the deicing system. Improper fit, imbalance, or component damage may result from parts mismatch or incorrect assembly.**
- **Unless otherwise directed, mounting hardware and pivot pins will be reinstalled after component removal, to prevent loss or damage.**
- **Smaller, hard–to–handle hardware items should be bagged and attached to related component, to prevent loss or damage.**

NOTE

Cleaning preservation and packaging procedures will be conducted after performance of required disassembly. Marking will be conducted before loading.

Table 2–1. Equipment Requirements for AH-64A Helicopter C-5 and C-17 Cargo Aircraft Shipment

(Sheet 1 of 3)

Item Number	Nomenclature	NSN	Part Number (CAGE/LIN)	Quantity Required	NOTES
1	Main rotor blade rack (root end)	1740–01–221–3329	7–267310002	*2	1
2	Main rotor blade rack (tip end)	1740–01–221–3333	7–267310002–3	*2	1
3	Stabilator actuator support	1740–01–256–6346	7–367310023	*1	1,
4	Tail rotor blade support	1740–01–221–3332	7–267310017	3	1, 5
5	Wing stowing kit	1740–01–220–8492	7–367310001	*1	1, 5
6	Forward fuselage tiedown fitting	1740–01–242–7265	7–367310009	*2	1
7	Forward winching adapter cable	1740–01–221–3327	7–267310008	2	1
8	Tail wheel steering bar and winching yoke	1740–01–221–9436	7–367310013	1	1
9	Hydraulic hose kit	1730–01–181–9275	7–262100019–601	1	1, 4
10	Hydraulic cart	1730–01–292–0972	70700–81650–041	1	1, 4
11	Aircraft mechanic’s tool kit	5180–00–323–4876			2
12	Fuel truck	2320–00–077–1631		1	2
13	M543A2 crane truck	2320–00–055–9258		1	2
14	Main rotor blade sling	1730–01–262–5310	7–362110216	1	2
15	Towbar	1730–00–967–9556		1	2
16	Droop stop wedge	1615–01–185–3102	7–262110074	4	2
17	1/2 drive socket wrench handle	5120–00–230–6385		2	2
18	1-1/16 socket	5120–00–935–7427		2	2
19	1-1/16 – 1-1/4 open end wrench	5120–00–187–7134		2	2
20	Hellfire launcher container			*2	2
21	Maintenance platform	1730–00–294–8883		1	2
22	Aircraft armament repairman basic tool set	4933–00–987–9816		1	2

Table 2–1. Equipment Requirements for AH-64A Helicopter C-5 and C-17 Cargo Aircraft Shipment

(Sheet 2 of 3)

Item Number	Nomenclature	NSN	Part Number (CAGE/LIN)	Quantity Required	NOTES
23	Aircraft armament repairman tool set	5180–01–110–7629		1	2
24	1/2 drive socket wrench handle	5120–00–236–7590		1	2
25	3/4 – 1/2 drive socket wrench adapter	5120–00–227–8088		1	2
26	1/2 – 3/8 socket wrench adapter	5120–00–240–8702		1	2
27	1-1/2 crowfoot	5120–00–184–8412		1	2
28	11/16 socket	5120–00–935–7421		1	2
29	9/16 socket adapter	5120–00–935–7420		1	2
30	1-5/16 – 1-1/4 open–end wrench	5120–00–277–2321		1	2
31	Offset crosstip screwdriver	5120–00–256–9014		1	2
32	1/2 drive torque wrench	5120–00–270–3121		1	2
33	3/4 drive torque wrench	5120–00–902–7983		1	2
34	Tow motor tug		as available	1	2
35	Fork lift		as available	1	2
36	2.75 in. rocket launcher container			*2	2
37	Tri–pod jacks (10 ton)	1730–00–516–2019		2	2
38	Captive boresight harmonization kit (CBHK)			1	
39	Grounding cable	local manufacture		*1	2
40	Pitot static system tester	4920–00–718–6480		1	2, 5
41	Forward jack pad	1560–01–226–7551	7–262120027	2	2
42	Rotor track and balance kit	4920–01–245–6004	7–262100008–607	1	2
43	Test kit, balance and track	4920–01–040–7816		1	2
44	Scale, aircraft weighing	6670–00–999–1195	C46500	1	2
45	Wheel chocks	Local manufacture		*2	2

Table 2–1. Equipment Requirements for AH-64A Helicopter C-5 and C-17 Cargo Aircraft Shipment

(Sheet 3 of 3)

Item Number	Nomenclature	NSN	Part Number (CAGE/LIN)	Quantity Required	NOTES
46	Jack, hydraulic tripod (3 ton)	1730–00–734–9382		1	2
47	Gauge, dial indicating	6635–00–578–5285		1	2
48	28 V dc adapter	5930–01–315–5178	70700–81650–045	1	3
49	Depinning Tool, 8 ga	5120–00–133–0158		*1	3

* Asterisk by quantity indicates quantity per helicopter shipped. Quantities of other equipment items are minimums. Quantities may be increased, based on number of aircraft and personnel.

NOTES:

1. Transportability peculiar items of equipment – not included in Tables of Organization and Equipment (TOE) and must be requisitioned for helicopter shipment.
2. Dual purpose item of equipment – normally included in TOE.
3. Dual purpose equipment – normally not included in TOE and must be requisitioned for helicopter shipment.
4. Additional equipment required for C-5 rear door load (not required for C-17 load).
5. Not required for C-17 (Tactical) shipment.

2–7 HELICOPTER CARGO AIRCRAFT LOADING AND TIEDOWN.

The prepared helicopter airframe and removed and packaged components will be sequentially loaded and secured on the cargo aircraft in accordance with instructions provided herein; aircraft floor–plans indicate exact shipping positions on the cargo deck.

2–8 HELICOPTER OFFLOADING.

Detailed procedures are included for offloading helicopters from the cargo aircraft upon arrival at the shipment destination.

2–9 PREPARATION FOR USE AFTER SHIPMENT.

Complete instructions are included to enable helicopter assembly, reconfiguration, refueling, checks and test flight of helicopters after cargo aircraft shipment.

Section II. SHIPMENT BY C–5 CARGO AIRCRAFT, FRONT DOOR LOADING AND UNLOADING

2–10 REQUIRED HELICOPTER PRELOADING CONDITION.

See figure 2–1 for **AH–64A** helicopter preloading condition required for shipment on C–5 cargo aircraft.

2–10.1 Equipment Requirements. Refer to table 2–1 for equipment items required for preparation and shipment of AH–64A helicopters on C–5 cargo aircraft. Items of equipment indicated by note 2 are Table of Organization and Equipment (TOE) items and are normally available within the unit. Items identified by notes 1 and 3 normally must be requisitioned for helicopter shipment.

2–10.2 Preliminary Safety Procedures. Before starting operations, perform safety procedures outlined in paragraphs 2–10.3 thru 2–10.5.

2–10.3 Ground Helicopters.
TM 1-1520-238-23.

2–10.4 Perform Helicopter Safety Check.
TM 1-1520-238-23.

2–10.5 Deactivate Armament.

WARNING

To prevent injury to personnel, M230 guns must be cleared and visually checked.

TM 9-1090-208-23-1.

2–10.6 Clean Helicopter. TM 1-1520-238-23 and TM 55-1500-333-24.

2–10.7 Corrosion Control. Repair corrosion (TM 55-1500-333-24, TM 55-1500-344-23 and TM 1-1520-238-23).

2–10.8 Drive Train. Check main transmission and nose gearbox lube oil sight gages (four locations); service if necessary (TM 1-1520-238-23).

NOTE

The grease–packed intermediate and tail rotor gearboxes will normally require no special check or servicing for shipment.

2–10.9 Engines and Auxiliary Power Unit (APU).

a. **Lube Oil Level Check.** Check engine and APU lube oil sight gages (three locations); service if necessary (TM 1-1520-238-23).

b. **Engine Ground Run Up.** Conduct five minute helicopter ground run (TM 1-1520-238-10) prior to disassembly for shipment.

2–10.10 Adjust Fuel Levels.

a. **Forward Tank.** Adjust fuel levels of forward tank to between a minimum of 38 gallons and maximum of 116 gallons.

b. **Aft Tank.** Adjust fuel level of aft tank to between a minimum of 55 gallons and maximum of 150 gallons.

c. **Annotate DD Form 1387-2.** Note actual fuel level of each tank for entry on DD Form 1387-2

2–10.11 Disconnect Battery. Disconnect helicopter battery (TM 1-1520-238-23). Wrap battery connectors with barrier material (D–1) sealed with tape (D–13).

2–10.12 Service Main Landing Gear.
TM 1-1520-238-23.

2–11 HELICOPTER DISASSEMBLY FOR C–5 SHIPMENT, FRONT DOOR LOADING.

Perform disassembly in accordance with procedures outlined in paragraphs 2–11.1 through 2–11.16.

2–11.1 Remove Hellfire Launchers.

a. **Removal.** Remove Hellfire launchers (TM 9-1427-475-20).

b. **Preservation.** Thoroughly coat unpainted mounting surfaces with corrosion preventive compound (D–4). Cap or wrap all electrical connectors with barrier material (D–1) sealed with tape (D–13).

c. **Component Wrap.** Wrap each launcher with barrier material (D–1) sealed with tape (D–13).

d. **Packaging.** Pack each removed and wrapped launcher in its shipping container (item 20, table 2–1).

2–11.2 Remove 2.75 Inch Rocket Launchers.

a. **Removal.** Remove rocket launchers (TM 9-1055-460-13&P).

b. **Preservation.** Coat unpainted mounting surfaces with corrosion preventive compound (D–4). Cap or wrap all electrical connectors with barrier material (D–1) sealed with tape (D–13).

c. **Component–Wrap.** Wrap each launcher with barrier material (D–1) sealed with tape (D–13).

d. **Packaging.** Pack each removed and wrapped rocket launcher in its shipping container (item 36, table 2–1).

2–11.3 Remove Main Rotor Blades.

a. **Install droop stop wedges** (item 16, table 2–1). TM 1-1520-238-23..

CAUTION

Prior to removal of main rotor blades, ensure that they are properly marked with aircraft number and appropriate location color code.

b. **Disconnect Deicing Receptacle.** Disconnect and cap deicing receptacle.

c. **Remove Rotor Blades.** Remove main rotor blades (TM 1-1520-238-23.) using crane truck (item 13, table 2–1) and main rotor blade sling (item 14, table 2–1).

d. **Preservation.** Thoroughly coat blade root fitting bolt holes with corrosion preventive compound (D–4). Wrap each blade root area with barrier material (D–1). Seal with tape (D–13).

e. **Install Blades.** Install blades in blade rack sets (items 1 and 2, table 2–1) (fig. 2–2).

(1) Remove upper and intermediate racks from blade root and blade tip racks.

(2) Install first blade in lower blade root and lower blade tip racks.

(3) Place intermediate racks on top of blade.

(4) Place second blade on intermediate racks with blade root of second blade inset approximately six inches from first blade root.

(5) Install upper racks on blade root and blade tip racks.

(6) Repeat steps (1) thru (5) for third and forth blades.

f. **Remove Wedges.** Remove droop stop wedges for use on next helicopter to be prepared.

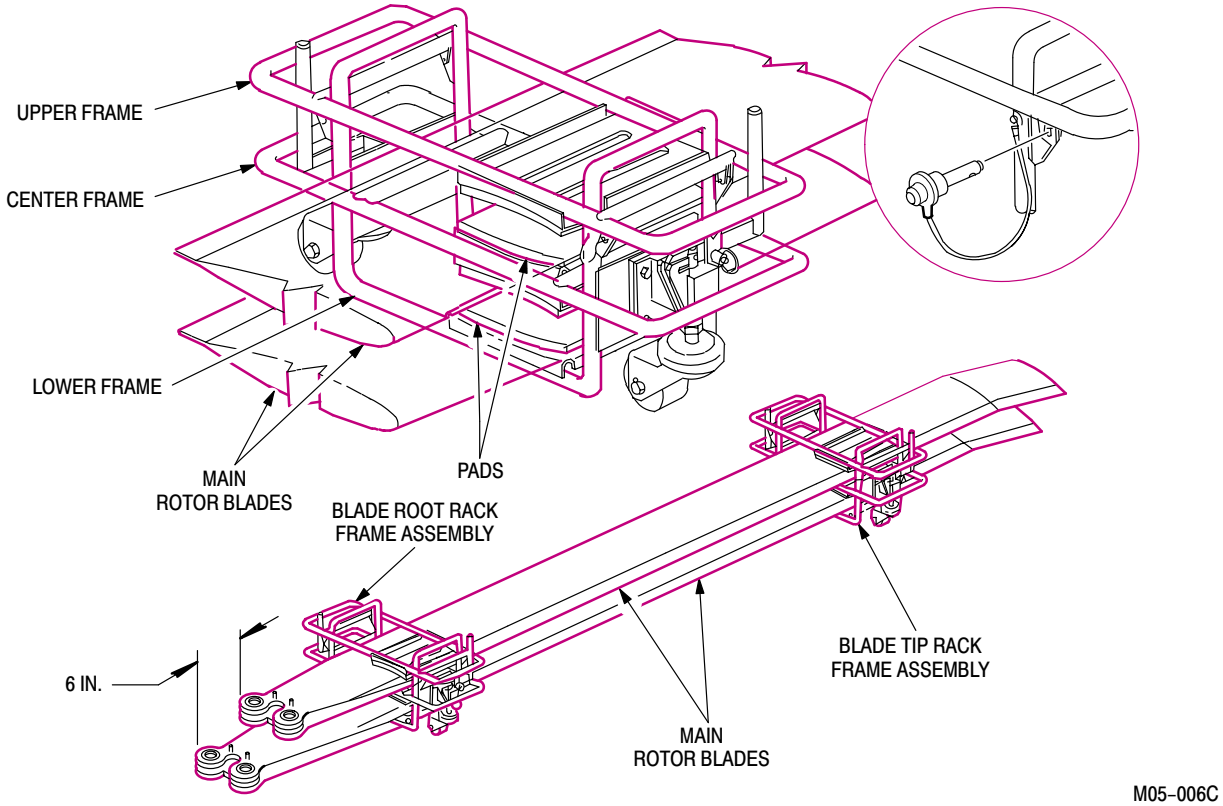


Figure 2–2. Installation of Main Rotor Blades in Blade Rack

2–11.4 Position Drive Train. After removal of main rotor blades, position the drive train so that the main rotor pitch housings are positioned 45° to the centerline of the fuselage and the tail rotor blades are ''X ed'' horizontally as shown in figure 2–1.

2–11.5 Remove Main Rotor Deice Power Distributor and Air Data System (ADS) Mast.

a. **Remove Panel.** Remove panel R200.

CAUTION

To prevent contamination of main rotor drive shaft and stand pipe, cover drive plate cover as soon as sensor housing unit is removed.

b. **Removal.** Remove main rotor deice power distributor and air data system mast (fig. 2–3 and TM 1-1520-238-23).

c. **Secure Cables.** Reinstall (for stowage) removed wire guides and cable clamps. Secure cables to deicing housing with twine (D–14).

d. **Main Rotor Drive Plate Cover.** Cover main rotor drive plate cover with barrier material (D–1) sealed with tape (D–13).

e. **Connection Closure.** Cap or wrap disconnected deicing connectors with barrier material (D–1) sealed with tape (D–13).

f. **Preservation.** Apply corrosion preventive compound (D–4) to all exposed surfaces of ADS mast and distributor.

g. **Component Wrap.** Wrap ADS mast and distributor with barrier material (D–1) sealed with tape (D–13).

h. **Stowage.** Stow wrapped ADS mast and distributor in pilot station. Secure with lap belt and shoulder harness.

i. **Install Panel.** Install panel R200.

2–11.6 Remove Fairings and Access Covers (fig. 2–4).

NOTE

Only the following fairings and access covers will be removed for C–5 shipment.

a. **Remove Wing Fairings.** Remove nine screws from each fairing (LW10, RW10, LW11, and RW11) (fig. 2–4).

b. **Remove Wing Access Covers.** Remove 16 screws from each cover (LW9 and RW9).

c. **Remove Tailboom Aft Closeout Fairings.** Remove 21 screws from fairings (L545 and R545).

d. **Remove Forward Ammunition Feed Fairings.** Release 10 camloc fasteners at each fairing (L140 and R140).

e. **Stow Fairings and Access Covers.** Wrap fairings and access covers removed in steps a thru d above with cushioning material (D–5) secured with tape (D–13) and secure in catwalk area.

NOTE

Wing trailing edges will be removed when required for internal connection access on extended–range capable helicopters. Trailing edges will be reinstalled for wing stowage.

f. **(Extended–Range Capable Helicopters Only) Remove Wing Trailing Edges.** Remove 68 screws from each trailing edge (LW13 and RW13).

2–11.7 Remove Steps.

a. **Remove Left Side Steps.** Remove FS 162/WL 148 and FS 162/WL 168 left side steps to permit wing stowage (TM 1-1520-238-23).

b. **Component–Wrap.** Wrap removed steps with cushioning material (D–5) secured with tape (D–13).

c. **Stow.** Stow wrapped steps in catwalk area.

2–11.8 Install Forward Fuselage Tiedown Fittings.

NOTE

Landing gear cross tube end studs have nuts at both ends. One cotter pin and nut will be removed from each stud, and stud will be pulled in direction allowing clear removal.

a. **Remove Main Landing Gear Cross Tube End Caps.** Remove one cotter pin, nut, and washer from cross tube left and right end studs. Then pull studs (with pinned nuts in place) from cross tube. Slide caps from cross tube ends. Retain removed studs, washers, and nuts. Discard removed cotter pins (fig. 2–5).

NOTE

If installed angle of cross tube stud prevents stud removal, helicopter must be jacked or lifted and cross tube turned (TM 1-1520-238-23).

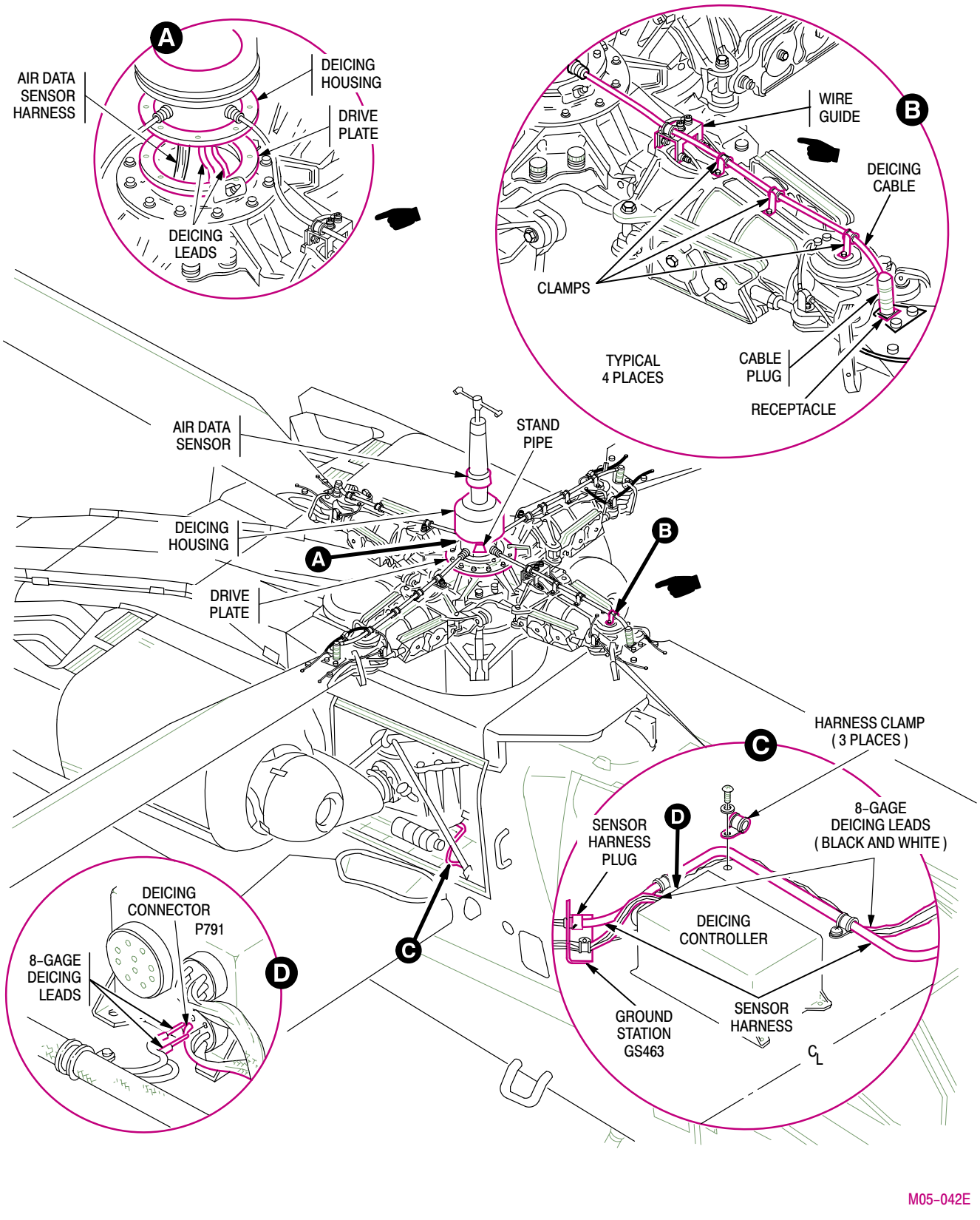
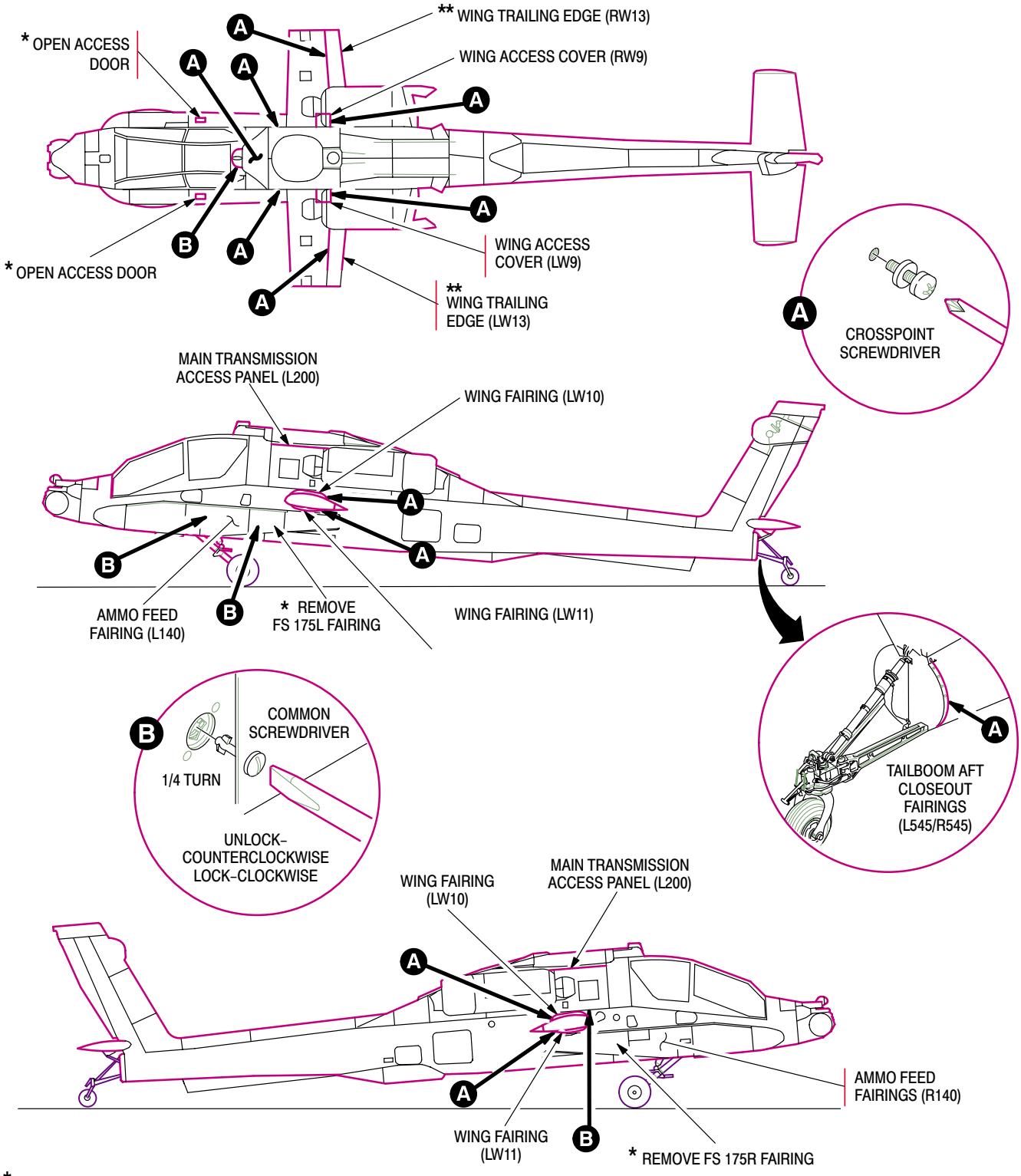


Figure 2–3. Removal and Installation of Main Rotor De–Ice Power Distributor and Air Data System (ADS) Mast



* HELICOPTER NO. 3 AND NO. 6 REAR DOOR LOAD ONLY

**EXTENDED RANGE EQUIPPED HELICOPTERS ONLY

M05–044E

Figure 2–4. Removal and Installation of Fairings and Access Covers

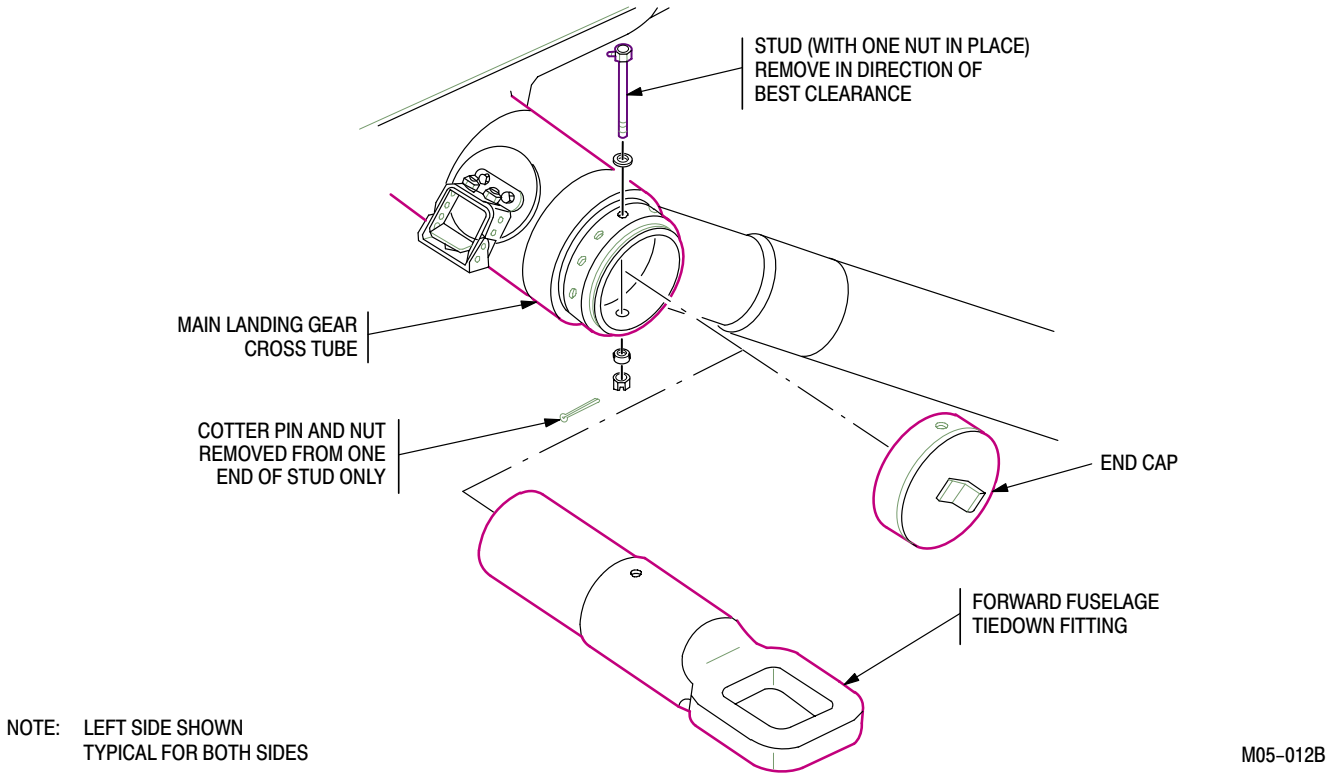


Figure 2–5. Installation and Removal of Forward Tiedown Fittings

b. **Install Tiedown Fittings.** Slide tiedown fittings (item 6, table 2–1) into left and right ends of each main landing gear cross tube. Aline holes in fittings and cross tube, and install removed studs, washers, and nuts.

c. **Stow Removed Cross Tube End Caps.** Wrap end caps with cushioning material (D–5) secured with tape (D–13). Stow wrapped end caps on floor of pilots station.

2–11.9 Remove 30MM Gun Wire Deflector.

a. **Remove Wire Deflector.** TM 1-1520-238-23.

b. **Component Wrap.** Wrap deflector assembly with cushioning material (D–5) secured with tape (D–13).

c. **Stow.** Stow deflector assembly securely in catwalk area.

2–11.10 Remove Main Landing Gear Lower Wire Cutters.

a. **Remove Wire Cutters.** Remove left and right lower main landing gear wire cutters (TM 1-1520-238-23).

b. **Component Wrap.** Wrap cutters with cushioning material (D–5) secured with tape (D–13).

c. **Stow.** Stow wrapped cutters on floor of pilots station.

2–11.11 Remove Horizontal Stabilator. (fig. 2–6 and TM 1-1520-238-23).

a. **Secure Stabilator Shims.** Secure shims in place until installed. Do not remove shims from spacers.

b. **Install Stabilator Actuator Support.** Mount yoke of support (item 3, table 2–1) to airframe stabilator pivots, and connect actuator rod end to support end fitting. Use removed stabilator pivot and actuator rod end hardware.

c. **Static Wicks.** To prevent damage to static wicks, loosen one screw and remove other in each wick. Rotate wick 180° and tighten screw. Reinstall first screw in stabilator.

d. **Access Covers.** Reinstall stabilator access covers.

e. **Component–Wrap.** Wrap stabilator with barrier material (D–1) then with cushioning material (D–5) secured with tape (D–13).

2–11.12 Number Helicopters.

NOTE

Helicopters must be configured differently within each load depending on whether they are to be loaded nose first or tail first.

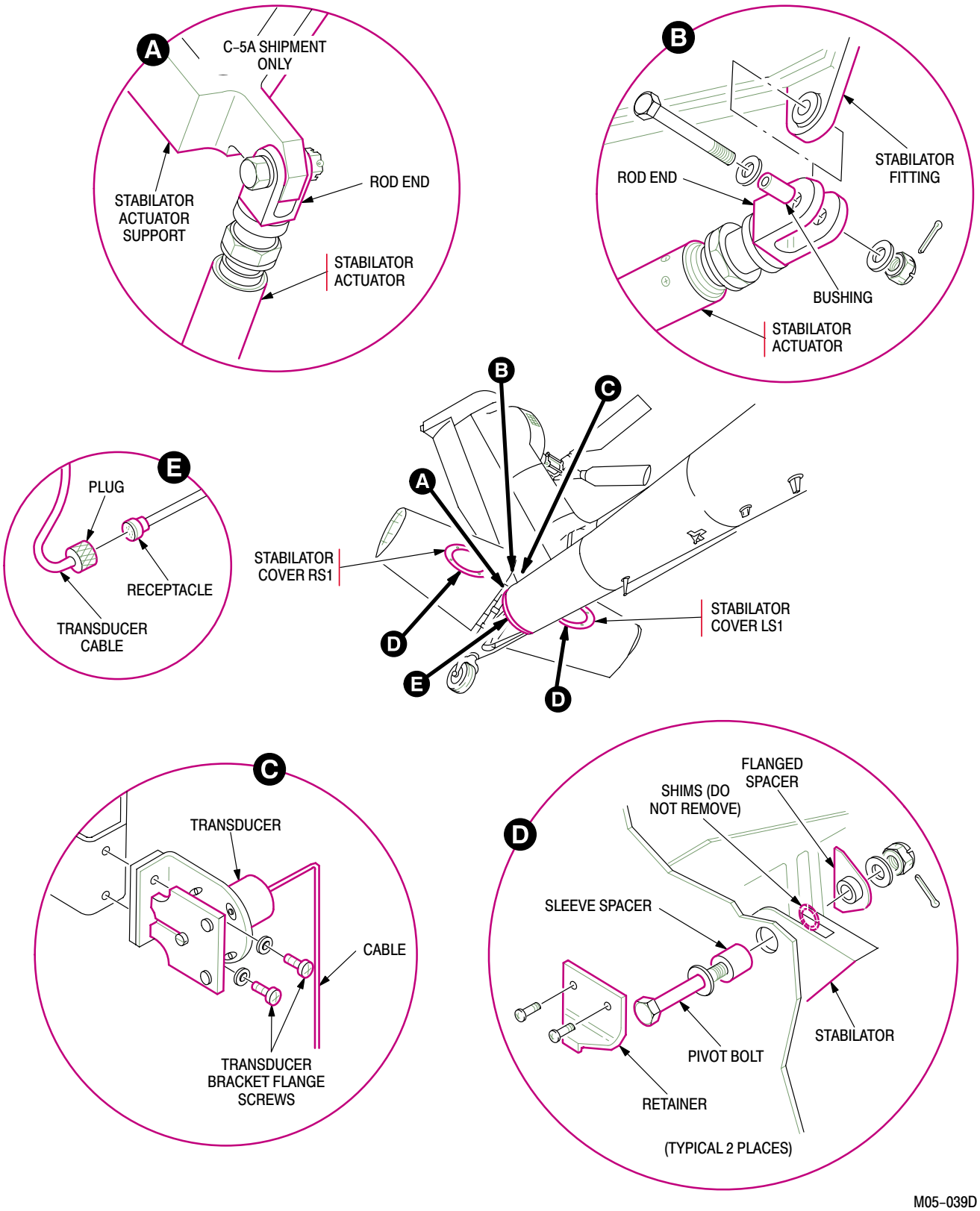


Figure 2–6. Removal and Installation of Horizontal Stabilator

NOTE

This numbering sequence will be maintained throughout this section.

Number helicopters one thru six in sequence they are to be loaded through front door of a C–5 (FO–1). Helicopter number one will be loaded first, followed by helicopter number two. Helicopter number six will be loaded last.

2–11.13 Remove Two Tail Rotor Blades (Helicopters Number One, Three, and Five Only).

CAUTION

Prior to removal of tail rotor blades ensure that main rotor head and tail rotor are positioned as required in paragraph 2–11.4 to prevent damage during loading.

NOTE

Prior to removal of tail rotor blades ensure that they are properly color coded and marked with aircraft number.

a. **Remove Two Upper Tail Rotor Blades From Helicopter Number One.** TM 1-1520-238-23.

(1) Reinstall pitch link bolt, nut, and washers in pitch horn

(2) Reinstall tail rotor blade bolt and nut in tail rotor blade.

(3) Cap or wrap deicing connectors with barrier material (D–1) sealed with tape (D–13).

(4) Coat bare metal of tail rotor hub surfaces with corrosion preventive compound (D–4).

(5) Wrap disconnected pitch links with cushioning material (D–5) secured with tape (D–13). Secure wrapped links to tail rotor hub with tape (D–13).

(6) Wrap each tail rotor blade hub fitting area with barrier material (D–1) sealed with tape (D–13).

(7) Install two tail rotor blades in blade support (item 4, table 2–1) and secure with tie down strap (fig. 2–7).

b. **Remove Two Lower Tail Rotor Blades From Helicopter Number Three.** TM 1-1520-238-23. Prepare tail rotor hub and blades in accordance with paragraph 2–11.13a (1) thru (7).

c. **Remove Two Upper Tail Rotor Blades From Helicopter Number Five.** TM 1-1520-238-23. Prepare tail rotor hub and blades in accordance with paragraph 2–11.13a (1) thru (7).

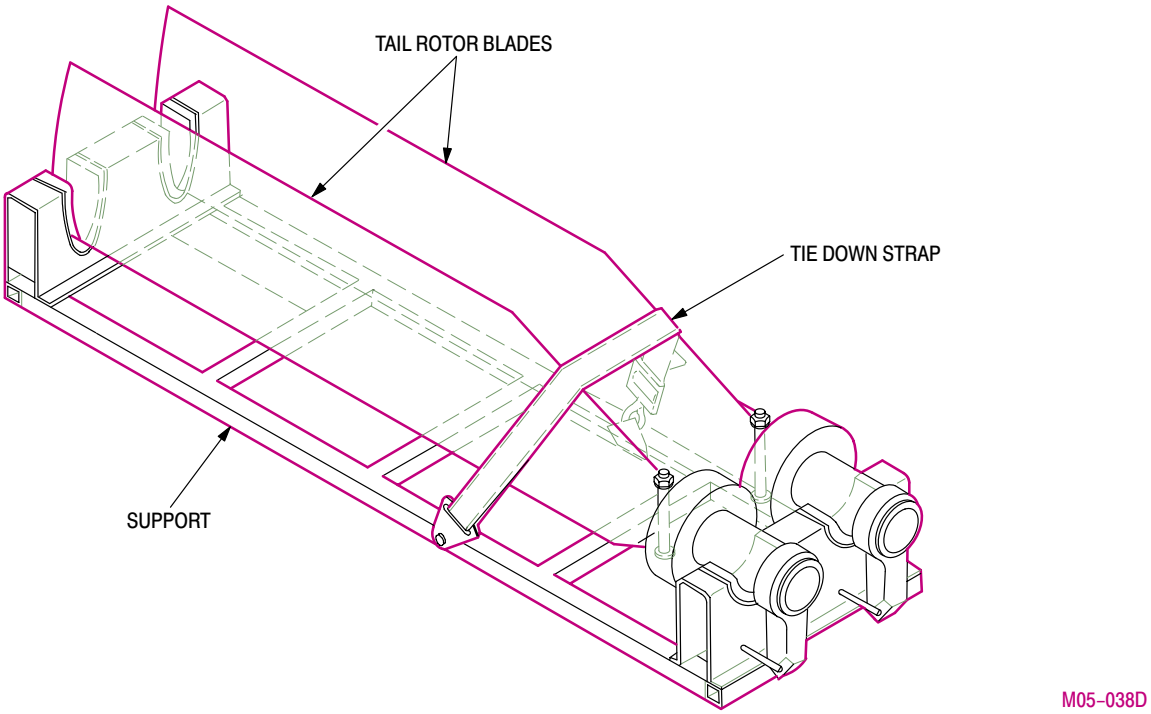


Figure 2–7. Installation of Tail Rotor Blades in Blade Rack

2–11.14 Remove ADF Wire Antenna and UHF L–Band, Communications, and Transponder Blade Antennas. Remove FM–AM whip antenna (MWO 1–1520–238–50–37 installed) (fig. 2–8).

a. **Remove FM–AM Whip Antenna.** Remove fairing. Remove lockwire and loosen antenna lower jam nut. Remove antenna. Remove lockwire and loosen antenna upper jam nut. Separate upper antenna half from lower half.

b. **Remove ADF Wire Antenna.** Unhook end of antenna from standoff terminal spring. Coil antenna and secure to latch on aft storage bay (R330) with twine (D–14).

c. **Remove Blade Antennas.** Remove six screws from each antenna flange and pull on antennas. If sealant will not permit removal, gently pry antennas with plastic (phenolic) tool to break sealant loose. Disconnect plugs from receptacles and remove antennas.

d. **Remove Lower IFF Antenna.** Remove four screws from antenna base. Remove antenna and detach connector.

e. **Stow Blade Antennas.** Wrap all antennas with cushioning material (D–5) and secured with tape (D–13). Secure antennas in pilots station.

2–11.15 Remove and Stow Wings.

NOTE

For C–5 shipment, wings will be removed and stowed with installed pylons in place.

a. **Disconnect.** Disconnect electrical harnesses and pitot lines. Install dust caps (D–24) on fuselage connectors and pitot fittings (fig. 2–9).

b. **(Extended–Range Capable Helicopters Only) Disconnect Wing Fuel and Air Fittings from Fuselage Fittings** (fig 2–9). Install dust caps (D–24) on fuselage fittings.

c. **Remove wings.** TM 1-1520-238-23.

d. **(Extended–Range Capable Helicopters Only) Reinstall Wing Trailing Edges.** Install 12 of 68 screws, evenly spaced, to secure trailing edge for wing stowage. Bag remaining screws.

e. **Preservation.**

(1) Cap or wrap all disconnected fittings and connectors with barrier material (D–1) sealed with tape (D–13).

(2) Apply corrosion preventive compound (D–4) to mounting surfaces and bolt holes.

f. **Install Stowing Kit Wing Root Brackets on Wings.** Using stowing kit (item 5, table 2–1), mount left and right brackets on wing forward mounting bosses. Using captive bracket bolts inserted through wing mount bosses, tighten captive bolts into mating bracket nuts (fig. 2–9).

g. **Install Stowing Kit Wing Cradles.** Install left and right cradles as shown. Tighten three cradle turnlock studs in mating fuselage holes.

h. **Mount Wings in Stowed Positions.**

CAUTION

Pitot tube can be seriously damaged if it contacts a landing gear pivot fitting or other solid surface. Use extreme care to clear pitot tube when positioning wing on fuselage side.

Fit each wing in its cradle with trailing edge up and root end aft. Aline wing root bracket on forward mounting holes in fuselage then mount brackets to fuselage holes. Use wing forward mounting bolts and washers. Torque upper forward bolts to **220 Foot–Pounds**, and lower forward bolts to **90 Foot–Pounds**.

i. **Install Trailing Edge Supports.** Install stowing kit left and right trailing edge supports (fig. 2–9).

j. **Install Left and Right Wing Outboard (Lower) Tiedown Straps.**
Snap flat hook ends of stowing kit outboard straps into trailing edge support outboard holes. Snap opposite hook ends into wing cradle holes (fig. 2–9).

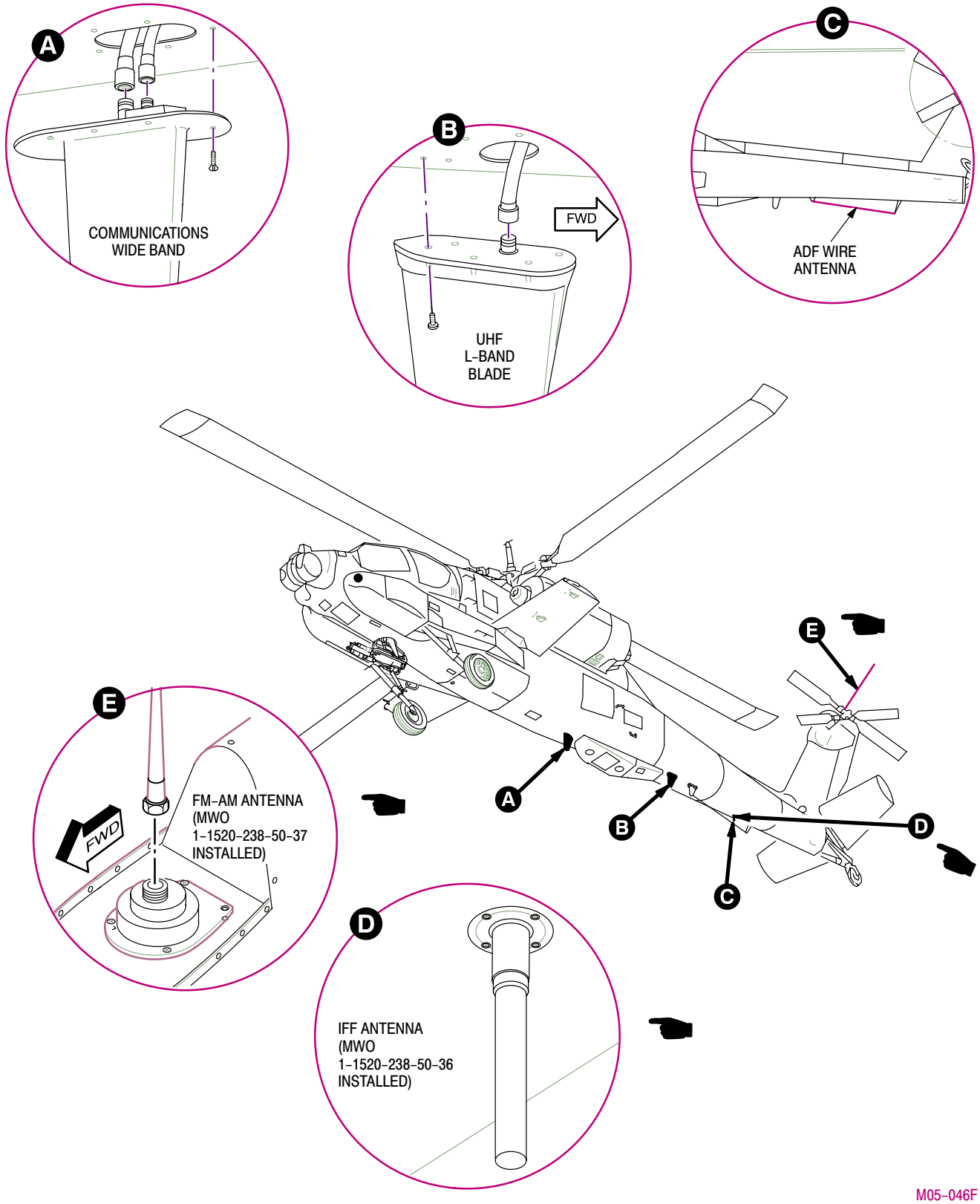


Figure 2–8. Removal and Installation of Antennas

k. **Install Left Wing Inboard (Upper) Tiedown Strap.** Snap flat hook end of stowing kit left inboard strap into shackle (D–26) attached to fuselage upper handle. Snap opposite hook end into left trailing edge support inboard hole (fig. 2–9).

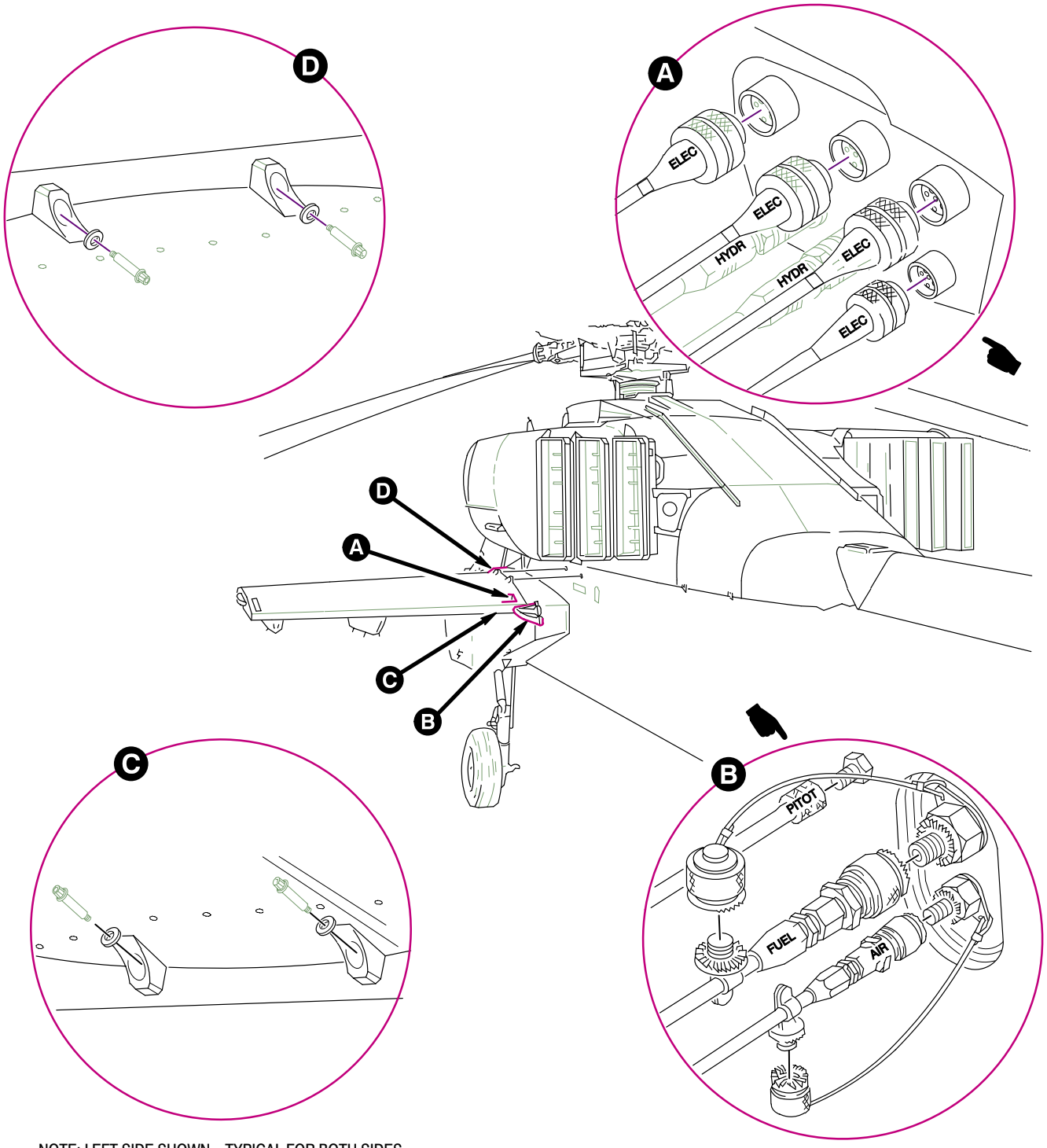
l. **Install Right Wing Inboard (Upper) Tiedown Strap.** Snap hook end of stowing kit right inboard strap in right trailing edge support inboard hole. Mount opposite fitting end to upper fuselage. Use installed fuselage tiedown screw to mount strap fitting (fig. 2–9).

m. **Tighten Tiedown Straps.** Adjust four tiedown straps to remove all strap slack and fully seat both trailing edge supports (fig. 2–9).

NOTE

When properly tightened, it will not be possible to move trailing edge supports in any direction.

2–11.16 Install Fly Away Covers.
TM 1-1520-238-23



NOTE: LEFT SIDE SHOWN – TYPICAL FOR BOTH SIDES

(EXTENDED – RANGE CAPABLE HELICOPTERS ONLY)
FUEL AND AIR LINES

WING REMOVAL AND INSTALLATION

M05–010–1D

Figure 2–9. Removal, Stowage, and Installation of Wings (Sheet 1 of 2)

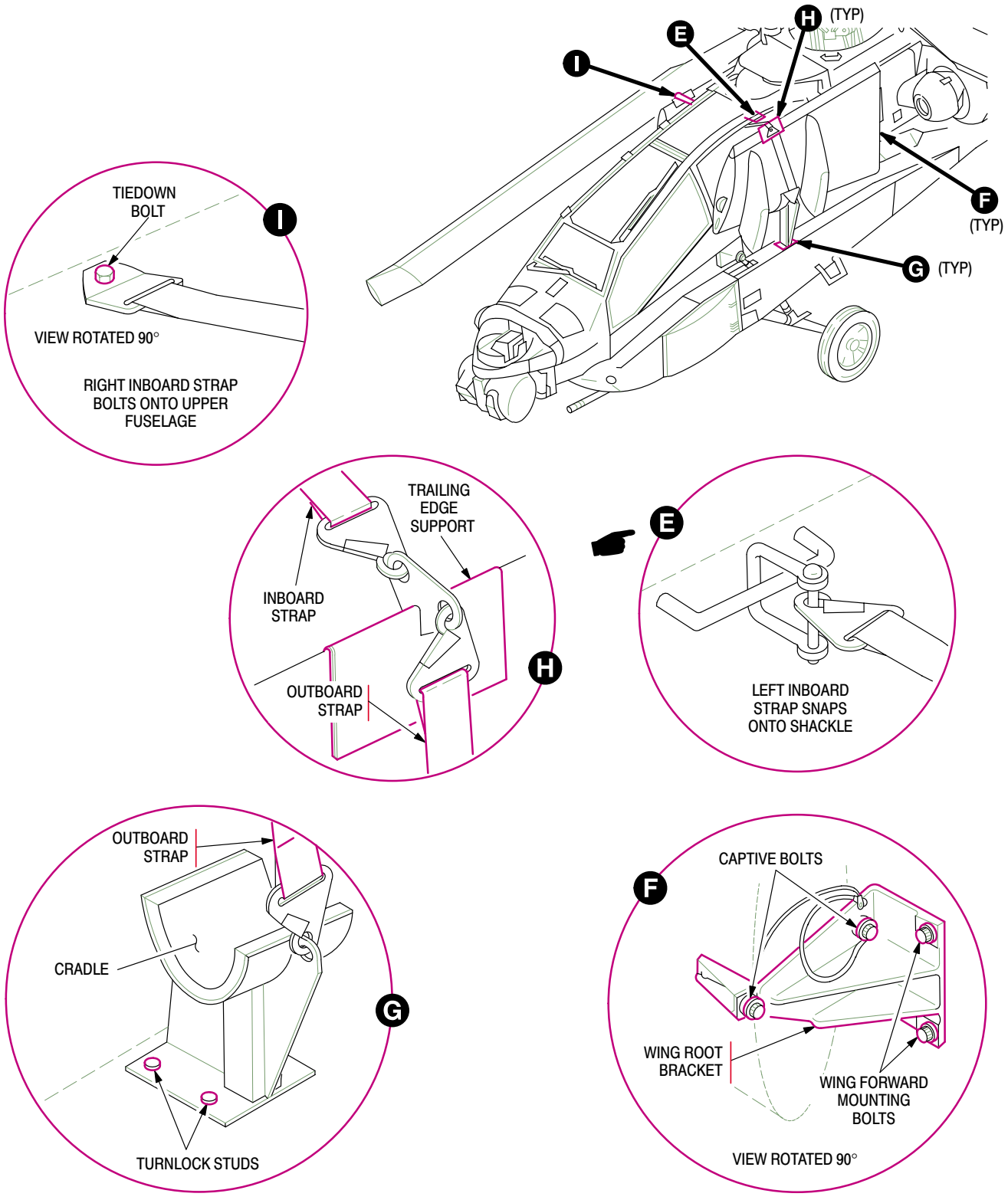


Figure 2–9. Removal, Stowage, and Installation of Wings (Sheet 2 of 2)

2–12 TRANSPORTED GROUND SUPPORT EQUIPMENT.

a. **Preservation.** Apply corrosion preventive compound (D–4) to bare metal surfaces of each equipment item to be transported with helicopters or on other designated carrier.

b. **Component–Wrap.** Wrap each equipment item not mounted on helicopter with barrier material (D–1) sealed with tape (D–13).

c. **Packaging.** Pack wrapped equipment items in a cleated wood box (D–2).

2–13 MARKING.

NOTE

Helicopters and components will be marked in accordance with MIL-STD-129 before loading for shipment.

a. **Removed Parts.** Each removed component will be tagged or marked to indicate serial number of helicopter from which it was removed.

b. **Separately Loaded Components and Equipment.** The sides of each separately loaded component container will be marked as follows:

(1) Painted one–inch black stripe to indicate center of balance extending three inches upwards from lower sheathing, and stenciled one–inch high letters "CENTER OF BALANCE", next to painted stripe.

(2) Stenciled one–inch high letters, "SHIPPING WEIGHT", followed by numerals indicating shipping weight.

c. **Components and Equipment Requiring Special Handling.** Shipments containing hazardous, dangerous, or other materials requiring special handling will be labeled and marked as follows:

(1) Special handling instructions, marking, and warnings will be provided in accordance with TM 38-250.

(2) A DD Form 1387-2 will be completed and secured to helicopter airframe and each applicable component container.

d. **Helicopter Airframe.** Each airframe will be marked and tagged as follows:

(1) Fuselage will be marked on both sides to indicate centers of balance location.

(2) Fuselage will be tagged on both sides to indicate shipping weight.

(3) A preservation limit tag (fig. 2–10) will be prepared on shipping tag (D–25), waterproofed, and secured to helicopter airframe a duplicate tag will be attached to and stowed with helicopter shipping documents.

(4) Attach a waterproofed DD Form 1387–2, prepared in accordance with TM 38-250, to fuselage.

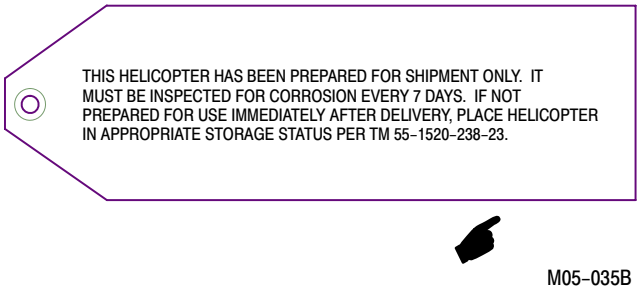


Figure 2–10. Preservation Limit Tag

2–14 HELICOPTER LOADING AND TIEDOWN (C–5 AIRCRAFT SHIPMENT – FRONT DOOR LOADING).

Paragraphs 2–14.1 thru 2–14.28 provide procedures for the loading and tie down of six **AH–64A** helicopters loaded through the front door of a C–5 cargo aircraft. The loaded configuration of the C–5 aircraft is shown in figure FO–1.

2–14.1 Air Force Responsibilities During Loading. The C–5 cargo aircraft loadmaster is responsible for:

a. Technical direction of all aspects of loading and tiedown.

b. Operation of C–5 aircraft integral loading devices (snatch blocks, winch, aircraft cargo ramps, etc).

c. Configuration of C–5 cargo aircraft.

(1) Airplane in forward kneeled position.

(2) Forward loading doors in drive–in loading position.

(3) Stow flight station ladder.

(4) Install cargo winch in aft ramp.

(5) Extend troop compartment ladder.

d. Direct placement of shoring.

2–14.2 Army Unit Responsibilities During Loading.

NOTE

Once helicopter has been towed to loading area, sequence of loading, placement of equipment and tie down operations will be directed by Air Force personnel. Loading instructions provided are intended only as a guide.

a. Provide shoring as described in paragraph 2–14.3.

b. Provide personnel to operate helicopter brakes during loading and unloading.

c. Place shoring as directed by loadmaster.

d. Steer helicopter as directed by loadmaster.

e. Place wheel chocks as directed by loadmaster.

f. Provide manpower for final positioning and tie down of helicopter, components, and equipment, as directed by loadmaster.

g. Load helicopter components as directed by loadmaster.

h. Unlock/lock tail wheel as required for helicopter maneuvering.

i. Provide additional assistance as requested by Air Force loadmaster.

2–14.3 Shoring. The amount of shoring required will vary depending on tire pressure, strut servicing, and aircraft weight. As a minimum, provide the following (lumber sizes are nominal sizes):

a. The following approach shoring is required when loading the helicopter nose first into the airplane (fig. 2–11 and 2–12).

(1) Five pieces of 12 x 12 x 3/4 inch plywood.

(2) Eleven pieces of 2 x 12 x 24 inch lumber.

(3) Eleven pieces of 2 x 12 x 48 inch lumber.

(4) Two pieces of 2 x 12 x 72 inch lumber.

b. The following step up shoring is required for the cargo floor when loading the helicopter tail first into the airplane (fig. 2–13).

(1) One piece of 2 x 12 x 72 inch lumber.

(2) One piece of 2 x 12 x 96 inch mm lumber.

(3) One piece of 2 x 12 x 120 inch mm lumber.

c. Shoring must be provided to protect the stowed roller conveyor strips on the cargo aircraft ramp extension. This will require two paths of 1/2-inch plywood, 12 inches wide and 228 inches long.

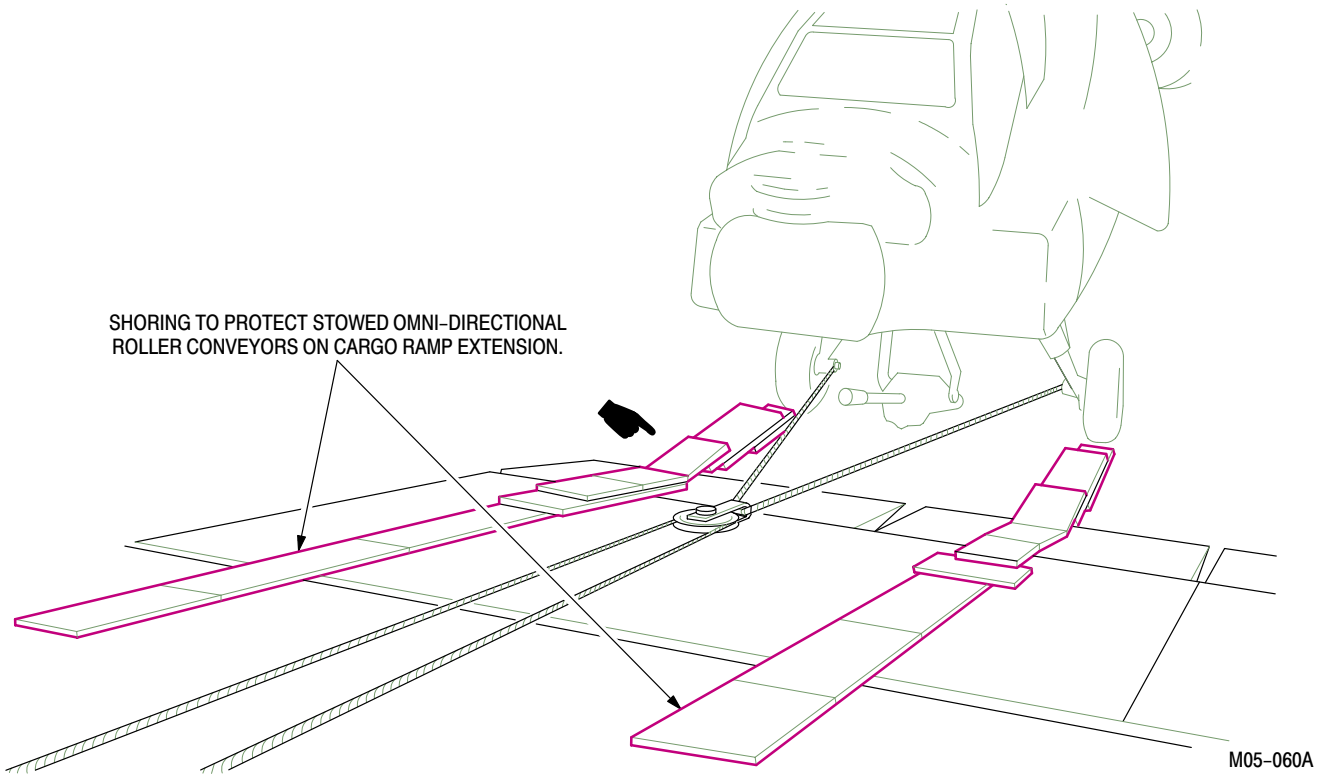


Figure 2–11. Main Gear Approach Shoring

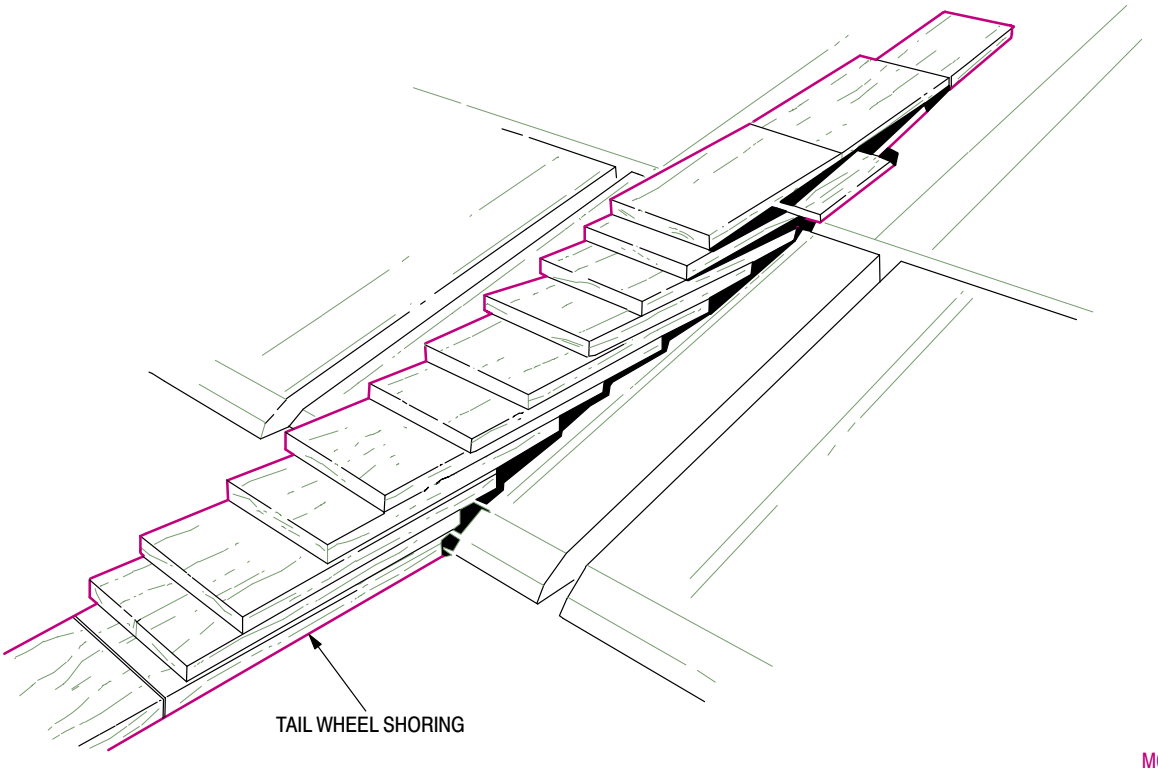


Figure 2–12. Tail Wheel Approach Shoring

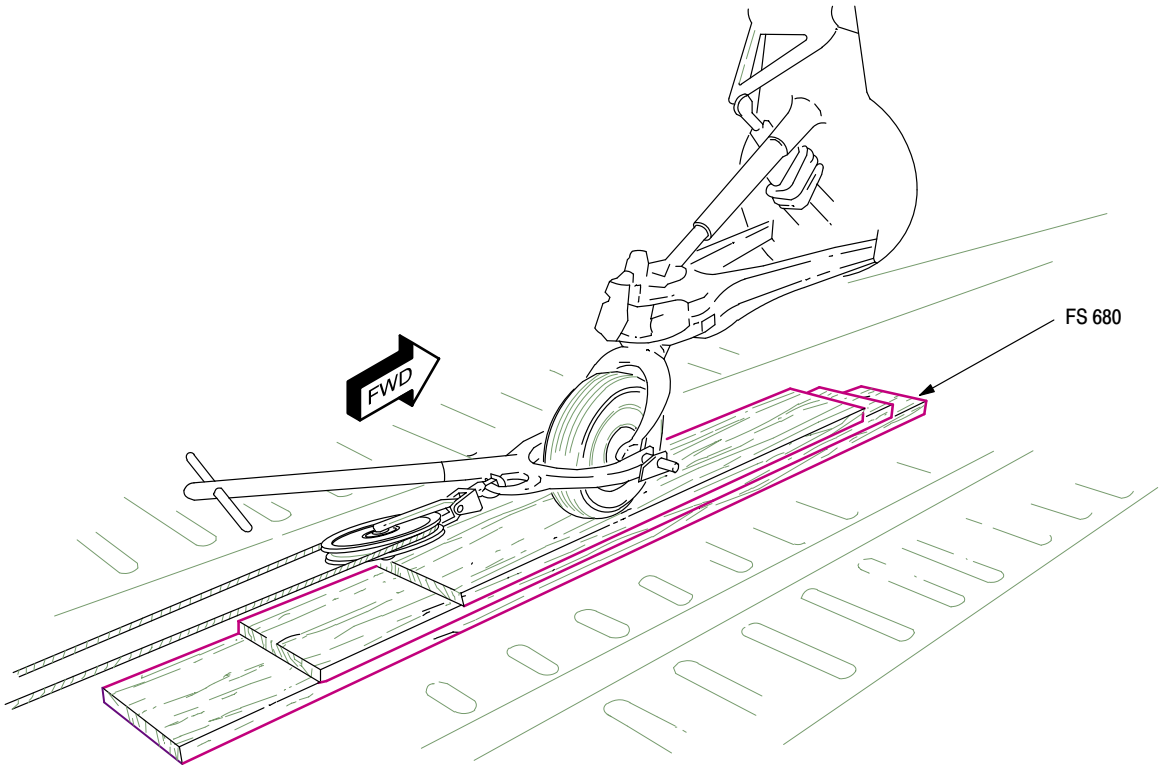


Figure 2–13. Cargo Compartment Step–Up Shoring for Tail Wheel

2–14.4 Verify Preliminary Safety Procedures.

WARNING

To prevent fire or explosion, verify that armament, canopy jettison, fuel and electrical systems are safetied on each helicopter prior to loading.

Check and ensure performance of all Preliminary Safety Procedures listed in paragraph 2–10.2.

2–14.5 Load Four Hellfire Launchers. Position two Hellfire launcher containers on left center area of aft ramp. Place the other two launcher containers on top first two containers (fig FO–1).

2–14.6 Load Helicopter Number One Nose First.

WARNING

- **To prevent injury to personnel and damage to helicopter and cargo aircraft from helicopter rolling free, the helicopter will be restrained with chains and wheel chocks prior to releasing tension on winch cable.**
- **To prevent injury to personnel and damage to helicopter and cargo aircraft in the event of winch failure, the helicopter CPG station will be occupied by a qualified person to operate brakes.**

CAUTION

- **To prevent damage to helicopter and cargo aircraft, chocks shall be used to prevent the helicopter from moving past the stated cargo aircraft fuselage station.**
- **To prevent damage to helicopter and cargo aircraft, ensure that rotor head and tail rotor are properly positioned prior to approaching cargo aircraft.**
- **To prevent damage to helicopter and cargo aircraft, use shoring as necessary under helicopter main and tail wheels to provide clearance between helicopter underbelly and cargo aircraft ramp hinge.**

a. **Unlock Tail Wheel Swivel.** Push swivel lock lever down to release tail wheel swivel lock. Install tail wheel lock safety pin (fig. 2–14).

b. **Install Tail Wheel Steering Bar and Winching Yoke.** Connect winching yoke (item 8, table 2–1) to tail landing gear wheel fork (fig. 2–14). Tighten yoke studs onto ends of tail wheel axle. Install steering bar in yoke tube.

NOTE

Tail wheel steering bar will be used to steer helicopter and to keep main and tail wheels on loading ramps.

c. **Place Shoring.** Place two stacks of approach shoring 70 inches apart (fig. 2–11). Each stack should consist of:

(1) One piece of 2 x 12 x 72 inch lumber.

(2) Four pieces of 2 x 12 x 48 inch lumber.

(3) One piece of 2 x 12 x 24 inch limber.

(4) Two pieces of 12 x 12 x 3/4 inch plywood.

(5) One strip of 12 x 228 x 1/2 inch plywood to protect stow roller conveyors on cargo aircraft ramp extension.

d. **Aline Helicopter at Shoring.** Position helicopter main landing gear wheel to aline with approach shoring.

e. **Connect Cargo Aircraft Winch Cable to Helicopter.** Couple hooks on forward winching adapter cable (item 7, table 2–1) to helicopter main wheel arm inboard eyes (fig. 2–15). Cargo aircraft loadmaster will direct coupling of the forward winching adapter cable to cargo aircraft winch cable and take up cable slack.

f. **Assign Personnel.** Assign loading team members to; monitor ramp crest, overhead and sidewall clearances, operate tail wheel steering bar and operate helicopter brakes.

g. **Winch Helicopter.** Winch helicopter onto approach shoring and up cargo ramp. Stop helicopter when main gear tire reaches C–5 fuselage station (FS) FS 450 (fig. FO–1).

h. **Apply Brakes.** Apply helicopter brakes and attach safety chains.

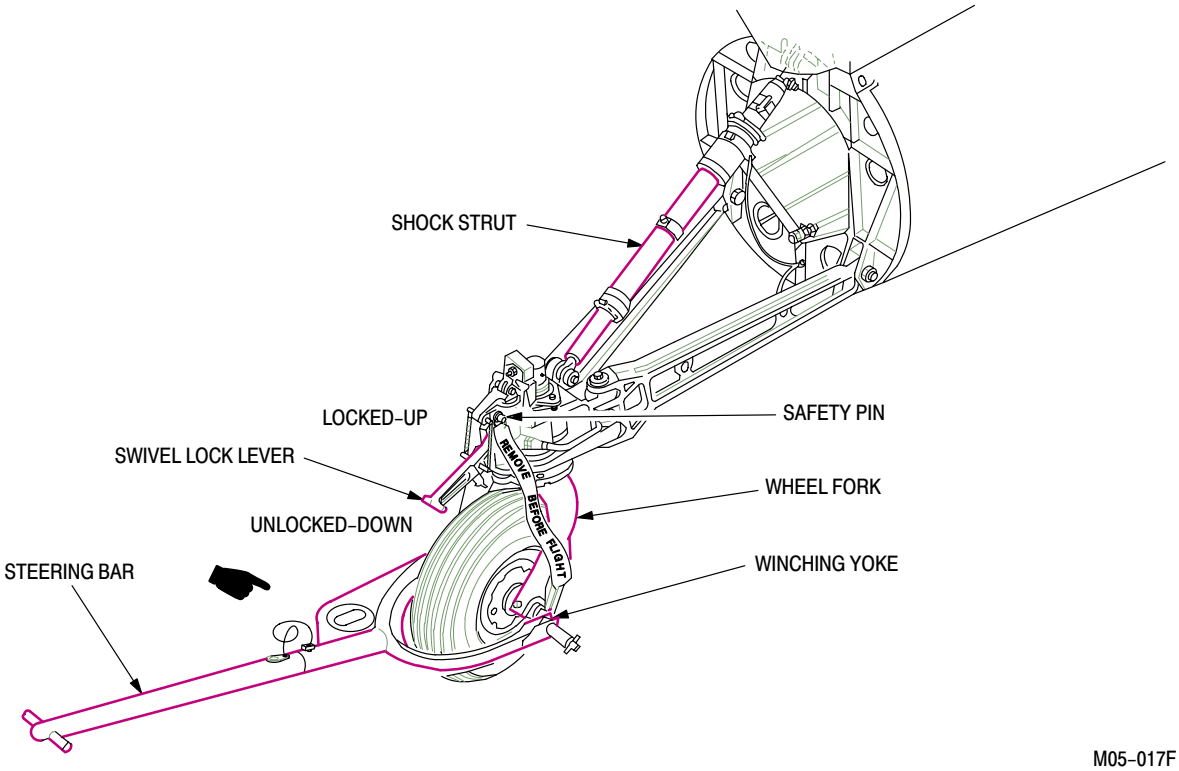


Figure 2–14. Tail Wheel Swivel Lock and Yoke Components

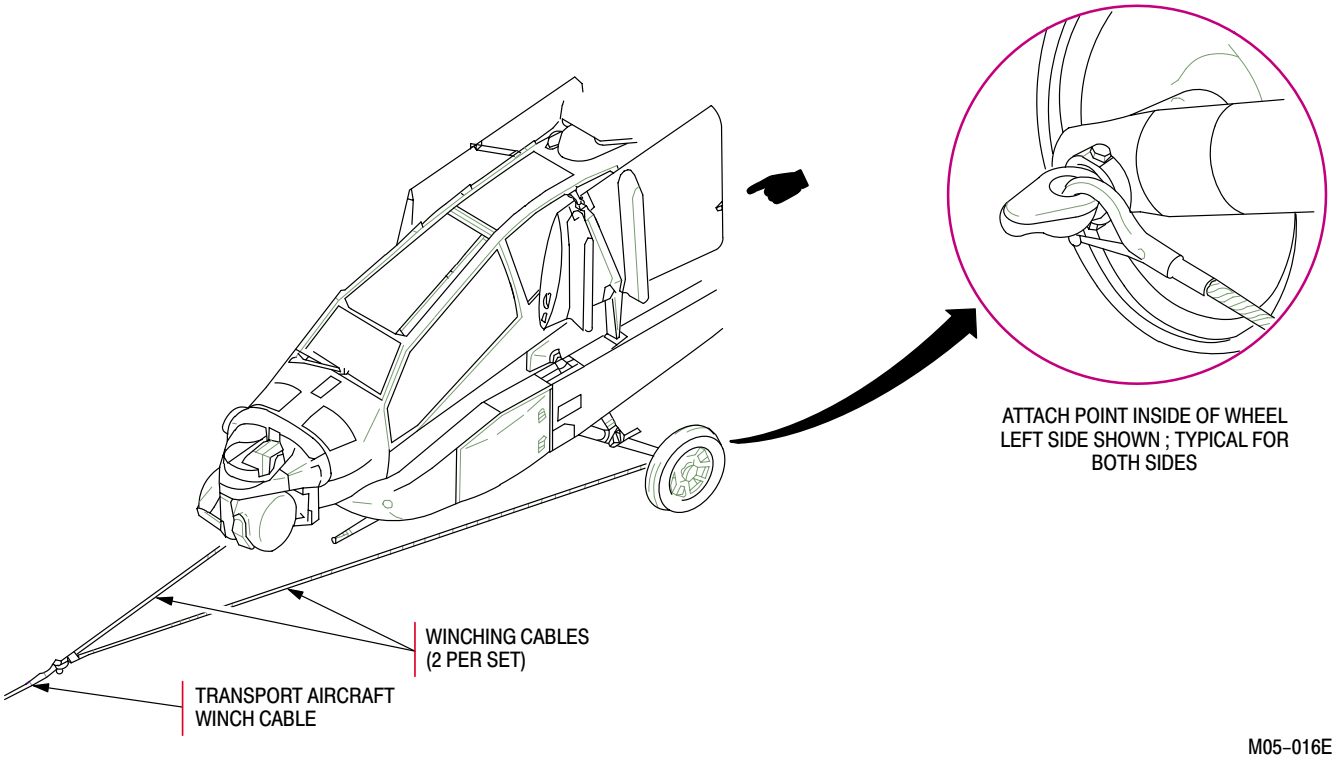


Figure 2–15. Helicopter Forward Towing Winch Connection

i. **Position Shoring.** Position a single stack of step up shoring for tail wheel consisting of following (fig. 2–12):

(1) Three pieces of 2 x 12 x 48 inch lumber.

