Technical Manual

PREPARATION FOR SHIPMENT

of

CH-47 HELICOPTER

This copy is a reprint which includes current pages from Changes 1 thru 6.

*This manual supersedes TM 1-CH47-S, 23 June 1975, including all changes.

HEADQUARTERS, DEPARTMENT OF THE ARMY

1 MARCH 1979

URGENT

TM 55-1520-241-S
C6

CHANGE
No. 6

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 11 July 1988

Preparation for Shipment of

CH-47 HELICOPTER

TM 55-1520-241-S, 1 March 1979, 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
7-21 through 7-23/7-24	7-21 through 7-23/7-24

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

By Order of the Secretary of the Army:

CARLE. VUONO
General, United States Army
Chief of Staff

Official:

R.L. DILWORTH
Brigadier GeneraI, United States Army
The Adjutant General

DISTRIBUTION:
To be distributed in accordance with DA Form 12-31, AVUM and AVIM Maintenance requirements for CH-47B/C/D Helicopter, Cargo Transport.

URGENT

URGENT

TM 55-1520-241-S
C 5

CHANGE
No. 5

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 16 May 1988

Preparation for Shipment of

CH-47 HELICOPTER

TM 55-1520-241-S, 1 March 1979, 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 through 1-3/1-4	1-1 through 1-3/1-4
2-1 through 2-4	2-1 through 2-4
--- --- ---	2-4.1/2-4.2
3-1 through 3-6	3-1 through 3-6
4-1 through 4-5/4-6	4-1 through 4-5/4-6
6-1/6-2	6-1/6-2
7-1 and 7-2	7-1 and 7-2
7-11 and 7-12	7-11 and 7-12
7-15 through 7-23/7-24	7-15 through 7-23/7-24
B-1 through B-5/B-6	B-1/B-2
C-1 through C-4	C-1/C-2

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

By Order of the Secretary of the Army:

CARL E. VUONO
General, United States Army
Chief of Staff

Official:

R. L. DILWORTH
Brigadier General, United States Army
The Adj tant General

DISTRIBUTION:
To be distributed in accordance with DA Form 12-31, AVUM and AVIM Maintenance requirements for CH-47B/C/D Helicopter, Cargo Transport.

URGENT

URGENT

TM 55-1520-241-S
C 4

CHANGE
NO. 4

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 11 March 1988

Preparation for Shipment of

CH-47 HELICOPTER

TM 55-1520-241-S, 1 March 1979, 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
G-1 through G-4	G-1 through G-14

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

By Order of the Secretary of the Army:

CARL E. VUONO,
General, United States Army
Chief of Staff

Official:

R. L. DILWORTH
Brigadier General, United States Army
The Adjutant General

DISTRIBUTION:
To be distributed in accordance with DA Form 12-31, AVUM and AVIM Maintenance requirements for CH-47B/C/D Helicopter, Cargo Transport.

URGENT

CHANGE NO. 3

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 14 July 1987

Preparation for Shipment of

CH-47 HELICOPTER

TM 55-1520-241-S, 1 March 1979, is changed as follows:

1. Cover page has been changed to read as stated above.

2. 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
A/B	A/B
1-1 and 1-2	1-1 and 1-2
2-1 and 2-2	2-1 and 2-2
2-7 through 2-8.2	2-7 through 2-8.2
2-15 through 2-19/2-20	2-15 through 2-19/2-20
- - -	2-23/2-24
3-3 through 3-6	3-3 through 3-6
4-1 through 4-4	4-1 through 4-4
6-1 and 6-2	6-1 and 6-2
7-1 and 7-2	7-1 and 7-2
7-17 through 7-22	7-17 through 7-22
A-1/A-2	A-1/A-2
D-3/D-4	D-3/D-4
E-1 through E-3/E-4	E-1 through E-4
G-1 and G-2	G-1 and G-2

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

By Order of the Secretary of the Army:

CARL E. VUONO
General, United States Army
Chief of Staff

Official:

R. L. DILWORTH
Brigadier General, United States Army
The Adjutant General

DISTRIBUTION:
To be distributed in accordance with DA Form 12-31, AVUM and AVIM Maintenance requirements for CH-47 A/B/C/D Helicopter, Cargo Transport.

CHANGE NO. 2

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 19 September 1986

Preparation for Shipment of

CH-47 A/B/C/D HELICOPTER

TM 55-1520-241-S, 1 March 1979, is changed as follows:

1. Cover page has been changed to read as stated above.

2. 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
i and ii	i and ii
1-1 and 1-2	1-1 and 1-2
3-1 through 3-6	3-1 through 3-6
4-1 and 4-2	4-1 and 4-2
- - -	G-1 through G-4

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

By Order of the Secretary of the Army:

JOHN A. WICKHAM, JR.
General, United States Army
Chief of Staff

Official:

R. L. DILWORTH
Brigadier General, United States Army
The Adjutant General

DISTRIBUTION:
To be distributed in accordance with DA Form 12-31, AVIM and AVUM Maintenance requirements for CH-47 A/B/C/D Helicopter, Cargo Transport.

CHANGE
No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 28 September 1982

Preparation for Shipment of

CH-47 HELICOPTERS

TM 55-1520-241-S, 1 March 1979, is changed as follows:

1. Remove and insert pages as indicated below.

	Remove pages	Insert pages
Table of Contents	i and ii	i and ii
Chapter 1	1-1 and 1-2	1-1 and 1-2
Chapter 2	2-1 thru 2-4	2-1 thru 2-4.1/2-4.2
	2-7 and 2-8	2-7 thru 2-8.2
	2-13 thru 2-18	2-13 thru 2-18
Chapter 3	3-1 and 3-2	3-1 and 3-2
Chapter 4	4-1 and 4-2	4-1 and 4-2
Chapter 6	6-1 and 6-2	6-1 and 6-2
Chapter 7	7-3 and 7-4	7-3 and 7-4
	7-7 thru 7-10	7-7 thru 7-10
	7-21 and 7-22	7-21 and 7-22
Appendix A	A-1/A-2	A-1/A-2
Appendix D	---	D-3/D-4
Appendix E	E-1 and E-2	E-1 thru E-3/E-4
Appendix F	F-3 and F-4	F-3/F-4

2. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

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

By Order of the Secretary of the Army:

E. C. MEYER
General, United States Army
Chief of Staff

Official:

ROBERT M. JOYCE
Major General, United States Army
The Adjutant General

DISTRIBUTION:
To be distributed in accordance with DA Form 12-31, Organizational Maintenance requirements for CH-47A and CH-47B/C & D aircraft.

WARNING

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

Warnings, cautions, and notes are used to emphasize important and critical instructions and shall be used for the following conditions:

WARNING

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

CAUTION

An operating procedure, practice, etc., which, if not strictly observed, could result in damage to or destruction of equipment.

NOTE

An operating procedure, condition, etc., which is essential to highlight.

GROUND HANDLING

It is possible that vehicle winch will turn faster than aircraft winch. Extreme caution must be taken to prevent this. Improper winching may result in damage to aircraft and injury to personnel.

TOXIC POISONS

Although MIL-0-81302 solvent is safe and nonflammable, use with adequate ventilation. Prolonged breathing of vapors should be avoided, Solvent should not be used near open flames or heat, as the products of decomposition are toxic and very irritating. Contact with skin should be avoided; wear rubber gloves. Personnel involved in application of dust and placing of bait blocks will wear robber gloves, protective clothing and respirators as recommended by the post surgeon or safety officer.

ELECTRICAL CONNECTIONS

Ensure battery switch on overhead panel is in OFF position prior to working on battery. Extereme care should be taken to keep electrolyte from coming in contact with clothing, skin, or eyes.

FUEL PURGING OPERATION

Helicopters scheduled for shipment in cargo aircraft which require fuel system to be purged to meet applicable requirements of TM 38-250 will be tested for a dangerous level of fuel vapors immediately prior to loading. Test with a combustible gas indicator. If a dangerous level of fuel vapors exists, repurge fuel system in accordance with prescribed procedure until a safe reading is obtained, To avoid emergency purging operations, check fuel system for dangerous fuel vapors periodically prior to loading.

TECHNICAL MANUAL
No. 55-1520-241-S

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 1 March 1979

PREPARATION FOR SHIPMENT OF

CH-47 HELICOPTER

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistake, or if you know of away to improve the procedures, please let us know. Mail your letter, or DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Commander, U.S. Army Aviation Systems Command, Attn: AMSAV-MMD, 4300 Goodfellow Boulevard, St. Louis, MO 63120-1798. A reply will be furnished directly to you.

TABLE OF CONTENTS

		Page
CHAPTER I.	INTRODUCTION	1-1
Section I.	Purpose	1-1
II.	General	1-1
III.	Checksheets	1-3
CHAPTER 2.	SHIPMENT BY CARGO AIRCRAFT.	2-1
Section I.	General	2-1
II.	Preparing the Aircraft	2-1
III.	Functions and Responsibilities.	2-13
IV.	Preparing Cargo Aircraft.	2-16
V.	Loading a C-5.	2-16
VI.	Tiedown	2-19
CHAPTER 3.	SHIPMENT BY VESSEL	3-1
Section I.	Responsibilities	3-1
II.	Preparing the Aircraft	3-2
III.	Loading	3-4
IV.	Tiedown	3-5
V.	Care During Shipment	3-6
CHAPTER 4.	SHIPMENT BY TRUCK OR RAIL.	4-1
Section I.	General	4-1
II.	Short Haul Shipments	4-1
III.	Long Truck Shipments	4-2
CHAPTER 5.	CRATED SHIPMENT.	5-1
CHAPTER 6.	TACTICAL SHIPMENT	6-1

		Page
CHAPTER 7.	PREPARATION FOR SHIPMENT	7-1
Section I.	Cleaning	7-1
II.	Preservation and Packaging	7-4
III.	Marking	7-22
IV.	Dangerous and Hazardous Materials	7-23
APPENDIX A.	REFERENCES	A-1
B.	DELETED	B-1
C.	DELETED	C-1
D.	CONSUMABLE MATERIALS	D-1
E.	SPECIAL TOOLS AND EQUIPMENT	
F.	QUARANTINE INSPECTION	F-1
G.	HEAT SHRINK FILM HELICOPTER PROTECTIVE COVERING	G-1

LIST OF ILLUSTRATIONS

Figure	Title	Page
1-1	Dimensional View	1-2
2-1	Removed Components Stowed Within Cargo Compartment	2-3
2-1.1	CH-47D Removed Components Stowed Within Cargo Compartment	2-4.1
2-2	Removal of Forward Transmission Using Hoisting Adapter on Main Rotor Shaft	2-5
2-3	Forward Transmission Mounted on Work and Transport Stand	2-6
2-4	Removal of Aft Pylon	2-9
2-5	Aft Pylon Mounted on Vertical Pylon Handling Skid	2-10
2-6	C-5 Loading Diagram	2-11
2-7	C-5 Ramp Extension	2-15
2-8	C-5 Tiedown Illustration	2-21
2-9	Safety Block, Landing Gear Fwd	2-23
3-1	Tiedown Diagram	3-2
3-2	Plexiglass Protection	3-3
7-1	Rotor Blade Transport Stand	7-16
G-1	Heat Shrink Wrapping Locations	G-12
G-2	Heat Shrink Wrapping Areas	G-13

LIST OF TABLES

Number	Title	Page
2-1	Disassembly Requirements for Cargo Aircraft	2-1
G-1	Materials and Equipment List	G-10
G-2	Safety Checklist,	G-11

CHAPTER 1

INTRODUCTION

Section I. Purpose

1-1. Purpose. This manual prescribes methods and procedures for cleaning, preserving, packing, marking, and loading CH-47C/D Model helicopters. It should be used for both logistic and tactical shipments to CONUS or overseas destinations. This manual will apply to the CH47C/D Model helicopters only. Due to the CH-47A and B models being modified, they are considered nondeployable and will not be addressed in the shipping manual.

Section II. General

1-2. Modes of Shipment. CH-47 helicopters are normally flight delivered within CONUS. Shipment to overseas destinations is by C-5 cargo aircraft or sea vessel. Regardless of delivery mode, the primary purpose of preparation for shipment is the prevention of damage and corrosion. Handle all classified materials in accordance with local procedures.

1-3. Dimensions. Overall dimensions for planning space requirements are found in figure 1-1.

1-4. Disassembly. Perform all disassembly called for in this manual in accordance with the applicable aircraft maintenance manual:

HELICOPTER SERIES	PUBLICATION
CH-47C	TM 55-1520-227-10-1 /-2 TM 55-1520-227-23
CH-47D	TM 55-1520-240-10 TM 55-1520-240-23
T-55 Turbine Engine	TM 55-2840-234-24
Auxiliary Power Unit	TM 55-2835-203-24

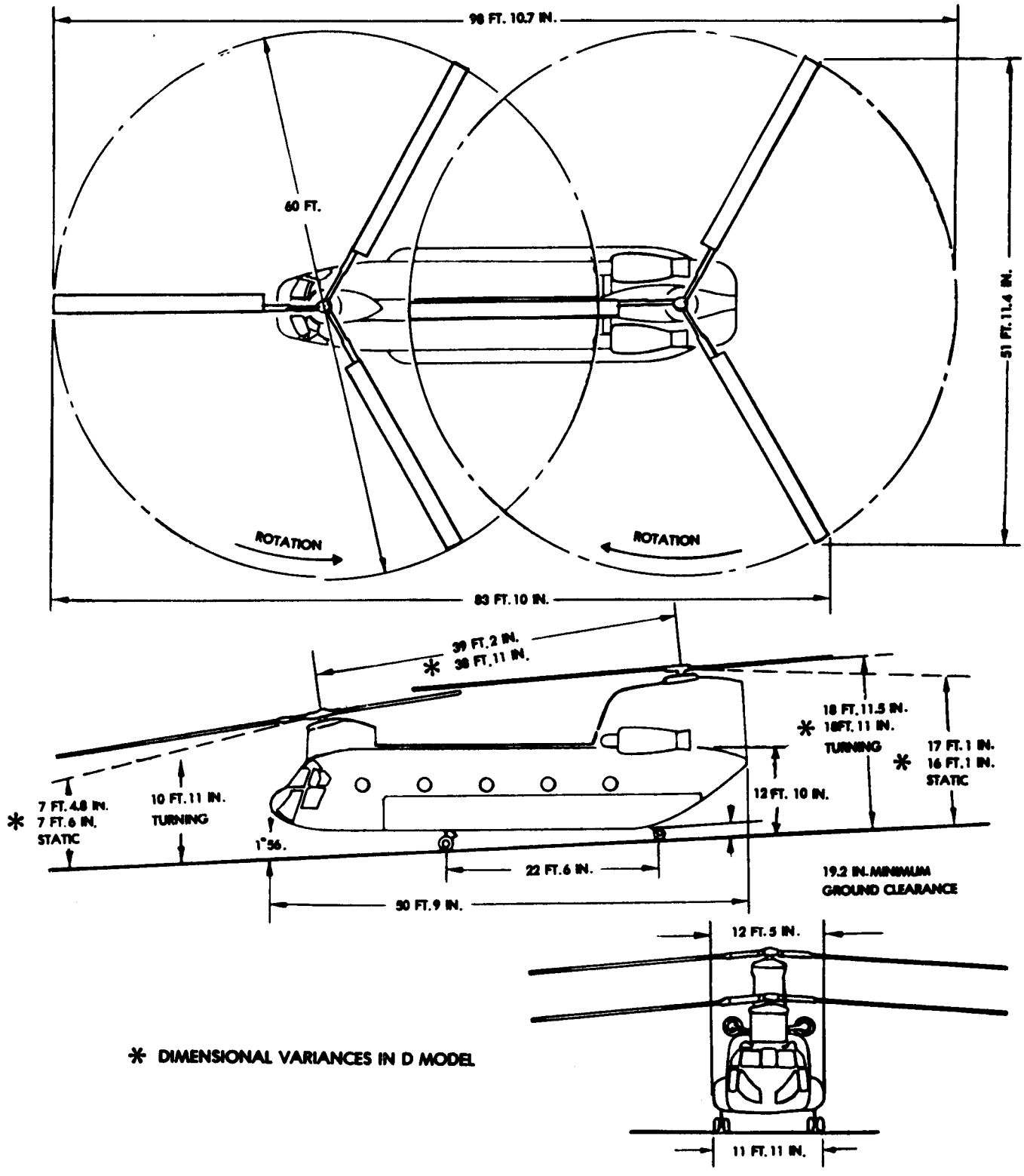


Figure 1-1. Dimensional View

1-5. Consumable Materials Designation. Packaging materials are called out in this manual by referencing the List of Consumable Materials, Appendix D.

1-6. Cushioning. Cushioning consists of shock-absorbing materials and devices which protect components from physical damage. C-13 and C-14 are acceptable cushioning materials.

1-7. Barrier Material. Items protected by contact preservative must be wrapped with barrier material before being cushioned. For partially preserved large items, it may be sufficient to use barrier material only on preserved areas. Cover any parts which could be damaged by shreds or fragments of cushioning. C-3 and C-4 are suitable barrier materials.

1-8. Tape. When tape (C-31) is called for, it must be of cloth-backed construction.

Section III. Checksheets

1-9. Preservation/Depreservation Checksheets. The organization preparing the aircraft for shipment will prepare a Preservation/Depreservation Checksheet on DA Form 2404 in accordance with DA Pam 738-751. As a task is completed during preparation of the aircraft, the mechanic will make an entry and enter the appropriate status symbol, Actions required for depreservation and assembly will be included on the form with the appropriate status symbol. The DA Form 2404 will become a continuation sheet of the aircraft DA Form 2408-13. A locally prepared overprinted DA Form 2404 is authorized.

CHAPTER 2

SHIPMENT BY CARGO AIRCRAFT

Section I. General

2-1. General.

a. This chapter presents technical information required to prepare and load three CH-47 helicopters disassembled as shown in Table 2-1 in a C-5 cargo aircraft.

NOTE

Determining aircraft balance and tiedown requirements are functions of the cargo aircraft loadmaster. In case of conflict, Air Force requirements found in the Loading Instructions for the appropriate cargo plane will prevail.

Table 2-1

Disassembly Required	CH-47C	CH-47D
Forward & Aft Rotor Blades	X	X
Forward Rotor Cowling & Fairings	X	X
Forward Transmission Package	X	X
Aft Pylon Package	X	X
Aft Transmission	*	X
Aft Cargo Hook	N/A	X
Oil Cooling Fan & Duct (Engine/Combin. XMSN)	*	X
Engine Transmission Oil Coolers (2)	*	X

*Components removed with aft pylon package.

NOTE: Perform all disassembly in accordance with the appropriate maintenance manual.

b. A crane with at least 5,000-pound capacity is required for disassembly.

c. A suitable forklift or other lifting device is required to load the forward transmission the CH-47.

d. All equipment required for loading will be transported with the load.

Section II. Preparing the Aircraft

2-2. General.

WARNING

Ground helicopters prior to any cleaning, disassembly, or preservation.

a. To reduce congestion in the vicinity of the cargo aircraft, process helicopters before towing them to loading site.

b. Cap or plug all disconnected oil, hydraulic, and fuel lines and vents.

c. Coat all removed hardware with corrosion - preventive compound (C-12). Replace in major conponent or secure in individual bags (C-2 or equivalent). Identify bagged hardware and secure to major component, or pack in a fiberboard box (C-5), identify, and secure within helicopter.

d. Pack all disassembled components except pylons, transmissions and rotor blades in cleated plywood boxes (C-6). Stow within helicopter.

e. Stow forward transmission and rotor blades within helicopter (figure 2-1.1).

NOTE

On CH-47D, disconnect squat switches prior to raising or lowering aircraft.

2-3. Cleaning. Clean helicopter as necessary in accordance with paragraphs 7-1 through 7-9.

2-4. Preservation and Packaging.

a. Drive System. Prepare drive system in accordance with paragraph 7-10.

b. Engine and APU. Preserve engine and APU in accordance with paragraphs 7-11 and 7-13.

