

TECHNICAL MANUAL

**PREPARATION FOR SHIPMENT
OF OH-58 HELICOPTER**

*This copy is a reprint which includes current
pages from Changes 1 through 3.*

This manual supersedes TM 1-OH58-S, 28 April 1970, including all changes.

**HEADQUARTERS, DEPARTMENT OF THE ARMY
18 JULY 1977**

CHANGE }
NO. 5 }

HEADQUARTERS
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WASHINGTON, D.C., 13 November 1990

PREPARATION FOR SHIPMENT
OF OH-58 HELICOPTER

TM 55-1500-338-S, 18 July 1977, is changed as follows:

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OF OH-58 HELICOPTER

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6-15 and 6-16
A-1 and A-2
B-1 and B-2

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2-1 and 2-2
2-7 through 2-12
3-1 and 3-2
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OF OH-58 HELICOPTER

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	Remove pages	Insert pages
Table of Contents	iii/iv	iii/iv
Section IV	4-1 and 4-2	4-1
	4-3 thru 4-5/4-6	4-3 thru 4-5/4-6
Appendix D	D-1/D-2	D-1/D-2

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PREPARATION FOR SHIPMENT

OF

OH-58 HELICOPTER

TM 55-1500-338-S, 18 July 1977, is changed as follows:

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Section II	2-11 and 2-12	2-11 thru 2-12.1/2-12.2

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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

Personnel should stand clear of modified ground handling wheels while loading, as bolts have been known to break, injuring loading personnel. 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 rubber 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. Extreme 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.

EXTERNAL STORES

Prior to performing any maintenance functions that require external stores removal, impulse cartridges shall be removed from ejector racks.

PREPARATION FOR SHIPMENT
 OF
 OH-58 HELICOPTER

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Commander, US Army Aviation Systems Command, ATTN: AMSAV-MC, 4300 Goodfellow Blvd., St. Louis, Missouri 63120-1798. A reply will be furnished to you.

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SECTION I

INTRODUCTION

1-1. Purpose. This manual prescribes methods and procedures to follow in preparing the OH-58 for logistical (non-tactical) shipments. Only the methods listed are recognized as acceptable modes of transport.

1-2. Scope. Methods and procedures outlined herein provide for cleaning, disassembly, preservation, packaging, packing, loading, blocking, and bracing of serviceable and reparable OH-58 helicopters prior to shipment.

1-3. General.

a. Flight delivery, when feasible, provides the most expeditious method of transporting aircraft. When circumstances dictate other methods of delivery, preparation of the OH-58 is required for protection against damage and corrosion. Shipping hazards vary with distance, means of transportation, handling facilities, weather, and many other factors. These instructions provide various degrees of protection, relating them to specific means and conditions of transportation. Judgment and foreknowledge of the planned transportation media will permit selection of a safe and economical procedure for any CONUS or oversea shipment.

b. It is the task of the packer and shipper to prevent damage from vibration, impact, and other shipping hazards by careful preparation and handling. This requires skillful utilization of airframe strong points, provisions for dampening shock and vibration, and exclusion of supports which would transmit damaging stresses. Mounts and tiedowns described are designed accordingly.

c. Configuration of individual aircraft will vary due to modifications or mission requirements. Minor dimensional changes to containers may be necessary. Presence of additional equipment may require preservation not covered by this manual. No special authorization is required to make minor deviation from the manual to cope with these situations.

d. Overall dimensions, which can be used to plan space requirements for any mode of shipment, can be found in TM 55-1520-228-10 and figure 1-1.

e. Cushioning consists of shock-absorbing materials or devices that will protect components from physical damage. Examples of such materials are PPP-C-1797 and PPP-C-1120. When items are protected by contact preservative compound, wrap preserved item with a barrier material before covering with cushioning material. On large items not entirely coated, it may be suitable to use barrier materials. A special situation occurs with shipment of entire aircraft where cushioning must be insulated from painted system of exterior surface of aircraft skin. Because of exposure to weather and other factors, L-P-378, polyethylene is recommended for this application.

1-4. Designation of Materials. Packaging materials are called out in this manual by name and specification. The nomenclature is usually abbreviated to one or two words because longer titles have no particular value,

1-5. Preservation Checksheets. The organization actually preserving the helicopter for shipment is responsible for writing the preservation checksheet. Two copies each of the preservation and depreservation checksheets (para. 1-6) will accompany the helicopter, except to depot overhaul when the depreservation sheets may be omitted. Place one of each in a waterproof bag (use MIL-B-117 or a similar type) heat seal, and stencil the following on the outside of the bag: PRESERVATION AND DEPRESERVATION INSTRUCTIONS. Tape this bag to cyclic stick with tape (item 26, appendix C). Place the other copy of each checksheet in log book. An example of a preservation checksheet based on the provisions of this manual is shown in appendix A.

1-6. Depreservation Checksheet. The organization preserving the helicopter for shipment is responsible for writing the depreservation checksheet. Refer to paragraph 1-5. Base depreservation check sheet on actual preservation applied, and indicate clearly and simply each operation to be performed in depreservation. Attach tags in conspicuous locations on items to draw attention to any depreservation operations otherwise liable to be overlooked. An example of a depreservation checksheet is shown in appendix B.

SECTION II

SHIPMENT BY CARGO AIRCRAFT

2-1. General. This section presents technical information for planning, disassembly, loading, tie-down, off loading and reassembly necessary to accomplish air transport of the OH-58 by cargo aircraft. The preparation for shipment procedures are the same regardless of the purpose for movement; however, if space is more valuable than time it may be advantageous to do more disassembly in order to get more helicopters into the cargo aircraft. This section is flexible enough to provide for this arrangement.

2-2 Capacities of Cargo Aircraft. OH-58 helicopters, disassembled to the extent shown in table 2-1 can be transported in cargo aircraft, See figures 2-1 and 2-2.

NOTE

When ordering a cargo aircraft to carry a maximum load, add to the order a statement that this load requires the full length, width, and height of the cargo compartment, and that all removable items must be excluded.

2-3. Functions of Cargo Aircraft Crew.

a. *Responsibility.* Responsibility for deciding when a United States Air Force aircraft is safe to fly vested in the cargo aircraft commander; thus, determining aircraft balance and tiedown restraint requirements are functions of the aircraft loadmaster.

b. *Movement of Helicopters.* Helicopters are loaded, tied down, and unloaded by unit or depot personnel with technical advice and assistance provided by the cargo aircraft loadmaster.

c. *Air Force Personnel Can Be Expected To:*

- (1) Advise and assist Army loading teams.
- (2) Prepare cargo aircraft for loading and unloading.
- (3) Rig and operate loading aids organic to aircraft.
- (4) Designate location of helicopter.
- (5) Determine restraint requirements.
- (6) Provide tiedown devices.
- (7) Inspect for adequacy of tiedown.

2-4. Functions of Army Loading Unit.

- a. *Army Loading Unit Is Expected To:*
- (1) Prepare helicopter for shipment.
 - (2) Load, tiedown, and unload helicopter.

CAUTION

Center of gravity and exact weight must be computed for each helicopter, so that loadmaster can accurately determine center of gravity for loaded cargo aircraft.

(3) Mark the center of gravity and furnish loadmaster exact weight of each helicopter.

(4) Furnish necessary lumber and construct extensions to aircraft loading ramps. See figure 2-3.

(5) Furnish, rig, and operate loading devices not organic to aircraft.

(6) Furnish and operate auxiliary lights necessary for night loading.

(7) Be prepared to demonstrate for cargo aircraft commander that disassembled components stowed within helicopter are packaged correctly and secured in accordance with Air Force restraint requirements specified in the applicable Air Force technical order for loading instructions.

(8) Prepare manifest, itemizing in such a manner that disassembled components stowed within helicopter for shipment as part of fuselage package.

(9) Furnish cargo aircraft commander a list of all dangerous materials, as defined by TM 38-250 (AFM 71-4), to be shipped with or within helicopter.

b. *Coordination.* The Army installation responsible for preparing and loading helicopter must coordinate with the Military Airlift Command (MAC) in order to have helicopter ready to load as soon as the MAC cargo aircraft arrives. All concerned must know how many helicopters are to be shipped and what model cargo aircraft will be used, to plan disassembly, obtain proper handling equipment, have necessary shoring available, obtain cushioning material, and provide for many other things that circumstances dictate.

2-5. Preparing Helicopter. To reduce congestion in the vicinity of cargo aircraft, the following should be completed prior to taking helicopter to loading site. Ground helicopter prior to cleaning, disassembly, or preservation.

a. Cleaning. Clean helicopter. Refer to paragraph 6-1.

b. Disassembly. Disassembly of some components must be optional with the shipper because of various circumstances. Disassembly requirements indicated in table 2-1 are based mainly on space and clearance considerations. Depending on existing conditions, more extensive removal of components may be accomplished. A cargo airplane may carry only one helicopter plus other cargo and troops. It may be advantageous to remove the horizontal stabilizer, for example, to make room for other cargo. All removed components must be color coded and TAGGED with serial number of aircraft immediately after disassembly. Under other conditions the shipper may take a calculated risk and leave on some components to save disassembly and reassembly time. Refer to tables 2-1 and 2-2. All disassembly will be in accordance with the aircraft Maintenance Manual. Preservation is covered in paragraph 6-3.

CAUTION

If components are to be stowed inside the helicopter during shipment, install platform assembly, cargo, NSN 1560-00-181-4820 in accordance with the procedures in TM 55-1520-228-23. The cargo platform will provide tiedown provisions and protect the helicopter floor from damage.

NOTE

When tailboom is removed for any reason, locally produced skate or dolly wheels (fig. 2-4) must be used to assist in movement of helicopter.

c. Lubrication. Lubricate helicopter in accordance with lubrication chart. Refer to chap. 1, the aircraft Maintenance Manual.

d. Engine Transmission and Tail Rotor Gearbox. Preserve and process engine for shipment

in accordance with flyable storage procedures. (Refer to the aircraft Maintenance Manual, appendix E.)

WARNING

Turn battery to OFF position prior to working on battery.

e. Battery Battery may be left in battery carrier of helicopter. Remove quick disconnect plug and secure to airframe with tape (item 26, appendix C).

e. 1. ATAS Launcher. Preserve and package. Refer to TM 9-1440-431-23.

f. Fuel Tanks. These will be no more than 3/4 full for air shipment, to which provisions of TM38-250 apply. Tag fuel tank caps to indicate type and number of gallons of fuel contained in each tank.

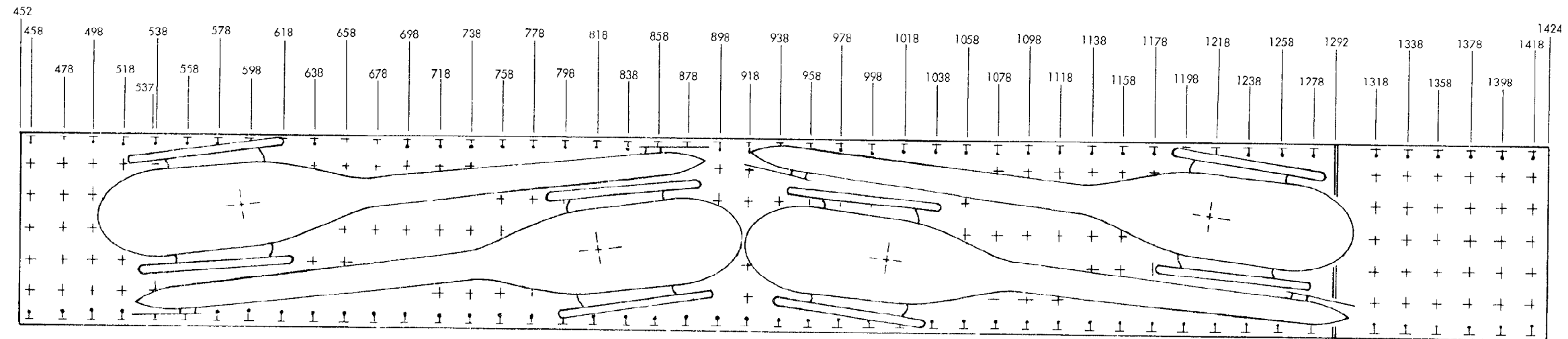
WARNING

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.