(2) Nine pieces of 2 x 12 x 24 inch lumber.

(3) One piece of 12 x 12 x 3/4 inch plywood.

j. **Remove Chains.** Remove safety chains and release helicopter brakes.

k. **Winch Helicopter.** Continue winching helicopter into aircraft.

l. **Position Helicopter.** Position helicopter to right side of cargo compartment. Ensure right side main landing gear tire is positioned down buttline (BL) 14R.

m. **Stop Winching.** Stop winching helicopter when main landing gear tires reach FS 1800.

n. **Apply Brakes.** Apply helicopter brakes and set chocks.

o. **Disconnect Winch.** Disconnect winch cable from adapter cables and adapter cables from helicopter (fig. 2–15).

CAUTION

Do not allow axle of main landing gear to move aft of FS 1965. Failure to comply could result in damage to helicopter nose and/or cargo aircraft pressure door.

NOTE

Final positioning of helicopter will be accomplished manually.

p. **Remove Chocks.** Remove chocks and release brakes.

q. **Move Helicopter.** Manually move helicopter aft until main landing gear reaches FS 1965.

r. **Position Helicopter.** Position tail of helicopter as far to right side of cargo compartment as possible.

s. **Apply Brakes.** Apply helicopter brakes and place chocks.

t. **Install Chains.** Install safety chains.

u. **Lock Tail Wheel.** Remove tail wheel lock safety pin. Lift swivel lock lever to engage tail wheel swivel lock (fig. 2–14). Push wheel sideways to check lock engagement. A locked tail wheel will not swivel.

v. **Remove Tail Wheel Steering Bar and Winching Yoke.** With tail wheel centered, loosen yoke studs from tail wheel axle and remove yoke (fig. 2–14). Remove steering bar from yoke tube.

w. **Release Brakes.** Instruct brakeman to release bakes and dismount helicopter.

NOTE

Do not restrain helicopter for flight at this time.

2–14.7 Load Four Main Rotor Blades. Position two main rotor blade rack sets holding two blades each (fig. 2–2) on cargo floor under helicopter number one fuselage (fig. FO–1).

2–14.8 Load Two Horizontal Stabilators. Position one stabilator under nose of helicopter number one and one at left rear of cargo aircraft (fig. FO–1).

2–14.9 Load Helicopter Number Two Nose First. Load helicopter number two nose first using same loading procedures used for helicopter number one (para 2–14.6) with following exceptions.

a. **Position Helicopter.** Position helicopter to left side of cargo compartment. Ensure that left main landing gear tire is positioned down BL 16L (fig. FO–1).

b. **Stop Winching.** Stop winching helicopter when main landing gear tires reach FS 1700.

CAUTION

Do not allow axle of main landing gear to move aft of FS 1820. Failure to comply could result in damage to helicopter nose and/or troop compartment ladder.

c. **Move Helicopter.** Manually move helicopter aft until main landing gear reaches FS 1820.

d. **Position Helicopter.** Position tail of helicopter as far to left side of cargo compartment as possible.

2–14.10 Load Four Main Rotor Blades. Position two main rotor blade rack sets holding two blades each (fig. 2–2), on cargo floor under helicopter number two fuselage (fig. FO–1).

2–14.11 Load Six Tail Rotor Blades. Position three tail rotor blade supports holding two blades (fig. 2–7), on left side of cargo floor, outboard of helicopter number two tailboom (fig. FO–1).

2–14.12 Load Helicopter Number Three Tail First.

WARNING

- **To prevent injury to personnel and damage to helicopter and cargo aircraft in the event of winch failure, the helicopter CPG station will be occupied by a qualified person to operate brakes.**
- **To prevent injury to personnel and damage to helicopter and cargo aircraft from helicopter rolling free, the helicopter will be restrained with chains and wheel chocks prior to releasing winch cable.**

CAUTION

- **To prevent damage to helicopter and cargo aircraft, use shoring as necessary under helicopter main and tail wheels to provide clearance between helicopter underbelly and cargo aircraft ramp hinge.**
- **To prevent damage to helicopter and cargo aircraft, chocks shall be used to prevent the helicopter from moving past the stated cargo aircraft fuselage station.**
- **To prevent damage to helicopter and cargo aircraft, ensure that rotor head and tail rotor are properly positioned prior to approaching cargo aircraft.**

a. **Unlock Tail Wheel Swivel.** Paragraph 2–14.6a.

b. **Install Tail Wheel Steering Bar and Winching Yoke.** Paragraph 2–14.6b.

c. **Aline Helicopter at Loading Ramp.** Position helicopter tail landing gear wheel at center of forward ramp base.

d. **Connect Cargo Aircraft Winch Cable.** Connect cargo aircraft winch cable to tail wheel winching yoke (fig. 2–16). Have loadmaster operate winch and take up all cable slack.

CAUTION

Ensure that winch cable does not contact rotor blades that have been placed under helicopters.

e. **Position Approach Shoring.** Normally the only approach shoring required when loading helicopter tail first will be two 12 x 228 inch strips of 1/2–inch plywood to protect stowed roller conveyors in cargo aircraft ramp extension.

f. **Winch Helicopter.** Winch helicopter up cargo ramp. Stop helicopter when tail wheel reaches FS 670.

g. **Apply Brakes.** Apply helicopter brakes and attach safety chains.

h. **Position Shoring.** Position a single stack of step up shoring on cargo compartment floor with forward end at FS 680 (fig. 2–13). The stack will consist of:

(1) One piece of 2 x 12 x 120 inch lumber.

(2) One piece of 2 x 12 x 96 inch lumber.

(3) One piece of 2 x 12 x 72 inch lumber.

NOTE

Secure tail wheel shoring to cargo floor using CGU–1/B cargo straps.

i. **Remove Chains.** Remove safety chains and release helicopter brakes.

j. **Winch Helicopter.** Winch the helicopter onto step up shoring and into cargo compartment until main wheels are past ramp.

k. **Apply Brakes.** Apply helicopter brakes and install safety chains.

l. **Attach Adapter Cables.** Attach hooks on winching adapter cables (item 7, table 2–1) to helicopter main landing gear jack point eyes (fig. 2–15).

m. **Rerig Cables.** Disconnect aircraft winch cable from tail wheel winching yoke and pass under helicopter. Connect cable to winching adapter cables.

n. **Remove Slack.** Take up cable slack.

o. **Remove Chains.** Remove safety chains and release brakes.

p. **Winch Helicopter.** Winch helicopter into cargo compartment with left gear on BL 0 and tail between helicopters number one and number two. Guide helicopter into position using steering bar.

NOTE

The tail rotor gearbox of helicopter number three will be positioned over left engine cowling of helicopter number two.

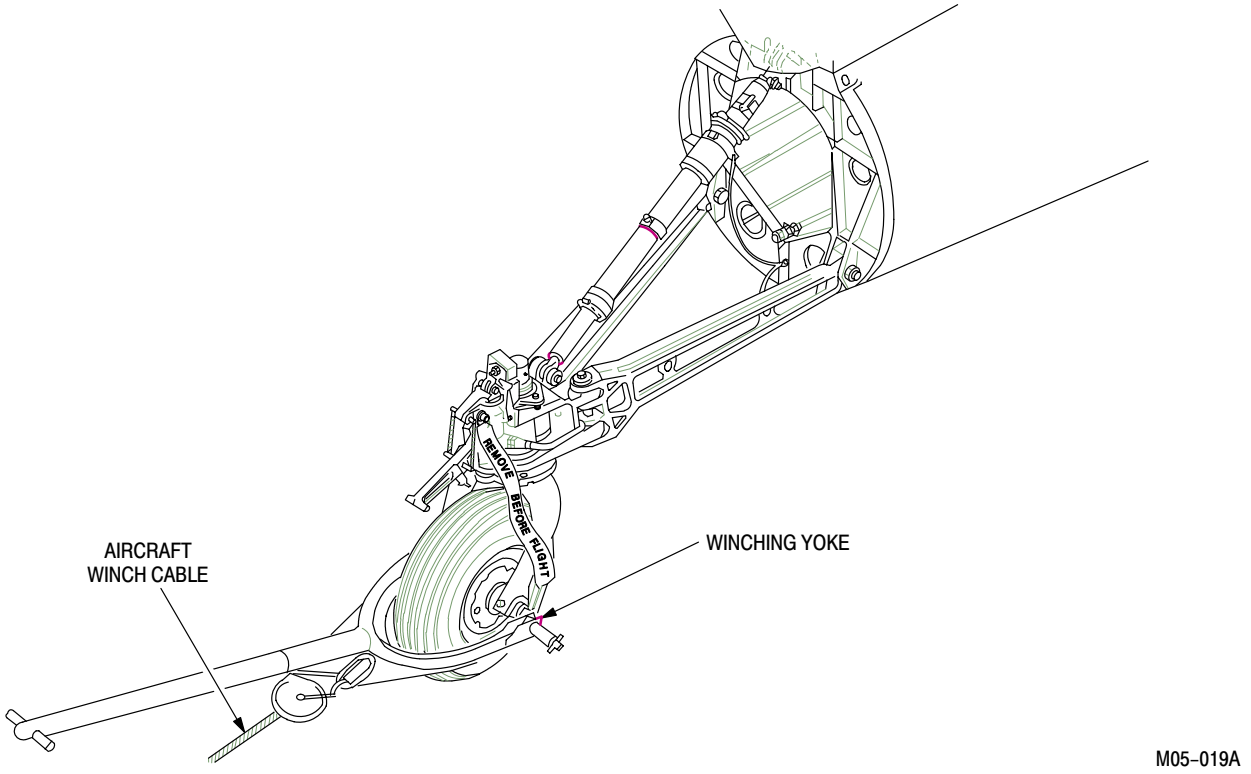


Figure 2–16. Helicopter Aft Towing Winch Connection

q. **Stop Winching.** Stop helicopter when axle of main landing gear reaches FS 1380.

r. **Apply Brakes.** Apply helicopter brakes, place chocks, and install safety chains.

s. **Lock Tail Wheel.** Paragraph 2–14.6u.

t. **Remove Tail Wheel Steering Bar and Winching Yoke.** Paragraph 2–14.6v.

u. **Disconnect Cables.** Disconnect winching cable from winching cable adapters and winching cable adapters from helicopter.

v. **Release Brakes.** Instruct brakeman to release brakes and dismount helicopter.

NOTE

Do not restrain helicopter for flight at this time.

2–14.13 Load Four Main Rotor Blades. Position two main rotor blade rack sets holding two blades each (fig. 2–2) on cargo floor under helicopter number three fuselage (fig. FO–1).

2–14.14 Load Two Horizontal Stabilators. Position two stabilators on cargo floor at front of helicopter number three (fig. FO–1).

2–14.15 Load Helicopter Number Four Nose First. Load helicopter number four nose first using same loading procedures used for helicopter number one (para 2–14.6) with following exceptions:

a. **Position Helicopter.** Position helicopter to left side of cargo compartment. Ensure that left main landing gear tire is positioned down BL 16L (fig. FO–1).

CAUTION

- **Ensure that winch cable does not contact previously loaded helicopter components.**
- **When winching helicopter number four into position, extreme care must be taken to prevent windshield from contacting tail rotor blades of helicopter number two.**

b. **Stop Winching.** Stop winching helicopter when main landing gear tires reach FS 1240 (fig. FO–1).

c. **Move Helicopter.** Manually move helicopter aft until main gear reaches FS 1265.

2–14.16 Load Four Main Rotor Blades. Position two main rotor blade rack sets holding two blades each (fig. 2–2), on cargo floor under number four helicopter fuselage (fig. FO–1).

2–14.17 Load Helicopter Number Five Nose First. Load helicopter number five nose first using same loading procedures used for helicopter number one (para 2–14.6) with following exceptions:

a. **Load Helicopter.** Load helicopter number five up right side of forward cargo ramp (fig. FO–1).

b. **Stop Winching.** Stop winching helicopter when main landing gear tires reach FS 1055.

CAUTION

When positioning helicopter number five, extreme care must be taken to prevent target acquisition designation system (TADS) from contacting TADS of helicopter number three.

c. **Manually Position.** Manually move helicopter aft until main gear reaches FS 1080.

2–14.18 Load Four Main Rotor Blades. Position two main rotor blade rack sets holding two blades each (fig. 2–2), on cargo floor under helicopter number five fuselage (fig. FO–1).

2–14.19 Load Helicopter Number Six Tail First. Load helicopter number six tail first using same loading procedures used for helicopter number three (paragraph 2–14.12) with following exceptions:

a. **Load Helicopter.** Load helicopter number six up center of forward cargo ramp (fig. FO–1).

b. **Winch Helicopter.** Winch tail of helicopter between helicopters number four and number five.

c. **Stop Winching.** Stop winching helicopter when main landing gear tires reach FS 620.

d. **Manually Position.** Manually move helicopter aft until main gear reaches FS 670.

2–14.20 Load Four Main Rotor Blades. Position two main rotor blade rack sets holding two blades each (fig. 2–2), on cargo floor, under helicopter number six (fig. FO–1).

2–14.21 Load Eight Hellfire Launchers. Position four packed Hellfire launcher containers on left side of cargo floor, left of helicopter number six. Place remaining four containers on top of first four (fig. FO–1).

2–14.22 Load Two Horizontal Stabilators. Position one stabilator on cargo floor, to right of the tail of helicopter number five and one under nose of helicopter number six (fig. FO–1).

2–14.23 Load Shoring. Position shoring on right side of cargo aircraft floor, beside helicopter number six (fig. FO–1).

2–14.24 Load Ground Support Equipment. Position boxed ground support equipment right side of forward cargo ramp (fig. FO–1).

2–14.25 Load Rocket Launchers. Position twelve boxed rocket launchers on left side of forward cargo ramp. (fig. FO–1).

2–14.26 Tie Down Helicopters Number One Thru Number Six.

CAUTION

Tiedown restraints will be tensioned only enough to remove all free play. Over tightened tiedowns will damage helicopter structure.

a. **Tie Down Twelve Forward Fuselage Fittings.** Install three 25,000–pound tiedown chains at each forward fuselage fitting (two fittings per helicopter) (fig. 2–17).

CAUTION

To prevent structural damage to helicopters, tiedown chains shall pass through FS 450 jack pad fitting.

b. **Tie Down Six Fuselage Tailboom Fittings.** Remove quick–release pin holding each FS 450 jack pad wire deflector. Secure wire deflector in open position. Install two 10,000–pound tiedown chains at each FS 450 jack pad tiedown fitting. Pass chains through fittings (one fitting per helicopter) (fig. 2–17).

c. **Remove Wheel Chocks.** Remove all chocks and secure to cargo floor.

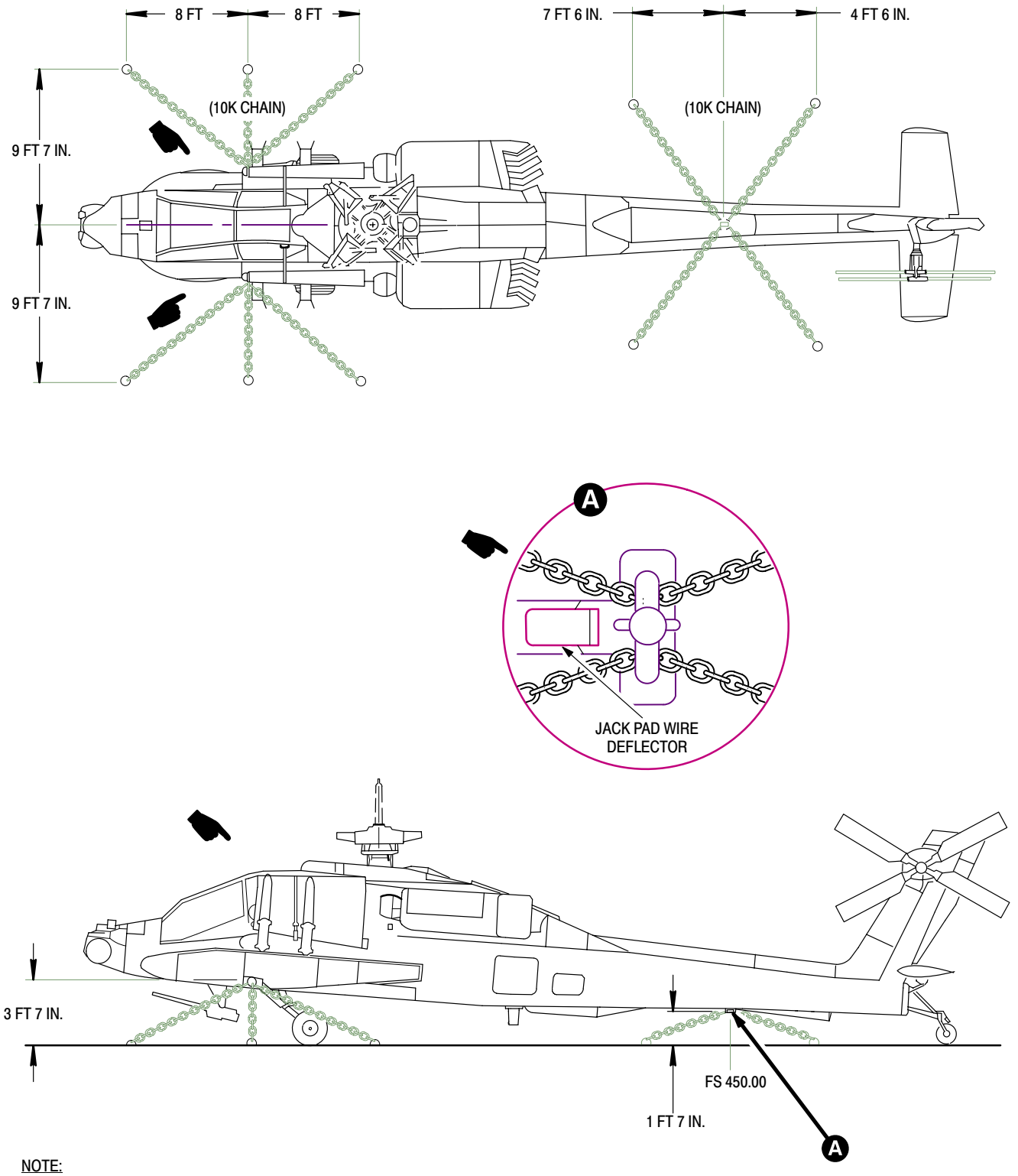
2–14.27 Tiedown Twenty–Four Main Rotor Blades.

CAUTION

To prevent damage to rotor blade deice connectors, ensure that cargo straps do not contact fittings.

Tiedown each main rotor blade rack set using four tiedown straps as shown in figure 2–18.

2–14.28 Tiedown Loose Helicopter Components and Ground Support Equipment. Install 5000–pound tiedown straps on floor-loaded components and ground support equipment (fig. FO–1).



NOTE:

- HELICOPTER TIEDOWN CHAIN STRENGTH INDICATED IN 1000–POUND (K) UNITS
- TIEDOWN DIAGRAM IS TYPICAL FOR ALL LOADING CONFIGURATIONS

M05–029E

Figure 2–17. Tiedown Diagram

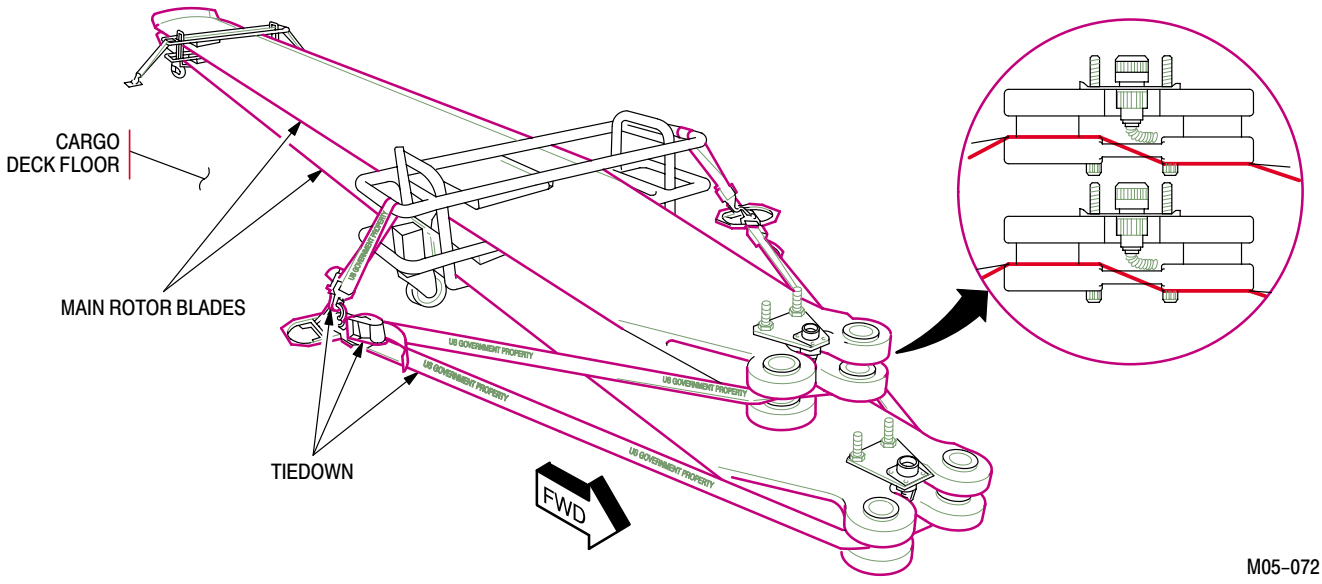


Figure 2–18. Tiedown of Main Rotor Blades

2–15 HELICOPTER OFFLOADING (C–5 AIRCRAFT, FRONT DOOR).

WARNING

To prevent injury to personnel and damage to helicopter and cargo aircraft all helicopters will remain restrained by chains until winch cable is attached for unloading.

Helicopter and components off loading from C–5 will be conducted in accordance with procedures outlined in paragraph 2–15.1 through 2–15.24 (fig. FO–1).

2–15.1 Remove Tiedowns from Helicopter Components and Ground Support Equipment. Unfasten and remove tiedown straps from ramp and cargo floor locations securing components and ground support equipment.

2–15.2 Unload Rocket Launchers. Remove twelve boxed rocket launchers from left side of forward cargo ramp.

2–15.3 Unload Ground Support Equipment. Remove boxed ground support equipment from left side of forward ramp.

2–15.4 Unload Shoring. Remove shoring from right side of cargo aircraft floor beside helicopter number six.

2–15.5 Stow C–5 Crew Stair–Ladder. Retract crew ladder, and stop in up position (loadmaster only).

2–15.6 Unload Two Horizontal Stabilators. Remove one stabilator from cargo floor, to right of tail of helicopter number five and one from under nose of helicopter number six.

2–15.7 Unload Four Main Rotor Blades. Remove two main rotor blade rack sets from cargo floor, under helicopter helicopter six.

2–15.8 Unload Eight Hellfire Launchers. Remove eight packed launchers containers from left side of cargo floor, beside helicopter number six.

2–15.9 Configure C–5 Loading Ramp. Para–graph 2–14.1c.

2–15.10 Unload Helicopter Number Six. Figure FO–1.

WARNING

- **To prevent injury to personnel and damage to helicopter and cargo aircraft from helicopter rolling free, chocks shall be in place and cargo winch cable attached, with slack removed, prior to removing tiedown chains.**
- **To prevent injury to personnel or damage to helicopter and cargo aircraft in the event of winch failure, the helicopter CPG station will be occupied by a qualified person to operate brakes.**

CAUTION

- **Ensure that cargo aircraft winch cable does not damage equipment loaded on cargo aircraft floor.**
- **To prevent damage to helicopter and cargo aircraft, use shoring as necessary under helicopter main and tail wheels to provide clearance between helicopter underbelly and ramp hinge.**

a. **Unlock Tail Wheel Swivel.** Paragraph 2–14.6a.

b. **Install Tail Wheel Steering Bar and Winching Yoke.** Paragraph 2–14.6b.

c. **Position Shoring.**

(1) Place step up shoring in cargo aircraft (para 2–14.12h).

(2) Place approach shoring (para 2–14.12e).

d. **Connect Winch.**

WARNING

Helicopters shall be restrained with winch during offloading. An unrestrained helicopter may shift suddenly or roll free, causing personnel injury or equipment damage.

Connect cargo aircraft winch cable to helicopter (para. 2–14.12d).

e. **Assign Personnel.** Assign loading team members to: monitor ramp crest, monitor overhead and sidewall clearances, operate tail wheel steering bar and operate helicopter brakes.

f. **Remove Tiedowns.**

(1) Unfasten and remove two chains from each FS 450 tiedown fitting (fig. 2–17). Close FS 450 jack pad wire deflector and secure with quick release pin.

(2) Unfasten and remove three tiedown chains from each of two forward fuselage tiedown fittings (fig. 2–17).

g. **Unload Helicopter.** Remove chocks and release helicopter brakes. Have loadmaster slowly reel–out cargo aircraft winch, shore main wheels on ramp for underbelly hinge clearance, and carefully guide helicopter down loading ramp until tail wheel is on ground.

h. **Disconnect Winch Cable.** Disconnect winch cable from tail wheel winching yoke.

i. **Remove Tail Wheel Steering Bar and Winching Yoke.** Paragraph 2–14.6v.

2–15.11 Unload Four Main Rotor Blades. Remove two main rotor blade rack sets from under helicopter number five (fig. FO–1).

2–15.12 Unload Helicopter Number Five.

WARNING

- **To prevent injury to personnel or damage to helicopter and cargo aircraft in the event of winch failure, the helicopter CPG station will be occupied by a qualified person to operate brakes.**
- **To prevent injury to personnel and damage to helicopter and cargo aircraft from helicopter rolling free, chocks shall be in place and cargo winch cable attached, with slack removed, prior to removing tiedown chains.**

CAUTION

- **Ensure that cargo aircraft winch cable does not damage equipment loaded on cargo aircraft floor.**
- **To prevent damage to helicopter and cargo aircraft, use shoring as necessary under helicopter main and tail wheels to provide clearance between helicopter underbelly and ramp hinge.**

a. **Unlock Tail Wheel Swivel.** Paragraph 2–14.6a.

b. **Install Tail Wheel Steering Bar In Winching Yoke.** Paragraph 2–14.6b.

c. **Position Shoring.** Place approach shoring on cargo ramp (para. 2–14.6c).

d. **Connect Winch.**

WARNING

Helicopters shall be restrained with winch during offloading. An unrestrained helicopter may shift suddenly or roll free, causing injury to personnel or equipment damage.

Connect cargo aircraft winch cable to helicopter (para. 2–14.6e).

e. **Assign Personnel.** Assign loading team members to: monitor ramp crest and overhead and sidewall clearances, operate tail wheel steering bar and operate helicopter brakes.

f. **Remove Tiedowns.**

(1) Unfasten and remove two chains from each FS 450 tiedown fitting (fig. 2–17). Close FS 450 jack pad wire deflector and secure with quick–release pin.

(2) Unfasten and remove three tiedown chains from each of two forward fuselage tiedown fittings (fig. 2–17).

g. **Unload Helicopter.** Remove restraint chains and release helicopter brakes. have loadmaster slowly reel–out cargo aircraft winch, shore tail wheel on ramp for underbelly hinge clearance, and carefully guide helicopter down loading ramp until main wheels are on ground.

h. **Disconnect Winch.** Disconnect cargo aircraft winch from helicopter (para. 2–14.6.o).

i. **Remove Tail Wheel Steering Bar and Winching Yoke.** Paragraph 2–14.6v.

2–15.13 Unload Two Horizontal Stabilators. Remove two stabilators from cargo floor forward of helicopter number three.

2–15.14 Unload Four Main Rotor Blades. Remove two main rotor blade rack sets from under helicopter number four fuselage.

2–15.15 Unload Helicopter Number Four. Remove helicopter number four using same procedures used for helicopter number five (para 2–15.12).

2–15.16 Unload Six Tail Rotor Blades. Remove tail rotor blade supports from left side of cargo floor, outboard of helicopter number two.

2–15.17 Unload Four Main Rotor Blades. Remove two main rotor blade rack sets from cargo floor, under helicopter number three fuselage.

2–15.18 Unload Helicopter Number Three. Remove helicopter number three using same procedures used for helicopter number six (para 2–15.10).

2–15.19 Unload Four Main Rotor Blades. Remove two main rotor blade rack sets from cargo floor, under helicopter number two fuselage.

2–15.20 Unload Helicopter Number Two. Remove helicopter number two using same procedures used for helicopter number five (para 2–15.12).

2–15.21 Unload Two Horizontal Stabilators. Remove one stabilator from under nose of helicopter number one and one from left side of aft cargo floor.

2–15.22 Unload Four Hellfire Launchers. Remove Hellfire launchers from left side cargo ramp at rear of aircraft.

2–15.23 Unload Four Main Rotor Blades. Remove two main rotor blade rack sets from cargo floor, under helicopter number one.

2–15.24 Unload Helicopter Number One. Remove helicopter number one using same procedures used for helicopter number five (para 2–15.12).

2–16 HELICOPTER PREPARATION FOR USE AFTER C–5 SHIPMENT.

Preparation of **AH–64A** helicopter for use after C–5 cargo aircraft shipment will be performed in accordance with instructions outlined in paragraph 2–16.1 through 2–16.21. All assembly will be in accordance with referenced TM's.

2–16.1 Preliminary Safety Procedures. Before starting operations, perform safety procedures outlined in paragraph 2–16.2 and 2–16.3.

2–16.2 Ground Helicopters.
TM 1-1520-238-23.

2–16.3 Perform Helicopter Safety Check.
TM 1-1520-238-23.

2–16.4 Unpacking and Depreservation.

a. **Preservation/Depreservation Checksheet.** Record all depreservation and assembly on preservation/depreservation checksheet initiated during helicopter preparation.

b. **Unpack Shipping Containers.** Remove all shipped (disassembled), boxed or crated helicopter components from shipping containers, crates and cartons.

c. **Unload Fuselage Package.** Remove all disassembled parts, equipment, and records stowed within helicopter (fuselage package items).

d. **Remove Wrapping Material.** Remove all tape, twine, plastic wrap, barrier and cushioning materials from shipped items and helicopter airframe.

NOTE

Coated mounting surfaces, bolt holes and hardware of stowed wings may be inaccessible for cleaning. These areas will be cleaned after wings are unstowed.

e. **Check Manifest.** Check–off each shipped item against manifest.

f. **Remove Shipping Seals and Caps.** Remove component shipping seals, covers and caps.

g. **Deprocess Treated Items.** Deprocess all insecticide and rodenticide–treated items (refer to Appendix F).

h. **Depreserve Coated Areas.** Clean all preservative material from coated areas. Remove all tape residue. Refer to TM 1-1520-238-23 for applicable cleaning procedures.

2–16.5 Remove Fly Away Covers.
TM 1-1520-238-23.

2–16.6 Install Wings.

a. **Remove Four Stowing Tiedown Straps.** Unsnap both ends of left wing inboard (upper) and left and right wing outboard (lower) tiedown straps, and remove three straps. Unbolt top end of right wing inboard (upper) tiedown strap, unsnap bottom end of strap, remove strap, and reinstall fuselage tiedown bolt (fig. 2–9).

b. **Remove Stowing Kit Trailing Edge Supports.** Lift left and right wing trailing edge supports from wing trailing edges.

WARNING

To prevent personnel injury and equipment damage, four persons must lift and carry wing during removal. If injury occurs seek medical aid.

c. **Remove Left and Right Wings from Stowed Positions.**

CAUTION

- **Pitot tube can be seriously damaged if it contacts landing gear pivot fitting or other solid surface. Use extreme care to clear pivot tube when removing wing from fuselage side.**
- **To prevent damage to helicopter, support wing during removal from stop position.**

Remove two mounting bolts and washers from each wing root bracket at fuselage. Then lift each wing from its cradle. Conduct depreservation of coated surfaces (para 2–16.4h). Retain wing mounting hardware.

d. **(Extended–Range Capable Helicopters Only) Remove Wing Trailing Edges.** TM 1-1520-238-23.

e. **Remove Stowing Kit Wing Cradles.** Release three turnlock studs from each wing cradle.

f. **Remove Stowing Kit Wing Root Brackets.** Remove two captive bracket bolts from wing mounts bosses and remove each wing root bracket from wing.

g. **Remove Stowed Wing Mounting Hardware.** Remove and retain two aft mounting bolts and washers from stowed positions on each side of fuselage.

h. **Mount Wings on Helicopter.** TM 1-1520-238-23 .

i. **(Extended–Range Capable Helicopters Only) Connect Wing Air Lines (fig. 2–9).** Remove dust cap from each fuselage side air fitting. Then connect each wing air line quick–disconnect fitting to mating fuselage air fitting. Stow dust caps on air line clamp fittings.

j. **(Extended–Range Capable Helicopters Only) Connect Wing Fuel Lines (fig. 2–9).** Remove dust cap from each fuselage side fuel fitting. Connect each wing fuel line quick–disconnect fitting to mating fuselage fuel fitting. Stow dust caps on fuel line clamp fittings.

k. **(Extended–Range Capable Helicopters Only) Install Wing Trailing Edges.** TM 1-1520-238-23..

2–16.7 Install Steps. Obtain left side steps from catwalk area and install steps at FS 162/WL 148 and FS 162/WL 168 (TM 1-1520-238-23).

2–16.8 Remove Forward Fuselage Tiedown Fittings.

a. **Remove Tiedown Fittings.** Remove one (unpinned) nut and washer from left and right end stud in each main landing gear cross tube, then pull studs (with pinned nuts in place) from cross tube. Slide tiedown fittings from cross tube ends (fig. 2–5).

b. **Install Landing Gear Cross Tube End Caps.** Obtain end caps from floor of pilot station. Slide end caps into left and right ends of each main landing gear cross tube. Aline holes in caps and cross tube, and install removed studs, washers, and nuts. Torque nut to **60 – 70 Inch– Pounds**. Install new cotter pins (D–20) at unpinned nuts.

2–16.9 Install Two Tail Rotor Blades.

a. **Identify Blades.**

b. **Unstrap Blades.** Unstrap two tail rotor blades from each blade support (fig. 2–7).

c. **Install Tail Rotor Blades.** Install two upper tail rotor blades on helicopters number one and five and two lower tail rotor blades on helicopter number three (TM 1-1520-238-23). Use new PLI washer assemblies (D–21).

2–16.10 Install Horizontal Stabilators.

a. **Remove Stabilator Actuator Support.** Remove nut, bolts, and washers from support end fitting and actuator rod end, and remove actuator support from stabilator airframe pivots. Retain rod end hardware (fig. 2–6).

b. **Install Horizontal Stabilator.** TM 1-1520-238-23 . Use new cotter pin (D–16) for nut on stabilator pivot bolt and one cotter pin (D–19) for nut on stabilator actuator rod end bolt.

2–16.11 Install Main Rotor Blades.

a. **Unclamp Blades.** Unclamp and remove two blades from each rack set (fig. 2–2).

b. **Install Blades.** TM 1-1520-238-23

2–16.12 Install Main Rotor Deice Power Distributor and Air Data System (ADS) Mast (fig. 2–3).

a. **Remove Main Transmission Right Side Access Panel (R200).** Release 12 camlock fasteners.

CAUTION

Polarized internal 8–gage deicing leads are tagged to indicate proper reconnection. Improperly connected leads will cause electrical malfunction or equipment damage.

b. **Install Power Distributor and ADS Mast.** TM 1-1520-238-23. Obtain power distributor and ADS mast from pilot station seat.

c. **Install Main Transmission Right Side Access Panel.** Secure 12 camloc fasteners at panel (R200).

2–16.13 Install Removed Fairings and Access Panels (fig. 2–4). Obtain fairings and access panels from catwalk area.

a. **Install Wing Access Covers.** Install 16 screws at each cover (LW9 and RW9).

b. **Install Wing Fairings.** Install nine screws at each fairing (LW10, RW10, LW11, and RW11).

c. **Install Forward Ammunition Feed Fairings.** Secure 10 camloc fasteners at each fairing (L140 and R140).

d. **Install Tailboom Aft Closeout Fairings.** Install 21 screws to secure fairings (L545 and R545).

2–16.14 Install ADF Wire Antenna and UHF L–Band, Communications, and Transponder Blade Antennas. Install FM–AM Whip Antenna (MWO 1–1520–238–50–37 installed) and Lower IFF Antenna (MWO 1–1520–238–50–36 installed) (fig. 2–8). Obtain ADF wire antenna from handle on aft storage bay (R330). Obtain blade antennas from pilot station.

a. **Install FM–AM Whip Antenna.** Attach lower half of antenna to upper half. Torque antenna upper jam nut to **265 INCH–POUNDS** and lockwire (D–27). Install antenna in vertical stabilizer mounting bracket. Torque antenna lower jam nut to **650 INCH–POUNDS** and lockwire (D–27).

b. **Install ADF Wire Antenna** Hook ends of antenna onto standoff terminal spring ends.

c. **Install Blade Antennas.** Connect each antenna plug to mating receptacle under antenna flange. Aline antenna flanges on fuselage and install six screws at each location. Seal antenna flanges with sealant (D–12) applied between edges of reinstalled antenna flanges and mating fuselage skin.

d. **Install Lower IFF Antenna.** Attach connector plug to antenna. Aline antenna to mounting bracket and install four screws.

2–16.15 Install Main Landing Gear Wire Cutters. TM 1-1520-238-23 Obtain wire cutters from floor of pilot station.

2–16.16 Install 30MM Gun Wire Deflector. TM 1-1520-238-23 Obtain wire deflector from catwalk area.

2–16.17 Connect Helicopter Battery. TM 1-1520-238-23.

2–16.18 Perform Pitot Static Test MOC. TM 1-1500-204-23

2–16.19 Inspect Helicopter. Perform 10 hour/14 day inspection (TM 1-1520-238-PMS).

2–16.20 Perform Maintenance Test Flight. TM 1-1520-238-MTF**.**

2–16.21 Refuel Helicopter. TM 1-1520-238-23.

2–16.22 Perform Pylon Boresight Check. TM 9-1230-476-20-1.

2–16.23 Install 2.75 Inch Rocket Launchers. TM 9-1055-460-13&P.

2–16.24 Install Hellfire Launchers. TM 9-1427-475-20.

2–16.25 Activate Armament As Required. TM 9-1090-208-23-1 and TM 9-1427-475-20.

Section III. SHIPMENT BY C–5 CARGO AIRCRAFT, REAR DOOR LOADING AND UNLOADING

NOTE

Rear door loading and unloading is to be used only when front door loading/unloading is not practical.

2–17 REQUIRED HELICOPTER PRELOADING CONDITION.

See figure 2–1 for AH–64A helicopter preloading condition required for shipment on C–5 cargo aircraft.

2–17.1 Equipment Requirements. Refer to table 2–1 for equipment items required for preparation and shipment of AH–64A helicopters on C–5 cargo aircraft. Items of equipment indicated by note 2 are Table of Organization and Equipment (TOE) items and are normally available within the unit. Items identified by notes 1 and 3 normally must be requisitioned for helicopter shipment.

2–17.2 Preliminary Safety Procedures. Before starting operations, perform safety procedures outlined in paragraph 2–10.2.

2–17.3 Corrosion Control. Paragraph 2–10.6 and 2–10.7.

2–17.4 Service Power Train. Paragraph 2–10.8 and 2–10.9.

2–17.5 Adjust Fuel Levels. Paragraph 2–10.10.

2–17.6 Disconnect Battery. Paragraph 2–10.11.

2–17.7 Service Main Landing Gear. Paragraph 2–10.12.

2–18 HELICOPTER DISASSEMBLY FOR C5 SHIPMENT, REAR DOOR LOADING.

Perform disassembly in accordance with procedures outlined in paragraph 2–18.1 through 2–18.17.

2–18.1 Remove Hellfire Launchers. Paragraph 2–11.1.

2–18.2 Remove 2.75 Inch Rocket Launchers. Paragraph 2–11.2.

2–18.3 Remove Main Rotor Blades. Paragraph 2–11.3.

2–18.4 Position Drive Train. Paragraph 2–11.4.

2–18.5 Remove Main Rotor Deice Power Distributor and Air Data System (ADS) Mast. Paragraph 2–11.5.

2–18.6 Number Helicopters.

NOTE

- Helicopters must be configured differently within each load depending on whether they are to be loaded nose first or tail first.
- This numbering sequence will be maintained throughout this section.

Number helicopters one thru six in sequence they are to be loaded through rear door of a C–5 (FO–1). Helicopter number six will be loaded first, followed by helicopter number five. Helicopter number one will be loaded last.

2–18.7 Remove Fairings and Access Covers. Remove fairings and access covers in accordance with paragraph 2–11.6. Also remove L175 fairing cover and step (fig. 2–1) from helicopters number three and six. Cushion, stow, and secure L175 fairing and step in catwalk area.

2–18.8 Remove Steps. Paragraph 2–11.7.

2–18.9 Install Forward Fuselage Tiedown Fittings. Paragraph 2–11.8.

2–18.10 Remove Main Landing Gear Wire Cutters. Paragraph 2–11.10.

2–18.11 Remove Horizontal Stabilator. Paragraph 2–11.11.

2–18.11.1 Remove Turret Fairing (Helicopters Number Three and Six Only). Release four fasteners. Wrap turret fairing with cushioning material (D–5). Secure wrapped fairing with tape (D–13) and stow in catwalk area.

2–18.12 Remove 30MM Gun and Turret (Helicopters Number Three and Six Only). TM 9-1090-208-23-1. Do not remove wire deflector from turret.

NOTE

- Removal of gun and turret is required to permit loading and unloading clearance.
- Helicopters number three and six will require kneeling during loading and unloading.

Set gun and turret aside for reinstallation on helicopter after C–5 loading. Secure feed chute to helicopter with lockwire (D–23).

2–18.13 Remove 30MM Gun Wire Deflector (Helicopters Number One, Two, Four, and Five Only). Paragraph 2–11.9.

2–18.14 Remove Two Tail Rotor Blades. (Helicopters Number One, Three, and Five Only). Paragraph 2–11.13.

2–18.15 Remove ADF Wire Antenna and UHF L–Band, Communications, and Transponder Blade Antennas. Remove FM–AM Whip Antenna (MWO 1-1520-238-50-37 installed) and Lower IFF Antenna (MWO 1-1520-238-50-36 installed) Paragraph 2–11.14.

2–18.16 Remove and Stow Wings. Paragraph 2–11.15.

2–18.17 Install Fly Away Covers. TM 1-1520-238-23.

2–19 TRANSPORTED GROUND SUPPORT EQUIPMENT.

Paragraph 2–12.

2–20 MARKING.

Paragraph 2–13.

2–21 HELICOPTER LOADING AND TIEDOWN (C–5 AIRCRAFT SHIPMENT – REAR DOOR LOADING).

Paragraphs 2–21.1 thru 2–21.32 provide procedures for the loading and tie down of six **AH–64A** helicopters loaded through the rear door of a C–5 cargo aircraft. The loaded configuration of the C–5 aircraft is shown in figure FO–1.

2–21.1 Air Force Responsibilities During Loading. Paragraph 2–1 and 2–14.1. Also the Air Force loadmaster shall direct kneeling and erecting operations during loading.

2–21.2 Army Unit Responsibilities During Loading. Paragraph 2–2 and 2–14.2. Also the Army Unit shall connect, test, and operate hydraulic kneeling cart.

2–21.3 Shoring. Paragraph 2–14.3.

2–21.4 Verify Preliminary Safety Procedures.

WARNING

To prevent fire or explosion, verify that armament, canopy jettison, fuel and electrical systems are safetied on each helicopter prior to loading.

Paragraph 2–10.2.

2–21.5 Load Rocket Launchers. Position twelve boxed rocket launchers on left side of forward cargo ramp (fig. FO–1).

2–21.6 Load Ground Support Equipment. Position boxed ground support equipment on right side of forward cargo ramp (fig. FO–1).

2–21.7 Load Helicopter Number Six Nose First. Figure FO–1.

WARNING

- **To prevent injury to personnel and damage to helicopter and cargo aircraft from helicopter rolling free, the helicopter will be restrained with chains and wheel chocks prior to releasing tension on winch cable.**
- **To prevent injury to personnel and damage to helicopter and cargo aircraft in the event of winch failure, the helicopter CPG station will be occupied by a qualified person to operate brakes.**

CAUTION

- **To prevent damage to helicopter and cargo aircraft, use shoring as necessary under helicopter main and tail wheels to provide clearance between helicopter underbelly and cargo aircraft ramp hinge.**
- **To prevent damage to helicopter and cargo aircraft, ensure that rotor head and tail rotor are properly positioned prior to approaching cargo aircraft.**
- **To prevent damage to helicopter and cargo aircraft, chocks shall be used to prevent the helicopter from moving past the stated cargo aircraft fuselage station.**
- **Ensure that C–5 crew stair ladder is fully extended prior to loading helicopter.**

a. **Unlock Tail Wheel Swivel.** Paragraph 2–14.6a.

b. **Install Tail Wheel Steering Bar and Winching Yoke.** Paragraph 2–14.6b.

NOTE

Tail wheel steering bar will be used to steer helicopter and to keep main and tail wheels on loading ramps.

c. **Connect and Checkout Hydraulic Cart.**

WARNING

- **Prior to operating hydraulic cart, personnel must be thoroughly familiar with operation and safety procedures contained in paragraphs 8–10, 8–11, 8–12, and 8–13.**
- **Personnel must remain clear of helicopter during kneeling and erecting operations to prevent injury to personnel in event of main landing gear strut collapse and helicopter roll over.**

Connect hydraulic cart to helicopter (paragraph 8–10).

d. **Position Approach Shoring.** Normally the only approach shoring required when loading helicopter nose first will be two 12 x 228 inch strips of 1/2–inch plywood to protect stowed roller conveyors in cargo aircraft ramp extension.

CAUTION

As helicopter approaches C–5, monitor clearance between tail rotor and C–5 pressure door to prevent damage.

e. **Position Helicopter.** Position helicopter at base of C–5 cargo ramp and align shoring.

f. **Connect Cargo Aircraft Winch Cable to Helicopter.** Paragraph 2–14.6e.

g. **Assign Army Loading Team Tasks.**

(1) Assign personnel to operate tail wheel steering.

(2) Assign personnel to monitor overhead, underbelly, and side wall clearance.

(3) Assign one person to operate helicopter brakes.

(4) Assign one person to move hydraulic kneeling cart into cargo aircraft and perform helicopter kneeling and erecting operations under direction of loadmaster.

CAUTION

- **Maintain clearance between helicopter rotor head and C–5 pressure door while winching helicopter up cargo ramp to prevent damage to helicopter and C–5**
- **Carefully monitor underbelly clearance when kneeling helicopter to prevent damage to helicopter and C–5.**
- **To prevent excessive stress on helicopter landing gear and C–5 cargo winch, do not apply helicopter brakes during kneeling or erecting operations.**

h. **Winch Helicopter Up Loading Ramp.** Begin winching helicopter up cargo aircraft ramp. Maintain clearance between helicopter rotor head and C–5 pressure door by kneeling helicopter (para. 8–13). Continue winching helicopter until main wheels reach FS 2080.

i. **Install Safety Chains.** Apply helicopter brakes and install safety chains.

j. **Place Tail Wheel Shoring.** Place a single stack of step up shoring for tail wheel consisting of following (fig. 2–19):

(1) Three pieces of 2 x 12 x 24 inch lumber.

(2) One piece of 12 x 12 x 3/4–inch plywood.

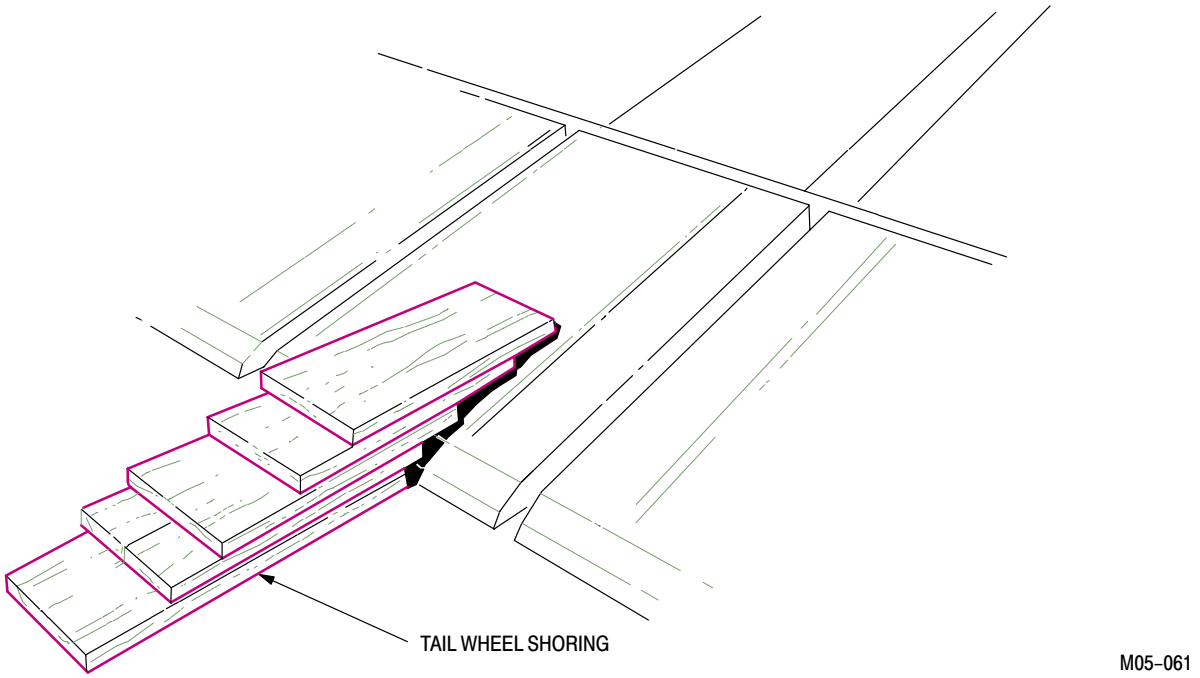


Figure 2–19. Tail Wheel Approach Shoring (Rear Door Loading)

k. **Remove Safety Chains.** Remove safety chains and release helicopter brakes.

l. **Continue Winching Helicopter.** Maintain overhead and underbelly clearance by kneeling and erecting helicopter as required (para 8–12 and 8–13). Raise helicopter to full up when main rotor head is forward of pressure door. Maintain underbelly clearance at ramp crest by using tail wheel shoring as necessary.

m. **Erect Helicopter.** After tail wheel is forward of ramp crest, place wheel chocks, erect helicopter, lock landing gear collar, and disconnect hydraulic cart (para 8–6h).

n. **Winch Helicopter.** Remove wheel chocks and continue winching helicopter into C–5. Stop winching helicopter when main landing gear tire reaches FS 580.

o. **Chock Helicopter.** Apply helicopter brakes and chock main landing gear tires.

p. **Disconnect Cable.** Disconnect winching cable and cable adapters from helicopter.

CAUTION

Ensure that C–5 crew station ladder is in down (extended) position prior to final positioning of helicopter.

NOTE

Final positioning of helicopter will be accomplished manually.

q. **Remove Chocks.** Remove chocks and release helicopter brakes.

r. **Position Helicopter.** Manually position helicopter as far forward as possible (fig. FO–1).

s. **Install Safety Chains.** Apply helicopter brakes, place chocks, and install safety chains.

t. **Lock Tail Wheel.** Paragraph 2–14.6u.

u. **Remove Tail Wheel Steering Bar and Winching Yoke.** Paragraph 2–14.6v.

v. **Release Brakes.** Instruct brakeman to release helicopter brakes and dismount helicopter.

NOTE

Do not restrain helicopter for flight at this time.

2–21.8 Temporarily Install 30MM Gun and Turret. Install removed 30MM gun and turret on helicopters number three and six with four mounting bolts for transport (gun and turret will be removed for off loading).

2–21.9 Load Four Main Rotor Blades. Position two main rotor blade rack sets holding two blades each (fig. 2–2), on cargo floor under helicopter number six fuselage (fig. FO–1).

2–21.10 Load Eight Hellfire Launchers. Position four packed Hellfire launcher containers on side of cargo floor left of helicopter number six. Place four additional containers on top of first four (fig. FO–1).

2–21.11 Load One Horizontal Stabilators. Position one stabilator on cargo floor under nose of helicopter number six (fig. FO–1).

2–21.12 Load Helicopter Number Five Tail First.

WARNING

- **To prevent injury to personnel and damage to helicopter and cargo aircraft in the event of winch failure, the helicopter CPG station will be occupied by a qualified person to operate brakes.**
- **To prevent injury to personnel and damage to helicopter and cargo aircraft from helicopter rolling free, the helicopter will be restrained with chains and wheel chocks prior to releasing tension on winch cable.**

CAUTION

- **To prevent damage to helicopter and cargo aircraft, ensure that rotor head and tail rotor are properly positioned prior to approaching cargo aircraft.**
- **To prevent damage to helicopter and cargo aircraft, chocks shall be used to prevent the helicopter from moving past the stated cargo aircraft fuselage station.**
- **To prevent damage to helicopter and cargo aircraft, use shoring as necessary under helicopter main and tail wheels to provide clearance between helicopter underbelly and cargo aircraft ramp hinge.**

a. **Unlock Tail Wheel Swivel.** Paragraph 2–14.6a.

b. **Install Tail Wheel Ste**Paragraph 2–14.6a.**ering Bar and Winching Yoke.** Paragraph 2–14.6b.

c **Position Shoring.** Place two stacks of approach shoring 70 inches apart (fig. 2–20). Each stack shall consist of following:

(1) Three pieces of 2 x 12 x 48 inch lumber.

(2) One piece of 12 x 12 x 3/4–inch plywood.

(3) One strip of 12 x 228 x 3/4–inch plywood to protect stowed roller conveyors on cargo aircraft ramp.

d. **Aline Helicopter at Shoring.** Position helicopter with main landing gear wheels alined with shoring.

e. **Connect Winch.** Paragraph 2–14.12d.

CAUTION

Ensure that winch cable does not contact components that have been already loaded on cargo aircraft.

f. **Assign Army Loading Team Tasks.** Paragraph 2–21.7g (1) thru (3).

g. **Winch Helicopter.** Winch helicopter up cargo loading ramp. Stop winching when tail wheel reaches FS 1860.

h. **Install Safety Chains.** Apply helicopter brakes and install safety chains.

i. **Position Tail Wheel Shoring.** Position a single stack of step up shoring on cargo compartment floor with aft end of shoring at FS 1850. Shoring will provide underbelly clearance for helicopter. The shoring stack will consist of (fig. 2–21):

(1) One piece of 2 x 12 x 120 inch lumber.

(2) One piece of 2 x 12 x 96 inch lumber.

(3) One piece of 2 x 12 x 72 inch lumber.

NOTE

Secure tail wheel shoring to cargo floor using CGU–1/B cargo straps.

j. **Remove Safety Chains.** Remove helicopter safety chains and release brakes.

k. **Winch Helicopter.** While carefully monitoring underbelly clearance, winch helicopter into cargo aircraft until main landing gear is past ramp crest.

l. **Install Safety Chains.** Apply helicopter brakes, place wheel chocks, and install safety chains.

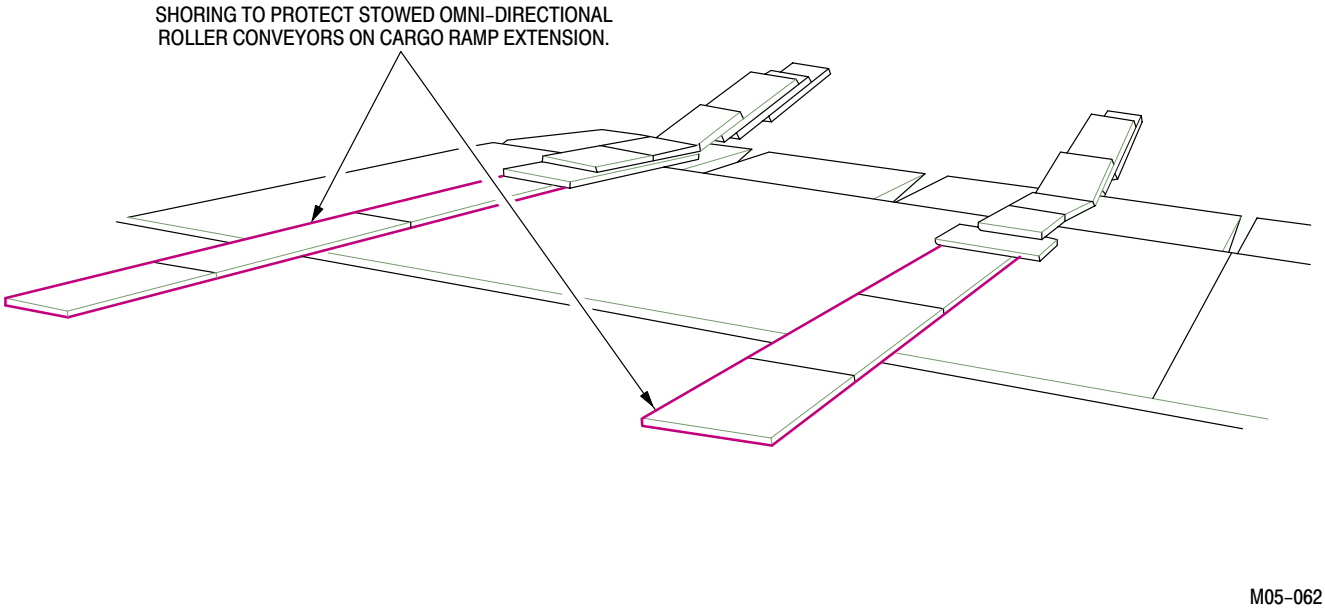


Figure 2–20. Main Gear Approach Shoring (Rear Door Loading)

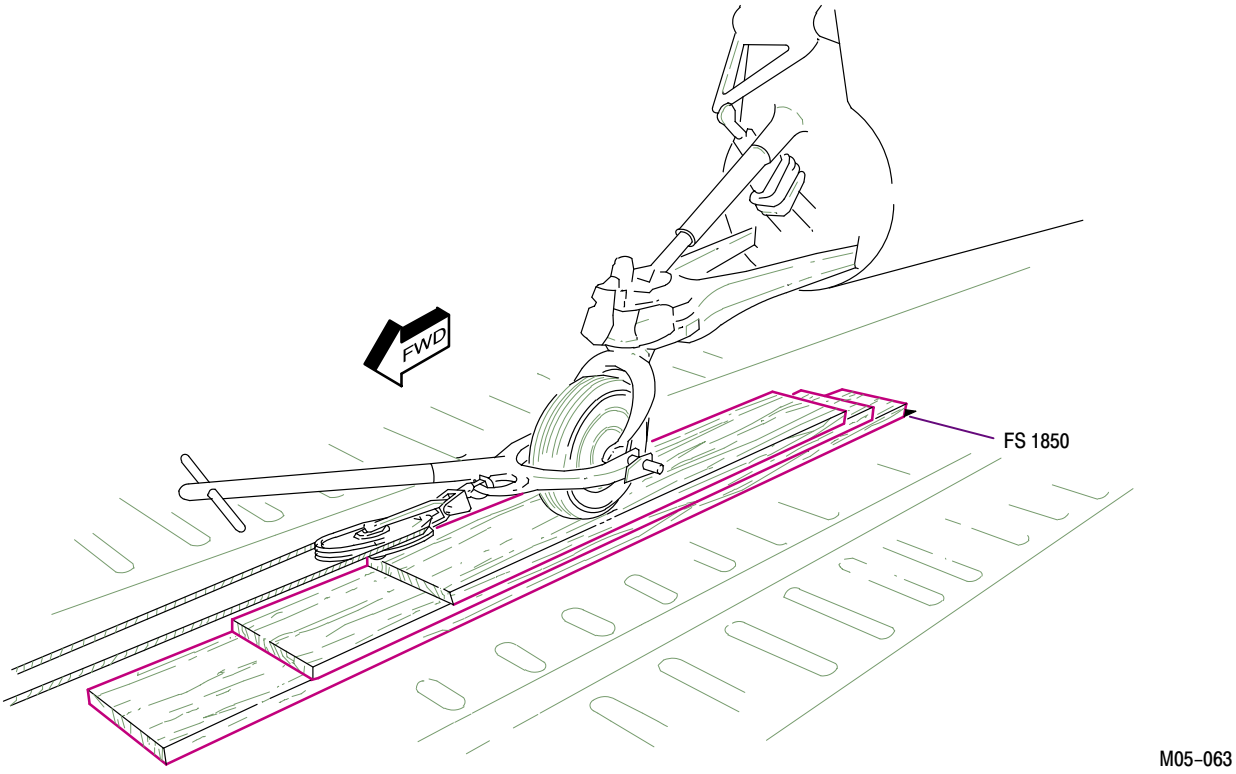


Figure 2–21. Cargo Compartment Step–Up Shoring for Tail Wheel (Rear Door Loading)

m. **Rerig Winching Cable.** Couple hooks on winching adapter cables (item 7, table 2–1) to helicopter main landing gear jack point eyes. Disconnect aircraft winch cable from towing yoke eye and pass under helicopter. Connect winch cable to winching adapter cables. Take up cable slack.

n. **Remove Safety Chains.** Remove safety chains. chocks and helicopter brakes.

o. **Winch Helicopter.** Winch helicopter into cargo aircraft along right side with tail positioned to right of helicopter number six. Stop winching helicopter when main gear tires reach FS 1100.

p. **Install Safety Chains.** Apply helicopter brakes, place wheel chocks, and install safety chains.

NOTE

Final positioning of helicopter will be accomplished manually.

q. **Disconnect Winching Cable.** Disconnect winching adapter cables and cargo aircraft winching cable from helicopter.

r. **Remove Safety Chains.** Remove safety chains, chocks, and release helicopter brakes.

s. **Position Helicopter.** Manually move helicopter forward in cargo aircraft to position main landing gear as far forward of FS 1080 as possible (fig. FO–1).

t. **Install Safety Chains.** Apply helicopter brakes, place chocks, and install safety chains.

u. **Lock Tail Wheel.** Paragraph 2–14.6u.

v. **Remove Tail Wheel Steering Bar and Winching Yoke.** Paragraph 2–14.6v.

w. **Release Brakes.** Instruct brakeman to release helicopter brakes and dismount helicopter.

NOTE

Do not restrain helicopter for flight at this time.

2–21.13 Load Four Main Rotor Blades. Position two main rotor blade rack sets holding two blades each (fig. 2–2), on cargo floor under helicopter number five fuselage (fig. FO–1).

2–21.14 Load One Horizontal Stabilator. Position one stabilator on cargo floor under tail rotor blade of helicopter number five (fig. FO–1).

2–21.15 Load Helicopter Number Four Tail First. Load helicopter number four tail first using same loading procedures used when loading helicopter number five (para 2–21.12) with following exceptions:

CAUTION

When winching helicopter number four into position, extreme care must betaken to prevent tail rotor contacting tail rotor of helicopter number six.

a. **Stop Winching.** Stop winching helicopter when main gear tires reach FS 1500.

b. **Position Helicopter.** Manually move helicopter forward in cargo aircraft while maneuvering tail rotor to left and past tail rotor of helicopter number six. Move helicopter as far as possible forward in cargo aircraft. Ensure that main landing gear tires are forward of FS1265 (fig. FO–1).

2–21.16 Load Four Main Rotor Blades. Position two main rotor blade rack sets holding two blades each (fig. 2–2), on cargo floor under helicopter number four fuselage (fig. FO–1).

2–21.17 Load Two Horizontal Stabilators. Position two stabilators on cargo floor under nose of helicopter number five (fig. FO–1).

2–21.18 Load Helicopter Number Three Nose First. Load helicopter number three nose first using same loading procedures used when loading helicopter number six (para 2–21.7) with following exceptions:

CAUTION

Ensure winch cable does not contact components that have been placed under helicopters.

a. **Winching Helicopter.** Winch helicopter into cargo compartment with helicopter left main landing gear tire on BL 0.

b. **Stop Winching.** Stop winching helicopter when main gear tires is at FS 1380. Manually move helicopter as far forward as possible.

2–21.19 Load Hydraulic Cart. Place hydraulic cart to right of helicopter number three (fig. FO–1).

2–21.20 Temporarily Install 30MM Gun and Turret. Temporarily install 30MM gun and turret on helicopter number three (para 2–21.8).

2–21.21 Load Four Main Rotor Blades. Position two main rotor blade rack sets holding two blades each (fig. 2–2), on cargo floor under number three helicopter fuselage (fig. FO–1).

2–21.22 Load Helicopter Number Two Tail First. Load helicopter number two tail first using same loading procedures used when loading helicopter number five (para 2–21.12) with following exceptions:

a. **Position Helicopter.** Position helicopter to left side of cargo compartment. Ensure that left main landing gear tire is positioned on BL 16L.

b. **Maneuver Tail Rotor.** Maneuver tail rotor around tail rotor of helicopter number three and ensure clearance between engine nacelle and tail rotor of helicopter number three.

c. **Stop Winching.** Stop winching helicopter when main landing gear tire reaches FS 1965.

d. **Position Helicopter.** Manually move helicopter toward forward end of cargo compartment so that troop stair ladder will clear nose of helicopter (fig. FO–1).

2–21.23 Load Four Main Rotor Blades. Position two main rotor blade rack sets holding two blades each (fig. 2–2), on cargo floor under helicopter number two fuselage (fig. FO–1).

2–21.24 Load Six Tail Rotor Blades. Position three tail rotor blade supports holding two blades (fig. 2–7) on left side of cargo floor, outboard of helicopter number two tailboom (fig. FO–1).

CAUTION

Ensure that troop stair ladder is extended prior to loading helicopter number one.

2–21.25 Load Helicopter Number One Tail First. Load helicopter number one tail first using same loading procedures used when loading helicopter number five (para 2–21.12) with following exceptions:

a. **Position Helicopter.** Position helicopter to right of cargo compartment, with its tail between number three helicopter and right side of cargo compartment.

b. **Stop Winching**. Stop winching helicopter when main landing gear tire are forward of cargo ramp crest.

c. **Position Helicopter**. Manually move helicopter as far forward of FS 1965 as possible (fig. FO–1).

2–21.26 Load Four Main Rotor Blades. Position two main rotor blade rack sets holding two blades each (fig. 2–3), on cargo floor under number one helicopter fuselage (fig. FO–1).

2–21.27 Load Two Horizontal Stabilators. Position one stabilator on cargo ramp, under nose of number one helicopter and the other on left side cargo floor forward of troop ladder (fig. FO–1).

2–21.28 Load Shoring. Position shoring on left side of aft cargo ramp aft of troop ladder (fig. FO–1).

2–21.29 Load Four Hellfire Launchers. Position two packed Hellfire launcher containers on left side of rear cargo ramp, aft of shoring . Place remaining two containers on top of first four (fig. FO–1).

2–21.30 Tie Down Helicopter Number One Thru Number Six. Paragraph 2–21.26.

2–21.31 Tie Down Twenty Four Main Rotor Blades. Paragraph 2–21.27.

2–21.32 Tiedown Loose Helicopter Components and Ground Support Equipment. Paragraph 2–21.28.

2–22 HELICOPTER OFFLOADING (C–5 AIRCRAFT, REAR DOOR).

WARNING

To prevent injury to personnel and damage to helicopter and cargo aircraft, all helicopters will remain restrained by chains until winch cable is attached for unloading.

Helicopter and components offloading from C–5 will be conducted in accordance with procedures outlined in paragraph 2–22.1 thru 2–22.25 (fig. FO–1).

2–22.1 Remove Tiedowns from Helicopter Components and Ground Support Equipment. Paragraph 2–15.1.

2–22.2 Unload Four Hellfire Launchers. Remove Hellfire launchers from left side of aft cargo ramp.

2–22.3 Unload Shoring. Remove shoring from left side of aft cargo ramp.

2–22.4 Retract Ladder. Cargo Loadmaster will retract troop stair ladder.

2–22.5 Unload Two Horizontal Stabilators. Remove one horizontal stabilator from under nose of helicopter number one and one from left side cargo floor forward of troop ladder.

2–22.6 Unload Four Main Rotor Blades. Remove two main rotor blade rack sets from cargo floor under helicopter number one.

2–22.7 Configure C–5 Aft Loading Ramp. Loadmaster only.

2–22.8 Unload Helicopter Number One.

WARNING

- **To prevent injury to personnel and damage to helicopter and cargo aircraft from helicopter rolling free, chocks shall be in place and cargo winch cable attached, with slack removed, prior to removing tiedown chains.**
- **To prevent injury to personnel or damage to helicopter and cargo aircraft in the event of winch failure, the helicopter CPG station will be occupied by a qualified person to operate brakes.**

CAUTION

- **Ensure that cargo aircraft winch cable does not damage equipment loaded on cargo aircraft floor.**
- **To prevent damage to helicopter and cargo aircraft, use shoring as necessary under helicopter main and tail wheels to provide clearance between helicopter underbelly and ramp hinge.**

a. **Unlock Tail Wheel Swivel**. Paragraph 2–14.6a.

b. **Install Tail Wheel Steering Bar and Winching Yoke**. Paragraph 2–14.6b.

c. **Connect Winch**.

WARNING

Helicopters shall be restrained with winch during offloading. An unrestrained helicopter may shift suddenly or roll free, causing personnel injury or equipment damage.

Paragraph 2–14.12d.

d. **Assign Army Loading Team Tasks**. Paragraph 2–21.7g (1) thru (3).

e. **Place Tail Wheel Shoring**. Paragraph 2–21.7j.

f. **Place Approach Shoring**. Paragraph 2–21.7d

g. **Chock Helicopter**. Apply helicopter brakes and chock main landing gear tires.

h. **Remove Tiedowns.** Paragraph 2–15.10f.

i. **Remove Chocks.** Remove chocks and release brakes.

j. **Unload Helicopter.** Manually push helicopter onto shoring and out of cargo aircraft. Carefully monitor under belly clearance. Keep winch cable tight through out unloading by slowly playing out cable as helicopter moves out of cargo aircraft.

k. **Disconnect Winching Cable.** Disconnect winching cable from tail wheel winching yoke.

l. **Remove Tail Wheel Steering Bar and Winching Yoke.** Paragraph 2–14.6v.

m. **Tow Helicopter.** Tow helicopter to build-up area.

2–22.9 Unload Four Main Rotor Blades. Remove two main rotor blade rack sets from cargo floor under helicopter number two.

2–22.10 Unload Helicopter Number Two. Remove helicopter number two using same procedures used for helicopter number one (para 2–22.8).

2–22.11 Unload Six Tail Rotor Blades. Remove three tail rotor blade supports from left side of cargo floor, outboard of helicopter number two.

2–22.12 Unload Four Main Rotor Blades. Remove two main rotor blade rack sets from cargo floor, under number three helicopter.

2–22.13 Remove 30MM Gun and Turret. Remove temporary installed 30MM gun and turret from helicopter number three. TM 9-1090-208-23-1.

2–22.14 Unload Helicopter Number Three.

WARNING

- **To prevent injury to personnel and damage to helicopter and cargo aircraft from helicopter rolling free, chocks shall be in place and cargo winch cable attached, with slack removed, prior to removing tiedown chains.**
- **To prevent injury to personnel or damage to helicopter and cargo aircraft in the event of winch failure, the helicopter CPG station will be occupied by a qualified person to operate brakes.**

CAUTION

- **Ensure that cargo aircraft winch cable does not damage equipment loaded on cargo aircraft floor.**
- **To prevent damage to helicopter and cargo aircraft, use shoring as necessary under helicopter main and tail wheels to provide clearance between helicopter underbelly and ramp hinge.**

a. **Unlock Tail Wheel Swivel.** Paragraph 2–14.6a.

b. **Install Tail Wheel Steering Bar In Winching Yoke.** Paragraph 2–14.6b.

c. **Connect Cargo Aircraft Winch Cable To Helicopter.**

WARNING

Helicopters shall be restrained with winch during offloading. An unrestrained helicopter may shift suddenly or roll free, causing personnel injury or equipment damage.

Paragraph 2–14.6e.

d. **Assign Army Loading Team Tasks.** Paragraph **2–21.7**g.

e. **Position Tail Wheel Shoring.** Paragraph 2–21.12i.

f. **Position Shoring.** Paragraph 2–21.12c

g. **Chock Helicopter.** Apply helicopter brakes and chock main landing gear tires.

h. **Remove Tiedowns.** Paragraph 2–15.10f.

i. **Remove Chocks.** Remove chocks and release brakes.

j. **Connect and Checkout Hydraulic Cart.**

WARNING

- **Prior to operating hydraulic cart, personnel must be thoroughly familiar with operation and safety procedures contained in chapter eight.**
- **Personnel must remain clear of helicopter during kneeling and erecting operations to prevent injury to personnel in event of main landing gear strut collapse and helicopter roll over.**

Connect hydraulic cart to helicopter (paragraph 8–4).

CAUTION

- **To prevent excessive stress on helicopter landing gear and C–5 cargo winch, do not apply helicopter brakes during kneeling or erecting operations.**
- **Carefully monitor under belly clearance as helicopter is off loaded to prevent damage to helicopter and cargo aircraft.**
- **As helicopter moves down cargo ramp, it must be kneeled to prevent rotor head from striking C–5 pressure door.**

k. **Unload Helicopter.**

(1) Manually move helicopter aft. Keep winch cable tight by slowly playing out cable as helicopter moves aft.

(2) Direct helicopter tail wheel on to shoring to provide underbelly clearance. Add shoring as necessary.

(3) As rotor head approached cargo aircraft pressure door, begin kneeling helicopter to provide clearance (paragraph 8–5).

(4) After rotor head clears pressure door slowly raise helicopter as it moves down ramp.

l. **Erect Helicopter.** After helicopter is off loaded, erect helicopter and disconnect hydraulic cart (paragraph 8–6).

m. **Disconnect Winching Cable.** Paragraph 2–21.7p.

n. **Remove Tail Wheel Steering Bar and Winching Yoke.** Paragraph 2–14.6v.

o. **Tow Helicopter.** Tow helicopter to build-up area.

2–22.15 Unload Two Horizontal Stabilators. Remove two stabilators from cargo floor under helicopter number five.

2–22.16 Unload Four Main Rotor Blades. Remove two main rotor blade rack sets from cargo floor under helicopter number four.

2–22.17 Unload Helicopter Number Four. Remove helicopter number four using same procedures used for helicopter number one (para 2–22.8).

2–22.18 Unload Four Main Rotor Blades. Remove two main rotor blade rack sets from cargo floor, under helicopter number five fuselage.

2–22.19 Unload Helicopter Number Five. Remove helicopter number five using same procedures used for helicopter number one (para 2–22.8).

2–22.20 Unload Two Horizontal Stabilators. Remove two remaining horizontal stabilators from cargo floor.

2–22.21 Unload Four Main Rotor Blades. Remove two main rotor blade rack sets from cargo floor under number six helicopter.

2–22.22 Remove 30MM Gun and Turret. Remove temporarily installed 30MM gun and turret from helicopter number six in accordance with TM 9-1090-208-23-1.

2–22.23 Unload Helicopter Number Six. Remove helicopter number six using same procedures used for helicopter number three (para 2–22.14).

2–22.24 Unload Eight Hellfire Launchers. Remove eight packed launcher containers from left side of forward cargo ramp.

2–22.25 Unload Ground Support Equipment. Remove boxed ground support equipment from right side forward cargo ramp.

2–23 HELICOPTER PREPARATION FOR USE AFTER C–5 SHIPMENT.

Preparation of AH–64A helicopter for use after C–5 cargo aircraft shipment will be performed in accordance with instructions outlined in paragraphs 2–23.1 through 2–23.23. All assembly will be in accordance with referenced TM's.

2–23.1 Preliminary Safety Procedures. Before starting operations, perform safety procedures outlined in paragraph 2–23.2 and 2–23.3.

2–23.2 Ground Helicopters. TM 1-1520-238-23.

2–23.3 Perform Helicopter Safety Check. TM 1-1520-238-23.

2–23.4 Unpacking and Depreservation. Paragraph 2–16.4.

2–23.5 Remove Fly Away Covers. TM 1-1520-238-23.

2–23.6 Install Wings. Paragraph 2–16.6.

2–23.7 Install Steps. Paragraph 2–16.7

2–23.8 Install 30MM Gun and Turret. Install 30MM gun and turret on helicopters number three and number six (TM 9-1090-208-23-1).

2–23.8.1 Install Turret Fairing. Obtain turret fairing from catwalk area. Install fairing with four fasteners on helicopters number three and six.

2–23.9 Remove Forward Fuselage Tiedown Fittings. Paragraph 2–16.8.

2–23.10 Install Tail Rotor Blades. Paragraph 2–16.9.

2–23.11 Install Horizontal Stabilator. Paragraph 2–16.10.

2–23.12 Install Main Rotor Blades. Paragraph 2–16.11.

2–23.13 Install Main Rotor Deice Power Distributor and Air Data System (ADS) Mast.
Paragraph 2–16.12.

2–23.14 Install Removed Fairings and Access Panels. Paragraph 2–16.13.

2–23.14.1 Install L175 Fairing and Step (Helicopters Three and Six Only).
TM 1-1520-238-23.Obtain fairing and step from catwalk area.

2–23.15 Install ADF Wire Antenna and UHF L–Band, Communications, and Transponder Blade Antennas. Install FM–AM Whip Antenna (MWO 1-1520-238-50-37 installed) and Lower IFF Antenna (MWO 1-1520-238-50-36 installed) Paragraph 2–16.14.

2–23.16 Install Main Landing Gear Wire Cutters.
TM 1-1520-238-23.

2–23.16.1 Install 30MM Gun Wire Deflector (Helicopters Number One, Two, Four and Five Only).TM 1-1520-238-23. Obtain deflectors from catwalk area.

2–23.17 Connect Helicopter Battery.
TM 1-1520-238-23.

2–23.18 Perform Pitot Static Test MOC.
TM 1-1500-204-23.

2–23.19 Inspect Helicopter. Perform 10 hour/14 day inspection (TM 1-1520-238-PMS).

2–23.20 Perform Maintenance Operational Checks as Required for Removed Components/Mission Equipment. TM 1-1520-238-23.

2–23.21 Refuel Helicopter.
TM 1-1520-238-23.

2–23.22 Perform Pylon Boresight Check.
TM 9-1230-476-20-1.