NOTE

Do not preserve engine compressor and exhaust assemblies unless engines will be idle 14 days or longer.

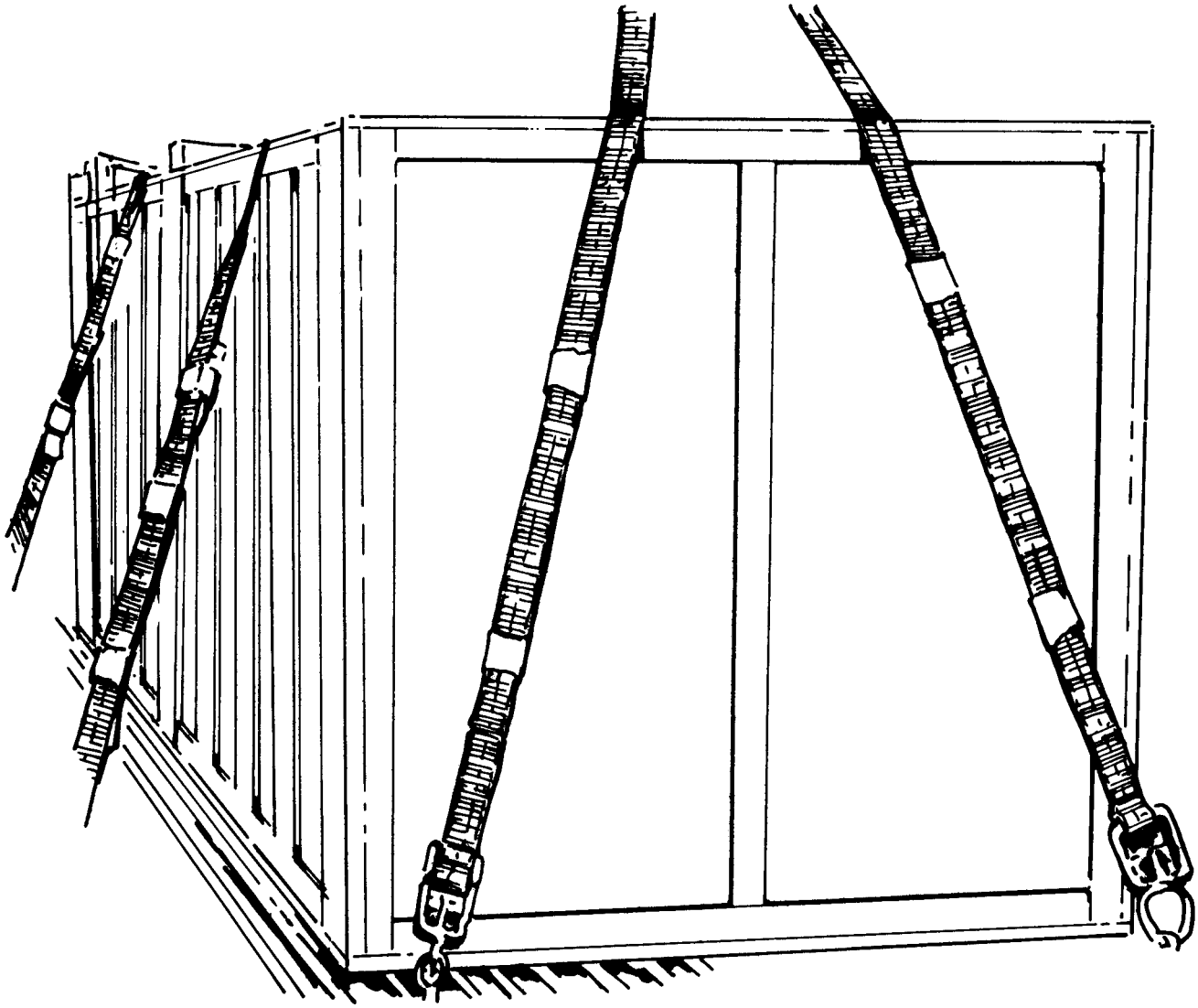


Figure 2-1. Removed Components Stowed Within Cargo Compartment

c. Hydraulic System. Preserve hydraulic system in accordance with paragraph 7-15.

d. Fuel System.

(1) Insure that fuel tanks are properly adjusted for shipment (maximum ¾ capacity or 150 gallons per tank, whichever is less).

(2) If purging is required, prepare fuel tanks and fuel system in accordance with paragraph 7-14.

e. Rotor Blades. Remove and prepare rotor blades in accordance with paragraph 7-16.

f. Forward Cowling and Fairing Assemblies.

(1) Open two forward work platfom and remove fairing and cowling assemblies. On CH-47D, also remove flexible air duct from hydraulic cooler fan.

(2) Cushion components as necessary with C-13 and place in a cleated plywood box (C-6).

(3) Secure boxes in helicopter cargo compartment (figures 2-1 and 2-1.1).

g. Forward Transmission Package.

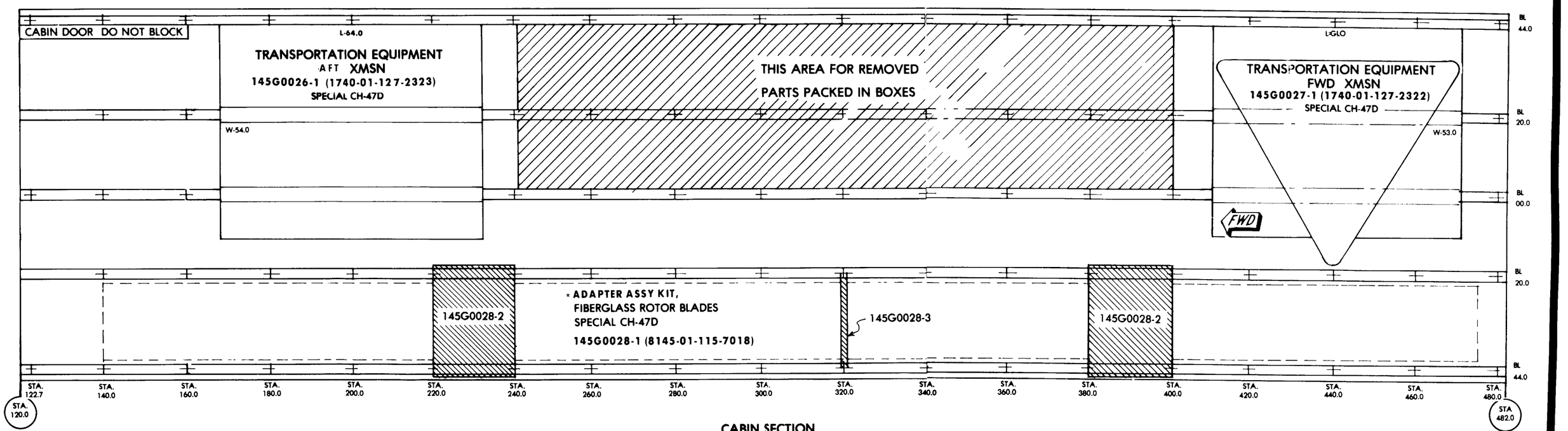
*(1) Color code each key in forward transmission adapter and plate assembly.

*(2) Remove forward cyclic bellcrank and support as an assembly.

CAUTION

Use care in mounting transmission on stand to prevent damage to transmission and components.

*These steps not applicable to CH-47D.



CABIN SECTION

***ADAPTER ASSY KIT,**

Consisting of:

2 each	145G0028-2
1 each	145G0028-3

Figure 2-1.1. CH-47D Components Stowed Within Cargo Compartment.

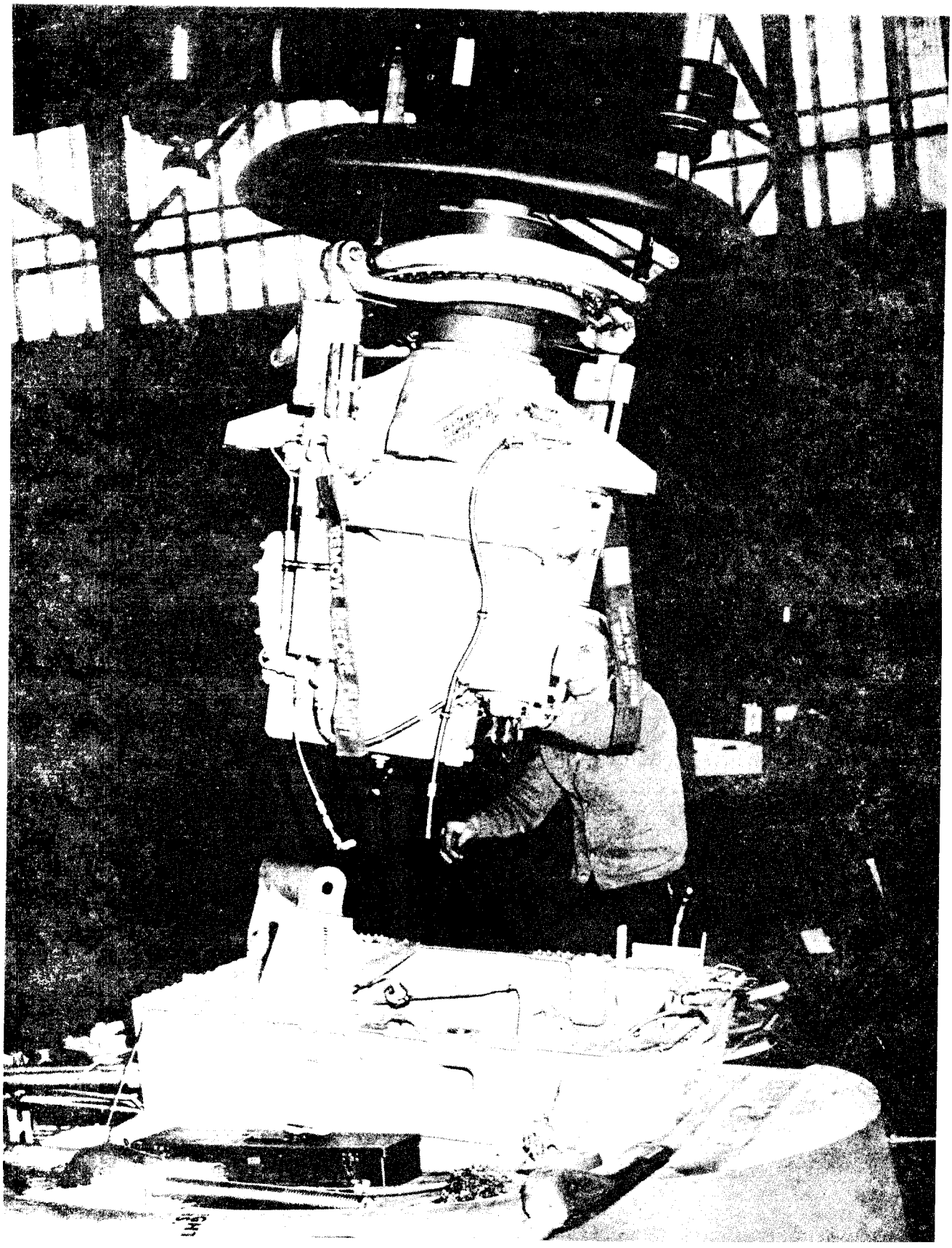


Figure 2-2. Removal of Forward Transmission Using Hoisting Adapter on Main Rotor Shaft

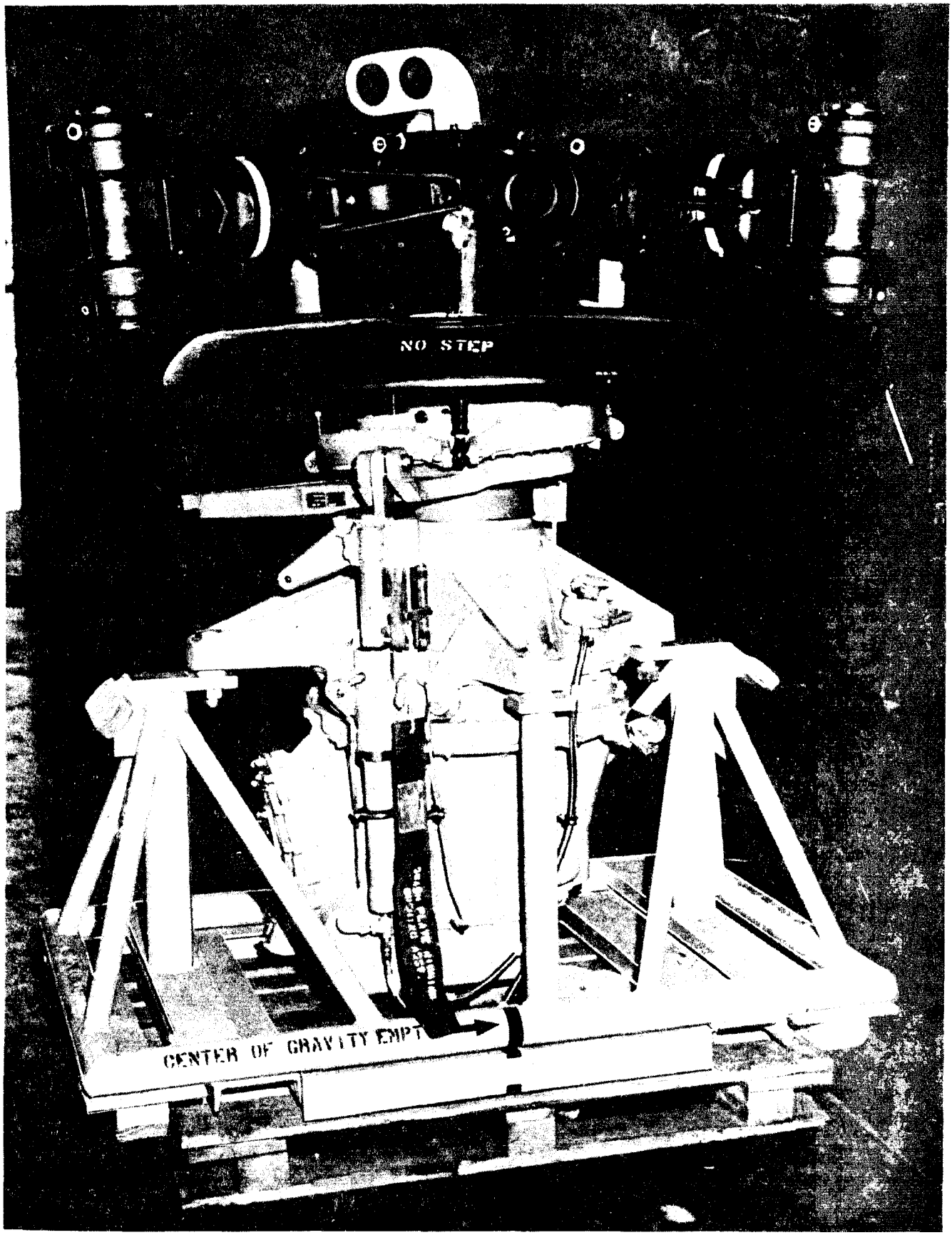


Figure 2-3. Forward Transmission Mounted on Work and Transport Stand

(3) Install transmission hoisting eye in vertical shaft. (Use P/N 145E5902-1, NSN 1730-01-130-1478 for CH47 aircraft and P/N 114E5909-8, NSN 1730-00-010-7462 for CH-47C aircraft)

(4) Remove forward transmission package (figure 2-2) and mount it on forward transmission work and transport stand (figure 2-3).

(5) Remove cabin work platforms, cyclic trim yolk, and drip pan brackets from forward transmission support structure.

NOTE

On CH47D, the cyclic trim yoke and support are part of

and removed with the forward transmission package.

(6) Fill rotor hub pitch-varying bearing oil tanks and vertical hinge pin bearing oil tanks as necessary.

(7) Clean vertical hinge pin and bearing inner race surfaces with a clean cloth dampened with solvent (C-18).

(8) Coat vertical hinge pin and inner race surfaces with corrosion-preventive compound (C-12).

(9) Cover vertical hinge pin areas with barrier material (C4) secured with tape (C-31).

(10) Secure forward transmission package in right side of helicopter fuselage with four MB-1 tiedown devices and chains (10,000-pound capacity). Refer to figure 2-1.1 for location of CH-47D components in the helicopter cargo compartment.

(11) Attach two nylon tiedown devices to rotor head and secure to transport stand to keep head from turning. This prevents oil from being pumped from transmission. Do not apply stress against devices.

h. Aft Transmission (CH-47D Only).

NOTE

Aft transmission removal is required prior to all pylon removal on the CH-47D aircraft only.

(1) Position the special aft transmission transport stand (P/N 145 G0026-1, NSN 1740-01-127-2323) on the helicopter loading ramp before transmissison removal.

(2) Remove the aft transmission in accordance with TM 55-1520-240-23-2.

CAUTION

The aft vertical shaft securing device (P/N 145G5996-1, NSN 4920-01-128-6321) is to remain installed while hoisting and transporting the aft pylon. It can be removed temporarily to permit access to pylon attaching hardware.

(3) Mount the transmission on the transport stand. Cover the vertical shaft opening immediately with barrier material (C-4) secured with tape (C-31.)

(4) Secure the aft transmission in the right side of the helicopter cabin with four MB-1 tiedown devices and chains (10,000-pound capacity), Refer to figure 2-1.1 for location of CH-47D components in the helicopter cargo compartment.

(5) Wrap the lower splined end of vertical shaft with barrier material (C-4) secured with tape (C-31),

i. Transmission Oil Coolers and Fan (CH-47D Only).

(1) Remove the oil cooler fan and duct from the combining transmission.

(2) Remove the two upper oil coolers (engine transmission coolers) from top of the combining transmission. Cover the top of remaining cooler with barrier material.

(3) Pack the oil coolers, fan, duct and fan shaft with cushioning (C-13) in a cleated plywood box (C-6) to be secured in right side of helicopter cabin (figure 2-1.1).

j. Aft Cargo Hook (CH-7D Only).

(1) Remove the aft cargo hook at station 409. Reinstall the two access plates on botton of fuselage.

NOTE

The center (main) cargo hook is stowed in the retracted position in rescue hatch.

(2) Pack the aft cargo hook with cushioning (C-13) in a cleated plywood box (C-6) to be secured in right side of helicopter cargo compartment (figure 2-1.1).

k. Aft Pylon Package.

NOTE

Aft transmission removal is required prior to aft pylon removal on the CH-47D aircraft only.

CAUTION

The aft pylon is sealed to the airframe with caulking compound which must be broken away prior to pylon removal. Use extreme care in removal or helicopter may be damaged.

(1) Coat vertical hinge pins and holes in rotor head with preservative (C-12). Reinstall pins in housing from which removed.

(2) Install one safety block (P/N 114E5900-14, NSN 1730-00-034-3874) on each upper boost actuator to prevent damage to rotor controls when hydraulic pressure is released.

(3) Wrap each rotor head pitch housing assembly with a barrier material (C-4) secured with tape (C-31).

(4) Remove aft pylon package (including components remaining installed) as a single unit.

(5) Remove hub retaining nut cover and install ring assembly. Place cover and screws in a bag (C-2) and attach bag to rotor head. Use hoisting adapter ring assembly P/N 145 E5902-1, NSN 1730-01-130-1478 on the CH-47D aircraft. Use P/N 114E5909-8, NSN 4920-00-010-7462 for The CH-47C aircraft.

(6) Attach hoist hook to adapter and adjust hoist to remove slack in cable.

(7) Remove pylon attachment hardware, noting locations of nuts, washers, and different length bolts.

CAUTION

Use care in placing pylon on skid to prevent damage to transmission and other components mounted beneath deck at waterline 72.00.

(8) Hoist pylon package (figure 2-4) and place it on vertical pylon handling skid (figure 2-5).

(9) Reinstall hub retaining nut cover.

(10) Position aft pylon package in cargo aircraft in accordance with figure 2-6, and secure in accordance with figure 2-8.