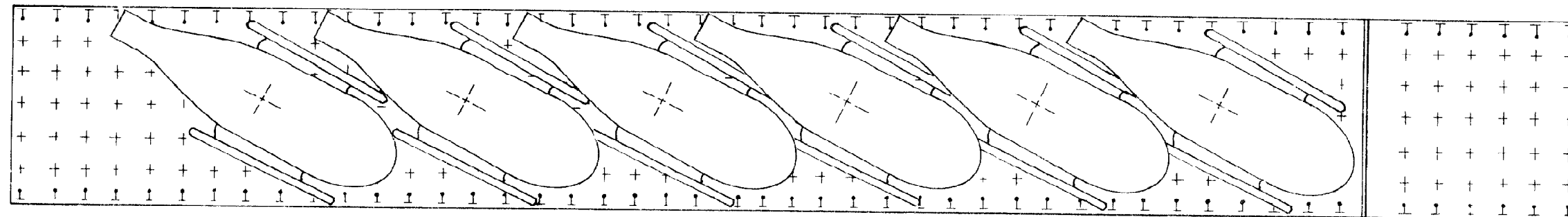
g. Cyclic Controls. Lock cyclic controls with AN5-12 bolt. Tag cyclic stick with a red tag stating: CYCLIC CONTROLS LOCKED WITH A BOLT. REMOVE BEFORE OPERATING.

h. Lights. Pad anti-collision, position, and navigation lights with cushioning material (item 28, appendix C) and secure with tape (item 26, appendix C).

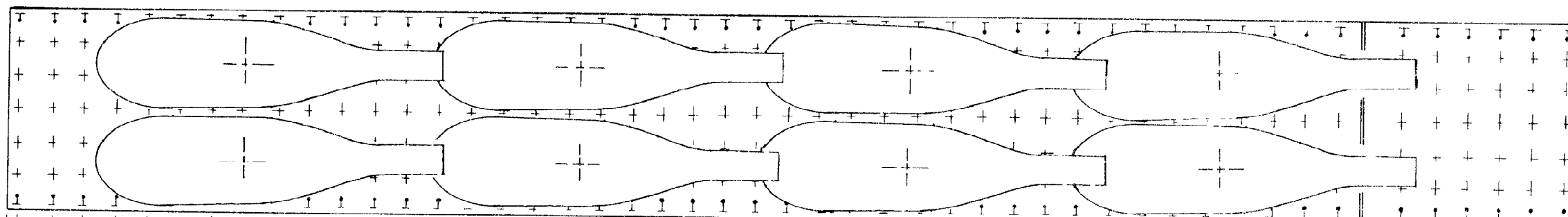
i. Antenna. Secure protective cover warning flag streamers to prevent damaging equipment. Secure a red tag to homing antenna(s), located just aft of cabin doors, with HANDS OFF printed on it. For aircraft shipped with tailboom secured to fuselage by a tailboom attachment fixture, secure a red tag to exposed end of tail rotor control tube with HANDS OFF printed on it.



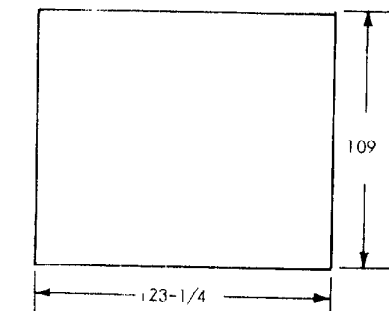
4 HELICOPTERS IN A C-141 CARGO AIRCRAFT



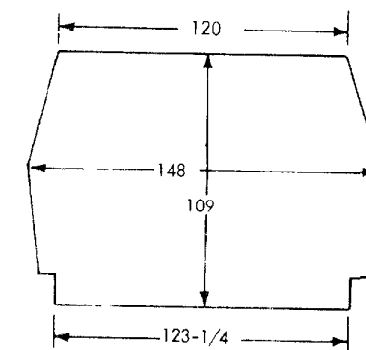
6 HELICOPTERS IN A C-141 CARGO AIRCRAFT



8 HELICOPTERS IN A C-141 CARGO AIRCRAFT



REAR OPENING

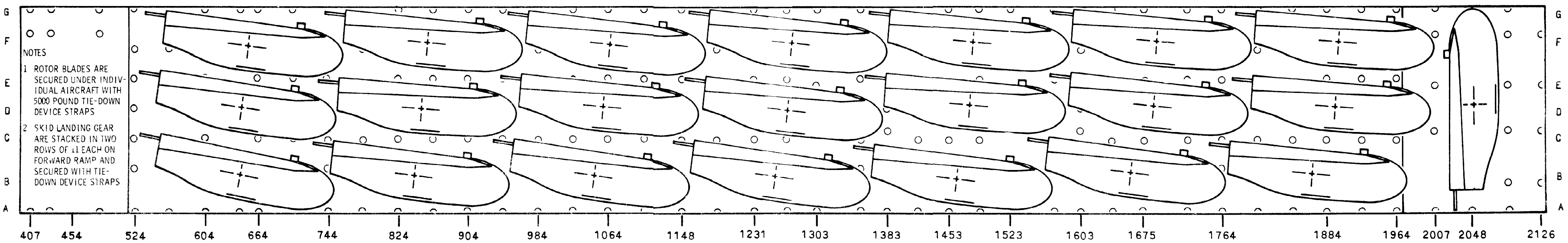
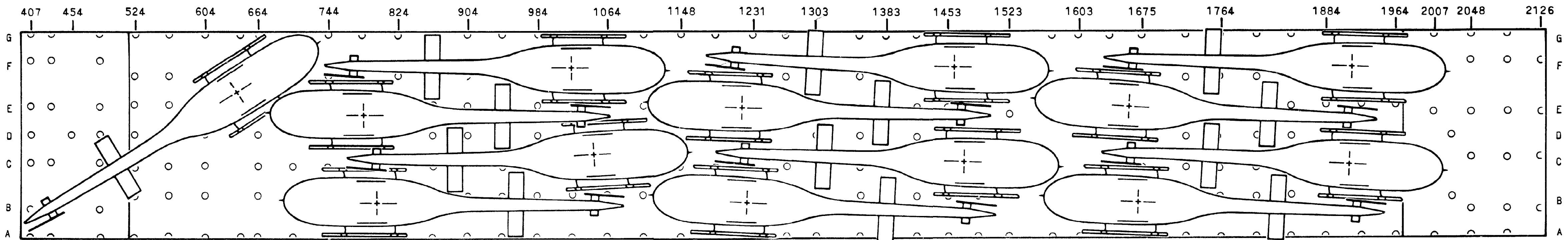


INTERIOR LIMITATIONS

NOTE
 r-LOOP SLOPES UPWARD
 FROM STA 1292 TO STA 1423
 WHEN RAMP DOOR IS CLOSED

- + - 10 000 - LB FITTINGS
- - 25 000 - LB FITTINGS

Figure 2-1 C-141 Loading Diagram



NOTES

- 1 ROTOR BLADES ARE SECURED UNDER INDIVIDUAL AIRCRAFT WITH 5000 POUND TIE-DOWN DEVICE STRAPS
- 2 SKID LANDING GEAR ARE STACKED IN TWO ROWS OF 11 EACH ON FORWARD RAMP AND SECURED WITH TIE-DOWN DEVICE STRAPS

FWD AV050337

SCALE 1/4"=1'-0"
Figure 2-2 C-5 Loading Diagram

j. *Circuit Breaker Panel.* Deenergize circuit breaker panel.

k. *Jack Pads.* Install tiedown shackles (P/N 204-031-464-1) on three jack pads.

NOTE

Use 1/2 inch diameter tubing 1-inch long as a sleeve on tiedown shackle pin.

1. *Vents and Drains.* Seal battery vents (2), vent pipe, oil tank drain line, and engine compartment drain line with caps or plugs. If caps or plugs are not available, wrap with barrier material (item 2, appendix C) secured with tape (item 26, appendix C). Attach a red cloth streamer to these openings with safety wire or tape (item 26, appendix C) so that the streamer is clearly visible from exterior of helicopter. Attach a tag to cyclic stick stating: BATTERY VENT LINES (2), STATIC VENTS (2), FUEL VENT PIPE, OIL TANK DRAIN LINE, AND ENGINE COMPARTMENT DRAIN LINE ARE SEALED. REMOVE SEALS PRIOR TO ENGINE RUNUP.

2-6. Preparing Cargo Aircraft. Cargo aircraft are prepared for loading by members of aircraft crew, assisted by Army or depot loading team. For maximum loads, all cargo or equipment which precludes placing transported helicopter within 20-inches of forward bulk-head must be removed from cargo aircraft. Stow such cargo or equipment on ramp at conclusion of loading. Army personnel must construct necessary ramp extensions to change angle of approach to cargo aircraft to keep the skid tubes from scraping the ground or gouging the ramp. See figure 2-3 for a C-5 and C-141 ramp extension. Retain lumber used in construction of ramp extensions for use in unloading.

2-7. Loading Procedures.

WARNING

Refer to warning following paragraph 2-5f.

a. The maximum number of helicopters which can be loaded in accordance with the extent of disassembly listed in table 2-1, the direction helicopters must face, and how they are fitted into a C-141 are illustrated in figure 2-1.