2–23.23 Perform 30MM Gun Boresight Check (Helicopters Number Three and Six Only).
TM 9-1230-476-20-1.

Section IV. SHIPMENT BY C–141B CARGO AIRCRAFT

2–24 REQUIRED HELICOPTER PRELOADING CONDITION.

See figure 2–22 for **AH–64A** helicopter preloading condition required for shipment on C–141B cargo aircraft.

2–24.1 Equipment Requirements. Refer to table 2–1 for equipment items required for preparation and shipment of **AH–64A** helicopters on C–141B cargo aircraft. Items of equipment indicated by note 2 are Table of Organization and Equipment (TOE) items and are normally available within the unit. Items identified by notes 1 and 3 normally must be requisitioned for helicopter shipment.

2–24.2 Preliminary Safety Procedures. Before starting operations, perform safety procedures outlined in paragraphs 2–24.3 thru 2–24.5.

2–24.3 Ground Helicopters.
TM 1-1520-238-23.

2–24.4 Perform Helicopter Safety Check.
TM 1-1520-238-23.

2–24.5 Deactivate Armament.

WARNING

To prevent injury to personnel, M230 guns must be cleared and visually checked.

TM 9-1090-208-23-1.

2–24.6 Corrosion Control. Paragraph 2–10.6 and 2–10.7.

2–24.7 Service Power Train. Paragraph 2–10.8 and 2–10.9.

2–24.8 Adjust Fuel Levels. Paragraph 2–10.10.

2–24.9 Disconnect Battery. Paragraph 2–10.11.

2–24.10 Service Main Landing Gear.
TM 1-1520-238-23.

2–25 HELICOPTER DISASSEMBLY FOR C141B SHIPMENT.

Perform disassembly in accordance with procedures outlined in paragraph 2–25.1 through 2–25.18.

2–25.1 Remove Hellfire Launchers. Paragraph 2–11.1.

2–25.2 Remove 2.75 Inch Rocket Launchers. Paragraph 2–11.2.

2–25.2.1 Remove Turret Fairing. Release four fasteners. Wrap turret fairing with cushioning material (D–5). Secure wrapped fairing with tape (D–13) and stow in catwalk area.

2–25.3 Remove M230 Gun. TM 9-1090-208-23-1.

a. **Connection Closure and Seal.** Cap all disconnected fittings and connectors. Wrap connectors with barrier material (D–1) sealed with tape (D–13).

b. **Preservation.** Thoroughly coat gun mounting surfaces, transfer unit latch pins, and recoil adapter–to–gun cradle quick–release fittings with corrosion preventive compound (D–4).

c. **Component–Wrap.** Wrap removed gun with barrier material (D–1) sealed with tape (D–13).

d. **Packaging.** Pack each removed, wrapped gun in its shipping container (item 53, table 2–2).

2–25.4 Remove Gun Wire Deflector and M230 Gun Turret.

a. **Remove Gun Wire Deflector.**
TM 1-1520-238-23.

b. **Remove M230 Gun Turret.** TM 9-1090-208-23-1.

c. **Connection Closure.** Cap all disconnected fittings and connectors.

d. **Preservation.** Thoroughly coat turret mounting surfaces with corrosion preventive compound (D–4).

e. **Component–Wrap.** Wrap and cover preserved surfaces with barrier material (D–1) sealed with tape (D–13).

f. **Packaging.**

(1) Pack each removed, wrapped gun turret in shipping container (item 54, table 2–2).

(2) Wrap wire deflector with cushioning material (D–5) sealed with tape (D–13).

(3) Secure wire deflector in catwalk area.

2–25.5 Remove Main Rotor Blades. Paragraph 2–11.3.

2–25.6 Remove Main Rotor De–Ice Power Distributor and Air Data System (ADS) Mast. Paragraph 2–11.5.

2–25.7 Remove Infra Red Counter Measure Device.

a. **Remove Infra–Red Counter Measure Transmitter from "Dog House".** TM 11-1520-238-23-1.

b. **Stow Transmitter.** Wrap infrared transmitter with cushioning material (D–5). Secure wrapped unit with tape (D–13). Secure in aft storage bay (R330).

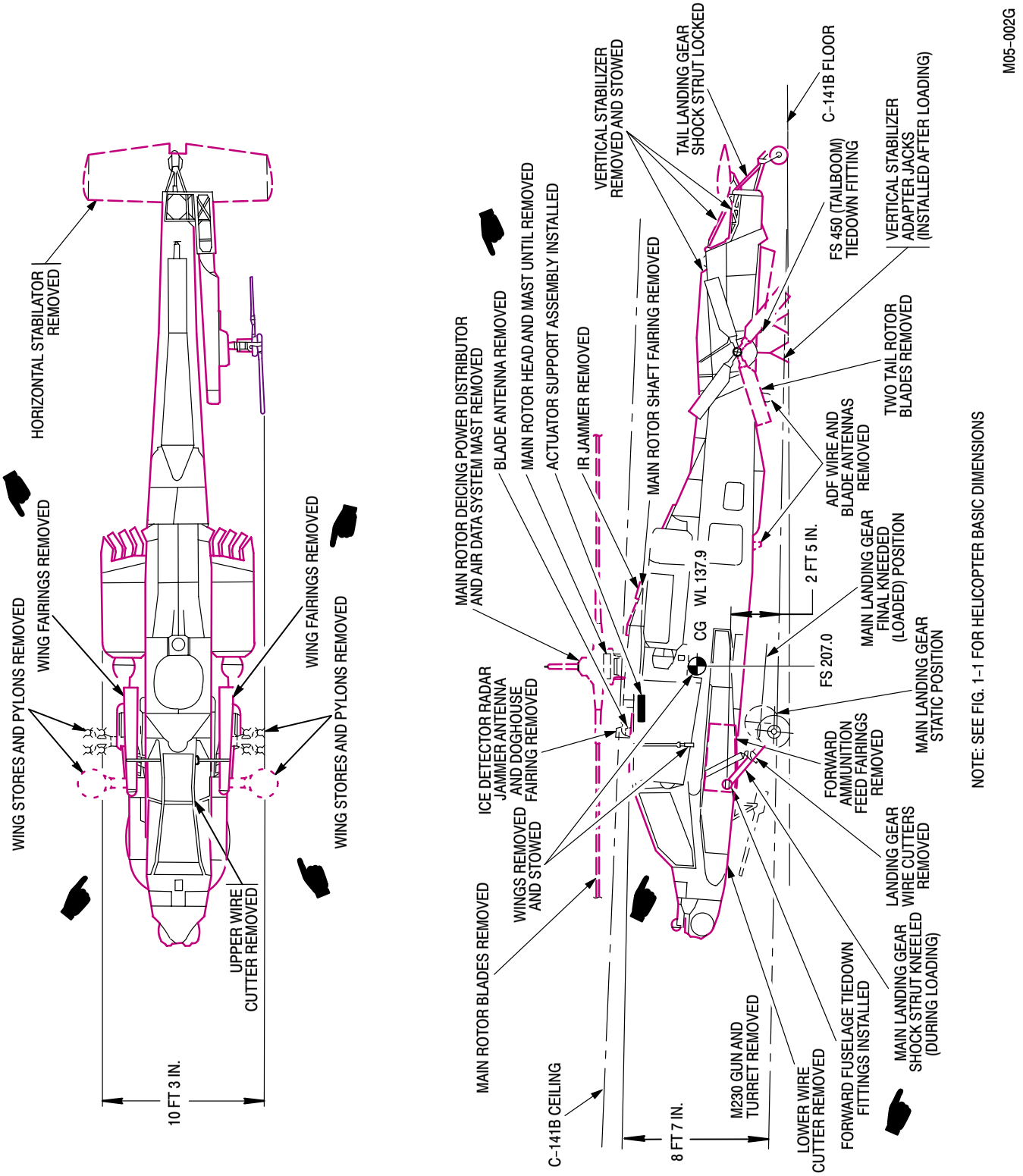


Figure 2–22. Helicopter Preloading Condition for C–141B Cargo Aircraft Shipment

Table 2–2. Equipment Requirements for AH–64A Helicopter C141BN Cargo Aircraft Shipment

(Sheet 1 of 3)

Item Number	Nomenclature	NSN	Part Number (CAGE/LIN)	Quantity Required	NOTES
1	Main rotor blade rack (root end)	1740–01–221–3329	7–267310002	*2	1
2	Main rotor blade rack (tip end)	1740–01–221–3333	7–267310002–3	*2	1
3	Stabilator actuator support	1740–01–256–6346	7–367310023	*1	1
4	Tail rotor blade support	1740–01–221–3332	7–267310017	*1	1
5	Wing stowing kit	1740–01–220–8492	7–367310001	*1	1
6	Forward fuselage tiedown fitting	1740–01–242–7265	7–367310009	*2	1
7	Forward winching adapter cable	1740–01–221–3327	7–267310008	2	1
8	Tail wheel steering bar and winching yoke	1740–01–221–9436	7–367310013	1	1
9	Hydraulic hose kit	1730–01–181–9275	7–262100019–601	1	1
10	Hydraulic cart	1730–01–292–0972	70700–81650–041	1	1
11	Aircraft mechanic’s tool kit	5180–00–323–4876		1	2
12	Fuel truck	2320–00–077–1631		1	2
13	M543A2 crane truck	2320–00–055–9258		1	2
14	Main rotor blade sling	1730–01–262–5310	7–362110216	1	2
15	Towbar	1730–00–967–9556		1	2
16	Droop stop wedge	1615–01–185–3102	7–262110074	4	2
17	1/2 drive socket wrench handle	5120–00–230–6385		2	2
18	1–1/16 socket	5120–00–935–7427		2	2
19	1–1/16M1–1/4 open end wrench	5120–00–187–7134		2	2
20	Hellfire launcher container			*2	2
21	Maintenance platform	1730–00–294–8883		1	2
22	Aircraft armament repairman basic tool set	4933–00–987–9816		1	2
23	Aircraft armament repairman tool set	5180–01–110–7629		1	2

Table 2–2. Equipment Requirements for AH–64A Helicopter C141BN Cargo Aircraft Shipment

(Sheet 2 of 3)

Item Number	Nomenclature	NSN	Part Number (CAGE/LIN)	Quantity Required	NOTES
24	1/2 drive socket wrench handle	5120–00–236–7590		1	2
25	3/4—1/2 drive socket wrench adapter	5120–00–227–8088		1	2
26	1/2M3/8 socket wrench adapter	5120–00–240–8702		1	2
27	1–1/2 crowfoot	5120–00–184–8412		1	2
28	11/16 socket	5120–00–935–7421		1	2
29	9/16 socket adapter	5120–00–935–7420		1	2
30	1–5/16 — 1–1/4 open–end wrench	5120–00–277–2321		1	2
31	Offset crosstip screwdriver	5120–00–256–9014		1	2
32	1/2 drive torque wrench	5120–00–270–3121		1	2
33	3/4 drive torque wrench	5120–00–902–7983		1	2
34	Tow motor tug		as available	1	2
35	Fork lift		as available	1	2
36	2.75 in. rocket launcher container			*2	2
37	Tri–pod jacks (10 ton)	1730–00–516–2019		2	2
38	Captive boresight harmonization kit (CBHK)			1	2
39	Grounding cable	local manufacture		*1	2
40	Pitot static system tester	4920–00–718–6480		1	2
41	Forward jack pad	1560–01–226–7551		2	2
42	Rotor track and balance kit	4920–01–245–6004	7–262100008–607	1	2
43	Test kit, balance and track	4920–01–040–7816		1	2
44	Scale, aircraft weighing	6670–00–999–1195	C46500	1	2
45	Wheel chocks	Local manufacture		*2	2
46	Jack, hydraulic tripod (3 ton)	1730–00–734–9382		1	2
47	Vertical stabilizer sling	1740–01–220–8476	7–267300016–603	2	2

Table 2–2. Equipment Requirements for AH–64A Helicopter C141BN Cargo Aircraft Shipment

(Sheet 2 of 3)

Item Number	Nomenclature	NSN	Part Number (CAGE/LIN)	Quantity Required	NOTES
48	Mixer spreader		7–262110077–19	1	2
49	Air vehicle sling	1730–01–165–6861	7–262110009–601	1	2
50	Hydraulic jack	1730–00–540–2343	53D22020	1	2
51	Mixer bolt torque adapter		7–362110085	2	2
52	3/4 drive x 3 inch long extension	5120–00–273–9208	L32	1	2
53	M230 gun container	local manufacture		*1	3
54	M230 gun turret container	local manufacture		*1	3
55	Vertical stabilizer stow kit	1740–01–273–7399	7–267310011–607	*1	1
56	Actuator support, RH	1740–01–220–8490	7–367310021–35	*1	1
57	Actuator support, LH	1740–01–242–7266	7–367310021–37	*1	1
58	Main rotor head mast and mixer shipping carrier	1740–01–221–2963	7–367310010–601	*1	1
59	Main transmission shipping cover	1740–01–221–3331	7–367310022	*1	1
60	Tail landing gear strut lock	1740–01–220–8464	7–267310006	*1	1
61	Fuselage station 450 support	1740–01–250–0047	7–367310005–601	*1	1
62	Vertical stabilizer adapter jack	1730–01–294–0141	7–367310025	*1	1
63	Gauge, dial indicating	6635–00–578–5285	PPT00	1	2
64	28 V dc adapter	1560–01–315–5178	70700–81650–045	1	3
65	Depinning Tool, 8 ga	5120–00–133–0158		*1	3

* Asterisk by quantity indicates quantity per helicopter shipped. Quantities of other equipment items are minimums. Quantities may be increased, based on number of aircraft and personnel.

NOTES:

1. Transportability peculiar items of equipment – not included in Tables of Organization and Equipment (TOE) and must be requisitioned for helicopter shipment.
2. Dual purpose item of equipment – normally included in TOE.
3. Dual purpose equipment – normally not included in TOE and must be requisitioned for helicopter shipment.

2–25.8 Remove Fairings and Access Covers. Figure 2–4.

a. **Remove Main Rotor Shaft Fairings.** (If MWO 1-1520-238-50-50 installed refer to paragraph 2–25.19 to remove both forward sensor LDS sensor units). Release 10 camloc fasteners and remove five screws at fairing (T225). Remove 16 (18 if MWO 1-1520-238-50-50 installed) screws from each fairing (T205L and T205R).

b. **Remove Wing Fairings.** Remove nine screws from each fairing (LW10, RW10, LW11, and RW11). Place removed fairings with main rotor shaft fairings.

c. **Remove Wing Access Covers.** Remove 16 screws from each cover (LW9 and RW9). Place removed covers with main rotor shaft fairings.

d. **Remove Forward Ammunition Feed Fairings.** Release 10 camloc fasteners at each fairing (L140 and R140). Place removed fairings with main rotor shaft fairings.

e. **Remove Aft Ammunition Feed Fairings.** Remove FS 175 L & R ammunition feed fairings and steps.

f. **Stow Fairings and Access Covers.** Wrap fairings and access covers removed in steps a thru e above with cushioning material (D–5). Secure wrapped unit with tape (D–13) and stow in catwalk area.

g. **Remove Tailboom Aft Closeout Fairings.** Remove 21 screws from fairings (L545 and R545). Stow removed fairings in CPG station.

NOTE

Wing trailing edges will be removed when required for internal connection access on extended–range capable helicopters. Trailing edges will be reinstalled to permit wing stowage. Install with 12 screws and bag remaining screws.

h. **(Extended–Range Capable Helicopters Only) Remove Wing Trailing Edges.** Remove 68 screws from each trailing edge (LW13 and RW13).

2–25.9 Install Forward Fuselage Tiedown Fittings. Paragraph 2–11.8.

2–25.9.1 Remove Main Transmission Access Panels. Release 12 camloc fasteners at each panel (L200 and R200).

2–25.10 Remove and Support Assembled Main Rotor Head, Mast, and Mixer (Main Rotor Head and Mast Unit) (fig. 2–23 and 2–24).

a. **Remove Air Data Sensor and Deicing Standpipe.** Remove drive plate cover and flexible support from drive plate (TM 1-1520-238-23). Slide standpipe up and out of rotor hub (fig. 2–23). Wrap removed items with cushioning material (D–5), secure with tape (D–13) and stow in pilot station.

b. **Remove Drive Shaft.** TM 1-1520-238-23.

c. **Disconnect and Remove Main Rotor Track and Balance Cable from Mixer.** Disconnect cable plug (P57) from main rotor interrupter magnetic pickup, then remove two clamps from mixer right side lateral link. Remove cable and plug from mixer. Wrap removed clamps, cable and plug with cushioning material (D–5) sealed with tape (D–13) and secure to airframe in main transmission area with tape (D–13) (fig. 2–23).

WARNING

During the following procedure, helicopter must be on level surface, with landing gear in normal static condition (not kneeled). If helicopter is tilted, removed main rotor head and mast unit may swing wide, causing possible injury of personnel or equipment damage.

d. **Aline Lifting Crane and Air Vehicle Sling.** Position crane truck at left or right side of helicopter. Aline crane lifting hook over air vehicle sling (item 49, table 2–2) on the ground. Connect crane lifting hook to sling link (lifting eye).

e. **Install Air Vehicle Sling.** Hoist sling up to main rotor head. Couple air vehicle sling fittings to mating lifting clevises on the rotor head (fig. 2–23). Insert and lock sling quick–release pins.

f. **Remove Cable Slack.** Carefully operate crane winch to remove all slack from sling cables.

g. **Disconnect Longitudinal, Lateral, and Collective Flight Control Servoactuators.** Remove rod end–to–mixer clevis cotter pins, nuts, bolts, and washers. Discard cotter pins. Retain removed rod end hardware to secure mixer clevises in shipping carrier.

h. **Support Flight Control Servoactuators.** Mount actuator supports (item 56 and 57, table 2–2) on top of fuselage, as shown (fig. 2–23). Connect servoactuator rod ends to supported clevises. Insert and lock the support quick–release pins.

i. **Install Mixer Spreader.** Put mixer spreader (item 48 table 2–2) in place on mixer.

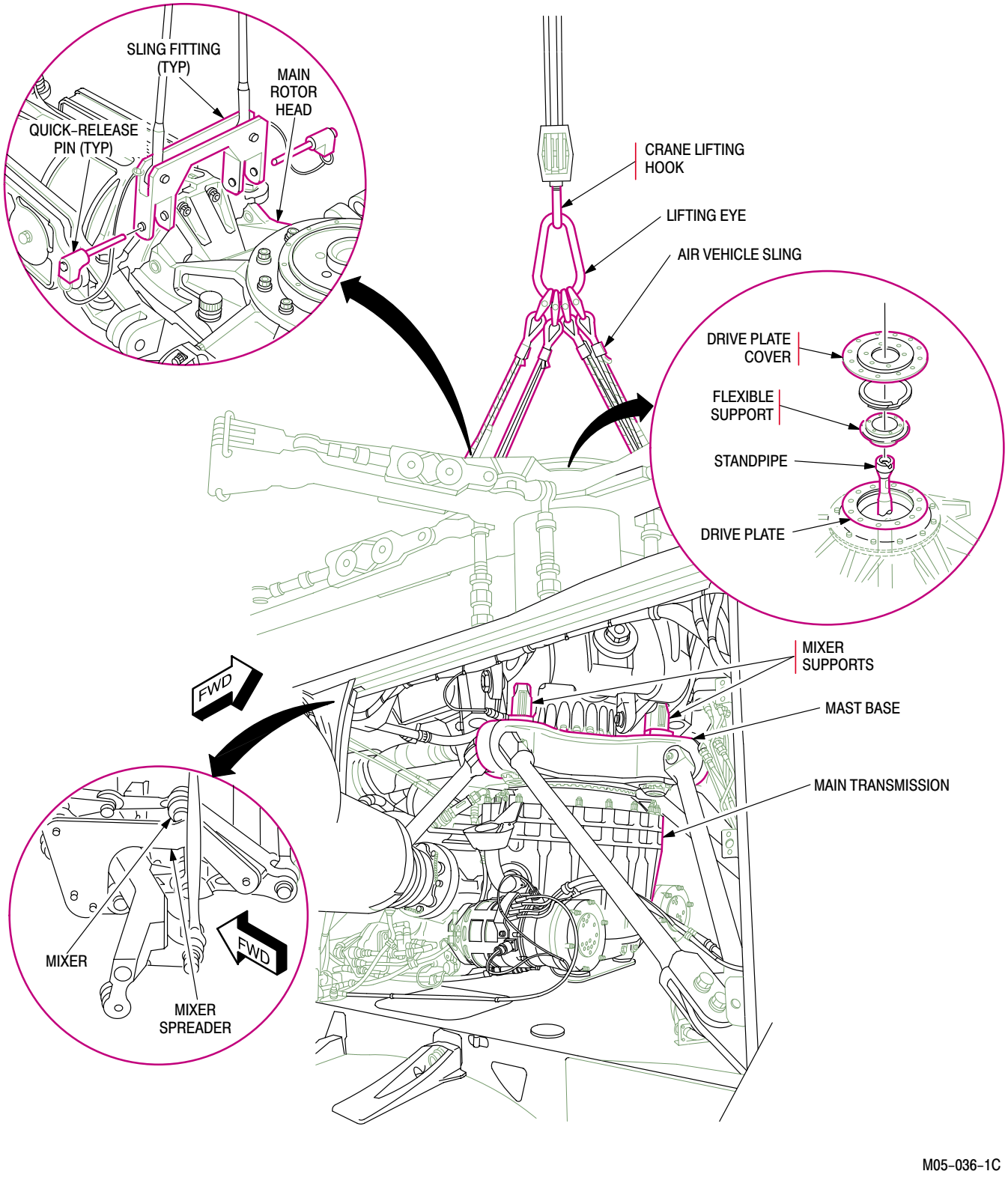


Figure 2–23. Removal and Installation of Main Rotor Head and Mast Unit (Sheet 1 of 3)

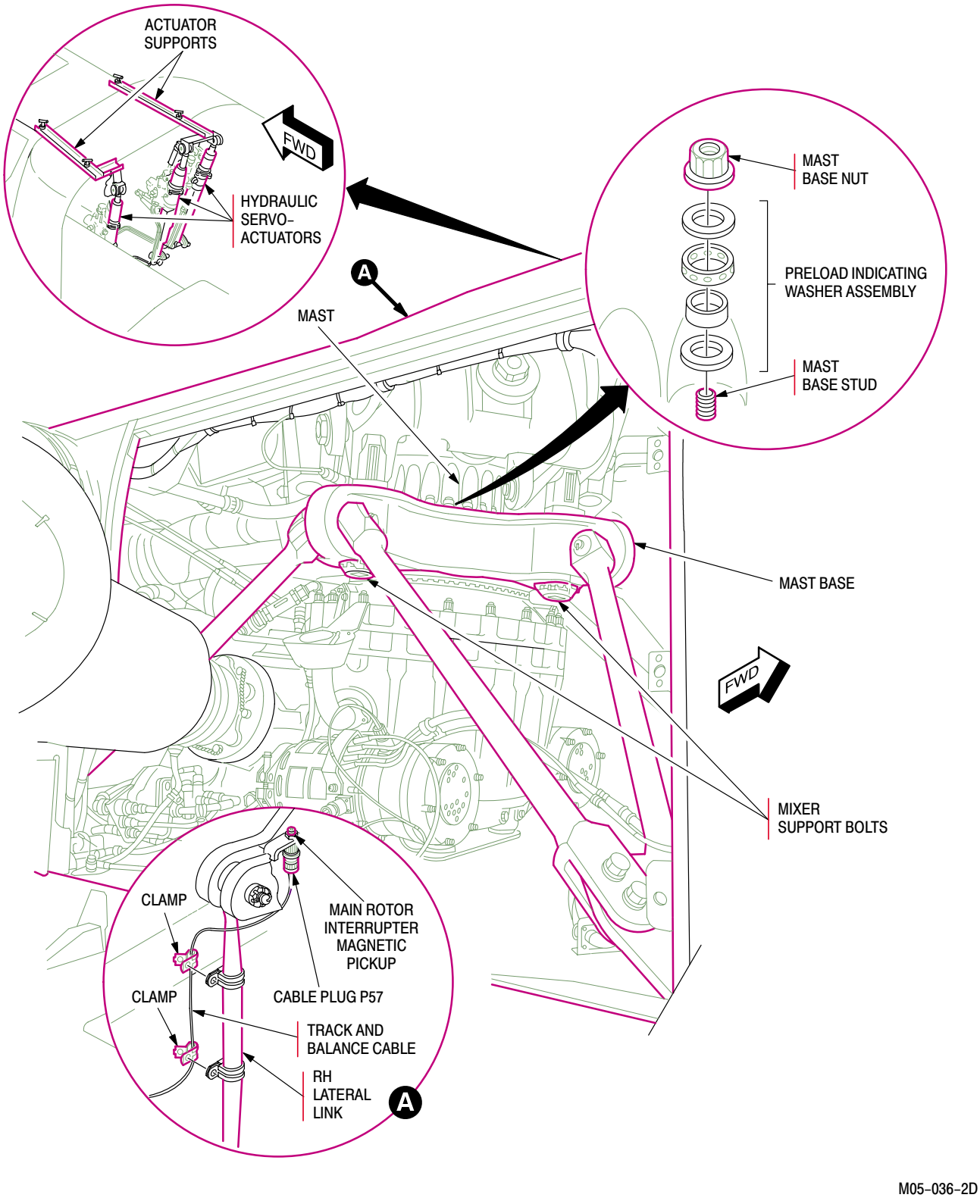


Figure 2–23. Removal and Installation of Main Rotor Head and Mast Unit (Sheet 2 of 3)

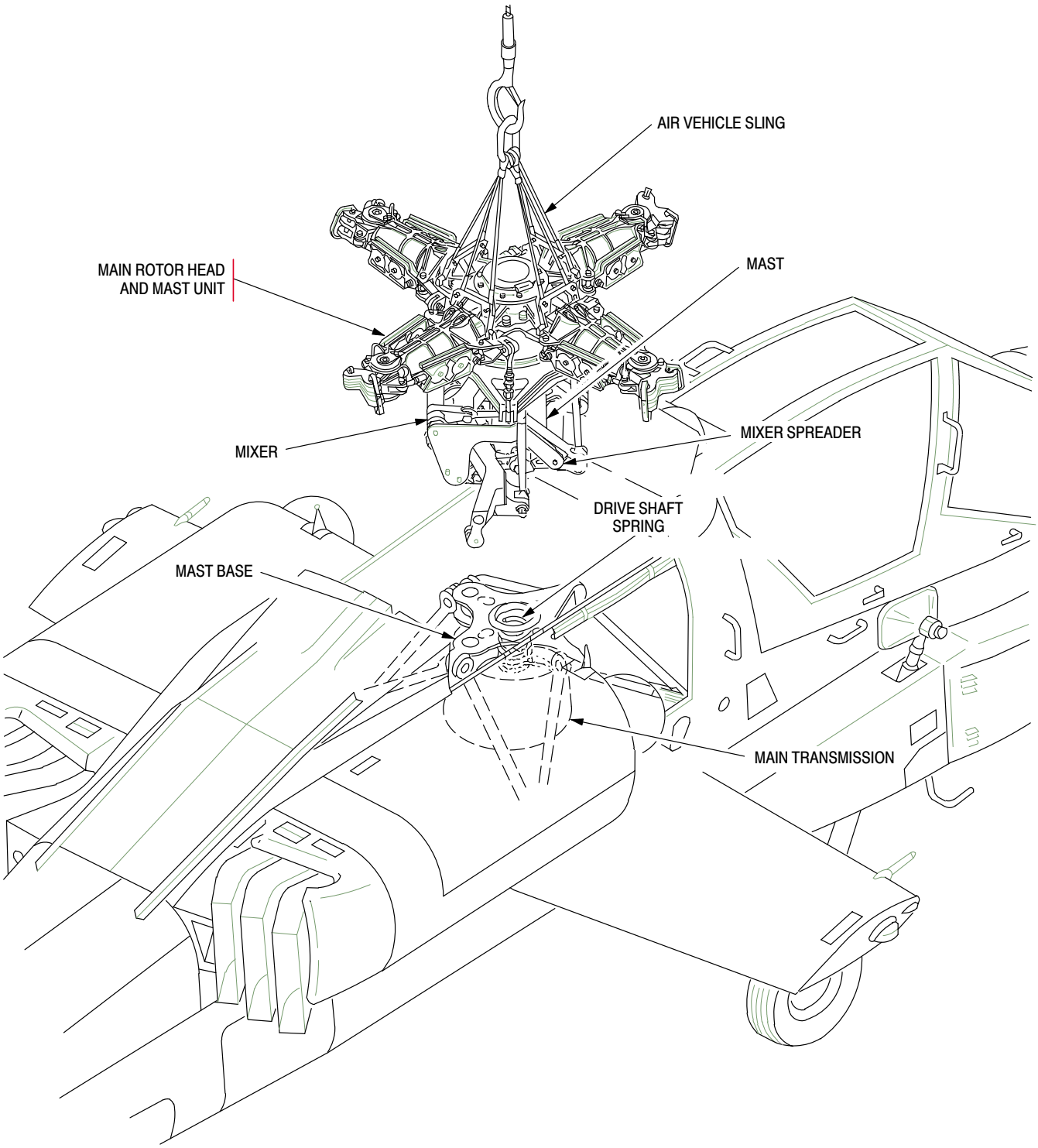


Figure 2–23. Removal and Installation of Main Rotor Head and Mast Unit (Sheet 3 of 3)

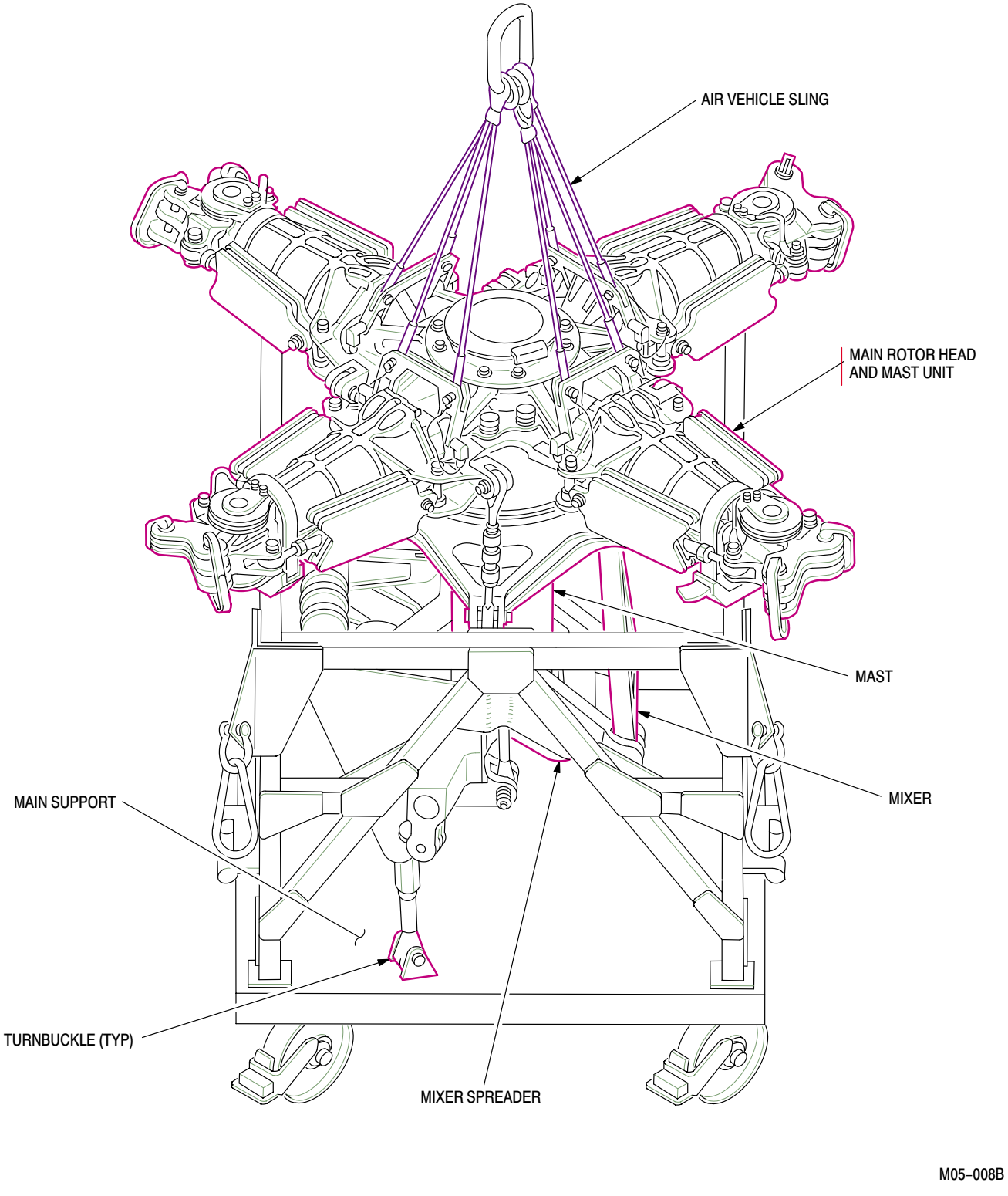


Figure 2–24. Installation of Main Rotor Head and Mast Unit in Shipping Carrier

j. **Disconnect Mast From Mast Base.** Remove 18 nuts and preload indicating washers from mast base. Discard preload indicating washers.

k. **Remove Main Rotor Head and Mast Unit.** Remove right side mixer support bolt and loosen forward mixer support bolt. Use mixer bolt torque adapter (item 51, table 2–2) with 3/4 drive, 3–inch long extension (item 52, table 2–2). Slowly raise crane to lift rotor head and mast unit while removing forward mixer support bolt. When forward mixer support bolt is removed, lift main rotor head and mast unit out of helicopter.

l. **Secure Main Rotor Drive Shaft Spring.** Position drive shaft spring within shaft hole at top of main transmission.

m. **Install Transmission Shipping Cover.** Aline main transmission shipping cover (item 59, table 2–2) over drive shaft spring and main transmission shaft hole. Secure cover to top of main transmission. Place 18 removed mast base nuts in bag and attach to mast base.

n. **Preservation.** Thoroughly coat all open bolt holes and reinstalled hardware with corrosion preventive compound (D–4).

o. **Component–Wrap.** Wrap exposed end of main rotor drive shaft with barrier material (D–1) sealed with tape (D–13).

p. **Install Main Rotor Head and Mast Unit in Shipping Carrier.** Aline hoisted main rotor head and mast unit over the shipping carrier (item 58, table 2–2). Then carefully lower the unit into the carrier, guide main rotor drive shaft and mixer support bolts into mating carrier base supports, and secure unit to carrier base with four captive bolts. Install mixer support bolts. Install main rotor head carrier corner straps over pitch housing (fig. 2–24) and secure disconnected longitudinal, lateral, and collective mixer clevises to mating carrier turnbuckles, using retained servoactuator rod end hardware. After securing unit in carrier remove mixer spreader.

NOTE

Mixer spreader will be used again during removal of second helicopter main rotor head and mast unit.

q. **Remove Sling and Crane.** Remove sling quick–release pins from main rotor head and hoist sling onto the ground. Uncouple crane lifting hook from air vehicle sling link (lifting eye) and remove crane from the area.

2–25.10.1 Install Main Transmission Left and Right Access Panels. Install access panels (L200 and R200) and engage 12 camloc fasteners on each panel (fig. 2–4).

2–25.10.2 Remove Ice Detector.
TM 1-1520-238-23.

a. Wrap ice detector with cushioning material (D–5) sealed with tape (D–13). Secure in aft storage bay (R330).

b. Remove two clamps on ice detector warm air tube. Deflect tube to fit under sheet metal and secure with tape (D–13).

2–25.10.3 Remove 'Doghouse' Fairing and Radar Jammer Antenna. Release 16 camloc fasteners and remove four screws from fairing (T185). Lift fairing, disconnect antenna plug from receptacle, and remove fairing with antenna in place.

2–25.11 Remove Wire Cutters.

a. **Remove Main Landing Gear Wire Cutters.** TM 1-1520-238-23.

b. **Remove Upper and Lower Fuselage Wire Cutters.** (TM 1-1520-238-23).

c. **Component Wrap.** Wrap wire cutters with cushioning material (D–5) sealed with tape (D–13). Secure wrapped wire cutters in catwalk area.

2–25.12 Remove Steps. Paragraph 2–11.7.

2–25.13 Remove Horizontal Stabilator. Paragraph 2–11.11.

2–25.14 Lock Tail Wheel Landing Gear Strut. Jack helicopter at FS 450 jacking pad. Use jack (item 50, table 2–2). Lift tail wheel just clear of ground. Install tail landing gear strut lock (item 60, table 2–2) over the fully extended tail gear shock strut (fig. 2–25). Lower and remove jack.

2–25.15 Stow Vertical Stabilizer.

a. **Remove FM–AM Whip Antenna (MWO 1–1520–238–50–37 installed)** Paragraph 2–11.14.

b. **Remove Vertical Stabilizer Lower Leading Edge Fairing.** Release 23 camloc fasteners at fairing (L510) (fig. 2–26).

c. **Remove Tailboom Left Side Aft Step.** Remove FS 517/WL 129 left side-step. Wrap step in cushioning material (D–5) secured with tape (D–13). Stow wrapped step in catwalk area.

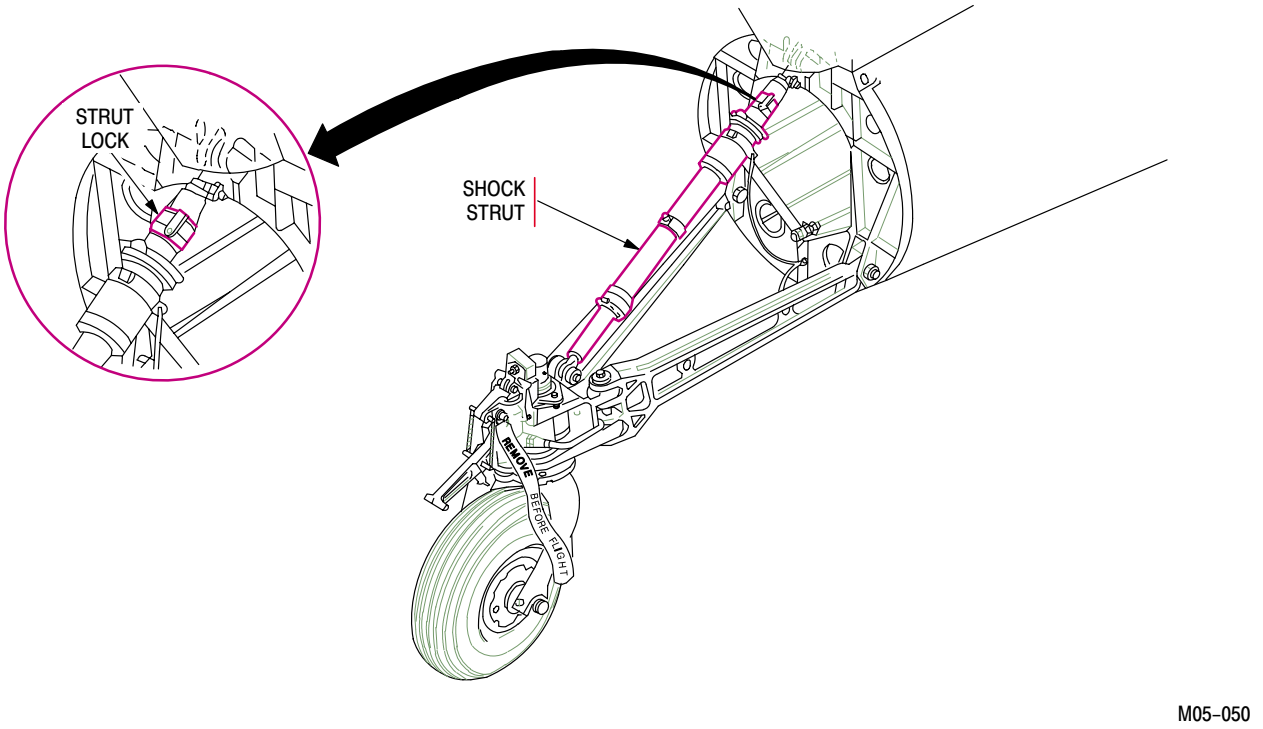


Figure 2–25. Installation of Tail Landing Gear Strut Lock

d. **Disconnect Vertical Stabilizer Forward and Aft Electrical Wiring.** Disconnect two electrical harness plugs from their tailboom bracket receptacles; disconnect coaxial plug (P329) from trailing edge base receptacle; and GPS antenna coaxial plug (P1304), if installed, from receptacle. Tie disconnected plugs (P124) and (P1304) to the intermediate gearbox, and tie plug (P756) to the stabilizer aft bulkhead with twine (D–14). Remove two clamps from the vertical coaxial lead.

e. **Disconnect Vertical Stabilizer Forward and Aft Hydraulic Lines.** Connect four hydraulic quick– disconnect fittings at lower ends of stabilizer vertical structure.

f. **Disconnect No. Five (Tail Rotor) Drive Shaft.** Remove five bolts from fan coupling flange at the tail rotor drive shaft end. Retain removed coupling bolts.

g. **Disconnect Tail Rotor Control Horizontal Pushrod.** Remove cotter pin, nut, washer, and bolt from both ends of pushrod. Discard cotter pins. Slide pushrod forward under drive shaft cover. Reinstall removed pushrod connection bolts, washers, and nuts in related bellcranks.

h. **Install Vertical Stabilizer Sling.**

WARNING

To prevent injury to personnel ensure that stabilizer sling quick release pins are fully bottomed and locked.

Preadjust vertical stabilizer sling (item 47, table 2–2) for proper nominal strap lengths (fig. 2–27). Insert and lock four sling quick–release pins in vertical stabilizer pin sockets, as shown (fig. 2–26). Pass fifth strap through tail rotor pitch links and around the tail rotor drive shaft. With both ends of fifth strap on sling bar end eye, remove all strap slack at the tail rotor drive shaft, and secure the fifth strap buckle.

i. **Aline Lifting Crane.** Position the crane aft of helicopter tail. Aline crane lifting hook over center of tail rotor gearbox fairing.

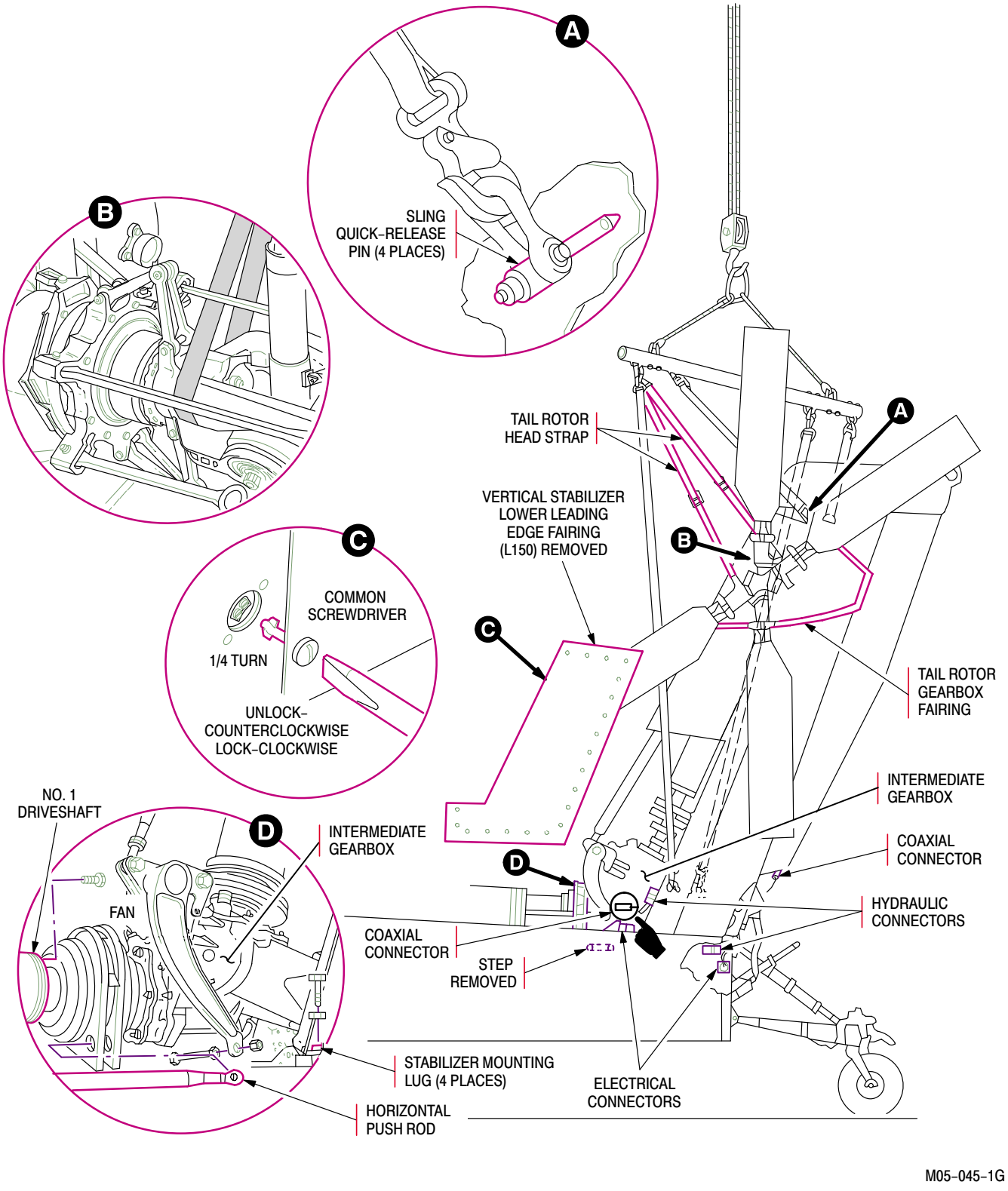


Figure 2–26. Removal, Stowage, and Installation of Vertical Stabilizer (Sheet 1 of 4)

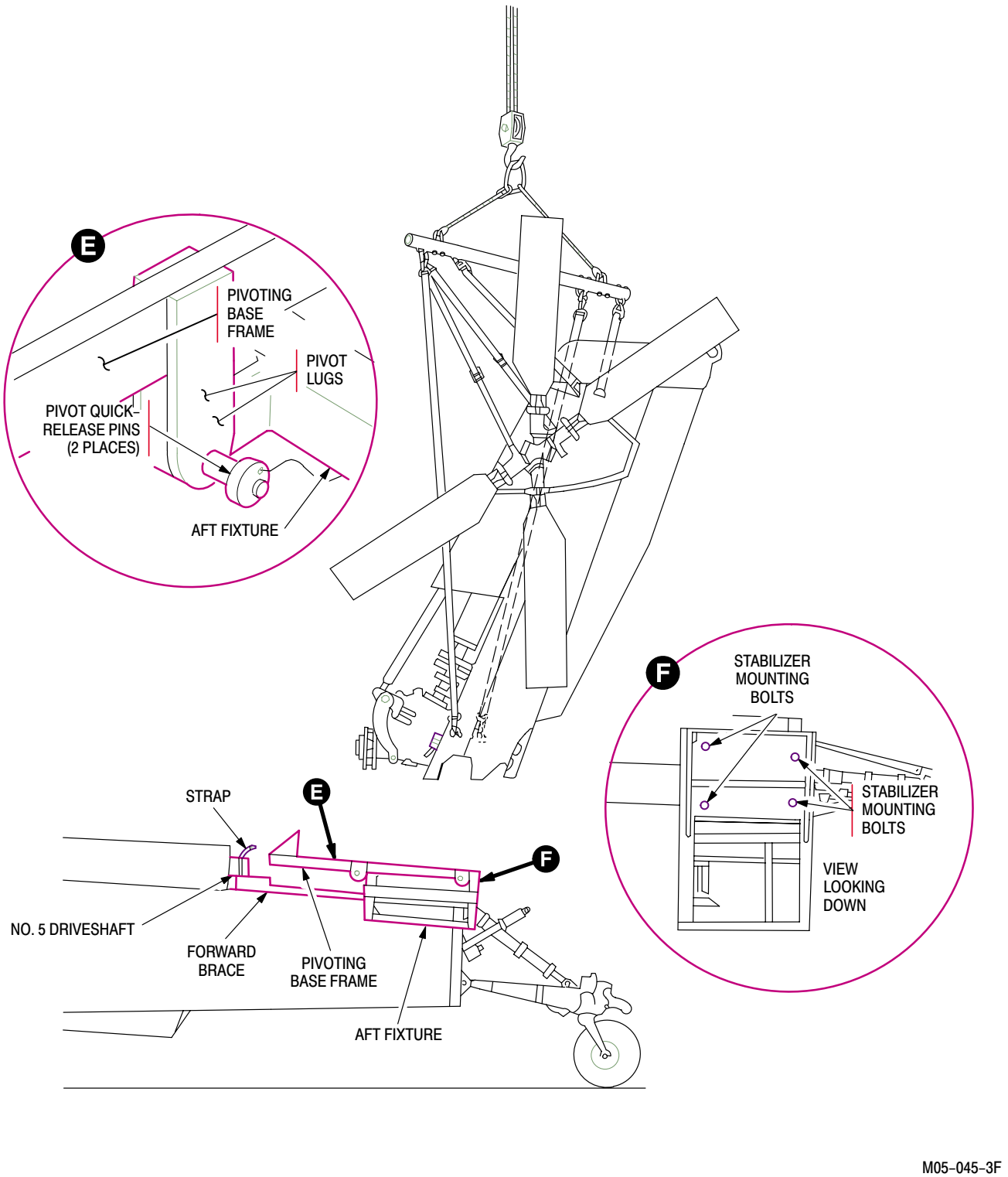


Figure 2–26. Removal, Stowage, and Installation of Vertical Stabilizer (Sheet 2 of 4)

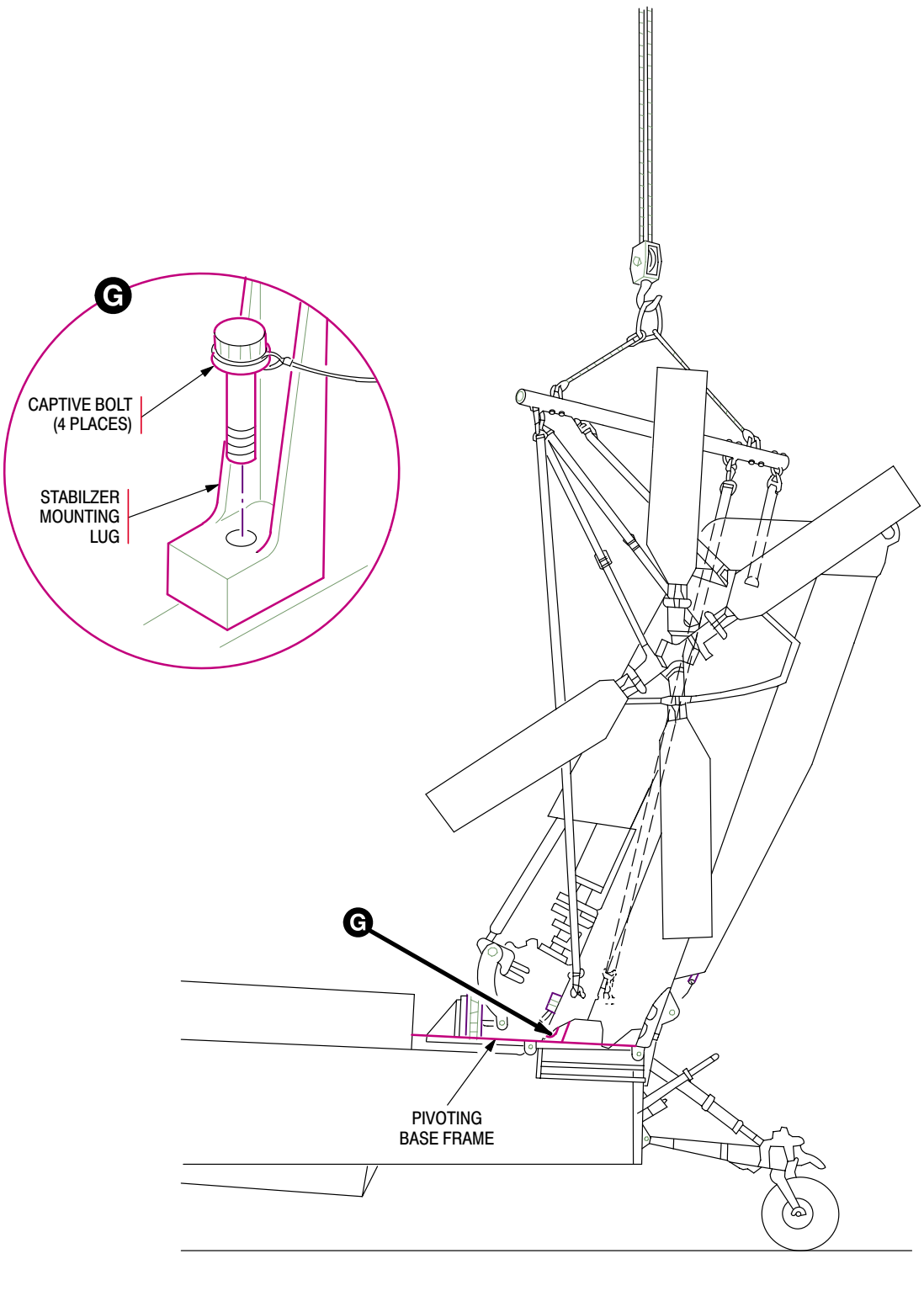


Figure 2–26. Removal, Stowage, and Installation of Vertical Stabilizer (Sheet 3 of 4)

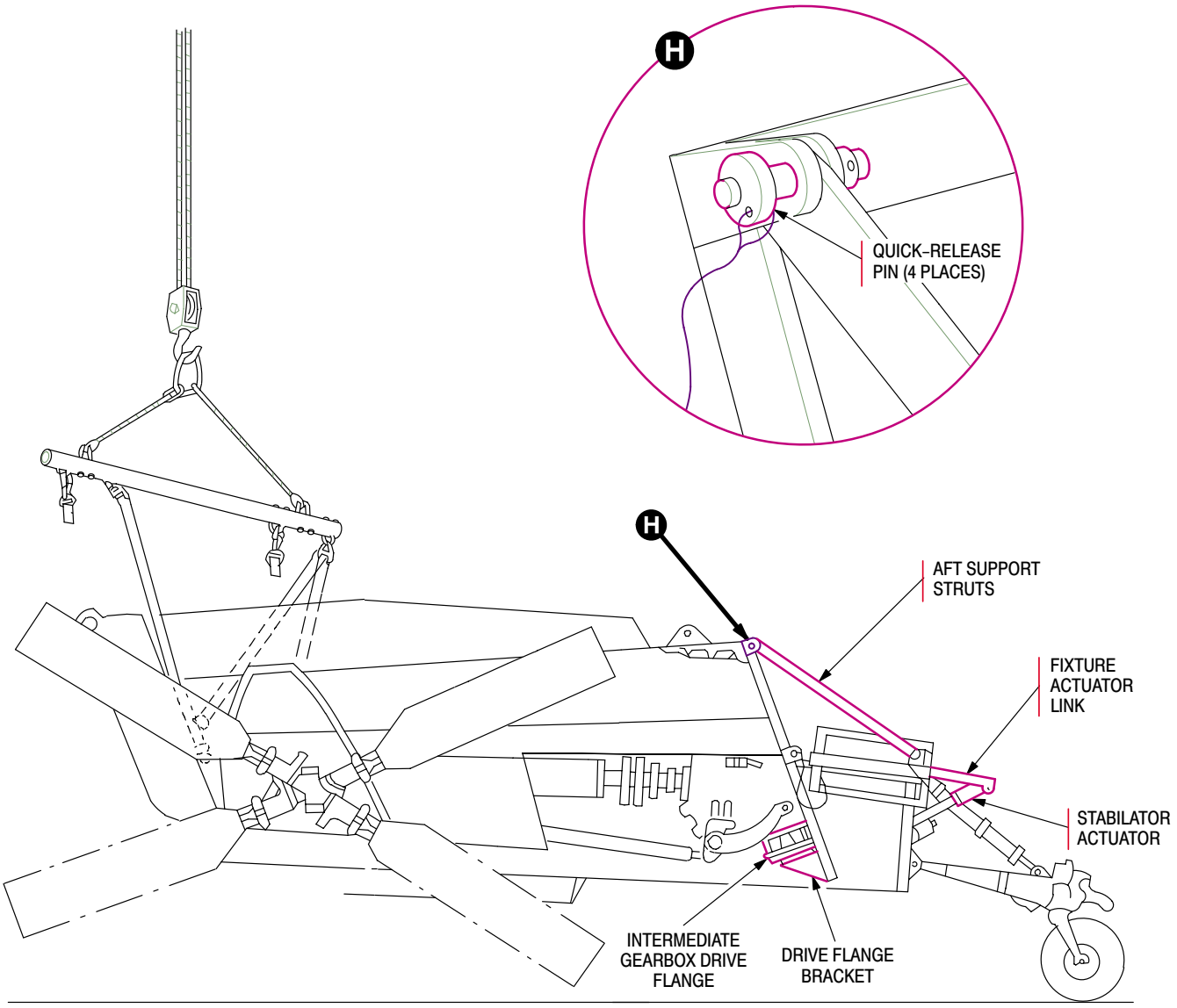


Figure 2–26. Removal, Stowage, and Installation of Vertical Stabilizer (Sheet 4 of 4)

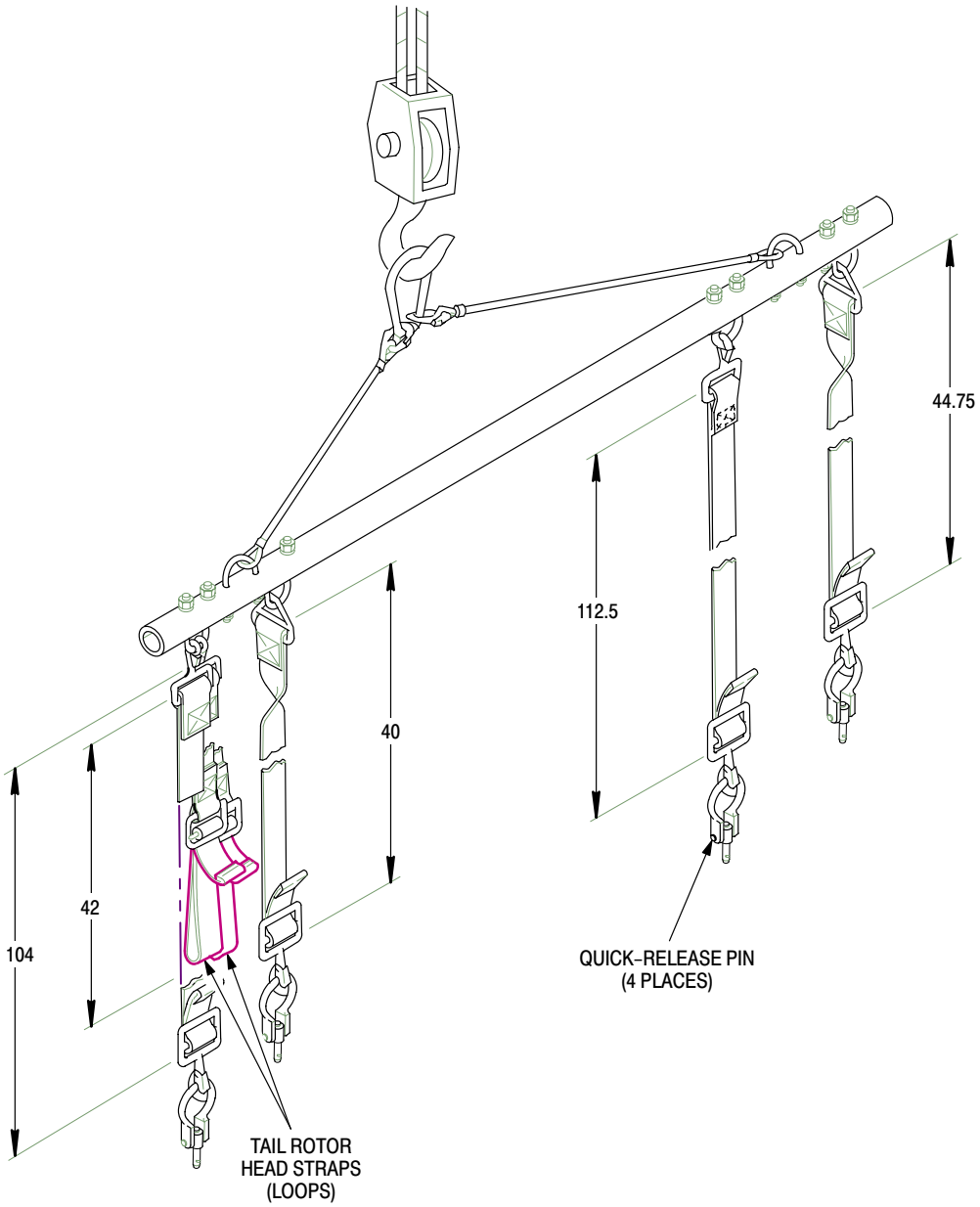


Figure 2–27. Vertical Stabilizer Sling Nominal Strap Adjustment

CAUTION

Sling will be tensioned at this point only enough to remove strap slack. Hoist–loading the installed vertical stabilizer will cause major structural damage.

i. **Couple Sling to Crane.** Connect crane lifting hook to stabilizer sling lifting eye. Carefully operate crane winch to remove all slack from sling straps.

CAUTION

Do not allow vertical stabilizer to swing forward after removal of mounting bolts. Tail rotor drive shaft or horizontal pushrod may be damaged by stabilizer forward movement.

NOTE

Vertical stabilizer will be removed as a unit with gearbox and tailrotor installed.

j. **Remove Vertical Stabilizer Mounting Bolts.** Remove four bolts and washers from stabilizer base mounting lugs. Retain the four bolts and washers.

k. **Hoist Vertical Stabilizer.** Swing vertical, stabilizer directly aft to clear the tail rotor control horizontal pushrod. Hoist stabilizer just above and to the left of helicopter tailboom.

l. **Perform Preservation Procedures.**

(1) Cap all disconnected fittings and connectors.

(2) Apply corrosion preventive compound (D–4) to stabilizer mounting surfaces, pivot fittings and bolt holes.

(3) Pad disconnected intermediate gearbox fan input coupling with barrier material (D–1) sealed with tape (D–13).

(4) Bag removed hardware and place in pilots station.

m. **Install Aft Stowing Fixture.** Use stowing kit (item 55, table 2–2). Mount stowing kit aft fixture on helicopter tailboom, with fixture forward brace alined under the disconnected drive shaft. Use the four removed stabilizer mounting bolts and washers. Torque four mounting bolts to **90 foot–pounds (1080 inch–pounds).**

n. **Secure Tail Rotor Drive Shaft to Aft Stowing Fixture.** Use fixture forward brace hook–and–pile strap.

o. **Connect Pivoting Base Frame to Aft Fixture.** Aline stowing kit pivoting base frame and aft fixture pivot lugs. Install the two pivot quick–release pins.

p. **Install Vertical Stabilizer on Pivoting Base Frame.** Mount vertical stabilizer on base frame. Use the four captive bolts attached to the base frame. Torque four captive bolts to **8 foot–pounds (96inch–pounds)**.

q. **Aline Tail Rotor.** Position tail rotor blades as shown. Secure intermediate gearbox drive flange to fixture drive flange bracket. Use five removed fan coupling bolts.

NOTE

Prior to removal of tail rotor blades ensure that they are properly color coded and marked with the helicopter tail number. The two removed blades will be in the lower position when stabilizer is down and stowed (fig. 2–22).

r. **Remove Two Forward Tail Rotor Blades.** TM 1-1520-238-23.

(1) Install pitch link bolt, nut, and washers in pitch horn.

(2) Install tail rotor blade bolt and nut in tail rotor blade.

(3) Cap or wrap deicing connectors with barrier material (D–1) sealed with tape (D–13).

(4) Coat bare metal of tail rotor hub surfaces with corrosion preventive compound (D–4).

(5) Wrap disconnected pitch links with cushioning material (D–5) sealed with tape (D–13) and secure wrapped links to tail rotor hub with tape (D–13).

(6) Wrap each tail rotor blade hub fitting area with barrier material (D–1) sealed with tape (D–13).

(7) Install two tail rotor blades in blade support (item 4, table 2–2) (fig. 2–7) and secure with tie down strap.

s. **Partially Lower Vertical Stabilizer.** Reel–out crane winch and carefully swing down stabilizer until two long (stabilizer bottom) sling straps and strap around tail rotor drive shaft are slack. Unlock and remove two long strap sling pins from stabilizer bottom pin sockets. Unbuckle and remove one end of tail rotor shaft strap from sling bar.

t. **Lower Vertical Stabilizer to Stowed Position.** Reel–out crane winch and swing top end of the stabilizer forward and down. Aline stabilizer forward (lower) edge parallel to lower surface of tailboom.

u. **Install Aft Support Struts.** Install stowing kit aft struts on base frame and aft fixture. Use the four strut quick–release pins.

v. **Support Stabilator Actuator.** Connect actuator rod end to the aft fixture actuator link. Use removed rod end clevis bolt, washer, and nut.

w. **Verify Stowed–Position Security.** Fully reel–out crane winch. Check security of stowed vertical stabilizer, with sling straps fully slack.

x. **Remove Stabilizer Sling.** Unlock and remove remaining two sling pins from stabilizer top end pin sockets. Remove sling lifting eye from crane hook.

y. **Stow Vertical Stabilizer Lower Leading Edge Fairing.** Wrap fairing (L510) in cushioning material (D–5) and stow between aft support struts.

2–25.16 Remove ADF Wire Antenna and UHF L–Band, Communications, and Transponder Blade Antennas. Paragraph 2–11.14.

2–25.16.1 Remove Pylons from Wings.
TM 1-1520-238-23 Wrap with cushioning material (D–5) and secure with tape (D–13). Stow wrapped pylons in catwalk area.

2–25.17 Remove and Stow Wings. Paragraph 2–11.15.

2–25.18 Install Fly Away Covers.
TM 1-1520-238-23.

2–25.19 Remove LDS Forward Sensor Units (MWO 1–1520–238–50–50 installed) (fig. 2–28).

CAUTION

When handling sensor unit, do not press on sensor window . The glass is fragile and may be scratched, cracked, or broken.

a. **Remove forward LDS Sensor Units.** Remove two screws from weather stripping angles on aft side of sensor units. Remove weather stripping angles. Remove six screws from each sensor unit flanges and pull on sensors. If sealant will not permit removal, gently pry weather striping angles/sensor units with plastic (phenolic) tool to break sealant loose. Disconnect plugs from receptacles and remove sensors. Cover receptacles and plugs with protective dust caps (D–24).

b. **Stow LDS Sensor Units.** Wrap each sensor with cushioning material (D–5) and secure with tape (D–13). Line bottom and sides of box (D–3) with cushioning material (D–5), Place weather stripping angles and wrapped sensor units in box and place more cushioning material on top of sensor units. Secure box with tape (D–13). Place part number and nomenclature on outside of box.

2–26 TRANSPORTED GROUND SUPPORT EQUIPMENT.

Paragraph 2–12.

2–27 MARKING.

Paragraph 2–13.

2–28 HELICOPTER LOADING AND TIEDOWN (C–141B AIRCRAFT SHIPMENT).

Paragraphs 2–28.1 thru 2–28.29 provide procedures for the loading and tie down of two AH–64A helicopters in a C–141B cargo aircraft. The loaded configuration of the C–141B aircraft is shown in figure FO–2.

2–28.1 Air Force Responsibilities During Loading.Paragraph 2–1 and 2–14.1. Also the Air Force loadmaster shall direct kneeling and erecting operations during loading.

2–28.2 Army Unit Responsibilities During Loading. Paragraph 2–2 and 2–14.2. Also the Army Unit shall connect, test, and operate hydraulic kneeling cart.

WARNING

Safetied condition of armament, canopy jettison, fuel and electrical systems must be verified before loading helicopters, to avoid hazard of accidental fire or explosion.

2–28.3 Verify Preliminary Safety Procedures. Check and ensure performance of all preliminary safety procedures listed in paragraphs 2–24.2.

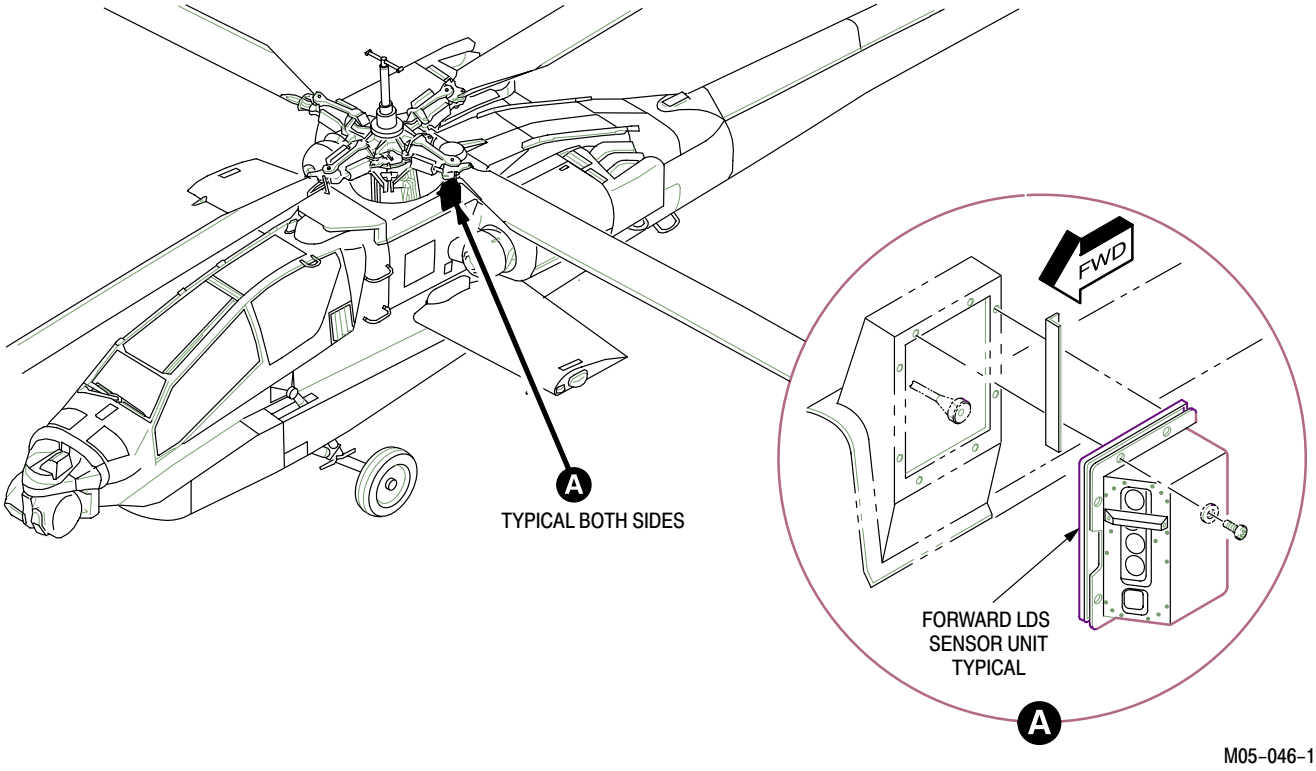


Figure 2–28. Removal and Installation of Forward LDS Sensor Units

2–28.4 Load Two Main Rotor Head and Mast Units.

WARNING

Loaded main rotor head and mast unit shipping carriers are top–heavy. Handle with extreme care to avoid injury.

a. **Load Unit Shipping Carriers on Aircraft Cargo Floor.** Use aircraft winch to hoist loaded carriers onto cargo floor (fig. FO–2).

b. **Aline Shipping Carriers in Loaded Positions.** Carefully roll each carrier into position at forward end of aircraft cargo floor.

c. **Tie Down Shipping Carriers.** Install four 5000–pound tiedown straps at corner rings of each carrier (eight tiedowns). Install shipping carrier wheel chocks.

2–28.5 Load One Hellfire Launcher. Position one packed Hellfire launcher container on forward cargo floor, aft of right side main rotor head and mast unit (fig. FO–2).

2–28.6 Load One 2.75 Inch Rocket Launcher. Position one packed 2.75 inch rocket launcher on top of Hellfire launcher.

2–28.7 Load One M230 Gun Turret. Position one packed gun turret container on forward cargo floor, aft of left side main rotor head and mast unit (fig. FO–2).

2–28.8 Configure C–141B Loading Ramp. Figure 2–28.1.

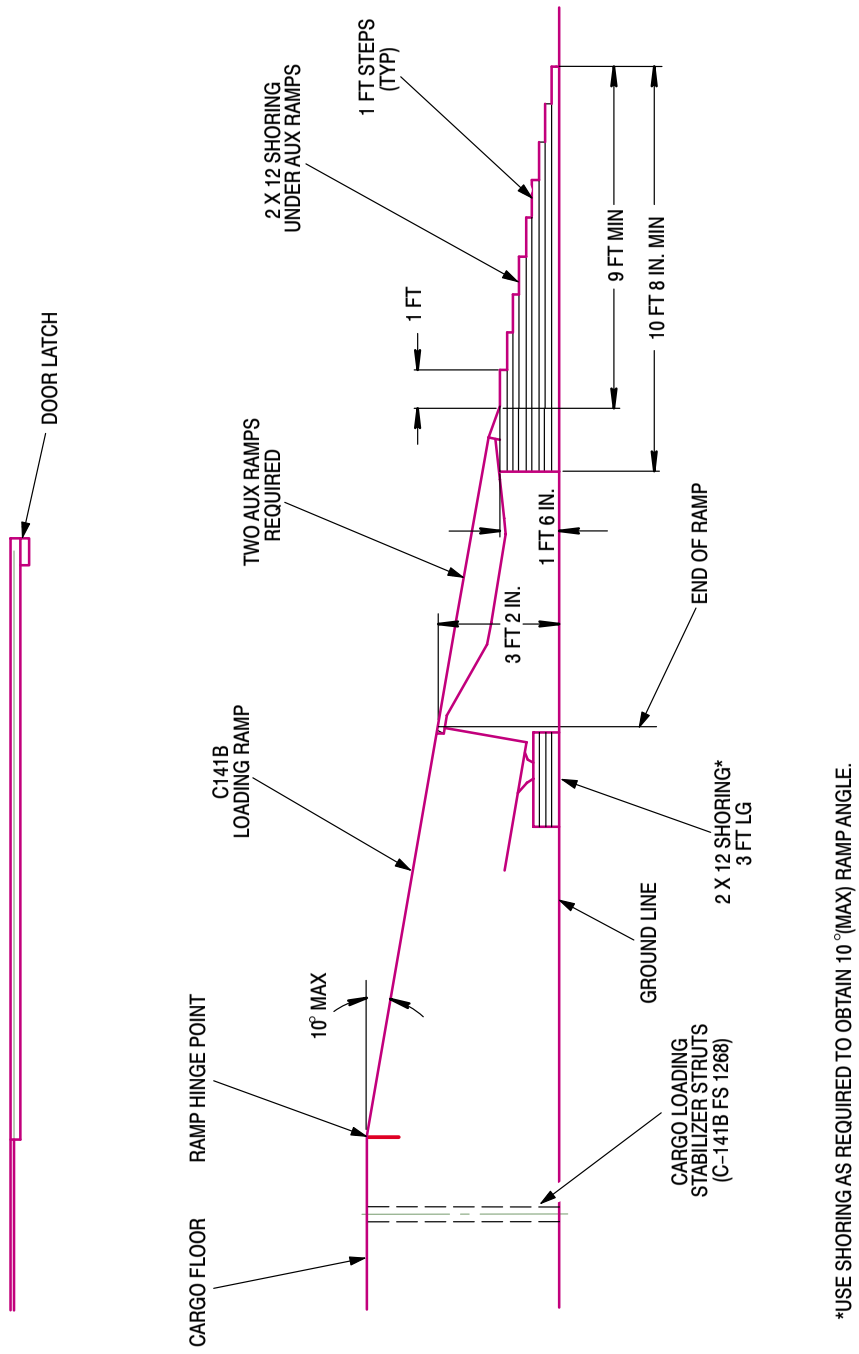


Figure 2–28.1. C–141B Cargo Aircraft Loading Ramp and Shoring Configuration

CAUTION

Loading ramps may have to be shored to obtain an over–all slope angle often degrees or less. A steeper ramp will reduce helicopter clearances, resulting in possible helicopter or cargo aircraft damage.

a. **Set Up Main Ramp.** Fully lower cargo aircraft main ramp. Support bottom end of ramp with shoring, as shown. Erect cargo loading stabilizer struts.

b. **Install Auxiliary Ramps.** Set up two 24–inch wide auxiliary ramps for helicopter landing gear wheels. Aline ramp centerlines 6 feet 8 inches apart and parallel to cargo aircraft centerline. Shore auxiliary ramps as shown.

c. **Check and Adjust Ramp Slope.** Measure slope angle of ramp (and shoring). An angle of ten degrees or less, is required. If necessary, adjust thickness of main and auxiliary ramp shoring to obtain required slope angle.

WARNING

One person will occupy CPG station in each helicopter as it is loaded, to operate helicopter brakes when required.

CAUTION

Ramp shoring will be used under helicopter main and tail wheels as needed for under belly clearance. Improper clearance will cause damage to helicopter and cargo aircraft.

2–28.9 Load First Helicopter Nose–In. (fig. 2–29 and FO–2).

a. **Unlock Tail Wheel Swivel.** Push swivel lock lever down to release tail wheel swivel lock. Install tail wheel lock safety pin (fig. 2–14).

b. **Install Tail Wheel Steering Bar and Winching Yoke.** Connect winching yoke (item 8, table 2–2) to tail landing gear wheel fork (fig. 2–14). Tighten yoke studs onto ends of the tail wheel axle. Install steering bar in yoke tube.

NOTE

Tail wheel steering bar will be used to steer the helicopter and to keep main and tail wheels on the loading ramps.

c. **Connect and Checkout Hydraulic Cart (item 10, table 2–2).**

WARNING

- **Prior to operating hydraulic cart, personnel must be thoroughly familiar with operation and safety procedures contained in paragraphs 8–4, 8–5, and 8–6.**
- **Personnel must remain clear of helicopter during kneeling and erecting operations to prevent injury to personnel in event of main landing gear strut collapse and helicopter roll over.**

CAUTION

The hydraulic cart will be tested with the helicopter clear of the C–141B to prevent possible damage to the C–141B in the event of main landing gear collapse and helicopter rollover.