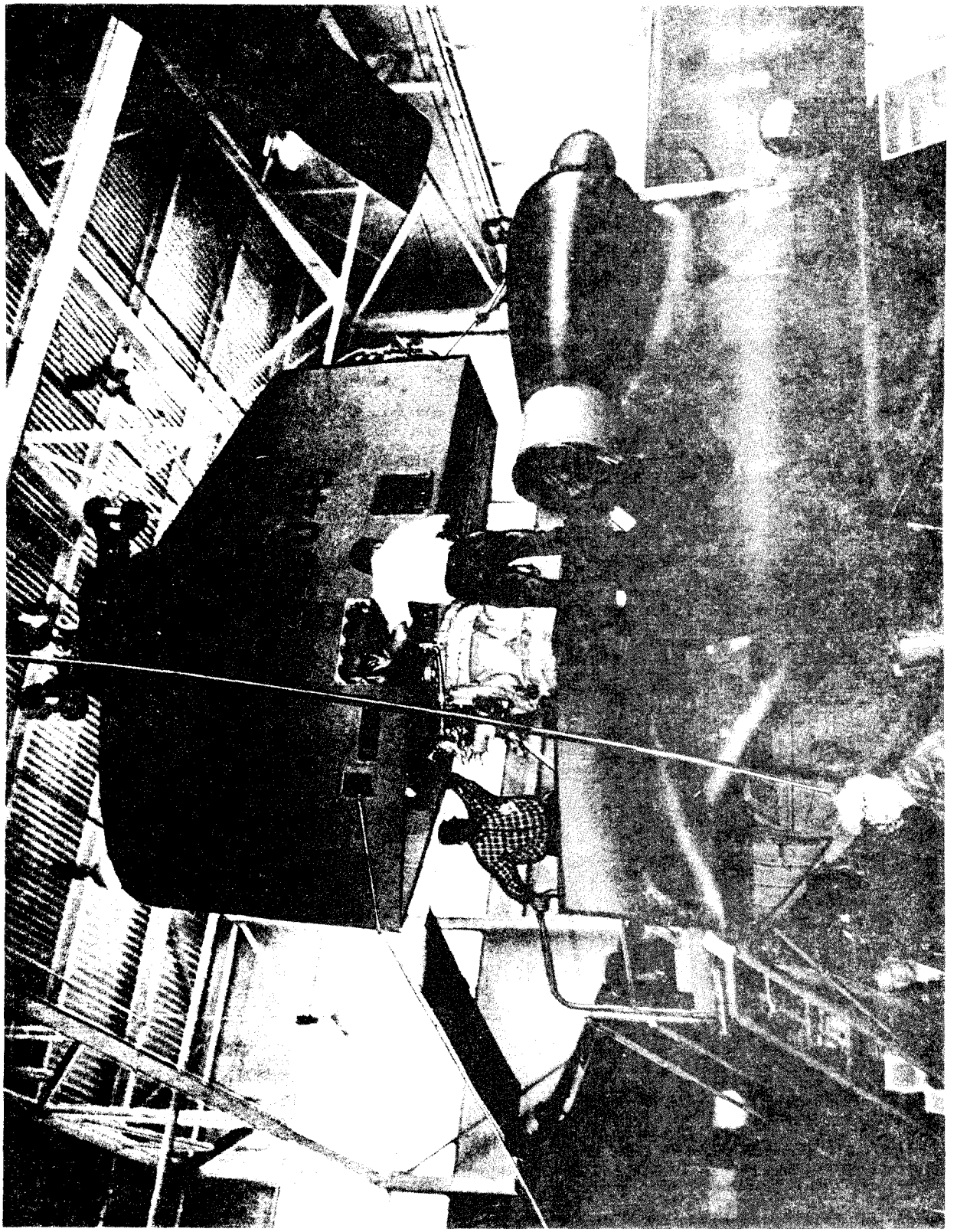


Figure 2-4. Removal of Aft Pylon Using Hoisting Adapter on Aft Drive Shaft

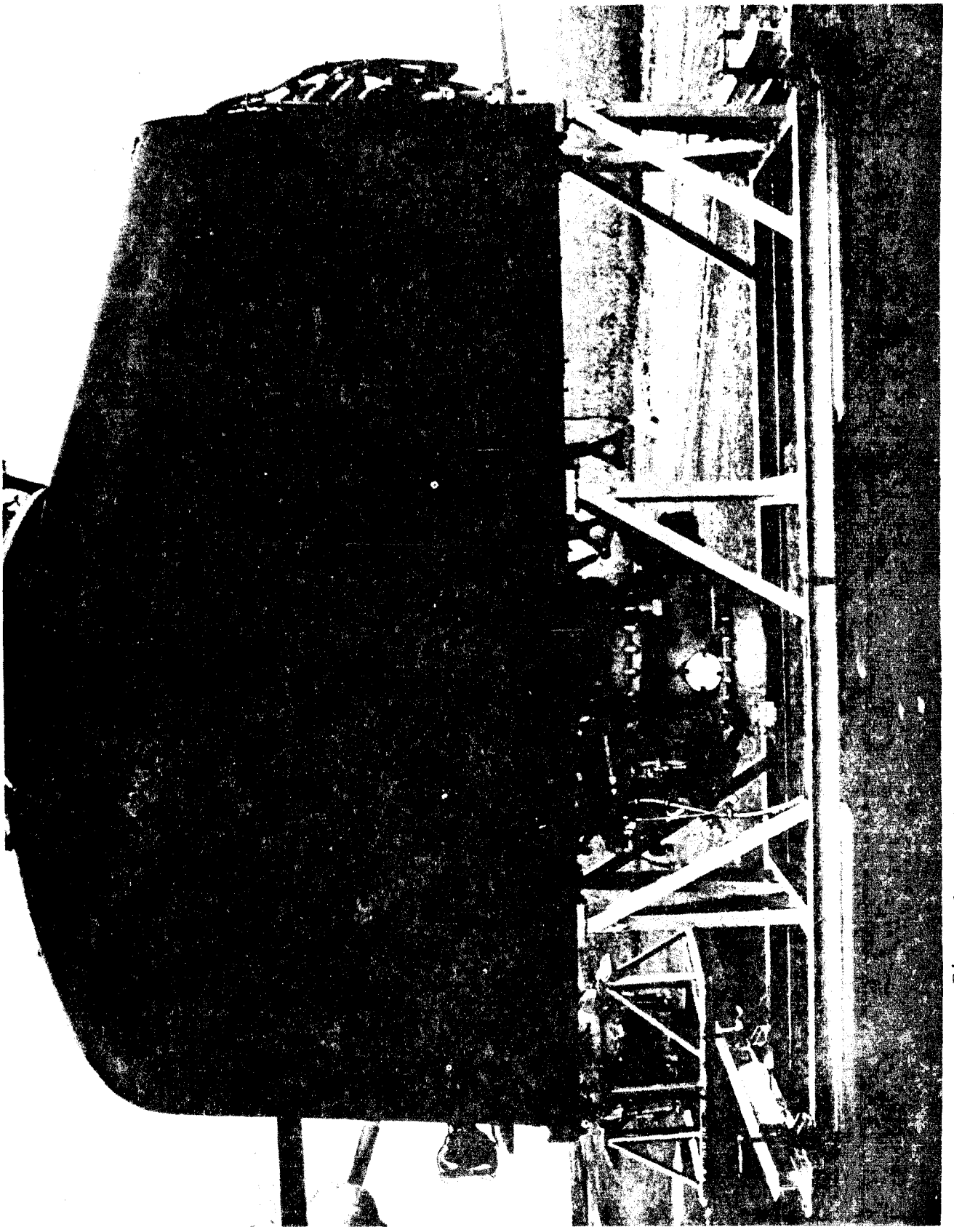


Figure 2-5. Aft Pylon Mounted on Vertical Pylon Handling Skid.

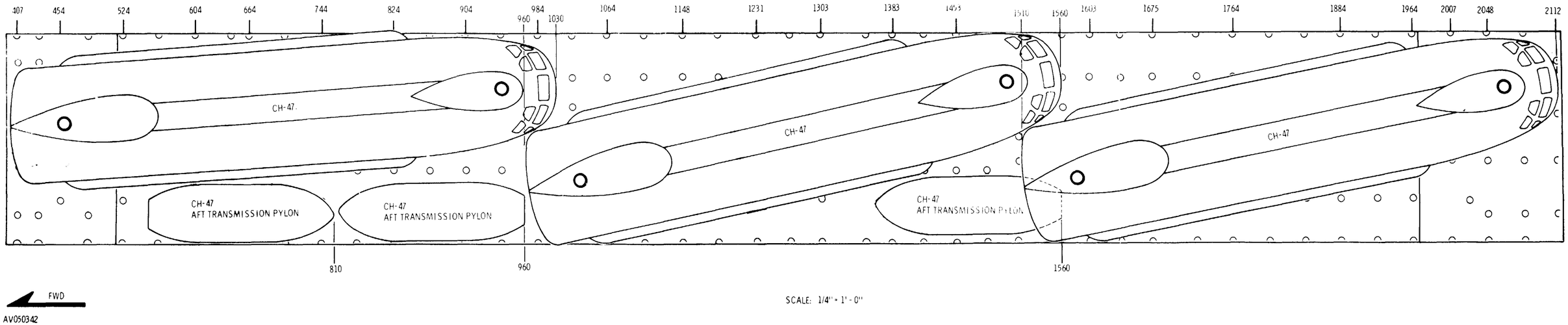


Figure 2-6. C-5 Loading Diagram

l. Instruments. Prepare instruments in accordance with paragraph 7-20.

m. Communications. Prepare communications systems in accordance with paragraph 7-21.

n. Battery. Preserve battery in accordance with paragraph 7-19.

o. Landing Gear. Preserve landing gear in accordance with paragraph 7-22.

p. Fuselage. Prepare fuselage in accordance with paragraph 7-23.

q. Additional Requirements (CH-47D Only).

(1) If helicopter is to be loaded through the forward end of the cargo aircraft, nose first, remove the number 1 flight boost hydraulic power control module and associated tubing at station 120. Removal of the module is not required if helicopter is to be loaded through the aft end of the cargo aircraft, tail first.

(2) If three helicopters are to be loaded into the cargo aircraft, remove the right hand (pilots) pitot tube from the nose of the helicopter that will be positioned in the aft end of the cargo aircraft.

(3) Package and stow all removed components as specified in paragraph 2-2.

2-5. Markings. Apply all markings in accordance with paragraph 7-24 through 7-26.

Section III. Functions and Responsibilities

2-6. Functions of Cargo Aircraft Crew. Air Force personnel can be expected to:

a. Advise and assist Army loading team.

b. Prepare cargo aircraft for loading and unloading.

c. Rig and operate loading aids belonging to cargo aircraft.

d. Designate exact location of helicopter(s) and components within cargo aircraft.

e. Determine restraint requirements.

f. Provide tiedown devices.

g. Inspect for correct tiedown.

2-7. Functions of Army Loading Team.

a. The Army installation perparing and loading aircraft must coordinate with Military Airlift Command (MAC) to ensure that aircraft are ready to load when the C-5 cargo aircraft arrives.

b. The Army loading team is expected to:

(1) Prepare helicopter for shipment.

(2) Load, tiedown, and unload helicopter.

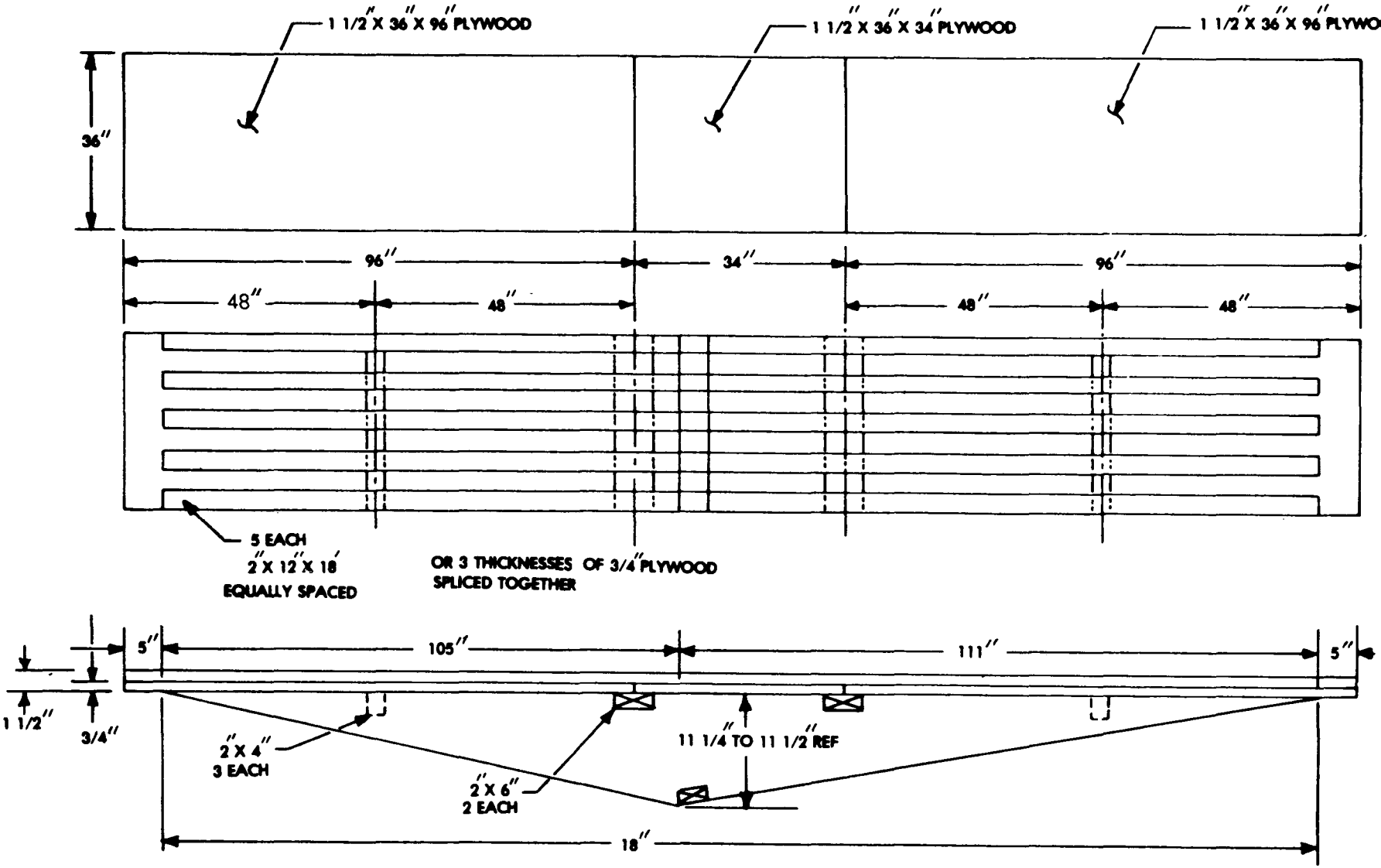
NOTE

Do not load aircraft or components in the absence of cargo aircraft commander or load-master.

WARNING

Use of predetermined CGs and estimated weights may cause severe damage to cargo aircraft and injury to personnel.

(3) Mark center of gravity (CG) of fuselage on side of fuselage package. Also, mark major components not stowed within helicopter. Verify shipping weights for each major component and record on manifest.



NOTES: 1. ALL LUMBER IN NOMINAL DIM.
2. NAILED CONSTRUCTION.
3. THE SEAMS OF THE SECOND LAYER OF FLOORING SHOULD OVERLAP THE FIRST SEAMS.

Figure 2-7. C-5 Ramp Extension

(4) Fabricate and install two ramp extensions in accordance with figure 2-7.

(5) Rig and operate loading devices not belonging to cargo aircraft.

(6) Be prepared to demonstrate that disassembled components are packaged correctly and secured in accordance with Air Force restraint requirements: 3 G's forward, 1 ½ G's aft and lateral, 2 G's vertical.

(7) Prepare manifest itemizing disassembled components stowed within helicopter as part of fuselage package.

(8) Furnish cargo aircraft commander DD Form 1387-2, listing all dangerous materials (defined by TM 38-250/AFM 71-4) to be shipped with or within helicopter.

Section IV. Preparing Cargo Aircraft

2-8. Preparing Cargo Aircraft. The cargo aircraft crew prepares the C-5 for loading. All excess equipment must be removed prior to loading.

Section V. Loading a C-5

2-9. Preparation for Loading.

a. Position helicopters and aft pylon packages at loading site to provide easy access for loading.

b. Prior to loading, deflate forward struts to within two inches of bottoming out. Aft struts to be fully inflated.

c. The loading team consists of at least eight men, plus one 463-L fork-lift operator, one experienced tug driver, and one leadman. Assign one man to each side of helicopter to check side clearances and one to check overhead clearances. Station two men aft of helicopter to control steering bars. If using a block and tackle instead of the electric winch, a tow truck and operator are required.

d. Attach two steering bars or universal tow bars to aft landing gear to steer helicopter into cargo aircraft.

CAUTION

Do not use aft jack point tiedown adapter to tow helicopter, since adapter is only designed for vertical stress. Damage to aircraft and/or adapter may occur if it is used to winch helicopter in or out of cargo aircraft.

e. Loop 10,000-pound tiedown chains so that two chains are attached to each forward tiedown ring, forming a bridle. (Use aft landing gear tiedown shackles when unloading.) Connect electric winch cable hook to bridle with open part of hook UP.

f. All tires on the helicopter shall be 67 (+2) PSI for air transport.

g. The gross weight of the helicopter shall not exceed 28,500 pounds.

2-10. Loading.

NOTE

All special loading aids, such as steering bars, universal tow bars, ramp extensions, and shoring accompany helicopter. This assures the cargo aircraft commander the capability of unloading under emergency conditions, without damage to cargo or cargo aircraft.

a. Slowly winch helicopter into cargo aircraft under direction of cargo aircraft loadmaster. Keep centerline of helicopter directly above centerline of ramp during winching.

b. When helicopter is completely winched into cargo aircraft, steer it in a straight line to its prescribed tiedown position (Figure 2-6).

NOTE

Positioning first helicopter is extremely important to properly position remainder of load.

(1) Place nose of first helicopter at station 2112, as close to right side of cargo aircraft fuselage as permitted by loadmaster.

(2) Place aft end of helicopter at station 1510, as close to left side of cargo aircraft fuselage as permitted by loadmaster.

c. Tow aft pylons into cargo aircraft with a tug or tow motor. Manually position No. 1 aft pylon between stations 1560 and 1400 on extreme left side of cargo aircraft.

NOTE

Do not block side walkway. Cargo aircraft crew must be able to walk to forward end without obstruction.

d. Position second helicopter parallel to first helicopter, between stations 1560 and 960.

e. Place No. 2 and No. 3 aft pylons against left side of cargo aircraft between stations 960 and 540.

f. Position third helicopter parallel to second helicopter between stations 1030 and 419, with tail extending over left side of forward ramp.

g. The helicopter in any load configuration shall have its CG within the limits so that the load shall not exceed 19,000 pounds at fuselage station 251.6 and 9,500 pounds at fuselage station 510.

Section VI. Tiedown

2-11. Tiedown.

a. Cover preserved area of forward strut pistons with barrier material (C-4) secured with tape (C-31).

b. Install 1-inch wooden collars on forward landing gear strut pistons and deflate struts until they rest lightly on collars. The wooden collar is to be locally manufactured (figure 2-9.)

c. Tiedown helicopters in accordance with figures 2-8 and 3-1.