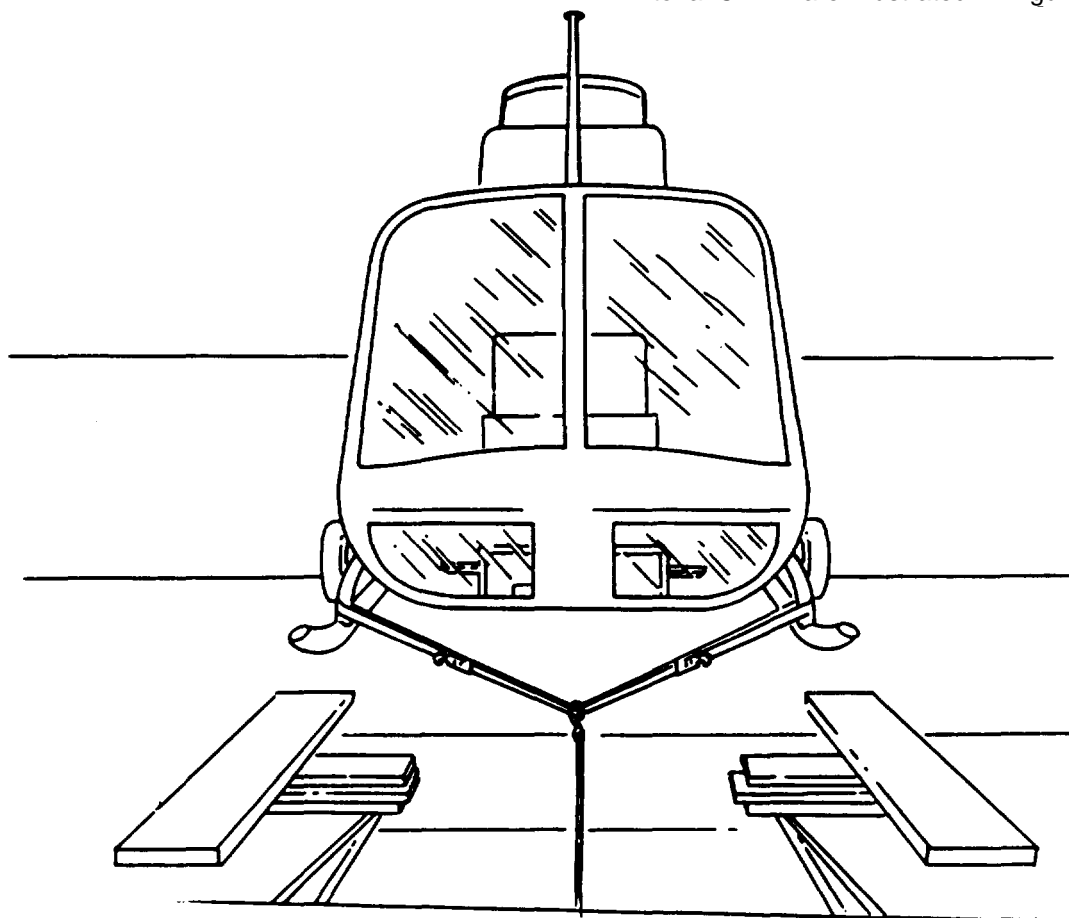


Figure 2-3. Ramp Extension for Cargo Aircraft

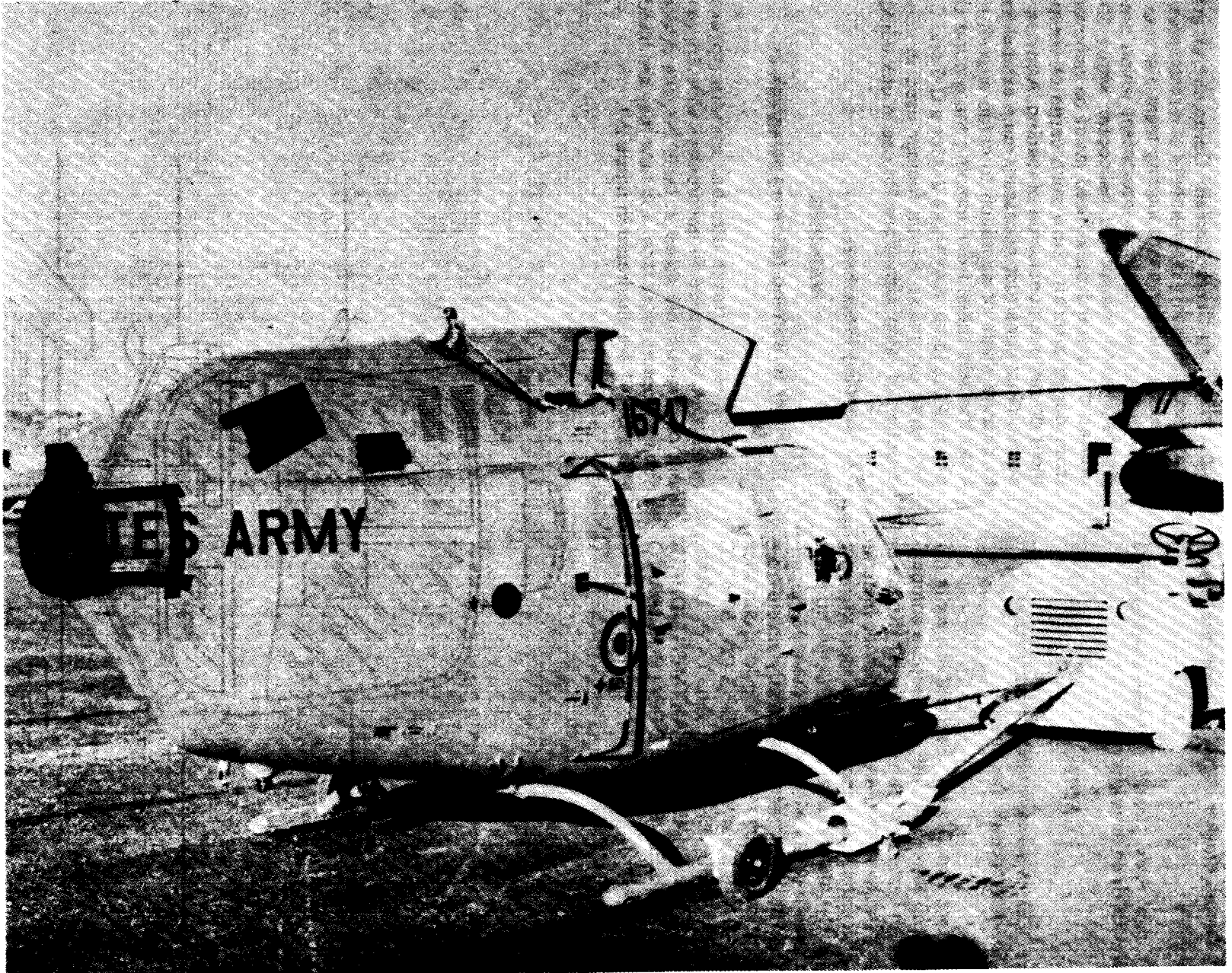


Figure 2-4. Ground Handling Equipment

Table 2-1. Disassembly Requirements for Air Cargo Shipments

	FOR MINIMUM DISASSEMBLY		FOR MAXIMUM DISASSEMBLY	
	C-5	C-141	C-5	C-141
No. of OH-58s per cargo aircraft	13	4	22	6 8
Components to be removed				
Main Rotor Blades	X	X	X	X X
Main Rotor Hub		X	X	X X
Main Rotor Mast		X	X	X X
Horizontal Stabilizer			X	X X
Vertical Fin	X	X	X	x x
Tail Rotor Blades			X	X X
Tailboom 1/		X	X	X X
Skid Landing Gear 2/			X	X
Pitot Tube				X
ATAS pylon Assembly			X	X
ATAS Launchers	X	X	X	X X
Impulse Cartridges	X	X	X	X X

X Denotes components to be removed.

1/ Removed tailbooms will be mounted on top of helicopter. See figures 6-6 and 6-7.

2/ Install air transportability fixture when it is necessary to remove skid landing gear. See figures 2-5 and 2-6.

Table 2-2. * Assembly and Disassembly Man-Minutes Required

COMPONENT	MAN MINUTES REQUIRED			MAN MINUTES REQUIRED		
	DISASSEMBLY	PRESERVATION and PACKAGING	TOTAL M/M	ASSEMBLY	DEPRESERVATION	TOTAL M/M
Main Rotor Blades	10	15	25	16	15	31
Main Rotor Hub	20	10	30	24	10	34
Main Rotor Mast	30	10	40	37	10	47
Horizontal Stabilizer	30	10	40	45	05	50
Vertical Fin	08	10	18	08	05	13
Tail Rotor Blades	10	10	20	15	05	20
Tailboom	12	20	32	18	20	38
Skid Landing Gear	10	—	10	10	—	10
Pitot Tube	20	05	25	20	05	25
ATAS Pylon Assembly	20	10	30	30	10	40
ATAS Launchers	10	05	15	20	10	30
Impulse Cartridges	05	05	10	10	10	20
Total M/H	3:05	1:50	4:55	4:13	1:45	5:58

* These figures are estimated and subject to revision.

NOTE: It is estimated that 4 men are required to load maximum loads of helicopters into cargo aircraft; estimated elapsed time 1.3 hours.

b. There is less chance of damaging rotor blades if helicopter is loaded first. Blades belonging to more than one helicopter can be loaded under same helicopter, since blades are positioned after helicopter has been loaded.

NOTE

Ensure blades are identified with serial number of helicopter.

c. When helicopter is started up ramp of cargo aircraft, vertical stabilizer or tailboom (if not removed) may drag. The loading crew must be prepared to lift tailboom to prevent damage. It is also very important to keep vertical stabilizer from hitting overhead door or ceiling of cargo aircraft. Generally, when landing gear is in proximity of or crossing top of ramp or inclined floor, tailboom must be pulled down and kept down until skid tubes are parallel with airplane floor. How long and how far tail must be pulled down depends on which cargo airplane is being loaded and which direction helicopter is facing. A satisfactory method to control tailboom is tie or loop nylon tiedown straps around tailboom, letting ends hang so that two men can hold each end. Men selected to man this position should be heavy enough to weight tail down, and able to hold it down until it clears critical area. These men may also have to swing tail to keep helicopter headed straight into cargo aircraft. Men should be along side not behind helicopter so strap will not slip off end of tailboom.

CAUTION

Ground handling and dolly wheels should not be abused by being run over objects such as pieces of 2 x 4 or planks. This is likely to blow out tires, or strain parts of handling wheel supports, at places where they tie into helicopter. When ramp extensions are made of nominal two inch lumber, the "bump" at the ends should be reduced by addition of small pieces of wood, or by tapering ends.

d. When ground handling wheels reach a point approximately two feet below ramp hinge on C-141 cargo aircraft, lay a sheet of heavy aluminum 1' x 4' in the path of approaching wheels. This will preclude gouging ramp or cargo floor with rough end of helicopter skid tube.

NOTE

Scrap aluminum sheet is preferred for protecting cargo aircraft floor and ramp. If this is not available, substitute material such as plywood, fiberglass, or plastic. It should not be more than 1/6- to 3/16-inch thick or the skid landing gear may hang up on it.

e. Prior to moving the helicopter up ramp of cargo aircraft, check that the slope of the ramp is less than 10 degrees to ensure safe clearance exists for the Wire Strike Protection System (WSPS) Lower Cutter. If the ramp slope is more than 10 degrees, a ramp extension may be used to reduce the slope to within 10 degrees. If this is not feasible, the lower cutter assembly must be removed together with the antenna which is mounted on the same panel assembly by removing the panel retaining screws and disconnecting the antenna.

2-8. Loading C-141 Cargo Aircraft.

a. A minimum of six men constitute a loading team. Station one man on each side of ramp ahead of helicopter. These men act as signalmen, and check side clearance. Station four men at tail end who guide helicopter as it moves up ramp into cargo aircraft. If vertical stabilizer is not removed, they must protect it from hitting ground or ceiling of cargo aircraft.

b. Make a towing bridle by looping a five thousand pound nylon strap around each end of cross tube nearest cargo aircraft. Two nylon straps are required on each side. Bring ends together to form a triangular bridle. Attach portable winch cable to towing bridle, see figure 2-4.

c. Tie two 5,000 pound nylon straps around tailboom, letting ends hang free. (Not applicable with tailboom removed.)

d. When loading four, five, or six helicopters, pull helicopters nose first slowly into cargo aircraft with block and tackle, tow cable, and tow vehicle; however, if these implements are not available, helicopters can be loaded by hand. The

electric winch is not used, since helicopters and rotor blades impede winch cable. When loading seven or eight helicopters, pull them slowly into cargo aircraft with organic electric winch. Regardless of the method of loading, care must be taken to prevent tail skid from digging ground and vertical stabilizer from hitting ceiling of cargo aircraft (not applicable if tailboom is removed).

e. As soon as ground handling wheels and dolly wheels (if applicable, see fig. 2-4) reach horizontal section of cargo floor, release hoist cable or tow cable, and manhandle helicopter into tie-down position designated by cargo aircraft loadmaster. Care must be taken in spotting helicopters to allow sufficient clearance for aircraft crew members to move along sides of aircraft. Do not load any portion of helicopter or disassembled components forward of Station 498. At least 4-inches clearance must be maintained at all times between homing antenna on one helicopter and fuselage on next helicopter.

f. Prior to removing dolly wheels, if applicable, place a 1 x 6 x 72-inch board under each skid landing gear to protect flooring of cargo aircraft. If air transportability skid is employed, reverse ground handling wheels so that wheels are inside skid. If applicable, attach ground handling wheels, to skid landing gear, or transportability fixture for shipment.

g. Secure disassembled components not stowed within helicopter with nylon straps as follows, unless otherwise directed by loadmaster:

(1) Place main rotor blades for all loads except six, see table 2-1, under helicopter immediately after helicopter has been placed in tie-down position.

(2) With a load of eight helicopters, stow two sets of main rotor blades under last three helicopters loaded, to facilitate unloading procedures and to reduce possibility of damage to blades.

(3) Secure vertical and horizontal stabilizer containers, plus skid landing gear, to ramp of cargo aircraft, unless otherwise directed by loadmaster.

(4) If ground handling wheels and dolly wheels (if applicable) are not shipped with individual aircraft, at least one pair of each must be placed aboard cargo aircraft to assist in unloading operations.

2-9. Loading C-5 Cargo Aircraft.

a. Thirteen OH-58 helicopters can be loaded into a C-5 cargo aircraft, if minimum disassembly is accomplished. See table 2-1 and figure 2-2. Twenty-two helicopters can be loaded if skid landing gear is replaced by an air transportability fixture, see figures 2-5 and 2-6, and tailboom is removed and secured to fuselage with tailboom attachment fixture, see figures 6-6, 6-7 and table 2-1.

b. OH-58 helicopters can be loaded into C-5 cargo aircraft by two methods:

(1) Rolled into cargo aircraft on modified ground handling wheels from Air Force "K" loader.