Connect hydraulic cart to helicopter (paragraph 8–4).

NOTE

Hydraulic cart will be rolled along with the main landing gear as helicopter is loaded into the cargo aircraft.

d. **Aline First Helicopter at Loading Ramp.** Position helicopter main landing gear wheels at base of sloped ramp shoring. Aline helicopter nose over ramp centerline (fig. 2–29).

e. **Connect Cargo Aircraft Winch Cable to Helicopter.** Couple hooks on forward winching adapter cable (item 7, table 2–2) to helicopter main wheel arm inboard eyes (fig. 2–15). Couple forward winching adapter cable towing eye to the aircraft winch cable. Have loadmaster operate winch and take up all cable slack.

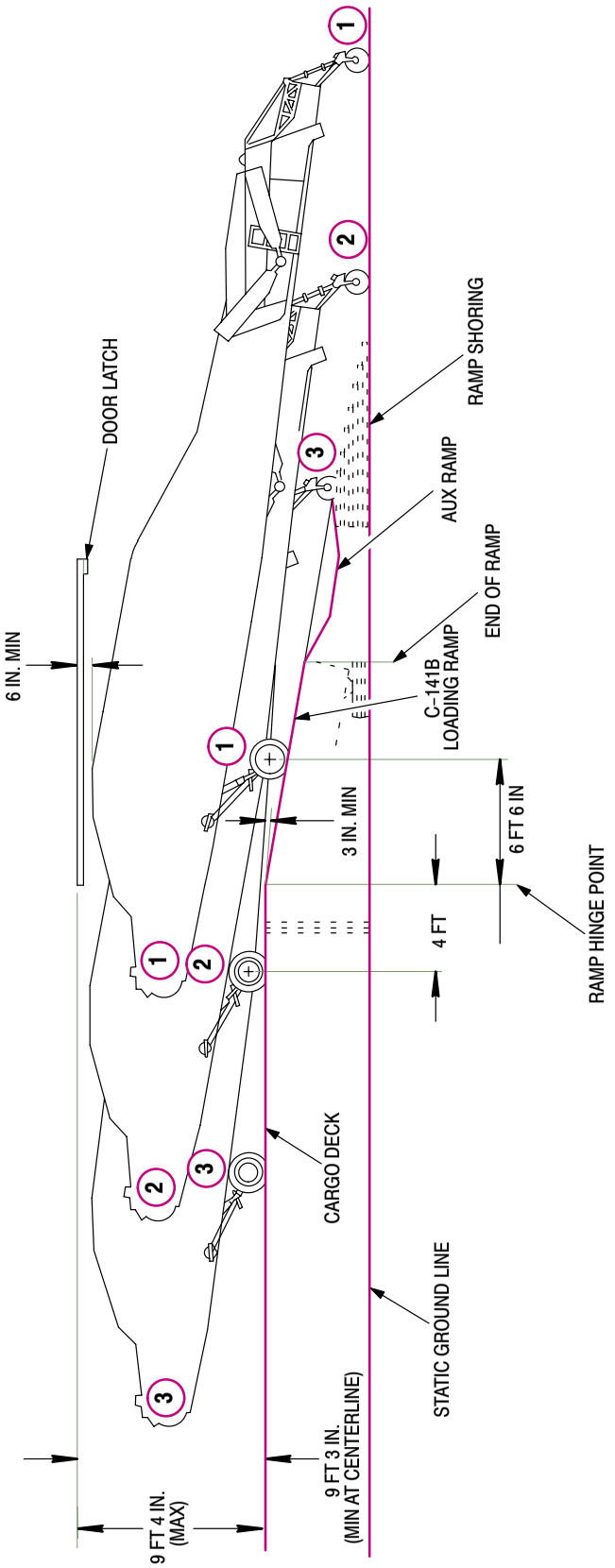


Figure 2–29. C–141B Cargo Aircraft Nose–In Helicopter Loading Profile

f. **Tow Helicopter to Position One.**

CAUTION

- **During the following procedures, helicopter underbelly and overhead clearances will be continuously checked to prevent damage to helicopter or cargo aircraft. Where necessary, helicopter height will be adjusted by kneeling or raising and by using shoring under tail wheel.**
- **To prevent excessive stress on helicopter landing gear and C–141B cargo winch, do not apply brakes during kneeling and erecting operations.**

Release helicopter brakes. Have loadmaster operate cargo aircraft winch and carefully tow helicopter up loading ramps until main landing gear wheels are 6–1/2 feet aft of the main ramp hinge (position one, fig. 2–29).

NOTE

Hydraulic cart will be rolled along with the main landing gear as helicopter is loaded into the cargo aircraft.

g. **Perform Kneeling Operation.** Paragraph 8–5.

h. **Tow Helicopter to Position Two.** Tow helicopter forward, while kneeling or erecting helicopter (paragraph 8–5 or 8–6) where required for overhead and ramp hinge clearance. Stop towing when main landing gear wheels are four feet forward of main ramp hinge (position two, fig. 2–29).

NOTE

Tail wheel will be at base line of ramp shoring when helicopter is at Position two.

i. **Reposition One Auxiliary Ramp for Tail Wheel.** Reposition left or right auxiliary ramp and shoring to center of loading ramp.

j. **Tow Helicopter to Position Three.** Tow helicopter forward until tail wheel is at base of the center auxiliary ramp (position three, fig. 2–29).

k. **Tow Helicopter into Cargo Compartment.** Guide tail wheel over the center auxiliary ramp and carefully tow helicopter to its tiedown location (fig. FO–2). When helicopter is properly located, set brakes, center the tail wheel, and chock main landing gear wheels with lumber or plywood blocks.

l. **Check and Adjust Helicopter Height.** Measure heights of left and right forward fuselage tiedown fitting centerlines (main landing gear cross tube) from the aircraft cargo floor. A height of 29 inches is required at each fitting. If necessary, kneel main landing gear shock struts to obtain required height. Close shutoff valves.

m. **Disconnect Hydraulic Cart.** Paragraph 8–5f.

NOTE

Shut–off valve will remain connected to shock struts for use when unloading.

n. **Lock Tail Wheel.** Remove tail wheel lock safety pin. Lift swivel lock lever to engage the tail wheel swivel lock (fig. 2–14). Push wheel sideways to check lock engagement. A locked tail wheel will not swivel.

o. **Remove Tail Wheel Steering Bar and Winching Yoke.** With tail wheel centered, loosen yoke studs from tail wheel axle and remove the yoke (fig. 2–14). Remove steering bar from yoke tube.

p. **Disconnect Cargo Aircraft Winch Cable from Helicopter.** Unhook forward winching adapter cable from helicopter main landing gear arms (fig. 2–15). Uncouple adapter cable towing eye from aircraft winch cable.

2–28.10 Load Six Main Rotor Blades. Position three main rotor blade rack sets holding two blades each (fig. 2–2), on cargo floor under helicopter number one fuselage (fig. FO–2).

2–28.11 Load One Hellfire Launcher. Position one packed Hellfire launcher container on cargo floor, aft of the left outboard main rotor blade racks (fig. FO–2).

2–28.12 Load One 2.75 Inch Rocket Launcher. Position one packed 2.75 inch rocket launcher on top of Hellfire launcher.

2–28.13 Load one M230 Gun Turret. Position one packed gun turret container on cargo floor under helicopter number one tail rotor (fig. FO–2).

2–28.14 Load Second Helicopter Tail–In.

a. **Unlock Tail Wheel Swivel.** Paragraph 2–28.9a.

b. **Install Tail Wheel Winching Yoke.** Paragraph 2–28.9b. Do not install steering bar at this time.

c. **Connect and Checkout Hydraulic Cart.**

WARNING

- **Prior to operating hydraulic cart, personnel must be thoroughly familiar with operation and safety procedures contained in chapter eight.**
- **Personnel must remain clear of helicopter during kneeling and erecting operations to prevent injury to personnel in event of main landing gear strut collapse and helicopter roll over.**

CAUTION

The hydraulic cart will be tested with the helicopter clear of the C–141B to prevent possible damage to the C–141B in the event of main landing gear collapse and helicopter rollover.

Connect hydraulic cart to helicopter (paragraph 8–4).

NOTE

Hydraulic cart will be rolled along with the main landing gear as helicopter is loaded into the cargo aircraft.

d. **Aline Second Helicopter at Loading Ramp.** Aline helicopter tailboom with cargo aircraft centerline. Position helicopter tail landing gear wheel at base of center ramp shoring.

e. **Connect Cargo Aircraft Winch Cable to Helicopter.** Couple aircraft winch cable to tail wheel winching yoke eye (fig. 2–16). Have loadmaster operate winch and take up all cable slack.

f. **Tow Helicopter to Position One.**

CAUTION

- **During the following procedures, helicopter underbelly and overhead clearances will be continually checked to prevent damage to helicopter or cargo aircraft. Where necessary, helicop– ter height will be adjusted by kneeling or erecting helicopter and by using shoring under tail wheel.**
- **To prevent excessive stress on helicopter landing gear and C–141B cargo winch, do not apply brakes during kneeling and erecting operations.**

Release helicopter brakes. Have loadmaster operate cargo aircraft winch and carefully tow helicopter tail into the aircraft until main landing gear wheels are at base of remaining ramp shoring (position one, fig. 2–30).

g. **Reposition Auxiliary Ramp.** Reposition center auxiliary ramp and shoring to side of loading ramp so that ramp centerlines are 6 feet 8 inches apart, alined with main landing gear wheels, and parallel to helicopter centerline.

h. **Tow Helicopter to Position Two.** Tow helicopter forward until main landing gear wheels are 6–1/2 feet aft of the main ramp hinge (position two, fig. 2–30).

i. **Kneel Helicopter to Position Three.** Kneel helicopter (paragraph 8–5) and reduce helicopter fuselage–to–ramp hinge clearance to 10 inches (position three, fig. 2–30).

j. **Tow Helicopter into Cargo Compartment.** Tow helicopter forward until main landing gear wheels are just forward of the main ramp hinge. Install steering bar in tail wheel winching yoke tube (fig. 2–14) and use steering bar to carefully guide helicopter to its tiedown location (fig. FO–2). When helicopter is properly located, set brakes, center the tail wheel, and chock main landing gear wheels with lumber or plywood blocks.

k. **Check and Adjust Helicopter Height.** Paragraph 2–28.9l.

l. **Disconnect Hydraulic Cart.** Paragraph 8–5f. Roll hydraulic cart down loading ramps from aircraft, disconnect power source, and prepare disconnected cart and kneeling hose components for shipping.

NOTE

Shut–off valve will remain connected to shock struts for use when unloading.

m. **Lock Tail Wheel.** Paragraph 2–28.9n.

n. **Remove Tail Wheel Steering Bar and Winching Yoke.** Paragraph 2–28.9o.

o. **Disconnect Cargo Aircraft Winch Cable from Helicopter.** Disconnect winch cable from tail wheel winching yoke (fig. 2–16).

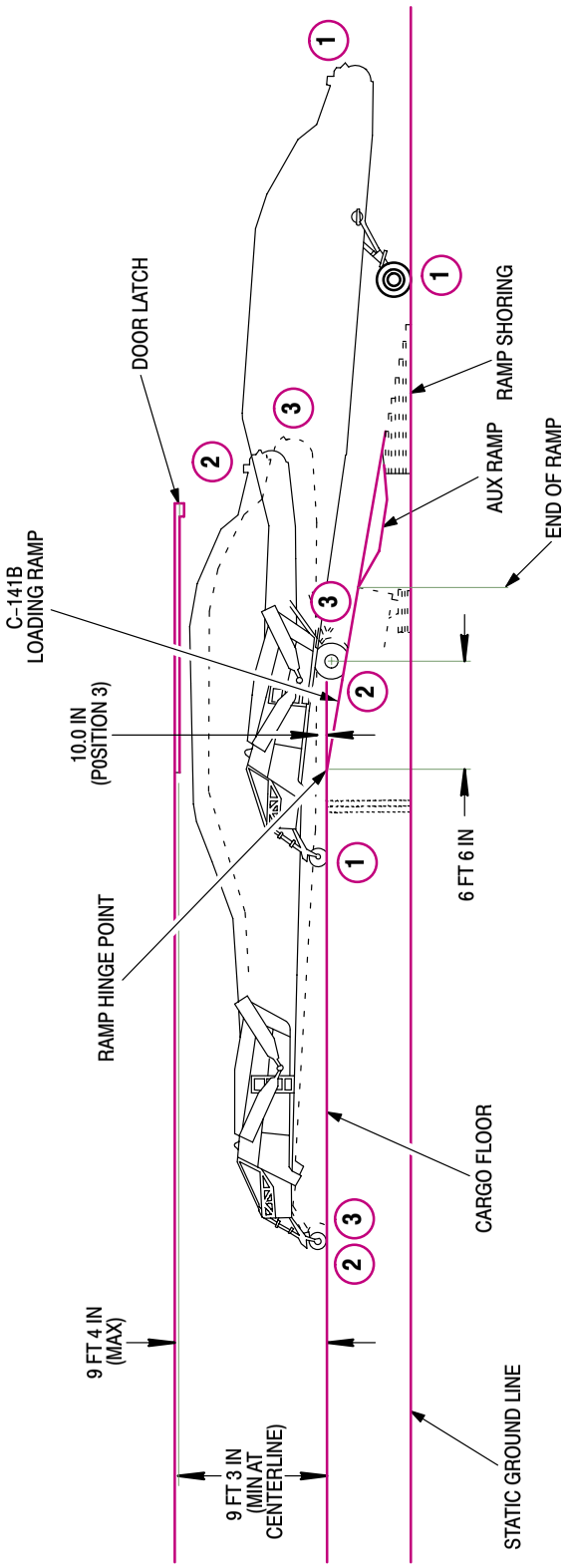


Figure 2–30. C–141B Cargo Aircraft Tail–In Helicopter Loading Profile

2–28.15 Load Two Horizontal Stabilators. Position two stabilators on right side of cargo deck, under helicopter number two tail rotor and left engine (fig. FO–2).

2–28.16 Load Two Doghouse Fairings. Position two doghouse fairings on cargo deck inboard of horizontal stabilators, under helicopter number 2 tailboom (fig. FO–2).

2–28.17 Load Two M230 Guns. Position two packed gun containers under helicopter number two fuselage (fig. FO–2).

2–28.18 Install Helicopter Number One and Number Two Fuselage Station 450 Supports. Remove quick release pin holding FS450 jack pad wire deflector. Secure wire deflector in open position. Jack each helicopter at the tail landing gear jacking pad and aline a fuselage station 450 support (item 61, table 2–2) under each fuselage station 450 (tail boom) jack pad. Lower and remove jack.

2–28.19 Install Vertical Stabilizer Adapter Jacks on Helicopters.

a. **Position Jack Adapter at Vertical Stabilizer.** Figure 2–31.

b. **Open –9 Fitting Assemblies.** Using knurled knob, open –9 fitting assemblies and remove –11 pin assembly (fig. 2–32).

c. **Loosen Nuts.** Loosen, but do not remove; two nuts on dash –11 pin assembly.

d. **Remove Jack Handle.** Remove jack handle from retainer clips on jack stand assembly.

e. **Position Jack Adapter.** Place jack adapter under vertical stabilizer and align –9 fittings (pin retainer) with vertical stabilizer upper sling pin receptacle and install pins into receptacles.

f. **Raise or Lower Adapter.** Using jack handle raise or lower adapter and position pin retainers around –11 pins. Close pin retainers and rotate knobs to lock pins in place.

g. **Center Jack Adapter.** Center jack adapter to vertical stabilizer by adjusting nuts on –11 pins. Close pin retainers and rotate knobs to lock pins in place.

h. **Rotate Jack Screw.** With jack stand adapter secured to vertical stabilizer, rotate jack screw to raise vertical stabilizer and relieve pressure on folding fixture support rod pins. Adjust jack as required to remove pins.

i. **Remove Support Rods.** Remove both support rods and reinstall pins into folding fixture.

j. **Wrap Support Rods.** Wrap support rods with cushioning material (D–5) sealed with tape (D–13). Stow rods for shipment.

k. **Secure Jack Adapter.** Using tie downs, secure jack adapter for transport. Stow jack handle in retainer clips.

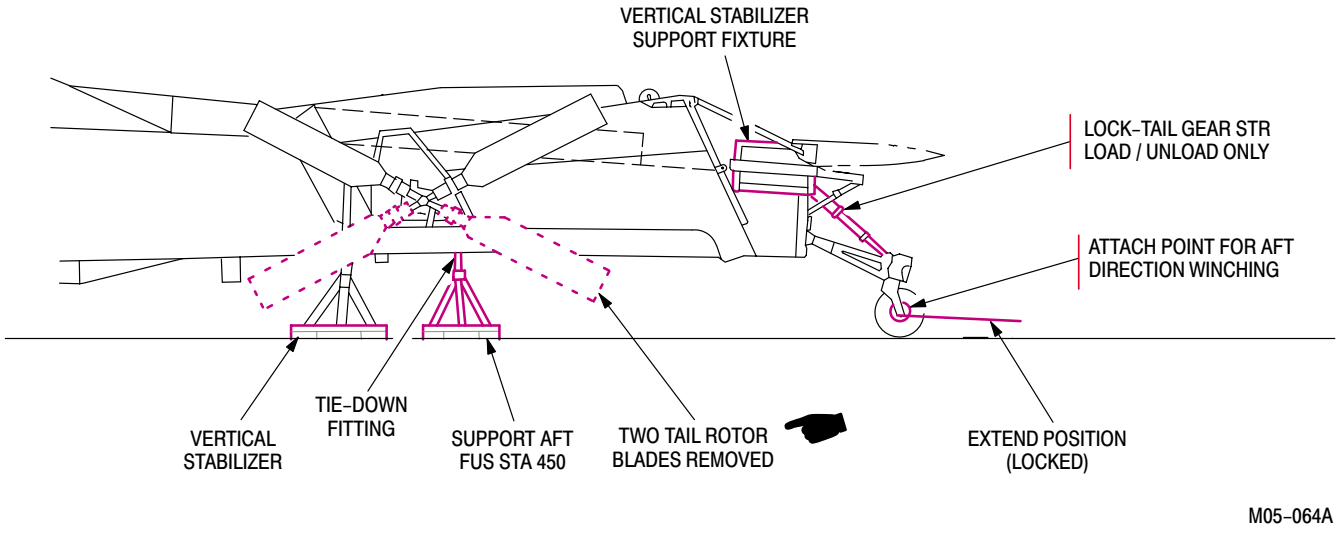


Figure 2–31. Positioning of Jack Adapters at Vertical Stabilizer

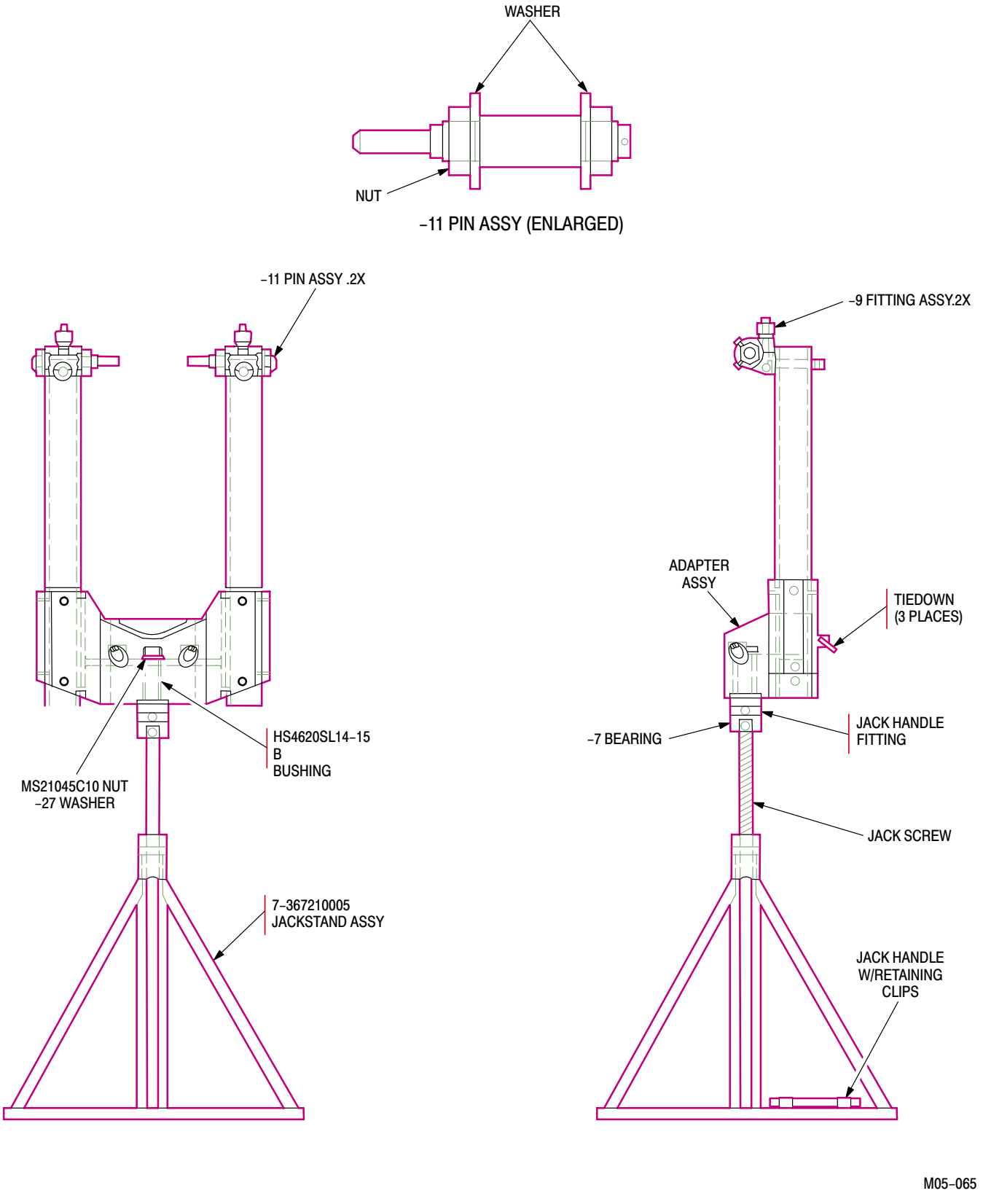


Figure 2–32. Jack Adapters for Vertical Stabilizer

2–28.20 Load Two Main Rotor Blades. Position the remaining main rotor blade rack set holding two blades (fig. 2–2), on left side of cargo deck, under helicopter number two (fig. FO–2).

2–28.21 Tiedown Helicopter Number One and Number Two.

CAUTION

Tiedown restraints will be tensioned only enough to remove all free play. Over–tightened tiedowns will damage helicopter structure.

a. **Tiedown Four Forward Fuselage Fittings.** Install three 25,000–pound tiedown chains at each of forward fuselage tiedown fittings (two fittings per helicopter) (fig. 2–17).

b. **Tiedown Two Fuselage Tailboom Fittings.**

CAUTION

To prevent structural damage to helicopters, tiedown chains shall pass through FS 450 jack pad fitting.

Install two 10,000–pound tiedown chains at FS 450 jackpad tiedown fittings (one fitting per helicopter) (fig. 2–17).

2–28.22 Load Four Tail Rotor Blades. Position two tail rotor blade supports holding two blades each, on aft end of cargo floor, under helicopter nose (fig. 2–7 and FO–2).

2–28.23 Level Main Loading Ramp. Remove auxiliary ramps and shoring. Raise main ramp to cargo floor level (fig. FO–2).

2–28.24 Load Two Main Rotor Shaft Fairings. Position two fairing packages on cargo floor, just aft of main ramp hinge (fig. FO–2).

2–28.25 Load Two Hellfire Launchers. Position two packed Hellfire launcher containers on right side of main ramp, in front of helicopter nose (fig. FO–2).

2–28.26 Load Two 2.75 Inch Rocket Launchers. Position one packed 2.75 inch rocket launcher on each loaded Hellfire launcher.

2–28.27 Load Ramp Shoring and Ground Support Equipment to be Shipped. Position boxed ground support equipment and ramp shoring on main ramp, aft of main rotor shaft fairings and to left of Hellfire launchers (fig. FO–2).

NOTE

Vertical stabilizer sling, air vehicle sling, forward winching adapter cable, tail wheel steering bar, and disconnected hydraulic cart and kneeling hose components will be shipped with the helicopters. These ground support equipment items are to be wrapped and packaged per paragraph 2–12.

2–28.28 Tiedown Eight Main Rotor Blades. Paragraph 2–14.27.

2–28.29 Tiedown Loose Helicopter Components and Ground Support Equipment. Install 5000–pound tiedown straps on floor–loaded Hellfire launchers, guns, turrets, rocket launchers, main rotor blade racks, horizontal stabilators, fairings, tail rotor blade supports, and boxed ground support equipment. Use enough tiedowns to secure these components to their cargo floor and ramp locations (fig. FO–2).

NOTE

Cargo nets may be used in place of straps to tiedown loose helicopter components and ground support equipment.

2–29 HELICOPTER OFFLOADING (C–141B AIRCRAFT)

Helicopter and component offloading from C–141B will be performed in accordance with procedures outlined in paragraph 2–29.1 through 2–29.24 (fig. FO–2).

2–29.1 Remove Tiedowns From Floor–Loaded Components and Equipment. Unfasten and remove tiedown straps from ramp and cargo floor locations of fairings, tail rotor blade supports, guns, turrets, rocket launchers, horizontal stabilators, main rotor blade racks, Hellfire launchers, and boxed ground support equipment.

2–29.2 Unload Ground Support Equipment. Remove boxed ground support equipment from main ramp.

2–29.3 Unload Two 2.75 Inch Rocket Launchers. Remove one packed rocket launcher from top of each Hellfire launcher on main ramp.

2–29.4 Unload Two Hellfire Launchers. Remove two packed launcher containers from main ramp.

2–29.5 Unload Two Main Rotor Shaft Fairings. Remove two fairing packages from main ramp.

2–29.6 Unload Four Tail Rotor Blades. Remove two tail rotor blade supports from aft end of cargo floor, under helicopter number two nose.

2–29.7 Unload Two Main Rotor Blades. Remove one main rotor blade rack from left side of cargo floor, under helicopter number two.

2–29.8 Unload Two M230 Guns. Remove two packed gun containers from cargo floor, under helicopter number two.

2–29.9 Unload Two Doghouse Fairings. Remove two doghouse fairings from cargo floor, under helicopter number two tailboom.

2–29.10 Unload Two Horizontal Stabilators. Remove two stabilators from right side of cargo floor, under helicopter number two tail rotor and left engine.

2–29.11 Configure C–141B Loading Ramp. Paragraph 2–28.8.

2–29.12 Remove Helicopter Number One and Number Two Fuselage Station 450 Supports. Jack each helicopter at the tail landing gear jack pad and remove the fuselage station 450 support. Lower and remove jack (fig. 2–31).

2–29.13 Remove Helicopter Vertical Stabilizer Adapter Jacks.

CAUTION

To prevent damage to vertical stabilizer and helicopter fuselage, folding fixture support rods and pins shall be installed prior to removing jack adapter or attempting to move helicopter.

a. **Loosen Tie Downs.** Loosen tie downs on jack adapter and adjust jackscrew until support rods and pins can be installed (fig. 2–31).

b. **Install Support Rods and Pins.** Figure 2–32.

c. **Lower Jack Adapter.** Lower jack adapter until vertical stabilizer is supported by folding fixture support arms.

d. **Open –9 Fittings.** Using knob, open –9 fittings (pin retainers) and remove –11 pin assemblies.

e. **Lower Jack Adapter.** Lower jack adapter using jack handle and move adapter away from vertical stabilizer.

2–29.14 Remove Helicopter Tiedowns.

WARNING

- **Wheel chocks must be in place before removing helicopter tie–downs. An unsecured helicopter may roll free, causing personnel injury or equipment damage.**
- **One person will occupy CPG station in each helicopter as it is unloaded, to operate helicopter brakes when required.**

a. **Remove Fuselage Tailboom Tie–downs.** Unfasten and remove two tiedown chains from each FS 450 tiedown fitting (fig. 2–17). Close FS 450 jack pad wire deflector and secure with quick release pin.

b. **Remove Forward Fuselage Tie–downs.** Unfasten and remove three tiedown chains from each of two forward fuselage tiedown fittings (fig. 2–17).

2–29.15 Unload Helicopter Number Two.

WARNING

Helicopter must be restrained with the winch during offloading. An unrestrained helicopter may shift suddenly or roll free, causing personnel injury or equipment damage.

a. **Connect Cargo Aircraft Winch Cable to Helicopter.** Paragraph 2–28.14e.

b. **Unlock Tail Wheel Swivel.** Paragraph 2–28.9a.

c. **Install Tail Wheel Steering Bar and Winching Yoke.** Paragraph 2–28.9b.

NOTE

The tail wheel steering bar will be used to steer the helicopter and to keep main and tail wheels on the loading ramps.

d. **Connect Hydraulic Cart.**

WARNING

- **Prior to operating hydraulic cart, personnel must be thoroughly familiar with operation and safety procedures contained in paragraphs 8–4, 8–5 and 8–6.**
- **Personnel must remain clear of helicopter during kneeling and erecting operations to prevent injury to personnel in event of main landing gear strut collapse and helicopter roll over.**

CAUTION

- **During the following procedures, helicopter underbelly and overhead clearances will be continually checked to prevent damage to helicopter or cargo aircraft. Where necessary, helicopter height will be adjusted by kneeling or erecting helicopter and by using shoring under tail wheel.**
- **To prevent excessive stress on helicopter landing gear and C–141B cargo winch, do not apply brakes during kneeling and erecting operations.**

NOTE

Hydraulic cart will be rolled along with the main landing gear as helicopter is unloaded from the cargo aircraft.

Connect hydraulic cart to helicopter (paragraph 8–4).

e. **Unload Helicopter to Position One.** Release helicopter parking brakes. Have loadmaster slowly reel–out cargo aircraft winch, while kneeling or raising helicopter where required for overhead and ramp hinge clearance. Manually guide helicopter down loading ramps until main landing gear wheels are on the ground (position one, fig. 2–30).

f. **Reposition One Auxiliary Ramp.** Reposition left or right auxiliary ramp and shoring to center of loading ramp.

g. **Unload Helicopter to Ground Level.** Reel–out cargo aircraft winch and guide helicopter tail wheel down center ramp until tail wheel is on the ground.

h. **Disconnect Cargo Aircraft Winch Cable from Helicopter.** Disconnect winch cable from tail wheel winching yoke.

i. **Erect Helicopter.** Erect helicopter and disconnect hydraulic cart (paragraph 8–6).

j. **Unlock Tail Landing Gear Shock Strut.** Jack helicopter at the fuselage station 450 (tailboom) jacking pad until tail landing gear strut lock (fig. 2–25) can be moved. Remove the strut lock. Lower and remove the jack.

k. **Remove Tail Wheel Steering Bar and Winching Yoke.** Paragraph 2–28.9o.

2–29.16 Unload One M230 Gun Turret. Remove packed gun turret container from cargo floor, under helicopter number one tail rotor.

2–29.17 Unload One 2.75 Inch Rocket Launchers. Remove one packed 2.75 inch rocket launcher from top of loaded Hellfire launcher next to helicopter number one tail rotor.

2–29.18 Unload One Hellfire Launcher. Remove packed launcher container from cargo floor, next to helicopter number one tail rotor.

2–29.19 Unload Six Main Rotor Blades. Remove three main rotor blade racks from cargo floor, under helicopter number one fuselage.

2–29.20 Unload Helicopter Number One.

a. **Connect Cargo Aircraft Winch Cable to Helicopter.** Paragraph 2–28.9e.

b. **Unlock Tail Wheel Swivel.** Paragraph 2–28.9a.

c. **Install Tail Wheel Steering Bar and Winching Yoke.** Paragraph 2–28.9b.

d. **Connect Hydraulic Cart.**

WARNING

- **Prior to operating hydraulic cart, personnel must be thoroughly familiar with operation and safety procedures contained in paragraphs 8–4, 8–5, and 8–6.**
- **Personnel must remain clear of helicopter during kneeling and erecting operations to prevent injury to personnel in event of main landing gear strut collapse and helicopter roll over.**

CAUTION

- **During the following procedures, helicopter underbelly and overhead clearances will be continually checked to prevent damage to helicopter or cargo aircraft. Where necessary, helicopter height will be adjusted by kneeling or raising and by using shoring under tail wheel.**
- **To prevent excessive stress on helicopter landing gear and C–141B cargo winch, do not apply brakes during kneeling and erecting operations.**

NOTE

Hydraulic cart will be rolled along with the main landing gear as helicopter is unloaded from the cargo aircraft.

Connect hydraulic cart to helicopter (paragraph 8–4).

e. **Unload Helicopter to Position Two.** Release helicopter parking brakes. Have loadmaster slowly reel–out cargo aircraft winch, while kneeling or erecting helicopter (paragraph 8–5 or 8–6) where required for overhead and ramp hinge clearance. Carefully guide helicopter down loading ramps until tail landing gear wheel is on the ground (position two, fig. 2–29).

f. **Reposition Auxiliary Ramp.** Reposition center auxiliary ramp to side of loading ramp so that ramp centerlines are 6 feet 8 inches apart alined with main landing gear wheels and parallel to helicopter centerline.

g. **Unload Helicopter to Position One.** Have loadmaster slowly reel–out cargo aircraft winch, while kneeling or raising helicopter where required for overhead and ramp hinge clearance. Carefully guide helicopter down loading ramps until main landing gear wheels are 6–1/2 feet aft of the main ramp hinge (position one, fig. 2–29).

h. **Unload Helicopter to Ground Level.** Reel–out cargo aircraft winch and guide helicopter down ramps until main wheels are on the ground.

i. **Disconnect Cargo Aircraft Winch Cable from Helicopter.** Paragraph 2–28.9p.

j. **Erect Helicopter.** Erect helicopter and disconnect hydraulic cart (paragraph 8–6).

k. **Unlock Tail Landing Gear Shock Strut.** Paragraph 2–28.9a.

l. **Remove Tail Wheel Steering Bar and Winching Yoke.** Paragraph 2–28.9o.

2–29.21 Unload One M230 Gun Turret. Remove packed gun turret container from forward left side of cargo floor, aft of main rotor head and mast unit (fig. FO–2).

2–29.22 Unload One 2.75 Inch Rocket Launchers. Remove one packed 2.75 inch rocket launcher from top of remaining loaded Hellfire launcher (fig. FO–2).

2–29.23 Unload One Hellfire Launcher. Remove packed launcher container from forward right side of cargo floor, aft of main rotor head and mast unit (fig. FO–2).

2–29.24 Unload Two Main Rotor Head and Mast Units.

a. **Remove Shipping Carrier Tie–downs.** Unfasten and remove four tiedown straps from each of two shipping carriers (eight tiedowns) (fig. FO–2).

b. **Remove Shipping Carriers.** Remove shipping carrier wheel shoring.

2–30 HELICOPTER PREPARATION FOR USE AFTER C–141B SHIPMENT.

Preparation of the AH–64A helicopter for use after C–141B cargo aircraft shipment will be performed in accordance with instructions outlined in paragraphs 2–30.1 through 2–30.23.

2–30.1 Preliminary Safety Procedures. Before starting operations, perform safety procedures outlined in paragraphs 2–30.2 and 2–30.3.

2–30.2 Ground Helicopters.
TM 1-1520-238-23.

2–30.3 Perform Helicopter Safety Check.
TM 1-1520-238-23.

2–30.4 Unpacking and Depreservation.
Paragraph 2–16.4.

2–30.5 Install Wings. Paragraph 2–16.6.

2–30.6 Install Vertical Stabilizer. Figure 2–26 and 2–27.

a. **Disconnect Stabilator Actuator from Stowing Fixture.** Remove clevis nut, washers, and bolt from aft fixture actuator link and actuator rod end eye. Retain rod end hardware.

b. **Install Stabilizer Top Sling Straps.** Preadjust sling straps (fig. 2–27). Insert and lock two stabilizer sling short strap quick–release pins in stabilizer top end pin sockets (fig. 2–26).

c. **Aline Lifting Crane.** Position craned aft of helicopter tail. Aline crane lifting hook over center of tail rotor gearbox fairing.

CAUTION

Sling will be tensioned at this point only enough to remove strap slack. Hoist–loading the stowed vertical stabilizer will cause major structural damage.

d. **Couple Sling to Crane.** Connect crane lifting hook to stabilizer sling lifting eye. Carefully operate crane winch to remove all slack from sling straps.

e. **Remove Stowing Fixture Aft Support Struts.** Remove the four strut–release pins.

f. **Raise Stabilizer.** Operate crane winch and swing stabilizer up and aft to vertical position.

g. **Install Remaining Stabilizer Sling Straps.** Insert and lock two sling long strap quick–release pins in stabilizer forward (bottom) pin sockets. Pass the fifth strap through tail rotor pitch links and around the tail rotor drive shaft. With both ends of fifth strap on sling bar forward end eye, remove all strap slack at the tail rotor drive shaft, and secure the fifth strap buckle.

h. **Disconnect Intermediate Gearbox Drive Flange from Stowing Fixture.** Remove five coupling bolts from fixture bracket and gearbox (fan) drive flange. Retain removed bolts.

i. **Remove Vertical Stabilizer from Stowing Fixture.** Remove four captive bolts from stabilizer mounting lugs and pivoting base frame. Operate crane winch and lift stabilizer clear of the fixture. Perform depreservation of coated surfaces.

j. **Release Number Five (Tail Rotor) Drive Shaft from Stowing Fixture.** Fully open aft fixture forward brace strap.

k. **Remove Stowing Fixture from Helicopter.** Remove two pivot quick–release pins and lift pivoting base frame from aft fixture. Remove four stabilizer mounting bolts and washers and remove the aft fixture from helicopter tailboom. Retain stabilizer mounting hardware.

l. **Seal Stabilizer Mounting Surfaces.** Coat joints between stabilizer mounting lugs and tailboom with primer (D–9), and allow to dry.

m. **Mount Vertical Stabilizer On Helicopter.** Carefully swing stabilizer over tailboom. Aline intermediate gearbox (fan) and number five drive shaft coupling flanges, and center four stabilizer mounting lugs over mating tailboom holes. Install four mounting lug bolts and washers. Torque four bolts to **900 inch–pounds.**

n. **Remove Stabilizer Sling.** Unlock and remove four sling pins from stabilizer pin sockets. Unsnap fifth (tail rotor shaft loop) strap from sling bar. Remove sling lifting eye from crane hook.

o. **Connect Tail Rotor Drive Shaft.** Install five coupling bolts through gearbox (fan) and shaft coupling drive flanges. Torque five bolts to **120 inch–pounds.**

p. **Connect Tail Rotor Control Horizontal Pushrod.** Slide pushrod aft through intermediate gearbox fan shroud. Install two rod end–to–bellcrank clevis bolts, washers, and nuts. Torque nuts to **0 to 40 inch–pounds.** Install new cotter pin (D–17) at torqued nuts.

q. **Install Tailboom Left Side Aft Step.** Obtain left side aft step from catwalk area. Install two mounting bolts and washers to secure FS 517/WL 136 left side step.

r. **Connect Vertical Stabilizer Forward and Aft Electrical Wiring.** Connect two electrical harness plugs (P124 and P756) to mating tailboom forward and aft bracket receptacles; connect coaxial plug (P329) to trailing edge base receptacle; and, if installed, connect GPS antenna coaxial plug (P1304) to mating receptacle. Secure vertical coaxial lead with two clamps.

s. **Connect Stabilizer Forward and Aft Hydraulic Lines.** Connect four hydraulic quick–disconnect fittings at lower ends of stabilizer vertical structure.

t. **Install Lower Leading Edge Fairing.** Secure 23 camloc fasteners at fairing (L510).

u. **Install FM–AM Whip Antenna (MWO 1-1520-238-50-37 installed)**. Paragraph 2–16.4.

2–30.7 Install Tail Rotor Blades. Paragraph 2–23.10.

2–30.8 Install Horizontal Stabilator. Paragraph 2–16.10.

2–30.9 Install Main Rotor Head and Mast Units. Figures 2–23 and 2–24.

WARNING

During this procedure, helicopter must be on a level surface, with landing gear in normal static condition (not kneeled). If helicopter is tilted, main rotor head and mast unit may slip and swing, causing possible injury of personnel or equipment damage.

a. **Remove Main Transmission Access Panels.** Release 12 camloc fasteners at each panel (L200 and R200).

b. **Check Drive Shaft Spring.** If not previously removed, lift shipping cover from top of main transmission. Check position of main rotor drive shaft spring. Spring must be centered over the transmission drive shaft hole (fig. 2–23).

c. **Install Air Vehicle Sling on Main Rotor Head.** Couple sling fittings to lifting clevises on main rotor head, in the shipping carrier (fig. 2–23).

d. **Aline Lifting Crane Over Main Rotor Head.** Center the crane lifting hook over shipping carrier. Aline lifting hook over installed air vehicle sling.

e. **Install Mixer Spreader.**
TM 1-1520-238-23.

f. **Release Main Rotor Head and Mast Unit from Shipping Carrier.** Open the four corner straps securing main rotor head to the carrier frame (fig. 2–24). Disconnect mixer clevises from carrier turnbuckles. Remove mixer support bolts and static mast bolts.

CAUTION

Air data sensor and attached deicing housing are shipped in the carrier with the main rotor head and mast unit. If not previously unpacked, the sensor and housing unit must be removed from carrier at this point, to prevent damage.

g. **Couple Sling to Crane.** Connect crane lifting hook to air vehicle sling link (lifting eye). Carefully operate crane winch to re move all slack from sling cables.

h. **Remove Main Rotor Head and Mast Unit from Shipping Carrier.** Operate crane winch and carefully lift main rotor head and mast unit straight up and out of the carrier. Conduct depreservation of coated surfaces. Hoist the unit high enough to clear helicopter upper fuselage.

CAUTION

- **Mixer supports must be centered over their mast base holes, and main rotor drive shaft must be properly alined with main transmission drive splines, to prevent damage to critical mixer and rotor drive components.**
- **When lowering main rotor head and mast units, carefully maintain central alinement of drive shaft, installed drive shaft spring and standpipe, and the drive plate opening, to prevent parts damage or misalinement.**

i. **Aline Main Rotor Head and Mast Unit Over Mast Base.** Center the main rotor drive shaft over drive shaft spring in main transmission, and rotate the unit to aline right and forward mixer supports over mating mast base holes.

j. **Lower Main Rotor Head and Mast Unit Into Place.** Slowly lower the unit, and install forward mixer support bolt and lock washer while the unit is moving down. Carefully aline drive shaft splines within main transmission drive splines, and slide mast flange holes over projecting mast base studs. Hand–tighten mixer support bolt.

k. **Install 18 New Preload Indicating (PLI) washer sets (D–22) and Torque 18 Mast Base Nuts.**
TM 1-1520-238-23.

l. **Install Right Side Mixer Support Bolt and Lock Washer.** Hand–tighten bolt.

m. **Seat and Torque Forward and Right Side Mixer Support Bolts to 230 to 280 Foot–Pounds.**
TM 1-1520-238-23. Use mixer bolt torque adapter (item 51, table 2–2) with 3/4 drive, 3–inch long extension (item 52, table 2–2). Bend lock washer tabs after final retorquing.

n. **Disconnect and Remove Actuator Supports.** Disconnect longitudinal, lateral, and collective flight control servoactuator top rod ends from support end fittings. Remove stowed rod end hardware. Remove actuator supports from top of fuselage.

o. **Connect Flight Control Servoactuators to Mixer.** Install three rod end–to–mixer clevis bolts, washers, bushings, and nuts to **900 – 1100 Inch–Pounds**. Install new cotter pin (D–15)at torqued nuts.

p. **Remove Mixer Spreader.** If installed, slide spreader from side of mixer.

q. **Remove Sling and Crane.** Remove crane lifting hook from air vehicle sling link and remove crane from the area. Remove sling pins from main rotor head and detach the sling.

r. **Install and Connect Main Rotor Track and Balance Cable.** Obtain main rotor track and balance cable from airframe in main transmission area. Position cable along right side lateral link (fig. 2–23) and loosely install two clamps. Connect cable plug (P57) to main rotor interrupter magnetic pickup, and secure the two cable clamps.

s. **Install Air Data Sensor and Deicing Standpipe.** Obtain air data sensor and deicing standpipe from pilot station. Carefully insert lower (keyed) end of standpipe through rotor hub, aline and fully seat the standpipe key in the internal transmission keyway. Then reinstall flexible support and drive plate cover (TM 1-1520-238-23).

2–30.10 Install Main Rotor Deice Power Distributor and Air Data System (ADS) Mast. Paragraph 2–16.12.

2–30.10.1 Install Main Transmission Access Panels. Secure 12 camloc fasteners at each panel (L200 and R200).

2–30.11 Install Main Rotor Blades. Paragraph 2–16.11.

2–30.12 Remove Forward Fuselage Tiedown Fittings. Paragraph 2–16.8.

2–30.13 Install M230 Guns and Turrets. TM 9-1090-208-23-1.

2–30.13.1 Install Gun Wire Deflector. TM 1-1520-238-23. Obtain wire deflector from catwalk area.

2–30.13.2 Install Turret Fairing. Obtain turret fairing from catwalk area. Install fairing with four fasteners.

2–30.14 Install Removed Fairings and Access Panels. TM 1-1520-238-23. Obtain fairings and access panels from catwalk area.

a. **Install Wing Access Covers.** Install 16 screws at each cover (LW9 and RW9).

b. **(Extended–Range Capable Helicopters Only) Install Wing Trailing Edges.** Install 68 screws at each trailing edge (LW8 and RW8).

c. **Install Wing Fairings.** Install nine screws at each fairing (LW10, RW10, LW11, and RW11).

d. **Install Forward Ammunition Feed Fairings.** Secure 10 camloc fasteners at each fairing (L140 and R140).

e. **Install Doghouse Fairing and Radar Jammer Antenna.** Connect antenna plug top receptacle under fairing (T185), aline fairing on fuselage, secure 16 camloc fasteners and install four screws.

NOTE

When installing Main Rotor Shaft Fairings on aircraft with MWO 1-1520-238-50-50 installed, clean burnished surface of aircraft longeron around nutplate hole corresponding to metal bonding strap on fairing. Seal around outer edge of burnished surface with sealant (D–12) TM 1-1520-238-23. Ensure P1101/P1103 (LDS sensor unit connectors) are accessible but do not interfere with fairing installation.

f. **Install Main Rotor Shaft Fairings.** Install 16 (18 if MWO 1-1520-238-50-50 installed) screws at each fairing (T205L and T205R). Secure 10 camloc fasteners and install five screws at fairing (T225).

g. **Install Tailboom Aft Closeout Fairings.** Install 21 screws to secure fairings (L545 and R545).

2–30.15 Install Infrared Counter Measure Device on "Doghouse". TM 11-1520-238-23-1. Obtain from aft storage bay (R330).

2–30.15.1 Install Ice Detector.
TM 1-1520-238-23.Obtain ice detector from aft storage bay (R330). Tube is deflected under doghouse sheet metal.

2–30.16 Install Main Landing Gear and Fuselage Wire Cutters. TM 1-1520-238-23. Obtain wire cutters from catwalk area.

2–30.17 Install ADF Wire Antenna and UHF L–Band, Communications, and Transponder Blade Antennas Install FM–AM Whip Antenna (MWO 1-1520-238-50-37 installed) and Lower IFF Antenna (MWO 1-1520-238-50-36 installed) Paragraph 2–16.14.

2–30.17.1 Install LDS Forward Sensor Units. (If MWO 1-1520-238-50-50 installed).

a. **Install LDS Sensor Units.** Attach connector plugs to sensors. Aline weather striping angles on aft sides of sensor units (sensor windows face forward). Install eight screws (six in each sensor and two in each weather stripping angle) at each location. Seal around sensor unit flanges and weather stripping angles with sealant (D–12).

2–30.17.2 Install Pylons. TM 1-1520-238-23. Obtain pylons from catwalk area.

2–30.18 Connect Helicopter Battery.
TM 1-1520-238-23.

2–30.19 Perform Pitot Static Test MOC. TM 1-1500-204-23.

2–30.20 Inspect Helicopter. Perform 10 hour/14 day inspection (TM 1-1520-238-PMS).

2–30.21 Perform Maintenance Operational Checks as Required for Removed Components/Mission Equipment. TM 1-1520-238-23.

2–30.22 Refuel Helicopter. TM 1-1520-238-23 Use fuel truck (item 12, table 2–2).

2–30.23 Perform Pylon and 30MM Gun Boresight Check. TM 9-1230-476-20-1.

Section V. SHIPMENT BY C-17 CARGO AIRCRAFT

2–31 REQUIRED HELICOPTER PRELOADING CONDITION.

See figure 2–33 for AH-64A helicopter preloading condition required for shipment on C-17 cargo aircraft for both Tactical and Maximum Density (Logistical) Shipment. Paragraph 2–32 provides procedures for configuring the AH-64A helicopter for Tactical Shipment (maximum of two helicopters per C-17) and paragraph 2–33 provides procedures for configuring the AH-64A helicopter for maximum density (Logistical) shipment (maximum of three helicopters per C-17).

2–31.1 Equipment Requirements. Refer to table 2–1 for equipment items required for preparation and shipment of AH-64A helicopters on C-17 cargo aircraft.

2–31.2 Preliminary Safety Procedures. Before starting operations, perform safety procedures outlined in paragraphs 2–31.3 thru 2–31.5.

2–31.3 Ground Helicopter. TM 1-1520-238-23.

2–31.4 Perform Helicopter Safety Check. (TM 1-1520-238-23).

WARNING

To prevent injury to personnel, M230 guns must be cleared and visually checked.

2–31.5 Deactivate Armament. TM 9-1090-208-23-1.

2–31.6 Clean Helicopter. TM 1-1520-238-23 and TM 1-1500-333-24.

2–31.7 Corrosion Control. Repair corrosion TM 1-1500-333-24, TM 55-1500-344-23, and TM 1-1520-238-23.

2–31.8 Drive Train. Check main transmission and nose gearbox lube oil sight gages (four locations); service if necessary (TM 1-1520-238-23).

NOTE

The grease-packed intermediate and tail rotor gearboxes will normally require no special check or servicing for shipment.

2–31.9 Engines and Auxiliary Power Unit (APU).

a. **Lube Oil Level Check.** Check engine and APU lube oil sight gages (three locations); service if necessary (TM 1-1520-238-23).

b. **Engine Ground Run Up.** Conduct five minute helicopter ground run to preserve dynamic components prior to disassembly for shipment (TM 1-1520-238-23).

2–31.10 Adjust Fuel Levels.

a. **Forward Tank.** Adjust fuel levels of forward tank to between a minimum of 38 gallons and maximum of 116 gallons.

b. **Aft Tank.** Adjust fuel level of aft tank to between a minimum of 55 gallons and maximum of 150 gallons.

c. **Annotate DD Form 1387-2.** Note actual fuel level of each tank for entry on DD Form 1387-2 (TM 38-250).

2–31.11 Disconnect Battery. Disconnect helicopter battery (TM 1-1520-238-23). Wrap battery connectors with barrier material (D–1) sealed with tape (D–13).

CAUTION

To prevent damage to the helicopter and the cargo aircraft because of inadequate overhead clearance, the distance from the ground to the center of the main landing gear tiedown shall not exceed 40 inches.

2–31.12 Service Main Landing Gear. TM 1-1520-238-23.

2–32 HELICOPTER DISASSEMBLY FOR C-17 SHIPMENT (TACTICAL CONFIGURATION).

Perform disassembly in accordance with procedures outlined in paragraphs 2–32.1 through 2–32.9.

2–32.1 Remove Main Rotor Blades.

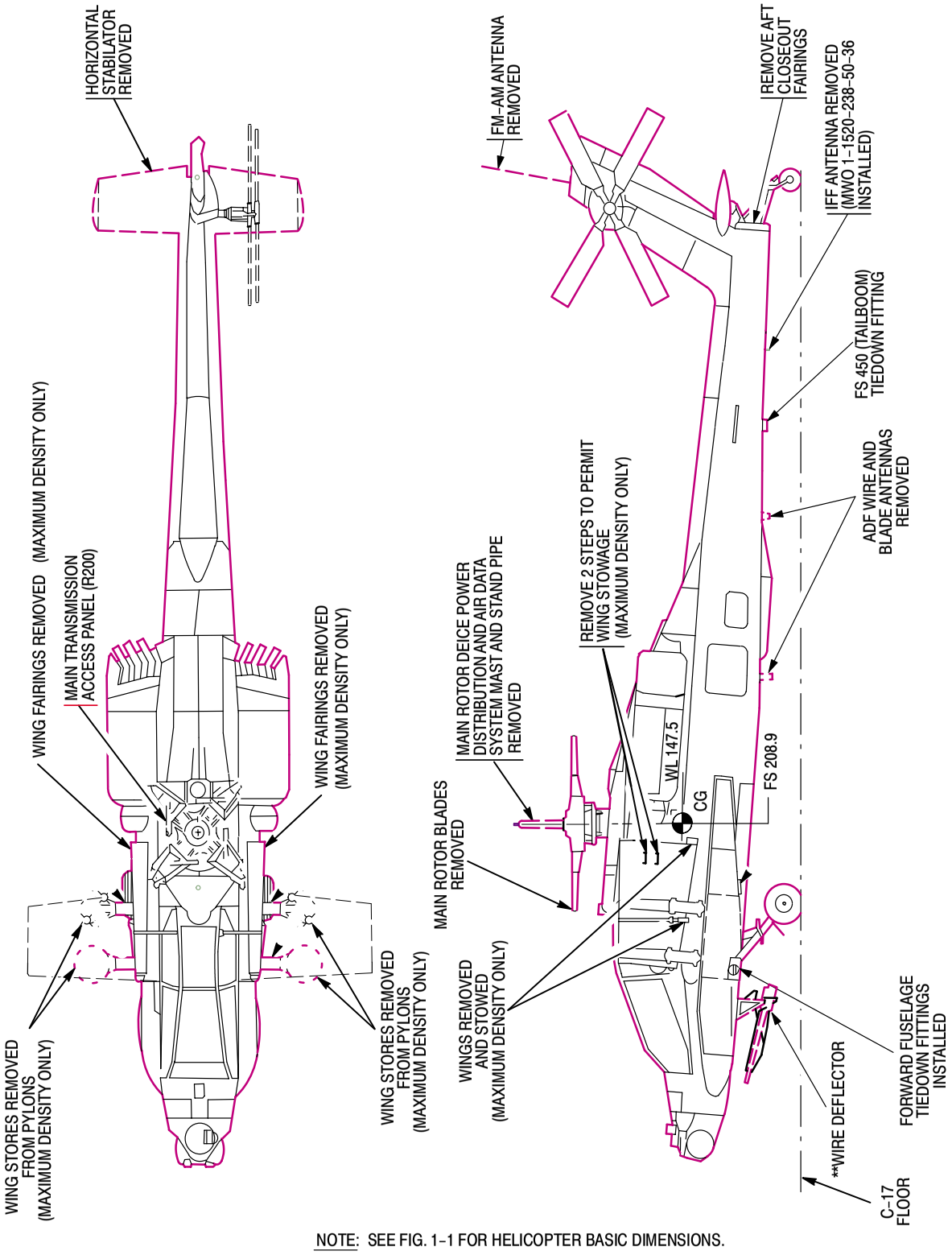
a. **Install Droop Stop Wedges** (item 16, table 2–1) in accordance with (TM 1-1520-238-23).

CAUTION

Prior to removal of main rotor blades, ensure that they are properly tagged and marked with the appropriate location color code.

b. **Disconnect Deicing Receptacle.** Disconnect and cap deicing receptacle.

c. **Remove Rotor Blades.** Remove main rotor blades (TM 1-1520-238-23) using crane truck (item 13, table 2–1) and main rotor blade sling (item 14, table 2–1).



NOTE: SEE FIG. 1-1 FOR HELICOPTER BASIC DIMENSIONS.

Figure 2–33. Helicopter Preloading Condition for C-17 Cargo Aircraft Shipment Tactical Shipment and Maximum Density (Logistical) Shipment

d. **Preservation.** Thoroughly coat blade root fitting bolt holes with corrosion preventive compound (D–4). Wrap each blade root area with barrier material (D–1). Secure with tape (D–13).

e. **Install Blades in Racks.** Install blades in blade rack sets (items 1 and 2, table 2–1) (fig. NO TAG).

(1) Remove upper and intermediate racks from blade root and blade tip racks.

(2) Install first blade in lower blade root and lower blade tip racks.

(3) Place intermediate racks on top of blade.

(4) Place second blade on intermediate racks with blade root of second blade inset approximately six inches from first blade root.

(5) Install upper racks on blade root and blade tip racks.

(6) Repeat steps NO TAG thru NO TAG for third and forth blades.

f. **Remove Wedges.** Remove droop stop wedges for use on next helicopter to be prepared.

2–32.2 Position Drive Train. After removal of main rotor blades, position the drive train so that the main rotor pitch housings are positioned 45° to the centerline of the fuselage and the tail rotor blades are ''X ed'' horizontally and secured as shown in figure 2–34. Use rope, D–28.

2–32.3 Remove Main Rotor Deice Power Distributor, Air Data System (ADS) Mast, and Stand Pipe.

a. **Remove Panel.** Remove panel R200.

CAUTION

To prevent contamination of main rotor drive shaft and stand pipe, cover drive plate cover as soon as sensor housing unit and stand pipe are removed.

b. **Component Removal.** Remove main rotor deice power distributor, air data system mast, and stand pipe (fig. NO TAG and TM 1-1520-238-23).

c. **Secure Cables.** Reinstall (for stowage) removed wire guides and cable clamps. Secure cables to deicing housing with twine (D–14).

d. **Main Rotor Drive Plate Cover.** Cover main rotor drive plate cover with barrier material (D–1), secure with tape (D–13).

e. **Connection Closure.** Cap or wrap disconnected deicing connectors with barrier material (D–1) secure with tape (D–13).

f. **Preservation.** Apply corrosion preventive compound (D–4) to all exposed surfaces of ADS mast, distributor and stand pipe.

g. **Component Wrap.** Wrap ADS mast, distributor, and stand pipe with barrier material (D–1) and cushioning material (D–5), secure with tape (D–13).

h. **Stowage.** Stow wrapped cushioned ADS mast, distributor, and stand pipe in catwalk area.

i. **Install Panel.** Install panel R200.

2–32.4 Install Forward Fuselage Tiedown Fittings.

NOTE

Landing gear cross tube end studs have nuts at both ends. One cotter pin and nut will be removed from each stud, and stud will be pulled in direction allowing clear removal.

a. **Remove Main Landing Gear Cross Tube End Caps.** Remove one cotter pin, nut, and washer from cross tube left and right end cap studs. Pull studs (with pinned nuts in place) from cross tube. Slide caps from cross tube ends. Retain removed studs, washers, and nuts. Discard removed cotter pins (fig. NO TAG).

NOTE

If installed angle of cross tube stud prevents stud removal, helicopter must be jacked or lifted and cross tube rotated (TM 1-1520-238-23).

b. **Install Tiedown Fittings.** Slide tiedown fittings (item 6, table 2–1) into left and right ends of each main landing gear cross tube. Aline holes in fittings and cross tube, and install removed studs, washers, and nuts.

c. **Stow Removed Cross Tube End Caps.** Wrap end caps with cushioning material (D–5), secured with tape (D–13). Stow wrapped end caps on floor of pilots station.

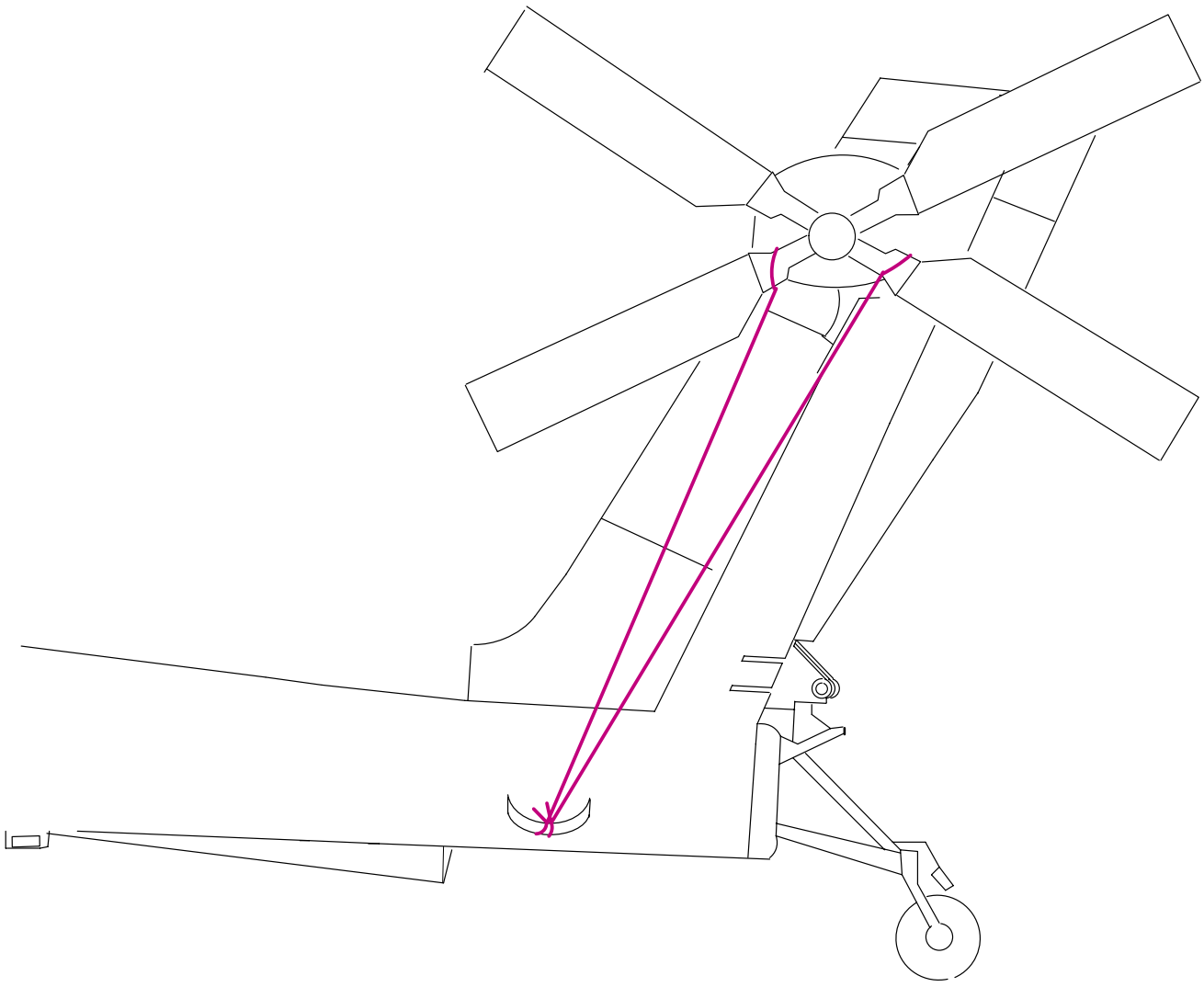


Figure 2–34. Secure Tail Rotor

2–32.5 Remove Tailboom Aft Closeout Fairing and Horizontal Stabilator. (fig. 2–6 and TM 1-1520-238-23).

a. **Secure Stabilator Shims.** Secure shims in place until installed. Do not remove shims from spacers.

b. **Install Stabilator Actuator Support.** Mount yoke of support (item 3, table 2–1) to airframe stabilator pivots, and connect actuator rod end to support end fitting. Use removed stabilator pivot and actuator rod end hardware.

c. **Static Wicks.** To prevent damage to static wicks, loosen one screw and remove the other in each wick. Rotate the wick 100° and tighten screw. Reinstall first screw in stabilator.

d. **Access Covers.** Reinstall stabilator access covers.

e. **Component–Wrap.** Wrap stabilator with barrier material (D–1), cushioning material (D–5) and secure with tape (D–13).

f. **Stow Tailboom Aft Closeout Fairing.** Wrap fairings with cushioning material (D–5), secured with tape (D–13) and stow in catwalk area.

2–32.6 Remove ADF Wire Antenna and UHF L–Band, Communications, and Transponder Blade Antennas, and FM–AM whip antenna (MWO 1-1520-238-50-37 installed). (fig. 2–8).

a. **Remove FM–AM Whip Antenna.** Remove fairing. Remove lockwire and loosen antenna lower jam nut. Separate upper antenna half from lower half.

b. **Remove ADF Wire Antenna.** Unhook end of antenna from standoff terminal spring. Coil antenna and secure to latch on aft storage bay (R330) with twine (D–14).

c. **Remove Blade Antennas.** Remove six screws from each antenna flange and pull on antennas. If sealant will not permit removal, gently pry antennas with plastic (phenolic) tool to break sealant loose. Disconnect plugs from receptacles and remove antennas.

d. **Remove Lower IFF Antenna.** Remove four screws from antenna base. Remove antenna and detach connector.

e. **Stow Blade Antennas.** Wrap all antennas with cushioning material (D–5), secured with tape (D–13). Secure antennas in pilots station.

2–32.7 Remove Left and Right Anti–collision Lights. (TM 1-1520-238-23).

a. **Stow Anti–collision lights.** Wrap with cushioning material (D–5) and secure with tape (D–13). Secure lights in pilots station.

2–32.8 Install Fly Away Covers.
(TM 1-1520-238-23**)**.

2–32.9 Weigh Helicopter. Weigh each helicopter and compute the center of gravity. Reduce or redistribute weight as necessary to keep from exceeding the following limits (maximum tire pressure 125 psi):

a. Main Gear. 5920 lbs per tire.

b. Tail Wheel. 1660 lbs.

2–33 HELICOPTER DISASSEMBLY FOR C-17 SHIPMENT (MAXIMUM DENSITY (LOGISTICAL) CONFIGURATION).

2–33.1 Prepare Helicopter for Tactical Shipment in C-17. Ensure that helicopter is in the required preloading condition in accordance with paragraph 2–31 thru 2–31.12. Prepare helicopter in accordance with paragraphs 2–33.2 thru 2–33.8.

2–33.2 Remove Hellfire Launchers.

a. **Removal.** Remove Hellfire launchers (TM 9-1427-475-20).

b. **Preservation.** Thoroughly coat unpainted mounting surfaces with corrosion preventive compound (D–4). Cap or wrap all electrical connectors with barrier material (D–1) sealed with tape (D–13).

c. **Component Wrap.** Wrap each launcher with barrier material (D–1), secure with tape (D–13).

d. **Packaging.** Pack each removed and wrapped launcher in its shipping container (item 20, table 2–1).

2–33.3 Remove 2.75 Inch Rocket Launchers.

a. **Removal.** Remove rocket launchers (TM 9-1055-460-13&P).

b. **Preservation.** Thoroughly coat unpainted mounting surfaces with corrosion preventive compound (D–4). Cap or wrap all electrical connectors with barrier material (D–1) sealed with tape (D–13).

c. **Component–Wrap.** Wrap each launcher with barrier material (D–1) sealed with tape (D–13).

d. **Packaging.** Pack each removed and wrapped rocket launcher in its shipping container (item 36, table 2–1).

2–33.4 Remove Fairings and Access Covers. (fig. NO TAG).

a. **Remove Wing Fairings.** Remove nine screws from each fairing (LW10, RW10, LW11, and RW11) (fig. NO TAG).

b. **Remove Wing Access Covers.** Remove 16 screws from each cover (LW9 and RW9).

c. **Remove Forward Ammunition Feed Fairings.** Release 10 camlock fasteners at each fairing (L140 and R140).

d. **Stow Fairings and Access Covers.** Wrap removed fairings and access covers in steps a thru d above with cushioning material (D–5) secured with tape (D–13) and secure in catwalk area.

NOTE

Wing trailing edges will be removed when required for internal connection access on extended-range capable helicopters. Trailing edges will be reinstalled for wing stowage.

e. **Remove Wing Trailing Edges. (Extended-Range Capable Helicopters Only).** Remove 68 screws from each trailing edge. (LW13 and RW13).

2–33.5 Remove Steps.

a. **Remove Left Side Steps.** Remove FS 162/WL 148 and FS 162/WL 168 left side steps to permit wing stowage (TM 1-1520-238-23).

b. **Component–Wrap.** Wrap removed steps with cushioning material (D–5), secured with tape (D–13).

c. **Stow.** Stow wrapped steps in catwalk area.

2–33.6 Remove and Stow Wings. Remove and stow wings in accordance with paragraph NO TAG.

2–33.7 Install Fly Away Covers .TM 1-1520-238-23.

2–33.8 Weigh Helicopter. Weigh each helicopter and compute the center of gravity. Reduce or redistribute weight as necessary to keep from exceeding the following limits (maximum tire pressure 125 psi):

a. Main Gear. 5920 lbs per tire.

b. Tail Wheel. 1660 lbs.

2–34 TRANSPORTED GROUND SUPPORT EQUIPMENT. Prepare transported ground support equipment in accordance with paragraph 2–12.

2–35 MARKING. Mark helicopters, removed components, and ground support equipment in accordance with paragraph 2–13 (DA PAM 738-751, TM 38-250.

2–36 RAMPS AND SHORING REQUIREMENTS.

CAUTION

The actual amount of shoring required will vary depending on helicopter weight, tire and strut servicing, temperature, and the ramp surface (cargo aircraft attitude). To prevent damage to cargo aircraft and helicopter ensure that required clearance is maintained.

2–36.1 Ramps. The helicopters may be loaded using a prefabricated approach ramp and secondary shoring or 30 inch wide 3/4 inch plywood built up shoring. It is the responsibility of the Army Loading Team to provide all required shoring and ramps. All materials used in loading the aircraft will accompany the load to its destination.

a. **Prefabricated Ramps.** Construct three each 12 ft. x 3 ft. x 12 3/4 inch prefabricated approach ramps and two each 50 inch long 12 inch by 4 inch (nominal) secondary approach shoring as shown in figure 2–35.

b. **Built-up Shoring.**

(1) In lieu of the prefabricated ramps, shoring built up from 30 inch wide 3/4 inch plywood may be used.

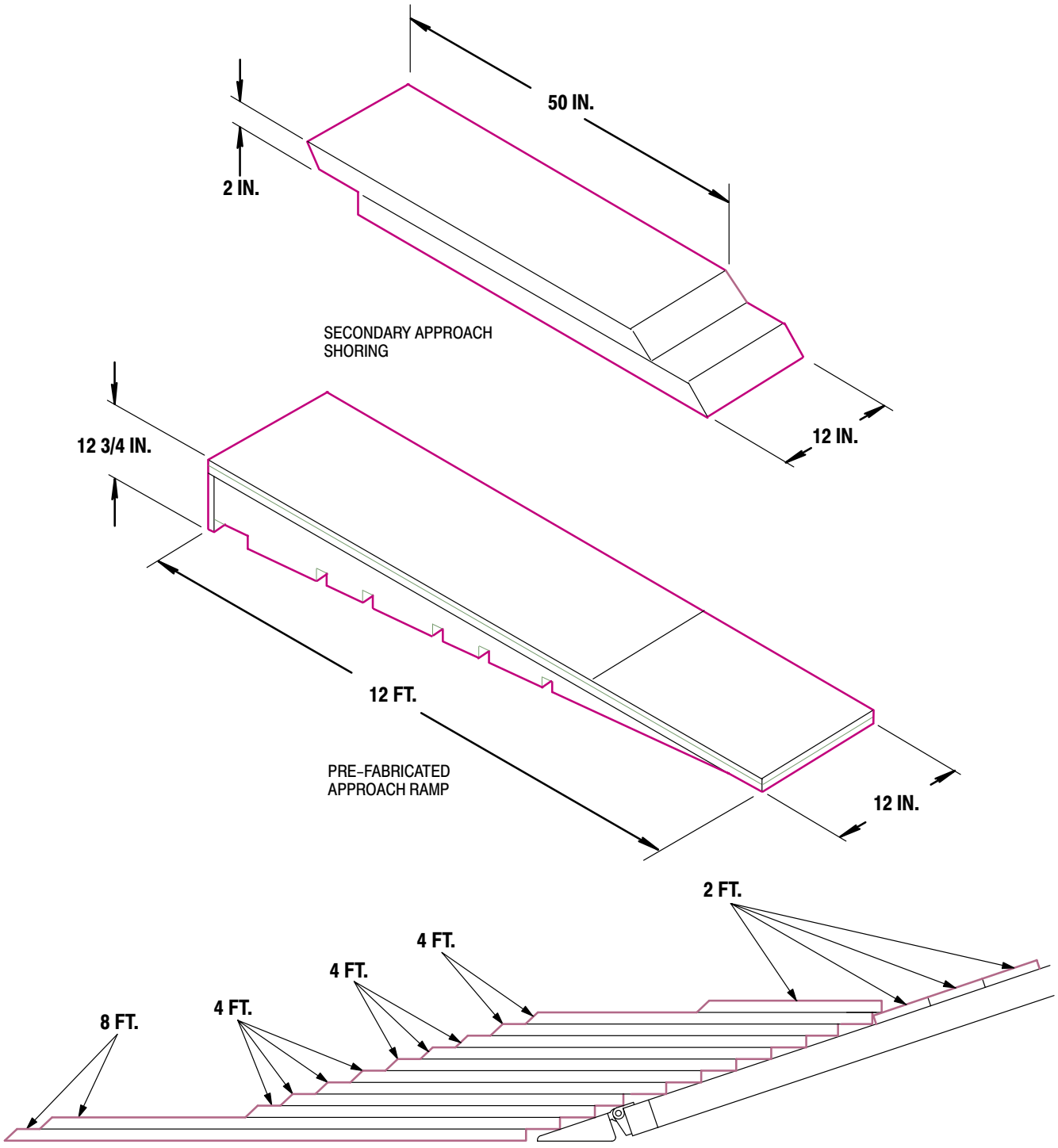
(2) Alternate shoring may be used in lieu of built–up shoring as shown in figure 2–35 and 2–36.

2–36.2 Secondary Approach Shoring. Provide 12 inch x 50 inch x 2 inch) secondary approach shoring as shown in figure 2–35.

2–36.3 Ramp Pedestal Shoring. Provide 18 inch x 30 inch x 2 1/4 inch (minimum) ramp pedestal shoring as shown in figure 2–37.

2–36.4 Roller Tray Shoring. Provide a minimum of 4 each, 12 inch x 12 inch x 3/4 inch pieces of shoring to protect roller trays from tail wheel as shown in figure 2–38.

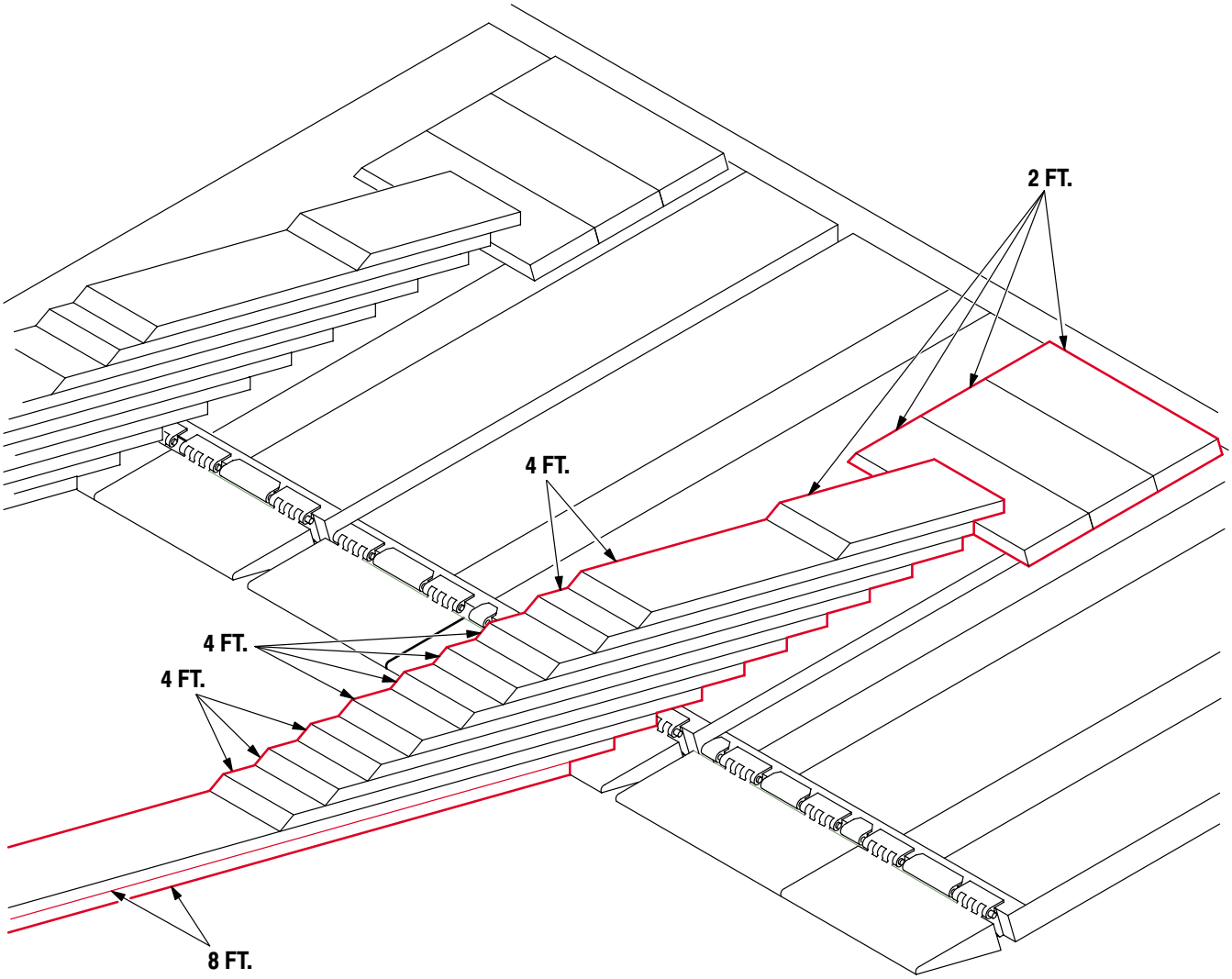
2–36.5 Parking Shoring. Provide two pieces of 12 inch x 12 inch x 3/4 inch parking shoring (stacked to 1 1/2 inch high) for the tail wheel of each helicopter loaded.