WARNING

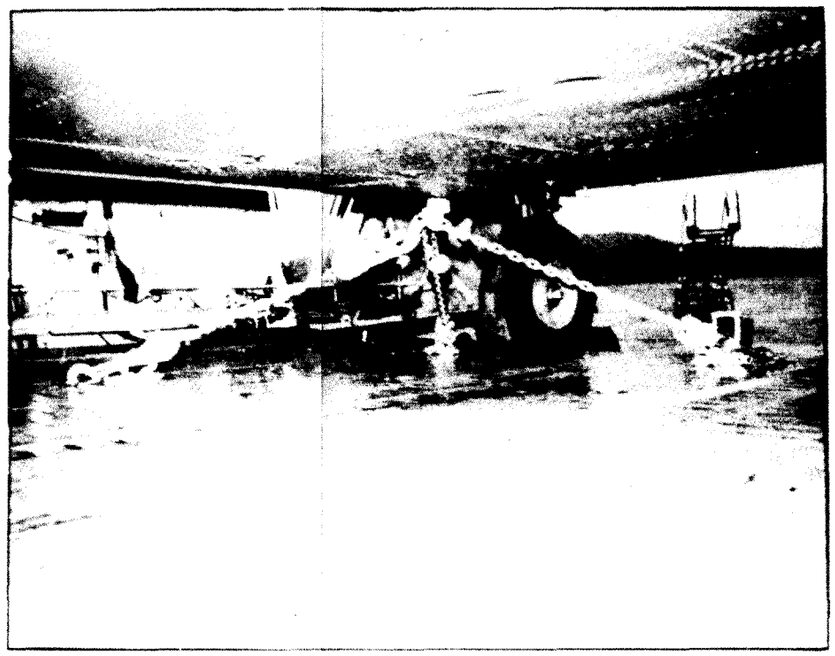
Do not attach tiedown chains to tiedown rings on aft pylon fixture. Stress from flight vibrations could cause tiedown rings to break.

d. Secure aft pylons with eight 10,000-pound tiedown chains attached to vertical supports of aft pylon fixture.

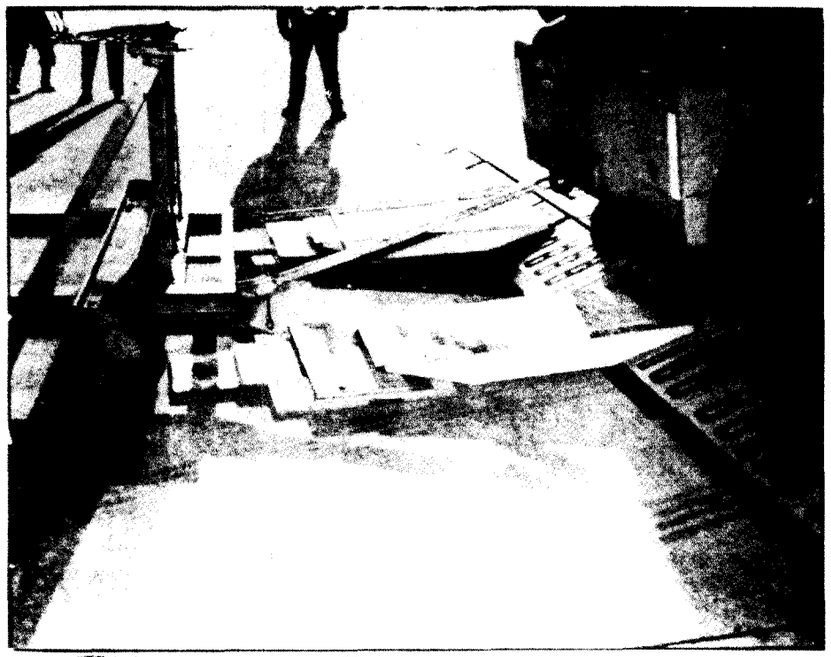
e. Attach one nylon tiedown device from each rotor head to tiedown rings on aft pylon fixture to prevent head from turning.

NOTE

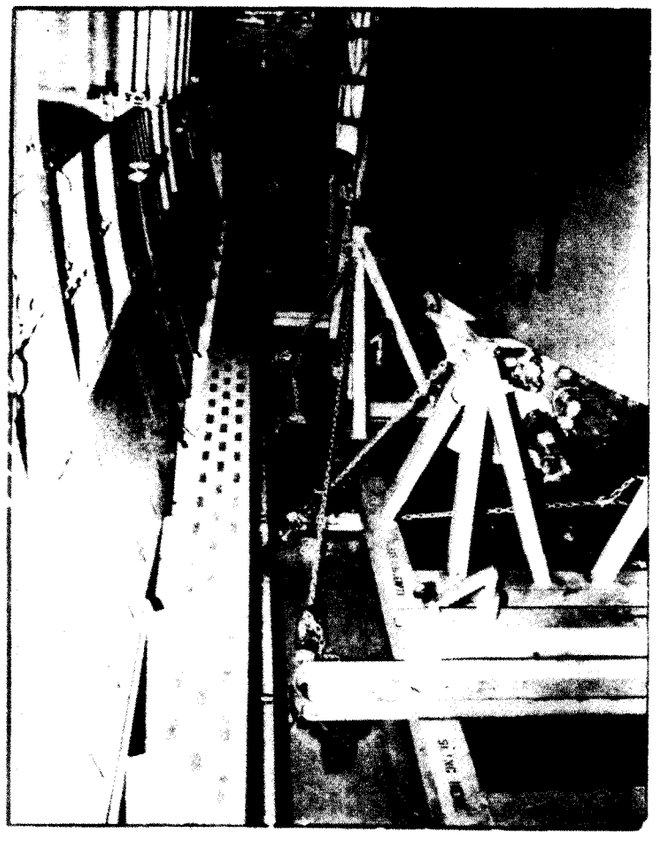
Apply no stress to tiedown devices.



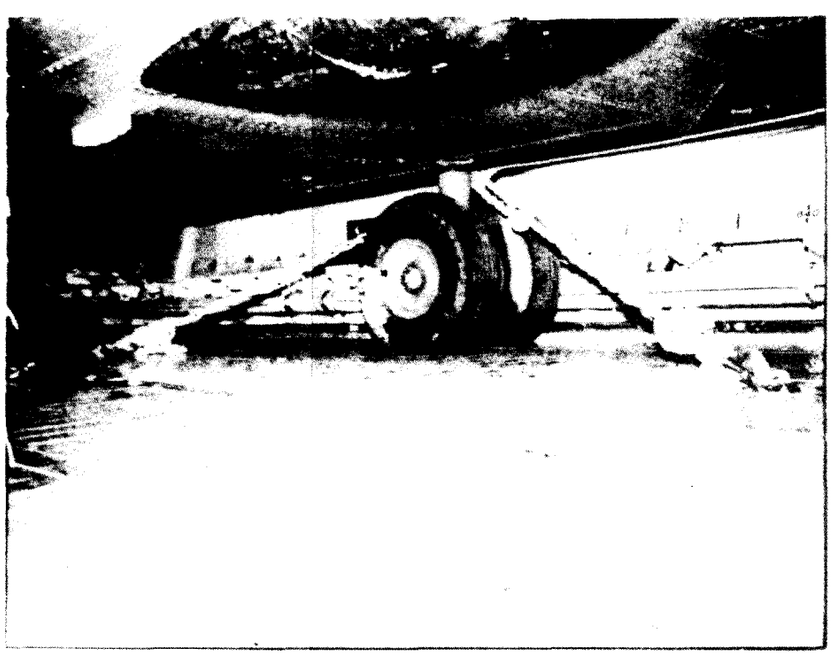
AFT JACKPOINT TIE DOWN



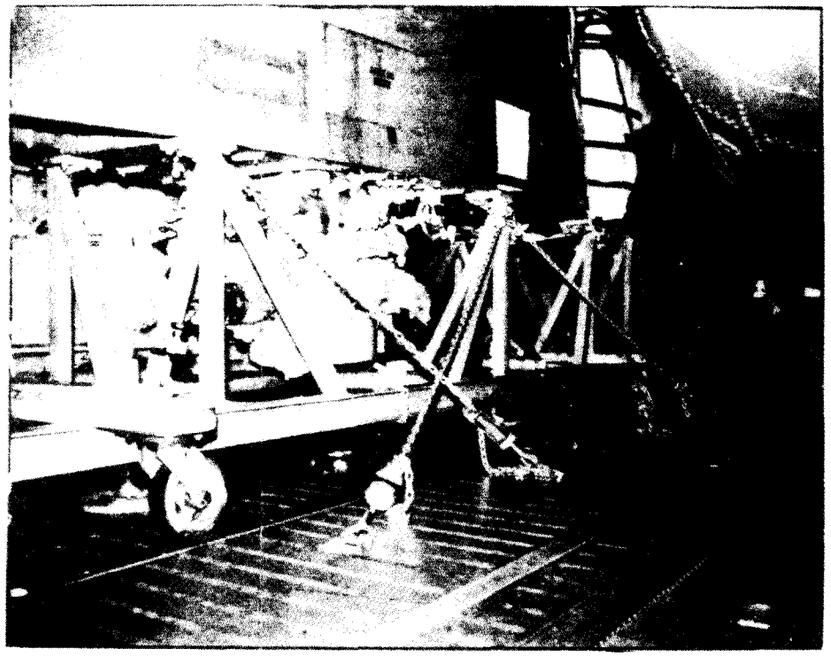
SHORING USED TO LOAD AFT PYLON FIXTURE



AFT PYLON TIE-DOWN



FORWARD TIE-DOWN ANGLES



AFT PYLON TIE-DOWN

Figure 2-8. C-5 *Tiedown Illustration*

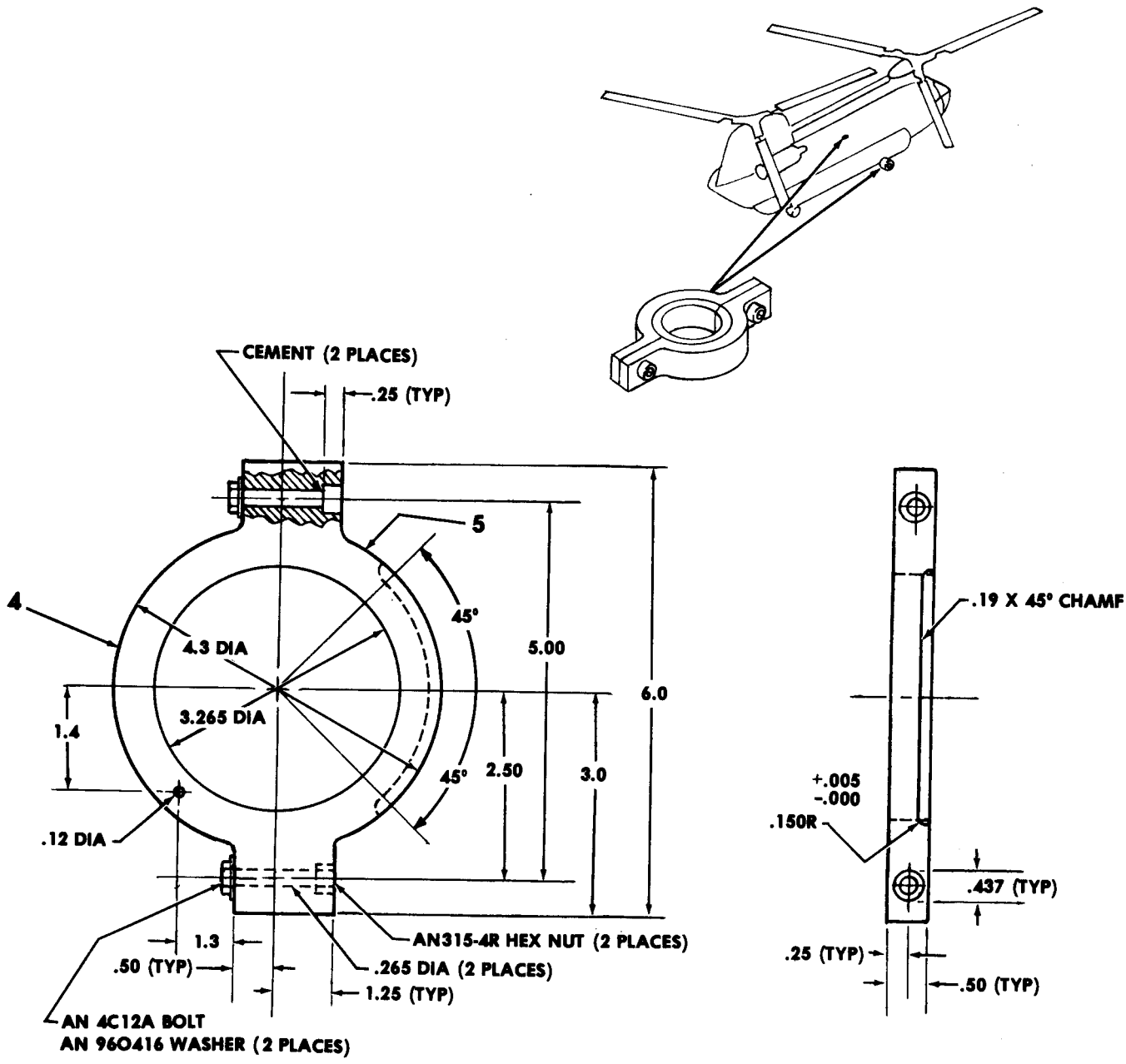


Figure 2-9. Safety Block, Landing Gear Fwd

CHAPTER 3

SHIPMENT BY VESSEL

Section I. Responsibilities

3-1. MTMC. Military Traffic Management Command (MTMC) is responsible for making necessary arrangements with Military Sealift Command (MSC) for use of vessels. MTMC is also responsible for arranging for a service stevedore activity or a commercial stevedore firm to load and tiedown aircraft and components. MTMC supervises these activities, along with MSC, and prepares loading plan and manifests after coordination with the shipper.

3-2. Shipper. The shipper is responsible for disassembly, preservation, protective covering of helicopter, and packaging of removed components. The shipper will furnish MTMC all the required information to efficiently load the helicopter on the vessel, (such as weight, cube and fueled or purged fueled tanks). The shipper will be responsible for installing protective covering on the helicopter in accordance with Appendix G. The shipper should be available to advise on loading and tiedown procedures, as necessary.

Section II. Preparing the Aircraft.

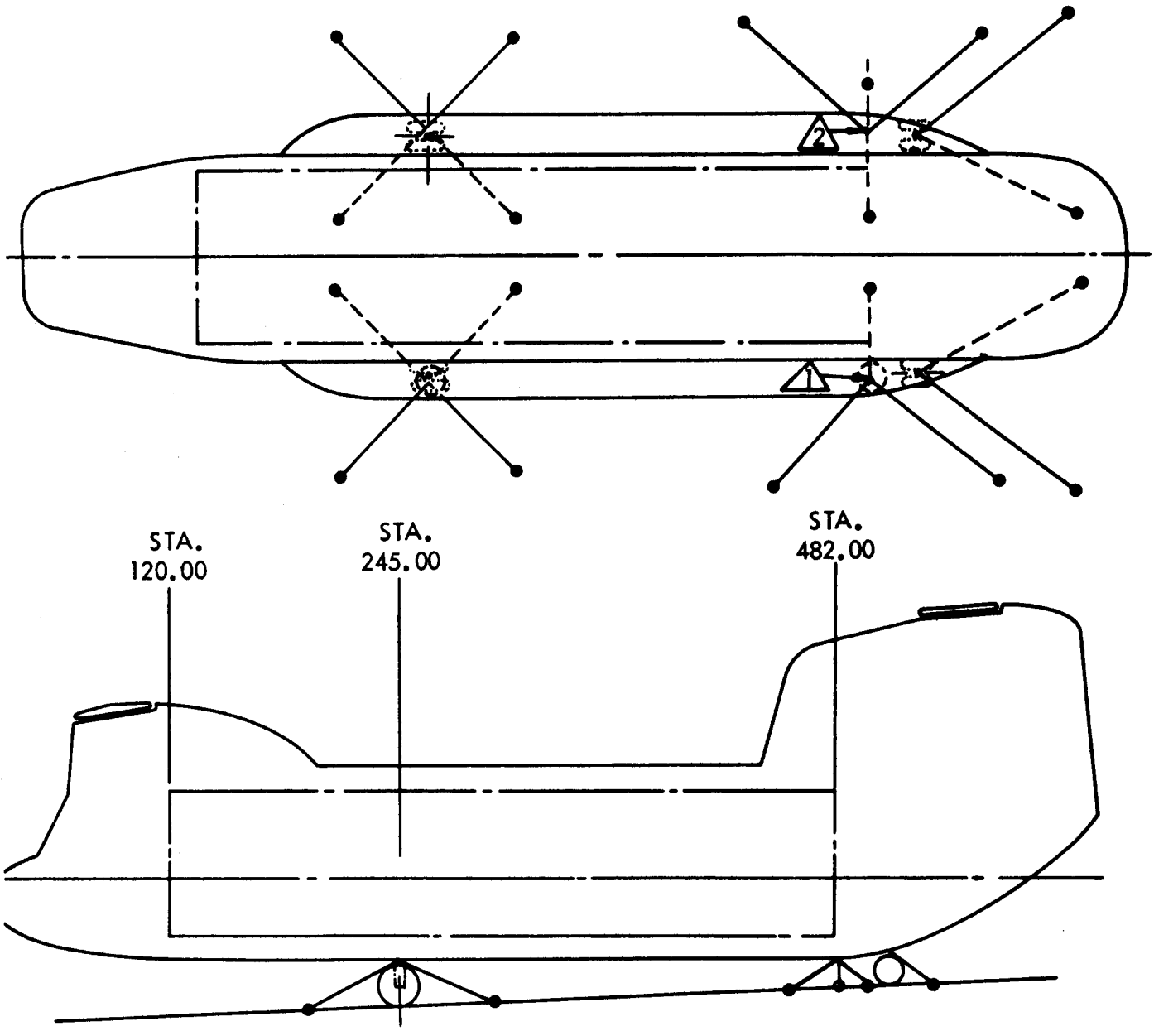
3-3. Cleaning. Clean aircraft as necessary in accordance with paragraphs 7-1 through 7-9.

3.4. Disassembly. Remove rotor blades in accordance with appropriate maintenance manual. Remove the HF antenna wire from the HF Standoff Supports, Coil the antenna wire, and tape coiled antenna wire to the fuselage. The HF Standoff Supports need not be removed.

3-5. Preservation and Packaging.

a. Drive System. Preserve drive system in accordance with paragraph 7-10.

b. Engines. Preserve engines in accordance with paragraph 7-11 or paragraph 7-12.



NOTES:

1. RESULTANT TIE-DOWN MUST BE VERTICAL.
2. AT AFT JACK POINT, REMOVE JACK PAD AND INSERT AFT JACK POINT TIE-DOWN ADAPTER IN ACCORDANCE WITH FIGURE 4.
3. TIE-DOWN ANGLE TO THE FLOOR WILL BE 30° TO 60°,
4. TIE DOWNS WILL BE EQUALLY SPACED AROUND TIE-DOWN POINT.
5. ALL TIE-DOWN CHAINS MUST HAVE A 10,000 POUND MINIMUM RATING.
6. INSTALL SUFFICIENT SHACKLES ON TIE-DOWN POINTS TO ACCOMMODATE TIE-DOWN CHAINS.

Figure 3-1. Tiedoum Diagram

Figure 3-2. Plexiglasss Protection

c. Auxiliary Power Unit. Preserve auxiliary power unit (APU) in accordance with paragraph 7-13.

d. Fuel Tanks.

(1) Ship helicopter with a maximum of ¾ capacity or 150 gallons per tank, whichever is less.

(2) Damaged helicopters will have fuel tanks purged in accordance with paragraph 7-14.

e. Hydraulic System. Preserve hydraulic system in accordance with paragraph 7-15.

f. Rotor Blades. Prepare blades in accordance with paragraph 7-16.

g. Rotor Heads. Preserve rotor heads in accordance with paragraph 7-17.

h. Rotor Controls. Prepare rotor controls in accordance with paragraph 7-18.

i. Battery. Preserve battery in accordance with paragraph 7-19.

j. Instruments. Prepare instruments in accordance with paragraph 7-20.

k. Communications. Prepare communications systems in accordance with paragraph 7-21.

l. I.anding Gear. Prepare landing gear in accordance with paragraph 7-22.

m. Fuselage.

(1) Prepare fuselage in accordance with paragraph 7-23.

(2) Cover windshields and transparent plastics with barrier material (C-3), secured to fuselage (not to glass) with tape (C-31). Tape should cover all edges of the barrier material to prevent tears on the barrier material and exposure of the glass or plastic. Cushioning material PPP-C-1797 (C-14) will be used in lieu of barrier material (C-3) when using heat shrink film protective covering on the helicopter.