(2) Rolled up kneeled cargo ramp into cargo aircraft on modified ground handling wheels.

c. If helicopter is loaded from a "K" loader proceed as follows:

(1) If tail booms are removed, install ground handling and dolly wheels on each helicopter (refer to appendix D).

WARNING

Personnel should stand clear of modified ground handling wheels while loading, as bolts have been known to break, injuring loading personnel.

CAUTION

Ground handling wheels, modified ground handling wheels, or dolly wheels should not be abused by running over objects, such as pieces of lumber, rocks, or chuck holes. This is likely to blow out tires or strain parts of wheel supports. When ramp extensions are constructed of nominal 2-inch lumber, taper edges.

(2) Hoist helicopter aboard "K" loader with a crane capable of lifting at least 2,500 pounds. Secure helicopter to conveyance with 5,000 pound tie-down device straps. Move "K" loader against cargo aircraft ramp to obtain a continuous surface between cargo aircraft floor and transporting vehicle. Release straps securing helicopter to vehicle.

(3) A minimum of seven men constitute loading team. Station one man on each side to check side clearance as helicopter is maneuvered within cargo aircraft. Station four men at tail end to move and/or guide helicopter into cargo aircraft. The seventh man will operate "K" loader.

(4) Manhandle helicopter into tiedown position as shown in applicable portion of figure 2-2.

(5) Secure helicopter. See figure 2-7.

(6) Stow main rotor blades under fuselage as each helicopter is loaded. Place cushioning material (item 27, appendix C) under and over blades. Secure blades against lateral move-

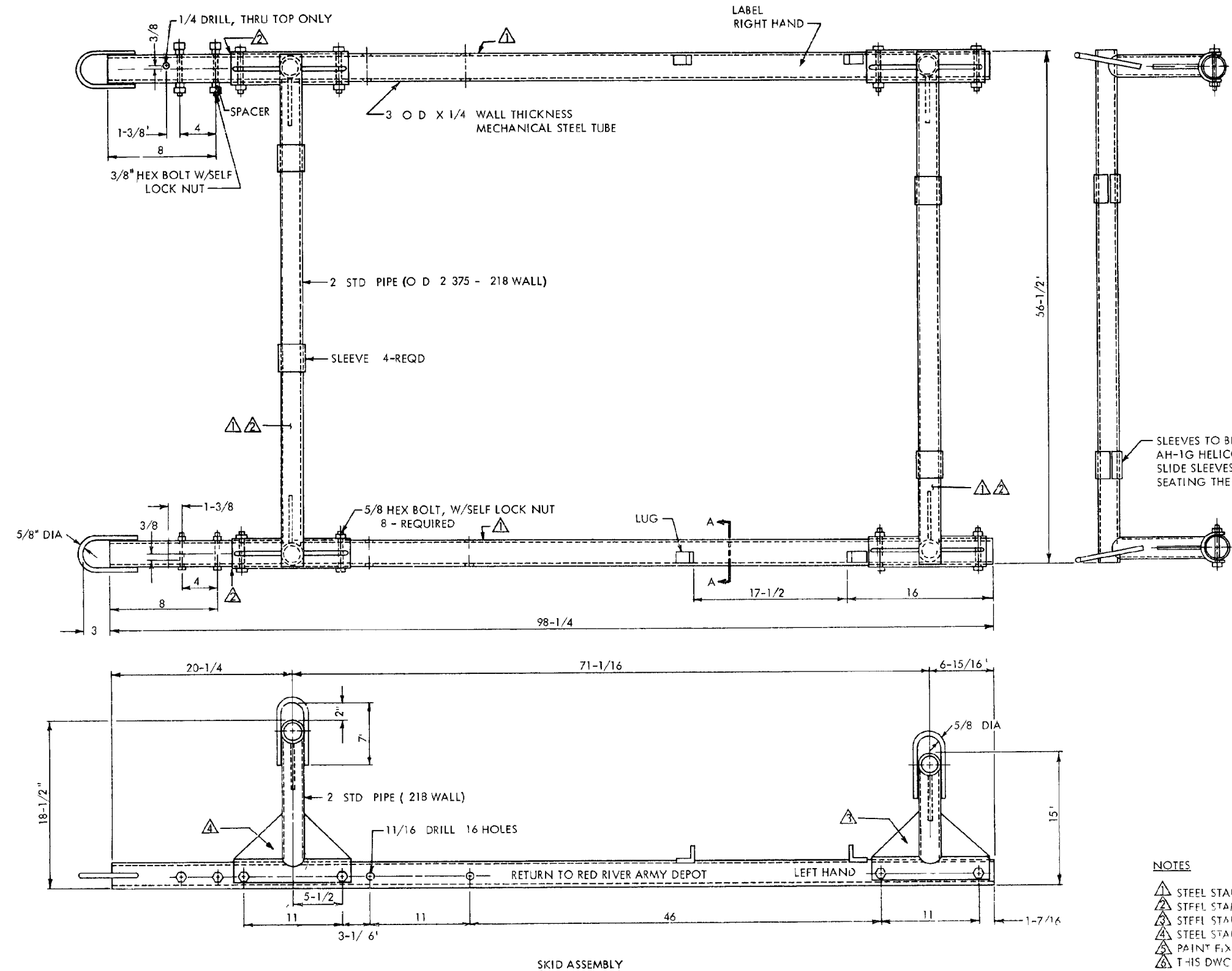
ment with two 5,000 pound tie-down device straps, and against forward movement with one strap.

(7) At least two sets of ground handling equipment will be shipped with each cargo aircraft.

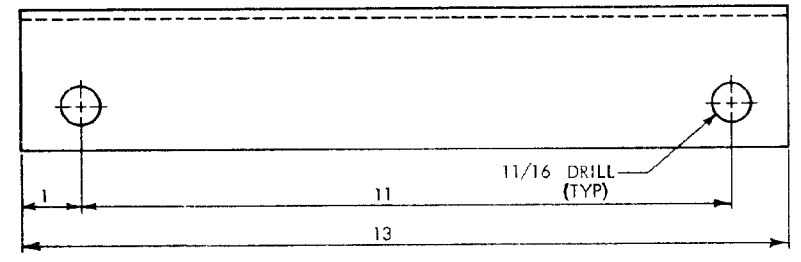
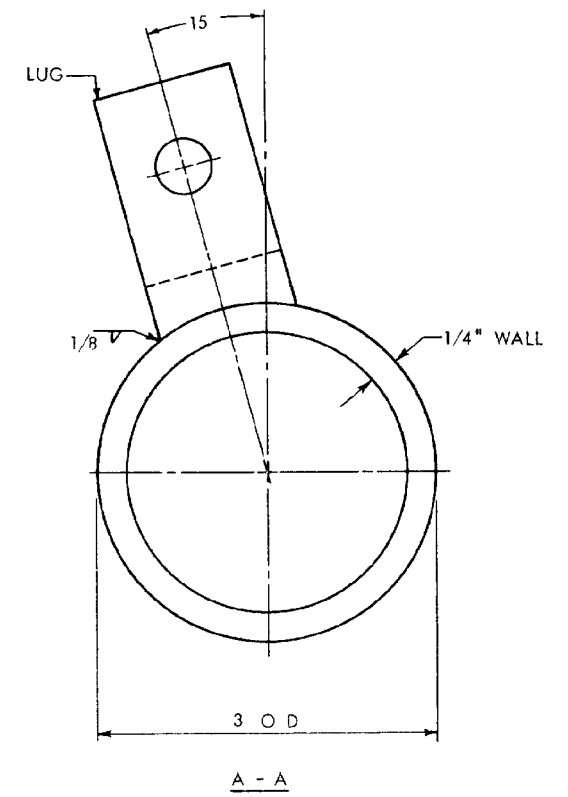
d. If it is necessary to winch helicopter up cargo aircraft ramp, proceed as follows:

(1) Install ground handling equipment. Refer to subparagraph c (1) above.

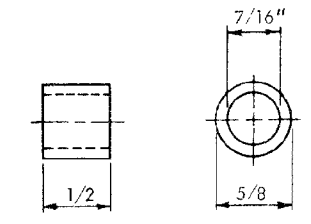
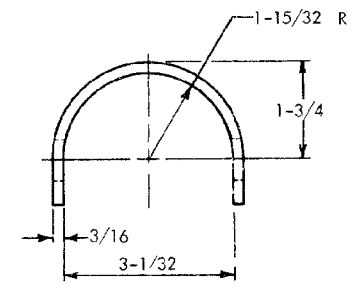
(2) A minimum of six men constitute a loading team. Station one man on each side to check side clearance as helicopter is maneuvered within cargo aircraft. Place four men at end of



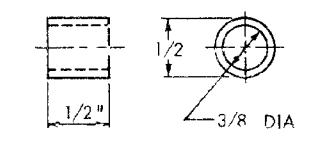
SKID ASSEMBLY



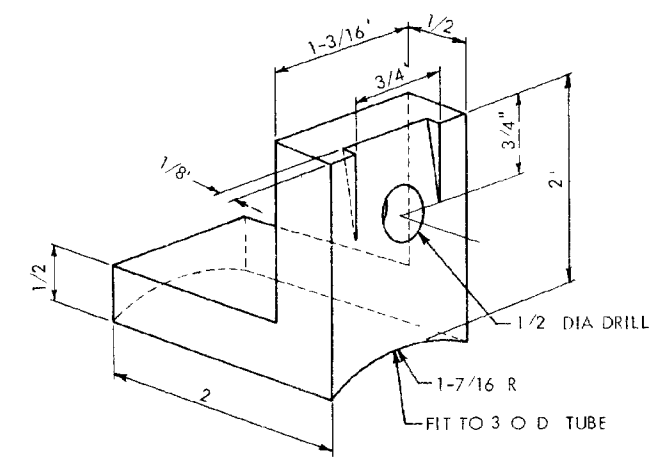
LEG SETTLE
FAB FROM 3/16 X 13 X 6-1/8 SHEET STEEL
SCALE 1/2 = 1



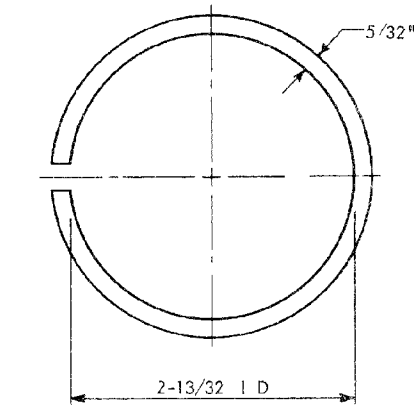
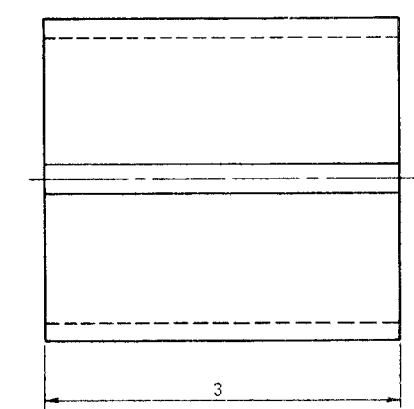
SPACER, STEEL
2 - REQUIRED



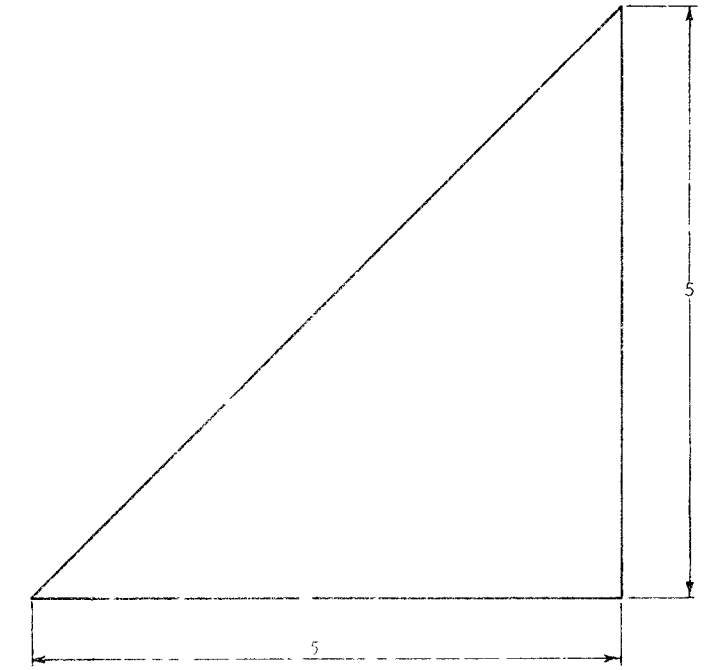
SPACER, STEEL
8 - REQUIRED



LUG DETAIL
FAB MILD STEEL



SLEEVE
FAB FROM 5/32X3X7-5/16 ALUMINUM SHEET



SUPPORT GUSSET
FAB FROM 3/8 PL MILD STEEL
12 - REQD

- NOTES
- ▲ STEEL STAMP OH-58
 - ▲ STEEL STAMP AH-1G
 - ▲ STEEL STAMP AFT ON 4 GUSSET
 - ▲ STEEL STAMP FWD ON 4 C1 SSF
 - ▲ PAINT FIXTURE YELLOW
 - ▲ THIS DWG SUPPERSDFDS DWG #D-707
- 8 APR 68

Figure 2-5 Air Transportability Fixture

helicopter to maneuver helicopter as directed by loadmaster.