Alternate Shoring Lumber

NOTE All Alternate Shoring Lumber made from 2 X 12's

Figure 2–35. Prefabricated Approach Ramp and Shoring



Alternate Shoring Lumber (two ramps)	8	2 X 12 X 24
	18	2 X 12 X 48
	4	2 X 12 X 96

Figure 2–36. Alternate Shoring

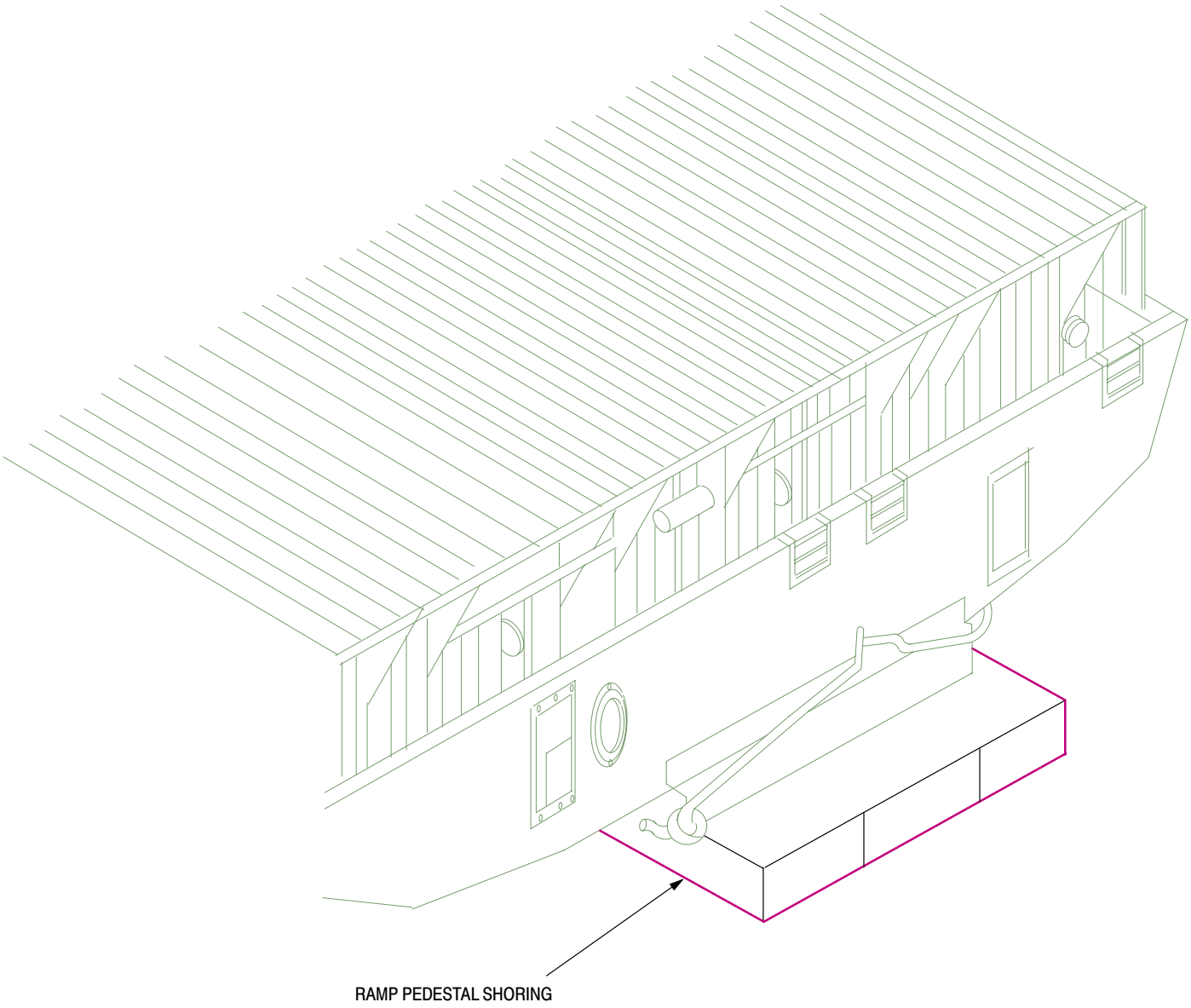


Figure 2–37. Ramp Pedestal Shoring

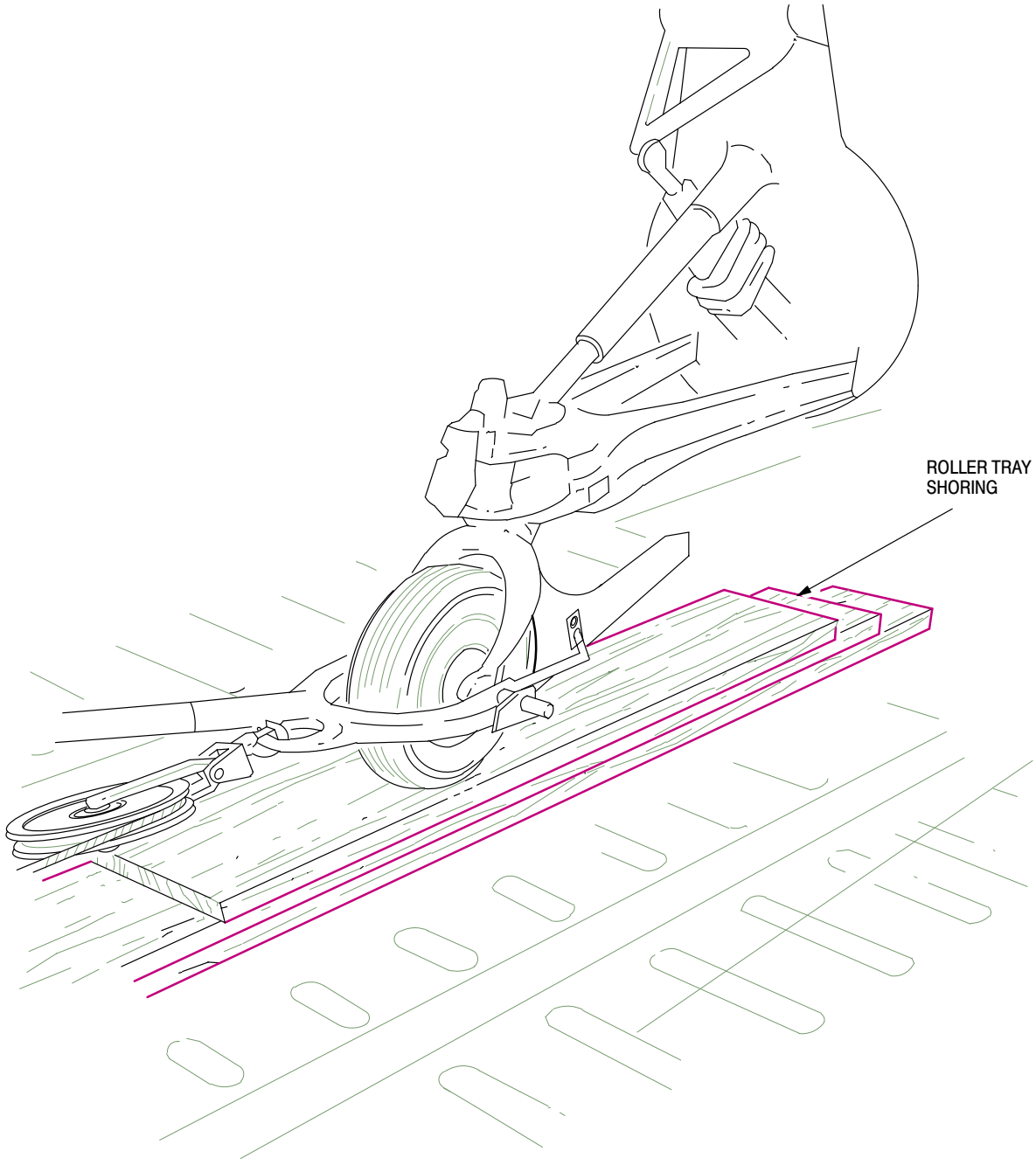


Figure 2–38. Roller Tray Shoring

2–37 PLACE SHORING.

CAUTION

An adequate thickness of ramp pedestal shoring is required to ensure the plane of the ramp toes, when supported by the approach ramps, matches the cargo ramp.

2–37.1 Pedestal Shoring. Place the ramp pedestal shoring under the skid pad. (fig. 2–37).

2–37.2 Approach Shoring. Place the built up shoring or the pre–fabricated ramps (fig. 2–35) under the ramp toes. Position secondary approach shoring ramps (fig. 2–39).

2–38 HELICOPTER LOADING AND TIEDOWN (TACTICAL SHIPMENT).

WARNING

- **To prevent fire, explosion, or weapon discharge, verify that armament, canopy jettison, fuel, and electrical systems are safe on each helicopter prior to loading.**
- **To prevent injury to personnel and damage to helicopter and cargo aircraft, the helicopter will be restrained with chains and wheel chocks prior to releasing tension on the winch cable.**
- **To prevent injury to personnel and damage to helicopter and cargo aircraft in the event of winch failure, the helicopter CPG station will be occupied by a qualified person to operate brakes.**

CAUTION

- **To prevent damage to helicopter and cargo aircraft, chocks shall be used to prevent the helicopter from moving past the required cargo aircraft fuselage station.**
- **To prevent damage to helicopter and cargo aircraft, ensure that rotor head and tail rotor are properly positioned prior to approaching cargo aircraft.**
- **To prevent damage to helicopter and cargo aircraft, use shoring as necessary under helicopter main and tail wheels to provide clearance between helicopter underbelly and cargo aircraft ramp hinge.**

2–38.1 Load First Helicopter Nose First.

a. **Unlock Tail Wheel Swivel.** Push swivel lock lever down to release tail wheel swivel lock. Install tail wheel lock safety pin (fig. 2–14).

b. **Install Tail Wheel Steering Bar and Winching Yoke.** Connect winching yoke (item 8, table 2–1) to tail landing gear wheel fork (fig. 2–14). Tighten yoke studs onto ends of tail wheel axle. Install steering bar in yoke tube.

NOTE

Tail wheel steering bar will be used to steer helicopter and to keep main and tail wheels on loading ramps.

c. **Align Helicopter at Shoring.** Position helicopter main landing gear to aline with approach shoring (fig. 2–39).

d. **Connect Cargo Aircraft Winch Cable to Helicopter.** Couple hooks on forward winching adapter cable (item 7, table 2–1) to helicopter main wheel arm inboard towing eyes (fig. 2–15). Cargo aircraft loadmaster will direct coupling of the forward winching adapter cable to cargo aircraft winch cable and take up cable slack.

e. **Assign Personnel.** Assign loading team members to monitor ramp crest, overhead and sidewall clearances, operate tail wheel steering bar, and operate helicopter brakes.

CAUTION

- **As helicopter moves up the ramp nose first, under-belly clearance is critical.**
- **The first critical clearance encountered will be the gun cage to ramp clearance. Adjust shoring under main wheels as required to maintain clearance.**
- **The second critical clearance is the dopler antenna fairing to the ramp crest. Maintain clearance by raising cargo aircraft ramp (after helicopter tail wheel is firmly on ramp).**

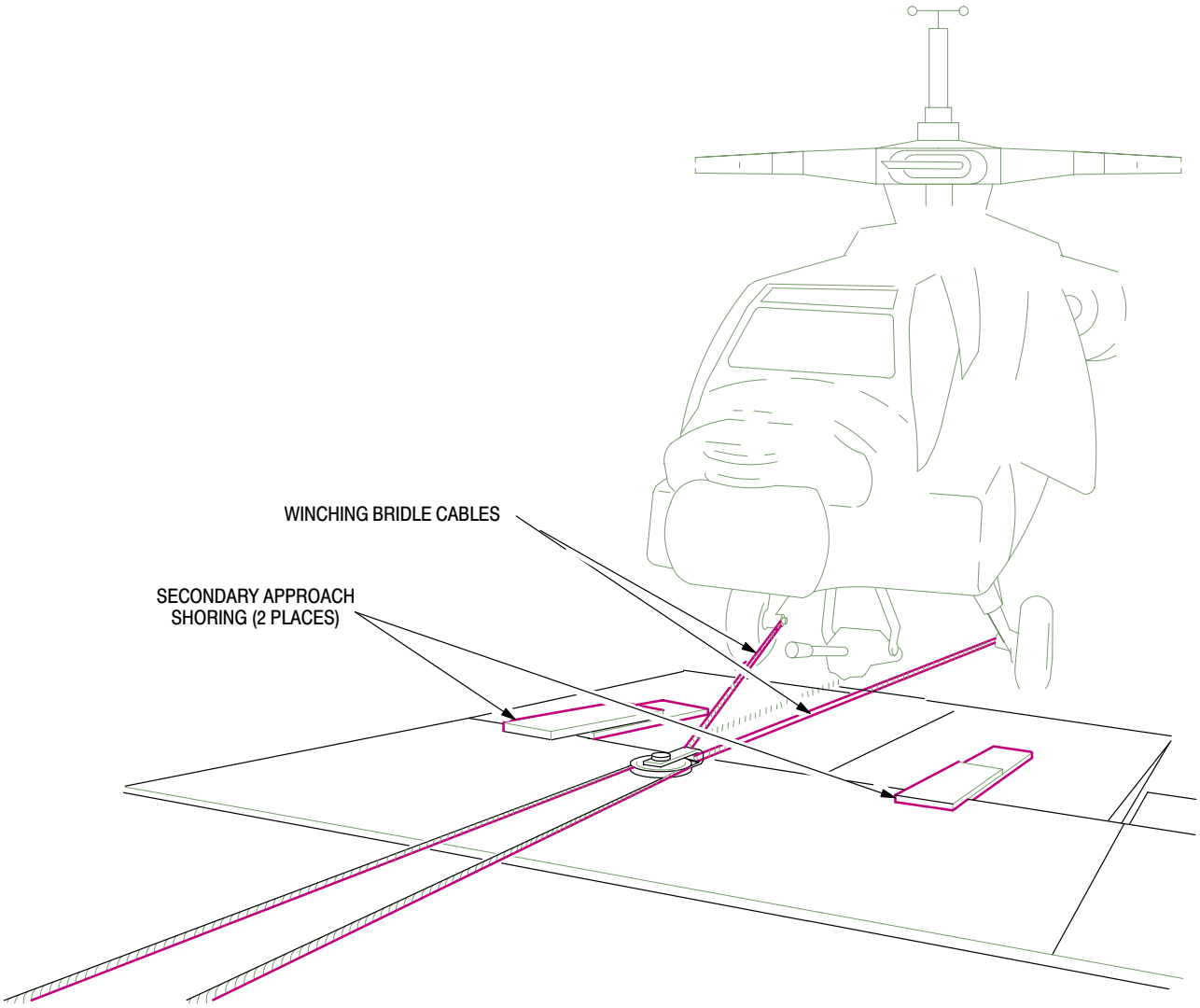


Figure 2–39. Winching Bridle/Nose First Loading

f. **Winch Helicopter.** Winch helicopter onto approach shoring and up cargo ramp (fig. 2–39). Stop helicopter when the tail wheel is on the ramp. Raise ramp to allow adequate ramp crest clearance. Continue winching to position the helicopter as shown in (fig. 2–40).

g. **Apply Brakes.** Apply helicopter brakes and place chocks.

h. **Install Chains.** Install safety chains.

i. **Lock Tail Wheel.** Remove tail wheel lock safety pin. Lift swivel lock lever to engage tail wheel swivel lock (fig. 2–14). Push wheel sideways to check lock engagement. A locked tail wheel will not swivel.

j. **Remove Tail Wheel Steering Bar and Winching Yoke.** With tail wheel centered, loosen yoke studs from tail wheel axle and remove yoke (fig. 2–14).

k. **Release Brakes.** Instruct brakeman to release helicopter bakes and dismount helicopter.

2–38.2 Load Four Main Rotor Blades. Position two main rotor blade rack sets holding two blades each on cargo floor under first helicopter.

2–38.3 Load Second Helicopter Tail First.

a. **Place Approach Shoring.** Place the built up shoring or the prefabricated ramps (fig. 2–35) under the ramp toes as shown for tail first load. Position secondary approach shoring ramps (fig. 2–41). Position roller tray shoring (fig. 2–38).

b. **Unlock Tail Wheel Swivel.** Paragraph 2–38.1.a.

c. **Install Tail Wheel Steering Bar and Winching Yoke.** Paragraph 2–38.1.b.

NOTE

Tail wheel steering bar will be used to steer helicopter and to keep main and tail wheels on loading ramps.

d. **Aline Helicopter at Shoring.** Position helicopter with main landing gear to aline with approach shoring.

e. **Connect Cargo Winch Cable to Helicopter.** Cargo aircraft loadmaster will direct coupling of the cargo aircraft winch cable to the tail wheel winching yoke and take up cable slack.

f. **Assign Personnel.** Assign loading team members to monitor ramp crest, overhead and sidewall clearances, operate tail wheel steering bar, and operate helicopter brakes.

CAUTION

- **As helicopter moves up the ramp tail first, under-belly clearance is critical.**
- **The first critical clearance encountered will be the gun cage to ground clearance as the tail of the helicopter moves up the ramp.**
- **Adjust shoring under main wheels as required to maintain clearance.**
- **The second critical clearance is the dopler antenna fairing to the ramp crest.**
- **Maintain clearance by raising cargo aircraft ramp (after helicopter main wheels are firmly on ramp).**

g. **Winch Helicopter.** Winch helicopter onto approach shoring and up cargo ramp. Stop helicopter when the main wheels are firmly on the ramp. Raise ramp to allow adequate ramp crest clearance. Continue winching until the helicopter is in final position. (fig 2–40).

h. **Apply Brakes.** Apply helicopter brakes and place chocks.

i. **Install Safety Chains.** Install safety chains.

j. **Lock Tail Wheel.** Paragraph 2–38.1.i.

k. **Remove Tail Wheel Steering Bar and Winching Yoke.** Paragraph 2–38.1.j.

l. **Release Brakes.** Instruct brakeman to release helicopter brakes and dismount helicopter.

2–38.4 Load Four Main Rotor Blades. Position two main rotor blade rack sets holding two blades each on cargo floor under second helicopter.

2–38.5 Load Two Horizontal Stabilators.

2–38.6 Load Four Hellfire Launchers.

2–38.7 Load Four 2.75 inch Rocket Pods.

2–38.8 Load Ramp and/or Shoring.

2–38.9 Install Helicopter Tiedowns. (fig. 2–17).

2–38.10 Secure Tail Rotor. (fig. 2–34).

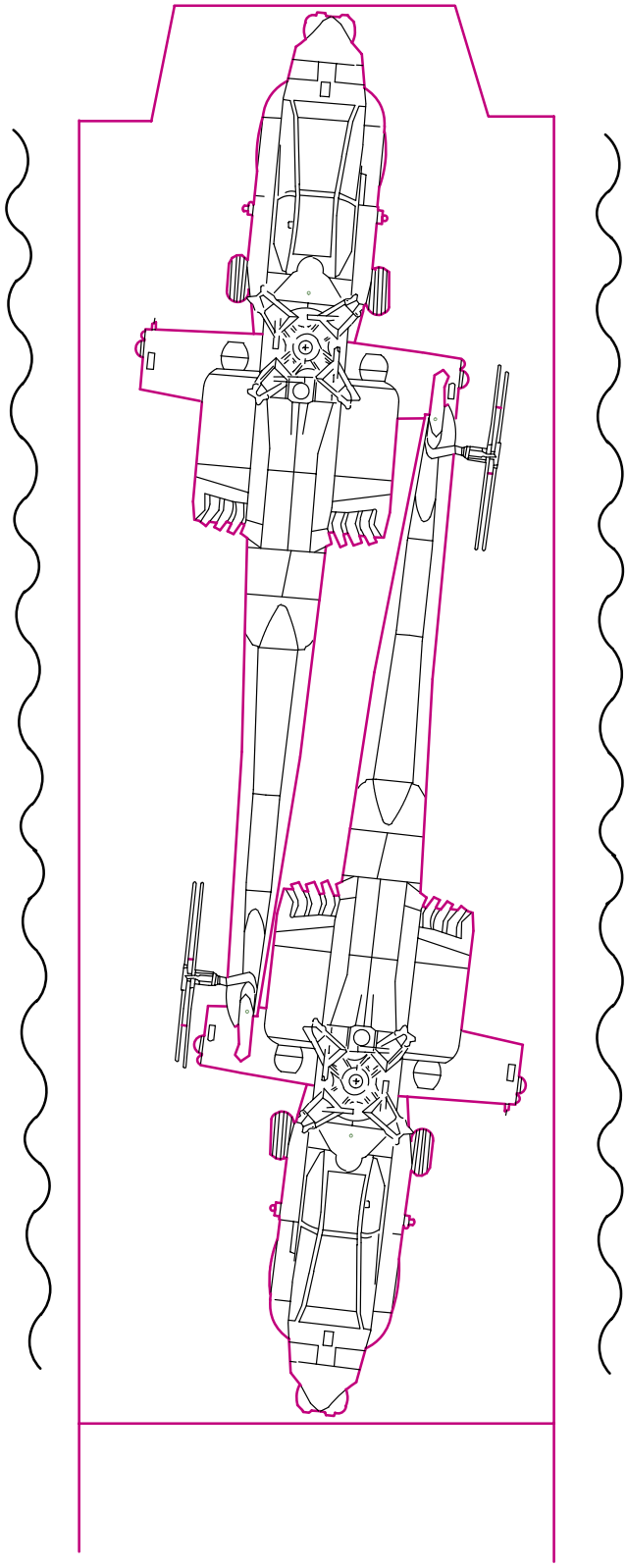


Figure 2–40. Two Helicopters Operational (Tactical Configuration)

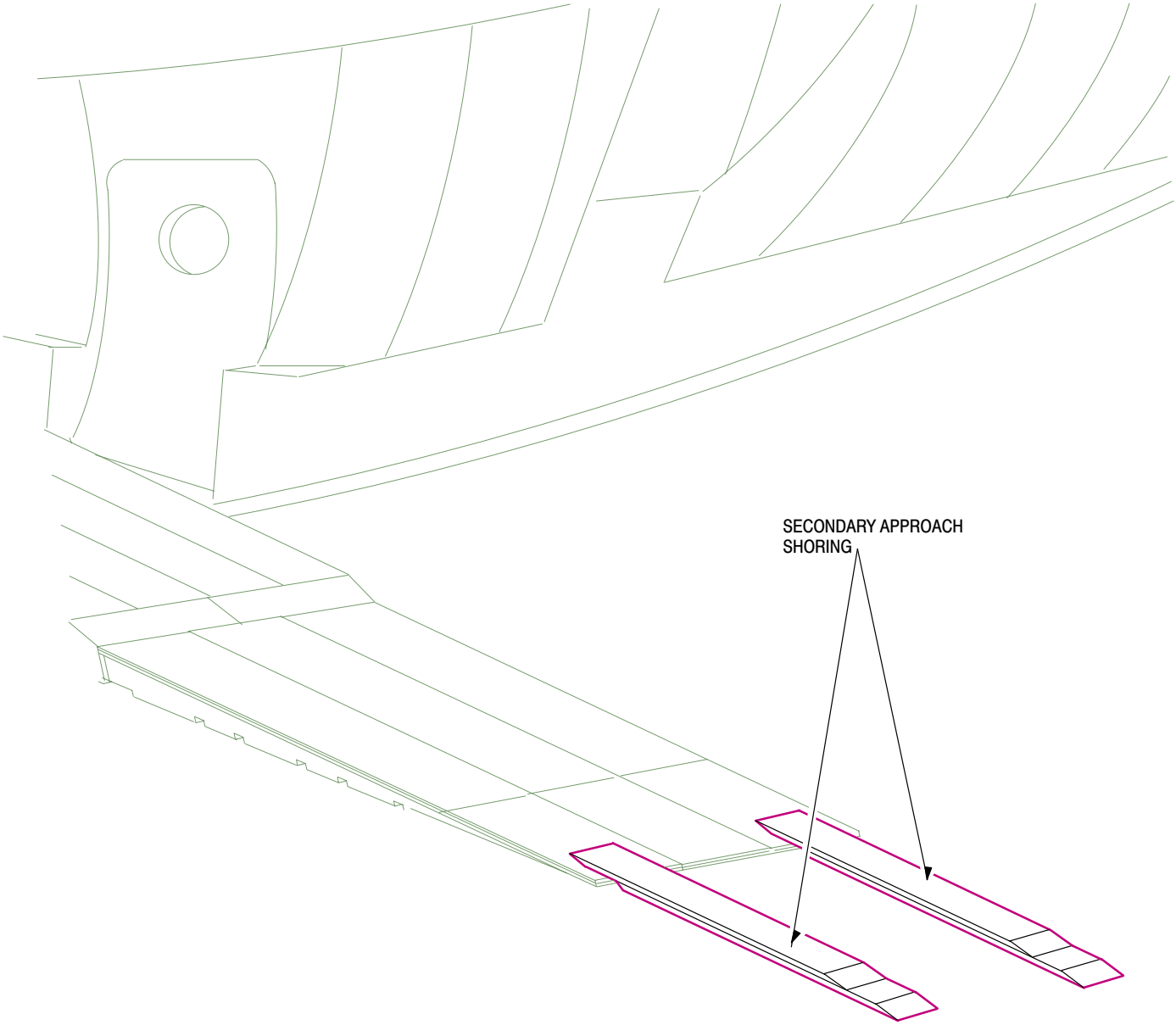


Figure 2–41. Secondary Approach Shoring Ramps Tail First Loading

2–39 HELICOPTER LOADING AND TIEDOWN (MAXIMUM DENSITY (LOGISTICAL) SHIPMENT.

WARNING

- **To prevent fire, explosion, or weapon discharge, verify that armament, canopy jettison, fuel, and electrical systems are safe on each helicopter prior to loading.**
- **To prevent injury to personnel and damage to helicopter and cargo aircraft, the helicopter will be restrained with chains and wheel chocks prior to releasing tension on the winch cable.**
- **To prevent injury to personnel and damage to helicopter and cargo aircraft in the event of winch failure, the helicopter CPG station will be occupied by a qualified person to operate brakes.**

CAUTION

- **To prevent damage to helicopter and cargo aircraft, chocks shall be used to prevent the helicopter from moving past the required cargo aircraft fuselage station.**
- **To prevent damage to helicopter and cargo aircraft, ensure that rotor head and tail rotor are properly positioned prior to approaching cargo aircraft.**
- **To prevent damage to helicopter and cargo aircraft, use shoring as necessary under helicopter main and tail wheels to provide clearance between helicopter underbelly and cargo aircraft ramp hinge.**

2–39.1 Load First Helicopter Nose First.

a. **Place Approach Shoring.** Place the built up shoring or the prefabricated ramps under the ramp toes as shown for nose first load. Position secondary approach shoring ramps (fig. 2–39).

b. **Unlock Tail Wheel Swivel.** Push swivel lock lever down to release tail wheel swivel lock. Install tail wheel lock safety pin (fig. 2–14).

c. **Install Tail Wheel Steering Bar and Winching Yoke.** Connect winching yoke (item 8, table 2–1) to tail landing gear wheel fork (fig. 2–14). Tighten yoke studs onto ends of tail wheel axle. Install steering bar in yoke tube.

NOTE

Tail wheel steering bar will be used to steer helicopter and to keep main and tail wheels on loading ramps.

d. **Aline Helicopter at Shoring.** Position helicopter with main landing gear to aline with approach shoring.

e. **Connect Cargo Aircraft Winch Cable to Helicopter.** Couple hooks on forward winching adapter cable (item 7, table 2–1) to helicopter main wheel arm inboard towing eyes (fig. 2–15). Cargo aircraft loadmaster will direct coupling of the forward winching adapter cable to cargo aircraft winch cable and take up cable slack.

f. **Assign Personnel.** Assign loading team members to monitor ramp crest, overhead and sidewall clearances, operate tail wheel steering bar, and operate helicopter brakes.

CAUTION

- **As helicopter moves up the ramp nose first, under-belly clearance is critical.**
- **The first critical clearance encountered will be the gun cage to ramp clearance. Adjust shoring under main wheels as required to maintain clearance.**
- **The second critical clearance is the dopler antenna fairing to the ramp crest. Maintain clearance by raising cargo aircraft ramp (after helicopter tail wheel is firmly on ramp).**

g. **Winch Helicopter.** Winch helicopter onto approach shoring and up cargo ramp. Stop helicopter when the main wheels are firmly on the ramp. Raise ramp to allow adequate ramp crest clearance. Continue winching until the helicopter is in final position. (fig 2–42).

h. **Apply Brakes.** Apply helicopter brakes and place chocks.

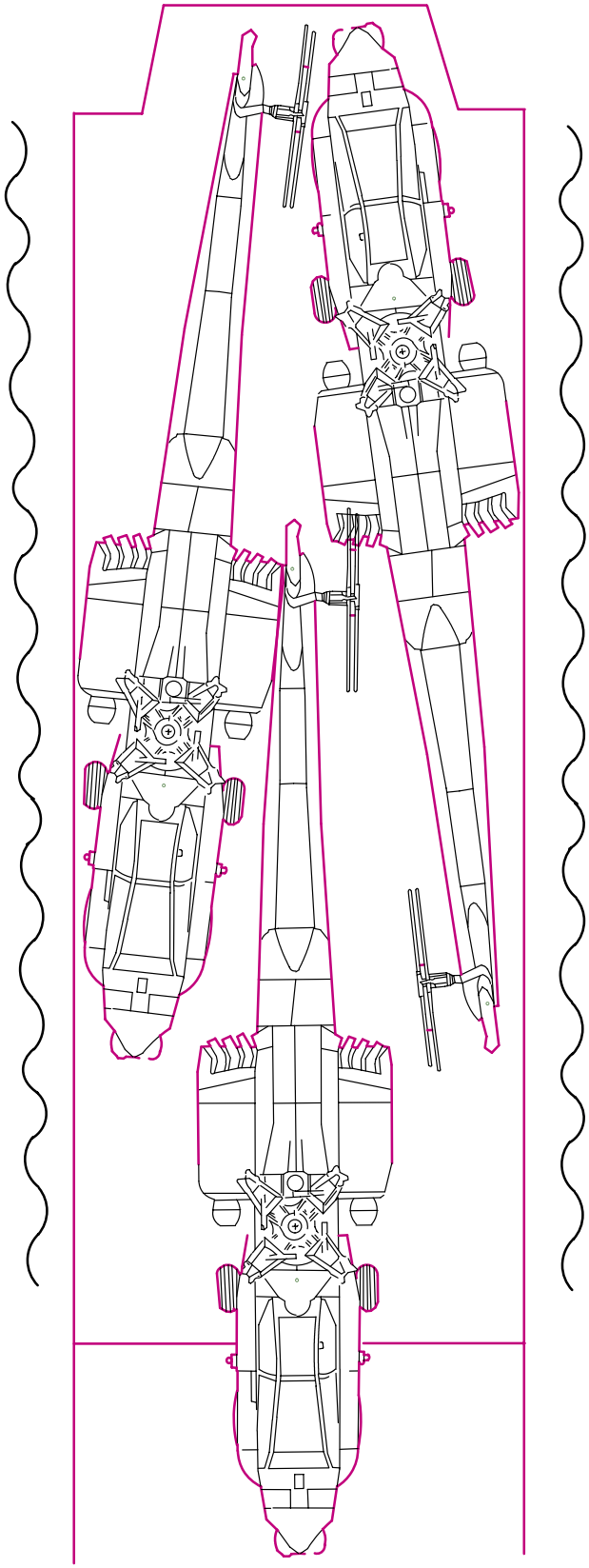


Figure 2–42. Three Helicopters Maximum Density (Logistical) Shipment

i. **Install Chains.** Install safety chains.

j. **Lock Tail Wheel.** Remove tail wheel lock safety pin. Lift swivel lock lever to engage tail wheel swivel lock (fig. 2–14). Push wheel sideways to check lock engagement. A locked tail wheel will not swivel.

k. **Remove Tail Wheel Steering Bar and Winching Yoke.** With tail wheel centered, loosen yoke studs from tail wheel axle and remove yoke (fig. 2–14).

l. **Release Brakes.** Instruct brakeman to release helicopter brakes and dismount helicopter.

2–39.2 Load Four Main Rotor Blades. Position two main rotor blade rack sets holding two blades each on cargo floor under first helicopter.

2–39.3 Load Second Helicopter Tail First.

a. **Place Approach Shoring.** Place the built up shoring or the prefabricated ramps under the ramp toes as shown for tail first load. Position secondary approach shoring ramps (fig. 2–41). Position roller tray shoring (fig. 2–38).

b. **Unlock Tail Wheel Swivel.** Paragraph 2–38.1.a.

c. **Install Tail Wheel Steering Bar In Winching Yoke.** Paragraph 2–38.1.b.

NOTE

Tail wheel steering bar will be used to steer helicopter and to keep main and tail wheels on loading ramps.

d. **Aline Helicopter at Shoring.** Position helicopter with main landing gear to aline with approach shoring.

e. **Connect Cargo Winch Cable to Helicopter.** Cargo aircraft loadmaster will direct coupling of the cargo aircraft winch cable to the tail wheel winching yoke and take up cable slack.

f. **Assign Personnel.** Assign loading team members to monitor ramp crest, overhead and sidewall clearances, operate tail wheel steering bar, and operate helicopter brakes.

CAUTION

- **As helicopter moves up the ramp tail first, under-belly clearance is critical.**
- **The first critical clearance encountered will be the gun cage to ground clearance as the tail of the helicopter moves up the ramp. Adjust shoring under main wheels as required to maintain clearance.**
- **The second critical clearance is the dopler antenna fairing to the ramp crest. Maintain clearance by raising cargo aircraft ramp (after helicopter main wheels are firmly on ramp).**

g. **Winch Helicopter.** Winch helicopter onto approach shoring and up cargo ramp. Stop helicopter when the main wheels are firmly on the ramp. Raise ramp to allow adequate ramp crest clearance. Continue winching until the helicopter is in final position. (fig 2–42).

h. **Apply Brakes.** Apply helicopter brakes and place chocks.

i. **Install Chains.** Install safety chains.

j. **Lock Tail Wheel.** Paragraph 2–38.1.j.

k. **Remove Tail Wheel Steering Bar and Winching Yoke.** Paragraph 2–38.1.k.

l. **Release Brakes.** Instruct brakeman to release helicopter brakes and dismount helicopter.

2–39.4 Load Four Main Rotor Blades. Position two main rotor blade rack sets holding two blades each on cargo floor under second helicopter.

2–39.5 Load Third Helicopter Tail First.

a. **Place Approach Shoring.** Place the built up shoring or the prefabricated ramps under the ramp toes as shown for tail first load. Position secondary approach shoring ramps (fig. 2–41). Position roller tray shoring (fig. 2–38).

b. **Unlock Tail Wheel Swivel.** Paragraph 2–38.1.a.

c. **Install Tail Wheel Steering Bar In Winching Yoke.** Paragraph 2–38.1.b.

NOTE

Tail wheel steering bar will be used to steer helicopter and to keep main and tail wheels on loading ramps.

d. **Align Helicopter at Shoring.** Position helicopter main landing gear to aline with approach shoring.

e. **Connect Cargo Aircraft Winch Cable to Helicopter.** Cargo aircraft loadmaster will direct coupling of the cargo aircraft winch cable to the tail wheel winching yoke and take up cable slack.

f. **Assign Personnel.** Assign loading team members to monitor ramp crest, overhead and sidewall clearances, operate tail wheel steering bar, and operate helicopter brakes.

CAUTION

- **As helicopter moves up the ramp tail first, under-belly clearance is critical.**
- **The first critical clearance encountered will be the gun cage to ground clearance as the tail of the helicopter moves up the ramp. Adjust shoring under main wheels as required to maintain clearance.**
- **The second critical clearance is the dopler antenna fairing to the ramp crest. Maintain clearance by raising cargo aircraft ramp (after helicopter main wheels are firmly on ramp).**

g. **Winch Helicopter.** Winch helicopter onto approach shoring and up cargo ramp. Stop helicopter when the main wheels is firmly on the ramp. Raise ramp to allow adequate ramp crest clearance. Continue winching to position the helicopter as shown in (fig. 2–42).

h. **Apply Brakes.** Apply helicopter brakes and place chocks.

i. **Install Chains.** Install safety chains.

j. **Lock Tail Wheel.** Paragraph 2–38.1.j.

k. **Remove Tail Wheel Steering Bar and Winching Yoke.** Paragraph 2–38.1.k

l. **Release Brakes.** Instruct brakeman to release helicopter brakes and dismount helicopter.

2–39.6 Load Four Main Rotor Blades. Position two main rotor blade rack sets holding two blades each on cargo floor under second helicopter.

2–39.7 Load Three Horizontal Stabilators.

2–39.8 Load Six Hellfire Launchers.

2–39.9 Load Six 2.75 inch Rocket Pods.

2–39.10 Load Ramp and/or Shoring.

2–39.11 Install helicopter Tiedowns. (Fig. 2–17).

2–39.12 Secure Tail Rotors. (Fig. 2–34).

2–40 HELICOPTER OFF LOADING – TACTICAL SHIPMENT.

2–40.1 Off–Load Ramps and/or shoring.

2–40.2 Off–Load Four 2.75inch Rocket Pods.

2–40.3 Off–Load Four Hellfire Launchers.

2–40.4 Off–Load Two Horizontal Stabilators.

2–40.5 Off–Load Four Main Rotor Blades.

WARNING

- **To prevent injury to personnel and damage to helicopter and cargo aircraft, the helicopter will be restrained with winch cable prior to releasing chains and wheel chocks.**
- **To prevent injury to personnel and damage to helicopter and cargo aircraft in the event of winch failure, the helicopter CPG station will be occupied by a qualified person to operate brakes.**

2–40.6 Off–Load First Helicopter.

a. **Place Approach Shoring.** Place the built up shoring or the prefabricated ramps under the ramp toes as shown for tail first load. Position secondary approach shoring ramps (fig. 2–41). Position roller tray shoring (fig. 2–38) for tail first load. Raise cargo aircraft ramp to approximately level.

b. **Assign Personnel.** Assign loading team members to monitor ramp crest, overhead and sidewall clearances, operate tail wheel steering bar, and operate helicopter brakes.

c. **Unlock Tail Wheel Swivel.** Paragraph 2–38.1.a.

d. **Install Tail Wheel Steering Bar and Winching Yoke.** Paragraph 2–38.1.b.

NOTE

Tail wheel steering bar will be used to steer helicopter and to keep main and tail wheels on loading ramps.

e. **Connect Cargo Aircraft Winch Cable to Helicopter.** Cargo aircraft loadmaster will direct coupling of the cargo aircraft winch cable to the tail wheel winching yoke and take up cable slack.

f. **Remove Tiedowns.** Remove aircraft tiedowns and wheel chocks. Maintain tension on cargo aircraft cable restrain helicopter.

CAUTION

- **As helicopter moves off the ramp, under-belly clearance is critical.**
- **The first critical clearance is the dopler antenna fairing to the ramp crest. Ensure that fairing is far enough past ramp crest to permit clearance prior to lowering ramp.**
- **The second critical clearance encountered will be the gun cage to ground clearance as the helicopter moves off the ramp. Adjust shoring under main wheels as required to maintain clearance.**

g. **Winch Helicopter.** Maneuver helicopter onto cargo ramp. Restrain helicopter with cargo aircraft winch. Stop helicopter prior to the main wheels moving off the ramp (ensure that the dopler antenna fairing is far enough past ramp crest to permit clearance). Lower cargo aircraft ramp onto auxiliary ramps. Maneuver helicopter off of cargo aircraft ramp and tow to staging area.

2–40.7 Off–Load Four Main Rotor Blades.

2–40.8 Off–Load Second Helicopter.

a. **Place Approach Shoring.** Place the built up shoring or the prefabricated ramps under the ramp toes as shown for tail first load. Position secondary approach shoring ramps (fig. 2–41). Position roller tray shoring (fig. 2–38) for tail first load. Raise cargo aircraft ramp to approximately level.

b. **Assign Personnel.** Assign loading team members to monitor ramp crest, overhead and sidewall clearances, operate tail wheel steering bar, and operate helicopter brakes.

c. **Unlock Tail Wheel Swivel.** Paragraph 2–38.1.a.

d. **Install Tail Wheel Steering Bar and Winching Yoke.** Paragraph 2–38.1.b.

NOTE

Tail wheel steering bar will be used to steer helicopter and to keep main and tail wheels on loading ramps.

e. **Connect Cargo Aircraft Winch Cable to Helicopter.** Couple hooks on forward winching adapter cable (item 7, table 2–1) to helicopter main wheel arm inboard towing eyes (fig. 2–15). Cargo aircraft loadmaster will direct coupling of the forward winching adapter cable to cargo aircraft winch cable and take up cable slack.

f. **Remove Tiedowns.** Remove aircraft tiedowns and wheel chocks. Maintain tension on cargo aircraft cable to restrain helicopter.

CAUTION

- **As helicopter moves off the ramp, under-belly clearance is critical.**
- **The first critical clearance is the dopler antenna fairing to the ramp crest. Ensure that fairing is far enough past ramp crest to permit clearance prior to lowering ramp.**
- **The second critical clearance encountered will be the gun cage to ground clearance as the helicopter moves off the ramp. Adjust shoring under main wheels as required to maintain clearance.**

g. **Winch Helicopter.** Maneuver helicopter onto cargo ramp. Restrain helicopter with cargo aircraft winch. Stop helicopter prior to the tail wheel moving off the ramp (ensure that the dopler antenna fairing is far enough past ramp crest to permit clearance). Lower cargo aircraft ramp onto auxiliary ramps. Maneuver helicopter off of cargo aircraft ramp and tow to staging area.

2–41 HELICOPTER OFF-LOADING MAXIMUM DENSITY (LOGISTICAL) SHIPMENT.

2–41.1 Off–Load Ramp and/or Shoring.

2–41.2 Off–Load Six 2.75 inch Rocket Pods.

2–41.3 Off–Load Six Hellfire Launchers.

2–41.4 Off–Load Four Main Rotor Blades.

2–41.5 Off–Load Three Horizontal Stabilators.

WARNING

- **To prevent injury to personnel and damage to helicopter and cargo aircraft, the helicopter will be restrained with winch cable prior to releasing chains and wheel chocks.**
- **To prevent injury to personnel and damage to helicopter and cargo aircraft in the event of winch failure, the helicopter CPG station will be occupied by a qualified person to operate brakes.**

2–41.6 Off–Load First Helicopter.

a. **Place Approach Shoring.** Place the built up shoring or the pre–fabricated ramps under the ramp toes. Position secondary approach shoring ramps (fig. 2–39) for nose first load. Raise cargo aircraft ramp to approximately level.

b. **Assign Personnel.** Assign loading team members to monitor ramp crest, overhead and sidewall clearances, operate tail wheel steering bar, and operate helicopter brakes.

c. **Unlock Tail Wheel Swivel.** Paragraph 2–38.1.a.

d. **Install Tail Wheel Steering Bar and Winching Yoke.** Paragraph 2–38.1.b.

NOTE

Tail wheel steering bar will be used to steer helicopter and to keep main and tail wheels on loading ramps.

e. **Connect Cargo Aircraft Winch Cable to Helicopter.** Cargo aircraft loadmaster will direct coupling of the cargo aircraft winch cable to the tail wheel winching yoke and take up cable slack.

f. **Remove Tiedowns.** Remove aircraft tiedowns and wheel chocks. Maintain tension on cargo aircraft cable restrain helicopter.

CAUTION

- **As helicopter moves off the ramp, under-belly clearance is critical.**
- **The first critical clearance is the dopler antenna fairing to the ramp crest. Ensure that fairing is far enough past ramp crest to permit clearance prior to lowering ramp.**
- **The second critical clearance encountered will be the gun cage to ground clearance as the helicopter moves off the ramp. Adjust shoring under main wheels as required to maintain clearance.**

g. **Winch Helicopter.** Maneuver helicopter onto cargo ramp. Restrain helicopter with cargo aircraft winch. Stop helicopter prior to the main wheels moving off the ramp (ensure that the dopler antenna fairing is far enough past ramp crest to permit clearance). Lower cargo aircraft ramp onto auxiliary ramps. Maneuver helicopter off of cargo aircraft ramp and tow to staging area.

2–41.7 Off–Load Four Main Rotor Blades.

2–41.8 Off–Load Second Helicopter. Repeat procedure used for first helicopter (Paragraph 2–41.6).

2–41.9 Off–Load Four Main Rotor Blades.

2–41.10 Off–Load Third Helicopter.

a. **Place Approach Shoring.** Place the built up shoring or the prefabricated ramps under the ramp toes as shown (fig. 2–39) for nose first load. Raise cargo aircraft ramp to approximately level.

b. **Assign Personnel.** Assign loading team members to monitor ramp crest, overhead and sidewall clearances, operate tail wheel steering bar, and operate helicopter brakes.

c. **Unlock Tail Wheel Swivel.** Paragraph 2–38.1.a.

d. **Install Tail Wheel Steering Bar and Winching Yoke.** Paragraph 2–38.1.b.

NOTE

Tail wheel steering bar will be used to steer helicopter and to keep main and tail wheels on loading ramps.

e. **Connect Cargo Winch Cable to Helicopter.** Couple hooks on forward winching adapter cable (item 7, table 2–1) to helicopter main wheel arm inboard towing eyes (fig. 2–15). Cargo aircraft loadmaster will direct coupling of the forward winching adapter cable to cargo aircraft winch cable and take up cable slack.

f. **Remove Tiedowns.** Remove aircraft tiedowns and wheel chocks. Maintain tension on cargo aircraft cable restrain helicopter.

CAUTION

- **As helicopter moves off the ramp, under-belly clearance is critical.**
- **The first critical clearance is the dopler antenna fairing to the ramp crest. Ensure that fairing is far enough past ramp crest to permit clearance prior to lowering ramp.**
- **The second critical clearance encountered will be the gun cage to ground clearance as the helicopter moves off the ramp. Adjust shoring under main wheels as required to maintain clearance.**

g. **Winch Helicopter.** Maneuver helicopter onto cargo ramp. Restrain helicopter with cargo aircraft winch. Stop helicopter prior to the tail wheel moving off the ramp (ensure that the dopler antenna fairing is far enough past ramp crest to permit clearance). Lower cargo aircraft ramp onto auxiliary ramps. Maneuver helicopter off of cargo aircraft ramp and tow to staging area.

2–41.11 Off–Load Four Main Rotor Blades.

2–42 HELICOPTER PREPARATION FOR USE AFTER C-17 SHIPMENT (TACTICAL SHIPMENT).

All assembly will be strictly in accordance with referenced TMs.

2–42.1 Preliminary Safety Procedures. Before starting operations, perform safety procedures outlined in paragraph 2–42.2 and 2–42.3.

2–42.2 Ground Helicopters. TM 1-1520-238-23.

2–42.3 Perform Helicopter Safety Check. TM 1-1520-238-23.

2–42.4 Unpacking and Depreservation.

a. **Aircraft Logbook.** Record all depreservation and assembly in aircraft logbook (DA PAM 738-751).

b. **Unpack Shipping Containers.** Remove all shipped (disassembled), boxed, or crated helicopter components from shipping containers, crates and cartons.

c. **Unload Fuselage Package.** Remove all removed parts, equipment, and records stowed within the helicopter (catwalk area and pilots station).

d. **Remove Wrapping and Cushioning Material.** Remove all tape, twine, barrier and cushioning materials from shipped items and helicopter airframe. Dispose of materials properly.

NOTE

Coated mounting surfaces, bolt holes, and hardware of stowed wings may be inaccessible for cleaning on helicopters with the wings removed. These areas will be cleaned after the wings are unstowed.

e. **Depreserve Coated Areas.** Clean all preservative material from coated areas. Remove all tape residue. Refer to TM 1-1520-238-23 for applicable cleaning procedures.

f. **Depreserve Treated Items.** Deprocess all insecticide and rodenticide-treated areas (ref. to appendix F). Dispose of material properly.

2–42.5 Install Main Rotor Blades.

a. **Unclamp Blades.** Unclamp and remove two main rotor blades from each rack set (fig. NO TAG).

CAUTION

Ensure that blades are installed on the same aircraft from which they were removed and in the correct location as indicated by the blade location color code.

b. **Install Main Rotor Blades.** Install main rotor blades (TM 1-1520-238-23) using crane truck (item 13, table 2–1) and main rotor blade sling (item 14, table 2–1).

2–42.6 Install Main Rotor Deice Power Distributor, Air Data System (ADS) Mast, and Stand Pipe.

a. **Remove Panel.** Remove panel R2000.

CAUTION

Polarized internal 8-gauge deicing leads are tagged to indicate proper reconnection. Improperly connected leads will cause electrical malfunction or equipment damage.

b. **Install Stand Pipe, Power Distributor, and ADS Mast.** (TM 1-1520-238-23).

2–42.7 Remove Forward Fuselage Tiedown Fittings.

a. **Remove Main Landing Gear Cross Tube Tiedown Fittings.** Remove one nut and washer from cross tube left and right tiedown fitting studs. Pull studs (with pinned nuts in place) from cross tube. Slide fittings from cross tube ends. Retain removed studs, washers, and nuts (fig. NO TAG).

b. **Install Cross Tube End Caps.** Slide end caps onto left and right ends of each main landing gear cross tube. Aline holes in fittings and cross tube, and install removed studs, washers, and nuts. Torque D–20nut to 60-70 inch pounds. Install new cotter pins (D–20) at unpinned nuts.

2–42.8 Install Horizontal Stabilator and Tailboom Aft Closeout Fairing. (fig. NO TAG and TM 1-1520-238-23).

a. **Remove Stabilator Actuator Support**. Remove nuts, bolts and washers from support end fitting and actuator rod end, and remove actuator support from stabilator airframe pivots. Retain rod end hardware.

b. **Install Horizontal Stabilator.** (TM 1-1520-238-23.. Use new cotter pin (D–16) for nut on pivot bolt and one (D–19) for nut on stabilator actuator rod end bolt.

c. **Static Wicks.** Loosen one screw and remove the other screw for each wick. Rotate the wick to parallel with the stabilator chord. Tighten screws.

d. **Access Covers.** Reinstall stabilator access covers and tailboom closeout fairing (TM 1-1520-238-23).

2–42.9 Install ADF Wire Antenna, UHF L–Band, Communications, Transponder Blade Antennas,and FM–AM Whip Antenna (MWO 1-1520-238-50-37 installed) and Lower IFF Antenna (MWO 1-1520-238-50-36 installed). (fig. 2–8).

a. **Install FM-AM Whip Antenna.** Attach lower half of antenna to upper half. Torque antenna upper jam nut to **265 INCH–POUNDS** and lockwire (D–27). Install antenna in vertical stabilizer mounting bracket. Torque antenna lower jam nut to **650 INCH–POUNDS** and lockwire. (D–27).

b. **Install ADF Wire Antenna.** Hook end of antenna onto standoff terminal spring ends.

c. **Install Blade Antennas.** Connect each antenna plug to mating receptacle under antenna flange. Aline antenna flanges on fuselage and install six screws at each location. Seal antenna flanges with sealant (D–12) applied between edges of reinstalled antenna flanges and mating fuselage skin.

d. **Install Lower IFF Antenna.** Attach connector plug to antenna. Aline antenna to mounting bracket and install four screws.

2–42.10 Install Anti-collision Lights. Install left and right anti-collision lights **(**TM 1-1520-238-23**)**.

2–42.11 Connect Helicopter Battery.
TM 1-1520-238-23.

2–42.12 Inspect Helicopter. Perform 10 hour/14 day inspection (TM 1-1520-238-PMS).

2–42.13 Perform Maintenance Operational Checks as Required for Removed Components/Mission Equipment. TM 1-1520-238-23.

2–42.14 Refuel Helicopter.
TM 1-1520-238-23. Use fuel truck (item 12, table 2–2).

2–43 HELICOPTER PREPARATION FOR USE AFTER C-17 SHIPMENT (MAXIMUM DENSITY (LOGISTICAL) SHIPMENT).

All assembly will be strictly in accordance with referenced TMs.

2–43.1 Depreserve and Assemble Helicopter. Prepare helicopter as required for tactical shipment in paragraphs 2–43.2 thru 2–42.9.

2–43.2 Install Wings.

a. **Remove Four Stowing Tiedown Straps.** Unsnap both ends of left wing inboard (upper) and left and right wing outboard (lower) tiedown straps, and remove three straps. Unbolt top end of right wing inboard (upper) tiedown strap, unsnap bottom end of strap, remove strap, and reinstall fuselage tiedown bolt. (fig. 2–9).

b. **Remove Stowing Kit Trailing Edge Supports.** Lift left and right wing trailing edge supports from wing trailing edges.

WARNING

To prevent personnel injury and equipment damage, a minimum of four persons must lift and carry wing during removal and installation. If injury occurs seek medical aid.

CAUTION

- **The pitot tube can be seriously damaged if it contacts landing gear pitot fitting or other sold surface. Use extreme care to clear pitot fitting when removing wing from fuselage side.**
- **To prevent damage to helicopter, support wing removal and installation procedures.**

c. **Remove Left and Right Wings From Stowed Positions.** Remove two mounting bolts and washers from each wing root bracket at fuselage. Then lift each wing from its cradle. Conduct depreservation of coated surfaces (paragraph 2–16.4). Retain wing mounting hardware.

d. **Remove Wing Trailing Edge (Extended Range Capable Helicopters Only).** (TM 1-1520-238-23).

e. **Remove Stowing Kit Cradles.** Release three turnlock studs from each wing cradle.

f. **Remove Stowing Kit Wing Root Brackets.** Remove two captive bracket bolts from wing mount bosses and remove each wing root bracket from wing.

g. **Remove Stowed Wing Mounting Hardware.** Remove and retain two aft mounting bolts and washers from stowed positions on each side of fuselage.

h. **Mount Wings on Helicopter.** (TM 1-1520-238-23).

i. **Connect Wing Air Lines (Extended Range Capable Helicopter Only)** (fig. 2–9)**.** Remove dust cap from each fuselage side air fitting. Then connect each wing fuel line quick disconnect fitting to mating fuselage air fitting. Stow dust caps on air line clamp fittings.

j. **Install Wing Trailing Edges (Extend-Range Capable Helicopters Only).** TM 1-1520-238-23.

2–43.3 Install Fairings and Access Covers (fig.NO TAG)**.**

a. **Install Wing Fairings.** Install wing fairings with nine screws for each fairing. (LW10, RW10, LW11, and RW11) **(**TM 1-1520-238-23).

b. **Install Wing Access Covers.** Install wing access covers with 16 screws for each cover (LW9 and RW9) (TM 1-1520-238-23).

2–43.4 Install Steps. Install FS 162/WL148 and FS162/WL 168 left side steps (TM 1-1520-238-23).

2–43.5 Perform Pylon Boresight Check. TM 9-1230-476-20-1.

2–43.6 Complete Helicopter Preparation. Complete helicopter preparation in accordance with paragraphs 2–42.11 thru 2–42.14.

CHAPTER 3
SHIPMENT BY VESSEL

Section I. RESPONSIBILITIES AND GENERAL PROCEDURES FOR SHIPMENT BY VESSEL

3–1 RESPONSIBILITIES OF MTMC AND MSC.

a. **Shipping Arrangements.** When contacted by the appropriate command,the Military Traffic Management Command (MTMC) Commander will arrange with the Military Sealift Command (MSC) Commander for vessel shipment of helicopters.

b. **Center of Balance Identification.** The MTMC will arrange for the shipping activity to mark the center of balance of each helicopter on the side of fuselage. (fig. 3–1, 3–2, and 3–3.)

c. **Loading and Tiedown.** The MTMC will make arrangements with a stevedore activity or commercial stevedore firm to load and tie down helicopters on the vessel. The MTMC and MSC will supervise all loading and tiedown procedures.

d. **Preparation of Loading Plan and Manifest.** The MTMC, in coordination with the shipper, will prepare a loading plan and all required manifests.

3–2 RESPONSIBILITIES OF SHIPPER.

a. **Preparation for Shipment.** Helicopter disassembly (component removal and stowage), cleaning, preservation, and packing will be accomplished by the shipper.

b. **Coordination with MTMC.** The shipper will furnish to the MTMC, all data and information required to efficiently load the vessel, for example: weight and cube; fueled (or unfueled) condition of helicopters; notification of helicopters covered topside or on hangar deck. In addition, the shipper will function as an advisor on loading and tiedown of helicopters.

3–3 RESPONSIBILITIES OF VESSEL CREW.

a. **Enroute Maintenance.** Designated maintenance escort personnel will conduct daily inspections of helicopter protective covering and will repair protective covering in accordance with Appendix G.

b. **Tiedown Security.** Security of loaded helicopters is the responsibility of the vessel commander. Tiedowns will be inspected daily and maintained in secure condition.

3–4 EQUIPMENT REQUIREMENTS.

Equipment items required for helicopter preparation and vessel shipment are listed and described in table 3–1. Special tools and equipment are identified in Appendix E.

NOTE

Equipment item numbers listed in table 3–1 are referenced elsewhere in Chapter 3 for identification of required equipment. For all other purposes, item (reference) numbers will be disregarded, and NSN or part number and CAGE will be used for equipment identification.

3–5 CONSUMABLE MATERIAL REQUIREMENTS.

Refer to Appendix D for identification of consumable materials and bulk items required during helicopter preparation and shipment procedures.

3–6 FACILITY REQUIREMENTS.

a. **Foul–Weather Shelter.** A hangar or other enclosure will be available for land site operations in poor weather.

b. **Fire Protection.** Fire–fighting equipment must be on–site and ready for use.

c. **Electrical Grounding.** A good electrical ground will be available.

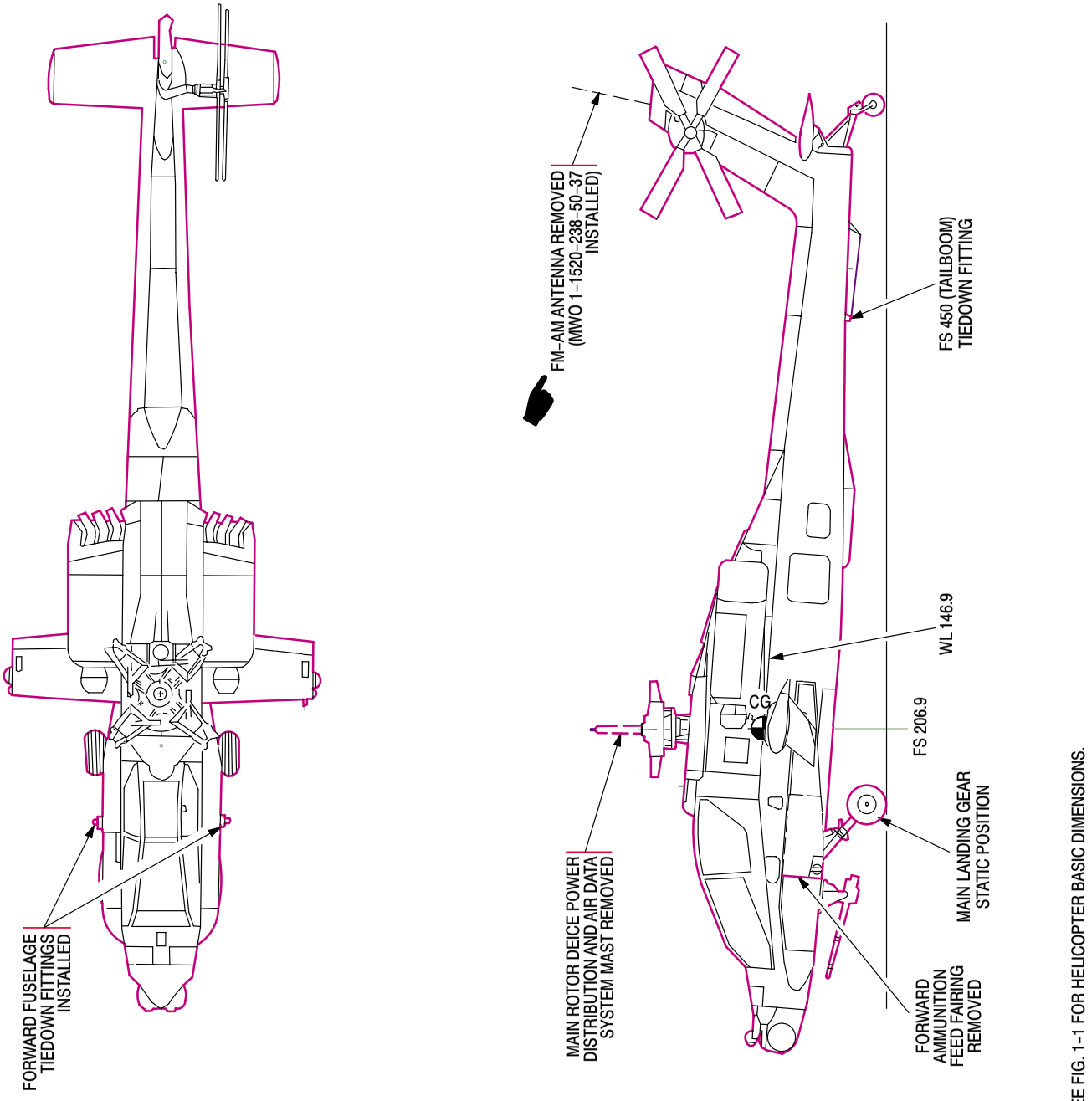


Figure 3–1. Operationally Ready Helicopter Preloading Condition for Vessel Shipment

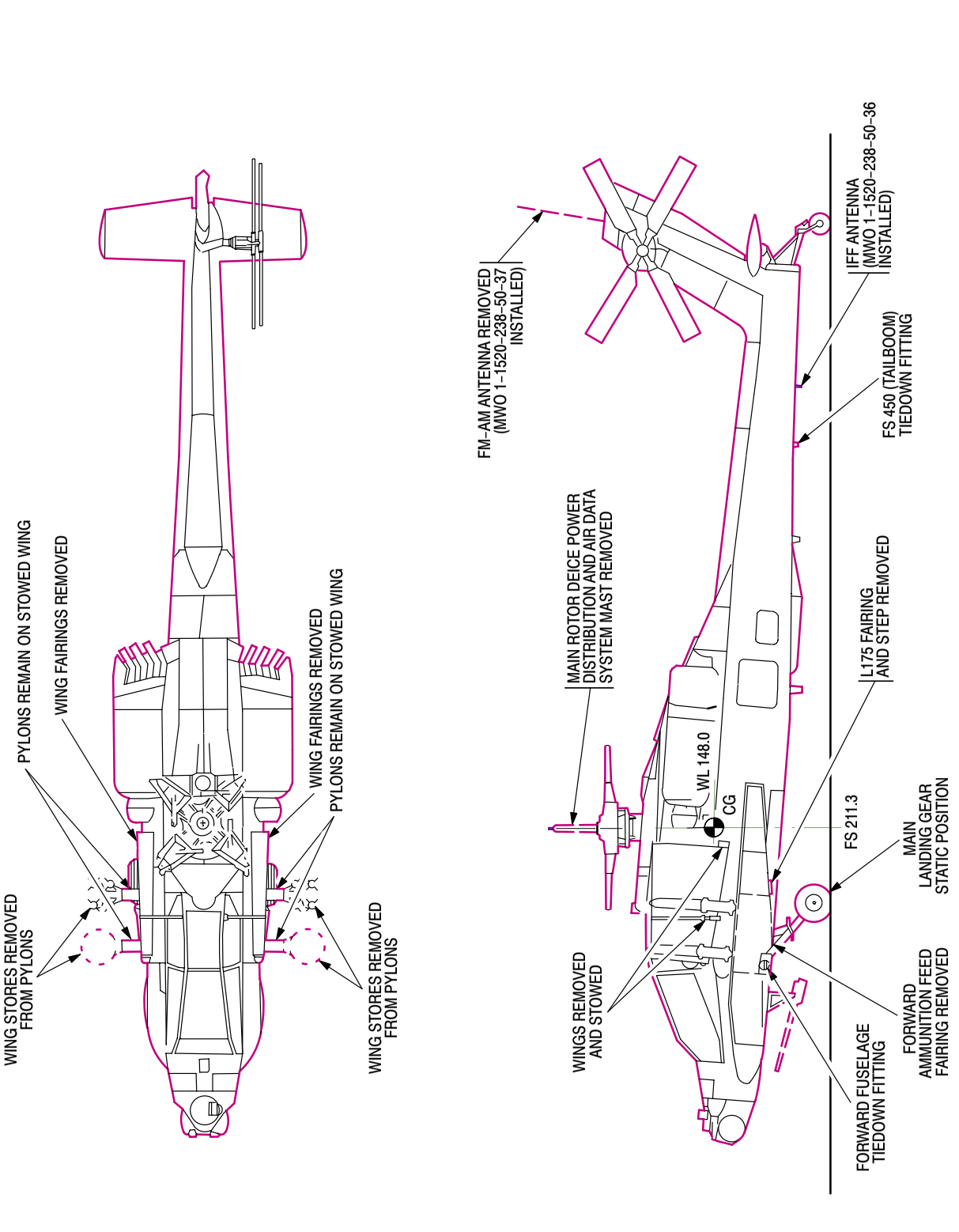
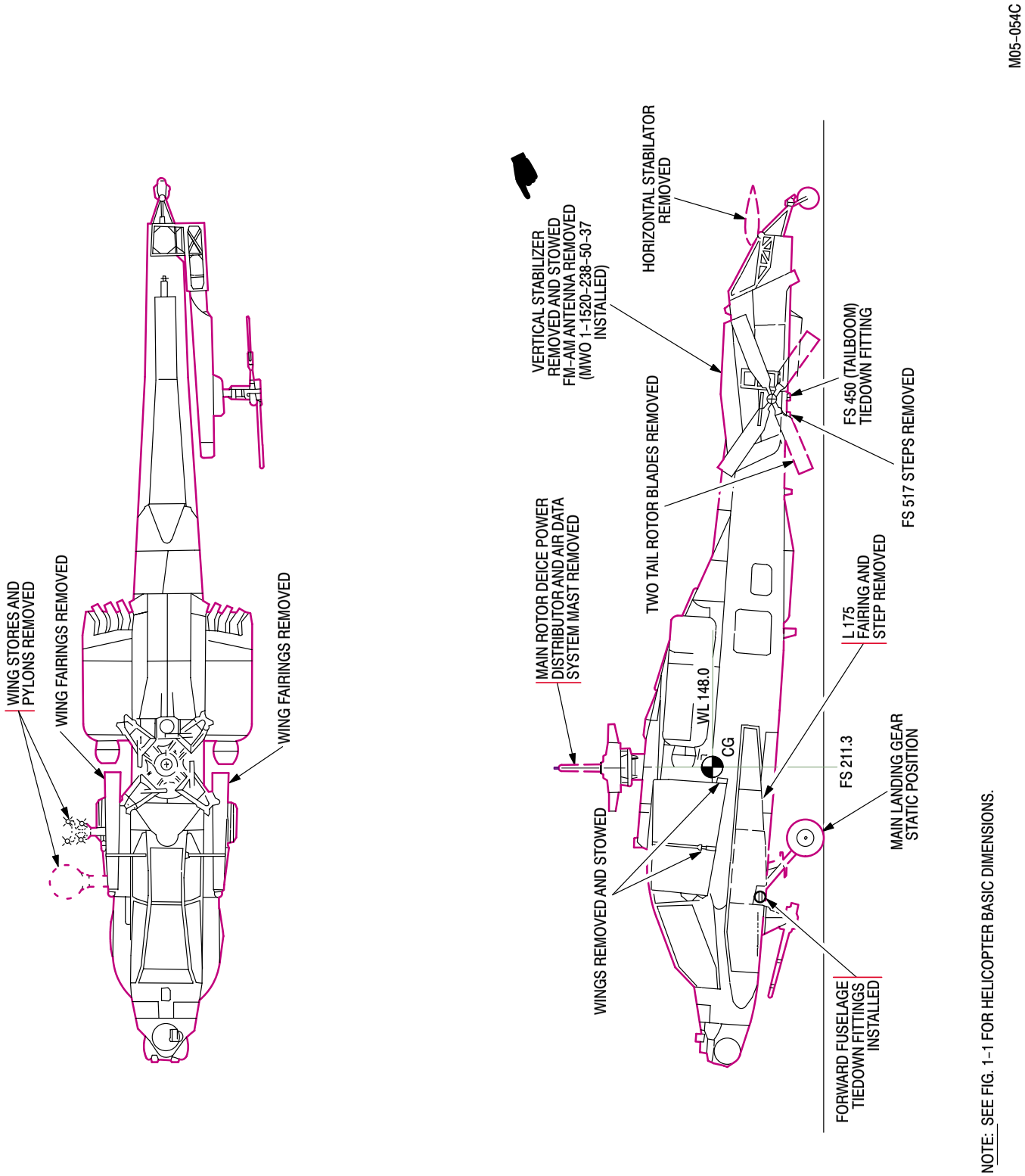


Figure 3–2. High Density Helicopter Preloading Condition for Vessel Shipment



NOTE: SEE FIG. 1-1 FOR HELICOPTER BASIC DIMENSIONS.

Figure 3–3. Maximum Density Helicopter Preloading Condition for Vessel Shipment

Table 3–1. Equipment Requirements for AH–64A Helicopter Vessel Shipment

(Sheet 1 of 3)

Item Number	Nomenclature	NSN	Part Number (CAGE/LIN)	Quantity Required	NOTES
1	Tail rotor blade support	1740–01–221–3332	7–267310017	*1	1, 5
2	Wing stowing kit	1740–01–220–8492	7–367310001	*1	1, 4, 5
3	Forward fuselage tiedown fitting	1740–01–242–7265	7–367310009	*2	1, 3, 4, 5
4	Forward winching adapter cable	1740–01–221–3327	7–267310008	4	1, 3 ,4 ,5
5	Tail wheel steering bar and winching yoke	1740–01–221–9436	7–367310013	1	1, 3, 4, 5
6	Aircraft mechanic’s tool kit	5180–00–323–4876		1	2, 3, 4, 5
7	Fuel truck	2320–00–077–1631		1	2,3, 4, 5
8	M543A2 crane truck	2320–00–055–9258		1	2, 3, 4, 5
9	Main rotor blade sling	1730–01–262–5310	7–362110216	1	2, 3, 4, 5
10	Towbar	1730–00–967–9556		1	2, 3, 4, 5
11	Droop stop wedge	1615–01–185–3102	7–262110074	4	2, 3, 4, 5
12	1/2 drive socket wrench handle	5120–00–230–6385		2	2, 3, 4, 5
13	1–1/16 socket	5120–00–935–7427		2	2, 3, 4, 5
14	1–1/16M1–1/4 open end wrench	5120–00–187–7134		2	2, 3, 4, 5
15	Hellfire launcher container			*2	2, 4, 5
16	Maintenance platform	1730–00–294–8883		1	2, 3, 4, 5
17	Aircraft armament repairman basic tool set	4933–00–987–9816		1	2, 3, 5
18	Aircraft armament repairman tool set	5180–01–110–7629		1	2, 3, 4, 5
19	1/2 drive socket wrench handle	5120–00–236–7590		1	2, 3, 4, 5
20	3/4M1/2 drive socket wrench adapter	5120–00–227–8088		1	2, 3, 4,5
21	1/2M3/8 socket wrench adapter	5120–00–240–8702		1	2, 3, 4, 5
22	1–1/2 crowfoot	5120–00–184–8412		1	2, 3, 4, 5

Table 3–1. Equipment Requirements for AH–64A Helicopter Vessel Shipment

(Sheet 2 of 3)

Item Number	Nomenclature	NSN	Part Number (CAGE/LIN)	Quantity Required	NOTES
23	11/16 socket	5120–00–935–7421		1	2, 3, 4, 5
24	9/16 socket adapter	5120–00–935–7420		1	2, 3, 4, 5
25	1–5/16 M 1–1/4 open–end wrench	5120–00–277–2321		1	2, 3, 4, 5
26	Offset crosstip screwdriver	5120–00–256–9014		1	2, 3, 4, 5
27	1/2 drive torque wrench	5120–00–270–3121		1	2, 3, 4, 5
28	3/4 drive torque wrench	5120–00–902–7983		1	2, 3, 4, 5
29	Tow motor tug		as available	1	2, 3, 4, 5
30	Fork lift		as available	1	2, 3, 4, 5
31	2.75 in. rocket launcher container			*2	2, 4, 5
32	Tri–pod jacks (10 ton)	1730–00–516–2019		2	2, 3, 4, 5
33	Captive boresight harmonization kit (CBHK)			1	2, 3, 4, 5
34	Grounding cable	local manufacture		*1	2, 3, 4, 5
35	Pitot static system tester	4920–00–718–6480		1	2, 4, 5
36	Forward jack pad	1560–01–226–7551		2	2, 3, 4, 5
37	Rotor track and balance kit	4920–01–245–6004	7–262100008–607	1	2, 3, 4, 5
38	Test kit, balance and track	4920–01–040–7816		1	2, 3, 4, 5
39	Scale, aircraft weighing	6670–00–999–1195	C46500	1	2, 3, 4, 5
40	Wheel chocks	Local manufacture		*2	2, 3, 4, 5
41	Jack, hydraulic tripod (3 ton)	1730–00–734–9382		1	2, 5
42	Vertical stabilizer sling	1730–01–285–3014	7–267310016–603	1	2, 5
43	Air vehicle sling	1730–01–165–6861	7–262110009–601	1	2, 3, 4, 5
44	Hydraulic jack	1730–00–540–2343	53D22020	1	2, 3, 4, 5
45	3/4 drive x 3 inch long extension	5120–00–233–9208	L32	1	1, 3, 4, 5
46	Vertical stabilizer stow kit	1740–01–273–7399	7–267310011–607	*1	1, 5

Table 3–1. Equipment Requirements for AH–64A Helicopter Vessel Shipment

(Sheet 3 of 3)

Item Number	Nomenclature	NSN	Part Number (CAGE/LIN)	Quantity Required	NOTES
47	Fuselage station 450 support	1740–01–250–0047	7–367310005–601	*1	1, 5
48	Gauge, dial indicating	6635–00–578–5285		1	2, 3, 4, 5
49	Depinning Tool, 8 ga	5120–00–133–0158		*1	3, 4, 5, 6
50	Tiedown chain 10,000 lbs MB–1	1670–00–516–8405		*10	3, 4, 5, 6
51	Tiedown device MB–1	1670–00–212–1149		*10	3, 4, 5, 6
52	Main rotor blade container	8145–01–235–1536	7–266100011–45	*4	3, 4, 5, 6
53	Horizontal stabilator container	Local manufacture		*1	1, 5
54	Tail rotor blade container	Local manufacture		*2	1, 5

* Asterisk by quantity indicates quantity per helicopter shipped. Quantities of other equipment items are minimums. Quantities may be increased, based on number of aircraft and personnel.

NOTES:

1. Transportability peculiar item of equipment – not included in TOE and must be requisitioned for helicopter shipment.
2. Dual purpose equipment – normally included in TOE.
3. Indicates required for Operationally Ready Shipment.
4. Indicates required for High Density Shipment.
5. Indicates required for Maximum Density Shipment.
6. Dual purpose equipment – normally not included in TOE and must be requisitioned for helicopter shipment.

d. **Area Clearance.** Area of operations will be cleared of all unneeded equipment and vehicles to allow free movement of helicopters; cleared area must accommodate a helicopter turning radius of at least 40 feet (80–foot turning circle).

NOTE

A towbar (item 10, table 3–1), or equivalent, will be used for towing and maneuver of helicopters.

e. **Crane.** A dockside crane will be available to hoist helicopters aboard the vessel, except Roll On/Roll Off (RORO) vessel loading.

NOTE

An on–board vessel crane may be used to load helicopters from dockside.

3–7 HELICOPTER PREPARATION FOR VESSEL SHIPMENT.

Preparation of the **AH–64A** helicopter consists of preliminary safety procedures (grounding, explosives deactivation, fuel level adjustment, etc.); helicopter disassembly (removal, folding, or stowage of certain helicopter components) to obtain required shipment preloading condition (fig. 3–1, 3–2 or 3–3); and cleaning, preservation, packaging, and marking of helicopters and components.

CAUTION

- **Each removed component will be color–coded, tagged, or otherwise identified to indicate the helicopter from which it was removed, and exact installed position. Rotor blades for each helicopter must be kept as sets, match–marked with mating hub components, to maintain blade balance and calibration of the deicing system. Improper fit, imbalance, or component damage may result from parts mismatched or incorrectly assembled.**
- **Unless otherwise directed, mounting hardware and pivot pins will be reinstalled after component removal, to prevent loss or damage.**
- **Smaller, hard–to–handle hardware items should be bagged and attached to related components, to prevent loss or damage.**

3–8 HELICOPTER LOADING AND TIEDOWN ON VESSEL.

The prepared helicopter airframe and removed and packaged components will be loaded and secured on the vessel in accordance with instructions provided herein.

3–9 HELICOPTER OFFLOADING.

Detailed procedures are included for offloading topside and main deck loaded helicopters to dockside upon arrival at the shipment destination.

3–10 PREPARATION FOR USE AFTER SHIPMENT.

Complete instructions are included to enable helicopter assembly, reconfiguration, refueling, checks and test flight of helicopters after vessel shipment.

Section II. SHIPMENT BY VESSEL

3–11 REQUIRED HELICOPTER PRELOADING CONDITION.

AH–64A helicopters can be shipped by vessel in Operationally Ready Configuration (fig. 3–1)), High Density Configuration, (fig. 3–2), or Maximum Density Configuration (fig. 3–3). The operationally ready helicopter configuration requires a minimum of preparation for loading or flyaway; the high density configuration requires additional preparation (disassembly) and allows increased quantities of helicopters to be loaded and shipped; the maximum density configuration requires a more extensive disassembly and allows the maximum number of helicopters to be loaded and shipped.

3–11.1 Equipment Requirements. Refer to table 3–1 for equipment items required for preparation and shipment of **AH–64A** helicopters by vessel.

3–11.2 Preliminary Safety Procedures. Before starting operations, conduct safety procedures outlined in paragraph 3–11.3 through 3–11.5.

3–11.3 Ground Helicopters.
TM 1-1520-238-23.

3–11.4 Perform Helicopter Safety Check.
TM 1-1520-238-23.