(3) Install heat shrink film protective covering in accordance with Appendix G.

3-6. Marking. Mark in accordance with paragraphs 7-24 through 7-26. When heat shrink film protective covering is used, mark the cover in accordance with Appendix G.

Section III. Loading

3-7. Loading.

a. Sling loading for top deck vessel shipment.

(1) Attach aircraft hoisting sling to forward rotor and aft drive shafts with two hoisting adapters (ring assembly, forward transmission and aft vertical shaft).

CAUTION

Use of hoisting adapters with damaged threads is prohibited.

(2) Inspect hoisting adapter for thread damage. Fully screw hoisting adapter into shaft, A minimum engagement of eight threads is required.

(3) To attach hoisting adapters, remove hub retaining nut covers. Place covers and retaining cover screws in bag (C-2). Attach bag to rotor head.

(4) Hoist helicopter aboard carrier. Remove sling.

(5) Reinstall hub retaining nut covers. Close hoisting adapter opening.

b. Roll-on Roll-off (RORO) Loading. Tow helicopter on the RORO vessel in accordance with standard ground handling and towing procedures.

Section IV. Tiedown

3-8. Tiedown.

a. Tiedown helicopter in accordance with figure 3-1. The helicopter requires 18 lashings for tiedown. The lashings beneath the helicopter inboard of the tiedown points areas necessary as the outboard lashings. Tiedown angle of 30° to 60° are required.

CAUTION

Take extreme care to prevent tiedown cables from contracting landing gear housings. Also, avoid excessive tension on tiedown cables which could cause structural damage to helicopter.

b. Secure each landing gear wheel with wooden chocks fore and aft. Attach chocks together with 1 x 4-inch strips of wood. Make chocks long enough to provide clearance between these strips and side walls of tires. (TM 55-1520-400-14, figures 7-46 and 7-47).

c. For top deck shipment, wrap helicopter wheels with heat shrink film and secure with heat shrink tape in accordance with Appendix G.

Section V. Care Enroute

3-9. Care Enroute.

a. Minimize changes of corrosion damage by providing a maintenance escort to inspect aircraft periodically. Maintenance escort shall check security and tiedown cables for proper tension. Care should be exercised to avoid excessive tension which could cause damage to aircraft structure.

b. The maintenance escort shall check the protective covering periodically for fit and damage. Repair to the cover will be accomplished in accordance with Appendix. G.

3-10. Depreservation and Assembly. Depreserve aircraft and components and reassemble aircraft in accordance with applicable technical manuals. Complete and close out DA Form 2404, Preservation Depreservation Checksheet.

CHAPTER 4

SHIPMENT BY TRUCK OR RAIL

Section I. General

4-1. General.

a. Long distance overland movement requires extensive disassembly and a special low-boy drop-center outrigger trailer. The legal maximum dimensions for CONUS unrestricted transport are 55'x8'x13'6", therefore; permits for highway movement of the CH-47 will be required. The CH-47 wheels can be no more than 6 inches above the pavement to keep overall height below 13% feet. For specific information, contact U.S. Army Aviation Systems Command, ATTN: AMSAV-SDP.

b. A truck-loaded CH-47 is more than 12 feet wide, 53 feet long, and 14 feet high. It must carry a "WIDE LOAD" sign fore and aft, and should be followed by an escort vehicle with a flashing light. The route, clearances, movement times, and permits must be investigated and complied with.

NOTE

No acceptable procedures have been established for shipment of Army aircraft bv rail. For further information, contact US Army Aviation Systems Command, ATTN: AMSAV-SDP

c. Long haul truck shipments of serviceable and reparable aircraft will be made in trucks with soft ride suspension systems. Deviations will be authorized only by Commander, AVSCOM, ATTN: AMSAV-SDP.

d. Responsibilities: The Military Traffic Management Command (MTMC) has the responsibility to provide appropriate vehicles for truck shipments, when contacted by the appropriate command. MTMC will prepare a loading plan and manifest under close coordination with the shipper. Aircraft will be delivered to the loading point at time designated by MTMC. The shipper will furnish MTMC with information required to efficiently load vehicle and will be available to give advice on loading and tiedown procedures, as required.

Section II. Short Haul Shipments

4-2. Short Haul Shipments.

a. When it is necessary to move a CH-47 a short distance, it is possible to tow the aircraft. If hard surface roads connect the sites and a time can be selected when traffic is minimal, the aircraft may be towed on its own wheels.

CAUTION

Before towing, ensure that aft wheel swivel lock switch is in SWIVEL RELEASE position.

Visually confirm that swivel locks are released.

b. Use CH-47 tow bar (NSN 1730-00-967-9556) with a tow vehicle having an automatic transmission and adequate brakes to restrain 25,000 pounds on an incline.

Section III. Long Truck Shipments

4-3. Disassembly.

a. Disassembly of helicopter will be performed as listed in Table 2-1. Removal of components will be in accordance with the appropriate maintenance manual. AFT cargo hook may remain installed for truck shipment.

b. Use a crane capable of lifting ten tons, and with a boom long enough to reach lifting adapter at the top of forward and aft vertical drive shafts.

NOTE

An Army M8-19 wrecker with 26-foot boom can barely be used, Its boom should have supports to the ground.

c. Disconnect battery. Wrap and secure quick-disconnect plug to airframe.

4-4. Preservation and Packaging.

NOTE

If truck shipment is to be followed by air or vessel shipment, follow the procedures given in Chapter 2 or 3, as applicable.

a. Drive System. Coat bare metal surfaces of drive system with corrosion preventative compound (C-12).

b. Engines and APU.

(1) Preserve engines and APU in accordance with aragrahs 7-11 and 7-13.

(2) If engines are inoperable or if the fuel system is empty, preserve engine in accordance with paragraph 7-12.

c. Fuel System.

(1) Insure that fuel tank levels are properly adjusted for shipment, maximum ¾ capacity or 150 gallons per tank, whichever is less.

(2) If purging is required, prepare fuel tanks and fuel system in accordance with paragraph 7-14.

d. Rotor Blades. Prepare rotor blades in accordance with paragraph 7-16.

e. Rotor Heads. Preserve rotor heads in acordance with paragraph 7-17.

f. Fuselage.

(1) Cushion and pack all removed cowling, fairings, and components in cleated plywood boxes (C-6) and stow within the CH-47 cargo compartment. Secure to floor with nylon straps.

(2) Cover all openings (pylon openings, pitot tube, missing windows) with barrier material (C-4) secured with tape (C-31).

(3) Lock cyclic and collective pitch control.

(4) Deenergize circuit breakers.

(5) Place all manuals in a fiberboard box (C-5). Secure to co-pilot's seat with safety harness.

(6) Secure overhead panel fixtures with tape (C-31).

(7) Cushion all navigation and landing lights with C-14 secured with tape (C-31).

(8) Secure first aid packs, windshield wiper blades, and clocks in a fiberboard box (C-5). Secure flaps with tape (C-31), identifiy, and secure in helicopter fuselage.

(9) Package and mark fire extinguishers in accordance with TM 38-250.

(10) Tie up troop seats and/or litters.

(11) Secure loose gear to prevent movement during shipment.

(12) Afler all entries are made, place equipment log book, maintenance and historical records in a polyethylene bag (C-2). Identify, heat seal, and secure to pilot's seat with safety belt.

(13) Check tire pressure for proper inflation.

(14) Install tiedown adapters at aft jack pad locations.

(15) Install air intake exhaust covers.

(16) Install one inch padded wooden collars on forward struts. Deflate struts until cylinder rests lightly on collar. The wooden collar is to be locally manufactured (figure 2-9).

(17) Bleed oleos to bottom-out aft shocks struts. Close valve.

(18) After all disassembled components are secured within CH-47, tie cargo ramp securely in UP position.

g. Hydraulic System. Preserve hydraulic system in accordance with paragraph 7-15.

h. Forward Cowling and Fairing Assembly. Remove, preserve and package in accordance with paragraph 2-4f.

i. Forward Transmission Package. Remove, preserve, and package in accordance with paragraph 2-4g.

j. AFT Transmission (CH-47D). Remove, preserve, and package in accordance with paragraph 2-4h.

k. Transmission oil Cooler and Fan (CH-47D). Remove, preserve, and package in accordance with paragraph 2-4i.

l. AFT Pylon Package,

(1) Remove, preserve, and package in accordance with paragraph 2-4k.

(2.) Stow aft pylon package on low-boy drop-center outrigger trailer.

m. Instruments. Prepare instruments in accordance with paragraph 7-20.

n. Communications. Prepare communications systems in accordance with paragraph 7-21.

o. Battery. Preserve battery in accordance with paragraph 7-19.

p. Landing Gear. Preserve landing gear in accordance with paragraph 7-22.

4-5. Protective Covering. Protective covering will be applied to the helicopter in accordance with Appendix G.

4-6. Markings. Apply all markings in accordance with paragraph 7-24 through 7-26 and Appendix G.

4-7. Loading.

a. When using special low-boy drop-center outrigger trailer available at New Curnberland Army Depot, tow/winch CH-47 aboard trailer.

b. If a conventional low-boy trailer is used, a 20-ton crane is necessary to position CH-47 on trailer. The four-point lifting sling must be used.

CAUTION

Total aircraft weight cannot exceed 20,000 pounds when using sling.

4-8. Mooring.

CAUTION

Do not overstress aircraft tie-down points with log chains and large turnbuckles. Each tiedown is limited to 5,000 pound tension.

Secure CH-47 to trailer at four tiedown areas using fore and aft restraints from each.

CAUTION

Ensure that there is sufficient clearance to avoid contact between landing gear strut pistons and tiedown chains during shipment.

CHAPTER 5

CRATED SHIPMENT

This chapter is not applicable to the CH-47.

CHAPTER 6

TACTICAL SHIPMENT

6-1. General.

a. Tactical movement represents the fastest deployment of a unit by any given mode of shipment. To accomplish this goal, disassembly (and subsequent reassembly) must be kept to a minimum.

b. If maximum utilization of carrier space is more important than time saved, a logistic move (with maximum disassembly) is advisable.

c. Since CH-47 shipment is restricted by its size, the tactical/logistic distinction does not exist. Therefore, refer to Chapter 2 or 3, as applicable for all procedures.

CHAPTER 7

PREPARATION FOR SHIPMENT

Section I. Cleaning

7-1. General. Cleaning aircraft before preparation for shipment is important since residue from exhaust gases or contamination of any kind accelerates corrosion.

7-2. Interior.

a. Thoroughly vaccum interior.

b. Clean upholstery and soundproofing material with mild soap (C-30) and water.

CAUTION

Although cleaning solvent (C-8) is safe and nonflammable, use with adequate ventilation and avoid prolonged breathing of vapors. Do not use near open flames or heat. Avoid contact with skin.

c. Use cleaning solvent (C-8) as necessary to remove oil or grease.

7-3. Exterior.

a. Protect windows and windshields with barrier material (C-4). Secure with tape (C-31), All edges of the barrier material must be taped to the fuselage (not to glass). When heat shrink film protective covering is used, substitute cushioning material, (Appendix G) in lieu of barrier material (C-4).

CAUTION

Water in pitot tube or static port openings causes incorrect flight instrument indications and erratic automatic flight control operation. Water in synchronizing shafts causes high frequency vibration during flight.

b. Seal pitot tube and instrument static port openings with barrier material (C-4), secured with tape (C-31).

c. Protect lubricated parts from cleaning solution.

d. Open all drain plugs on bottom of fuselage and ramp to drain accumulated water.

e. Prepare a mixture of one part cleaning compound, (C-7) in three to seven parts water. Use stronger mixtures for exhaust outlet areas and other very dirty surfaces.

CAUTION

Rinse off cleaning solution splashed on plexiglass with clear water before it dries, making plexiglass hazy.

f. Apply cleaning solution in liberal quantities to one small section at a time. Allow it to remain five to ten minutes. Scrub with a soft bristle brush to remove heavy soil.

CAUTION

If solution is allowed to dry or is not completely rinsed off, it could damage painted surfaces.

g. Rinse surface thoroughly with a stream of water.

h. Inspect surfaces and lubricate as necessary in accordance with lubrication charts.

7-4. Windshield and Transparent Plastics.

a. Carefully wash windshield and plastic surfaces with mild soap (C-30) and water. Use finger pads to dislodge insect specks, caked dirt, and mud.

b. Rinse thoroughly with clean water and allow to dry.

c. Raise windshield wiper blade. Wipe rubber surface with damp cloth to remove dirt.

d. Remove grease or oil with aliphatic naphtha (C-25).

e. Lightly dust interior plastic surfaces with a soft clean cloth. Wipe surfaces with a damp clean cloth or sponge.

NOTE

Keep cloth or sponge free of grit by frequent rinsing in clean water.

7-5. Hydraulic Pistons.

a. Protect tires from fluid with suitable covers.

CAUTION

Hard rubbing causes grit to scratch metal surfaces.

b. Clean exposed pistons with clean cloths dipped in hydraulic preservative (C-20) or hydraulic fluid (C-19). Do not damage highly finished surfaces or seals.

c. Flush away dirt with hydraulic fluid (C-19) or preservative (C-20). Do not rub dirt off. Change cloth frequently.

d. If hydraulic fluid (C-19) was used, apply a coat of hydraulic preservative fluid (C-20) to prevent corrosion.

7-6. Battery.

a. Remove battery.

b. Thoroughly clean battery exterior, quick-disconnect plug, battery compartment, sump jar, felt pad, and vent hoses with vinegar (C-33).

c. Rinse with clean water and allow to dry.

d. Saturate felt pad in sump jar with vinegar solution.

e. Reinstall parts and battery.

7-7. Rotor Blades.

NOTE

Care should be taken to prevent any solvent from contacting the fiberglass blade.

a. To remove light soil, wipe rotor blades with a soft, clean cloth.

b. To remove heavy soil, clean as necessary.

(1) Rinse blades with clean water to remove any loose dirt.

(2) Wash blades with mild soap (C-30) and water, using a soft, clean cloth.

(3) Rinse blades thoroughly with clean water.

7-8. Relief Tube.

a. Clean relief tube horn with soap (C-15) and water, using a bristle brush.

b. Flush horn and tube with soap (C-15) and water solution, then rinse with disinfectant (C-17).

c. Clean area around relief tube outlet with soap (C-15) and water, using a soft bristle brush. Rinse with water.

7-9. Magnesium and Aluminum Alloy Corrosion. Treat magnesium and aluminum alloy corrosion in accordance with TM 55-1500-204-25/1. Immediately after chemical treatment dries, apply protective paint finish to affected area in accordance with TB 746-93-2.

Section II. Preservation and Packaging

7-10. Drive System.

a. Service engine oil systems, transmission oil systems, and APU oil system with operating oil (C-23).

b. If engine is operable, add corrosion preventive concentrate (C-32) to oil system in accordance with TB 55-9150-200-24.

NOTE

If engines cannot be motored, proceed to step e.

c. Start engines. Operate for 10 minutes at approximately 75 percent of rated speed or at highest power possible without gaining flight attitude. Ensure that temperature stabilizes and check instruments for normal operation. Shut down engines.

d. Remove fuel control filters and strainers. Clean with solvent (C-18) and reinstall.

NOTE

Do not attempt to remove pump filter from fuel controls with single element pump.

e. Clean drive system exterior surfaces, as necessary, with clean cloth and solvent (C-18).

f. Coat bare metal surfaces of drive system with corrosion preventive compound (C-12).

g. Tag engine condition levers with: ENGINE, TRANSMISSION, AND APU OIL SYSTEMS PRESERVED WITH OPERATING OIL.

7-11. Operable Engines.

NOTE

Do not treat engines for corrosion if they have been involved in an accident where engine failure or malfunction is known or suspected to have been a factor. Ship these engines to overhaul depot or designated investigation area without treating for corrosion prevention.

a. Keep engine and accessories clean and free of foreign materials. Use solvent (C-18) when external cleaning is necessary.

b. Preserve engine fuel system.

(1) Open No. 1 and No. 2 ENG IGNITION circuit breakers. Tag circuit breakers: DO NOT CLOSE CIRCUIT BREAKERS.

(2) Disconnect main fuel hose at oil cooler assembly fuel outlet port and attach drain hose.

(3) Disconnect starting fuel hose assembly from starting fuel tube connection. Attach drain line.

(4) Place free ends of drain hoses in a 2-gallon container.

(5) Disconnect airframe fuel line.

(6) Pour one gallon lubricating oil (C-22) into a 2-gallon container. Elevate container and connect a hose between it and fuel boost pump inlet port or fuel purifier inlet port.

(7) Connect ac power to aircraft.

(8) Connect hydraulic power to utility hydraulic system.

(9) Set engine condition lever to GROUND and set the START FUEL switch to OPEN.

(10) Motor engine to 12 percent N1 speed to flush fuel system with lubricating oil (C-22). Continue motoring until approximately one gallon of lubricating oil passes through system.

(11) Cycle ENG CONDITION lever between GROUND and FLIGHT at least five times during motoring.

(12) Move power lever (N1) to OFF and set START FUEL switch to CLOSE.

(13) Shut off ac power source to aircraft.

(14) Shut off hydraulic power source to utility hydraulic system.

(15) Disconnect and remove hose and oil container.

(16) Remove drain hose connected to starting fuel hose. Connect starting fuel hose to starting fuel connection.

(17) Remove drain hose connected to oil cooler assembly fuel outlet port. Connect flexible hose to fuel outlet port.

c. Preserve Engine Compressor.

(1) Disconnect flexible tube assembly from connector. Place protective cap over opening to prevent corrosion preventive oil from entering air-bleed hose and air-bleed actuator.

(2) Apply dc power and utility hydraulic power to aircraft. Do not disconnect until engines and APU are completely preserved.

(3) Turn anti-ice switch OFF to prevent bleed air from passing through.

(4) Disconnect flexible tube assembly at diffuser housing. Cap port.

(5) Disconnect inlet and exit air tubes from temperature-sensing adapter assembly. Cover open ends of tubes with caps or barrier material (C-4). Secure tubes to engine to prevent physical damage.

(6) Ensure that engine is cool enough to preclude auto-ignition.

(7) Using starter, motor engine to starting rpm. With power lever OFF, permit engine to coast down. As engine coasts down, use a 16-ounce aerosol can with snorkel tube to spray compressor blades with preservative (C-34 or (C-29).

(a) Hold can so that snorkel tube projects between inlet housing struts.

(b) Direct jet stream between any two inlet guide vanes onto rotating compressor blades.

(c) Move jet stream from tip to base of blades for 3U seconds, covering as much of blade as possible with preservative.

(8) Reconnect compressor air-bleed assembly air hose. Disconnect dc power

and utility hydraulic power to aircraft.

(9) After engine stops, spray turbine rotors through exhaust with sufficient preservative (C-34) to cover blades.

(10) Deactivate hot-air valve solenoid.

d. Visually check entire engine.

(1) Close engine cowl.

(2) Plug all holesand cap all ports.

(3) Cover all baremetal surfaces, including internal and external threads, with corrosion- preventive compound (C-12).

(4) Install engineair inlet and exhaust covers or seal air inlet and exhaust with barrier material (C-4) secured with tape (C-31).

e. Tag pilot's controls with: ENGINE SERVICED WITH STANDARD OPERATING OIL. FUEL CONTROL PRESERVED WITH MIL-L-6081, GRADE 1010 LUBRICATING OIL. FLUSH WITH STANDARD FUEL BEFORE PLACING IN SERVICE.

f. Record extent of engine preservation in engine historical records. Specify that corrosion-preventive concentrate was added to engine oil system in accordance with TB 55-9150-200-24, and that flushing is not required.

7-12. Inoperable Engines.

NOTE

Do not treatengines involved in an accident where enginefailure or malfunction is known or suspectedto have been a factor. Ship these engines to an overhaul depot or designated investigation area without treating for corrosion.

a. Clean engine and accessories of all foreign materials. If external cleaning is necessary, use solvent (C-18).

b. Disconnect fuel lines and drain plugs from fuel control.

c. Drain all fuel from pump pressure fittings, pump inlet, pressure tap, fuel inlet port, main and starting fuel outlet ports, and drain port.