(3) Winch helicopter up ramp with electric winch and snatch blocks. Rigging and operating winch and snatch blocks is a function of cargo aircraft crew under direction of cargo aircraft loadmaster, while the main task of Army personnel is to maneuver helicopter as directed by loadmaster.

(4) Make a towing bridle by looping a five thousand pound nylon strap around each end of cross tube nearest cargo aircraft. Two nylon straps are required on each side. Bring ends together to form a triangular bridle. Attach portable winch cable to towing bridle. See figure 2-4.

CAUTION

Make certain open portion of winch hook is up, or damage may result to cargo floor.

(5) Place metal strips under aft end of skid tubes as they approach ramp hinge to protect cargo floor.

(6) When handling wheels reach horizontal section of cargo floor, release winch hook and remove towing bridle. Manhandle helicopter into tiedown position, See figure 2-2.

(7) Tiedown helicopter. See figure 2-7.

(8) After each helicopter is loaded, place main rotor blades under fuselage. Refer to subparagraph c (6) above.

2-10. Marking.

a. General. Apply all markings in accordance with MIL-STD-129. Include serial number of helicopter in container markings.

b. *Components.* Identify each disassembled part or assembly by marking or tagging it with correct part or assembly number, and serial number of aircraft from which removed.

c. *Dangerous and Hazardous Materials.* Show special handling instructions, markings, and warnings required by TM 38-250 (AFM 71-4), Packaging and Handling of Dangerous Materials for Transportation by Military Aircraft. In addition, label all shipments containing dangerous and hazardous materials and any other material requiring special handling with a DD Form 1387 Data/Certification Label. Detailed instructions for required copies and preparation of DD Form 1387-2 labels are given in TM 38-250 (AFM 71-4). Secure DD Form 1387-2 to fuselage or container in a clearly visible location.

2-11. Tiedown.

a. Tiedown helicopter, See figure 2-7. This is a diagrammatic representation of the OH-58 superimposed on tiedown fittings in the floor of a typical cargo aircraft. Points with numbered-flags are floor tiedown fittings. The opposite end of each strap is fastened to helicopter. See figure 2-8.

b. Regardless of how many aircraft are loaded or where they are set, the tiedown plan must be applied. See figure 2-7. Attach tiedown device of at least specified strength to point of attachment indicated in tiedown instructions. See figure 2-8. Cargo aircraft tiedown fittings have not been identified because exact location of helicopter is determined by cargo aircraft loadmaster.

c. If helicopter is secured to cargo floor, see figure 2-8, the following Air Force restraint requirements are satisfied:

Table 2-3. Required Restraint Criteria - Minimum Allowable G Factors

Cargo Aircraft	C-5	C-141
Forward	3	4.0G ¹
Aft	1 1/2	1.5G
Side	1 1/2	1.5G
Vertical	2	2.0G

¹Normal forward restraint for this cargo aircraft is 8G's. It is permissible to reduce this to 4G's if no passengers are carried forward of helicopter. Restraints shown in figure 2-8 are designed for 4G's forward restraint; therefore, passengers may not be carried.



Figure 2-6. Air Transportability Fixture Installed

2-12. Unloading Procedures.

a. Preparations for Unloading Operations.

The helicopter may be unloaded either by mechanical power or manpower. Mechanical power is preferable and usually available using the airplane winch, a vehicle equipped with winch, or a combination of the two. Regardless of method used to unload helicopter, rate of descent must be controlled as the helicopter rolls down the inclined floor and ramp. The following preparations are required before proceeding with unloading operations:

(1) Extend cargo plane loading ramps by using 2 x 8-inch by 10 or 12 foot lengths of boards supported by shorter pieces placed underneath (lumber used in loading should be shipped with helicopter). See figure 2-3.

(2) Position one man at each side of ramp to exchange signals with aircraft loadmaster.

(3) Position four men at tail end of helicopter to guide tail, and to prevent it from coming into contact with airplane or striking the ground as it comes off ramp. A nylon web strap secured around tail skid will enable the men to control tail more effectively.

b. Mechanical Power Unloading Procedures.

(1) Install ground handling wheels.

(2) Move helicopter to cargo compartment exit.

(3) Station vehicle equipped with winch at foot of loading ramp.

(4) Attach nylon strap bridle loops in the same manner and to the same points used for loading.

(5) Attach aircraft winch hook to bridle arrangement, with hook opening up.

(6) Attach similar bridle arrangement to other cross tube.

(7) Attach hook from vehicle winch to second bridle arrangement.

(8) Pull helicopter from aircraft by taking in on vehicle winch, while letting out the corresponding amount of cable from aircraft winch restraining descent.

WARNING

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.

(9) Allow helicopter to proceed down ramp and along ground until helicopter clears loading ramp.

(10) Remove cables and bridle-strap loop arrangements.

c. Manpower Unloading Procedures.

(1) Install ground handling wheels.

(2) Move helicopter to inclined floor or ramp.

(3) Attach two 5,000-pound tiedown devices to each skid and cross tube joint. (Use same points used in loading.)

(4) Hook movable hooks of each strap to a tiedown fitting so quick locking device may be shut instantly.

(5) Position two men at end of each strap.

(6) Attach two lengths of 5,000 pound tiedown devices to each of other skids and cross tube joints.

(7) Position two men at end of each strap.

(8) Place four men at tail end of helicopter to keep tailboom from hitting ceiling of cargo aircraft, and tail skid from hitting ground. These men also guide aircraft as it is unloaded.

(9) Pull helicopter to start it down incline; at same time, pry out on restraining straps.

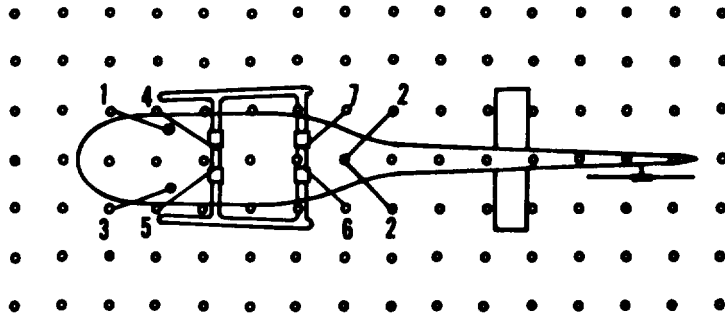
NOTE

Men controlling restraining straps should be prepared to shut quick locking device at first sign of trouble.

(10) Allow helicopter to roll down ramp and along ground until helicopter clears loading ramp.

NOTE

Unloading helicopter by manpower is an expedient. It should not be attempted unless there is no mechanical device to assist in unloading operations.



TIEDOWN INSTRUCTIONS

POINT OF ATTACHMENT ON HELICOPTER	TIEDOWN DEVICE NUMBER	TIEDOWN DEVICE
* MOORING RING	1,3,2	5
CROSS TUBE	4,5,6,7	5

MATERIAL REQUIREMENTS:

- 3 TIEDOWN RINGS P/N 204-031-461-1
- 2 PCS-1-BY 4-BY 84 INCH BOARD
- 7 MATTRESSES OR EQUIVALENT CUSHIONING MATERIAL

Figure 2-7. Tiedown Diagram



SECTION III

VESSEL SHIPMENT

3-1. General. It is the responsibility of the Military Traffic Management Command (MTMC) to make necessary arrangements with the Military Sealift Command (MSC) for use of vessels for ocean shipment of aircraft when contacted by the appropriate command. It is also the responsibility of MTMC to make arrangements with a service or commercial stevedore activity to load, tiedown all aircraft with component parts, and to supervise these activities, along with MSC. MTMC will prepare a loading plan and manifest under close coordination with shipper. Protective plastic covering (Appendix G) is required for vessel shipment. Cleaning, disassembly, preservation, and packing of aircraft is the responsibility of the shipper. Aircraft will be transported or flown to loading point at time designated by MTMC. The shipper will furnish MTMC information required to efficiently load vessel (such as weight and cube, amount of fuel, and be available to give advice on loading and tiedown procedures, as necessary.

3-2. Preparation. Cleaning and metal treatment, prior to shipment, is covered in Section VI, paragraph 6-1.

3-3. Disassembly. The only disassembly necessary for vessel shipment is removal of the main rotor blades, impulse cartridges, and ATAS launcher. Refer to TM 55-1520-228-23.

3-4. Preservation and Packaging. Refer to paragraph 6-3.

3-5. Marking.

a. General. Apply all markings. (Refer to MIL-STD-129.) Include serial number of helicopter in container markings.

b. Components. Identify each disassembled part or assembly by marking or tagging it with correct part or assembly number and serial number of aircraft from which removed.

c. Rotor Blade Crates.

(1) Mark each side and end of crate or box with 2-inch stenciled letters: USE NO GRAB HOOKS.

(2) Indicate center of balance of loaded crate by a painted black strip 1 inch wide on each side of crate extending upward 3 inches from lower edge of sheathing. Stencil CENTER OF BALANCE in 1-inch letters adjacent to the strip.

(3) Indicate sling points by conspicuous arrows and the words SLING HERE in 1-inch letters.

d. Special Marking. In addition to any other marking required by shipping instructions, attach a tag which reads: THIS AIRCRAFT WAS PRESERVED FOR THE LENGTH OF TIME NORMALLY REQUIRED TO REACH DESTINATION ONLY IF NOT IMMEDIATELY PREPARED FOR OPERATION WHEN RECEIVED, IT MUST BE PLACED IN A STORAGE STATUS AS DESCRIBED IN APPENDIX E OF THE TECHNICAL MAINTENANCE MANUAL FOR THE AIRCRAFT. Waterproof and secure tag to exterior of aircraft in a conspicuous location such as the main entrance door handle. When possible, include same information with shipping documents. Such action is in addition to required tag.

3-6. Loading.

a. Hoist helicopter by attaching hoisting adapter (fig. 3-1) to mast nut.

b. To attach hoisting adapter to main rotor group, cut barrier material as necessary. Attach crane hook to hoisting adapter.

c. Attach guide ropes to skid landing gear to steady helicopter during hoisting. Slowly hoist helicopter aboard vessel and remove crane hook.

d. Remove hoisting adapter and seal barrier material with tape (item 26, appendix C).