3–11.5 Deactivate Armament.

WARNING

To prevent injury to personnel, M230 guns must be cleared and visually checked.

TM 9-1090-208-23-1.

3–11.6 Prepare Helicopter for Intermediate Storage. If it is projected that the helicopter may remain inactive for more than 45 days, it shall be prepared for intermediate storage TM 1-1520-238-23.

3–11.7 Corrosion Control. Paragraph 2–10.6 and 2–10.7.

3–11.8 Service Power Train. Paragraph 2–10.8 and 2–10.9

3–11.9 Adjust Fuel Levels.

CAUTION

To prevent deterioration of fuel cells do not ship helicopters with fuel cells filled less than 1/4–full unless the fuel cells have been preserved (TM 55-1500-204-25/1).

NOTE

If the helicopter was prepared for intermediate storage, the fuel cells are drained and preserved.

Paragraph 2–10.11. Certain contract vessel shipments are restricted to a maximum fuel load of tanks 1/4–full by Department of Transportation regulations. Contact local supporting transportation office to determine status of specific vessel to be used.

3–11.10 Disconnect Battery.
Paragraph 2–10.11.

3–11.11 Service Main Landing Gear.
TM 55-1520-238-23.

3–12 HELICOPTER DISASSEMBLY FOR VESSEL SHIPMENT.

Conduct disassembly in accordance with procedures outlined in paragraph 3–12.1 through 3–12.14.

3–12.1 (High Density and Maximum Density Shipments Only) Remove Hellfire Launchers. Paragraph 2–11.1.

3–12.2 (High Density and Maximum Density Shipments Only) Remove 2.75 Inch Rocket Launchers. Paragraph 2–11.2.

3–12.2.1 Maximum Density Shipment Only. Remove Wing Pylons. Paragraph 2–25.16.1

3–12.3 Remove Main Rotor Blades. Paragraph 2–11.3. Place removed blades in blade box (item 52, table 3–1).

3–12.4 Remove Main Rotor De–ice Power Distributor and Air Data System (ADS) Mast. Paragraph 2–11.4.

3–12.5 Remove Forward Ammunition Feed Fairings. Paragraph 2–11.6d.

3–12.6 (High Density and Maximum Density Shipments Only) Remove Remaining Fairings and Access Covers. Paragraph 2–11.6. Also remove L175 fairing and step.

3–12.7 (High Density and Maximum Density Shipments Only) Remove Steps. Paragraph 2–11.7.

3–12.8 Install Forward Fuselage Tiedown Fittings. Paragraph 2–11.8.

3–12.9 (Maximum Density Shipments Only) Remove Horizontal Stabilizer. Paragraph 2–11.1.

3–12.10 (Maximum Density Shipments Only) Stow Vertical Stabilizer. Paragraph 2–25.15.

3–12.11 (RORO Loaded Vessel Only) Remove Antennas. Paragraph 2–11.4.

3–12.12 (High Density and Maximum Density Shipments Only) Remove and Stow Wings. Paragraph 2–11.5.

3–12.13 Install Flyaway Covers. Appendix G and.TM 1-1520-238-23.

3–12.14 Install Heat Shrink Film Protective Covering. Appendix G.

3–13 TRANSPORTED GROUND SUPPORT EQUIPMENT.

Paragraph 2–12.

3–14 MARKING.

Paragraph 2–13.

3–15 HELICOPTER LOADING AND TIEDOWN (VESSEL SHIPMENT).

Paragraph 3–15.1 thru 3–15.7 provide procedures for the loading and tiedown for helicopters and components for vessel shipment.

3–15.1 Verify Preliminary Safety Procedures.

WARNING

To prevent fire or explosion, verify that armament, canopy jettison, fuel, and electrical systems are safetied on each helicopter prior to loading.

Check and ensure performance of all Preliminary Safety procedures listed in paragraph 3–11.2.

3–15.2 Load Each Helicopter From Dockside (Crane Loading).

a. **Aline Helicopter at Dockside.** Position helicopter on dock adjacent to vessel deck loading location.
b. **Apply Helicopter Brakes and Place Chocks.** TM 1-1520-238-23.
c. **Install Air Vehicle Sling.** TM 1-1520-238-23.
d. **Install Helicopter Guide Ropes.** Tie one length of 1/2 inch diameter rope to tail landing gear arm and one length to each MLG tiedown fitting.
e. **Hoist Helicopter Onto Vessel Deck.** Operate crane winch and hoist helicopter onto the vessel deck. Use guide ropes.
f. **Apply Helicopter Brakes and Place Chocks.** TM 1-1520-238-23.
g. **Remove Sling and Guide Ropes.** Uncouple crane hook from air vehicle sling link (lifting eye). Remove sling pins from main rotor head, detach the sling, and untie guide ropes.
h. **Unlock Tail Wheel Swivel.** Paragraph 2–14.6a.
i. **Install Tail Wheel Steering Bar and Winching Yoke.** Paragraph 2–14.6b. Use winching yoke (item 5, table 3–1).

NOTE

Tail wheel steering bar will be used to steer the helicopter on vessel decks.

j. **Remove Chocks and Release Brakes.**
k. **Position Helicopters on Vessel.** Manually position each helicopter to be shipped to its shipping location. When helicopters are properly positioned, center tail wheels.
l. **Apply Helicopter Brakes and Place Chocks.** TM 1-1520-238-23.
m. **Lock Tail Wheel.** Paragraph 2–14.6u.
n. **Remove Tail Wheel Steering Bar and Winching Yoke.** Paragraph 2–14.6v.
o. **Install Safety Chains and Release Helicopter Brakes.** TM 1-1520-238-23.

3–15.3 Load Helicopters (RORO Loaded Vessels).

a. **Shoring.** The amount of shoring required will vary greatly depending on vessel design, dock height, and tide. Contact supporting transportation office to ensure that adequate shoring will be available at port. Shoring will be used as required to provide under belly clearance at base of ramp and at crest.
b. **Provide Brakeman.** A person will be stationed in CPG station throughout loading operations to apply helicopter brakes as required.
c. **Loading Helicopter Tail First.**
   (1) Connect tow bar (TM 1-1520-238-23).
   (2) Unlock tail wheel (para 2–14.6a).
   (3) Tow helicopter on board vessel using shoring as required to provide under belly clearance.
   (4) Apply helicopter brakes and place chocks (TM 1-1520-238-23).
   (5) Perform final positioning.
      (a) Remove tow bar (TM 1-1520-238-23).

(b) Install tail wheel steering bar and winching yoke (para 2–14.6b.).
(c) Remove chocks and release brakes (TM 1-1520-238-23).
(d) Manually position helicopter into final position.
(e) Apply helicopter brakes and place chocks
TM 1-1520-238-23).
(f) Lock tail wheel swivel (para 2–14.6u.).
(g) Remove tail wheel steering bar and winching yoke (para 2–14.6v.).
(h) Install safety chains and release helicopter brakes
(TM 1-1520-238-23).

d. **Loading Helicopter Nose First.**

CAUTION

To prevent possible damage to tail wheel and shock strut, do not push helicopter up ramp using tow bar attached to tail wheel.

(1) Connect Towing Bridle. Couple hooks on forward winching adapter cable (item 4, table 3–1) to helicopter landing gear jack points. Couple forward winching adapter towing eye to pintle on tow vehicle.

NOTE

Two sets of adapter cables may be required depending on type of tow vehicle available at port.

(2) Unlock tail wheel (para 2–14.6a).
(3) Install tail wheel steering bar and winching yoke (para 2–14.6b).
(4) Tow helicopter on board vessel using shoring as required to provide under belly clearance.
(5) Apply helicopter brakes and place chocks TM 1-1520-238-23).
(6) Perform final positioning.
(a) Remove towing bridle.
(b) Remove chocks and release brakes.
(c) Manually position helicopter into final position.
(d) Apply helicopter brakes and place chocks TM 1-1520-238-23).
(e) Lock tail wheel swivel (para 2–14.6u).
(f) Remove tail wheel steering bar and winching yoke (para 2–14.6v).
(g) Install safety chains and release helicopter brakes
(TM 1-1520-238-23).

3–15.4 Tiedown Below Deck Loaded Helicopters. Figure 3–4.

CAUTION

Tiedown restraints will be tensioned only enough to remove all free play. Overtightened tiedowns will damage helicopter structure.

a. **Tiedown Forward Fuselage Fittings.** Install three 10,000–pound tiedown devices/chains (items 50 and 51, table 3–1) at each forward fuselage tiedown fitting (six tiedowns per helicopter).

b. **Tiedown Fuselage Tailboom Fittings.** Remove quick release pin holding each FS 450 jack pad wire deflector. Secure in open position. Install two 10,000–pound tiedown devices/chains (items 50 and 51, table 3–1) at each fuselage station 450 tiedown fitting (two tiedowns per helicopter).

3–15.5 Tiedown Topside Loaded Helicopters. Figure 3–5 and paragraphs 3–15.4a and b.

3–15.6 Load Removed Helicopter Components and Ground Support Equipment to be Shipped. Position boxed components and ground support equipment on vessel.

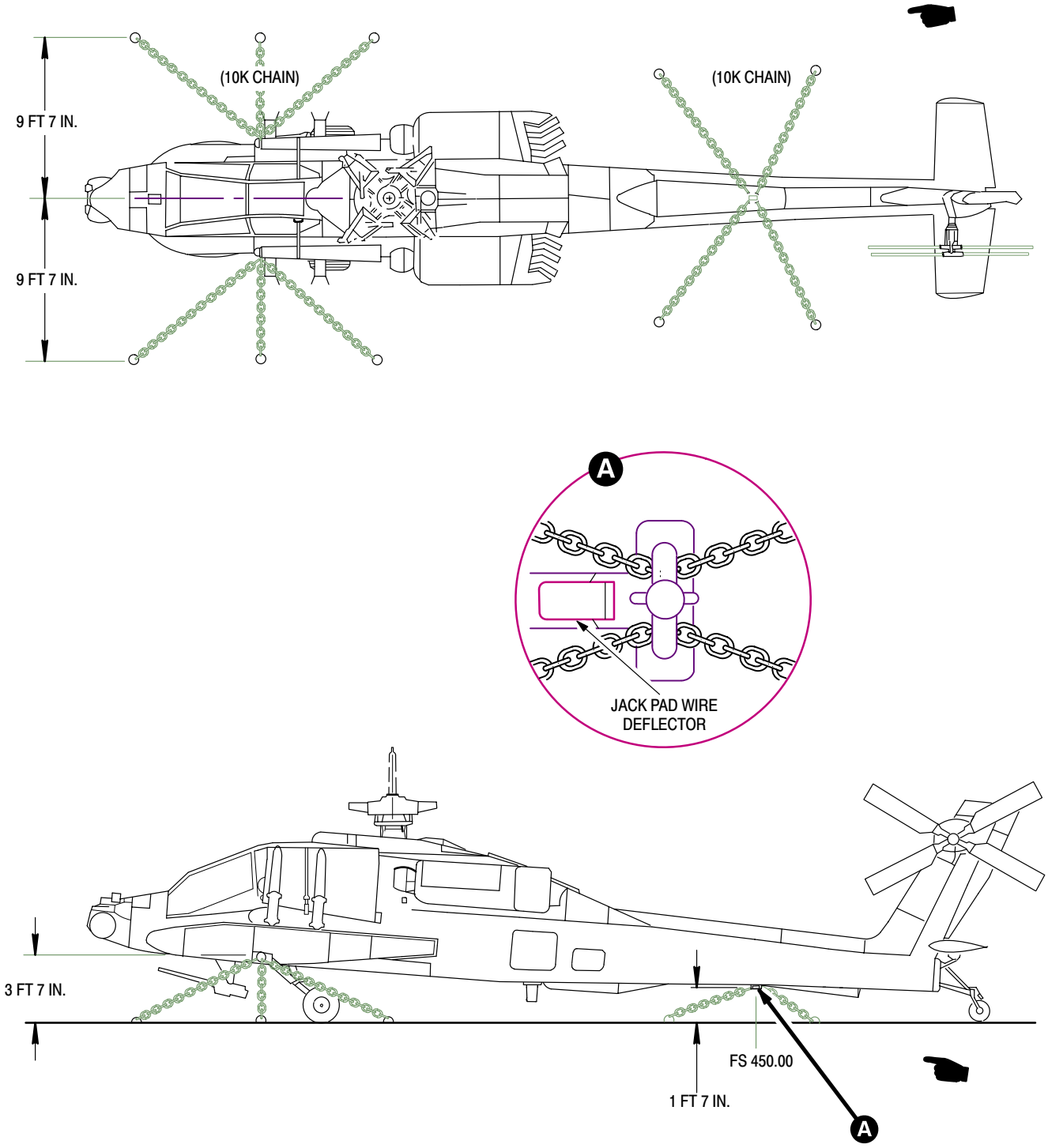
3–15.7 Tiedown Loose Helicopter Components and Boxed Ground Support Equipment. Install 5000–pound tiedown straps at helicopter components and boxed ground support equipment. Use enough tiedowns to secure these components at their locations.

3–16 HELICOPTER OFFLOADING.

Helicopter and component offloading from a vessel will be performed in accordance with procedure outlined in paragraph 3–16.1 through 3–16.5.

3–16.1 Remove Tiedowns from Helicopter Components and Ground Support Equipment. Unfasten and remove tiedown straps from helicopter components and boxed ground support equipment.

3–16.2 Unload Helicopter Components and Ground Support Equipment. Remove helicopter components and boxed ground support equipment from vessel.

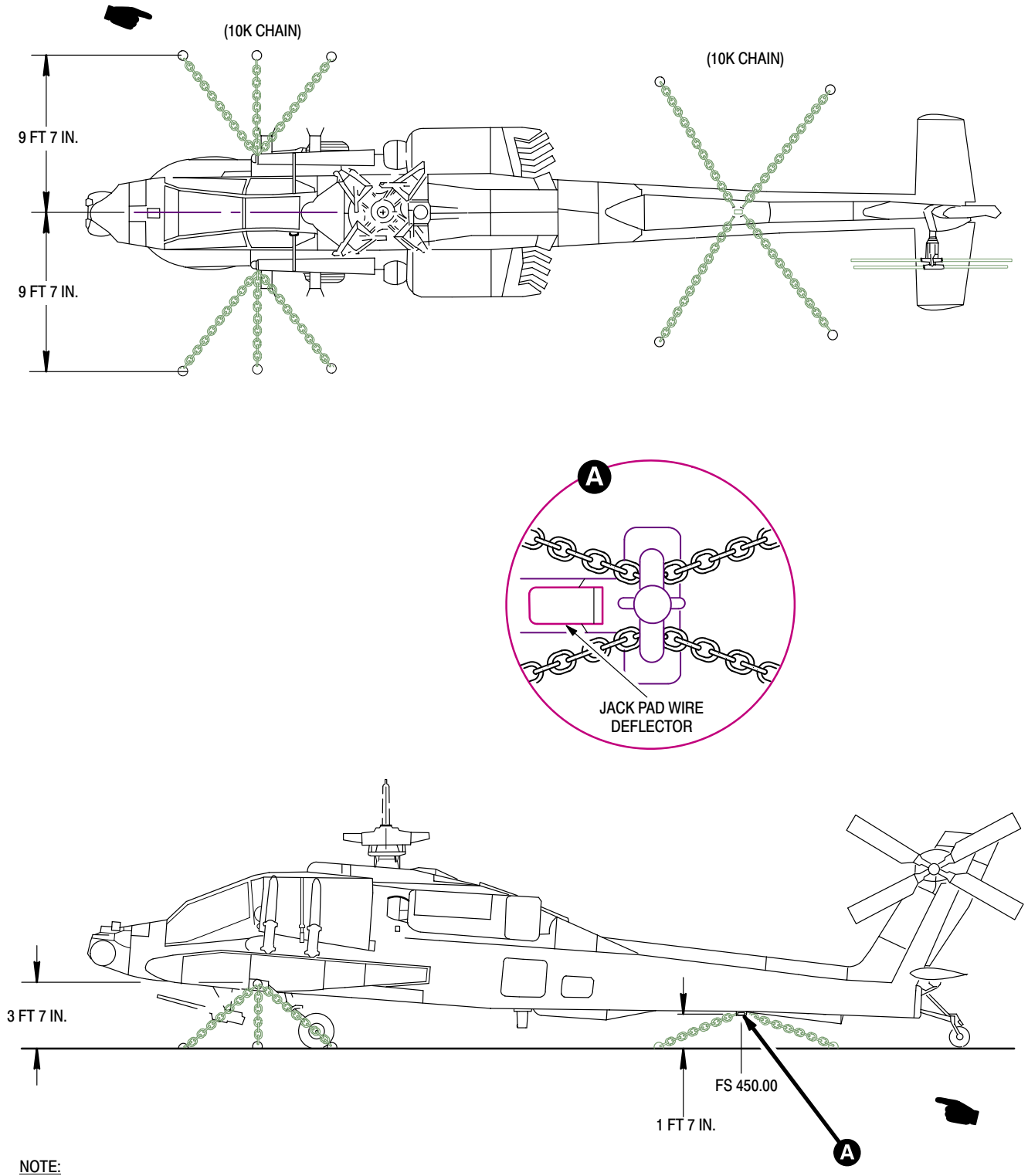


NOTE:

- HELICOPTER TIEDOWN CHAIN STRENGTH INDICATED IN 1000–POUND (K) UNITS
- TIEDOWN DIAGRAM IS TYPICAL FOR ALL LOADING CONFIGURATIONS

M05–066C

Figure 3–4. Vessel Below Deck Tiedown Diagram



NOTE:

- HELICOPTER TIEDOWN CHAIN STRENGTH INDICATED IN 1000–POUND (K) UNITS
- TIEDOWN DIAGRAM IS TYPICAL FOR ALL LOADING CONFIGURATIONS

M05–030J

Figure 3–5. Vessel Topside Tiedown Diagram

3–16.3 Remove Tiedowns from Helicopters. Figures 3–4 and 3–5.

NOTE

Tiedowns will normally be removed from topside helicopters first. These helicopters will be unloaded before tiedowns are removed from below deck helicopters.

a. **Remove Fuselage Tailboom Tiedowns.** Unfasten and remove chains from each fuselage station 450 tiedown fitting. Close FS 450 jack pad wire deflector and secure with quick release pin.

b. **Remove Forward Fuselage Tiedowns.** Unfasten and remove three tiedown chains from each forward fuselage tiedown fitting (two fittings, six chains per helicopter).

3–16.4 Unload Each Helicopter to Dockside (Crane Unloading).

a. **Unlock Tail Wheel Swivel.** Paragraph 2–14.6a.

b. **Install Tail Wheel Steering Bar and Winching Yoke.** Paragraph 2–14.6b, use winching yoke (item 5, table 3–1).

c. **Remove Chocks.**

d. **Position Helicopter at Deck Offloading Position.** Manually position helicopter to crane pickup point.

e. **Apply Helicopter Brakes and Place Chocks.** TM 1-1520-238-23.

f. **Install Air Vehicle Sling.** TM 1-1520-238-23.

g. **Install Helicopter Guide Ropes.** Paragraph 3–15.2d.

h. **Remove Tail Wheel Steering Bar and Winching Yoke.** Paragraph 2–14.6v.

i. **Hoist Helicopter From Topside To Dockside.** Operate crane winch and hoist helicopter down onto dockside or level ground surface. Use guide ropes to maintain proper alinement.

j. **Apply Helicopter Brakes and Place Chocks.** TM 1-1520-238-23.

k. **Remove Sling and Guide Ropes.** Paragraph 3–15.2g.

l. **Remove Chocks and Release Brakes.**

m. **Position Helicopter at Reassembly Area.** Tow helicopter to reassembly area TM 1-1520-238-23.

3–16.5 Unload Helicopters (RORO Loaded Vessels).

a. **Place Shoring.** Paragraph 3–15.3a.

b. **Provide Brakeman.** Paragraph 3–15.3b.

c. **Connect Tow Bar.** TM 1-1520-238-23.

d. **Unlock Tail Wheel.** Paragraph 2–14.6a.

e. **Tow Helicopter.** Remove chocks and tow helicopter off vessel using shoring as required to provide under belly clearance.

f. **Position Helicopter at Reassembly Area.** Tow helicopter to reassembly area TM 1-1520-238-23).

3–17 HELICOPTER PREPARATION FOR USE AFTER VESSEL SHIPMENT.

Preparation of **AH–64A** helicopter for use after vessel shipment will be conducted in accordance with instructions outlined in paragraph 3–17.1 through 3–17.21. All assembly will be in accordance with referenced TM's.

3–17.1 Ground Helicopters. TM 1-1520-238-23.

3–17.2 Remove Heat Shrink Film Protective Covering. Appendix G.

3–17.3 Perform Helicopter Safety Check. TM 1-1520-238-23.

3–17.4 Unpacking and Depreservation. Paragraph 2–16.4.

3–17.5 Remove Flyaway Covers. TM 1-1520-238-23.

3–17.6 (If Required) Remove Helicopters from Intermediate Storage. TM 1-1520-238-23.

3–17.7 (High Density and Maximum Density Shipments Only) Install Wings. Paragraph 2–16.6.

3–17.7.1 (Maximum Density Shipment Only) Install Wing Pylons. TM 1-1520-238-23 Obtain pylons from catwalk area.

3–17.8 (High Density and Maximum Density Shipments Only) Install Steps. Paragraph 2–16.7.

3–17.9 (RORO Loaded Vessel Only) Install Antennas. Paragraph 2–16.14.

3–17.10 Maximum Density Shipments Only) Install Vertical Stabilizer. Paragraph 2–30.6.

3–17.11 (Maximum Density Shipments Only) Install Horizontal Stabilizer. Paragraph 2–16.10.

3–17.12 Remove Forward Fuselage Tiedown Fittings. Paragraph 2–16.8.

3–17.13 Install Forward Ammunition Feed Fairings. Paragraph 2–16.13c.

3–17.14 (High Density and Maximum Density Shipments Only) Install Fairings and Access Covers. Paragraph 2–16.13. Also install L175 fairing and step.

3–17.15 Install Main Rotor De–ice Power Distributor and Air Data System (ADS) Mast. Paragraph 2–16.12.

3–17.16 Install Main Rotor Blades. Remove blades from blade box and install in accordance with paragraph 2–16.11.

3–17.17 Connect Helicopter Battery. TM 1-1520-238-23.

3–17.18 Perform Pitot Static Test MOC. TM 1-1500-204-23.

3–17.19 Inspect Helicopter. Perform 10 hour/14 day inspection (TM 1-1520-238-PMS).

3–17.20 Perform Maintenance Operational Checks as Required for Removed Components/Mission Equipment. TM 1-1520-238-23.

3–17.21 Refuel Helicopter. TM 1-1520-238-23. Use fuel truck (item 12, table 2–2).

CHAPTER 4
SHIPMENT BY TRUCK

Section I. RESPONSIBILITIES AND GENERAL PROCEDURES FOR SHIPMENT BY TRUCK

4–1 GENERAL.

These procedures may be used for transport of a **AH–64A** helicopter on a commercial low boy trailer with air ride suspension or a military M270A1 trailer truck.

4–2 TYPE OF SHIPMENTS

The methods of truck shipments are short haul tactical and long haul logistical shipments.

a. **Tactical Truck Shipment.** This is defined as short haul (not to exceed 100 miles) shipment (including helicopter recovery) by Army M270A1 trailer truck. This type of shipment is intended to evacuate a disabled helicopter to a maintenance unit for repair or preparation fora different mode of transport.

b. **Logistical Truck Shipment.** This is defined as long haul (in excess of 100 miles) shipment by a standard commercial, 30 inch high, low boy, air ride suspension, semi–trailer. It is intended to evacuate a disabled helicopter to a major overhaul facility. Normally, truck transport of serviceable helicopters is not a primary mode recommended for use, however, it is permissible when transported in accordance with these procedures on air–ride suspension tractor/trailer.

c. **Damaged Helicopter Shipment.** For technical assistance in preparing structurally damaged helicopters for shipment, contact CDR, AVSCOM, Attn: AMSAV–SDP, 4300 Goodfellow Blvd, St. Louis, MO 63120–1798, Commercial Telephone (314) 263–2372 or Autovon 693–2372.

4–3 RESPONSIBILITIES OF MILITARY TRAFFIC MANAGEMENT COMMAND (MTMC).

The supporting Transportation Officer (TO) will function as MTMC Representative and coordinate data with MTMC as necessary.

a. **Shipping Arrangement.** TO will arrange for highway truck shipment of AH–64A helicopter. Required permits will be obtained for all overweight, overlength and overheight loads.

b. **Loading and Tiedowns.** The TO will designate a service activity or unit to load and tiedown helicopter on transport trailer in accordance with these procedures. TO personnel will supervise all loading and tiedown tasks.

4–4 RESPONSIBILITIES OR SHIPPER.

a. **Coordinate Movement.** The shipper will coordinate all shipments through supporting Transportation Officer.

b. **Coordinate Lifting Device.** The shipper will coordinate through command channels for a lifting device and operator to load helicopter on truck. Coordinate with receiving availability of device for unloading helicopter.

c. **Center of Balance and Weight Identification.** The shipper will mark accurate weight and center of balance of helicopter on both sides of each helicopter fuselage (fig. 4–1 or 4–2).

d. **Loading and Tiedown.** The shipper shall function as an advisor and assist in loading and tiedown of helicopter.

e. **Preparation for Shipment.** Helicopter disassembly (component folding, removal, and stowage), cleaning, preservation, packaging and installation of Heat Shrink Protective Covering will be accomplished by shipper (Appx G).

f. **Equipment and Materials.** The shipper will provide all necessary materials and equipment to prepare and load helicopter on the trailer.

g. **Rig Helicopter.** The shipper will rig helicopter for loading.

4–5 EQUIPMENT REQUIREMENTS.

Equipment items required for helicopter preparation and truck shipment are listed and described in table.4–1 Special tools and equipment are identified in Appendix E.

NOTE

Equipment item numbers listed in table 4–1 are referenced elsewhere in Chapter 4 for identification of required equipment. For all other purposes, item (reference) numbers will be disregarded, and NSN or part number and CAGE will be used for equipment identification.

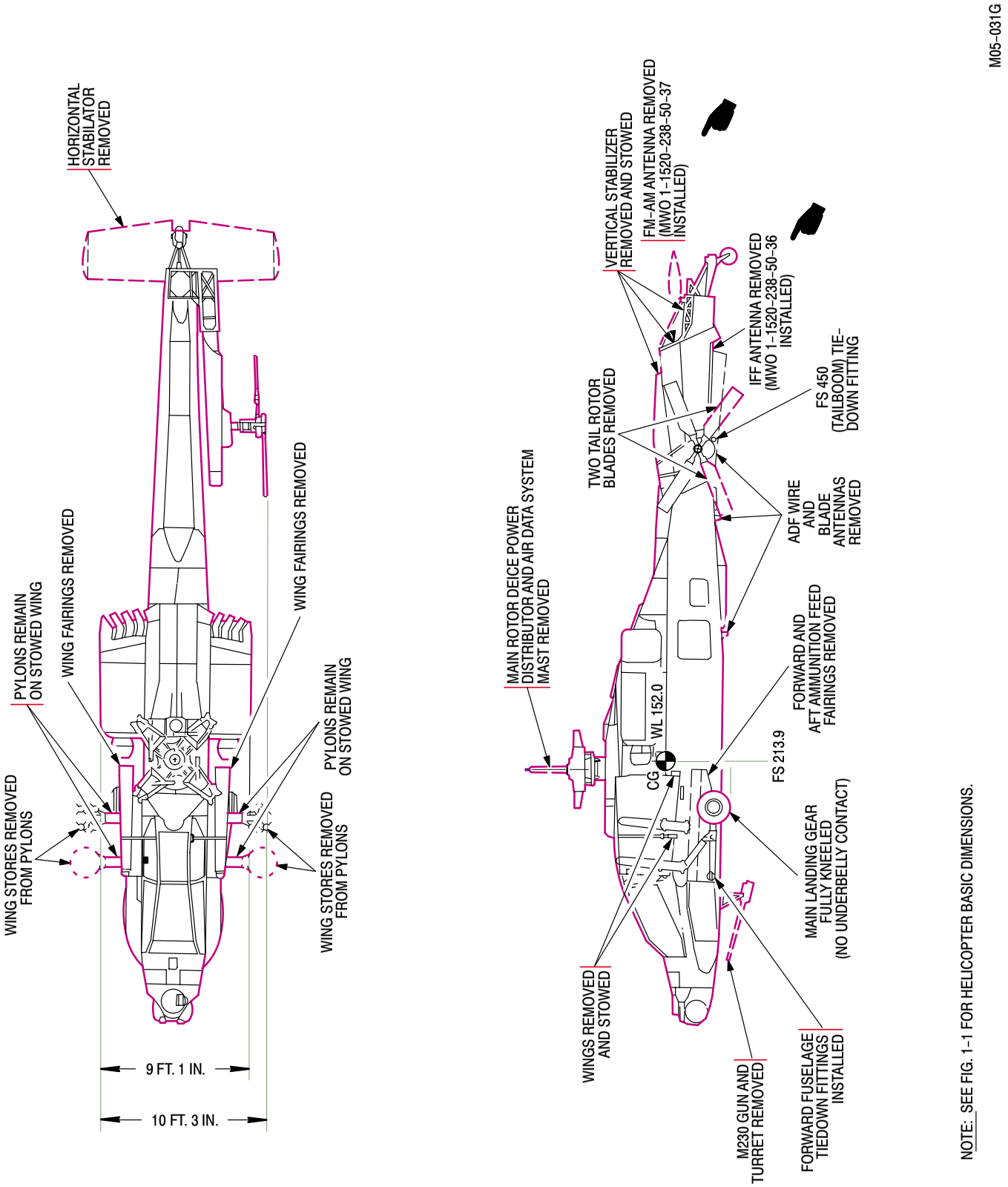


Figure 4–1. Helicopter Preloading Condition for Commercial Truck Shipment

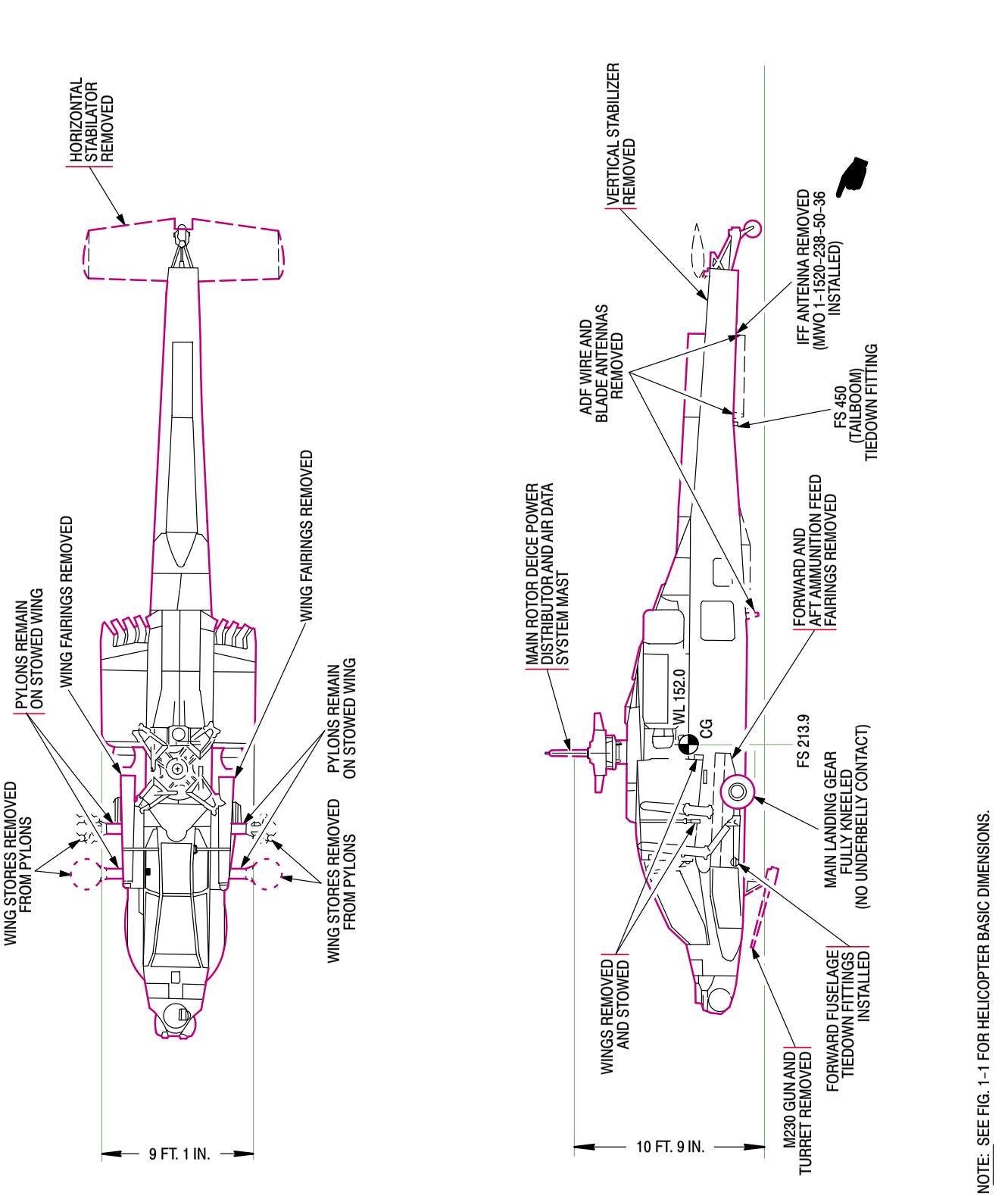


Figure 4–2. Helicopter Preloading Condition for Military M270A1 Truck Shipment

4–6 SECURITY OF HELICOPTER.

The helicopter shall be provided security in accordance with local directions. Doors on helicopter will be locked during shipment.

4–7 CONSUMABLE MATERIAL REQUIREMENTS.

Refer to Appendix D for identification of consumable materials and bulk items required during helicopter preparation and shipment procedures.

4–8 FACILITY REQUIREMENTS.

a. **Foul–Weather Shelter.** A hangar or other enclosure will be available for operations in poor weather.

b. **Fire Protection.** Fire–fighting equipment must be on–site and ready for use.

c. **Electrical Grounding.** A good electrical ground will be available.

d. **Area Clearance.** Area of operations will be cleared of all unneeded equipment and vehicles to allow free movement of helicopters; cleaned area must accommodate a helicopter turning radius of at least 40 feet (80–foot turning circle).

NOTE

A towbar (item 11, table 4–1) or equivalent, will be used for towing and maneuver of helicopter on ground.

4–9 CAPACITY AND REQUIREMENTS OF TRANSPORT TRAILER.

4–9.1 Logistical Shipment (Commercial Trailer, Lowboy, 30 in high, 40/50foot).

CAUTION

Transport trailer and tractor must be equipped with air ride suspension. Un–cushioned shock loads may damage helicopter engine bearings.

a. **Capacity.** One AH–64A helicopter in shipment preloading condition indicated in figure 4–1 and table 4–2, will be loaded for shipment on platform of transport trailer.

b. **Trailer Requirements (50 foot).** A 20,000 pounds (minimum) capacity, single drop frame flat bed trailer, expandable to 50 feet, with air ride suspension is required.

c. **Trailer Requirements (40–foot).** A 20,000 pound (minimum) capacity, step deck trailer, 40 foot long x 8 foot wide, with air ride suspension is required.

d. **Tractor Requirements.** A tractor with air ride suspension, capable of hauling a fully loaded trailer described in paragraph 4–9.1b and c, is required.

4–9.2 Tactical Shipment (Military M270A1 Trailer).

a. **Capacity.** One AH–64A helicopter, in shipping configuration indicated in figure 4–2 and table 4–2 may be loaded for shipment on Army M270A1 trailer.

b. **Trailer Requirements.** Army trailer, transporter M270A1 is required to transport **AH–64A** helicopter.

c. **Tractor Requirements.** A tractor capable of hauling a fully loaded M270A1 trailer. Army tractor, truck cargo, 5 ton is available.

d. **General Truck/Trailer.** A second truck will be require to transport removed components and support equipment. (Main rotor blades, approx. 22 foot long, tail rotor blades, horizontal/vertical stabilizers, gun and turret, launchers, hydraulic cart and strut servicing cart.)

e. **Highway Legal Limits.** An AH–64A loaded on a M270A1 trailer, hauled by a Army 5 ton tractor, exceeds height, width and length legal limits in US and a foreign countries. Special routing and permits are required.

f. **M270A1 Speed.** Towing speed of M270A1 semitrailers is limited to 10 mph cross country and 20 mph highway, in accordance with MS53089.

4–10 HELICOPTER PREPARATION (TACTICAL AND LOGISTIC TRUCK SHIPMENT).

Preparation of AH–64A helicopter consists of preliminary safety procedures (grounding, explosives deactivation, fuel level adjustment, etc.); helicopter disassembly (removal, folding, or stowage of certain helicopter components) to obtain required shipment preloading condition (fig 4–1 and 4–2), and cleaning, preservation, packaging, and marking of helicopters and components.

CAUTION

Each removed component will be color–coded, tagged or otherwise identified to indicate helicopter from which it was removed, and exact installed position. Rotor blades for each helicopter shall be kept assets, match–marked with mating hub components, to maintain blade balance and calibration of deicing system. Improper fit, imbalance, or component damage may result from parts mismatch or incorrect assembly.

Table 4–1. Equipment Requirements for AH–64A Helicopter Truck Shipment

(Sheet 1 of 3)

Item Number	Nomenclature	NSN	Part Number (CAGE/LIN)	Quantity Required	NOTES
1	Stabilator actuator support	1740–01–256–6346	7–367310023	*1	1, 4
2	Tail rotor blade support	1740–01–221–3332	7–267310017	*2	1, 3
3	Wing stowing kit	1740–01–220–8492	7–367310001	*1	1, 3, 4
4	Forward fuselage tiedown fitting	1740–01–242–7265	7–367310009	*2	1, 3, 4
5	Hydraulic hose kit	1730–01–181–9275	7–262100019–601	1	1, 3 ,4
6	Hydraulic cart	1730–01–292–0972	70700–81650–041	1	1, 3, 4
7	Aircraft mechanic’s tool kit	5180–00–323–4876		1	2, 3, 4
8	Fuel truck	2320–00–077–1631		1	2, 3, 4
9	M543A2 crane truck	2320–00–055–9258		1	2, 3, 4
10	Main rotor blade sling	1730–01–262–5310	7–362110216	1	2, 3, 4
11	Towbar	1730–00–967–9556		1	2, 3, 4
12	Droop stop wedge	1615–01–185–3120	7–262110074	4	2, 3, 4
13	1/2 drive socket wrench handle	5120–00–230–6385		2	2, 3, 4
14	1-1/16 socket	5120–00–935–7427		2	2, 3, 4
15	1-1/16 – 1-1/4 open end wrench	5120–00–187–7134		2	2, 3, 4
16	Hellfire launcher container			*2	2,,3
17	Maintenance platform	1730–00–294–8883		1	2, 3
18	Aircraft armament repairman basic tool set	4933–00–987–9816		1	2, 3, 4
19	Aircraft armament repairman tool set	5180–01–110–7629		1	2, 3, 4
20	1/2 drive socket wrench handle	5120–00–236–7590		1	2, 3, 4
21	3/4 – 1/2 drive socket wrench adapter	5120–00–227–8088		1	2, 3, 4
22	1/2 – 3/8 socket wrench adapter	5120–00–240–8702		1	2, 3, 4
23	1-1/2 crowfoot	5120–00–184–8412		1	2, 3, 4
24	11/16 socket	5120–00–935–7421		1	2, 3, 4

Table 4–1. Equipment Requirements for AH–64A Helicopter Truck Shipment

(Sheet 2 of 3)

Item Number	Nomenclature	NSN	Part Number (CAGE/LIN)	Quantity Required	NOTES
25	9/16 socket adapter	5120–00–935–7420		1	2, 3, 4
26	1-5/16 – 1-1/4 open–end wrench	5120–00–277–2321		1	2, 3, 4
27	Offset crosstip screwdriver	5120–00–256–9014		1	2, 3, 4
28	1/2 drive torque wrench	5120–00–270–3121		1	2, 3, 4
29	3/4 drive torque wrench	5120–00–902–7983		1	2, 3, 4
30	Tow motor tug		as available	1	2, 3, 4
31	Fork lift		as available	1	2, 3, 4
32	2.75 in. rocket launcher container			*2	2, 3
33	Tri–pod jacks (10 ton)	1730–00–516–2019		2	2, 3
34	Captive boresight har–monization kit (CBHK)			1	2, 3, 4
35	Grounding cable	Local manufacture		*1	2, 3, 4
36	Pitot static system tester	4920–00–718–6480		1	2, 3, 4
37	Forward jack pad	1560–01–226–7551		2	2, 3, 4
38	Rotor track and balance kit	4920–01–245–6004	7–262100008–607	1	2, 3, 4
39	Test kit, balance and track	4920–01–040–7816		1	2, 3, 4
40	Scale, aircraft weighing	6670–00–999–1195	C46500	1	2, 3, 4
41	Wheel chocks	Local manufacture		*2	2, 3, 4
42	Jack, hydraulic tripod (3 ton)	1730–00–734–9382		1	2, 3, 4
43	Vertical stabilizer sling	1740–01–285–3014	7–267310016–603	1	2, 3, 4
44	Air vehicle sling	1730–01–165–6861	7–262110009–601	1	2, 3, 4
45	Hydraulic jack	1730–00–540–2343	53D22020	1	2, 3, 4
46	3/4 drive x 3 inch long extension	5120–00–233–9208	L32	1	2, 3, 4
47	M230 gun container	Local manufacture		*1	2, 3
48	M230 gun turret container	Local Manufacture		*1	2, 3
49	Vertical stabilizer stow kit	1740–01–273–7399	7–267310011–607	*1	2, 3

Table 4–1. Equipment Requirements for AH–64A Helicopter Truck Shipment

(Sheet 3 of 3)

Item Number	Nomenclature	NSN	Part Number (CAGE/LIN)	Quantity Required	NOTES
50	Fuselage station 450 support	1740–01–250–0047	7–367310005–601	*1	1, 3, 4
51	Vertical stabilizer adapter jack		7–367310025	*1	1, 3
52	Gauge, dial indicating	6635–00–578–5285		1	2, 3, 4
53	28 V dc adapter	5930–01–315–5178	70700–81650–045	1	3, 4, 5
54	Depinning Tool, 8 ga	5120–00–133–0158		*1	3, 4, 5
55	Tiedown chain, 10,000 lb MB–1	1670–00–516–8405		*4	3, 4, 5
56	Tiedown device, MB–1	1670–000–212–1149		*4	3, 4, 5
57	Main rotor blade container	8145–01–235–1536	7–266100011–45	*4	3, 5
58	Horizontal stabilator container	Local manufacture		*1	3, 5
59	Tail rotor blade container	Local manufacture		*2	3, 5
60	Tiedown chain, 25,000 lb MB–2	1670–00–778–4079		*6	3, 4, 5
61	Tiedown device, MB–2	1670–00–212–1150		*6	3, 4, 5
62	25 ton crane	As available		1	3, 4, 5

* *Asterisk by quantity indicates quantity per helicopter shipped. Quantities of other equipment items are minimums. Quantities may be increased, based on number of aircraft and personnel.

NOTES:

1. Transportability peculiar item of equipment – not included in TOE and must be requisitioned for helicopter shipment.
2. Dual purpose equipment – normally included in TOE
3. Indicates required for long haul logistical shipment.
4. Indicates required for tactical truck shipment (aircraft recovery).
5. Dual purpose equipment – normally not included in TOE and must be requisitioned for helicopter shipment.

Table 4–2. Height Diagram, Static/Knelt, Different Configurations for Truck Shipment

			Blades Removed, ADS Installed	ADS Removed	MRH and Mast Removed, Jammer Antenna Doghouse Removed	Main Rotor Shaft Fairing and Antenna Removed	CONUS Not To Exceed (NTE)	O'CONUS Not To Exceed (NTE)
			Height	Height	Height	Height	Height	Height
Static Position	Any Trailer (T)	Decimal–Feet	T +15.25'	T +12.59'	T +9.70'	T +9.16'	13.5'	13.17'
		Feet–Inches	T +15' 3''	T +12' 7''	T +9' 8''	T +9' 2''	13' 6''	13' 2''
		Metric	T +4.65m	T +3.84m	T +2.96m	T +2.80m	4.1m	4.0m
	M270A1 Trailer		19' 4''	16' 8''	13' 9''	13' 3''	NTE as above	NTE as above
Knelt Position	Any Trailer (T)	Decimal–Feet	T +12.86'	T +10.20'	T +7.31'	T +6.77'	13.5'	13.17'
		Feet–Inches	T +12' 10''	T +10' 2''	T +7' 4''	T +6' 9''	13' 6''	13' 2''
		Metric	T +3.92m	T +3.11m	T +2.23m	T +2.07m	4.1m	4.0m
	M270A1 Trailer		17' 1/2''	14' 4 1/2''	11' 6 1/2''	10' 11 1/2''	NTE as above	NTE as above

NOTE

- Unless otherwise directed, mounting hardware and pivot pins will be reinstalled after component removal, to prevent loss or damage.
- Smaller, hard–to–handle hardware items should be bagged and attached to related component, to prevent loss or damage.

4–11 HELICOPTER LOADING AND TIEDOWN ON TRUCK TRAILER.

Prepared helicopter airframe and removed and packaged components will be loaded and secured on trailer in accordance with instructions provided herein.

4–12 HELICOPTER OFFLOADING.

Detailed procedures are included for offloading helicopter upon arrival at shipment destination.

4–13 PREPARATION FOR USE AFTER SHIPMENT.

Complete instructions are included to enable helicopter assembly, reconfiguration, refueling, checks and test flight of helicopter after tractor trailer shipment.

Section II. SHIPMENT BY TRUCK

4–14 REQUIRED HELICOPTER PRELOADING CONDITION.

See figure 4–1 and 4–2 for configuration of AH–64A helicopter prepared for shipment on a tractor–trailer.

4–14.1 Equipment Requirements. Refer to table 4–1 for equipment items required for preparation and shipment of an AH–64A helicopter on a tractor–trailer truck.

4–14.2 Preliminary Safety Procedures. Before starting operations, conduct safety procedures outlined in paragraph 4–14.3 through 4–14.5.

4–14.3 Ground Helicopter. TM 1-1520-238-23**.**

4–14.4 Perform Helicopter Safety Check. TM 1-1520-238-23**.**

4–14.5 Deactivate Armament.

WARNING

To prevent injury to personnel, M230 guns must be cleared and visually checked.

TM 9-1090-208-23-1.

NOTE

For tactical shipment (aircraft recovery) corrosion control and preservation procedures contained in this section may be omitted providing helicopter will be placed in maintenance upon arrival at destination. All corrosion control and preservation is required for logistical shipment.

4–14.6 Corrosion Control. Paragraph 2–10.6 and 2–10.7.

4–14.7 Service Power Train. Paragraph 2–10.8 and 2–10.9.

4–14.8 Adjust Fuel Levels. Adjust as required (TM 1-1520-238-23).

4–14.9 Disconnect Battery. Paragraph 2–10.11.

4–14.10 Service Main Landing Gear. TM 1-1520-238-23.

4–15 HELICOPTER DISASSEMBLY FOR SHIPMENT BY TRUCK.

Perform disassembly in accordance with procedures outlined in paragraph 4–15.1 through 4–15.16.

4–15.1 Remove Hellfire Launchers. Paragraph 2–11.1.

4–15.2 Remove 2.75 Inch Rocket Launchers. Paragraph 2–11.2.

4–15.2.1 Remove Turret Fairing. Release four fasteners. Wrap turret fairing with cushioning material (D–5). Secure wrapped fairing with tape (D–13) and stow in catwalk area.

4–15.3 Remove 30MM Gun. Paragraph 2–25.3. Package gun in gun container (item 47, table 4–1).

NOTE

For CONUS shipment, remove gun bolt carrier and ship separately (TM 9-1090-208-23-1).

4–15.4 Remove Gun Wire Deflector and 30MM Gun Turret. Paragraph 2–25.4. Package gun turret in gun turret container (item 48, table 4–1).

4–15.5 Remove Main Rotor Blades. Paragraph 2–11.3. Package blades in blade boxes (item 57, table 4–1).

4–15.6 Remove Main Rotor Deice Power Distributor and Air Data System (ADS) Mast. Paragraph 2–11.5.

4–15.7 Remove Fairings and Access Covers. Paragraph 2–11.6.

4–15.8 Install Forward Fuselage Tiedown Fittings. Paragraph 2–11.8.

NOTE

Upper fuselage wire cutter may be left installed for truck shipment.

4–15.9 Remove Wire Cutters. Paragraph 2–25.11.

4–15.10 Remove Steps. Paragraph 2–11.7.

4–15.11 Remove Horizontal Stabilator. Paragraph 2–11.11.

4–15.12 (Tactical Shipment Only) Remove Four Tail Rotor Blades. TM 1-1520-238-23.

a. Install pitch link bolt, nut, and washers in pitch horn

b. Reinstall tail rotor blade bolt and nut in tail rotor blade.

c. Cap or wrap deicing connectors with barrier material (D–1) sealed with tape (D–13).

d. Coat bare metal of tail rotor hub surfaces with corrosion preventive compound (D–4).

e. Wrap disconnected pitch links with cushioning material (D–5) sealed with tape (D–13). Secure wrapped links to tail rotor hub with twine (D–14).

f. Wrap each tail rotor blade hub fitting area with barrier material (D–1) sealed with tape (D–13).

g. Wrap tail rotor blades with cushioning material (D–5) sealed with tape (D–13).

h. Package blades in blade boxes (item 59, table 4–1).

4–15.13 Remove ADF Wire Antenna and UHF L–Band, Communications, and Transponder Blade Antennas. Remove FM–AM Whip Antenna (MWO 1–1520–238–50–37 installed) and Lower IFF Antenna (MWO 1–1520–238–50–36 installed) Paragraph NO TAG.

4–15.14 Remove Vertical Stabilizer.

a. **Logistical Shipment**. Remove and stow vertical stabilizer (para 2–25.15).

b. **Tactical Shipment.**

(1) Remove vertical stabilizer in accordance with TM 1-1520-238-23. Vertical stabilizer will not be stowed on helicopter.

(2) Place and secure wrapped and cushioned vertical stabilizer on separate truck with rotor shaft in upright position.

NOTE

- Vertical stabilizer may be left installed on helicopter for tactical shipment. However, height of helicopter at vertical stabilizer will be 18 feet and 4 inches. Special routing will be required.
- Tail rotor shaft and tail rotor control rod will require support when vertical stabilizer is removed for tactical shipment. Use wood blocks to support shaft and control rod. Secure wood block to shaft and rod with tape.

4–15.15 Remove and Stow Wings. Paragraph 2–11.15.

4–15.16 Install Protective Covers.

a. **Tactical Shipment.**

(1) Install flyaway protective covers (TM 1-1520-238-23). Secure covers in place with tape (D–13).

(2) Operational Opening Coverage. Cover all uncovered open areas, operational openings, air inlets and vents with barrier material (D–1) sealed with tape (D–13).

(3) Canopy Glass Protection. Cover all transparent wind screen and canopy surfaces with barrier material (D–1) sealed with tape (D–13).

b. **Logistical Shipment.**

(1) Install flyaway protective covers (Appendix G and TM 1-1520-238-23 Secure covers in place with tape (D–13).

(2) Install heat shrink film protective covering (Appendix G).

4–16 TRANSPORTED GROUND SUPPORT EQUIPMENT.

Paragraph 2–12.

4–17 MARKING.

Paragraph 2–13.

4–18 HELICOPTER LOADING AND TIEDOWN (TRUCK SHIPMENT).

Helicopter and component loading and tiedown on truck trailer will be conducted in accordance with procedures outlined in paragraphs 4–18.1 thru 4–18.5 using figure 4–3 for 40–foot commercial truck, figure 4–4 for 50–foot commercial truck, or figure 4–5 for M270A1 military truck.

WARNING

Safetied condition of armament, canopy jettison, fuel, and electrical systems must be verified before loading helicopters to avoid hazard of accidental fire or explosion.

4–18.1 Verify Preliminary Safety Procedures. Check and ensure performance of all Preliminary Safety procedures listed in paragraph 4–14.2.

4–18.2 Load Helicopter. Figure 4–3, 4–4, or 4–5.

a. **Aline Transport Trailer for Loading.** Position trailer forward of, and in–line with, helicopter to be loaded. Aline aft end of trailer 15 to 20 feet forward of helicopter tail, then set truck parking brakes.

b. **Install Air Vehicle Sling.** TM 1-1520-238-23

NOTE

Allow sufficient cable slack for full helicopter kneel.

c. **25 Ton Crane.** Position crane to side of helicopter. Connect air vehicle sling to crane. Operate crane until slack in sling is removed.

CAUTION

Air vehicle sling attached to crane will remain installed to helicopter during helicopter kneeling procedures.

d. **Connect and Checkout Hydraulic Cart.** Paragraph 8–4.

e. **Kneel Helicopter and Disconnect Hydraulic Cart.** Paragraph 8–5.

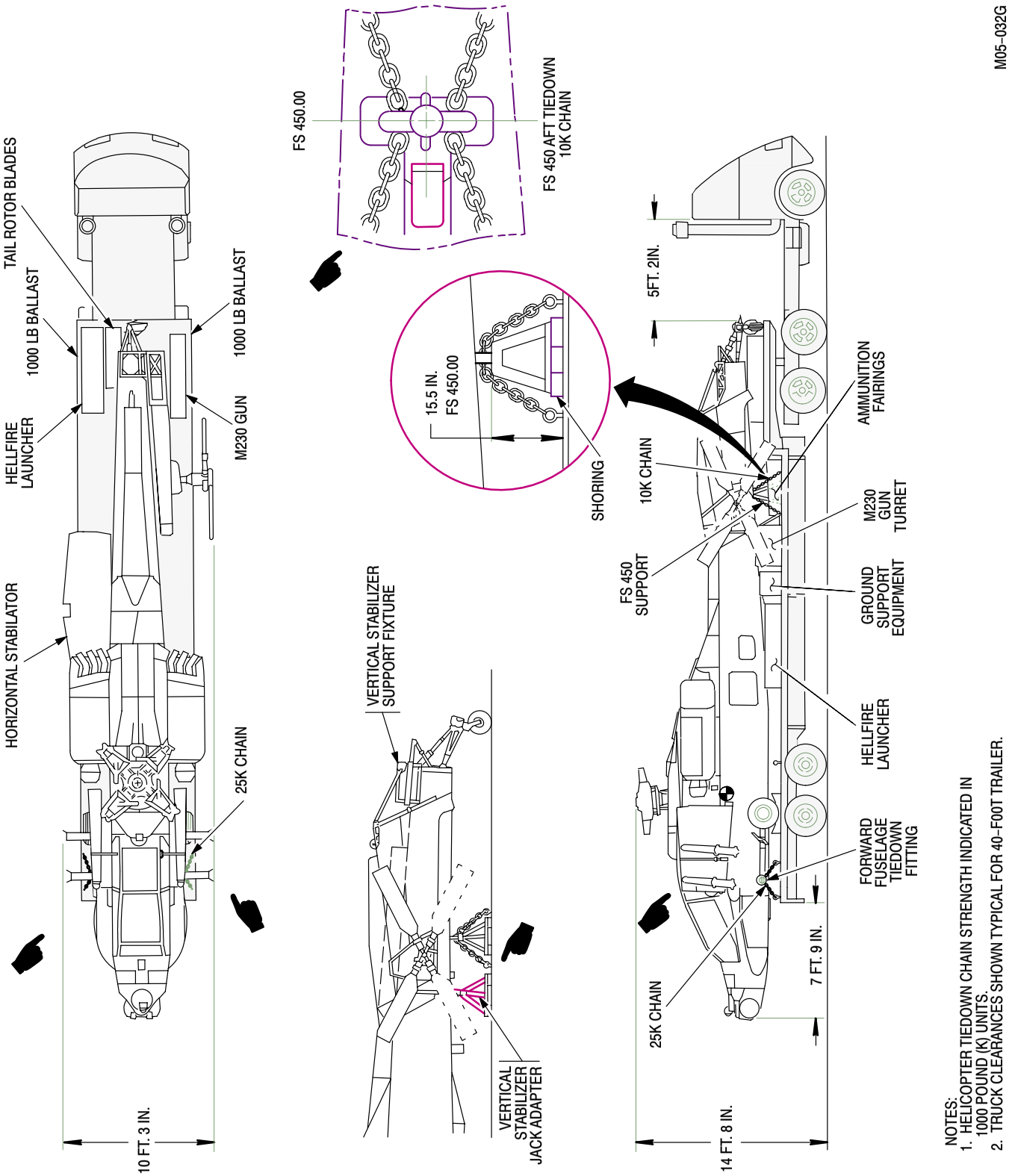


Figure 4–3. Truck Shipment Loading and Tiedown (40 foot trailer)

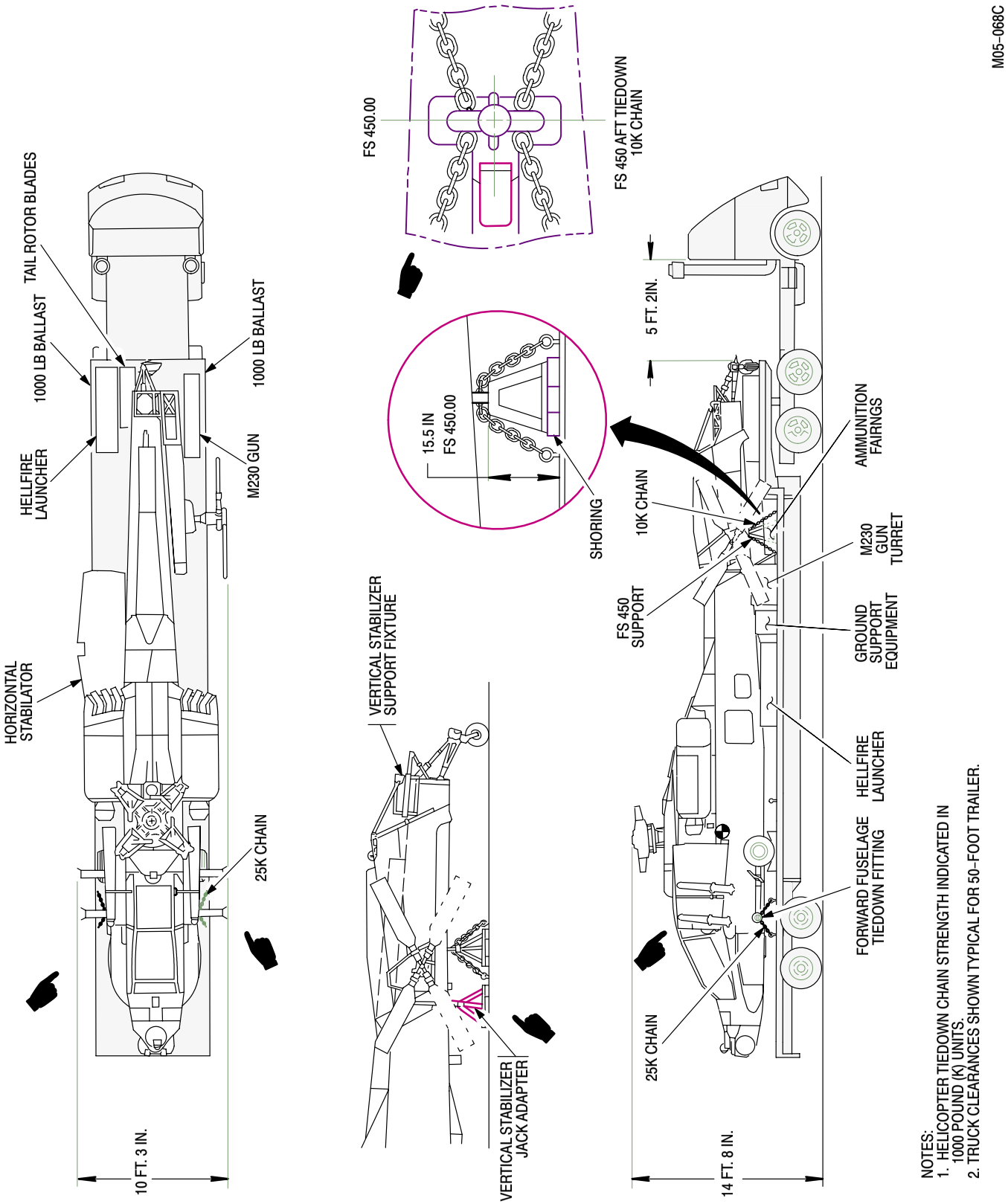


Figure 4–4. Truck Shipment Loading and Tiedown (50 foot trailer)

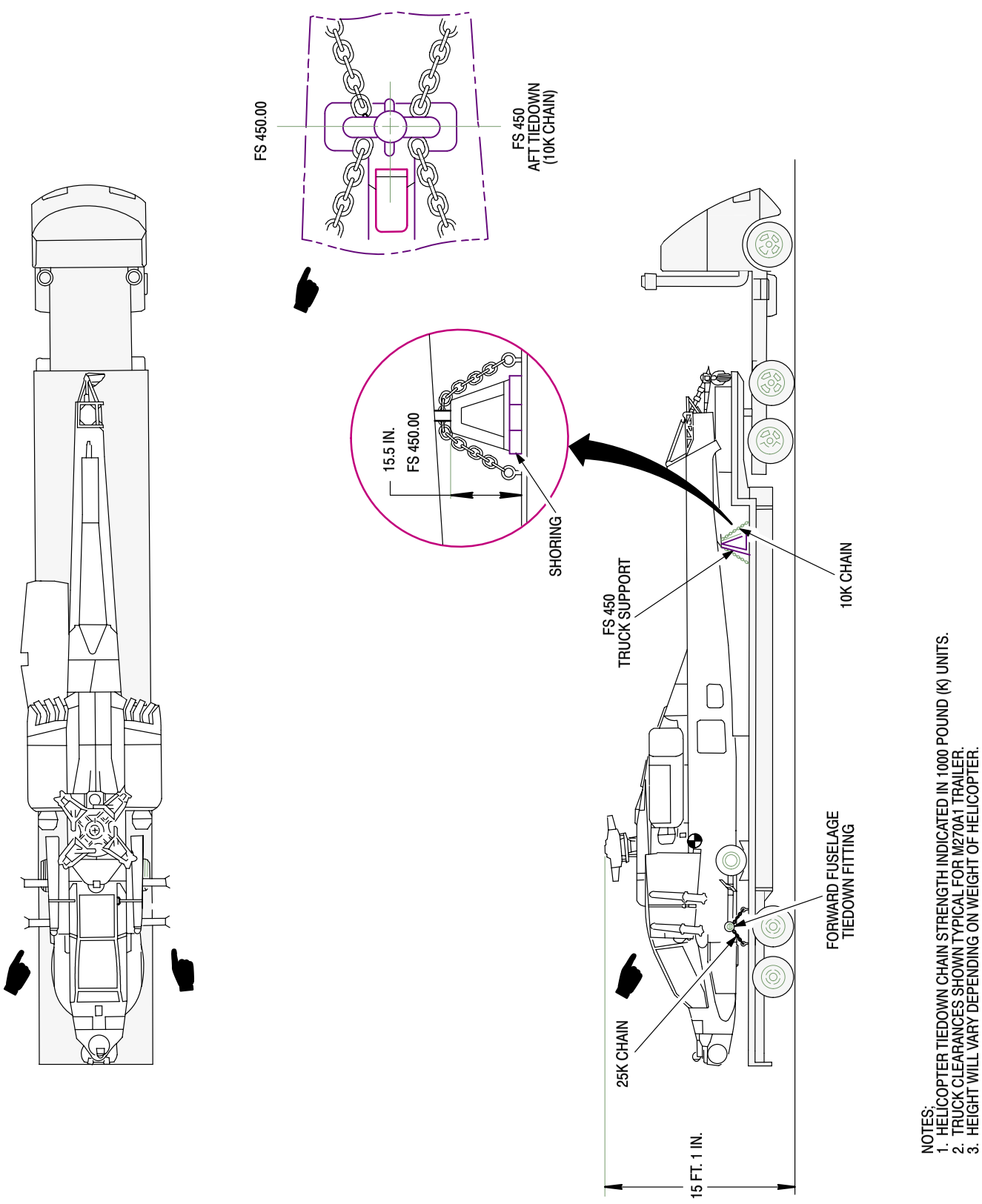


Figure 4–5. Truck Shipment Loading and Tiedown (Military M270A1 trailer)

f. **Install Helicopter Guide Ropes.** Tie two 20–foot lengths of 1/2–inch diameter rope to tail landing gear arms.

CAUTION

Helicopter must be hoisted high enough to allow landing gear wheels to clear trailer platform. Insufficient helicopter–to–trailer clearance will result in serious component damage when trailer is backed.

g. **Hoist Helicopter.** Operate crane winch and hoist helicopter higher than trailer platform.

CAUTION

When first backing trailer for loading, allow at least 6 feet clearance for safe maneuver between rear of tractor cab and tail of helicopter. Further adjustment of helicopter position will be made by careful control of crane winch and trailer position, and hand–control with guide ropes.

h. **Back Trailer Under Helicopter.** Carefully back trailer under hoisted helicopter. Aline trailer platform and helicopter centerlines, then set truck parking brakes.

i. **Install Fuselage Support on Trailer Platform.** Position fuselage station 450 truck support (item 50, table 4–1) on platform centerline, 10 feet aft of trailer forward end. Elevate FS 450 support by placing 4 pieces of 6–inch by 8–inch wood shoring under FS 450 support when using M270A1 trailer. Height of shoring will vary depending upon commercial trailer configuration.

j. **Install Shoring Under Main Landing Gear Wheels.** Place 2–inch by 12–inch wood shoring under main landing gear wheels. Shoring will not cover trailer tiedown hole.

k. **Install Cushioning Material Under Nose of Helicopter.** Use cushioning material (D–5) folded to a 3–inch thickness and secured to trailer platform under nose/fuselage of helicopter. This is used as a safety factor to prevent contact of trailer and helicopter.

l. **(Logistical Shipment Only) Install Vertical Stabilizer Support.** Install six–inch by eight–inch wood shoring under support stand to obtain required height.

m. **Lower Helicopter Onto Trailer Platform.** With an assistant holding fuselage support under helicopter fuselage station 450 (tailboom) jacking pad, slowly lower helicopter onto trailer platform. Use guide ropes to maintain proper fuselage alinement. If adjustment of fore–and–aft positioning is required, operate crane winch to raise helicopter, carefully move truck forward or aft, use guide ropes to maintain proper alinement, and lower helicopter into place.

n. **Shoring and Chocks.** Install wheel chocks (4–inch, 45 degree) forward and aft of both main landing gear wheels. Nail chocks to 2–inch x 12–inch wheel shoring. Nail 2–inch x 12–inch shoring for MLG wheels to trailer platform. Nail 6–inch x 8–inch shoring together for FS 450 support and vertical stabilizer jack adapter and nail shoring to trailer platform. Secure FS 450 support and vertical stabilizer jack adapter to shoring with nails to prevent slippage.

o. **Lock Tail Wheel Swivel.** Paragraph 2–14.6u.

4–18.3 Tiedown Helicopter.

CAUTION

- **Tiedown restraints will be tensioned only enough to remove all free play. Overtightened tie– downs will damage helicopter structure.**
- **For security of helicopter on trailer platform, crane lifting hook, air vehicle sling, and guide ropes will remain in place until completion of helicopter tie– down procedures.**

a. **Tiedown Forward Fuselage Fittings.** Install two 25,000 pound tiedown devices/chains (items 60 and 61, table 4–1) at each of two forward tiedown fittings. Tiedown devices/chains will be connected from forward tiedown fitting to nearest trailer stake pocket (fig. 4–3, 4–4 or 4–5).

b. **Tiedown Fuselage Tailboom Fitting.** Remove quick release pin holding FS 450 jack pad wire deflector. Secure wire deflector in open position. Install two 10,000 pound tiedown devices/chains (items 55 and 56, table 4–1) at fuselage station 450 tiedown fitting (fig. 4–3, 4–4, or 4–5). Tiedowns will pass through FS 450 fitting.

c. **Remove Sling, Crane, and Guide Ropes.** After securing helicopter tiedowns, uncouple crane lifting hook from air vehicle sling link (lifting eye) and remove crane from loading area. Remove sling pins from main rotor head, detach sling, and untie guide ropes from tail landing gear arms.

4–18.4 Load and Tiedown Removed Components and Support Equipment.

a. **Tactical Shipment**. Figure 4–5.

(1) M230 gun, turret, Hellfire launchers, 2.75 inch rocket launchers, tail rotor blade racks, vertical stabilizer, horizontal stabilator, boxed fairings and boxed ground support equipment will be loaded on separate truck for transport.

(2) Kneeling cart and hoses, vertical stabilizer sling, MRB sling and air vehicle sling will be shipped on separate truck. These ground support items are to be wrapped and packaged per paragraph 2–12.

(3) Install 5,000 pound tiedown straps to secure cargo. Use enough tiedowns to properly secure these support equipment items to a separate truck.

b. **Logistical Shipment**. Figure 4–3 or 4–4.

(1) Position packed gun turret container on right side of trailer platform, under top end of stowed stabilizer.

(2) Position packed gun container on right side, forward end of trailer.

(3) Position one packed Hellfire launcher container on right side of trailer platform under helicopter left engine exhaust, and one packed Hellfire launcher container on left side, forward end of trailer.

(4) Position two packaged tail rotor blades on left side, forward end of trailer, inboard of Hellfire launcher.

(5) Position horizontal stabilator on left side of trailer platform, under helicopter right engine exhaust. Cushion with cushioning material (D–5) and secure cushioning in place with tape (D–13).

(6) Position two forward and aft ammunition feed fairings on right side of trailer platform, forward of area weapon turret container. Load wrapped fairings and access covers with ammunition feed fairings.

(7) Load boxed ground support equipment on right side of trailer platform, between area weapon turret and Hellfire launcher.

NOTE

Hydraulic cart and hoses, vertical stabilizer and air vehicle slings will be shipped on trailer platform with helicopter. These support equipment items are to be wrapped and packaged per paragraph 2–12.

(8) Install 5,000–pound tiedown straps on loaded horizontal stabilator, M230 gun, access covers and fairings, gun turret, Hellfire launchers, and boxed ground support equipment. Use enough tiedowns to secure these components to their trailer platform locations.

4–18.5 (Logistical Shipment Only) Install Trailer Air–Ride Ballast. For commercial truck with air ride suspension (fig. 4–3 or 4–4).

NOTE

Trailer ballast is required for proper function of truck air–ride suspension. Amount of weight required will vary due to weight of helicopter and length of trailer.

a. **Install Ballast.** Position 2000 pounds total weight of concrete, sandbags, or bagged lead shot on forward end of trailer.

b. **Tie Down Ballast.** Install 10,000–pound tiedown chains on installed ballast. Use enough tiedowns to secure all ballast items to their trailer forward–end locations.

4–19 HELICOPTER OFFLOADING (TRUCK SHIPMENT).

Helicopter and component offloading from truck trailer will be performed in accordance with procedures outlined in paragraphs 4–19.1 thru 4–19.3 using figures 4–3 for 40–foot commercial truck, figure 4–4 for 50–foot commercial truck, or figure 4–5 for M270A1 military truck.

4–19.1 Unload Components and Support Equipment.

a. **Tactical Shipment.**

(1) Unfasten and remove tiedown straps from components and support equipment located on separate truck.

(2) Unload loose components and ground support equipment from separate truck using same manner as used for loading.

b. **Logistical Shipment**

(1) Unfasten and remove tiedown straps from trailer platform locations of gun and turret, Hellfire launchers, tail rotor blade supports, horizontal stabilator, fairings, boxed ground support equipment and air–ride ballast.

(2) Remove 2000–pound ballast from forward end of trailer.

(3) Remove boxed ground support equipment from right side of trailer platform.

(4) Remove forward and aft ammunition feed fairings, access panel and wing fairing units from right side of trailer platform.

(5) Remove horizontal stabilator from left side of trailer, under helicopter right engine exhaust.

(6) Remove two packaged tail rotor blades from left side, forward end of trailer.

(7) Remove one packed launcher container from left side, forward end of trailer, and one packed container from right side of trailer under helicopter left engine exhaust.

(8) Remove packed turret container from right side of trailer under stowed helicopter stabilizer.

(9) Remove packed gun container from right side, forward end of trailer.

4–19.2 Remove Tiedowns From Helicopter.

a. **Remove Vertical Stabilizer Support Jack.** Paragraph 2–29.13.

CAUTION

For safety of helicopter on trailer platform, air vehicle sling and crane will be installed before releasing tiedowns.

b. **Install Air Vehicle Sling.** TM 1-1520-238-23.

c. **Remove Fuselage Tailboom Tiedowns.** Unfasten and remove two chains from each fuselage station 450 tiedown fitting tied to trailer platform. Close FS 450 jack pad wire deflector and secure with quick release pin.

d. **Remove Forward Fuselage Tiedowns.** Unfasten and remove two tiedown chains from each forward fuselage tiedown fitting tied to trailer platform.

e. **Unfasten and Remove Trailer Tiedown Fittings and Cables.**

4–19.3 Unload Helicopter From Trailer Platform. Figure 4–3, 4–4, or 4–5.

a. **Unlock Helicopter Tail Wheel.** Paragraph 2–14.6a.

b. **Install Helicopter Guide Ropes.** Paragraph 4–18.2g.

CAUTION

Helicopter must be hoisted high enough to allow landing gear wheels to clear trailer platform. Insufficient helicopter–to–trailer clearance will result in serious component damage when trailer is driven clear.

c. **Hoist Helicopter.** Operate crane winch and hoist helicopter higher than trailer platform.

d. **Drive Trailer From Helicopter.** Drive trailer forward until well clear of hoisted helicopter.

e. **Lower Helicopter to Ground Level.** Operate crane winch and carefully lower helicopter to ground.

f. **Remove Fuselage Support From Trailer.** Remove fuselage station 450 truck support from trailer platform.

g. **Remove Chocks and Shoring.** Remove main landing gear wheel chocks from trailer platform. Unload all shoring.

CAUTION

For safety of helicopter, crane and air vehicle sling will remain installed during raising of kneeled helicopter.

h. **Connect and Checkout Hydraulic Cart.** Paragraph 8–4.

i. **Erect Helicopter and Disconnect Hydraulic Cart.** Paragraph 8–6.

j. **Remove Sling and Guide Ropes.** Uncouple crane lifting hook from air vehicle sling link (lifting eye). Remove sling pins from main rotor head, detach sling, and untie guide ropes from landing gear arms.

4–20 HELICOPTER PREPARATION FOR USE AFTER TRUCK SHIPMENT.

Preparation of **AH–64A** helicopter for use after truck shipment will be performed in accordance with instructions outlined in paragraph 4–20.1 thru 4–20.21.

4–20.1 Ground Helicopter. TM 1-1520-238-23.

4–20.2 (Logistical Shipment Only) Remove Heat Shrink Film Protective Cover. Appendix G.

4–20.3 Preliminary Safety Procedures. Before starting operations, perform safety procedures outlined in paragraphs 4–14.3. and 4–14.4.

4–20.4 Unpacking and Depreservation. Paragraph 2–16.4.

4–20.5 Install Wings. Paragraph 2–16.6.

4–20.6 Install Steps. Paragraph 2–16.7.

4–20.7 Install Vertical Stabilizer.

a. **Logistical Shipment.** Paragraph 2–30.6.

b. **Tactical Shipment.** TM 1-1520-238-23.

4–20.8 (Tactical Shipment Only) Install Four Tail Rotor Blades. TM 1-1520-238-23.

4–20–9 Install Horizontal Stabilator. Paragraph 2–16.10.

4–20.9 Install Main Rotor Deice Power Distributor and Air Data System (ADS) Mast. Paragraph 2–16.12.

4–20.10 Install Main Rotor Blades. Paragraph 2–16.11.

4–20.11 Remove Forward Fuselage Tiedown Fittings. Paragraph 2–16.8.

4–20.12 Install M230 Gun and Turret. TM 9-1090-208-23-1.

4–20.12.1 Install Gun Wire Deflector. TM 1-1520-238-23.

4–20.12.2 Install Turret Fairing. Obtain turret fairing from catwalk area. Install fairing with four fasteners.

4–20.13 Install Removed Fairings and Access Panels. Paragraph 2–16.13.

4–20.14 Install Main Landing Gear Lower Wire Cutters. TM 1-1520-238-23.

4–20.15 Install ADF Wire Antenna and UHF L–Band, Communications, and Transponder Blade Antennas. Install FM–AM Whip Antenna (MWO 1–1520–238–50–37 installed) and Lower IFF Antenna (MWO 1–1520–238–50–36 installed) Paragraph 2–16.14.

4–20.16 Connect Helicopter Battery. TM 1-1520-238-23.

4–20.17 Perform Pitot Static Test MOC. TM 1-1500-204-23.

4–20.18 Inspect Helicopter. TM 1-1520-238-PMS.

4–20.19 Perform Maintenance Test Flight. TM 1-1520-238-MTF.

4–20.20 Perform Maintenance Operational Checks as Required for Removed Components/Mission Equipment. TM 1-1520-238-23.

4–20.21 Refuel Helicopter. TM 1-1520-238-23. Use fuel truck (item 12, table 2–2).

CHAPTER 5
CRATED SHIPMENT

NOTE

Crated Shipment of the **AH–64A** helicopter is not applicable.

CHAPTER 6

TACTICAL SHIPMENT

6–1 GENERAL.

The concept of tactical shipment assumes expeditious mode of transport. Helicopters must be ready to perform their mission immediately after delivery; thus, little on no disassembly is implied. If maximum utilization of carrier space is more important than time saved, logistical mode is advised.

6–2 USAF CARGO AIRCRAFT.

a. The C–5 is the largest of available cargo aircraft. Its cargo compartment dimensional design limit are 1454 inches long, 216 inches wide and 150 inches high. These design limits allow for 6 inches of safety clearance for ceiling and sidewalls.

b. The quickest method of shipment is the C–5, and is suggested as the prime carrier, depending upon the number of helicopters being shipped. The C–5 can transport a maximum of six **AH–64A** helicopters with moderate disassembly. C–5 density loading will require removal of main rotor blade, air data sensor, horizontal stabilator and wings; wings are stowed.

c. The C–141B cargo aircraft is not used for tactical shipment because of the amount of disassembly and the maximum number of helicopters (2) that can be transported. The C–141B cargo aircraft is used only for logistical shipment.