CAUTION

Do not attempt to remove pump filter from fuel controls with a single element pump.

d. Remove, clean, and reinstall fuel strainer and filters.

e. Allow fuel to drain from control unit.

f. Install high pressure caps on all fuel lines and on all fuel boost pump and fuel control ports except fuel inlet ports.

g. Pour lubricating oil (C-22) into fuel control inlet port and fuel boost pump inlet port. Cap ports.

h. Preserve compressor blades with preservative (C-34), using 16-ounce aerosol can with snorkel tube.

(1) Spray preservative between inlet housing struts. Direct jet streams evenly on all compressor blades.

(2) Apply jet stream for 30 seconds.

i. Spray turbine rotors through exhaust with sufficient preservative (C-34) to cover blades.

j. Visually check engine.

(1) Plug all holes, cap all ports, and ensure that all external parts are complete and secure.

(2) Cover bare metal surfaces, including internal and external threads, with a film of lubricating oil (C-23).

(3) Close engine cowl. Seal all louvered cowl openings with barrier material (C-4) secured with tape (C-31).

k. Install engine air inlet and exhaust covers, or seal openings with barrier material (C-4) secured with tape (C-31).

l. Record engine preservation and date in aircraft log book.

m. Tag engine start switch with: ENGINE PRESERVED, MAINTENANCE REQUIRED, DO NOT OPERATE.

7-13. Auxiliary Power Unit.

a. Remove all electrical power from aircraft.

b. If APU is operable, add corrosion-preventive concentrate (C-32) to oil system in accordance with TB 55-9150-200-24.

c. Service APU oil sump to FULL.

d. Service aft transmission with oil (C-23), as necessary.

CAUTION

To prevent accessory gear box damage, ensure that aft transmission is serviced before APU is motored.

e. Flush APU fuel system as follows:

(1) Disconnect fuel line from fuel filter inlet port. Cap fuel line with high pressure cap.

(2) Disconnect power supply connector from ignition exciter.

(3) Disconnect fuel lines from main fuel manifold and start fuel nozzle. Connect a drain hose to each disconnected line. Place free ends of drain hoses in a l-quart container.

(4) Remove cover from APU and generator control box, located at station 518 on the left side of the aft cabin.

(a) Disconnect electrical wire from terminal X2 of relay K1.

(b) Connect a single pole single-throw toggle switch between disconnected wire and terminal X2.

(c) Turn switch ON.

(5) Check that utility system accumulator is charged to 3000 psi.

(6) Apply dc electrical power to aircraft.

(7) Station assistant by APU and generator control box to turn temporary switch OFF on signal.

(8) Hold APU switch on START.

(9) When cranking begins, signal assistant to turn temporary switch OFF. Listen for actuation of relays, solenoids, and APU fuel booster pump.

(10) Release APU switch to APU position.

(11) Observe flow from drain hoses into container. When all residual fuel has drained from fuel control unit set APU switch to OFF.

(12) Have assistant set temporarily installed switch to ON.

(13) Connect supply of lubricating oil (C-22) to fuel filter inlet port.

(14) Repeat steps (5) through (10). Observe drain hoses. Set APU switch to OFF when oil flows into container.

(15) Remove dc and hydraulic power from aircraft.

(16) Blow residual fuel from start fuel nozzle and main fuel manifold with compressed air to prevent accumulation of gum deposits.

(17) Remove oil supply from fuel filter inlet port. Install standard shipping plug in port.

(18) Remove drain hoses. Connect fuel lines to main fuel manifold and to start fuel nozzle.

(19) Attach power supply connector to ignition exciter.

(20) Remove temporary switch from electrical wire and terminal X2 of relay K1 in control box. Connect electrical wire to terminal X2 of relay K1. Replace cover on control box.

CAUTION

Do not apply solvent to cable insulation, rubber or gasket material. Damage and deterioration could result.

f. Clean APU external metal surfaces with a clean cloth and solvent (C-18). Dry with clean cloths or compressed air.

g. Install APU exhaust cover or seal exhaust opening with with barrier material (C-4) secured with tape(C-31).

h. Seal APU air inlet with barrier material (C4) secured with tape (C-31).

i. Record extent of preservation and date in aircraft log book.

j. Tag APU switch with: APU PRESERVED: DO NOT OPERATE. SERVICE APU SUMP BEFORE OPERATING.

7-14. Fuel Tanks.

WARNING

Do not drain fuel tanks and allow them to stand empty overnight. Residue fuel drains down tank sides, forming puddles which evaporate into the air in the tank. If a critical fuel-air ratio develops, a spark could set off an explosion. Prevent this by purging tanks immediately after draining.

a. Drain fuel tanks.

b. Pour ten gallons of diesel fuel (C-16) into each fuel tank.

c. Disconnect airframe line from engine fuel inlet connection. Place a suitable container at the end of airframe line.

d. Operate fuel booster pump to force diesel fuel through system and into container. When diesel fuel flowing through lines is free of all traces of operating fuel, shut off fuel booster pump.

e. Repeat step d at each tank. Disconnect power source.

f. Drain remaining oil from each tank.

WARNING

When using a fire extinguisher as a source of CO_2 for purging fuel tanks, remove fiber horn. Ground nozzle as well as bottle itself to aircraft. Discharge CO_2 slowly to avoid generating static electricity and allowing rapid CO_2 expansion, which could damage the cell.

g. Discharge CO_2 (C-10) into tank through the filler neck at a rate of one pound per minute. Use two 15-pound bottles of CO_2 for each main tank, and one 15-pound bottle for each auxiliary tank.

NOTE

The size of CO_2 bottle used can vary to meet existing conditions, with 15-pound size handy to use. Total amounts recommended are based on quantities usually needed, but more may be needed to obtain a safe reading on combustible gas indicator.

NOTE

Nitrogen (C-26) or another inert gas may be used instead of CO_2. Observe above precautions.

h. Test each purged tank with a combustible gas indicator. If a dangerous level of fuel vapors exists, repurge until a safe reading is obtained.

CAUTION

Serious damage to tank interior can result if spray nozzle is inserted into tank too far and permitted to whirl around with air pressure in hose.

i. Spray interior of each fuel tank with one pint of oil (C-22).

(1) Insert nozzle into filler cap opening.

(2) Rotate nozzle slowly, while spraying, to apply a thin film of oil to entire tank lining.

(3) Use dehumidified air for spraying.

(4) Drain excess oil from fuel tanks.

j. Cap all lines and close filler caps. Do not seal fuel vents.

k. Tag fuel filler cap with: FUEL SYSTEM PRESERVED WITH MIL-L-6081 OIL. FLUSH WITH OPERATING FUEL BEFORE PLACING IN SERVICE.

7-15. Hydraulic System.

a. Check hydraulic system for leaks. Repair as necessary.

b. Depress WATER DRAIN button on flight control pneumatic system pressure regulator, if installed.

c. Service flight control and utility hydraulic system tanks in accordance with the appropriate maintenance manual.

d. Cap all vents to prevent entry of foreign materials into system.

e. Clean all exposed polished surfaces of actuators, hydraulic cylinders, valves, and other hydraulic equipment (except landing gear assemblies) with a clean cloth dampened with solvent (C-18).

f. Coat cleaned areas with preservative hydraulic fluid (C-20).

g. Reduce pressure in accumulator tanks to 250 psi in accordance with the appropriate maintenance manual. Reducing pressure in the accumulator tanks is applicable only to the C-5A transport mode.

7-16. Rotor Blades.

a. Color code blades and identify with aircraft serial number.

b. Clean blades, excluding hinge pin holes, in accordance with paragraph 7-7.

c. Clean vertical hinge pin holes with dry cleaning solvent (C-18).

d. Remove any fretting corrosion with metal conditioner and rust remover (C-24).

e. Apply preservative (C-12) to vertical hinge pin holes and other bare metal surfaces. Cover preserved surfaces with barrier material (C-4) secured with tape (C-31).

f. Cushion entire blade socket, including lag shock absorber and bracket, clamp-up bolt, incident pin bolt and ISIS mount, with at least two inches of polyethylene sheeting (C-13) secured with tape (C-31).

CAUTION

Do not use corrosion preventive compounds or oils on direct action shock absorbers. Solvents to remove these compounds could damage dry-type bearings.

g. Service direct action shock absorbers in accordance with the appropriate maintenance manual. Clean shock absorbers with a clean cloth dampened with solvent (C-18).

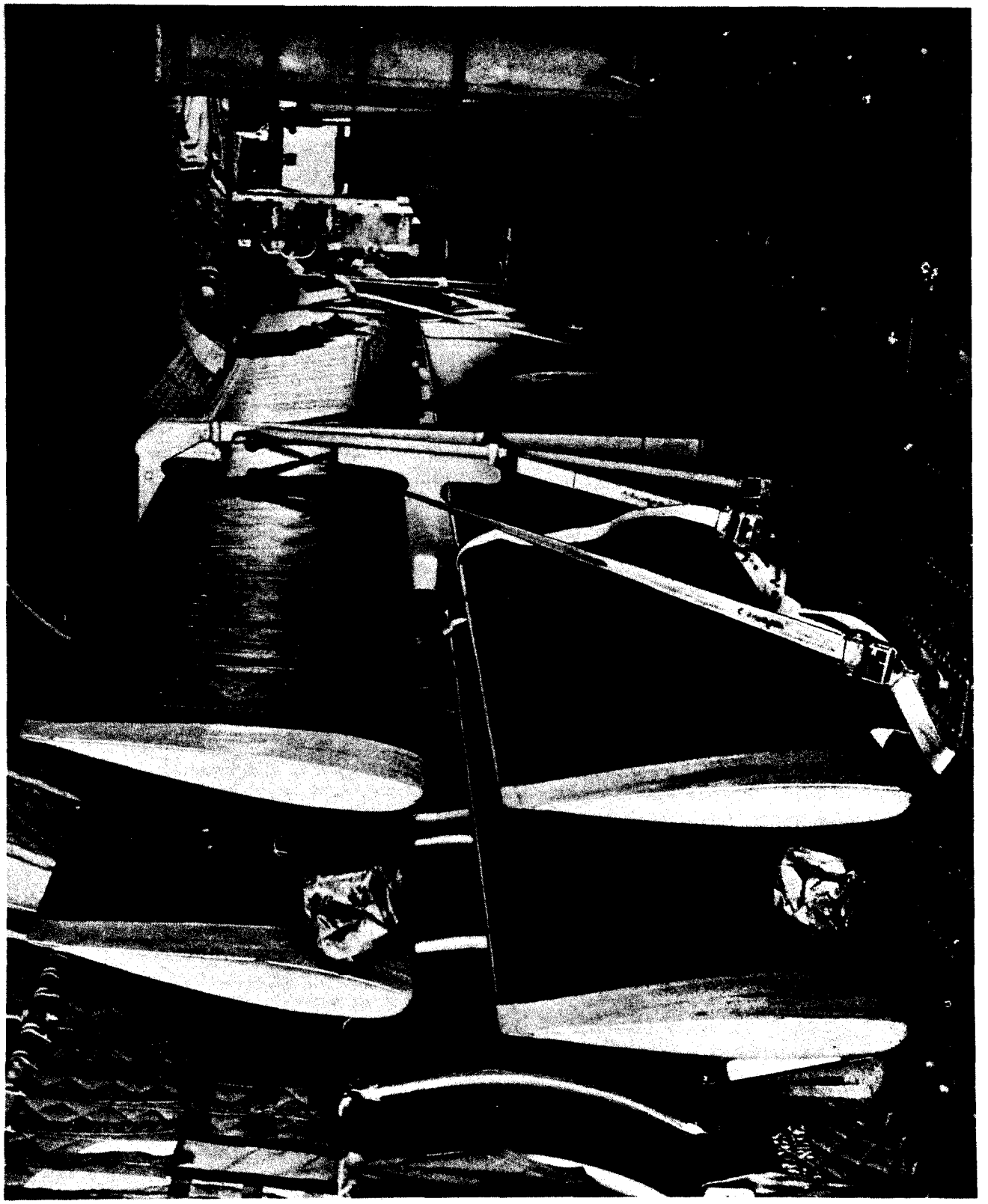


Figure 7-1. Rotor Blade Transport Stand

h. Wrap each shock absorber with barrier material (C-4), cushion with C-14, pack in a fiberboard box (C-5), identify, and stow in helicopter cargo compartment.

i. Stow blades in rotor-blade transport stand (P/N 145 G0028-1, NSN 8145-01-115-7018) secured to left side of helicopter cargo compartment at stations 200 and 400 (figure 7-1).

(1) Wrap blade surfaces which contact rack saddles with barrier material (C-4) prior to securing blades in stand.

(2) Alternate blades when placing them in transit stand. Ensure that entire blade socket (approximately 19 inches long) is forward of adjacent blade tip to prevent damage to blade tips.

7-17. Rotor Heads.

a. Service rotor hub, pitch-varying and vertical hinge pin bearing oil tanks in accordance with the appropriate maintanance manuel.

b. Clean verticle hinge pins, pitch-varying housing and bearing inner race surfaces with a clean cloth and solvent (C-18). Wipe dry with a clean, dry cloth.

CAUTION

Do not use metal conditioner (C-24) on vertical hinge pins or bearing inner race surface. Damage to surface hardness could result.

c. Remove any fretting corrosion from pitch-varying housings with metal conditioner (C-24). Wipe dry with clean, dry cloths.

d. Coat vertical hinge pins, pitch-varying housings and bearing inner race surfaces with corrosion-preventive compound (C-12).

e. Insert vertical hinge pins in pitch-varying housings. Cover with barrier material (C-4) secured with tape (C-31).

f. If rotor hub nut cover is not installed, seal end of forward transmission drive shaft or aft rotor drive shaft as applicable with barrier material (C-4) secured with tape (C-31). This prevents water entry into shaft and transmission.

7-18. Rotor Controls.

a. Lubricate controllable swashplates in accordance with the appropriate maintenance manual.

b. Install one spacer assembly on each set of actuating arms (4 required) to prevent damage to actuating cylinders when hydraulic pressure is released.

c. Remove dirt and other foreign accumulations from rotor head controls with a dry cloth.

d. Wrap rotor head assembly, including rotor drive saft and control rods, with barrier material (C-4). Secure wrap to rain shield with tape (C-31) to prevent entry of water into fuselage. After wrapping the rotor head with barrier materia.l, wrap the rotor head with cushioning material (C-14) several times to cushion the sharp edges of the rotor head which will prevent tear to the aircraft protective covering, heat shrink film. Use tape (C-31) to secure cushioning materials,

NOTE

After wrap is completed, any movement of flight controls will damage barrier material.

7-19. Battery.

a. If battery is serviceable and fully charged, ship it wet in aircraft battery carrier. However, dry-charged batteries may be shipped when available.

b. If emergency lights are installed, ensure that EMER EXIT LTS switch is at DISARM.

c. Clean battery in accordance with paragraph 7-6.

d. Use quick-disconnect plug to open electrical system circuit. Cover end of quick-disconnect plug with barrier material (C-4) secured with tape (C-31), to prevent short circuits and exclude dirt.

e. Secure plug in a safe position to prevent movement.

7-20. Instruments.

a. Install pitot tube cover or cover opening with barrier material (C-4) secured with tape (C-31).

b. Remove dust from static and sideslip ports with a dry cloth. Seal ports with barrier material (C-4) secured with tape (C-31).

c. Seal static openings in airspeed system with barrier material (C-4) secured with tape (C-31).

d. Remove outside air temperature (OAT) gauge. Wrap OAT gauge in cushioning material (C-14) and tape to cyclic.

e. Seal OMEGA temperature probe with barrier material (C-4) secured with tape (C-31).

7-21. Communications Systems.

a. Remove and wrap headset microphones with barrier material (C-3) secured with tape (C-31). Stow them with other 780 gear in helicopter cargo compartment.

b. Secure classified equipment and publications in accordance with AR 380-5 and local directives.

c. Cover all disconnected plugs with barrier material (C-4). Secure each in place with tape (C-31).

d. Secure all disconnected cables to prevent damage during shipment.

e. Remove whip, wire, and homing antennas. Wrap each with barrier material (C-3) secured with tape (C-31).

(1) Secure whip antenna to interior side of fuselage with tape (C-31).

(2) Pack wire antenna and homing antenna wands in a fiberboard box (C-5), close box with tape (C-31), identify, and secure in fuselage.

(3) Cover mounting holes and attachment points with barrier material (C-4) secured with tape (C-31).

f. Remove ARC-199 antenna, coil and secure to side of aircraft with tape (C-31), Do not remove standoffs.

g. Cover antennas not removed with barrier material (C-4) secured with tape (C-31). Use cushioning material (C-14) to pad the antennas and secure with tape (C-31).

7-22. Landing Gear.

a. Remove wheels and brakes.

(1) Touch up all spots where original paint has been chipped off wheels with paint similar to original coat.

(2) Coat entire wheel with preservative (C-12). Give special attention to areas where brake disc restraining keys are located.

NOTE

Do not apply oil type preservative compound to braking surfaces.

(3) Lubricate wheel bearings in accordance with lubrication chart.

b. Reinstall brakes and wheels.

c. Clean hydraulic pistons in accordance with paragraph 7-5.

d. Protect strut with barrier material (C-4) and install safety blocks (Figure 2-9) on front landing gear Struts.

NOTE

Safety blocks are used on front struts for C-5A and truck transport modes because the struts are fully deflated. They are used as a safety device for vessel mode in case of strut leakage or collapse.

e. Adjust forward and aft landing gear strut inflation to maintain overhead and ramp crest clearance. The following principles apply:

(1) Normally the aft struts will be at normal or greater inflation for shipment to allow access to aft strut tiedown points.

(2) For shipment by C-5A aircraft deflate forward struts until they rest lightly on safety blocks and fully inflate aft struts.

(3) For shipment by truck deflate forward struts until they rest lightly on safety blocks (Figure 2-9) and service aft struts to normal inflation.

(4) For shipment by RORO vessel fully inflate forward struts and service aft struts to normal inflation.

f. Cover exposed area of front hydraulic piston with barrier material (C-4) secured with tape (C-31).

g. Apply preservative (C-12) to remaining uncoated metal surfaces on landing gear attaching members. Check tire pressure for proper inflation.

h. For vessel and truck shipment wrap front landing gear with two layers of cushioning material (C-14) to prevent chafing of tiedown chains.

7-23. Fuselage

a Lubricate in accordance with lubrication chart.

b. De-energize circuit breaker panel.

c. Check tire pressure for proper inflation.

d. Secure overhead instrument lights to overhead panel fixtures with tape (C-31).

e. Group all technical manuals and handbooks and wrap with barrier material (C-3).

(1) Package publications in a fiberboard box (C-5) and secure with tape (C-31).

(2) Identify contents on box and secure to co-pilot's seat with safety belt.

f. Tie up troops seats and/or litters.

g. Seat cushions and backs remain in installed seats. Attach safety belt and shoulder harness together, tightening to eliminate slack.

h. Tie cargo ramp securely in UP position.

i. Open all water drain valves on bottom of fuselage and ramp.

j. Lock collective pitch and cyclic controls.

k. Install tiedown adapters at jack pad locations (figure 2-8).

l. Secure all loose gear to prevent movement during shipment.

m. Cover windshields and transparent plastics with barrier material (C-4) secured to fuselage (not to glass) with tape (C-31). Tape all edges of the barrier material to the fuselage to prevent tear and exposure of windshield and plastics. When protective covering film is used, substitute cushioning material in lieu of barrier material.

n. Complete preservation and depreservation checksheets in accordance with paragraphs 1-9 and 1-10.

o. When all necessary entries are made in log book, place log book and maintenance and historical records in a polyethylene bag (C-2) sealed with tape (C-31). Place under seat belt on pilot's seat. Complete DA Form 2404 and insert in the log book.
with tape (C-31), when shipping covers are utilized.

p. Use cushioning material (C-14) to wrap all sharp protruding edges on the exterior of the helicopter, secure with tape (C-31), when aircraft protective covering, heat shrink film is utilized.