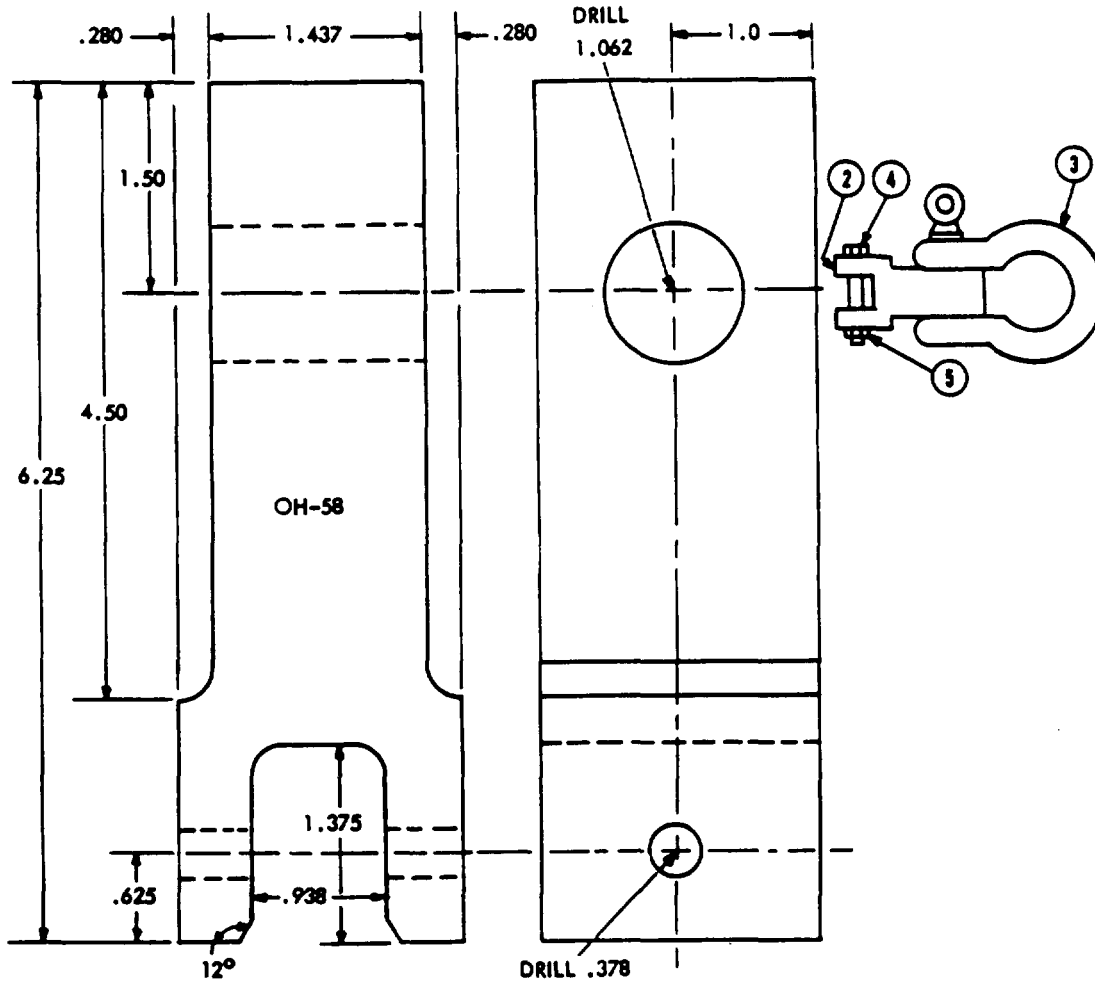
NOTE

Sufficient ground handling wheels must be placed on carrier to enable crew to move helicopters into tiedown position. Two hoisting adapters must accompany the helicopters for unloading operations.

3-7. Mooring.

a. Mooring aboard vessel is the responsibility of the vessel commander. Place rubber pads (item 24, appendix C) under each skid tube when helicopter is moored on deck.

b. Secure two tiedown cables laterally from each forward jack pad, one forward and one aft at a 45° angle.



5	1	NUT	3/8"-24UNF	AN315-3R	OR EQUAL
4	1	BOLT CLOSE TOL.	3/8"-24UNF x 2 1/2"	NAS464-6L-33	OR EQUAL
3	1	SHACKLE		AN116-14	OR EQUAL
2	1	ADAPTER	2" x 2" x 6 1/4"	M1020 STEEL	BAR STOCK
1		ASSEMBLY, SHACKLE ADAPTER FOR OH-58			
ITEM NO.	QTY REQ.	PART	DESCRIPTION	SPEC.	NOTES

NOTES:

1. MAKE FROM 2" BAR STOCK M1020 MERCHANT QUALITY HOT ROLLED SQUARE (LOW CARBON) STEEL MATERIAL.
2. STEEL STAMP OH-58 WHERE SHOWN.
3. PAINT YELLOW.
4. MILL. TWO (2) SIDES ONLY.

Figure 3-1. Hoisting Adapter

SECTION IV HIGHWAY SHIPMENT

4-1. SHORT HAUL SHIPMENT.

a. *General.* Flight delivery, when feasible, provides the most expeditious method of transposing a helicopter. Air cargo shipment of OH-58 is the alternate method of transport; however, under emergency conditions, serviceable and repairable aircraft can be transported within CONUS by a truck van. Entire helicopter is highly susceptible to shock and vibration; therefore, use only vans or flat bed trucks with soft ride suspension to transport helicopters for maintenance, emergency, or distances of less than 100 miles on smooth surfaced highways with concurrence of Commander, AVSCOM.

NOTE

Since overall height of helicopter with main rotor hub installed is 9 feet 7 inches, height of carrier floor is of prime importance. Highway clearances must be checked prior to shipment and height of carrier bed ordered accordingly.

b. Disassembly.

(1) Remove and pack main rotor blades. Refer to paragraph 6-3f.

(2) Remove impulse cartridges. Remove and pack ATAS missile launcher. Refer to TM 55-1520-228-23 and TM 9-1440-431-23.

c. Preservation.

(1) Preservation of helicopter is not required for short haul shipment.

(2) If truck shipment is followed by air cargo or vessel shipment, the provisions of sections II and III are applicable; however, since plexiglass and rotor head are not normally protected for air shipment, take the following additional precautions for truck phase of shipment.

(a) Completely cover windshield and lower windows with barrier material. (item 3, appendix C) secured with tape (item 26, appendix C). Make certain that printed side of barrier material is next to plexiglass surfaces and that tape does not contact plexiglass.

(b) Place barrier material (item 3, appendix

C) shroud over main rotor group and secure with tape (item 26, appendix C).

(3) Install tiedown shackles (3) on forward and aft jacking and tiedown fittings, and to tiedown clamps.

(4) Install pitot tube cover.

(5) Refer to paragraph 4-3 for additional shipping procedures.

4-2. Cleaning. Clean helicopter as necessary. Refer to paragraph 6-1.

4-3. Long Truck Shipments.

NOTE

For long truck shipment of serviceable aircraft apply protective heat shrink film in accordance with Appendix G.

a. *General.* Long truck shipments of serviceable and repairable aircraft will only be made in highway vans with a soft ride suspension system. Deviations from the following procedures will be authorized only by Commander, AVSCOM.

b. *Disassembly.* Remove following components for all truck shipments, unless directed otherwise by competent shipping orders. All disassembly will be in accordance with the aircraft Maintenance Manual.

- (1) Main Rotor Blades
- (2) Main Rotor Hub
- (3) Main Rotor Mast and Swashplate Assembly
- (4) Tail Rotor Group
- (5) Vertical Fin
- (6) Horizontal Stabilizer
- (7) Tailboom
- (8) Impulse Cartridges
- (9) ATAS Launcher

c. *Capacities of Standard Vans.* OH-58 helicopters disassembled to the extent stated in subparagraph *b* above can be transported in standard vans in the following numbers:

TYPE OF VAN	NO. OF AIRCRAFT
20 Foot Mil Van	1
26 Foot Van	1
35 Foot Van	2
40 Foot Van	2

d. *Preservation of Engine, Transmission, and Gear Boxes.* Preserve engine, transmission, and gear boxes. Refer to paragraph 6-3b.

e. *Fuel System.* Drain and purge fuel system. Refer to paragraph 6-3c.

f. Battery.

(1) Clean and service battery as necessary. Refer to paragraph 6-3d.

(2) Wrap quick disconnect plug with barrier material (item 2, appendix C) and secure plug to airframe with tape (item 26, appendix C).

NOTE

When available and practical, use polyethylene sheeting (item 27, appendix C) or cushioning material (item 28, appendix C) in all packing operations.

f. 1. *ATAS Launcher.* Preserve and package. Refer to TM 9-1440-431-23.

Figure 4-1. Deleted by Change 3

g. *Hydraulic System.* Preserve hydraulic system. Refer to paragraph 6-3e.

h. *Main Rotor Blades.* Remove and pack main rotor blades. Refer to paragraph 6-3f.

i. *Main Rotor Hub.* Remove, preserve, and cushion main rotor hub. Refer to paragraph 6-3g. (1). Secure cushioned or boxed hub in passenger compartment.

j. *Mast and Swashplate Assembly.* Remove, preserve, and cushion mast assembly. Refer to paragraph 6-3g.(2). Secure cushioned or boxed assembly in passenger compartment.

k. *Tail Rotor Assembly.* Remove, preserve, and cushion tail rotor assembly. Refer to paragraph 6-3m. Secure cushioned or boxed assembly in passenger compartment of helicopter.

l. *Vertical Stabilizer.* Remove, preserve, and pack vertical stabilizer. Refer to paragraph 6-3i. Secure packed fins to floor of van with nylon straps.

m. *Horizontal Stabilizer.* Remove, preserve, and pack horizontal stabilizer. Refer to paragraph 6-3h. Secure packed stabilizer to floor of van with nylon straps.

n. *Tailboom.*

(1) Preserve tailboom and close all openings. Refer to paragraph 6-3l.

(2) Deleted.

(3) Secure tailboom on top of fuselage with tailboom attachment fixture. Refer to paragraph 2-10.

o. *Skid Landing Gear.*

(1) Coat exposed metal surfaces of skid landing gear with corrosion preventive compound (item 11 or 13, appendix C).

(2) If skid landing gear is damaged and unable to support weight of helicopter, install fuselage on AH-1/OH-58 Air Transportability Fixture. See figures 2-5 and 2-6.

p. *Fuselage.* Prepare in accordance with paragraph 6-3p.

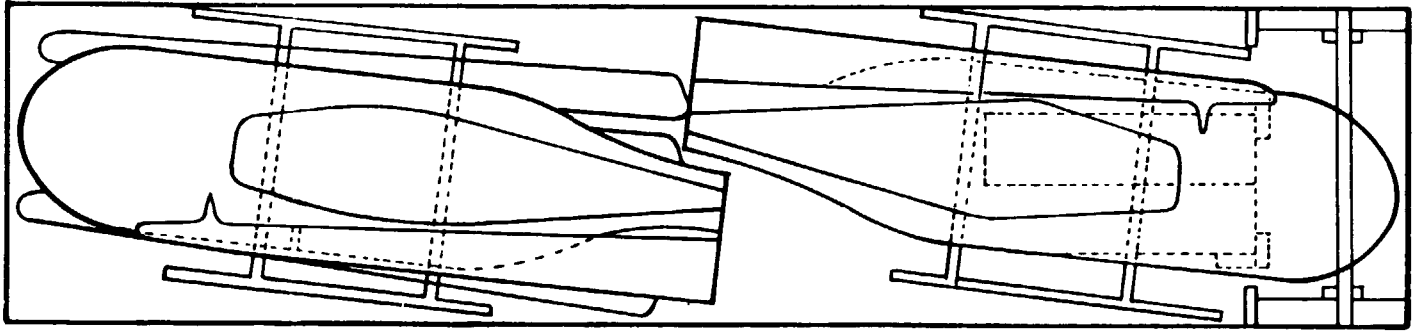
4-4. Marking. Apply marking. Refer to paragraph 2-10.

4-5. Loading and Tiedown.