6–3 VESSEL SHIPMENT.

Dependency upon the time frame and the number of helicopters involved, the Roll On/Roll Off (RORO) vessel may provide the most feasible and expeditious mode of shipment. The RORO vessel provides load density with minimum disassembly, removing the main rotor blades only. RORO vessel is considered for tactical shipment.

Lash Lighter and Seabee barges are not considered for tactical shipment due to the amount of helicopter disassembly required.

6–4 PREPARATION OF HELICOPTERS.

Helicopter preparation will be performed (depending on mode of transportation) in accordance with Chapter 2, 3, or 4 of this manual.

CHAPTER 7
PREPARATION FOR SHIPMENT

NOTE

See the individual chapters, by mode of transportation, for procedures for cleaning, preservation, packaging and marking.

CHAPTER 8
OPERATOR INSTRUCTIONS, TRANSPORTABILITY EQUIPMENT HYDRAULIC CART ASSEMBLY, AIR TRANSPORT

Section I. GENERAL

8–1 SCOPE.

This chapter provides instructions for the operation of the hydraulic cart assembly and for the kneeling and erecting the **AH–64A** helicopter for transport by cargo aircraft and truck. Section II provides procedures for kneeling and erecting operations when shipping **AH–64A** helicopters by C–141 and by truck. Section III provides procedures for kneeling and erecting operations when shipping **AH–64A** helicopters by C–5.

8–2 APPLICABILITY.

Personnel will be thoroughly familiar with and practiced in these procedures prior to performing kneeling and erecting operations in conjunction with helicopter transport operations.

8–3 CONFIGURE HELICOPTER FOR SHIPMENT.

Prior to performing kneeling and erecting operations, configure the helicopter for kneeling in accordance with Chapter 2, section III or IV; or Chapter 4, as appropriate.

Section II. KNEELING AND ERECTING OPERATIONS FOR C–141B AND TRUCK SHIPMENT

8–4 CONNECT AND CHECK OUT HYDRAULIC CART.

a. **Service Reservoir.** Service cart hydraulic reservoir (fig. 8–1) with two gallons MIL–H–5606 hydraulic fluid.

b. **Bleed Pump Assembly.** Crack open cap (AN929–6) on motor and pump assembly until air–free hydraulic fluid emerges, tighten cap.

c. **Connect Hydraulic Cart to Power Source.**

CAUTION

To prevent damage to aircraft and/ or equipment make sure that polarity of plug on the hydraulic cart is the same as than on cargo aircraft. If required, use 28 V dc adapter 70700–20437–045 for commonly used U. S. Army 7.5 Kw generator power source.

(1) Plug ground wire from hydraulic cart (fig. 4–1) into ground receptacle on helicopter fuselage.

(2) Connect power cable (fig. 8–1) to J2 connection on control box in back of hydraulic cart.

(3) Connect other end of cable to source of 28 V dc (supplied by cargo aircraft). If electrical power from cargo aircraft is not available, use adapter and connect cable to adapter and 28 V dc external power source.

d. **Connect Control Pendant.** Connect remote control pendant to J4 (fig. 8–1) on control box.

e. **Start Hydraulic Cart.**

(1) Push in CONTROL POWER AND MOTOR/PUMP POWER circuit breakers on control box.

(2) Press START button on pendant assembly and run motor and pump assembly two minutes.

(3) Test emergency stop by pressing red EMERGENCY STOP handle on control box.

(4) Restart hydraulic cart and press STOP button on pendant assembly.

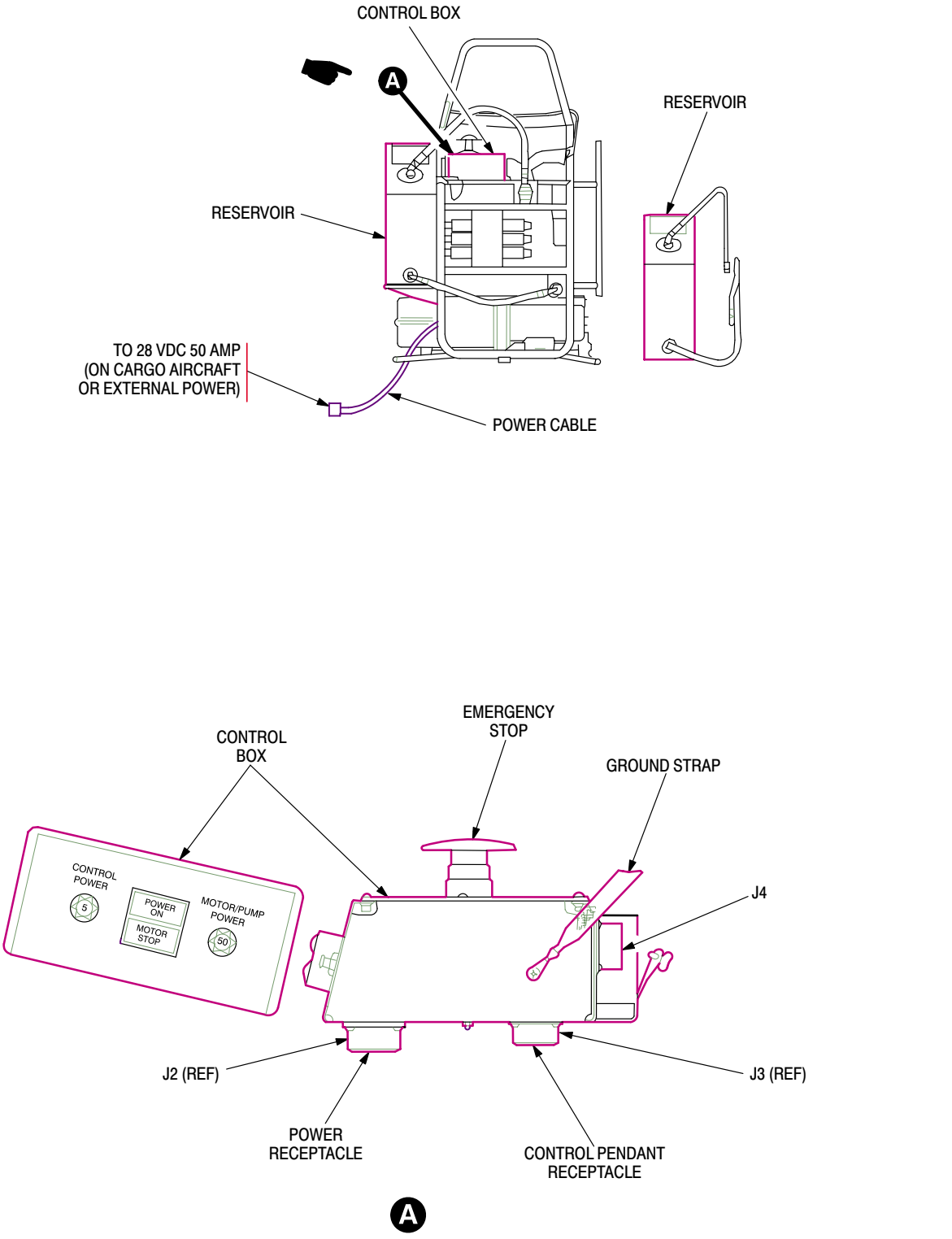


Figure 8–1. Hydraulic Cart Components

f. **Bleed Air from Hydraulic Hoses.**

(1) Connect left landing gear 40 foot kneeling hose (fig. 8–2) to hydraulic cart.

(2) With shutoff valve opened, connect shut off valve/aircraft hose to 40 foot kneeling hose connected in step (1).

(3) Remove quick disconnect from aircraft end of shutoff valve/hose.

(4) Hold aircraft end of shutoff valve/ hose in hydraulic cart reservoir.

(5) Press START button on pendant assembly.

(6) Press and hold LEFT LANDING GEAR switch, on pendant assembly, in the UP position until air–free hydraulic fluid flows from hose.

(7) Release LEFT LANDING GEAR switch and press STOP button on pendant assembly.

(8) Replace quick disconnect on aircraft end of shutoff valve/hose.

(9) Repeat steps (1) thru (8) for right landing gear kneeling hoses and shutoff valve.

g. **Connect Shutoff Valve/Hoses to Landing Gear.**

WARNING

- **To prevent injury and damage to equipment due to strut collapse and helicopter rollover, insure that hydraulic line is properly routed to prevent fouling. Route hydraulic line down through the access cover on top of the forward avionics bay (FAB) walkway to the landing gear kneeling nipple.**
- **To prevent injury and damage to equipment due to strut collapse and helicopter rollover, do not force quick disconnect on to strut kneeling valve nipple. Difficulty in connecting quick disconnect may indicate strut collar is unlocked and if forced, the quick disconnect may fail. If difficulty is experienced, jack helicopter (TM 1-1520-238-23) to relieve pressure before proceeding.**

(1) Place hydraulic cart in front of helicopter with hydraulic cart and cart operator facing helicopter.

NOTE

The cart operator stands in front of and facing the helicopter. Connecting the left hose to the right strut and the right hose to the left strut will avoid confusion during kneeling and erecting operations. The LEFT switch on the control pendant will operate the landing gear on the operators left. The RIGHT switch on the control pendant will operate the landing gear on the operators right.

(2) Open access cover on right hand FAB walkway and route aircraft end of left hand shutoff valve/hose down through opening.

(3) Remove cap from kneeling nipple on right hand shock strut.

(4) Connect aircraft end of left hand shutoff valve/hose quick disconnect to kneeling nipple on right hand landing gear strut.

(5) Open access cover on left hand FAB walkway and route aircraft end of right hand shutoff valve/hose down through opening.

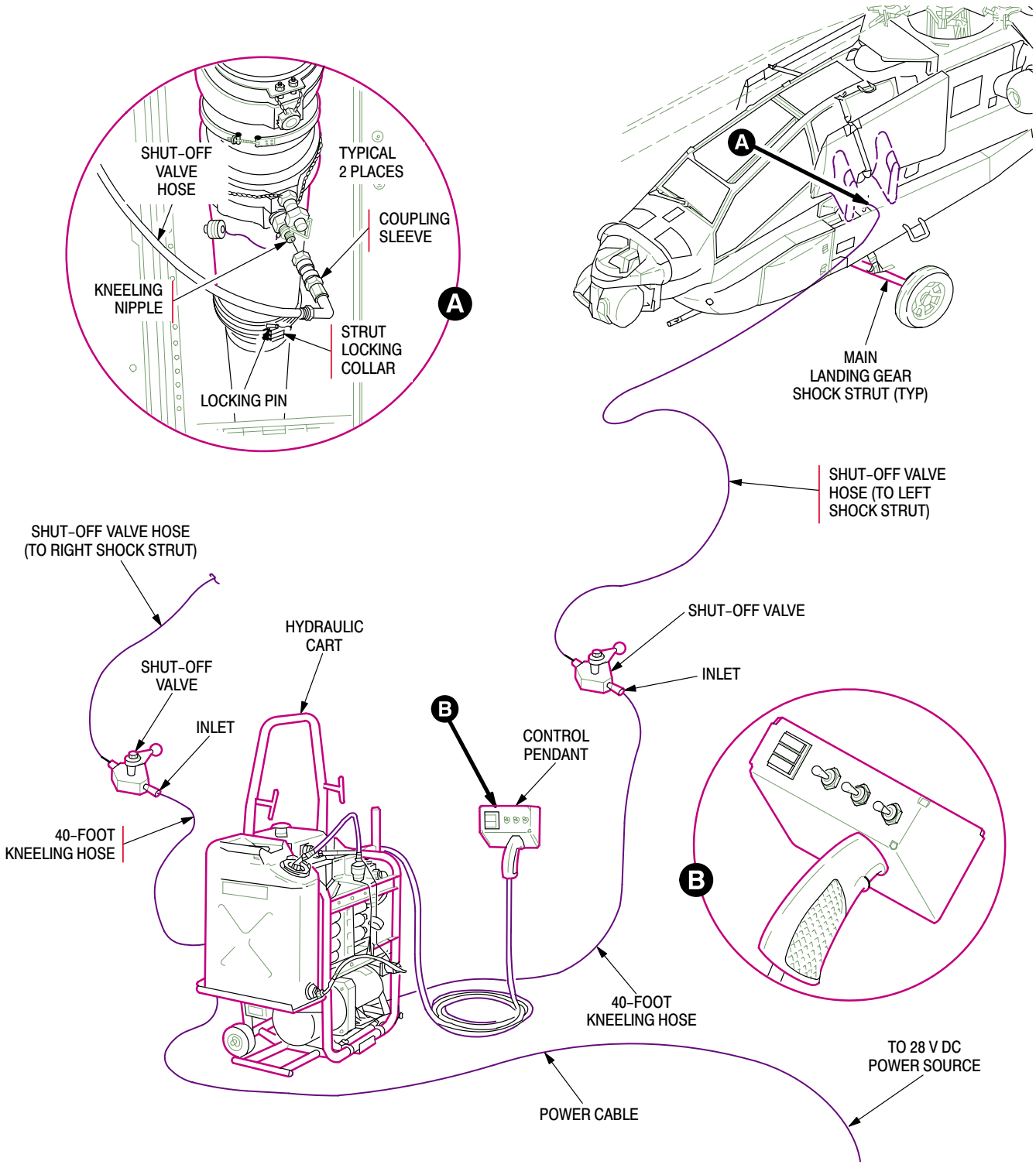
(6) Remove cap from kneeling nipple on left hand shock strut.

(7) Connect aircraft end of right hand shutoff valve/hose quick disconnect to kneeling nipple on left hand landing gear strut.

8–5 KNEEL HELICOPTER.

WARNING

- **To prevent injury and equipment damage from strut collapse and helicopter rollover, personnel will be thoroughly familiar with procedures contained in this chapter prior to conduction kneeling or erecting operations.**
- **To prevent injury and equipment damage from strut collapse and helicopter rollover, personnel will remain clear of helicopter during kneeling or erecting operations.**
- **To prevent injury from possible helicopter rollover, keep struts as close to the same length as possible during kneeling and erecting operations.**



NOTE: LEFT SIDE SHOWN-TYPICAL FOR BOTH SIDES

MO5-015E

Figure 8–2. Main Landing Gear Kneeling Set–Up

CAUTION

- **To prevent damage to equipment from excessive stress on helicopter landing gear and cargo aircraft winch, do not apply helicopter brakes during kneeling or erecting operations.**
- **To prevent damage to equipment, maintain adequate overhead and underbelly clearance during kneeling and erecting operations.**

a. **Position Personnel.**

(1) Position one person to operate left shut off valve.

(2) Position one person to operate right shut off valve.

(3) Position one person to move hydraulic cart, as required.

(4) Position one person to operate hydraulic cart.

(5) Position personnel to monitor overhead and underbelly clearances.

b. **Extend Struts.**

NOTE

Landing gear struts are extended separately to insure that hydraulic hoses are correctly connected.

(1) Connect and check out cart (para 8–4).

(2) Insure both shutoff valves are open.

(3) Press start switch on control pendant.

(4) Move LEFT switch on control pendant to UP position. Insure that landing gear on operators left is fully extended to its stop, release LEFT switch.

(5) Move RIGHT switch on control pendant to UP position. Insure that landing gear on operators right is fully extended to its stop, release RIGHT switch.

c. **Inspect for Hydraulic Leaks.**

WARNING

To prevent injury and equipment damage from strut collapse and helicopter rollover, do not proceed until all leaks are repaired.

(1) Inspect landing gear, hoses, fittings, valves and hydraulic cart for leaks.

(2) Repair leaks as required.

d. **Unlock Strut Collars.**

NOTE

If landing gear collars do not rotate, counterclockwise, easily, the landing gear strut has not been fully extended. Fully extend strut (step b) before proceeding.

(1) Remove aircraft left strut collar locking pin, rotate collar counterclockwise to unlock, reinstall locking pin.

(2) Remove aircraft right strut collar locking pin, rotate collar counterclockwise to unlock, reinstall locking pin.

e. **Position Helicopter at Desired Height.**

(1) Slowly kneel helicopter by moving LEFT and RIGHT switches on control pendant to DOWN position.

(2) Slowly erect helicopter by moving LEFT and RIGHT switches on control pendant to UP position.

f. **Disconnect Hydraulic Cart (Kneeled Condition).**

WARNING

To prevent injury and equipment damage from strut collapse and helicopter rollover, ensure that there is no strut movement after closing shutoff valves. Strut movement indicates a leaking shutoff valve that must be replaced prior to shipment.

CAUTION

To prevent damage to strut kneeling nipple, shutoff valve hoses must remain attached to the helicopter when it is in the kneeled positioned.

(1) Close left and right shutoff hose valves.

(2) Move LEFT and RIGHT switches on control pendant to DOWN position to bleed pressure from kneeling hoses.

(3) Disconnect left and right 40 foot kneeling hoses from hydraulic cart and shutoff valve. Install dust caps on both 40 foot kneeling hoses.

(4) Press STOP button on control pendant.

(5) Disconnect electrical power supply and ground wire from power source and helicopter.

(6) Position cart for kneeling next helicopter or prepare for transport, as appropriate.

8–6 ERECT HELICOPTER.

WARNING

- **To prevent injury and equipment damage from strut collapse and helicopter rollover, personnel will be thoroughly familiar with procedures contained in this chapter prior to conduction kneeling or erecting operations.**
- **To prevent injury and equipment damage from strut collapse and helicopter rollover, personnel will remain clear of helicopter during kneeling or erecting operations.**
- **To prevent injury from possible helicopter rollover, keep struts as close to the same length as possible during kneeling and erecting operations.**

CAUTION

- **To prevent damage to equipment from excessive stress on helicopter landing gear and cargo aircraft winch, do not apply helicopter brakes during kneeling or erecting operations.**
- **To prevent damage to equipment, maintain adequate overhead and underbelly clearance during kneeling and erecting operations.**

a. **Connect Hydraulic Cart.**

(1) Insure there are approximately two gallons of hydraulic fluid in the hydraulic cart reservoir. If reservoir is empty, bleed pump assembly after servicing (para 8–4a and b).

(2) Connect hydraulic cart to electrical ground and power source (para 8–4c).

(3) Connect control pendant to control box (para 8–4d).

b. **Start Hydraulic Cart.** Paragraph 8–4.

c. **Bleed Air from Hydraulic Hoses.**

(1) Connect left landing gear 40 foot kneeling hose (fig. 8–2) to hydraulic cart.

(2) Remove quick disconnect from shutoff valve end of 40 foot kneeling hose.

(3) Hold shutoff valve end of 40 foot hose in hydraulic cart reservoir.

(4) Press START button on pendant assembly.

(5) Press and hold LEFT LANDING GEAR switch, on pendant assembly, in the UP position until air–free hydraulic fluid flows from hose.

(6) Release LEFT LANDING GEAR switch and press STOP button on pendant assembly.

(7) Replace quick disconnect on shutoff valve end of hose.

(8) Repeat steps (1) thru (7) for right landing gear 40 foot kneeling hose.

d. **Connect 40 Foot Kneeling Hoses to Shutoff Valve/Hoses Connected to Helicopter.**

(1) Place hydraulic cart in front of helicopter with hydraulic cart and cart operator facing helicopter.

NOTE

The cart operator stands in front of and facing the helicopter. Connecting the left hose to the right strut and the right hose to the left strut will avoid confusion during kneeling and erecting operations. The LEFT switch on the control pendant will operate the landing gear on the operators left. The RIGHT switch on the control pendant will operate the landing gear on the operators right.

(2) Connect left hand 40 foot kneeling hose to right hand landing gear strut shutoff valve/hose.

(3) Connect right hand 40 foot kneeling hose to left hand landing gear strut shutoff valve/hose.

e. **Position Personnel.** Paragraph 8–5a.

f. **Raise Helicopter.**

NOTE

Before fully erecting helicopter, switches are checked separately to insure that hydraulic hoses are correctly connected.

(1) Press start switch on control pendant.

(2) Open left and right shutoff valves.

(3) Momentarily move LEFT switch on control pendant to UP position. Insure that landing gear on operators left extends, release LEFT switch.

(4) Momentarily move RIGHT switch on control pendant to UP position. Insure that landing gear on operators right extends, release RIGHT switch.

(5) Slowly erect helicopter by moving LEFT and RIGHT switches on control pendant to UP position until helicopter struts are fully extended.

g. **Lock Landing Gear Collars.**

(1) Remove aircraft left strut collar locking pin, rotate collar clockwise to lock, reinstall locking pin.

(2) Remove aircraft right strut collar locking pin, rotate collar clockwise to lock, reinstall locking pin.

(3) Move LEFT and RIGHT switches on control pendant to DOWN position to depressurize hydraulic hoses.

(4) Press STOP switch on control pendant.

h. **Disconnect Hydraulic Cart (Erected Condition).**

(1) Close left and right shutoff hose valves.

(2) Disconnect left and right shutoff valve/hoses from helicopter. Install caps on both left and right kneeling nipples.

(3) Disconnect electrical power supply and ground wire from power source and helicopter.

(4) Secure access covers on both left and right FAB walkways.

(5) Position cart for kneeling next helicopter or prepare for storage, as appropriate.

Section III. KNEELING AND ERECTING OPERATIONS FOR C–5 SHIPMENT (REAR DOOR LOAD ONLY)

8–7 GENERAL.

This chapter provides instructions for the operation of the hydraulic cart and for the kneeling and erecting of the **AH–64A** helicopter for transport by C–5 cargo aircraft, rear door load only.

8–8 APPLICABILITY.

Personnel will be thoroughly familiar with and practiced in these procedures prior to performing kneeling and erecting operations in conjunction with helicopter transport operations.

8–9 CONFIGURE HELICOPTER FOR SHIPMENT.

Prior to performing kneeling and erecting operations, configure the helicopter for kneeling in accordance with chapter 2, section III.

8–10 CONNECT AND CHECK OUT HYDRAULIC CART (OUTSIDE OF C–5 CARGO AIRCRAFT).

Paragraph 8–4.

8–11 KNEEL HELICOPTER (OUTSIDE OF C–5 CARGO AIRCRAFT).

Paragraph 8–5.

8–12 ERECT HELICOPTER (INSIDE C–5 CARGO AIRCRAFT).

NOTE

The helicopter will be kneeled and erected, as required, for underbelly and overhead clearance while winching helicopter into C–5 cargo compartment. After the helicopter has been winched into cargo compartment, helicopter will be erected.

WARNING

- **To prevent injury and equipment damage from strut collapse and helicopter rollover, personnel will be thoroughly familiar with procedures contained in this chapter prior to conduction kneeling or erecting operations.**
- **To prevent injury and equipment damage from strut collapse and helicopter rollover, personnel will remain clear of helicopter during kneeling or erecting operations.**
- **To prevent injury from possible helicopter rollover, keep struts as close to the same length as possible during kneeling and erecting operations.**

CAUTION

- **To prevent damage to equipment from excessive stress on helicopter landing gear and cargo aircraft winch, do not apply helicopter brakes during kneeling or erecting operations.**
- **To prevent damage to equipment, maintain adequate overhead and underbelly clearance during kneeling and erecting operations.**

Paragraph 8–6e thru 8–6h.

8–13 KNEEL HELICOPTER (INSIDE C–5 CARGO AIRCRAFT).

WARNING

- **To prevent injury and equipment damage from strut collapse and helicopter rollover, personnel will be thoroughly familiar with procedures contained in this chapter prior to conduction kneeling or erecting operations.**
- **To prevent injury and equipment damage from strut collapse and helicopter rollover, personnel will remain clear of helicopter during kneeling or erecting operations.**
- **To prevent injury from possible helicopter rollover, keep struts as close to the same length as possible during kneeling and erecting operations.**

CAUTION

- **To prevent damage to equipment from excessive stress on helicopter landing gear and cargo aircraft winch, do not apply helicopter brakes during kneeling or erecting operations.**
- **To prevent damage to equipment, maintain adequate overhead and underbelly clearance during kneeling and erecting operations.**

a. **Connect Hydraulic Cart.** Paragraph 8–6a.

b. **Start Hydraulic Cart.** Paragraph 8–4e.

c. **Bleed Air from Hydraulic Hoses.** Paragraph 8–6c.

d. **Connect 40 Foot Kneeling Hoses to Shutoff Valve/Hoses Connected to Helicopter.** Paragraph 8–6d.

e. **Position Personnel.** Paragraph 8–5a.

f. **Extend Struts.** Paragraph 8–5b.

g. **Inspect for Hydraulic Leaks.** Paragraph 8–5c.

h. **Unlock Strut Collars.** Paragraph 8–5d.

i. **Position Helicopter at Desired Height.** Paragraph 8–5e.

NOTE

The helicopter will be kneeled and erected, as required, for underbelly and overhead clearance while removing helicopter from C–5 cargo compartment. After the helicopter has been removed from cargo compartment, helicopter will be erected.

8–14 ERECT HELICOPTER (OUTSIDE C–5 CARGO AIRCRAFT).

WARNING

- **To prevent injury and equipment damage from strut collapse and helicopter rollover, personnel will be thoroughly familiar with procedures contained in this chapter prior to conduction kneeling or erecting operations.**
- **To prevent injury and equipment damage from strut collapse and helicopter rollover, personnel will remain clear of helicopter during kneeling or erecting operations.**
- **To prevent injury from possible helicopter rollover, keep struts as close to the same length as possible during kneeling and erecting operations.**

CAUTION

- **To prevent damage to equipment from excessive stress on helicopter landing gear and cargo aircraft winch, do not apply helicopter brakes during kneeling or erecting operations.**
- **To prevent damage to equipment, maintain adequate overhead and underbelly clearance during kneeling and erecting operations.**

Paragraph 8–6e thru 8–6h.

APPENDIX A
REFERENCES

A–1 GENERAL.

This appendix lists publications called out in preceding chapters. Commodity (material) specifications are not listed.

A–2 LIST OF REFERENCES.

Nomenclature	Publication Number
Functional Users Manual for the Army Maintenance Management System – Aviation (TAMMS–A)	DA PAM 738-751
Movement of Units in Air Force Aircraft	FM 55-12
Marking for Shipment and Storage	MIL-STD-129
Preparation of Hazardous Materials for Military Air Shipment	TM 38-250
Operator's, Aviation Unit and Intermediate Maintenance Manual Including Repair Parts and Special Tools for Hydra 70 Rocket Launchers	TM 9-1055-460-13&P
Aviation Unit and Intermediate Maintenance Manual, Area Weapon and Rocket Subsystems, AH–64A Helicopter	TM 9-1090-208-23-1
Aviation Unit Maintenance Manual, Fire Control System, AH–64A Helicopter	TM 9-1230-476-20-1
Aviation Unit Maintenance Manual, Hellfire Missile Equipment, AH–64A Helicopter	TM 9-1427-475-20
Cleaning of Aeronautical Equipment	TM 55-1500-333-24
Corrosion Control for Army Aircraft	TM 55-1500-344-23
Operator's Manual, AH–64A Helicopter	TM 1-1520-238-10 (Supercedes TM 55-1520-238-10)
Aviation Unit and Intermediate Maintenance Manual, AH–64A Helicopter	TM 1-1520-238-23 (Supercedes TM 55-1520-238-23)
Maintenance Test Flight Manual, AH–64A Helicopters	TM 1-1520-238-MTF (Supercedes TM 55-1520-238-MTF)
Aviation Unit and Intermediate Preventive Maintenance (10 Hour/14 Day Inspection) Checklist, AH–64A Helicopter	TM 1-1520-238-PMS (Supercedes TM 55-1520-238-PMS)

APPENDIX B

PRESERVATION/DEPRESERVATION WORKSHEET

Worksheet shall reflect exactly what work was performed for the specific transport mode.

EQUIPMENT INSPECTION AND MAINTENACNE WORKSHEET

For use of this form, see TM 38–750; the proponent agency is the Office of the Deputy Chief of Staff for Logistics.

1. ORGANIZATION			2. NOMENCLATURE AND MODEL			
3. REGISTRATION/SERIAL/NSN	4a. MILES	b. HOURS	c. ROUNDS FIRED	d. HOT STARTS	5. DATE	6. TYPE INSPECTION

7. APPLICABLE REFERENCE			
TM NUMBER	TM DATE	TM NUMBER	TM DATE

COLUMN a–Enter TM item number.
COLUMN b–Enter the applicable condition status symbol.
COLUMN c–Enter deficiencies and shortcomings.

COLUMN d – Show corrective action for deficiency or shortcoming listed in Column C.
COLUMN e – Individual ascertaining completed corrective action initial in this column.

STATUS SYMBOLS

"X" – Indicates a deficiency in the equipment that places it in an inoperable status.

CIRCLED "X" i Indicated a deficiency, however, the equip–ment may be operated under specific limitations as directed by higher authority or as prescribed locally, until corrective action can be accomplished.

HORIZONTAL DASH "(–)" –Indicated that a required inspec–tion, component replacement, maintenance operation check. or test flight is due but has not been accomplished, or an overdue MWO has not been accomplished.

DIAGONAL "(/)" –Indicates a materiel defect other than a deficiency which must be corrected to in–crease efficiency or to make the item completely serviceable.

LAST NAME INITIAL IN BLACK, BLUE–BLACK INK, OR PENCIL–Indicated that a completely satisfactory condition exists.

FOR AIRCRAFT–Status symbols will be recorded in red.

ALL INSPECTIONS AND EQUIPMENT CONDITIONS RECORDED ON THIS FORM HAVE BEEN DETERMINED IN ACCORDANCE WITH DIAGNOSITC PROCEDURES AND STANDARDS IN THE TM CITED HEREON.

8a. SIGNATURE (Person(s) performing inspection)	8b. TIME	9a. SIGNATURE (Maintenence Supervisor)	9b. TIME	10.MANHOURS REQUIRED

TM ITEM NO. a	STATUS b	DEFICIENCIES AND SHORTCOMINGS c	CORRECTIVE ACTION d	INITIAL WHEN COR-RECTED c

DA FORM 1 APR 79 2404

Replaces edition of 1 Jan 64, which will be used

M05–071

Figure B–1. DA Form 2404, Equipment Inspection and Maintenance Worksheet

APPENDIX C
WEIGHT AND BALANCE FOR SHIPMENT

NOTE

Information to be provided at a later date.

APPENDIX D
CONSUMABLE MATERIALS

D–1 GENERAL.

This appendix lists consumable materials and supplies required during helicopter preparation and shipment procedures. Items are listed in alphabetical order of nomenclature. Item numbers assigned to the listings are referenced in the narrative instructions to identify materials (e.g., use cushioning material (D–5). The applicable Government specification or manufacturer's part number is provided for each item. Available National Stock Numbers (NSN's) are given for common unit packages of listed items.

NOTE

Different unit packages (drum, gallon, pint, pound) of the same material may have different stock numbers.

All items will be procured on an ''as required'' basis. When ordering, use complete nomenclature and description, Government Specification or manufacturer's part number and code (CAGE); and provide amount and type of package which will be needed (three 1–gallon cans, six 100–yard rolls, etc.).

D–2 CONSUMABLE MATERIALS LIST.

Item Number	Nomenclature	Government Specification (or manufacturer's part number and CAGE code)	Unit Package	NSN
D–1	Barrier Material, Water Vaporproofed, 36–inch width	MIL–B–131, Class 1	200–yard roll	8135–00–282–0565
D–2	Box, Cleated Wood	PPP–B–601	1 each	—
D–3	Box, Fiberboard	PPP–B–636	1 each	—
D–4	Corrosion Preventive Compound	MIL–C–16173, Type P–2	1–gallon can	8030–00–244–1297
D–5	Cushioning Material, Resilient, Polypropylene Foam, 1/4 by 30–inch width	PPP–C–1797	255–foot roll	8135–00–300–4905
D–6	Insecticide, Dichlorvos Strip, 2–inch width	MIL–I–51323	1–gross carton	6840–00–142–9438
D–7	Paint, Stencil, Flat, Black	TT–P–98	TBD	8010–00–TBD
D–8	Plastic Film, Polyethylene sheet, 144" x 1200"	L–P–378	RL	8135–00–579–6489
D–9	Primer	MIL–P–23377	TBD	TBD
D–10	Rodenticide, Bait Block, Diaphacin Paraffin, 8–ounce block	Part No. 788 (CAGE 27622)	40–block carton	6840–00–089–4664
D–11	Sealant, Class 1	MIL–S–8802, Type I, can	1–gallon	TBD
D–12	Sealing Compound	HMS 16–1097B2 (CAGE 02731)	TBD	TBD
D–13	Tape, Packaging, Waterproof, 2–inch width	PPP–T–60, Type IV, Class 1	60–yard roll	7510–00–266–5016
D–14	Twine, Fibrous, Jute	T–T–911	TBD	4020–00–TBD
D–15	Cotter Pin (one per disconnected servoactuator to mixer)	MS24665–377	1	5315–00–285–7161
D–16	Cotter Pin (two per removed stabilator pivot)	MS24665–374	2	5315–00–241–7332

Item Number	Nomenclature	Government Specification (or manufacturer's part number and CAGE code)	Unit Package	NSN
D–17	Cotter Pin (two per disconnected tail rotor control push rod)	MS24665–153	2	
D–18	Cotter Pin (one per removed tail rotor pitch horn)	MS24665–304	1	5315–00–241–7330
D–19	Cotter Pin (one per removed stabilator actuator)	MS24665–155	1	5315–00–234–1863
D–20	Cotter Pin (one per removed landing gear crosstube end stud)	MS24665–288	1	
D–21	PLI Washer Assembly (one per removed tail rotor blade)	HS4742–9D287 (CAGE 02731)	1	5310–01–176–7025
D–22	PLI Washer Assembly (18 per removed mast base)	HS4742–8C196 (CAGE 02731)	18	1615–01–177–5689
D–23	Lockwire	MS20995C20	roll	9505–00–221–2650
D–24	Caps/Fittings,Elec/Fuel/Air Lines	N/A	A/R	
D–25	Tag, Shipping	N/A	A/R	
D–26	Shackle (one per helicopter)	AN116–9	1	4030–00–266–0795
D–27	Lockwire	MS20995NC32	roll	9525–00–355–6072
D–28	Rope	9868–105X4PC50	50–foot	4920–00–593–9584

NOTE

The following is a list of lumber and shoring to be locally procured for use on an as required basis for C–5, C–141B and C–17 shipment.

C–5 Cargo Aircraft		
Nomenclature	Dimensions	Quantity
Lumber	2 x 12 x 24	11
Lumber	2 x 12 x 48	11
Lumber	2 x 12 x 72	2
Lumber	2 x 12 x 96	1
Lumber	2 x 12 x 120	1
Plywood	12 x 12 x 3/4	5
Plywood	16 x 16 x 1/2	1
Plywood	16 x 228 x 1/2	1
C–141B Cargo Aircraft		
Lumber	2 x 12 x 36	16
Lumber	2 x 12 x 32	3
Lumber	2 x 12 x 44	3
Lumber	2 x 12 x 56	3
Lumber	2 x 12 x 68	3
Lumber	2 x 12 x 80	3
Lumber	2 x 12 x 92	3
Lumber	2 x 12 x 104	3
Lumber	2 x 12 x 116	3
Lumber	2 x 12 x 128	3
C–17Cargo Aircraft		
Lumber	2 x 12 x 24	8
Lumber	2 x 12 x 48	20
Lumber	2 x 12 x 96	4
Lumber	2 x 12 x 50	4
Lumber	2.25 x 18 x 30	1
Lumber	0.75 x 12 x 12	4
Lumber	0.75 x 12 x 12	*2

*NOTE Two 0.75x12x12 per AH–64A loaded

APPENDIX E
SPECIAL TOOLS AND EQUIPMENT

E–1 GENERAL.

This appendix lists special equipment and fixtures required during helicopter preparation, loading, and offloading procedures. Items are listed in alphabetical order of nomenclature. The applicable MDHC part number is provided for each item. National Stock Numbers (NSN's) are listed, when available.

E–2 SPECIAL TOOLS AND EQUIPMENT LIST.

Note	Nomenclature	Source	Part Number	NSN
	Actuator support set	TPTP	7–367310021–35 7–367310021–37	1740–01–220–8490 1740–01–242–7266
(1)	Air vehicle sling	DP	7–262110009–601	1730–01–165–6861
(2)	Droop stop wedge	DP	7–262110074	1615–01–185–3120
	Forward fuselage tiedown fitting	TP	7–367310009	1740–01–242–7265
	Forward winching adapter cable	TP	7–267310008	1740–01–221–3327
	Fuselage station 450 support	TP	7–367310005–601	1740–01–250–0047
	Hydraulic jack	DP	53D22020	1730–00–540–2343
	Hydraulic hose kit	TP	7–262100019–601	1730–01–181–9275
	Hydraulic cart	TP	70700–81650–041	1730–01–292–0972
	Main rotor blade rack (root)	TP	7–267310002	1740–01–221–3329
	Main rotor blade rack (tip)	TP	7–267310002–3	1740–01–221–3333
(1)	Main rotor blade sling set	DP	7–362110216	1730–01–262–5310
	Main rotor head, mast, and mixer shipping carrier	TP	7–367310010–601	1740–01–249–1943
	Main transmission shipping cover	TP	7–367310022	1740–01–221–3331
(3)	Mixer bolt torque adapter	DP	7–362110085	No NSN (Maint)
(1)	Mixer spreader	DP	7–262110077–19	No NSN (Maint)
	Main rotor blade container	TP	7–266100011–45	8145–01–235–1536
	Stabilator actuator support	TP	7–367310023	1740–01–256–6346
	Tow bar	DP	AA1730–1251	1730–00–967–9556
	Tail landing gear strut lock	TP	7–267310006	1740–01–220–8464
	Tail rotor blade support	TP	7–267310017	1740–01–221–3332
	Tail wheel steering bar and winching yoke	TP	7–367310013	1740–01–221–9436
	Vertical stabilator adapt jack	TP	7–367310025	TBD
	Vertical stabilizer sling	DP	7–267310016–603	1730–01–285–3014
	Vertical stabilizer stowing kit	TP	7–267310011–607	1740–01–273–7399
	Wing stowing kit	TP	7–367310001	1740–01–220–8492
*	MB1 tiedown device	TP		1670–00–212–1149
*	MB1 tiedown chain	TP		4010–00–516–8405
*	MB2 tiedown device	TP		1670–00–212–1150
*	MB2 tiedown chain	TP		4010–00–778–4079

NOTES: (1). Part of kit sling set, 7–262100005–607, NSN 1730–01–246–6781
(2). Part of Main rotor blade sling set, 7–262110008, NSN 1730–01–165–6860
(3). Part of tool kit, (AVUM) 4920–01–180–7613, (AVIM) 4920–01–182–8811
* Indicates items are for reference only, equivalent size and weight ratings are suitable.
DP Dual Purpose: Used in maintenance/transportability functions. Available in unit maintenance.
TP Transportability Peculiar. Requisition required items.

APPENDIX F

QUARANTINE INSPECTION

F–1 GENERAL.

This appendix provides the procedures necessary to prepare a helicopter (including removed components which are packed separately) for quarantine inspection, and procedures for deprocessing such material upon arrival at destination. This appendix is not a directive; it was derived from existing regulations and is presented in convenient form. AR 40-12 and TM 5-632 will be checked for changes affecting these procedures.

In the event that these instructions are at variance with command regulations regarding shipment of retrograde cargo, the command entomologist will be consulted.

Technical assistance and advice regarding the following instructions will be obtained from the command entomologist.

F–2 PREPARATION OF MATERIAL FOR QUARANTINE INSPECTION.

a. All equipment and containers will be completely free of soil when loaded on aircraft or ships.

b. All containers will be cleared of all grain, food, and soil before being loaded with retrograde cargo or returned empty to the continental United States.

c. Wooden containers and packing materials will be inspected for termites, wood bores, and other insect infestations, before being packed in larger containers or loaded on aircraft or ships. Under no circumstances will infested wood or packing material be used.

d. All containers and packing material will be inspected immediately prior to packing to ensure the absence of rodents, snakes,and other animals or insects.

e. Only authorized packing material will be used. In no instance will native grasses or fibers be used. All packing material will be stored to prevent infestation by insects and rodents. Personnel handling insecticides or rodenticides must be properly qualified and instructed. They will wear protective clothing, gloves, and respirators as recommended by the post surgeon or safety officer.

f. 2-inch insecticide strip (D–6) will be attached to the interior of each closed container larger than 10 cubic feet. Under 6 linear inches of insecticide strip per 300 cubic feet of container. In crates or boxes with small vent holes, and helicopter interiors which cannot be completely sealed, 8 to 10 inches of strip will be used per 300 cubic feet.

NOTE

Insecticide strips will not be used in open containers.

g. 2-inch insecticide strip (D–6) will be positioned within retrograde helicopters which are sealed while being processed for return to the United States. Twelve insecticide strips will be hung at different locations in the helicopter interior, including the tailboom.

h. One bait block (D–10) will be placed in each crew station of each helicopter, near the crew station door. The red tape attached to the bait block will be led to the outside of the helicopter. The tape must be clearly visible after the door is sealed.

F–3 DEPROCESSING OF TREATED MATERIAL.

Collection and disposal of insecticides and rodenticides will be accomplished during helicopter depreservation, as follows (refer to WARNING, para F–2):

NOTE

A red tape extending from a helicopter exterior, indicates the presence of rodenticide bait blocks.

a. When opening a container or helicopter, use a vacuum cleaner to collect loose insecticide and rodenticide dust and residue from individual items and packages as they are removed.

b. After removal of all packages and loose items, thoroughly vacuum helicopter and container interiors.

c. Remove all insecticide strips and rodenticide bait blocks.

d. Store all strips and bait blocks, dust and residue in closed containers for collection and proper disposal by the post engineer.

e. Immediately notify the post engineer and the post surgeon or health officer if living or dead insects, rodents, or other animals are found during depreservation.

APPENDIX G

HEAT SHRINK FILM HELICOPTER PROTECTIVE COVERING

G–1 PURPOSE:

These instructions are prepared to assist personnel in the installation of protective covering on the **AH–64A** helicopter during transport via vessel and tractor–trailer truck.

G–2 GENERAL:

a. Polyethylene heat shrink film, materials, and equipment, as listed in Table G–1, have been approved for use in the protection of Army helicopters from corrosion, salt water spray, dirt, dust, and foreign objects.

b. Protective covering is required for all helicopters shipped on the topdeck of a vessel and in areas that may be subjected to salt laden spray. Helicopters shipped under hatch covers will be protected with plastic sheets as a minimum. Protective covering of helicopter shipped below deck is the option of the Commander. The Commander's decision on the amount of protection required will be based on the resources available and the below deck environment of the vessel used for shipment. For helicopters shipped below deck, it is approved to partially cover the helicopter and/or partially shrink the film cover.

c. Protective covering will be applied to those helicopters being shipped by tractor–trailer truck on highways. The level of protective covering required for short distance shipments by military truck will be determined by the shipper.

d. The helicopter will be disassembled, preserved, and prepared for shipment in accordance with Chapter 3 or Chapter 4 of this manual, as applicable.

e. Installation of protective covering is the responsibility of the shipper.

f. When applying the protective covering, heat shrink film, sufficient working space around the helicopter will be provided to move the maintenance stands, ladders, supplies and equipment.

g. In addition to the equipment listed in Table G–1, it is essential that an adequate number of maintenance stands are available for preparation and covering of aircraft. There should be two stands for each aircraft being prepared at a given time. For the uncovering process, a single maintenance stand will be adequate.

h. Insure that adequate waste receptacles are available for waste film and cushioning materials – for both covering and uncovering procedures.

Table G–1. Materials and Equipment List

NOMENCLATURE	UNIT	P/N, SPEC (CAGE)	NSN
Plastic, Heat Shrink Film White, 7 Mil, 14' x 200'	Roll	8135SDP000–1	8135–01–250–4931
Plastic, Heat Shrink Film, White, 7 Mil, 20' x 200'	Roll	8135SDP000–2	8135–01–250–2301
Tape, Heat Shrink 2''	Roll	7510SDP000–1	7510–01–250–2299
Heat Cannon Kit, Propane	Each	3540SDP000–1 (81996)	4940–01–250–2300
Cylinder, Empty, Propane, 25 lb.	Each	RR–C–910/2	8120–00–530–5225
Knife, Safe–T–Cut	Each	Model 100HD	7330–01–255–3444
Gloves, Safety, Leather	Pair	A–A–50022	8415–00–269–0433
Cushioning Material 1/4'' x 30'' x 255''	Roll	PPP–C–1797	8135–00–300–4905
Vent, White Plastic, Stick–on, Air	Each	Airlette Corp	8115–01–255–3445
Strapping polyester 1/2''	Roll	R40 (62780)	8135–00–956–2151
Combustible Gas Indicator	Each		6665–00–941–6554

i. Environmental conditions of rain and wind cause considerable difficulty in the application of the helicopter protective covering, and should be avoided if possible. Although the preferred method of covering is outdoors, the covering is approved for installation indoors providing the safety precautions of paragraph G–3 are adhered to.

j. For planning purposes, one AH–64 will require approximately 200 ft. of 14 ft. wide heat shrink film. Three rolls of heat shrink rape, 1/2 roll of cushioning material, five plastic vents, eight pounds of propane, and 300 ft. of polyester strapping.

k. The optimum number of personnel for the covering procedure is three per aircraft. One helicopter will require 3 people approximately 7 hours to cover. With experience, elapsed time can be reduced to approximately 5 hours. Adverse weather conditions and/or dirty (oily) helicopters will increase the optimum number. It is highly recommended that personnel become thoroughly familiar with the heat shrink process prior to working on a helicopter. This can be accomplished by applying the general procedure to available objects such as boxes or crates for practice.

G–3 SAFETY:

The below minimum safety procedures will be followed to insure a safe heat shrink operation.

a. Comply with all safety procedures outlined in applicable chapters three or four of this manual.

b. Ground the helicopter in accordance with TM 1-1520-238-23.

c. Insure that fuel tank levels are properly adjusted for shipping (maximum 3/4 capacity or 150 gallons per tank, whichever is less). Seal fuel filler ports, vents, drains, and battery vents prior to covering the aircraft.

d. Provide fire truck and adequate fire fighting equipment on site and ready for use prior to operating the heat cannon.

e. Insure that the helicopter exterior and the adjacent area is free of fuel and other combustibles prior to operating the heat cannon.

f. The helicopter will be covered outdoors if environmental conditions permit. The covering procedures may be accomplished in a hangar if the following additional procedures are adhered to:

(1) The area must be well ventilated.

(2) No other aircraft will be within 50 feet of the helicopter being covered.

(3) No other maintenance operations will be permitted in the hangar while the helicopter is being covered.

WARNING

Prior to the operation of the heat cannon, the helicopter and adjacent areas will be tested with an M–6 combustible gas indicator set (or equivalent) for combustible vapors. The areas to be tested on the helicopter are the fuel filler, drain, and vent ports, the battery vents, the stub wing area, and the engine compartments. If the indicator shows an unsafe condition, do not attempt to apply heat shrink film.

g. Prior to the operation of the heat cannon, the helicopter and adjacent areas will be tested with an M–6 combustible gas indicator set (or equivalent) for combustible vapors. The areas to be tested on the helicopter are the fuel filler, drain, and vent ports, the battery vents, the stub wing area, and the engine compartments. If the indicator shows an unsafe condition, do not attempt to apply heat shrink film.

h. Aircraft will be inspected for fuel leaks prior to covering. No attempt will be made to cover aircraft that are known to have or suspected of having fuel leaks.

i. Covering on the helicopter will be applied so that large pieces of film are centered on fuel filler ports, vents, and drains so that no joining seams are formed near potential fuel fume sources. Fuel filler ports, vents, and drains should be padded with cushioning material to further protect from heat.

j. After the covering and shrinking process is complete, the film will be cut to allow removal of the tape seals applied to fuel vents. Heat shrink tape will be used to re–seal heat shrink film.

k. Leather safety gloves will be worn while using the heat cannon.

l. Table G–2, safety checksheet, will be completed prior to the use of the heat cannon. The completed checksheet will be attached to DA Form 2408-13.

Table G–2. Safety Checksheet

Item	Item Description	Mech	Insp
1.	Ground helicopter. TM 1-1520-238-23		
2.	Perform helicopter safety check. TM 1-1520-238-23		
3.	Deactivate armament–M230 guns must be cleared and visually checked. TM 9-1090-208-23-1		
4.	Fire truck/fire fighting equipment ready for use.TM 55-1520-238-S		
5.	Adjust fuel levels. TM 55-1520-238-S		
6.	Remove Hellfire launchers. TM 9-1427-475-20		
6.1.	Remove rocket launchers. TM 9-1055-460-13&P		
7.	Perform test with M–6 combustible gas indicator. TM 55-1520-238-S		
8.	Cover fuel access, vent and drain areas. TM 55-1520-238-S		
9.	Working area well ventilated. TM 55-1520-238-S		
	After Covering Is Completed		
10.	Inspect covering seams for complete bonding. TM 55-1520-238-S.		
11.	Tape and film seal removed from fuel vent areas. TM 55-1520-238-S		
12.	Make handling instructions entry on DD Form 1387–2 “FUEL IN TANKS”. Attach form to helicopter. TM 55-1520-238-S		

G–4 HELICOPTER PREPARATION:

CAUTION

Composite main rotor and tail rotor blades, rubber and plastic surfaces, the TADS/PNVS unit, and the canopy are heat sensitive. These surfaces must be completely covered with cushioning material to provide insulation to prevent serious damage to the helicopter.

Insure that the helicopter is prepared for shipment in accordance with Chapter 3 or 4 of this manual as applicable.

a. Stabilator. Insure that stabilator is at zero degrees.

b. Static Wicks. Loosen static wicks on the trailing edge of the stabilator and wings and rotate them forward for protection. Reinstall screw.

c. Aircraft Cleaning. Wash aircraft in accordance with this manual. This is necessary to remove corrosive substances such as dirt, bugs and exhaust residue. It will make the task of helicopter preparation much easier by providing an oil free surface for the adhesion of tape. A dirty aircraft will take more time to cover.

d. Flyaway Equipment. Install flyaway equipment, except canopy cover, M230 gun and turret cover, and main rotor aperture cover. Install in accordance withTM 1-1520-238-23.

e. Protect Glass and Canopy. Install foam cushioning material over glass and canopy surfaces to prevent scratching and protect them from heat. Secure padding with heat shrink tape using care not to apply tape to glass or plexiglass areas.

f. Seal Vents. Locate all fuel filler ports, drains, and vents, (including auxiliary power unit) and battery vents. Seal with heat shrink tape and film. These areas must remain sealed throughout the heat shrink process. All but the fuel vents may remain sealed after the covering process is completed.

g. Preparation of Sharp Edges, Protrusions, and Heat Sensitive Areas. Pad all protrusions and sharp edges with tape or cushioning material to prevent damage to film during the shrinking process and prevent high stress points on the film after shrinking.

(1) Heat shrink tape may be used to protect the film from sharp edges such as the trailing edge of the stabilator. For best results apply 2 inch wide tape along the bottom edge so that approximately 1/2 inch adheres to the bottom surface. Fold the tape over so that approximately 1/2 inch adheres to the top surfaces. Tape alone may be used to protect the film from many protrusions such as flow fences, hinges, louvers, and wing nuts.

(2) Cushioning Material is used to pad protrusions and provide insulation from the heat of the film application process. Cushioning material may be held in place with shrink tape and/or 1/2 inch strapping.

NOTE

Examples below are not intended to be all inclusive.

(a) Examples of techniques using cushioning primarily for protection are:

1. Wrapping material around the main rotor control tubes.
2. Individually wrapping main rotor blade grips.
3. Padding over top of main rotor head.
4. Padding for turret.
5. Padding around cannon barrel.
6. Padding around upper main landing gear strut and mount.
7. Padding around pitot tube.

(b) Examples of techniques using cushioning material for both protection and insulation from heat are:

1. Complete padding of TADS/PNVS unit.
2. Complete padding of tail rotor blades.
3. Padding of windshield wipers.
4. Padding of antennae.
5. Padding of fuel filler ports, vents and drains.

G–5 APPLICATION OF FILM:

WARNING

Insure that adequate maintenance stands are available and all personnel are thoroughly familiar with no step areas prior to covering the helicopter.

NOTE

- Because the film is subject to damage from handling on rough surfaces it is recommended that a piece of film approximately 14’ x 30’ be cut and secured to the ground as a measuring and cutting work surface.
- Insure that the provisions of Appendix F, Quarantine Inspection, and customs clearance is obtained for the aircraft prior to the application of heat shrink protective film.

a. Shrink Film Characteristics. The shrink film is provided in a bulk roll. It is a white, opaque, 7 mil thick, polyethylene that contains an ultra–violet inhibitor. The white color is used to reflect the sun to maintain a lower inside temperature. When heated to approximately 325 degrees F, the film becomes soft. When the heat is removed the film will shrink about 25% of its original size. The melting temperature of the film is only slightly higher than the shrinking temperature.

b. Heat Cannon Characteristics. The heat cannon operates on bottled propane. It produces an even flame with a temperature of 750 degrees F approximately 12 inches from the cannon. The heat cannon has safety features designed to automatically shut off the flame if it is dropped. The open flame is safe for use on aircraft when the procedures of this appendix are strictly adhered to.

c. After the aircraft has been prepared as in paragraph G–4 above, it is ready for the application of the film. The film cover is created by first visually dividing the helicopter into sections. Film sections are cut from the bulk roll with a safety knife to piece together a complete cover. The pieces are held together with heat shrink tape until they are fused together. There is no hard and fast procedure for this phase of the process. The following is a workable procedure:

(1) Determine sections such as small protrusions, antenna, main rotor controls, and cannon that need to be covered separately. They should be wrapped with sufficient excess material to allow later fusing

to each other and larger pieces as required. Landing gear struts should be covered with sufficient material to allow for strut extension if the helicopter is hoisted (film on landing gear struts will not be shrunk).

(2) The larger sections to be wrapped include the vertical stabilizer, the stabilator, and the fuselage.

(a) The vertical stabilizer can be wrapped with a piece of film measuring 12' x 14'.

(b) The horizontal stabilizer requires a section of film 12' x 14'.

(c) The fuselage at the base of the vertical stabilizer requires a piece 8–1/2' x 10–1/2'.

(d) The remainder of the fuselage can be sectionalized by using the width of the bulk film and cutting it to a length equivalent to the helicopter circumference for the section (plus overlap). For example, with 14 foot wide film:

1. section from the vertical stabilizer forward to the engines requires a piece 14' x 15–1/2'.
2. next section, over the top of the engines, requires a piece of film 14' x 31'.
3. section from the front of the engines forward requires a piece of film 14' x 26–1/2'.
4. final section, covering the nose, requires a piece of film measuring 14' x 14'.

(3) Large void areas in the film covering are to be avoided. This can be done by using polyester strapping. For example voids beneath the engine areas can be minimized by wrapping each engine nacelle, lengthwise, and tying strapping snug. Also to prevent voids, slits may be cut in large pieces of covering to allow previously covered small protrusions to stick through. These protrusions such as steps, hand–holds, and antennae will be fused as in paragraph G–5d below.

d. Fusing Film Pieces Together.

(1) After the helicopter has been completely covered, all seams and pieces must be fused together before the film is shrunk. Where two pieces come together to form a horizontal seam, the top piece should overlap the bottom to prevent the possibility of water entrapment.

WARNING

Prior to operation the heat cannon, insure that all requirements of paragraph have been complied with.

CAUTION

To prevent water leakage at seams insure seams are completely bonded.

(2) To fuse two pieces together to form a seam, pull the pieces together to form a snug fit around the area being covered. A minimum overlap of 6 inches is required for fusing. Hold pieces in place with heat shrink tape. Heat the area to be fused by first shooting the flame between the top and bottom layers to be fused and then holding the heat cannon 8 to 12 inches from the seam and moving the head along the seam. As the film becomes soft, pat the seam gently with a safety gloved hand (the film is HOT).

(3) Repeat this process until all seams are fused.

(4) After film is cooled, test seams for proper bonding by trying to pull seam apart with fingernails. If seam comes loose, reseal it.

e. Shrinking Film.

NOTE

To allow strut extension during loading, do not not shrink film on landing gear.

(1) After all the seams have been fused and the helicopter has been completely enclosed in film, the shrinking process should be accomplished. To shrink the film, hold the heat gun 8 to 12 inches from the surface and move the gun evenly along the surface. Apply just enough heat to soften the film. After the heat is removed, the film will shrink to a glove tight fit.

(2) If a hole is inadvertently burned through, it may be easily repaired by fusing a piece of film to the damaged area and/or repairing with heat shrink tape.

f. Inspection. When the shrinking process is completed and allowed to set for approximately 30 minutes, inspect the helicopter covering to determine if any areas require further shrinking. Insure that all seams are completely fused and that no holes are present. Repairs may be made as required by applying the procedure in paragraph G–5e above. Insure good seals around landing gear struts and other procedures.

G–6 FUEL VENTS:

WARNING

Do not attempt to patch, shrink, or fuse the heat shrink material with the heat cannon after fuel vents have been unsealed.

CAUTION

Adequate ventilation of the cover is essential to minimize condensation and permit drainage.

After the inspection of the covering has been completed and the covering has been found satisfactory, the fuel vents must be unsealed. Cut a small slit in the area of the vent and remove the seal. Repair the cut with tape. Repeat this process for each fuel vent.

G–7 INSTALLATION OF VENTILATORS:

After the inspection of the covering has been completed, the covering must be ventilated. Ventilators are to be placed to allow a flow of air through the covering. Each aircraft will require approximately five ventilators. They should be placed to allow air to flow through the helicopter. At least one vent will be required at each low point on the helicopter to drain condensation. The vents are applied by peeling the backing off the adhesive surface and pressing the vent to the shrink film. The vent cover is then removed and the center hole is cut in the shrink film. The vent cover is then replaced and secured with tape.

G–8 ACCESS TO HELICOPTER:

After the shrink film process has been completed, access to the cockpit area may be required for the operation of the brakes. If access is required, cut the shrink film in the outline of the door on three sides. Fold the film out of the way and open the door. After the operation is complete, the cover can be resealed with heat shrink film and/or tape. Insure that a good seal has been accomplished.

G–9 HOISTING:

If the helicopter is being hoisted on a vessel or truck, the heat shrink film will be cut at the rotor head area where the sling is installed. After the hoisting task is complete, the cut film may be closed with two inch heat shrink tape and/or a piece of heat shrink film taped to the cover to seal the rotor head area.

G–10 TIEDOWN POINTS:

Tiedown points, two forward fuselage and one station 450, will protrude through the heat shrink film. After loading aircraft, restrain it in accordance with either Chapter 3 or 4 of this manual as appropriate.

G–11 PROTECTION OF WHEELS AND BRAKES (TOP DECK OF VESSEL):

After the aircraft is secured, the wheel and brake areas may be protected by securing heat shrink film tightly around them with heat shrink tape. Do not attempt to shrink the film.

G–12 ENROUTE MAINTENANCE:

Shrink covers should be checked daily by designated escort personnel and/or vessel crew for damage. Damaged areas may be repaired by patching the shrink film using two inch heat shrink tape. Main landing gear struts will be inspected daily for proper inflation and serviced as necessary. Cuts made to access the struts may be repaired with 2” heat shrink tape.

G–13 REMOVAL OF SHRINK FILM:

To remove the shrink film, use the safety knife and cut along the top and side surfaces. The shrink film does not adhere to the helicopter and will fall away.

CAUTION

Use only the safety knife when removing the film. A standard knife blade will damage the helicopter.

a. All film and cushioning material will be removed prior to depreservation.

b. Recycling of the used shrink film can be established through the Defense Reutilization and Marketing Service DLA.

G–14 DEPRESERVATION:

Depreserve helicopter in accordance with this manual.

APPENDIX H
REPAIR PARTS AND SPECIAL TOOLS LIST

Section I. INTRODUCTION

H–1 GENERAL.

This Repair Parts and Special Tools List (RPSTL) consists of a list of special tools and other special support equipment used in the performance of shipping–related operations.

H–2 EXPLANATION OF COLUMNS.

a. Illustration (Column 1). This column is divided as follows:

(1) FIG NO. (Figure Number). Indicates the figure number illustrating a view of a functional (spare parts) group, special tool, or equipment item. 'Group' numbers used on illustration titles are the same as those used in the related Maintenance Repair Parts and Special Tools List, TM 1-1520-238-23P.

(2) ITEM NO. (Item Number). Indicates the number used to identify items called out in the illustration.

b. SMR CODE (Column 2). The Source, Maintenance, and Recoverability (SMR) code is a five–position code containing supply/requisitioning information, maintenance category authorization criteria, and disposition instruction. Refer to TM 1-1520-238-23P for explanation, application, and definitions of SMR codes.

c. National Stock Number (Column 3). Lists the National stock number (NSN) assigned to the item. Use the NSN for requests/requisitions.

d. CAGE (Column 4). The Company Activity Government Entity (CAGE) is a five–digit numeric code which is used to identify the manufacturer, distributor, or Government agency, etc., that supplies the item.

e. Part Number (Column 5). Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications standards, and inspection requirements to identify an item or range of items.

NOTE

When you use an NSN to requisition an item, the item you receive may have a different part number from the part ordered. You may use or furnish it as the replacement part.

f. Description (Column 6). This column includes the following information:

(1) The Federal item name and, when required, a minimum description to identify the item.

(2) Physical security classification not applicable.

(3) Items that are included in kits and sets are listed below the name of the kit or set.

(4) When the part to be used differs between serial numbers of the same model, the effective serial numbers are shown as the last line of the description.

(5) The usable on code is not applicable.

g. U/M (Column 7). The Unit of Measure (U/M) indicates the measure (e.g., foot, gallon, pound) or count (e.g., each, dozen, gross) of a listed item. A two character alpha code (e.g., FT, GL, LB, EA, DZ, GR) appears in this column to indicate the measure or count. If the U/M code appearing in this column differs from the Unit of Issue (U/I) code listed in the Army Master Data File (AMDF), request the lowest U/I that will satisfy your needs.

h. QTY INC IN UNIT (Column 8). The Quantity Incorporated in Unit (QTY INC IN UNIT) indicates the quantity of the item used in the breakout shown on the illustration figure. A 'V' appearing in this column in lieu of a quantity indicates that no specific quantity is applicable (e.g., shims, spacers).

H–3 SPECIAL INFORMATION.

Detail assembly instructions for items source coded to be assembled from component spare/repair parts are found in TM 1-1520-238-23.

H–4 HOW TO LOCATE PARTS.

a. First. Find the figure covering the group to which the item belongs.

b. Second. Identify the item on the figure and note the item number of the item.

c. Third. Refer to the Repair Parts Lists for the figure to find the line entry for the item number noted on the figure.

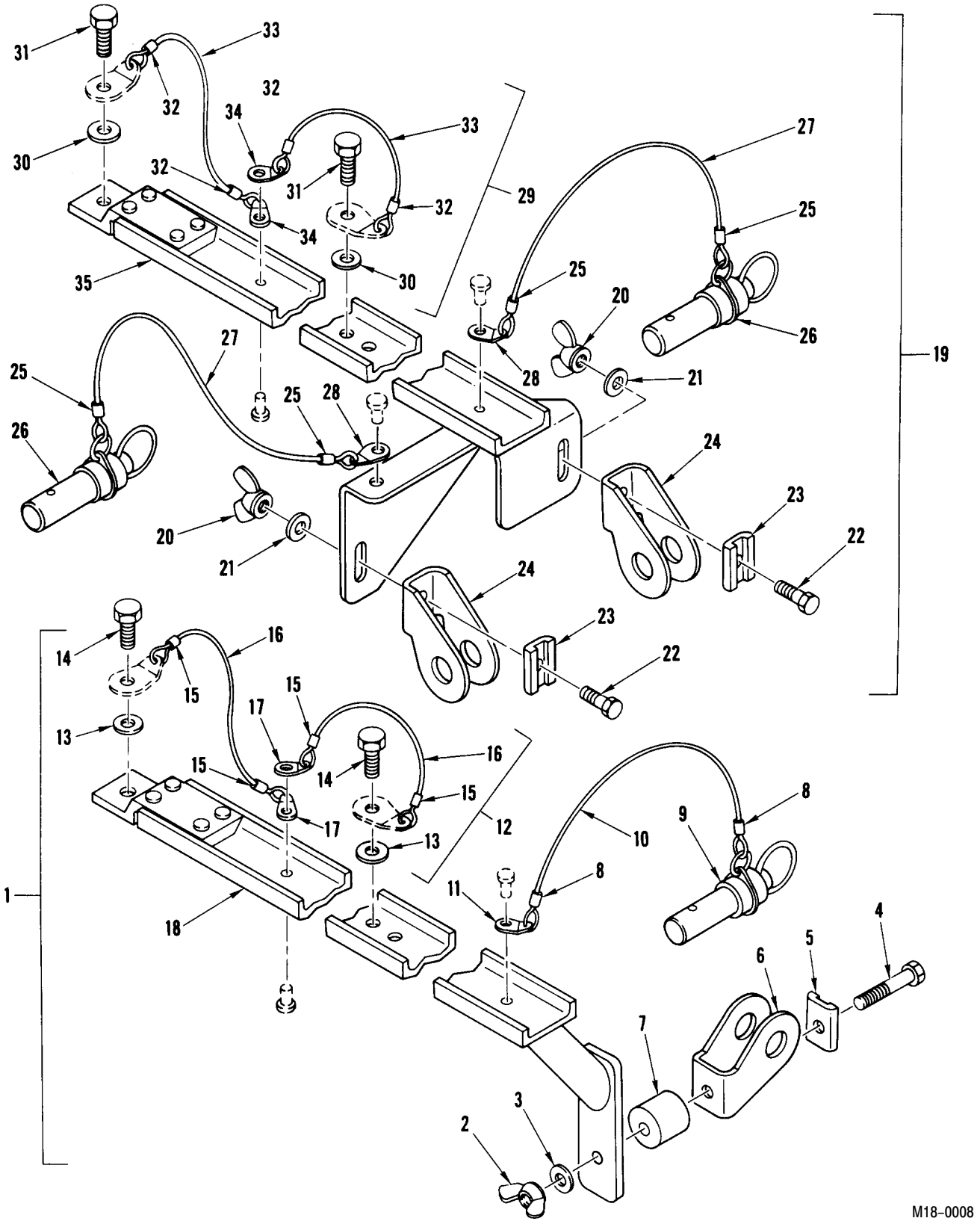
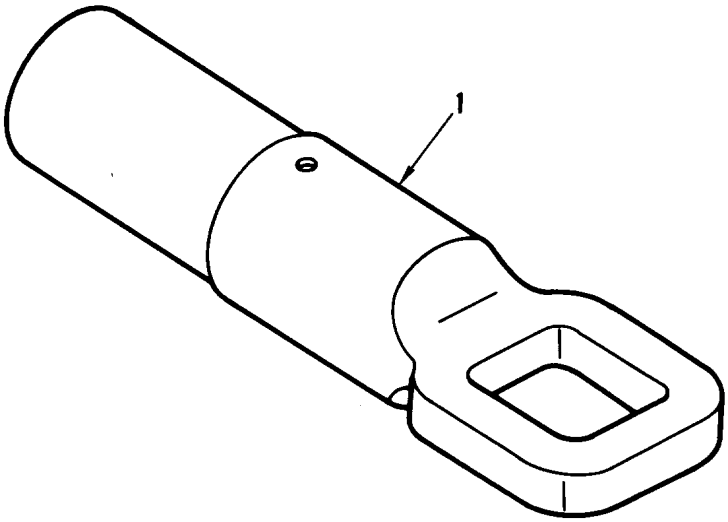


Figure H–1. GROUP 80 SPECIAL TOOLS
ACTUATOR SUPPORT SET

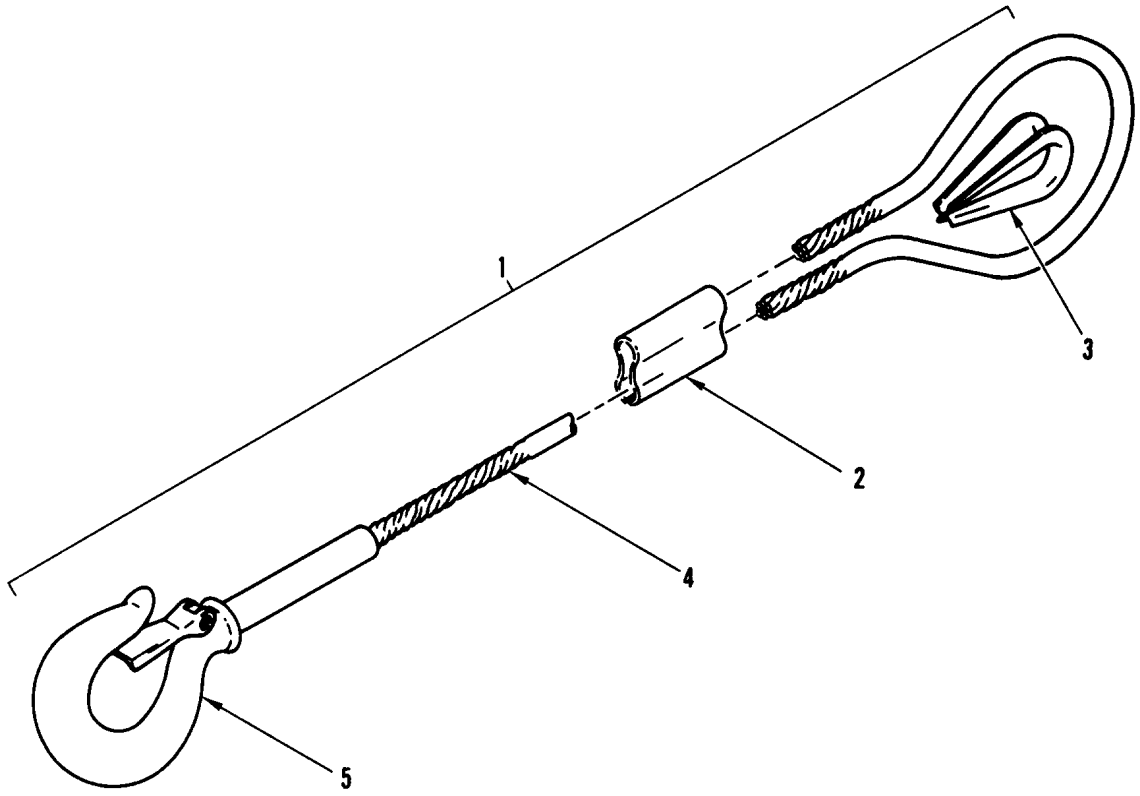
(1) ILLUSTRATION		(2)	(3)	(4)	(5)	(6)	(7)	(8)
(A) FIG NO.	(B) ITEM NO.	SMR CODE	NATIONAL STOCK NUMBER	CAGE	PART NUMBER	DESCRIPTION USABLE ON CODE	U/M	QTY INC IN UNIT
						GROUP 80 SPECIAL TOOLS ACTUATOR SUPPORT SET		
H1	1		1740–01–220–8490	02731	7–367310021–35	SUPPORT ASSY, ACTUATOR	EA	1
H1	2		5310–01–100–5199	96906	MS35426–27	• NUT, WING	EA	1
H1	3		5310–00–531–9515	88044	AN960C416	• WASHER, FLAT	EA	1
H1	4		5306–00–702–9637	80205	NAS1304–21	• BOLT, MACHINE	EA	1
H1	5		8145–01–276–0540	02731	7–367310021–21	• GUIDE	EA	1
H1	6		8145–01–276–0539	02731	7–367310021–9	• SUPPORT	EA	1
H1	7			02731	7–367310021–47	• SPACER	EA	1
H1	8		4030–01–088–2952	96906	MS51844–62	• SLEEVE, SWAGING	EA	2
H1	9		5340–01–228–3366	96906	MS17990C1213	• PIN, LOCK	EA	1
H1	10		4010–01–176–7016	02731	HS4494–4900	• LANYARD	EA	1
H1	11			02731	7–367310021–27	• TAB	EA	1
H1	12		1740–01–220–8489	02731	7–367310021–25	• LANYARD ASSY, BOLT	EA	2
H1	13		5365–00–850–9719	96906	MS16634–4037	• • RING, RETAINING	EA	1
H1	14		5306–01–H76–3735	02731	7-367310028	• • BOLT, MACHINE	EA	1
H1	15		4030–01–088–2952	96906	MS51844–62	• • SLEEVE, SWAGING	EA	2
H1	16		4010–01–176–7016	02731	HS4494–4900	• • LANYARD	EA	1
H1	17			02731	7–367310021–27	• • TAB	EA	2
H1	18			02731	7–367310021–49	• SUPPORT, ACTUATOR	EA	1
H1	19		1740–01–242–1266	02731	7–367310021–37	SUPPORT ASSY, ACTUATOR	EA	1
H1	20		5310–01–100–5199	96906	MS35426–27	• NUT, WING	EA	2
H1	21		5310–00–531–9515	88044	AN960C416	• WASHER, FLAT	EA	2
H1	22		5306–00–702–3998	80205	NAS1304–5	• BOLT, MACHINE	EA	2
H1	23			02731	7–0367310021–21	• GUIDE	EA	2
H1	24			02731	7–367310021–9	• SUPPORT	EA	2
H1	25		4030–01–088–2952	96906	MS51844–62	• SLEEVE, SWAGING	EA	4
H1	26		5340–01–228–3366	96906	MS17990C1213	• PIN, LOCK	EA	2
H1	27		4010–01–179–0846	02731	HS4494–4600	• LANYARD	EA	2
H1	28			02731	7–367310021–27	• TAB	EA	2
H1	29		1740–01–220–8489	02731	7–367310021–25	• LANYARD, BOLT	EA	2
H1	30		5365–00–850–9719	96906	MS16634–4037	• • RING, RETAINING	EA	1
H1	31		5306–01–H76–3751	02731	7–367310028	• • BOLT, MACHINE	EA	1
H1	32		4030–01–088–2952	96906	MS51844–62	• • SLEEVE, SWAGING	EA	2
H1	33		4010–01–176–7016	96906	HS4494–4900	• • LANYARD	EA	1
H1	34			02731	7–367310021–27	• • TAB	EA	2
H1	35			02731	7–367310021–51	• SUPPORT, ACTUATOR	EA	1
						END OF FIGURE		



M18-0012

Figure H–2. GROUP 80 SPECIAL TOOLS
FORWARD FUSELAGE TIEDOWN FITTING

(1) ILLUSTRATION		(2)	(3)	(4)	(5)	(6)	(7)	(8)
(A) FIG NO.	(B) ITEM NO.	SMR CODE	NATIONAL STOCK NUMBER	CAGE	PART NUMBER	DESCRIPTION USABLE ON CODE	U/M	QTY INC IN UNIT
						GROUP 80 SPECIAL TOOLS FORWARD FUSELAGE TIEDOWN FITTING		
H2	1		1740–01–242–7265		7–267310009	FITTING, TIEDOWN, FORWARD FUSELAGE	EA	1
						END OF FIGURE		



M18-0013

Figure H–3. GROUP 80 SPECIAL TOOLS
FORWARD WINCHING ADAPTER CABLE

(1) ILLUSTRATION		(2)	(3)	(4)	(5)	(6)	(7)	(8)
(A) FIG NO.	(B) ITEM NO.	SMR CODE	NATIONAL STOCK NUMBER	CAGE	PART NUMBER	DESCRIPTION USABLE ON CODE	U/M	QTY INC IN UNIT
						GROUP 80 SPECIAL TOOLS FORWARD WINCHING ADAPTER CABLE		
H3	1		1740–01–221–3327	02731	7–367310008	CABLE, FORWARD WINCHING ADAPTER	EA	1
H3	2			96906	MS51844–91	• SLEEVE, SWAGING	EA	1
H3	3			88044	AN100G14	• THIMBLE, WIRE ROPE	EA	1
H3	4			02731	7–367310008–3	• CABLE, WIRE ROPE	EA	1
H3	5			37581	SA151–14	• HOOK, SAFETY	EA	1
						END OF FIGURE		