Section III. Marking

7-24. General. Apply all markings in accordance with MIL-STD-129. Include aircrafl serial number on all containers.

7-25. Tagging.

a. Attach a waterproofed tag to helicopter door stating: THIS AIRCRAFT PRESERVED ONLY FOR LENGTH OF TIME NORMALLY REQUIRED TO REACH DESTINATION IF NOT PREPARED FOR OPERATION IMMEDIATELY UPON RECEIPT, PLACE IN STORAGE STATUS IN ACCORDANCE WITH THE AIR-CRAFT MAINTENANCE MANUAL.

b. Include same information with shipping documents,

c. When helicopter is being transported with protective covering film, the necessary shipping documents will be placed in water proof plastic bag and taped to the protective covering film in front of cabin door.

Section IV. Dangerous and Hazardous Materials

7-26. Dangerous and Hazardous Materials.

a. Show special handling instructions, markings and warnings required by TM 38-250/AFM 71-4.

b. Label all shipments containing dangerous and hazardous materials and any other material requiring special handling with DU Form 1387-2 in a clearly visible location.

APPENDIX A

REFERENCES

STANDARDS, MILITARY	
MIL-STD-129	Marking for Shipment and Storage
MANUALS, TECHNICAL	
TM 5-632	Military Entomology Operational Handbook
TM 38-250/AFR 71-4	Preparation of Hazardous Materials for Military Air Shipment
TM 55-1500-204-25/1	General Aircraft Maintenance Manual
TM 55-1520-227-10-1/-2	CH-47B/C Operator's Manual
TM 55-1520-227-23	CH-47B/C Aviation Unit and Aviation Intermediate Maintenance Manual
TM 55-1520-240-10	CH-47D Operator's Manual
TM 55-1520-240-23	CH-47D Aviation Unit and Aviation Intermediate Maintenance Manual
TM 55-1520-400-14	Transportability Guidance Marine Transport of US Army Helicopter
TM 55-2835-203-24	APU Organizational, DS and GS Maintenance Manual
TM 55-2840-234-24	Engine Organizational, DS and GS Maintenance Manual
BULLENTINS, TECHNICAL	
TB 55-9150-200-24	Engine and Transmission Oils, Fuels and Additives for Army Aircraft
TB 746-93-2	Painting and Marking of Army Aircraft
REGULATIONS, ARMY	
AR 40-1	Medical and Agricultural Foreign and Domestic Quarantine Inspections
AR 380-5	Department of the Army Supplement to DOD 5200.1-R

APPENDIX B
DELETED

APPENDIX C
DELETED

APPENDIX D

CONSUMABLE MATERIALS

NOTE

Method of shipment dictates materials and actual amounts required. Any given material may have different lengths, widths, etc., and so have more than one NSN. Thus, the following list is for guidance only.

NO.	NSN	QTY RQR	ITEM DESCRIPTION
C-1	8030-00-201-0996	1 pt	Antisieze Compound, white, lead base, general purpose, TT-A-580, 1 pt can.
C-2	8105-00-274-2390	4 ea	Bag, greaseproof, waterproof, flexible, MIL-B-117.
C-3	8135-00-753-4661	50 yds	Barrier Material, greaseproof, waterproof, flexible, MIL-B-121, type I, grade A, class 2, 36 in X 100 yds.
C-4	8135-00-282-0565	100 yds	Barrier Material, watervaporproof, flexible, MIL-B-131, class 1, 36 in x 200 yds.
C-5	As applicable	4 ea	Box, fiberboard, PPP-B-636.
C-6	As applicable	2 ea	Box, cleated, plywood, PPP-B-601.
C-7	6850-00-826-0818	5 gal	Cleaning Compound, aircraft surface, alkaline base, MIL-C-25769, 5 gal drum.
C-8	6850-00-033-8851	1 pt	Cleaning Compound, Trichlototri-fluoroethane, MIL-C-81302, type II, 10 gal drum.
C-9	7920-00-292-9204	12 ea	Cloth, cleaning, CCC-C-46, 12 in x 15 in.
C-10	6830-00-281-3053	90 lb	CO_2, technical, BB-C-101, grade B, 50 lb cylinder.

C-11	6850-00-281-2031	1 gal	
C-12	8030-00-244-1297	1 gal	Corrosion Preventive Compound, solvent cut-back, cold application, MIL-C-16173, grade 2, 1 gal can.
C-13	8135-00-180-5922	60 ft	Cushioning Material, polyethylene foam sheeting, PPP-C-1752, ½ in x 48 in x 60 ft.
C-14	8135-00-300-4905	60 ft	Cushioning Material, unicellular, polypropylene foam, MIL-C-1797. ¼ in x 30 in x 225 ft.
C-15	7930-00-282-9699	1 gal	Detergent, General Purpose, Liquid MIL-D-16791, 1 gal can
C-16	9140-00-286-5294	40 gal	Diesel fuel, MIL-F-l6884, #2 grade, bulk
C-17	6840-00-530-7109	1 gal	Disinfectant, germicidal and fungicidal, concentrate, 0-D-406, 1 gal can.
C-18	6850-00-285-8011	1 gal	Dry cleaning solvent, P-D-680, type II, 55 gal drum.
C-19	9150-00-252-6383	1 qt	Hydraulic Fluid, petroleum base, aircraft, missile and ordnance, MIL-H-5606, 1 qt can
C-20	9150-00-935-9807	1 qt	Hydraulic Fluid, preservative, petroleum base, MIL-H-6083, type 1, 1 qt can
C-21	6840-00-142-9438	5 ea	Insecticide, dichlorvous strips, 2 in, 144 per case
C-22	9150-00-231-6676	1 gal	Lubricating Oil, aircraft turbine engine, petroleum base, MIL-L-6081, grade 1010, 55 gal drum.
C-23	9150-00-782-2629	1 qt	Lubricating Oil aircraft turbine

C-24	6850-00-174-9672	1 gal	Metal Conditioner and Rust Remover, MIL-M-10578, 1 gal can
C-25	6810-00-238-8119	1 pt	Naphtha, aliphatic, TT-N-95, type II, 1 gal can
C-26	6830-00-292-0131	90 lb	Nitrogen, technical, BB-N-411, type 1, class 1, grade B, 230 cu ft cylinder
C-27	6840-00-089-4664	2 blocks	Rodenticide, bait block, diaphacin paraffin, 8 oz blocks
C-28	4020-00-928-3438	50 ft	Rope, nylon, MIL-R-17343, 1/4 in OD, 3/4 in circumference, 600 ft coil
C-29	8030-00-244-1293	1 qt	Rust Inhibitor and Preservative, LPS-2, 5 gal can
C-30	8520-00-531-6484	3 bars	Soap, toilet, white floating, P-S-620, type I, 6 oz bar
C-31	7510-00-266-5016	3 rolls	Tape, pressure-sensitive, cloth-backed, PPP-T-60, type IV, class 1, 2 in x 60 yds
C-32	6850-00-142-9582	As Rqr	Transmission Additive, Corrosion Preventive Concentrate, Brayco 599
C-33	8950-00-223-5489	1 qt	Vinegar, white, distilled, V-Z-401, 1 qt bottle
C-34	8030-00-838-7789	2 cans	WD-40, MIL-C-23411, 16 oz aerosol can
C-35	8135-00-579-6489		1 RL Plastic film, 144 in. x 1200 in. L-P-378

APPENDIX E

SPECIAL TOOLS AND TRANSPORTABILITY EQUIPMENT

NSN	P/N (FSCM)	QTY	NOMENCLATURE
	EQUIPMENT PECULIAR TO TRANSPORTABILITY AIR TRANSPORT		
None	None		C-5A Air Transportability Kit for CH-47C consisting of:
1730-00-157-6023	65SSMAC-C0095 (12757)	2	Aft Jack Point Tie down Adapter
1740-00-883-1658	114E5856-22 (77272)	1	Skid Vertical Pylon Handling
*1730-00-034-3874	114E5900-14 (77272)	1	Spacer Set, Rigging Actuating Cylinder Safety Block
8145-01-115-7018	14500028-1 (77272)	1	Container Rotor Blade (FRB) Consist of 2 each, P/N 14500028-2 and 1 each, P/N 14500028-3
4920-00-079-8892	114G1026-34 (77272)	1	Work and Transport Stand Fwd Transmission
1730-01-225-9225	1730SDP005-1 (81996)	1	C-5A Air Transportability Kit for CH-47D consisting of
8145-01-115-7018	14500028-1 (77272)	1	Container Rotor Blade (FRB) Consist of 2 each, P/N 14500028-2 and 1 each, P/N 14500028-3
1740-01-127-2322	14500027-1 (77272)	1	Trailer, Aircraft Transport Fwd Transmission
1740-01-127-2323	145G0026-1 (77272)	1	Trailer, Aircraft Transport AFT Transmission
920-01-128-6321	145E5996-1 (77272)	1	Securing Device AFT Vertical Shaft
*1730-00-034-3874	114E5900-14 (77272)	1	Spacer Set, Rigging (Actuating Cylinder Safety Block)

1740-00-883-1658	114E5856-22 (77272)	1	Skid, Vertical Pylon Handling
1730-00-157-6023	65SSMAC-C0095 (12757)	2	AFT Jack Point Tiedown Adapters

EQUIPMENT PECULIAR TO TRANSPORTABILITY
VESSEL TRANSPORT

1730-00-157-6023	65SSMAC-C0095 (12757)	2	AFT Jack Point Tiedown Adapters
1730-01-128-1808	1730QNP001-1 (81996)	1	Aircraft Shipping Cover
1730-00-135-4637	1730CH47001-1 (81996)	1	Sling Aircraft (Spreader Bar)
*1730-00-034-3874	114E5900-14 (77272)	1	Spacer Set, Rigging Actuating Cylinder Safety Block)
8145-01-115-7018	14500028-1 (77272)	1	Container Rotor Blade (FRB) consist of 2 each P/N 14500028-2 and 1 each P/N 14500028-3

EQUIPMENT PECULIAR TO TRANSPORTABILITY
TRUCK TRANSPORT

1730-00-157-6023	65SSMAC-C0095 (12757)	2	AFT Jack Point Tiedown Adapter
1740-00-883-1658	114E5856 (77272)	1	Skid Vertical Pylon Handling
*1730-00-034-3874	114E5900-14 (77272)	1	Spacer Set Rigging Actuating Cylinder Safety Block
8145-01-115-7018	14500028-1 (77272)	1	Container Rotor Blade (FRB) consist of 2 each P/N 145G0028-2 and 1 each P/N 14500028-3
4920-00-079-8892	114G1026-34 (77272)	1	Work and Transport Stand, Fwd. Transmission. CH-47C
1740-01-127-2323	145G0026-1 (77272)		Trailer Aircraft Transport

1740-01-127-2322	145G0027-1 (77272)		Trailer Aircraft Transport
*4920-01-128-6321	145E5996-1 (77272)		Securing Device, AFT Vertical Shaft

DUAL PURPOSE TOOLS/EQUIPMENT REQUIRED FOR NORMAL MAINTENANCE AND TRANSPORTABILITY

1730-00-010-7462	114E5909-8 (77272)	2	Hoisting Adapter, Ring Assy for Fwd Transmission (P/N 114D1200 series) and AFT Rotor Shaft (P/N 114D3250 series) and all CH-47C's.
or			
1730-01-130-1478	145E5902-1 (77272)	2	Hoisting Adapter, Eye, Fwd Transmission and AFT Vertical Shaft CH-7D
	145E5911-101 (77272)	1	Sling, Rotor Blade (FRB)
	114E5124-1 (77272)	1	Hoist Assembly Aft Transmission CH-47D
4920-00-624-0680	PD 1433 (81996)	1	Adapter, Reaction, Torque Plate, Aft Transmission
1730-01-130-9689	145G0034-1 (77272)	1	Torque Plate, Aft Transmission
5180-00-103-0001	114G1137-10 (77272)	1	Puller, Kit, Universal Vertical Hinge Pin
5120-00-935-7452	34230-2	1	Socket
5120-00-902-3550	GGG-W-686 (81349)	1	Wrench, Torque 3/4 Sq Dr, 500 ft. lb capacity
5120-00-625-3885	PD 1434 (77272)	1	Wrench, Vertical Pin Nut, Rotor Head
6685-00-664-4650	89220 (40912)	1	Combustible Gas Indicator

1730-00-967-9556	AA 1730-1251 (81996)	1	Tow Bar
Local Manufactured		2	1" Wooden Collar Fwd Landing Gear Safety Block See figure 2-9.
1730-00-080-7833	114G1034-46 (77272)	2	Steering Bar, Aft Landing Gear

*Dual purpose, i.e., equipment/tools required for normal aircraft maintenance and transportability.

APPENDIX F

QUARANTINE INSPECTION

F-1. Scope. This appendix outlines procedures necessary to prepare CH-47 helicopters (including removed components packed separately) for quarantine inspection and to deprocess them at destination. The information is derived from AR 40-12 and TM 5-632, and is presented for your information.

F-2. Preparation for Quarantine Inspection.

a. Free all aircraft and containers of soil before loading for return to CONUS.

b. Clear containers of any spilled grain, food, etc.

c. Inspect wooden containers and packing material for termites, wood borers, and other insect infestations before using. Never use infested wood orpacking materials.

d. Inspect all containers and packing material immediately prior to packingto ensure absence of rodents, snakes, and other animals.

e. Use only authorized packing material. Never use native grasses or fibers. Store all packing material to preclude insect or rodent infestation.

f. Use dichlorvous strips (C-21) for insect control in helicopters sealed prior to shipment.

(1) Space five strips two inches wide and five inches long equally throughout each aircraft.

(2) Attach strips to top of cockpit or cargo compartment with string or tape.

g. Attach dichlorvous strips (C-21) to the interior of each closed container at a rate of five linear inches of strips per ten cubic feet. Use equal or lesser amounts for smaller containers.

NOTE

Since dichlorvous strips, operate by vapor release, do not use in open containers.

WARNING

Personnel involved in placing or removing bait blocks should wear rubber gloves, protective clothing and respirators recommended by post surgeon or safety officer.

h. Place one rodenticide bait block (C-27) near the forward and ramp aircraft doors. Lead the red tape attached to the block outside aircraft so as to be clearly visible when the door is sealed.

i. Place one bait block (C-27) near the center of each container of ten cubic feet or more. Lead red tape outside container so as to be visible when container is closed.

NOTE

Supplies and equipment should be available in the Command.

j. If these instructions vary from command regulations regarding shipment of retrograde cargo, consult command entomologist for technical assistance and advice.

F-3. Deprocessing of Treated Material.

a. Collect and dispose of insecticides and rodenticides during aircraft depreservation.

(1) Aircraft and containers with red tape extending from them contain one or more bait blocks. Remove blocks before individual items are unpacked or processed.

(2) Store dichlorvous strips and bait blocks in separate closed containers for collection by post engineer for proper disposal.

b. Notify post engineer or surgeon immediately if living or dead insects, rodents, or 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 CH-47 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 top deck 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 helicopters 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 receptacals are available for waste film and cushioning materials - both for covering and uncovering process.

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 CH-47 will require approximately one 200 ft. roll of 20 ft. wide heat shrink film, seven rolls of heat shrink tape, one roll of cushioning material, nine plastic vents and 100 ft. of polyester strapping, two rolls of PPP-T-60 tape, 50 ft. of 4 ft. wide MIL-B-131 barrier material and two 20 pound bottles of propane.

k. The optimum number of personnel for the covering procedure is four per aircraft. One helicopter will require four people approximately 10 hours to cover. With experience, elapsed time can be reduced to approximately 7 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 3 and 4 of this manual.

b. Ground the helicopter in accordance with TM 55-1520-227-23 or TM 55-1520-240-23 as appropriate.

c. Insure that fuel tank levels are properly adjusted for shipping (maximum 3/4 capacity or 150 gallons per tank, which ever is less).

d. Seal fuel filler ports, vents, drains, and battery vents prior to covering the aircraft.

e. Provide fire truck and adequate fire fighting equipment on site and ready for use prior to operating the heat cannon.

f. Insure that the helicopter exterior and the adjacent area is free of fuel and other combustibles prior to operating the heat cannon.

9. The helicopter will be covered outdoors if environmental conditions permit. The covering procedure 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.

h. 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 vapor. The areas to be tested on the helicopter are the fuel filler, drain, and vent ports, the battery vents, and the engine compartments. If the indicator shows an unsafe condition, do not attempt to apply heat shrink film.

i. 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.

j. 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.

k. 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 reseal heat shrink film.

l. Leather safety gloves will be worn while using the heat cannon.

m. Table G-2, Safety Checksheetwill be completed prior to the use of the heat cannon. The completedchecksheet will be attached to DA Form 2408-13.

WARNING

Composite main rotor and tail rotor blades, rubber and plastic surfaces, and glass windshields and plexiglass windows are heat sensitive. These surfaces must be completely covered with cushioning material to provide insulation to prevent serious damage to the helicopter.

G-4. HELICOPTER PREPARATION. Insure that the helicopter is prepared for shipment in accordance with either Chapter 3 or 4 of this manual as applicable.

a. 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.

b. Flyaway Equipment. Install flyaway equipment (pitot tube, exhaust stack, and engine covers) , in accordance with this manual.

c. OAT Gauge. Remove OAT gauge and tape to cyclic.

d. Protect Glass and Canopy. Install foam cushioning material over glass and plexiglass surfaces to prevent scratching and protect them from heat. Secure padding with heat shrink tape and/or strapping using care not to apply tape to glass or plexiglass areas.

e. HF Antenna. If HF antenna is installed, remove it from supports, coil it, and tape coil to fuselage.

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, and can be left sealed with the exception of the fuel vents.

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. 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 surface. 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 heads.

4. Padding around upper main landing gear strut and mounts.

5. Padding around pitot tube.

(b) Examples of techniques using cushioning material for both protection and insulation from heat are:

1. Padding of windshield wipers.

2. Padding of antennae.

3. Padding of fuel filler ports, vents, and drains.

G-5. APPLICATION OF FILM.

NOTE

Insur that the provisions of Appendix F, Quaratine 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 pase of the process. The following is a workable procedure:

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 20 ft. x 30 ft. be cut and secured to the ground as a measuring and cutting work surface.

(1) Determine sections such as small protrusions, antennae, main rotor controls, and engines 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 forward crown, main fuselage, aft pylon, aft fuselage, cockpit, and engine areas. Refer to Figures G-1 and G-2 for a workable method.

(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.

WARNING

Prior to operating the heat cannon, insure that all requirements of paragraphs G-3 have been complied with.

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.

(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 it slowly along it. 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 has cooled, test seams for proper bonding by trying to pull seam apart with fingernails. If seam comes loose, reseal it.

CAUTION

To prevent water leakage at seams insure that seams are completely bonded.

e. Shrinking Film.

NOTE

To allow strut extension during loading, do 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 back and forth along the surface as if spray painting. 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 hold 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. Marking. Stencil cover with the aircraft serial number “NO STEP” and “NO PUSH” in one inch letters as required using locally manufactured stencil and spray paint.

g. 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 correctly and 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 protrusions.

WARNING

Do not attempt to patch, shrink, or fuse the heat shrink material with the heat cannon after fuel vents have been unsealed.

G-6. FUEL VENTS. 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 vent.

CAUTION

Adequate ventilation of the cover is essential to minimize condensation and permit drainage.

G-7. INSTALLATION OF VENTILATORS. After the covering has been inspected and approved, it must be properly ventilated to prevent water entrapment and subsequent corrosion. Each aircraft will require 9 ventilators. Four vents will be located strictly for ventilation: one on the underside of each engine cowl, and one on each rotor pylon. Five vents will be located on the underside of the helicopter to provide both drainage and ventilation: three vents will be located on a line at the low point between the aft landing gear; one vent between the front landing gear; and one vent approximately centered on the bottom of the fuselage. The vents are applied by peeling the backing off the adhesive surface and pressing the vent to the shrink film. The cover is then removed and the center hole is cut in the shrink film. The vent cover is then replaced.