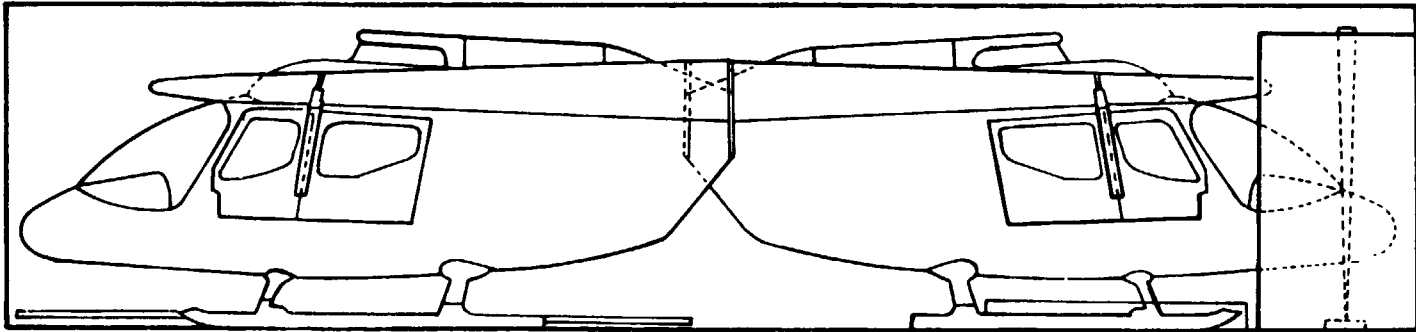
a. *Positioning Van for Loading.* The loading site should be a loading platform with a height equal to the height of van floor. Maneuver helicopter to rear of van and align with van door for loading. Install bridging plate (1/2-inch plywood or 1/4-inch steel plate) with sufficient width to accommodate loading device. Bridging plate should have lugs on bottom, or be of sufficient length to prevent slipping-off dock or trailer.

b. *Truck Interior Dry Van Dimensions.*

	TYPE OF VAN	LENGTH	WIDTH	HEIGHT
(1)	Military Van			
	Cargo Compartment	19'5"	90	85
(2)	26 Foot Van			
	Cargo Compartment	26"	91	101
(3)	35 Foot Van			
	Cargo Compartment	34'7½"	92½	94½
(4)	40 Foot Van			
	Cargo Compartment	89 3/8	91	
	Door			97
	Door	39'4"	91	92'
	Door		91	90



PLAN



SIDE

Figure 4-2. Loading Diagram for 35' Vans

c. *Loading into Vans.* Load aircraft into vans using ground handling wheels, or loading and positioning device, see figure 4-1.

(1) *Twenty Foot Mil Van.* Boxed vertical and horizontal stabilizers are placed on end, one on each side at front end of van, and secure with 2 x 4 bracing and nylon straps. Move helicopter into van nose first, to within 6 inches of forward end of van. Place main rotor blades under helicopter on polyethylene sheeting (item 27, appendix C) or other suitable cushioning material. Similar cushioning must be placed over rotor blades, so that nylon tiedown straps will not come in contact with rotor blades.

(2) *Twenty Six Foot Van.* Secure boxed vertical and horizontal stabilizers to van floor against forward wall with nylon straps, Move helicopter into van nose first with nose approximately 4 1/2 feet from forward end of van. Secure main rotor blades under helicopter. Refer to sub-paragraph (1) above.

(3) *Thirty Five and Forty Foot Vans* see figure 4-2. Place boxed vertical stabilizers on end, one on each side at front of van. Move first helicopter into van nose first, with loading and positioning device, see figure 4-1, positioned 4 inches from front of van, with left rear end and right front end of landing skids close to sides of van. The two boxed horizontal stabilizers are then placed side by side between landing skids under helicopter, Move second helicopter, tail first, into position similar to first helicopter, with nose 4 inches from door of van. Protect rotor blades with cushioning material (item 27, appendix C), and secure to van floor under second helicopter. Secure both helicopter and boxed component parts. Refer to sub-paragraph d below,

d. *Tiedown.*

(1) *General.* Tiedown facilities contained in the 26 and 40 foot vans vary, with manufacturer and/or desires of purchaser. Some have tiedown rails, others have recessed tiedown rings, and still others have no available mooring devices.

(2) *Thirty Five Foot Vans.* Secure metal angle irons to floor of van, as close as possible to walls of van, utilizing 1/4 inch high strength carriage bolts, lock nuts and existing bolt holes, Make all tiedowns to these fastening devices, which can run the length of van or be sectionalized, if necessary, to increase clearance across width of van, Secure helicopters to floor of van, see figure 2-7, using 5,000 pound tiedown devices or equivalent. Secure boxed components and main rotor blades, to van floor with same type of tiedown devices.

(3) *Van With Interior Tiedown Devices.* When tiedown rails or recessed tiedown rings are available, secure all 5,000 pound restraints to these rings. See figures 2-7 and 2-8.

(4) *Vans With No Organic Tiedown Devices.* Construct tiedown fixtures in accordance with sub-paragraph (2) above. Secure four such devices ahead and at a 45° angle to center-line of helicopter. Secure four other devices aft of helicopter.

(5) *Mil-Van.* Secure tiedown fixtures to floor of van. Refer to sub-paragraph (2) above. Tiedown helicopter and main rotor blades. See figures 2-7 and 4-2. Place polyethylene sheeting (item 27, appendix C) under and over each blade. Secure blades and boxed components to van floor with 5,000 pound restraints.

SECTION V

CRATED SHIPMENT

5-1. Crating OH-58 Helicopter.

a. Crate shipment provides the best protection from combined hazards of exposure, rough handling, and external causes of physical damage. Crating is indicated for ocean shipments by cargo vessel, for lengthy overland shipments where transfer between carriers or poor handling facilities is anticipated, for shipments during which extended exposure to elements may occur, and for shipments involving a combination of these conditions.

b. In order to schedule the work properly, read this entire section in advance. Pack the OH-58 in one remountable sheathed crate. One crate will contain main fuselage, landing gear, mast and swashplate assembly, main rotor hub, tailboom, main and tail rotor blades, and stabilizers. Stow fairings, antennas, and other small items, removed during disassembly, in cabin.

5-2. Cleaning.

NOTE

Ground helicopter before cleaning, disassemble or preservation of helicopter. Clean helicopter. Refer to paragraph 6-1.

5-3. Disassembly. Crating the OH-58 involves removal of main rotor blades, main rotor hub, mast and swashplate assembly tail rotor assembly, vertical stabilizer, horizontal stabilizer, battery, exhaust stacks, tailboom control tube, tail light support assembly skid landing gear and ATAS pylon assembly. Detailed disassembly procedures will be in accordance with the aircraft Maintenance Manual. All removed components must be color coded, and TAGGED with serial number of aircraft immediately after disassembly.

NOTE

No loading plan is prescribed for stowing disassembled components in helicopter. Ship items in their designated containers or stow on cushioning material and secure to floor of passenger compartment. In loading helicopter, light objects will be placed on top to avoid damage by crushing.

5-4 Presentation.

NOTE

Lubricate in accordance with lubrication chart. See the aircraft Maintenance Manual.

a. *General.* Preserve drive system, engine, fuel system, hydraulic system, main rotor blades, main rotor head and mast assembly, tail rotor assembly, battery, instruments, transparent plastic surfaces, and airframe. Unless otherwise specified, coat bolts, washers, etc., with a light film of corrosion preventive compound (item 12, appendix C) and reinstall as removed from major component. Use barrier material (item 2 or 3, appendix C) and tape (item 26, appendix C) unless otherwise specified.

a. 1. *ATAS Launcher.* Preserve and package. Refer to TM 9-1440-431-23.

b. *Engine, Transmission, and Tail Rotor Gearbox.* Preserve engine, transmission, and tail rotor gearbox. Refer to paragraph 6-3b.

c. *Fuel System.* Drain, purge, and preserve fuel system. Refer to paragraph 6-3c.

5-5. Preservation and Packaging. The sequence of disassembly, preservation and packaging prescribed herein is arranged for maximum operational efficiency; however, it is not imperative that the work be accomplished in the order listed. See notes on export shipping crate, figure 5-1.

a. Battery.

(1) Prepare battery for shipment. Refer to paragraph 6-3d.

(2) Pack battery in wooden box lined on all faces with a 2-inch thickness of cushioning material (item 28, appendix C). Be sure to keep battery right side up. Secure battery box to base of export crate (figure 5-1) after fuselage has been secured to it.

b. Hydraulic System.

(1) , Fill hydraulic reservoir to normal operating level, check hydraulic system for leaks, and repair as necessary.

(2) Coat actuator control rods on side of engine with hydraulic preservative fluid (item 29, appendix C).

c. *Main Rotor Blades.* Prepare rotor blades for shipment. Refer to paragraph 6-3f.

d. *Main Rotor Hub.*

(1) Remove main rotor hub, guarding against damage to splines and threads.

(2) Fill rotor hub reservoirs to normal operating level.

(3) Coat blade retaining bolt washers and nuts sparingly with corrosion preventive compound (item 12, appendix C), and replace in grip exactly as removed. Coat splines, threads, blade retention bolt holes and other exposed metal surfaces on grip with same preservation.

NOTE

Under normal temperatures, preservative need not be heated for this application.

(4) Wrap assembly in barrier material (item 3, appendix C), secure wrapping with tape (item 26, appendix C) cushion adequately with cushioning (item 15, appendix C) and pack in container. See figure 6-6. Secure container to floor of fuselage crate.

e. *Landing Gear.*

(1) If ground handling wheels are to be shipped with helicopter, place wheel assemblies in wooden container, and secure to floor of export crate.

(2) Attach hoisting adapter see figure 3-1 to main rotor mast nut. Hoist helicopter slowly, and remove skid landing gear.

(3) Lower helicopter slowly until it rests on fuselage fixture mounted to floor of export crate.

f. *Mast and Swashplate Assembly.*

(1) Prepare in accordance with paragraph 6-3g(2).

(2) Place in container see figure 6-5 and secure to export shipping crate base. See figure 5-1.

CAUTION

Do not handle mast, particularly around the splined area, with bare hands. Use gloves when contacting this highly critical component.

Nicks, scratches, or corrosion cannot be tolerated on this highly finished, critical part. Transmission and bearing end of mast must be kept clean to prevent dirt from entering transmission at time of reassembly.

CAUTION

The aircraft technical inspector must ascertain that government verification inspection is accomplished for mast removal and transmission adapter or transmission cover plate assembly installation, see figure 5-2, during preparation for shipment or storage of aircraft. Evidence that verification inspection was accomplished is a decal or seal with aircraft technical inspector's inked stamp affixed on transmission adapter or cover, and transmission top case. He must assure that top of transmission case is never uncovered except when absolutely necessary.

g. *Tail Rotor Assembly.*

CAUTION

Care must be taken not to coat teflon bearings with preservative compound.

(1) Remove tail rotor hub and blade assembly and coat splined surfaces and exposed metal surfaces with corrosion preventive compound (item 12, appendix C).

(2) Wrap assembly in barrier material (item 2, appendix C) and secure with tape, (item 26, appendix C). Cushion adequately with cushioning material (item 28, appendix C).

(3) Pack in designated container see figure 5-3, and secure in export crate. See figure 5-1.

h. *Horizontal Stabilizer.*

(1) Prepare in accordance with paragraph 6-3h.

(2) Place preserved and packaged stabilizer in designated container, see figure 5-4, and secure to export crate base. See figure 5-1.

Vertical Stabilizer.

(1) Prepare in accordance with paragraph 6-3i.

(2) Place preserved and packaged stabilizer in designated container see figure 5-5, and secure to fuselage crate base. See figure 5-1.

j. *Tail and Light Support Assembly.* Prepare in accordance with paragraph 6-3j.

k. *Tail Rotor Control Tube.*

(1) Prepare in accordance with paragraph 6-3k.