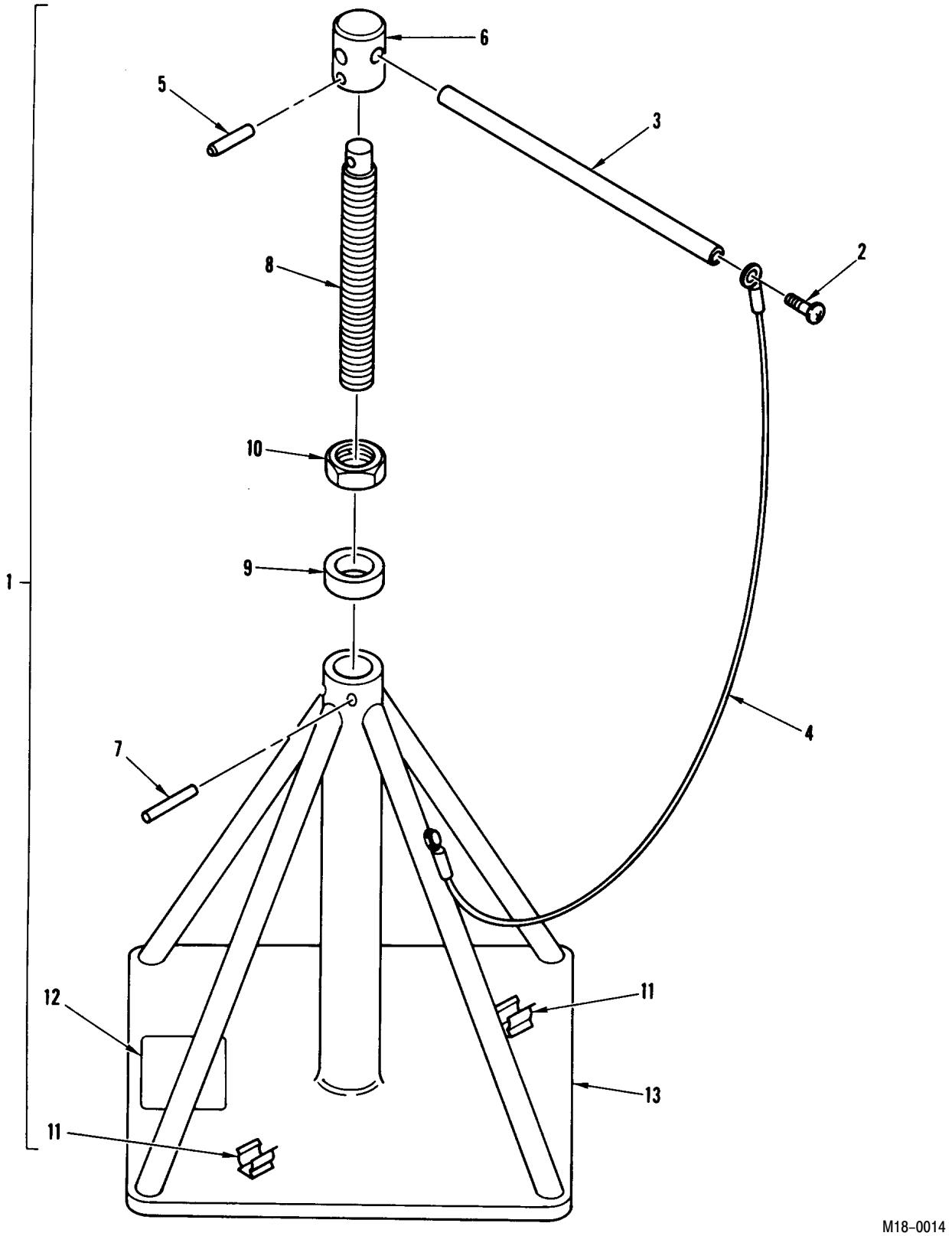


Figure H–4. GROUP 80 SPECIAL TOOLS
FUSELAGE STATION 450 SUPPORT

(1) ILLUSTRATION		(2)	(3)	(4)	(5)	(6)	(7)	(8)
(A) FIG NO.	(B) ITEM NO.	SMR CODE	NATIONAL STOCK NUMBER	CAGE	PART NUMBER	DESCRIPTION USABLE ON CODE	U/M	QTY INC IN UNIT
						GROUP 80 SPECIAL TOOLS FUSELAGE STATION 450 SUPPORT		
H4	1		1740–01–220–8039	02731	7–367310005–601	JACK STAND ASSY, FUSELAGE STATION 450 SUPPORT	EA	1
H4	2		5305–00–059–3659	96906	MS51958–3	• SCREW	EA	1
H4	3		1740–01–249–1942	02731	7–367311039–3	• HANDLE	EA	1
H4	4		1740–01–221–2935	02731	HS5198–6024	• LANYARD	EA	1
H4	5		5315–00–812–7767	80205	NAS561P8–24	• ROLLPIN	EA	1
H4	6		1740–01–220–8044	02731	7–367311040	• BEARING, JACK PAD	EA	1
H4	7			80205	NAS561P6–16	• ROLLPIN	EA	2
H4	8		1740–01–220–8040	02731	7–367311036	• SCREW, ACME	EA	1
H4	9		1740–01–220–8042	02731	7–367311038	• NUT, ACME	EA	1
H4	10		1740–01–220–8041	02731	7–367311037	• NUT, JAM, ACME	EA	1
H4	11		5304–00–849–9606	80205	NAS1464–050–10C	• CLIP	EA	2
H4	12			02731	HS5216–1	• PLATE, IDENTIFICATION	EA	1
H4	13			02731	7–367311035	• STAND WELDMENT	EA	1
						END OF FIGURE		

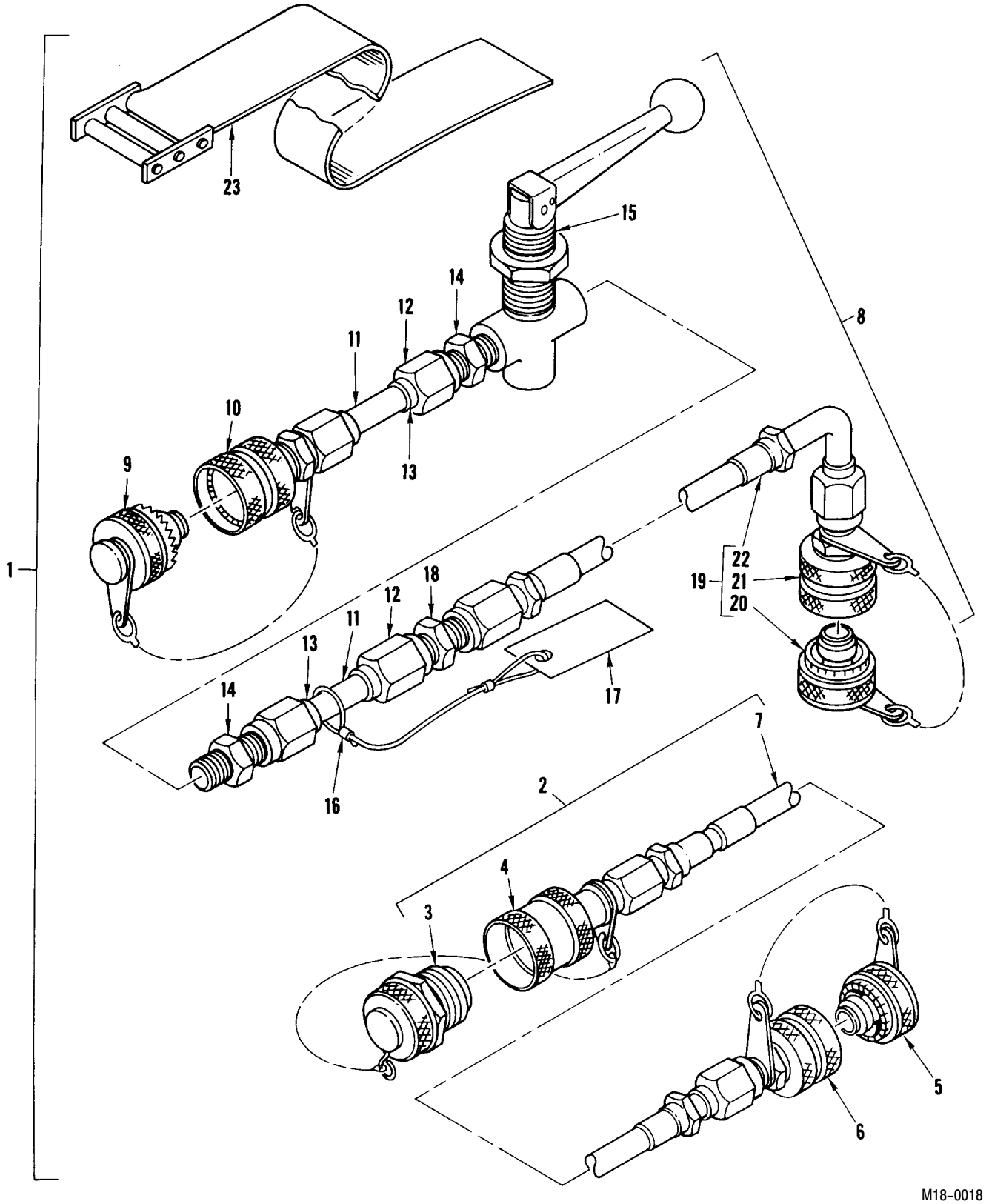
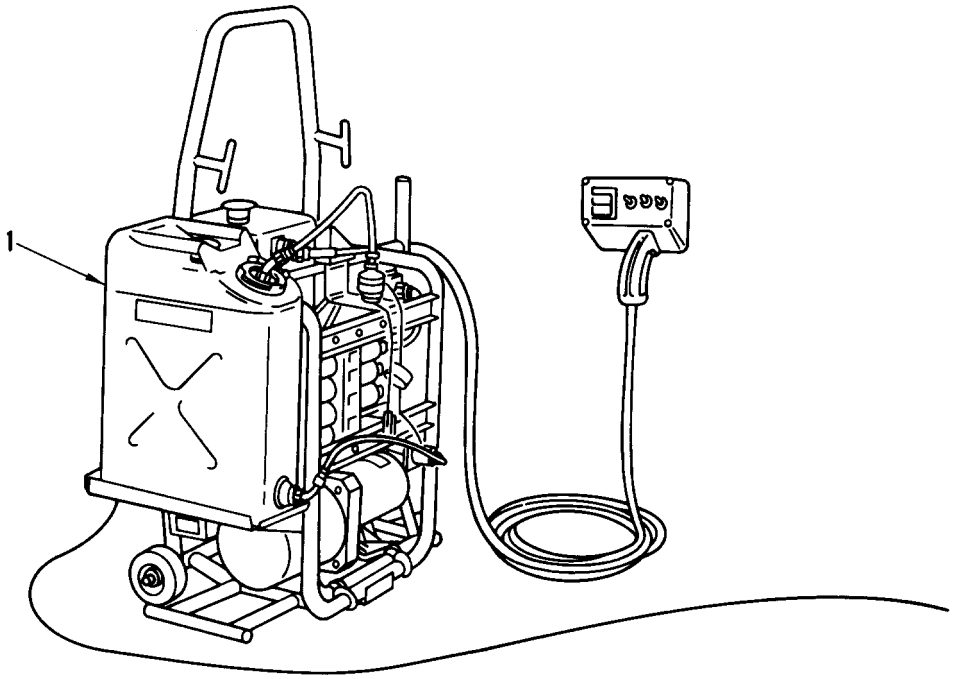


Figure H–5. GROUP 80 SPECIAL TOOLS
HYDRAULIC HOSE KIT

(1) ILLUSTRATION		(2)	(3)	(4)	(5)	(6)	(7)	(8)
(A) FIG NO.	(B) ITEM NO.	SMR CODE	NATIONAL STOCK NUMBER	CAGE	PART NUMBER	DESCRIPTION USABLE ON CODE	U/M	QTY INC IN UNIT
						GROUP 80 SPECIAL TOOLS HYDRAULIC HOSE KIT		
H5	1	PBOOO	1730–01–181–9275	02731	7–262100019–601	KIT, HYDRAULIC HOSES	EA	1
H5	2	XDOOO	4720–01–278–6925	02731	7–262110083	• HOSE ASSY, HYD	EA	2
H5	3	XDOZZ		02731	HS5244–0004	• • PLUG, DUST	EA	1
H5	4	XDOZZ	1560–01–249–3996	02731	HS5243–0304	• • COUPLER, QD	EA	1
H5	5	XDOZZ		02731	HS5197–0304	• • PLUG, DUST	EA	1
H5	6	XDOZZ	4730–01–179–4384	02731	HS4555–0004	• • NIPPLE, QUICK–DISCONNECT	EA	1
H5	7	XAOZZ		02731	HS4408AA4–4800	• • HOSE	EA	1
H5	8	XDOZZ		02731	7–262110084	• VALVE, SHUT–OFF	EA	4
H5	9	XDOZZ		02731	HS5197–0004	• • PLUG, DUST	EA	1
H5	10	XDOZZ		02731	HS4556–4	• • COUPLING ASSY	EA	1
H5	11	XDOZZ	4730–00–289–8619	02731	7–262110084–3	• • TUBING, EXT	EA	2
H5	12	PAOZZ	4730–00–919–4651	96906	MS21921–4J	• • NUT, TUBE COUPLING	EA	4
H5	13	PAOZZ	4730–00–289–8619	96906	MS21922–4	• • SLEEVE, CLINCH, TUBE	EA	4
H5	14	XDOZZ		02731	HS4508–4C4	• • ADAPTER, FLARELESS	EA	2
H5	15	XDOZZ		02731	HS5280–0004	• • VALVE, SHUT–OFF	EA	1
H5	16	XAOZZ	4030–01–088–2952	96906	MS51844–62	• • SLEEVE, SWAGING	EA	1
H5	17	XDOZZ	4730–00–702–5377	02731	HS5216–1	• • PLATE, IDENT	EA	1
H5	18	PAOZZ	4730–00–702–5377	90906	MS21902–4J	• • UNION, TUBE	EA	1
H5	19	XAOZZ		02731	7–262160038	• • HOSE, HYDRAULIC	EA	1
H5	20	XDOZZ		02731	HS5197–0004	• • • PLUG, DUST	EA	1
H5	21	XDOZZ	4730–01–179–4338	02731	HS4556–4	• • • COUPLING ASSY	EA	1
H5	22	XDOZZ		02731	HS4408AC4–1200	• • • HOSE ASSY, HYDRAULIC	EA	1
H5	23	XDOZZ		02731	7–362110088	• STRAP, HYDRAULIC	EA	1
						END OF FIGURE		



M18-0019

Figure H–6. GROUP 80 SPECIAL TOOLS
HYDRAULIC CART

(1) ILLUSTRATION		(2)	(3)	(4)	(5)	(6)	(7)	(8)
(A) FIG NO.	(B) ITEM NO.	SMR CODE	NATIONAL STOCK NUMBER	CAGE	PART NUMBER	DESCRIPTION USABLE ON CODE	U/M	QTY INC IN UNIT
						GROUP 80 SPECIAL TOOLS HYDRAULIC CART		
H6	1		1730–01–292–0972		0700–81650–041	CART, HYDRAULIC	EA	1
						END OF FIGURE		

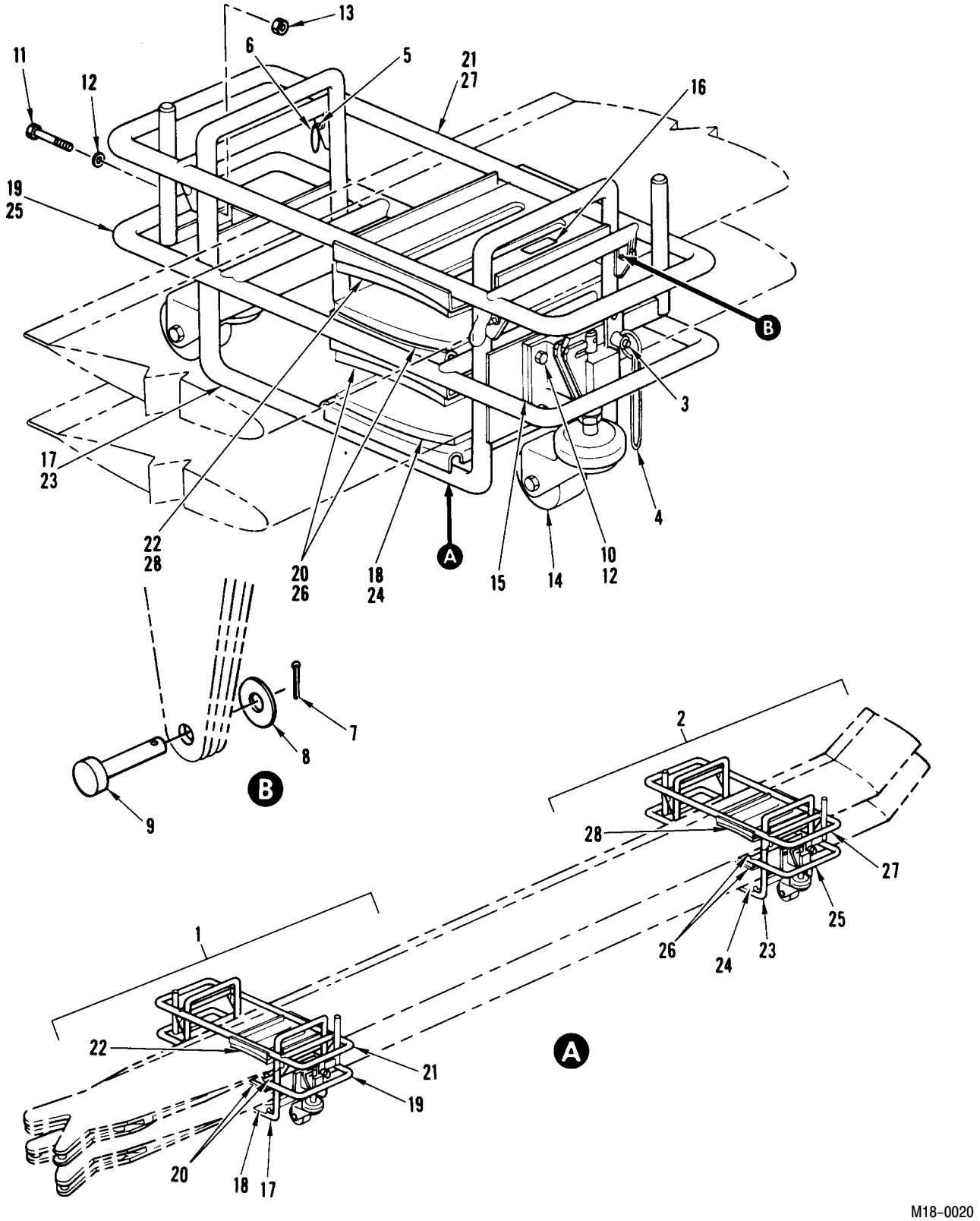
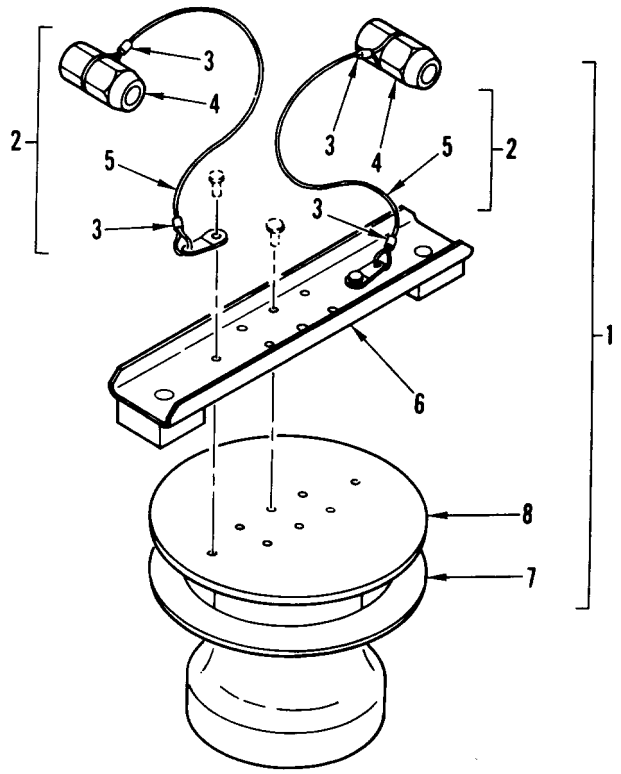


Figure H–7. GROUP 80 SPECIAL TOOLS
MAIN ROTOR BLADE RACK SET

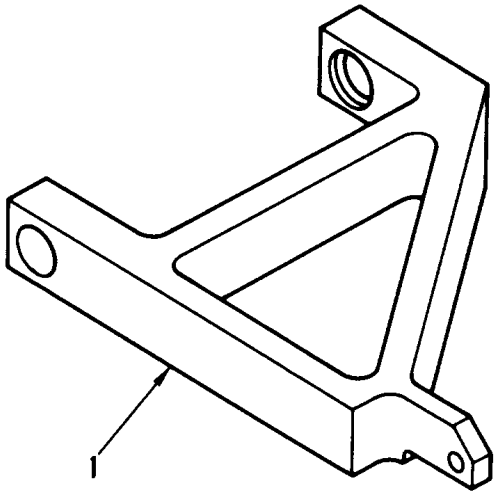
(1) ILLUSTRATION		(2)	(3)	(4)	(5)	(6)	(7)	(8)
(A) FIG NO.	(B) ITEM NO.	SMR CODE	NATIONAL STOCK NUMBER	CAGE	PART NUMBER	DESCRIPTION USABLE ON CODE	U/M	QTY INC IN UNIT
						GROUP 80 SPECIAL TOOLS MAIN ROTOR BLADE RACK SET		
H7	1		1740–01–221–3329	02731	7–267310002	RACK ASSY, MAIN ROTOR BLADE ROOT	EA	1
H7	2		1740–01–221–3333	02731	7–267310002–3	RACK ASSY, MAIN ROTOR BLADE TIP	EA	1
H7	3		5340–00–903–7880	96906	MS17987C308	• PIN, QUICK–RELEASE	EA	2
H7	4		4010–01–179–08467	02731	HS4494–4600	• LANYARD	EA	2
H7	5			80205	NAS1333S307D	• PIN, QUICK–RELEASE	EA	2
H7	6		4010–01–178–5011	02731	HS4494–4400	• LANYARD	EA	2
H7	7		5315–00–839–5820	96906	MS24665–134	• PIN, COTTER	EA	2
H7	8		5310–00–167–0752	88044	AN960D102	• WASHER, FLAT	EA	2
H7	9		5315–00–811–1233	96906	MS20392–2C25	• PIN, STRAIGHT, HEADED	EA	2
H7	10		5306–00–722–1788	80205	NAS1304–6	• BOLT, SHEAR	EA	4
H7	11		5306–00–616–6471	80205	NAS1304–10	• BOLT, SHEAR	EA	4
H7	12		5310–00–141–1795	88044	AN960–416	• WASHER, FLAT	EA	8
H7	13		5310–00–208–9283	96906	MS21044N4	• NUT, SELF–LOCKING	EA	8
H7	14		1740–01–221–9434	02731	7–367311–034	• CASTER	EA	2
H7	15			02731	7–267310002–83	• PLATE, CASTER	EA	2
H7	16		1740–01–220–8464	02731	7–267310006	• DECAL, IDENTIFICATION	EA	1
H7	17			02731	7–267310002–5	• RACK, BLADE ROOT, LWR (U/O 7–267310002)	EA	1
H7	18			02731	7–267310002–45	• PAD	EA	1
H7	19			02731	7–267310002–7	• RACK, BLADE ROOT, INTMD (U/O 7–267310002)	EA	1
H7	20			02731	7–267310002–45	• • PAD	EA	2
H7	21			02731	7–267310002–9	• RACK, BLADE ROOT, UPR (U/O 7–267310002)	EA	1
H7	22			02731	7–267310002–45	• PAD	EA	1
H7	23			02731	7–267310002–11	• RACK, BLADE ROOT, LWR (U/O 7–267310002–3)	EA	1
H7	24			02731	7–267310002–45	• • PAD	EA	1
H7	25			02731	7–267310002–13	• RACK, BLADE ROOT, INTMD (U/O 7–267310002–3)	EA	1
H7	26			02731	7–267310002–45	• • PAD	EA	2
H7	27			02731	7–267310002–15	• RACK, BLADE ROOT, UPR (U/O 7–267310002–3)	EA	1
H7	28			02731	7–267310002–45	• • PAD	EA	1
						END OF FIGURE		



M18-0022

Figure H–8. GROUP 80 SPECIAL TOOLS
MAIN TRANSMISSION SHIPPING COVER

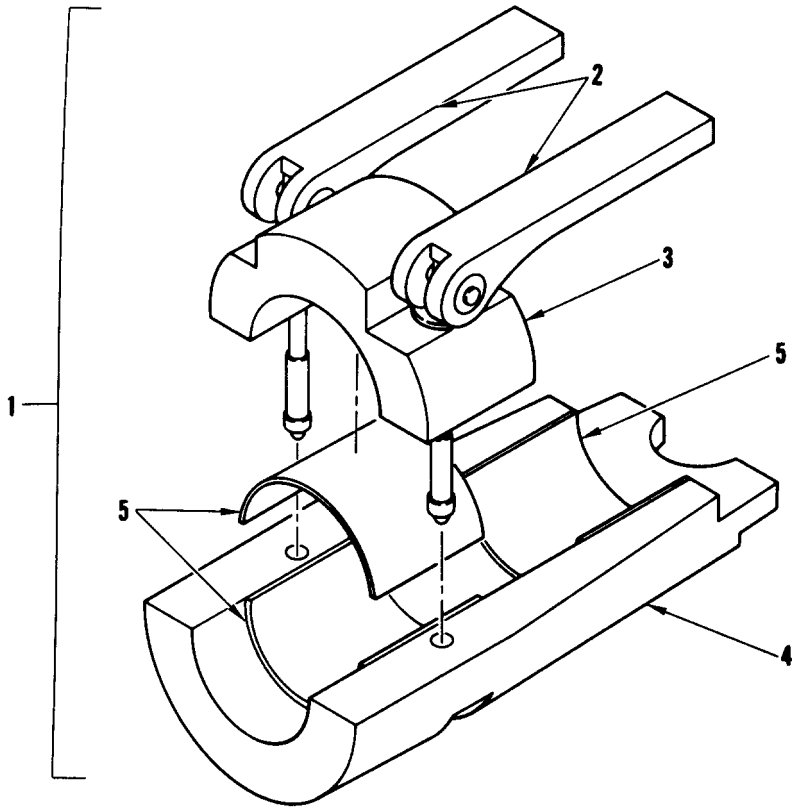
(1) ILLUSTRATION		(2)	(3)	(4)	(5)	(6)	(7)	(8)
(A) FIG NO.	(B) ITEM NO.	SMR CODE	NATIONAL STOCK NUMBER	CAGE	PART NUMBER	DESCRIPTION USABLE ON CODE	U/M	QTY INC IN UNIT
						GROUP 80 SPECIAL TOOLS MAIN TRANSMISSION COVER		
H8	1		1740–01–221–3331	02731	7–367310022	COVER ASSY, TRANSMISSION	EA	1
H8	2		1740–01–220–8469	02731	7–367310022–13	• RETAINER ASSY	EA	2
H8	3		4030–01–088–2952	96906	MS51844–62	• • SLEEVE, SWAGING	EA	2
H8	4		1740–01–220–8470	02731	7–367311027	• • RETAINER	EA	1
H8	5			02731	7–367311022	• • LANYARD ASSY	EA	1
H8	6			02731	7–367311022–3	• SUPPORT WELDMENT	EA	1
H8	7			02731	7–367311022–9	• GASKET	EA	1
H8	8			02731	7–367311026	• SHAFT	EA	1
						END OF FIGURE		



M18-0025

Figure H–9. GROUP 80 SPECIAL TOOLS
STABILATOR ACTUATOR SUPPORT

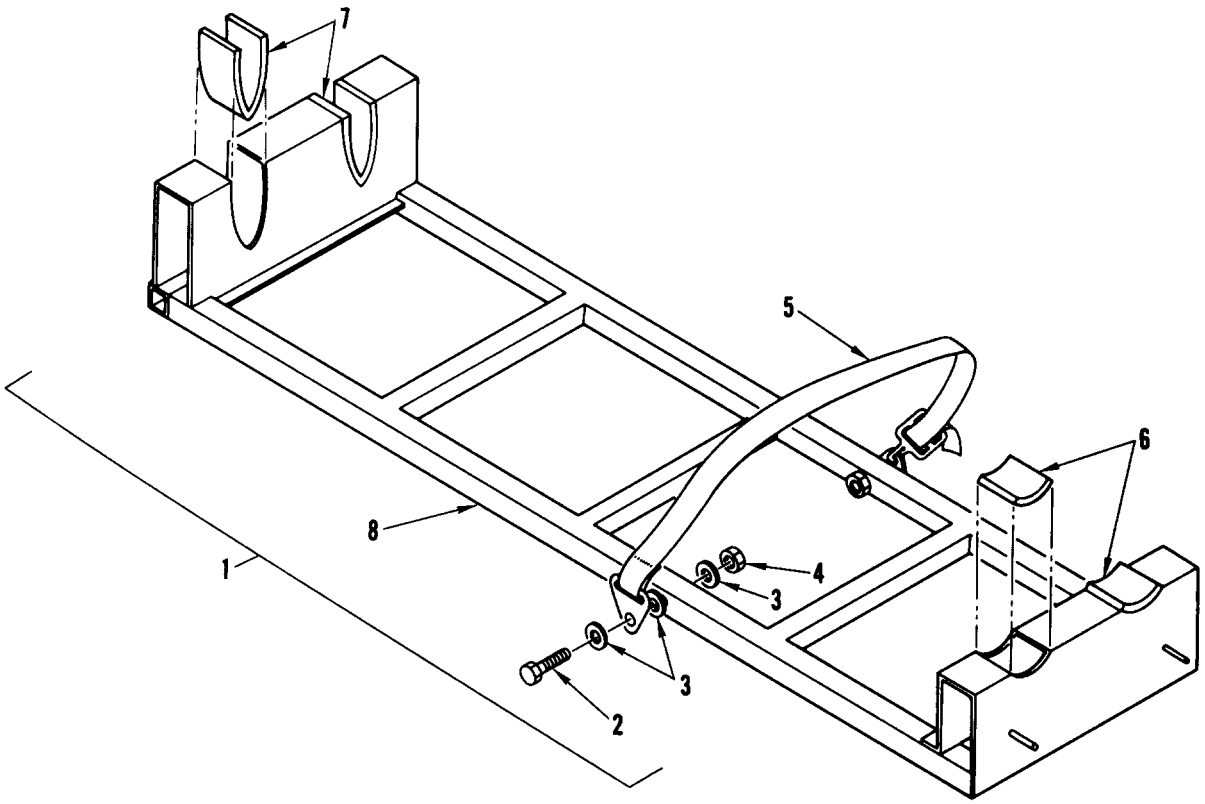
(1) ILLUSTRATION		(2)	(3)	(4)	(5)	(6)	(7)	(8)
(A) FIG NO.	(B) ITEM NO.	SMR CODE	NATIONAL STOCK NUMBER	CAGE	PART NUMBER	DESCRIPTION USABLE ON CODE	U/M	QTY INC IN UNIT
						GROUP 80 SPECIAL TOOLS STABILATOR ACTUATOR SUPPORT		
H9	1		1740–01–222–5256	02731	7–367310021–3	SUPPORT, STABILATOR ACTUATOR END OF FIGURE	EA	1



M18-0026

Figure H–10. GROUP 80 SPECIAL TOOLS
TAIL LANDING GEAR STRUT LOCK

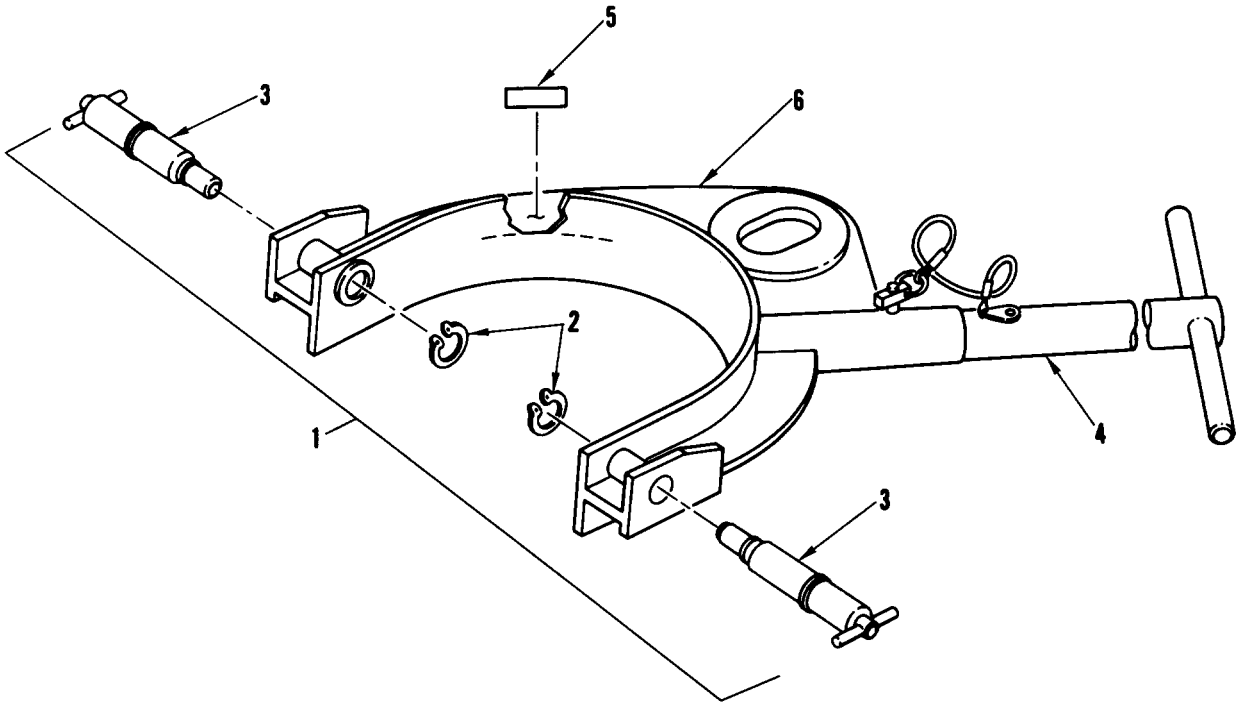
(1) ILLUSTRATION		(2)	(3)	(4)	(5)	(6)	(7)	(8)
(A) FIG NO.	(B) ITEM NO.	SMR CODE	NATIONAL STOCK NUMBER	CAGE	PART NUMBER	DESCRIPTION USABLE ON CODE	U/M	QTY INC IN UNIT
						GROUP 80 SPECIAL TOOLS TAIL LANDING GEAR STRUT LOCK		
H10	1		1740–01–220–8464	02731	7–267310006	LOCK ASSY, TAIL GEAR SHOCK STRUT	EA	1
H10	2		5315–01–224–2509	02731	HS5030–0001	• PIN, EXPANDABLE	EA	2
H10	3		1740–01–220–8466	02731	7–267310006–5	• COLLAR	EA	1
H10	4		1740–01–220–8465	02731	7–267310006–3	• LOCK	EA	1
H10	5			02731	7–267310006–7	• PAD, RUBBER	EA	3
						END OF FIGURE		



M18-0027

Figure H–11. GROUP 80 SPECIAL TOOLS
TAIL ROTOR BLADE SUPPORT

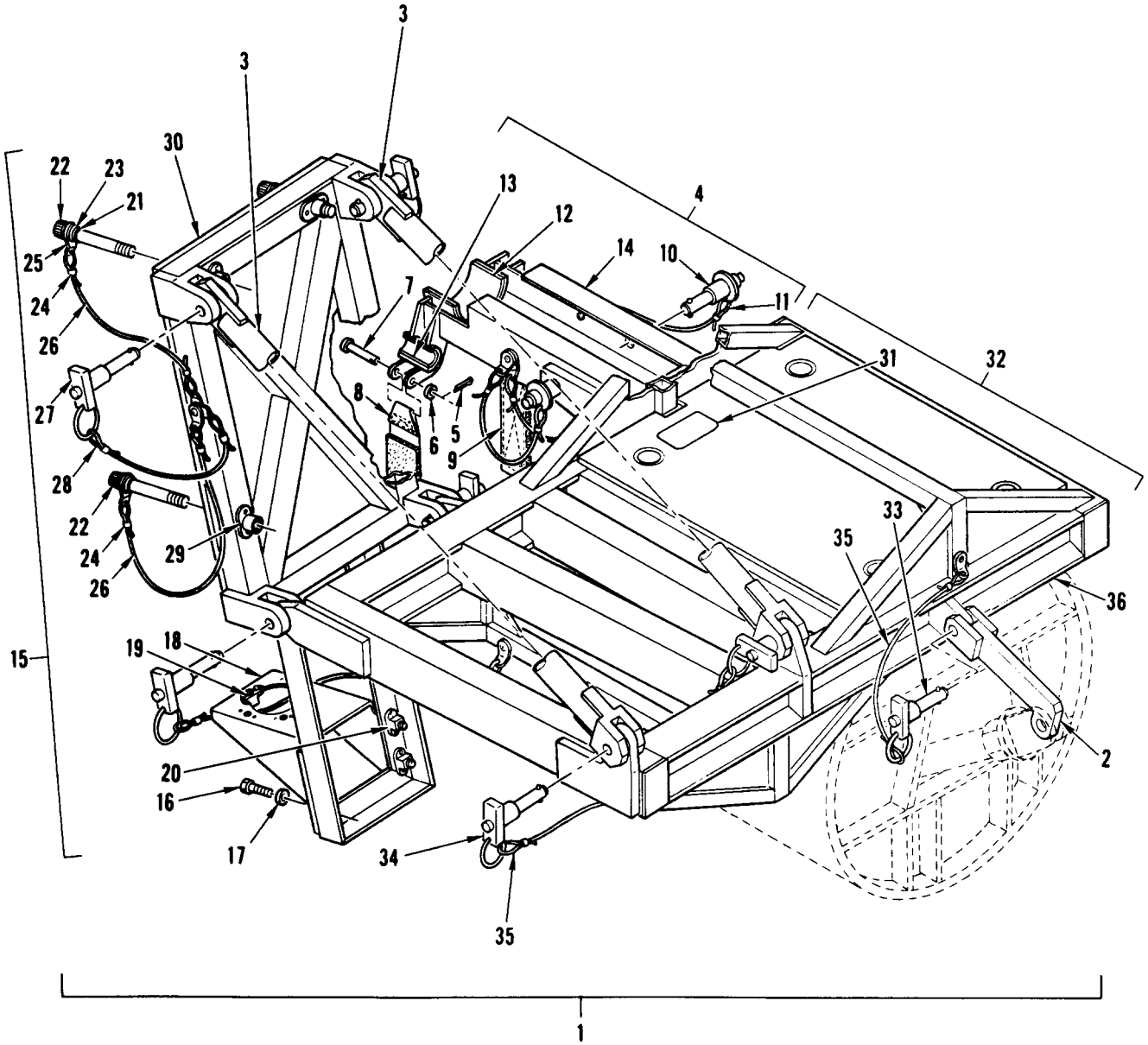
(1) ILLUSTRATION		(2)	(3)	(4)	(5)	(6)	(7)	(8)
(A) FIG NO.	(B) ITEM NO.	SMR CODE	NATIONAL STOCK NUMBER	CAGE	PART NUMBER	DESCRIPTION USABLE ON CODE	U/M	QTY INC IN UNIT
						GROUP 80 SPECIAL TOOLS TAIL ROTOR BLADE SUPPORT		
H11	1		1740–01–221–3332	02731	7–267310017	SUPPORT ASSY, TAIL ROTOR BLADE	EA	1
H11	2		5305–00–819–6030	80205	NAS623–4–18	• SCREW, MACHINE	EA	1
H11	3		5310–00–141–1795	88044	AN960–416	• WASHER, FLAT	EA	3
H11	4		5310–00–903–8282	96906	MS21083N4	• NUT, SELF–LOCKING	EA	1
H11	5		1740–01–220–8468	02731	7–267311003	• STRAP ASSY	EA	1
H11	6			02731	7–267310017–31	• PAD	EA	2
H11	7			02731	7–267310017–19	• PAD	EA	2
H11	8			02731	7–267310017–33	• FRAME WELDMENT	EA	2
						END OF FIGURE		



M18-0028

Figure H–12. GROUP 80 SPECIAL TOOLS
TAIL WHEEL STEERING BAR/WINCHING YOKE

(1) ILLUSTRATION		(2)	(3)	(4)	(5)	(6)	(7)	(8)
(A) FIG NO.	(B) ITEM NO.	SMR CODE	NATIONAL STOCK NUMBER	CAGE	PART NUMBER	DESCRIPTION USABLE ON CODE	U/M	QTY INC IN UNIT
						GROUP 80 SPECIAL TOOLS TAIL WHEEL STEERING BAR/WINCHING YOKE		
H12	1		1740–01–221–9436	02731	7–367310013	BAR ASSY, STEERING/WINCHING	EA	1
H12	2		5340–00–514–0393	96906	MS16624–4087	• RING, RETAINING	EA	2
H12	3		1740–01–220–8473	02731	7–367311031	• PLUNGER ASSY	EA	2
H12	4		1740–01–220–8472	02731	7–3667311029	• HANDLE, STEERING BAR	EA	1
H12	5		9905–01–221–0504	02731	HS4367–2	• PLATE, IDENTIFICATION	EA	1
H12	6			02731	7–267311030	• YOKE WELDMENT	EA	1
						END OF FIGURE		



M18-0031

Figure H–13. GROUP 80 SPECIAL TOOLS
VERTICAL STABILIZER STOWING KIT

(1) ILLUSTRATION		(2)	(3)	(4)	(5)	(6)	(7)	(8)
(A) FIG NO.	(B) ITEM NO.	SMR CODE	NATIONAL STOCK NUMBER	CAGE	PART NUMBER	DESCRIPTION USABLE ON CODE	U/M	QTY INC IN UNIT
						GROUP 80 SPECIAL TOOLS VERTICAL STABILIZER STOWING KIT		
H13	1			02731	7–267310011–603	FIXTURE ASSY, STOW, VERTICAL STABILIZER	EA	1
H13	2			02731	7–367311019	• LINKAGE, ACTUATOR SUPPORT	EA	1
H13	3			02731	7–367311015	• ROD, AFT SUPPORT STRUT	EA	2
H13	4			02731	7–367311020–79	• SUPPORT ASSY, DRIVE SHAFT	EA	1
H13	5		5315–01–839–2325	96906	MS24665–132	• • PIN, COTTER	EA	2
H13	6		5310–01–115–3435	88044	AN960JD416	• • WASHER, FLAT	EA	2
H13	7		5315–00–081–7018	96906	MS20392–3C59	• • PIN, STRAIGHT, HEADED	EA	2
H13	8			02731	7–367311020–39	• • STRAP, RETAINER, PILE TAPE	EA	1
H13	9			02731	7–367311020–41	• • STRAP, RETAINER, HOOK TAPE	EA	1
H13	10		5340–01–234–0432	80205	NAS1335A3C08D	• • PIN, QUICK–RELEASE	EA	4
H13	11		1740–01–221–2918	02731	HS4494–4–1000	• • LANYARD	EA	4
H13	12			02731	7–367311020–61	• • PAD, SHAFT, RUBBER	EA	1
H13	13			02731	7–367311020–63	• • PAD, LINKAGE, RUBBER	EA	1
H13	14			02731	7–367311020–73	• • SUPPORT WELDMENT	EA	1
H13	15			02731	7–367311018–41	• SUPPORT ASSY, PIVOTING	EA	1
H13	16		5306–00–816–2952	80205	NAS1304–11	• • BOLT, MACHINE	EA	4
H13	17		5310–00–531–9515	88044	AN960C416	• • WASHER FLAT	EA	4
H13	18			02731	7–367311018–5	• • SUPPORT, DRIVE SHAFT	EA	1
H13	19			80205	NAS1013P4	• • • NUTPLATE	EA	5
H13	20			80205	NAS3031P4	• • NUTPLATE	EA	4
H13	21		5365–01–221–2943	02731	HS3013RS50CD	• • RING, RETAINING	EA	4
H13	22			02731	7–367312014	• • BOLT	EA	4
H13	23			02731	7–367311018–29	• • WASHER	EA	4
H13	24		4030–01–088–2952	96906	MS51844–62	• • SLEEVE, SWAGING	EA	4
H13	25			02731	7–367311018–25	• • TAB	EA	4
H13	26			02731	7–367311018–39	• • LANYARD	EA	4
H13	27		5340–01–232–3569	80208	NAS1338A2C17D	• • PIN, QUICK–RELEASE	EA	2
H13	28		4010–01–176–7015	02731	HS4494–41200	• • LANYARD	EA	2
H13	29		5310–00–995–5789	80205	NAS1031P8	• • NUTPLATE	EA	4
H13	30			02731	7–367311018–35	• • SUPPORT WELDMENT	EA	1
H13	31			02731	HS5433–0002	• PLATE, IDENTIFICATION	EA	1
H13	32			02731	7–367311–17	• SUPPORT ASSY, FIXED	EA	1
H13	33		5340–01–231–0755	80205	NAS1334A2C12D	• • PIN, QUICK–RELEASE	EA	1
H13	34		5340–01–232–3569	80205	NAS1338A2C17D	• • PIN, QUICK–RELEASE	EA	4
H13	35		1740–01–221–2936	02731	HS4494–41400	• • LANYARD	EA	5
H13	36			02731	7–367311017–3	• • SUPPORT WELDMENT	EA	1
						END OF FIGURE		

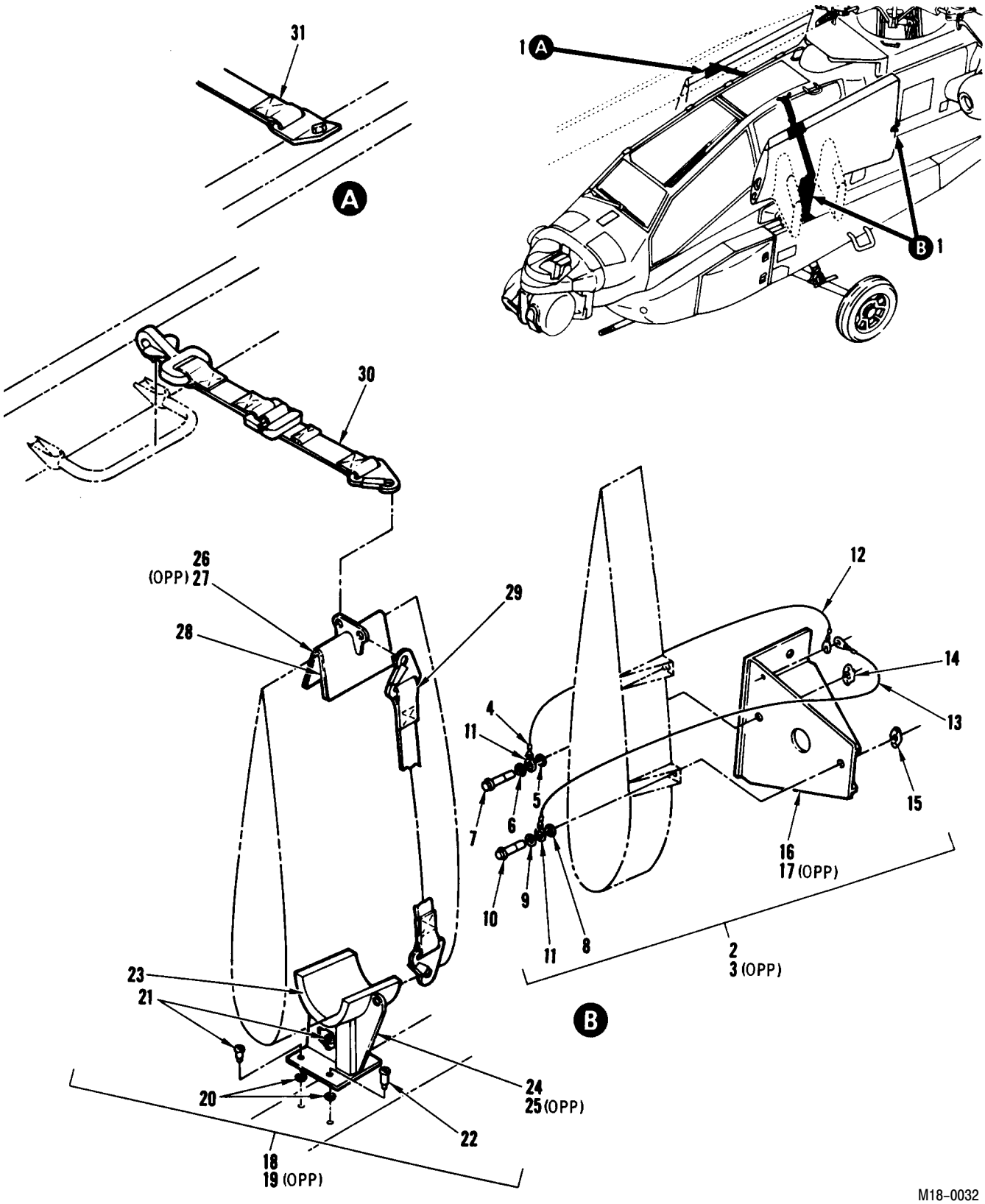


Figure H–14. GROUP 80 SPECIAL TOOLS
WING STOWING KIT

(1) ILLUSTRATION		(2)	(3)	(4)	(5)	(6)	(7)	(8)
(A) FIG NO.	(B) ITEM NO.	SMR CODE	NATIONAL STOCK NUMBER	CAGE	PART NUMBER	DESCRIPTION USABLE ON CODE	U/M	QTY INC IN UNIT
						GROUP 80 SPECIAL TOOLS WING STOWING KIT		
H14	1		1740–01–220–8492	02731	7–367310001	KIT, WING STOWING	EA	1
H14	2		1740–01–221–2969	02731	7–367311001–1	• BRACKET ASSY, WING ROOT, LH	EA	1
H14	3		1740–01–220–8037	02731	7–367311001–2	• BRACKET ASSY, WING ROOT, RH	EA	1
H14	4		4030–01–088–2952	96906	MS51844–62	• • SLEEVE, SWAGING	EA	2
H14	5			02731	HS3C13RS62	• • RING, RETAINING	EA	1
H14	6			02731	7–367311001–19	• • WASHER	EA	1
H14	7			96906	MS21250–10020	• • BOLT, SHEAR	EA	1
H14	8			02731	HS3013RS50	• • RING, RETAINING	EA	1
H14	9			02731	7–367311001–17	• • WASHER	EA	1
H14	10		5306–00–195–2299	96906	MS21250–08020	• • BOLT, SHEAR	EA	1
H14	11			02731	7–367311001–15	• • TAB	EA	2
H14	12			02731	7–367311001–25	• • LANYARD	EA	1
H14	13			02731	7–367311001–23	• • LANYARD	EA	1
H14	14			02731	HS4539–108Y	• • NUTPLATE	EA	1
H14	15		5310–000–995–5789	80205	NAS1031P8	• • NUTPLATE	EA	1
H14	16			02731	7–367311001–13	• • BRACKET (U/O 7–367311001–1)	EA	1
H14	17			02731	7–367311001–14	• • BRACKET (U/O 7–367311001–2)	EA	1
H14	18		1740–01–221–1756	02731	7–367311002–1	• CRADLE ASSY, WING, LH	EA	1
H14	19		1740–01–221–1757	02731	7–367311002–2	• CRADLE ASSY, WING, RH	EA	1
H14	20		3120–01–221–3711	02731	HS4881–1	• • RING, RETAINING	EA	2
H14	21			02731	HS4731–6	• • STUD	EA	2
H14	22		5325–01–220–8496	02731	HS4371–5	• • STUD	EA	1
H14	23			02731	7–367311002–13	• • PAD, CUSHION	EA	1
H14	24			02731	7–367311002–17	• • CRADLE (U/O 7–367311002–1)	EA	1
H14	25			02731	7–367311002–18	• • CRADLE (U/O 7–367311002–2)	EA	1
H14	26		1740–01–222–7767	02731	7–367311032–1	• SUPPORT, TRAILING EDGE, LH	EA	1
H14	27		1740–01–221–9435	02731	7–367311032–2	• SUPPORT, TRAILING EDGE, RH	EA	1
H14	28			02731	7–367311032–7	• • PAD, CUSHION	EA	1
H14	29		1740–01–220–8038	02731	7–367311004	• STRAP, TIEDOWN, OUTBOARD	EA	2
H14	30		5340–01–220–8499	02731	7–367310006	• STRAP, INBD UPR, LH	EA	1
H14	31		5340–01–221–2945	02731	7–367310033	• STRAP, INBD UPR, RH	EA	1
						END OF FIGURE		

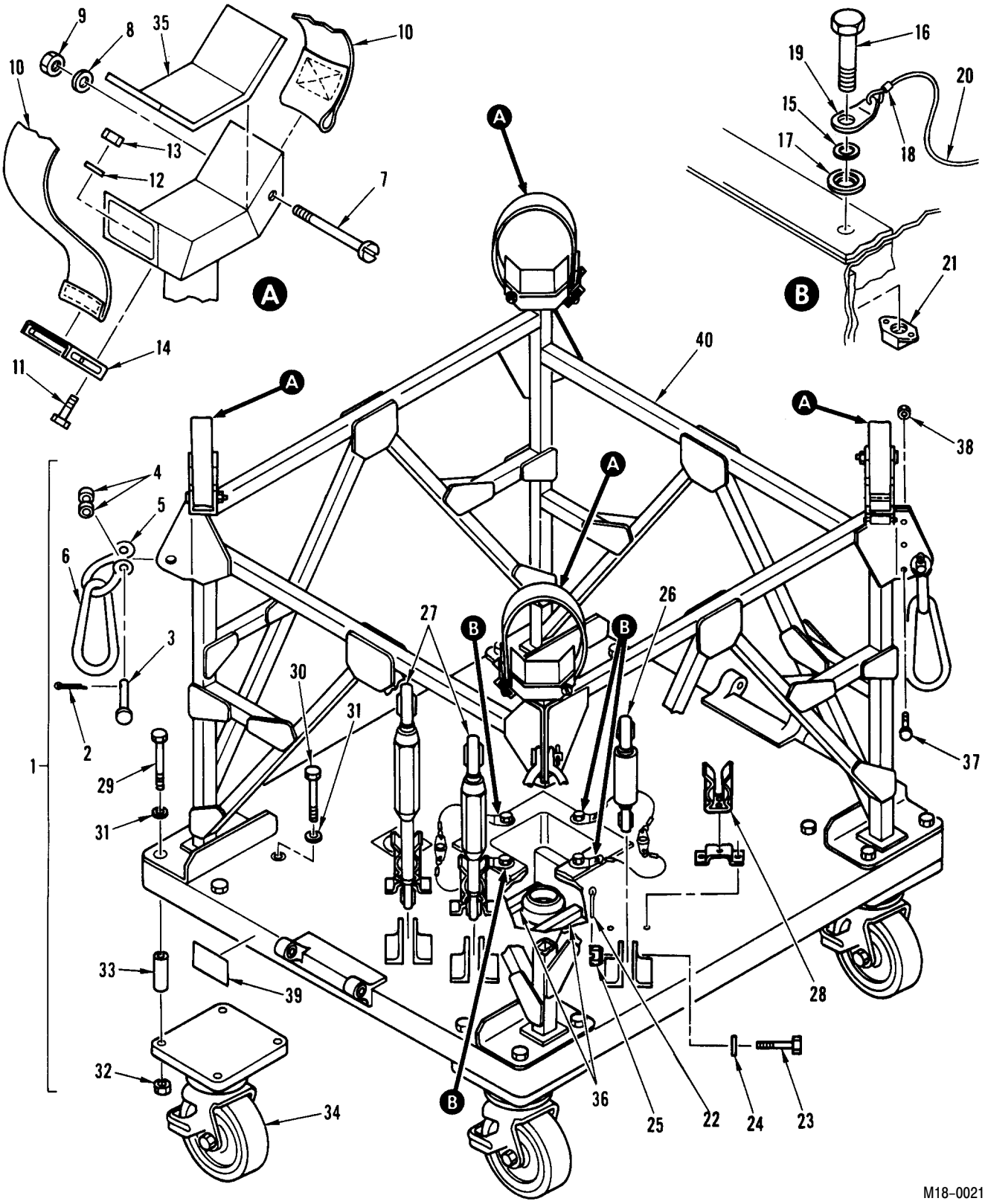


Figure H–15. GROUP 80 SPECIAL TOOLS
MAIN ROTOR HEAD, MAST, AND
MIXER SHIPPING CARRIER

(1) ILLUSTRATION		(2)	(3)	(4)	(5)	(6)	(7)	(8)
(A) FIG NO.	(B) ITEM NO.	SMR CODE	NATIONAL STOCK NUMBER	CAGE	PART NUMBER	DESCRIPTION USABLE ON CODE	U/M	QTY INC IN UNIT
						GROUP 80 SPECIAL TOOLS MAIN ROTOR HEAD, MAST, AND MIXER SHIPPING CARRIER		
H15	1	PAOZZ	1740–01–249–1943	02731	7–367310010–601	CARRIER ASSY, MAIN ROTOR HEAD, MAST, AND MIXER	EA	1
H15	2	PAOZZ	5315–00–236–8359	96906	MS24665–370	• PIN, COTTER	EA	4
H15	3	PAOZZ	5315–00–781–7112	96906	MS20392–9C65	• PIN, STRAIGHT	EA	4
H15	4	PAOZZ		80205	NAS43HT10–11	• SPACER, SLEEVE	EA	8
H15	5	PAOZZ	4030–00–542–3180	80205	NAS1042–8	• SHACKLE	EA	4
H15	6	PAOZZ	4010–00–990–3413	80205	NAS1049–8P	• LINK, CHAIN, END	EA	4
H15	7	PAOZZ	5306–00–943–8180	80205	NAS1302–42	• BOLT, SHEAR	EA	4
H15	8	PAOZZ	5310–00–141–1795	88044	AN960–416	• WASHER, FLAT	EA	4
H15	9	PAOZZ	5310–00–623–5988	80205	NAS1031N4	• NUT, SELF–LOCKING	EA	4
H15	10	XAOZZ		02731	7–267311014	• STRAP, ROTOR TIEDOWN	EA	4
H15	11	PAOZZ	5305–00–718–9470	80205	NAS604–16	• SCREW, MACHINE	EA	4
H15	12	PAOZZ	5310–00–933–8121	96906	MS35338–139	• WASHER, LOCK	EA	4
H15	13	PAOZZ	5310–01–232–1455	80205	MAS1329S4–140	• NUT, PLAIN	EA	4
H15	14	PAOZZ		02731	HS–5042–0001	• ADJUSTER, STRAP	EA	4
H15	15	PAOZZ	5365–01–221–2943	02731	HS3013RS50CD	• RING, RETAINING	EA	4
H15	16	PAOZZ	5306–00–893–6474	80205	NAS1308–32	• BOLT, SHEAR	EA	4
H15	17	MOOZZ		02731	7–367310010–29	• WASHER	EA	4
H15	18	PAOZZ		96906	MS51844–82	• SLEEVE, SWAGING	EA	4
H15	19	XDOZZ		02731	7–36731001–15	• TAB	EA	4
H15	20	PAOZZ	1740–01–221–2967	02731	7–367310010–21	• LANYARD ASSEMBLY	EA	4
H15	21	PAOZZ	5310–00–688–1998	96906	MS21083N8	• NUT, SELF–LOCKING	EA	4
H15	22	PAOZZ	5315–00–234–1856	96906	MS24665–155	• PIN, COTTER	EA	3
H15	23	PAOZZ	5306–00–083–7057	80205	NAS1297–4D12	• BOLT, SHOULDER	EA	3
H15	24	PAOZZ	5310–00–141–1795	88044	AN960–416	• WASHER, FLAT	EA	3
H15	25	PAOZZ	5310–00–961–8390	96906	MS17825–4	• NUT, SELF–LOCKING	EA	3
H15	26	AOOOO		02731	7–367311024–7	• TURNBUCKLE, CARRIER	EA	1
H15	27	AOOOO		02731	7–367311024–5	• TURNBUCKLE, CARRIER	EA	2
H15	28	PAOZZ	5340–01–231–5519	80205	NAS1464–098–10C	• CLIP, SPRING TENSION	EA	3
H15	29	PAOZZ		80205	NAS6208–70	• BOLT, SHEAR	EA	8
H15	30	PAOZZ	5306–01–234–0371	80205	NAS6208–66	• BOLT, SHEAR	EA	8
H15	31	PAOZZ	5310–00–167–0823	88044	AN960–816	• WASHER, FLAT	EA	16
H15	32	PAOZZ	5310–00–902–9369	96906	MS21083N8	• NUT, SELF–LOCKING	EA	16
H15	33	PAOZZ	3120–01–232–0478	80205	NAS75–8–306	• BUSHING, SLEEVE	EA	16
H15	34	PAOZZ	1740–01–221–2966	02731	HS5031–0001	• CASTER	EA	4
H15	35	MOOZZ		02731	7–367310010–7	• PAD	EA	4
H15	36	MOOZZ		02731	7–367310010–19	• PAD	EA	4
H15	37	PAOZZ	5306–01–054–9237	80205	NAD6204–6	• BOLT, SHEAR	EA	12
H15	38	PAOZZ	5310–00–878–3292	96906	MS21043–4	• NUT, SELF–LOCKING	EA	12
H15	39	XDFZZ		02731	HS5216–1	• PLATE, IDENTIFICATION	EA	1
H15	40	PAOOO		02731	7–367311042	• BASE ASSEMBLY	EA	2
						END OF FIGURE		

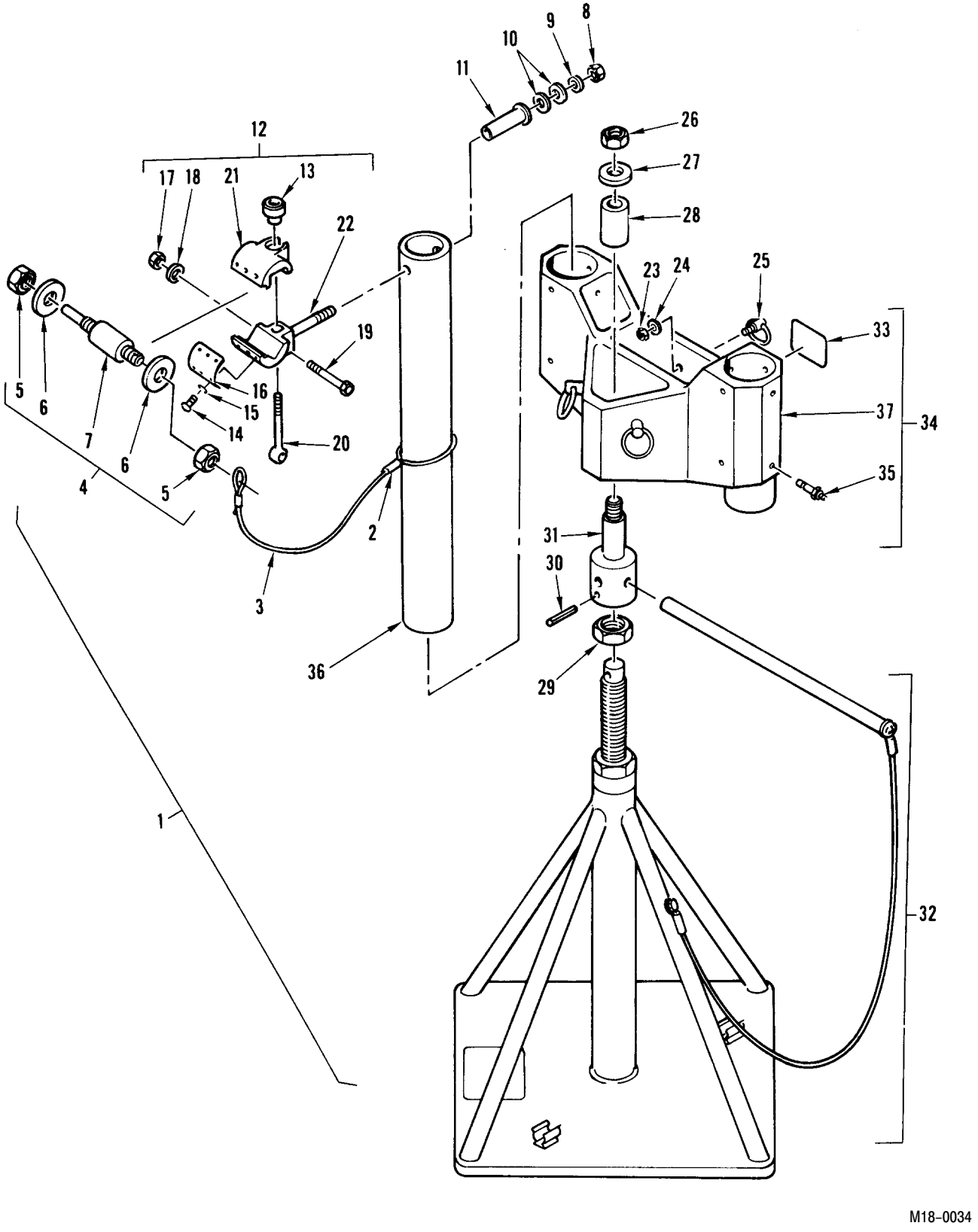


Figure H–16. GROUP 80 SPECIAL TOOLS
VERTICAL STABILIZER JACK ADAPTER

(1) ILLUSTRATION		(2)	(3)	(4)	(5)	(6)	(7)	(8)
(A) FIG NO.	(B) ITEM NO.	SMR CODE	NATIONAL STOCK NUMBER	CAGE	PART NUMBER	DESCRIPTION USABLE ON CODE	U/M	QTY INC IN UNIT
						GROUP 80 SPECIAL TOOLS VERTICAL STABILIZER JACK ADAPTER		
H16	1	PBODD		02731	7–367310025	VERTICAL STABILIZER JACK ADAPTER	EA	1
H16	2	PAOZZ	4030–01–088–2952	96906	MS51844–62	• SWAGING, SLEEVE	EA	2
H16	3	PAOZZ		02731	7–367310025–33	• CABLE–NYLON COATED	EA	2
H16	4	AOOOO		02731	7–367310025–11	• PIN ASSEMBLY	EA	1
H16	5	PAOZZ		80205	NAS1423C12	• • NUT	EA	2
H16	6	PAOZZ		02731	7–367310025–23	• • WASHER	EA	1
H16	7	PAOZZ		02731	7–367310025–21	• • PIN	EA	1
H16	8	PAOZZ		80205	NAS1291C6M	• NUT	EA	2
H16	9	PAOZZ	5310–00–167–0808	88044	AN960C1016	• WASHER, FLAT	EA	2
H16	10	PAOZZ		02731	7–367310025–31	• WASHER	EA	2
H16	11	PAOZZ		02731	7–367310025–29	• BUSHING	EA	2
H16	12	AOOOO		02731	7–367310025–9	• FITTING ASSEMBLY	EA	2
H16	13	PAOZZ		02731	7–367310025–13	• • KNOB, KNURLED	EA	1
H16	14	PAOZZ		80205	NAS1223–1L	• • BOLT	EA	6
H16	15	PAOZZ		88044	AN960C10	• • WASHER, FLAT	EA	6
H16	16	PAOZZ		02731	7–367310025–19	• • HINGE, SPRING	EA	1
H16	17	PAOZZ	5310–00–807–1469	96906	MS21042–5	• • NUT, SELF–LOCKING	EA	1
H16	18	PAOZZ	5310–00–167–0803	88044	AN960C516	• • WASHER, FLAT	EA	1
H16	19	PAOZZ		80205	NAS1305–20	• • BOLT	EA	1
H16	20	PAOZZ		02731	HS5491–38	• • EYEBOLT	EA	1
H16	21	PAOZZ		02731	7–367310025–15	• • CLAMP, UPPER	EA	1
H16	22	PAOZZ		02731	7–367310025–17	• • CLAMP, LOWER	EA	1
H16	23	PAOZZ		96906	MS21045C5	• NUT	EA	3
H16	24	PAOZZ	5310–00–167–0803	88044	AN960C516	• WASHER, FLAT	EA	3
H16	25	PAOZZ		80205	NAS1251–2–5	• BOLT RING	EA	3
H16	26	PAOZZ		96906	MS21045C10	• NUT	EA	1
H16	27	PAOZZ		02731	7–367310025–27	• WASHER	EA	1
H16	28	PAOZZ		02731	HS4620SL14–158	• BUSHING	EA	1
H16	29	PAOZZ		02731	7–367311037	• JAM NUT, JACK STAND	EA	1
H16	30	PAOZZ		80205	NAS561P8–24	• PIN, SPRING	EA	1
H16	31	PAOZZ		02731	7–367310025–7	• BEARING	EA	1
H16	32	PBODD	1740–01–220–8039	02731	7–367310005–603	• JACK STAND ASSEMBLY (SEE FIG. H–4 FOR BREAKDOWN)	EA	1
H16	33	XDOZZ		02731	HS5216–2	• PLATE, IDENTIFICATION	EA	1
H16	34	PBOOO		02731	7–367310025–1	• ADAPTER ASSEMBLY	EA	1
H16	35	PAOZZ		02731	HS5450–10	• • FASTENER	EA	16
H16	36	PAOZZ		02731	7–367310025–5	• • UPRIGHT	EA	2
H16	37	PAOZZ		02731	7–367310025–3	• • BASE	EA	1
						END OF FIGURE		

GLOSSARY

Unusual abbreviations, acronyms, and special usages of terms are explained herein. Refer to MIL-STD-12 for other (common) abbreviations used in this manual.

A

B

C

CLOSURE – Capping of disconnected fittings and connectors, over–wrap and seal of disconnected electrical leads. Seal–off of component gaps and joint openings.

COMPONENT–WRAP – Wrapping of removed components with barrier material or bubble wrap to protect against damage or moisture.

CPG – Copilot–gunner.

D

DISASSEMBLY – As used herein, describes the operation necessary to reduce an assembly or subassembly to condition suitable for shipment.

E

F

FUSELAGE PACKAGE ITEMS – Items that will be removed from the helicopter and stored in the helicopter during shipment.

G

H

HIGH–DENSITY (helicopter preloading condition) – Helicopter partially disassembled for vessel shipment loading.

I

J

K

L

LOGISTICAL TRUCK SHIPMENT – A long haul (in excess of 100miles) shipment of helicopter by standard commercial 30 inch–high low boy air ride suspension semi–trailer.

M

MAC – Military Airlift Command.

MAXIMUM–DENSITY (helicopter preloading condition) – Helicopter disassembled for maximum quantity vessel loading.

MSC – Military Sealift Command.

MTMC – Military Traffic Management Command.

N

O

P

Q

R

S

T

TACTICAL DEPLOYMENT BY CARGO AIRCRAFT – Deployment of helicopters by C–5 aircraft.

TACTICAL DEPLOYMENT BY SEAGOING VESSEL – Deployment of helicopters by vessel.

TACTICAL TRUCK SHIPMENT – A short haul (not to exceed 100miles) shipment of helicopter by Army M270A1 trailer truck.

U

UNIT WRAP – See COMPONENT–WRAP.

V

W

X

Y

Z

INDEX

N

O

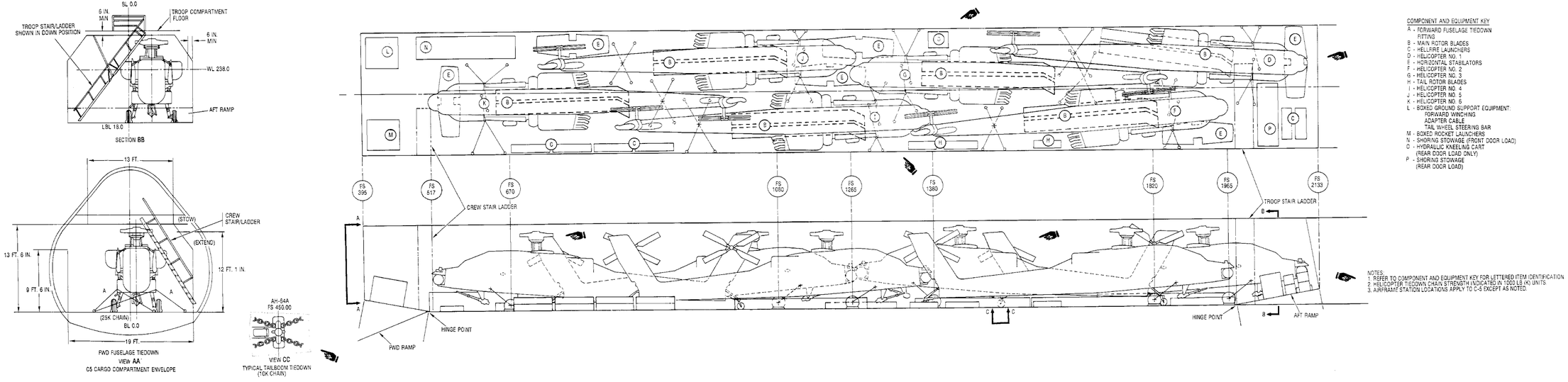
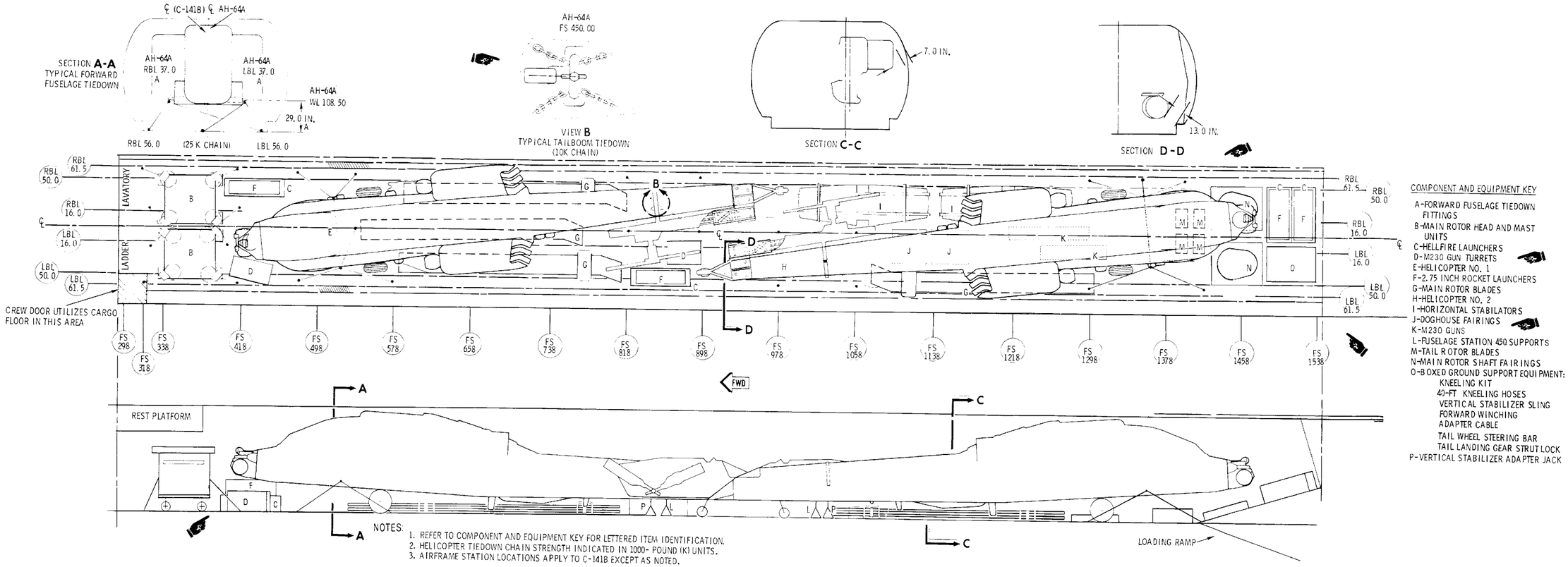


Figure FO-1. C-5 Cargo Aircraft Loading Pattern and Tiedown Diagram.



MM05-011D

☆ U.S. GOVERNMENT PRINTING OFFICE: 1992 654-121/41101

Figure FO-2. C-141B Cargo Aircraft Loading Pattern and Tiedown Diagram

By Order of the Secretary of the Army:

CARLE.VUONO
General, United States Army
Chief of Staff

Official:

THOMAS F. SIKORA
Brigadier General, United States Army
The Adjutant General

DISTRIBUTION :
To be distributed in accordance with initial distribution number (IDN) 313010 requirements for TM 55-1520-238-S.

THESE ARE THE INSTRUCTIONS FOR SENDING AN ELECTRONIC 2028

The following format must be used if submitting an electronic 2028. The subject line must be exactly the same and all fields must be included; however only the following fields are mandatory: 1, 3, 4, 5, 6, 7, 8, 9, 10, 13, 15, 16, 17, and 27.

From: "Whomever" <whomever@avma27.army.mil>

To: 2028@redstone.army.mil

Subject: DA Form 2028

1. **From:** Joe Smith
2. Unit: Home
3. **Address:** 4300 Park
4. **City:** Hometown
5. **St:** MO
6. **Zip:** 77777
7. **Date Sent:** 19-Oct-93
8. **Pub no:** 55-2840-229-23
9. **Pub Title:** TM
10. **Publication Date:** 04-Jul-85
11. Change Number: 7
12. Submitter Rank: MSG
13. **Submitter Fname:** Joe
14. Submitter Mname: T
15. **Submitter Lname:** Smith
16. **Submitter Phone:** (123) 123-1234
17. **Problem:** 1
18. Page: 2
19. Paragraph: 3
20. Line: 4
21. NSN: 5
22. Reference: 6
23. Figure: 7
24. Table: 8
25. Item: 9
26. Total: 123
27. **Text:**

This is the text for the problem below line 27.

TEAR ALONG PERFORATED LINE

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

SOMETHING WRONG **WITH THIS PUBLICATION?**

THEN . . . JOT DOWN THE DOPE ABOUT IT ON THIS FORM. CAREFULLY TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL.

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

SSG John Doe
F Troop 5th Cav. 1st Training Bldg.
Fort Knox, Kentucky 12345-6789

DATE SENT

20 October 1990

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 55-1520-238-S	30 September 1990	Preparation for Shipment FOR Army Model AH-64A Helicopters

BE EXACT . . . PIN–POINT WHERE IT IS

PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.	IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
2–60	2–26, 151			T.M. references should be TM 55-1520-238 S, not TM 55-1500-238-S
2–68		2–30		Support AFT FUS STA 430 should read Support AFT FUS STA 450.

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SP4 John Doe (805) 555-1234

SIGN HERE

John Doe

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ARE OBSOLETE.

DRSTS-M Overprint 2, 1 Nov 80.

PS. . .IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATIONS MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS

REVERSE OF DA FORM 2028-2

FILL IN YOUR
UNIT'S ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

POSTAGE AND FEES PAID FOR
DEPARTMENT OF THE ARMY
DOD 314

U. S. MAIL

Commander
U.S. Army Aviation And Missile Command
ATTN: AMSAM–MMC–LS–P
Redstone Arsenal, AL 35898–5230

TEAR ALONG PERFORATED LINE

TEAR ALONG PERFORATED LINE

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

SOMETHING WRONG **WITH THIS PUBLICATION?**

THEN . . . JOT DOWN THE DOPE ABOUT IT ON THIS FORM. CAREFULLY TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL.

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 55-1520-238-S	30 Sep 90	Preparation for Shipment for Army Model AH-64A Helicopters

BE EXACT . . . PIN–POINT WHERE IT IS

PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE

DA FORM 2028-2 1 JUL 79

PREVIOUS EDITIONS ARE OBSOLETE.

DRSTS-M Overprint 2, 1 Nov 80.

PS. . .IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATIONS MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS

REVERSE OF DA FORM 2028-2

FILL IN YOUR
UNIT'S ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

POSTAGE AND FEES PAID FOR
DEPARTMENT OF THE ARMY
DOD 314

U. S. MAIL

Commander
U.S. Army Aviation And Missile Command
ATTN: AMSAM–MMC–LS–P
Redstone Arsenal, AL 35898–5230

TEAR ALONG PERFORATED LINE

The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigrams = .035 ounce
1 dekagram = 10 grams = .35 ounce
1 hectogram = 10 dekagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliliters = .34 fl. ounces
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	*To*	*Multiply by*	*To change*	*To*	*Multiply by*
inches	centimeters	2.540	ounce–inches	newton–meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.452	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29.573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound–feet	newton–meters	1.356	metric tons	short tons	1.102
pound–inches	newton–meters	.11296			

Temperature (Exact)

° F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	° C

PIN: 045932-007