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 two aft, 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, (Above Deck Shipment). After the aircraft is secured, the landinq gear, wheel, and brake areas will 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.

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.

TABLE G-1

MATERIALS AND EQUIPMENT LIST

NOMENCLATURE	UNIT	P/N, SPEC, (FSCM)	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 lbs	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
Tape, Packaging, Water Proof	Roll	PPP-T-GO	7510-00-266-5016
Barrier Material, Water Proof, 36" x 200'	Roll	MIL-B-131	8135-00-282-0565

TABLE G-2

SAFETY CHECKLIST

ITEM	ITEM DESCRIPTION	MECH	INSP
1	Ground Helicopter in accordance with TM 55-1520-227-23, TM 55-1520-240-23.		
2	Fire Truck/Fire Fighting Equipment ready for use. TM 55-1520-241-S		
3	Adjust fuel levels. TM 55-1520-241-S		
4	Cover fuel access, vent and drain areas. TM 55-1520-241-S		
5	Perform test with M-6 combustible gas indicator. TM 55-1520-241-S		
6	Working area well ventilated. TM 55-1520-241-S		
	AFTER HEAT SHRINK PROCESS COMPLETE		
7	Inspect shrink film seams for complete bonding. TM 55-1520-241-S		
8	Remove seal from fuel vent areas and tape film openings. TM 55-1520-241-S		
9	Make handling instructions entry on DD Form 1387-2. "FUEL IN TANKS." Attach form to helicopter cover.		

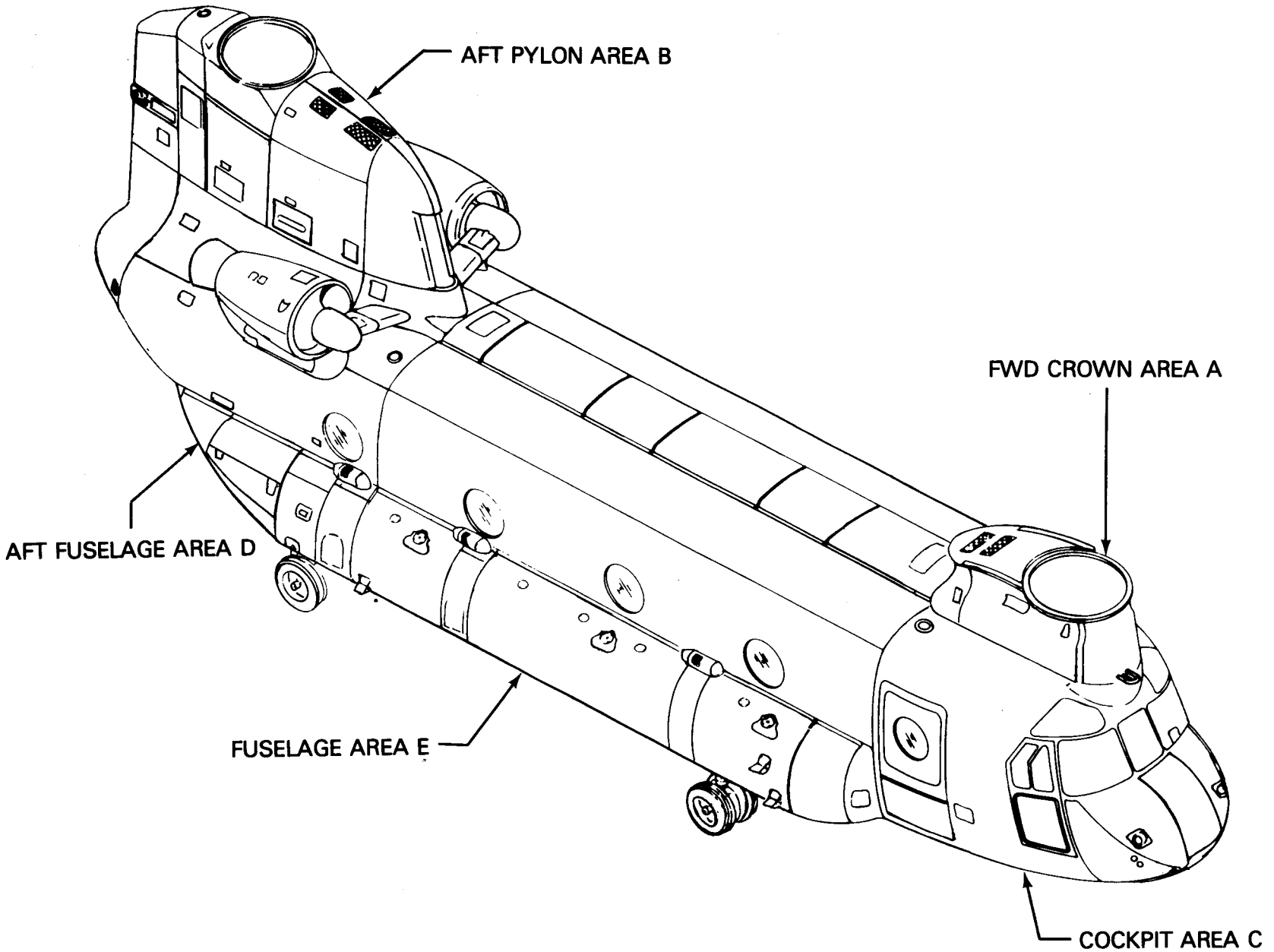
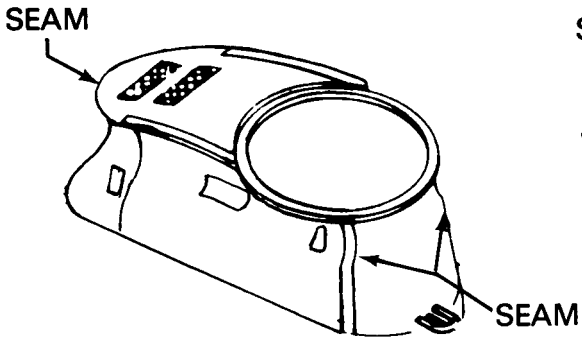


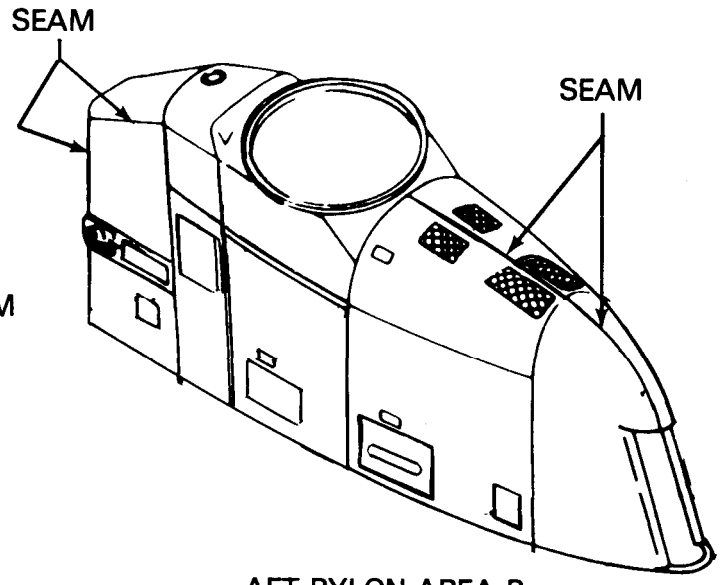
Figure G-1. Heat Shrink Wrapping Locations



FWD CROWN AREA A

18’ X 20’ Sheet

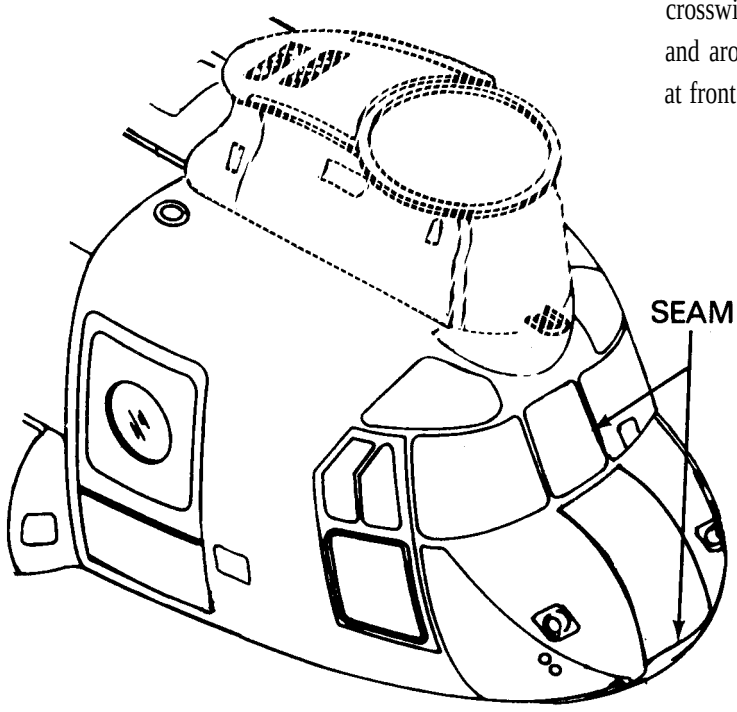
Drape 18ft wide sheet crosswise over crown. Use nylon cord to pull plastic in around rotorhead and around base of crown. Cut excess material away and seam down in front and back of crown.



AFT PYLON AREA B

25' X 20' Sheet

Drape over the top pylon with the 20ft measurement crosswise. Use nylon cord to pull plastic in around rainshield and around rotorhead. Cut out excess material and seam at front and rear of pylon.



COCKPIT AREA C

38' X 20' Sheet

Wraps around from underneath and fits under fwd crown cover. Fold over front of cockpit and seam down center. Pull sheet up from under nose and attach to front of nose. Cut away excess material and run seam under each side of nose.

STEP 1-

Aft Pylon and Fwd Crown Area

STEP 2-

Aft Fuselage and Cockpit Area

STEP 3-

Fuselage Area

Figure G-2. Heat Shrink Wrapping Areas (Sheet 1 of 2)

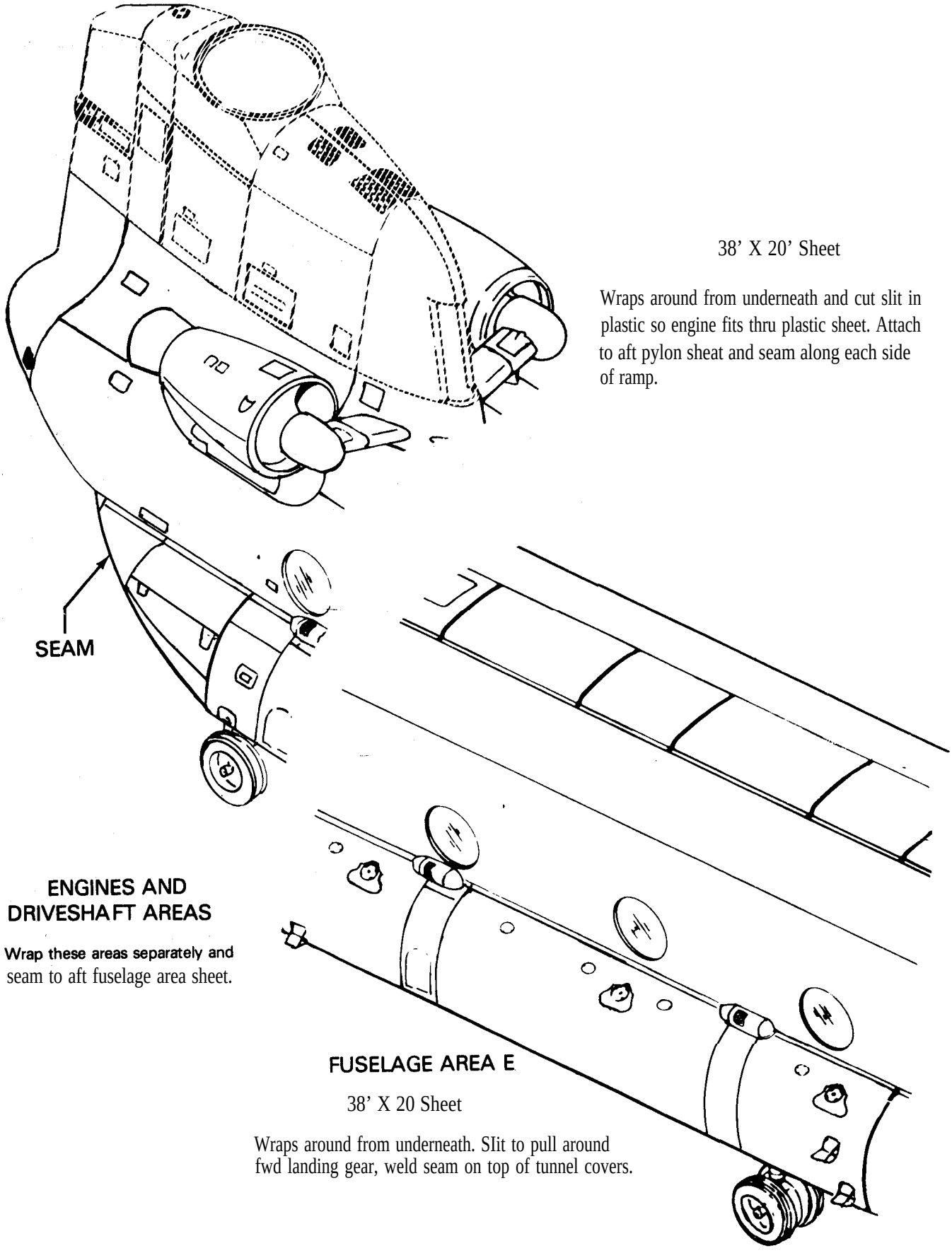


Figure G-2. Heat Shrink Wrapping Areas (sheet 2 of 2)

This manual is published for the use of .all concerned.

By Order of the Secretary of the Army:

BERNARDW.ROGERS
General, United States Army
Chief of Staff

Official:

J. C. PENNINGTON
Major General, United States Army
The Adjutant General

DISTRIBUTION:
To be distributed in accordance with DA Form 12-31, Organizational Maintenance Requirements for CH-47A and CH-47B/C aircraft.

☆U.S. GOVERNMENT PRINTING OFFICE: 1993-342-421/62977

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL MANUALS

SOMETHING WRONG WITH THIS MANUAL?

THEN. . .JOT DOWN THE DOPE ABOUT IT ON THIS FORM, TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL!

FROM: (YOUR UNIT'S COMPLETE ADDRESS)
PFC JOHN DOE
CoA, 3d ENGINEER BN
FT. LEONARD WOOD MO 63108

DATE 16 DEC 74

PUBLICATION NUMBER	DATE	TITLE
TM 55-1520-241-S	1 Mar 79	Preparation for Shipment of CH-47 Helicopters

BE EXACT. . .PIN-POINT WHERE IT IS

PAGE NO.	PARAGRAPH	FIGURE NO.	TABLE NO.
6	2-1 a		
81		4-3	
125	line 20		

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

In line 6 of paragraph 2-1a the manual states the engine has 6 cylinders. The engine on my set only has 4 cylinders. Change the manual to show 4 cylinders

Callout 16 on figure 4-3 is pointing at a bolt. In the key to fig. 4-3, item 16 is called a shim Please correct one or the other.

I ordered a gasket, item 19 on figure B-16 by NSN 2910-00-762-3001. I got a gaskit but it doesn't fit. Supply says I got what I ordered so the NSN is wrong. Please give me a good NSN

SAMPLE

TYPED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER
JOHN DOE, PFC (268) 317-7111

SIGN HERE: John Doe

TEAR ALONG DOTTED LINE

DA FORM 1 AUG 74 2028-2 (TEST)

P.S.—IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR MANUAL "FIND," MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

FILL IN YOUR UNIT'S ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS

Commander
US Army Troop Support and Aviation
Material Readiness Command
ATTN: DRSTS-MTPS
4300 Goodfellow Blvd
St. Louis, MO 63120

CUT ALONG DOTTED LINE

FOLD BACK

REVERSE OF DA FORM 2028-2

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL MANUALS

SOMETHING WRONG WITH THIS MANUAL?

THEN... JOT DOWN THE DOPE ABOUT IT ON THIS FORM, CUT IT OUT, FOLD IT AND DROP IT IN THE MAIL!

FROM: (YOUR UNIT'S COMPLETE ADDRESS)

DATE

PUBLICATION NUMBER	DATE	
TM 55-1520-241-S	1 Mar 79	Preparation for Shipment of CH-47 Helicopter

BE EXACT...PIN-POINT WHERE IT IS				IN THIS SPACE TELL WHAT IS WRONG
PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.	

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE:

CUT ALONG DOTTED LINE

DA FORM 1 APR 78 2028-2

REPLACES DA FORM 2028 2 (TEST), 1 AUG 74, WHICH WILL BE USED UNTIL EXHAUSTED.

P.S.—IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR MANUAL "FIND," MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

FILL IN YOUR UNIT'S ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS

Commander
US Army Troop Support and Aviation
Material Readiness Command
ATTN: DRSTS-MTPS
4300 Goodfellow Blvd
St. Louis, MO 63120

CUT ALONG DOTTED LINE

FOLD BACK

REVERSE OF DA FORM 2028-2

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL MANUALS

SOMETHING WRONG WITH THIS MANUAL?

THEN... JOT DOWN THE DOPE ABOUT IT ON THIS FORM, CUT IT OUT, FOLD IT AND DROP IT IN THE MAIL!

FROM: (YOUR UNIT'S COMPLETE ADDRESS)

DATE

PUBLICATION NUMBER	DATE	
TM 55-1520-241-S	1 Mar 79	Preparation for Shipment of CH-47 Helicopter

BE EXACT. . .PIN-POINT WHERE IT IS | IN THIS SPACE TELL WHAT IS WRONG

PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE:

CUT ALONG DOTTED LINE

DA FORM 1 APR 78 2028-2

REPLACES DA FORM 2028 2 (TEST), 1 AUG 74, WHICH WILL BE USED UNTIL EXHAUSTED.

P.S.—IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR MANUAL "FIND," MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

FILL IN YOUR UNIT'S ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS

Commander
US Army Troop Support and Aviation
Material Readiness Command
ATTN: DRSTS-MTPS
4300 Goodfellow Blvd
St. Louis, MO 63120

CUT ALONG DOTTED LINE

FOLD BACK

REVERSE OF DA FORM 2028-2

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL MANUALS

SOMETHING WRONG WITH THIS MANUAL?

THEN... JOT DOWN THE DOPE ABOUT IT ON THIS FORM, CUT IT OUT, FOLD IT AND DROP IT IN THE MAIL!

FROM: (YOUR UNIT'S COMPLETE ADDRESS)

DATE

PUBLICATION NUMBER	DATE	
TM 55-1520-241-S	1 Mar 79	Preparation for Shipment of CH-47 Helicopter

BE EXACT...PIN-POINT WHERE IT IS				IN THIS SPACE TELL WHAT IS WRONG
PAGE NO.	PARAGRAPH	FIGURE NO.	TABLE NO.	

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE:

CUT ALONG DOTTED LINE

DA FORM 1 APR 78 2028-2

REPLACES DA FORM 2028 2 (TEST), 1 AUG 74, WHICH WILL BE USED UNTIL EXHAUSTED.

P.S.—IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR MANUAL "FIND," MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

FILL IN YOUR UNIT'S ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS

Commander
US Army Troop Support and Aviation
Material Readiness Command
ATTN: DRSTS-MTPS
4300 Goodfellow Blvd
St. Louis, MO 63120

CUT ALONG DOTTED LINE

FOLD BACK

REVERSE OF DA FORM 2028-2

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 milliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 38.82 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 = 10 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	3.94
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	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	1.365	metric tons	short tons	1.102
pound-inches	newton-meters	.11375			

Temperature (Exact)

°F Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

PIN : 040200-000