NOTES

1 ADJACENT TO THE INSPECTION PORT THE FOLLOWING SHALL BE STENCILED IN LETTERS ONE INCH IN HEIGHT

OPEN FOR VENTILATION IF STORAGE PERIOD EXCEEDS 30 DAYS

PACKED _____ (DATE) _____

OPENED FOR VENTILATION

DATE _____ BY _____

DATE _____ BY _____

DATE _____ BY _____

2 THE CENTER OF BALANCE OF THE LOADED CRATE SHALL BE INDICATED BY A DURABLE PAINTED OR STENCILED BLACK STRIP ONE INCH WIDE ON EACH SIDE OF THE CRATE EXTENDING UPWARDS 24 FROM THE LOWER EDGE OF THE SHEATHING THE WORDS CENTER OF BALANCE SHALL BE PAINTED OR STENCILED NOT LESS THAN 1-3/4 INCH IN HEIGHT ADJACENT TO THE STRIPE SLING POINTS SHALL BE INDICATED BY CONSPICUOUS ARROWS AND THE WORDS SLING HERE NOT LESS THAN 1-3/4 INCH IN HEIGHT THE NOTE USE NO HOOKS WITH THE SYMBOL DIRECTLY BELOW, LOCATED IN THE CENTER OF EACH SIDE, SHALL BE STENCILED IN 1-1/2 INCH BLACK LETTERS

3 OPENING INSTR TO BE STENCILED ON TWO (2) SIDES OF

(- 1 CABIN CRATE)

(A) SET CRATE ON (8) JACKS (APPROX 12 TO 15 HIGH - (4) JACKS EACH SIDE)

(B) REMOVE TOP, FWD END, AND SIDES

(C) REMOVE LOOSE FLOOR-BOARDS FROM BASE & UNBOLT CABIN FROM PALLET & TIE-DOWNS

4 ALL ACCESSOR. CRATES SHALL BE SECURED INSIDE - 1 CRATE USING 1-1/2 STEEL STRAPPING

5 EYE BOLTS INSTALLED THE TOP ASSEMBLY SHALL HAVE THE EYE WELDED TO PREVENT SPREADING DURING LIFTING OPERATION

6 ALL RADIO EQUIPMENT WILL BE DISASSEMBLED, WRAPPED & PACKAGED SEPARATELY AND SECURED INSIDE HELICOPTER CABIN

ITEM	QUANTITY	NOMENCLATURE	MATERIAL
1	4	Block	11 1/2 x 2 x 4 Wood *
2	1	Flooring	95 1/4 x 1 x 6 Wood *
3	8	Flooring	95 1/4 x 1 x 12 Wood *
4	2	Filler	30 1/2 x 1 x 4 Wood *
5	2	Flooring	95 1/4 x 2 x 12 Wood *
6	4	Filler	23 x 1 x 4 Wood *
7	11	Flooring	95 1/4 x 2 x 8 Wood *
8	2	Header	95 1/4 x 2 x 8 Wood *
9	8	Filler	30 1/2 x 1 x 4 Wood *
10	4	Rubbing Strip	16 x 2 x 4 Wood *
11	8	Rubbing Strip	95 x 2 x 4 Wood *
12	4	Skid	239 x 4 x 4 Wood *
13	?	Filler	123 1/2 x 11 1/2 x 1/2 Plywood **
14	4	Support	123 1/2 x 2 x 12 Wood *
15	1	Fixture	19 x 17 x 1/2 Plywood **
16	1	Support	19 x 2 x 4 Wood *
17	4	Brace	24 x 2 x 4 Wood *
18	8	Block	6 x 2 x 4 Wood *
19	1	Contour	19 x 2 x 10 Wood *
20	1	Support	19 x 2 x 2 Wood *
21	4	Brace	13 3/8 x 2 x 4 Wood *
22	1	Decking	96 x 46 1/4 x 1/4 Plywood ** (5/16 if C/D is used)
23	9	Sheathing	239 x 1 x 12 Wood *
24	9	Joist	93 3/4 x 3 x 6 Wood *
25	2	Joist	93 3/4 x 2 x 6 Wood *
26	2	Header	238 1/4 x 1 x 6 Wood *
27	4	Decking	96 x 46 1/4 x 1/4 Plywood ** (5/16 if C/D is used)
28	1	Brace	20 5/8 x 2 x 4 Wood *
29	1	Frame, Upper	235 x 2 x 4 Wood *
30	1	Joist Support	235 x 2 x 6 *
31	8	Brace	20 1/4 x 2 x 4 Wood *
32	1	Sheathing	96 x 46 1/4 x 3/8 Plywood **
33	4	Sheathing	96 x 48 x 3/8 Plywood **
34	1	Brace	15 x 2 x 4 Wood *
35	11	Strut	77 5/8 x 2 x 4 Wood *
36	1	Strapping	235 x 2 x 4 Steel ***
37	8	Stiffener	78 3/4 x 2 x 4 Wood *
38	1	Frame, Lower	235 x 2 x 4 Wood *
39	1	Baffle	20 x 7 x 1/4 Plywood **
40	1	Brace	20 1/4 x 2 x 2 Wood *
41	1	Screen	1/4 x 3/8 Mesh Steel
42	1	Cleat	20 x 2 x 4 Wood *
43	2	Panel	24 x 14 x 3/8 Plywood **
44	2	Brace	20 1/4 x 2 x 4 Wood *
45	2	Brace	18 x 2 x 4 Wood *
46	2	Sheathing	92 1/4 x 48 x 3/8 Plywood **
47	5	Strut	75 5/8 x 2 x 4 Wood *
48	2	Frame	95 1/2 x 2 x 4 Wood *
49	1	Strapping	95 1/4 050 x 2 Steel QQ-5-781
50	2	Hinge	3 1/2 Butt Brass
-3	2	Strap	6 x 3/4 x 1/8 Steel
-1	2	Strap	7 x 3/4 x 1/8 Steel
-2	6	Strap, Support	35 x 1 1/2 x 1/4 Steel
-4	2	Support	62 1/2 x 2 1 D Black Iron Pipe (218) Wall

ITEM	QUANTITY	NOMENCLATURE	MATERIAL
	8	Carriage Bolt	1/2 Dia x 8
	76	Square Nut	1/2 Dia
	120	Flat Washer	1/2 Dia
	120	Lock Washer	1/2 Dia
	1	Carriage Bolt	1/2 Dia x 6
	8	Carriage Bolt	1/2 Dia x 4
	24	Carriage Bolt	3/8 Dia x 2 1/2
	90	Flat Washer	3/8 Dia
	24	Lock Washer	3/8 Dia
	24	Square Nut	3/8 Dia
	4	Bolt	AN4-5A
	8	Nut	NAS679A4
	8	Washer	AN960PD10
	4	Bolt	AN4-6A
	4	Eye Bolt	1/2 x 8
	4	Hex Nut	1/2 Dia
	14	Lag Bolt	3/8 Dia x 2 1/2
	42	Lag Bolt	3/8 Dia x 3 1/2
	40	Lag Bolt	1/2 Dia x 4
	A/R	Felt	1/2 C-F-206A
	A/R	Webbing Material	1/2 CCC-C-467A
	A/R	Nails	1/2 FF-N-105
	A/R	Staples	2 1/8 x 3/4 12 Gauge FF-N-105
	A/R	Roofing Felt	
	A/R	Mastic	Bituminous Base
	A/R	Strapping	1 1/2 Steel QQ-5-781
	4	Nut	NAS1291-8
	24	Washer	AN960PD616
	4	Bolt	NAS1306-18
	1	Swashplate Container	
	1	Mast Container	
	2	Horizontal Stabilizer Container	
	1	Fin Container	
	1	M/R Hub Container	
	2	M/R Blade Container	

* MIL-STD-731
 ** NN-P-530
 *** QQ-5-781

Plywood shall be standard grade with exterior glue of U S Product Standard PSI-66 (Int-DFPA) Plywood will have the grade stamp of approved testing agency and will be surface treated in accordance with TT-W-572

Figure 5 1 Export Crate (Sheet 1 of 2)

(2) Secure wrapped control tube to floor of export crate. See figure 5-1.

l. TailBoom.

(1) Prepare in accordance with paragraph 6-3l.

(2) Include reinstallation hardware (bolts and nuts).

(3) Install in tailboom container. See figure 5-6.

m. Exhaust Stacks. Prepare in accordance with paragraph 6-3m.

n. Fuselage. Prepare in accordance with paragraph 6-3n.

5-6. Packing. Description and approximate quantity of materials to be used in fabrication of crates and boxes are shown in the appropriate figure.

a. Crate Construction. Construct one demountable plywood-sheathed crate. See figure 5-1.

b. Nailing. When nailing flat faces of two pieces of lumber together, the combined thickness of which is 3-1/8-inches or less, nails will be long enough to pass through joint, and will be clinched not less than 1/4-inch. When pieces of different thicknesses are joined, nail heads will be in thinner piece. When nailing flat faces of two pieces of lumber together, the combined thickness of which exceeds 3-1/8-inches, and when nailing flat faces of one or more pieces to edge or end face of another piece, nails will be as long as practicable without splitting pieces. The portion of nail in thicker piece will be two to two and one-half times the length of nail in thinner piece for ten-penny nails and smaller, and not less than 1 1/2-inches for twelve-penny nails and larger. Generally, in crate construction, no nail should be driven closer than the thickness of piece from edge of lumber. No two nails in same row should be closer than three inches. Nails that are not clinched will be cement coated or etched.

c. Use of Lag Screws. Assemble crates with lag screws; in all instances, drill lead holes and turn in lag screws with a plain washer under head of each. Do not drive by hammering or other impact.

d. Bolted Connections. After nuts have been tightened, coat exposed bolt threads with thick paint or bituminous compound to resist loosening of nuts.

5-7. Marking.

a. General. Apply all markings in accordance with MIL-STD-129. Include serial number of helicopter in container markings.

b. Components. Identify each disassembled part or assembly by marking or tagging it with correct part or assembly number and serial number of aircraft from which removed.

c. Containers.

(1) Mark each side and end of crates with 2-inch stenciled letters: USE NO GRAB-HOOKS.

(2) Stencil instructions for opening in 1-inch letters on front end of each crate:

(a) REMOVE ALL LAG SCREWS FROM SIDES AND ENDS ADJACENT TO TOP.

(b) REMOVE TOP.

(c) REMOVE ALL LAG SCREWS IN THIS END.

(d) REMOVE THIS END.

(3) Indicate center of balance of loaded crate by a painted black strip 1-inch wide on each side of crate, extending upward 3-inches from lower edge of sheathing. Stencil CENTER OF BALANCE in 1-inch letters adjacent to strip.

(4) Indicate sling points by conspicuous arrows and SLING POINT in 1-inch letters.

(5) Stencil the following in 1-inch letters adjacent to inspection doors:

NOT PRESERVED FOR STORAGE, REPRESERVE IF NOT ACTIVATED BY

(Enter 90 days from date of preservation.)

(6) Preservation method and level of protection marking required by MIL-STD-129 are only applicable to marking of crates. The marking will be B/A.

(7) Treat metal strapping to resist rust using corrosion preventive compound (item 11, appendix C).

(8) All cut, drilled, or worked edges of plywood sheets shall be coated with wood preservative.

(9) Lumber shall be sound and free from all defects that would interfere with the prescribed fabrication on nailing. All lumber used for sheathing shall be free from knots having a diameter

greater than one-third the width of face of lumber in which they appear. When the greatest dimensions of knotholes or loose knots in lumber for sheathing exceeds 1/2-inch, with a sheet of metal with a wood block or piece of plywood adequately secured inside container.

5-8. Plywood or Fiberboard Boxes.

a. When a plywood or fiberboard box is called out as exterior container to be stowed in cargo compartment, no effort is made to limit either type of material or design used. Cleated fiberboard, triple wall, or wirebound boxes, each have certain advantages. Items may also be packed in small containers placed on a light weight pallet, secured with filament reinforced tape. Whatever type container is used, the following must be considered:

- (1) Adequate protection.
- (2) Space availability.
- (3) Ease in handling.
- (4) Volume and weight.
- (5) Availability of materials.
- (6) Protection against pilferage.
- (7) Blocking, bracing, and cushioning required.

b. Regardless of type of container used, remember that the prime function of a shipping container is to protect contents, and to provide ease in handling at lowest possible cost.

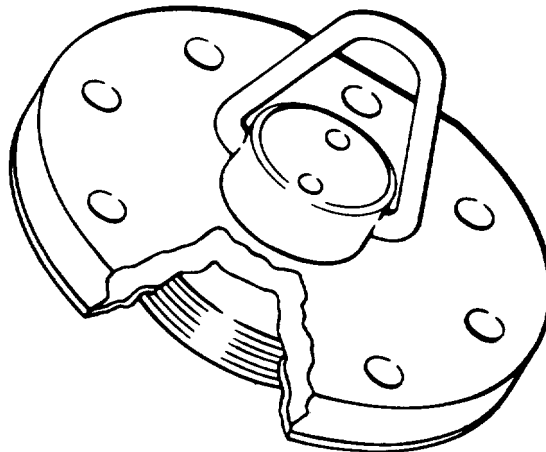
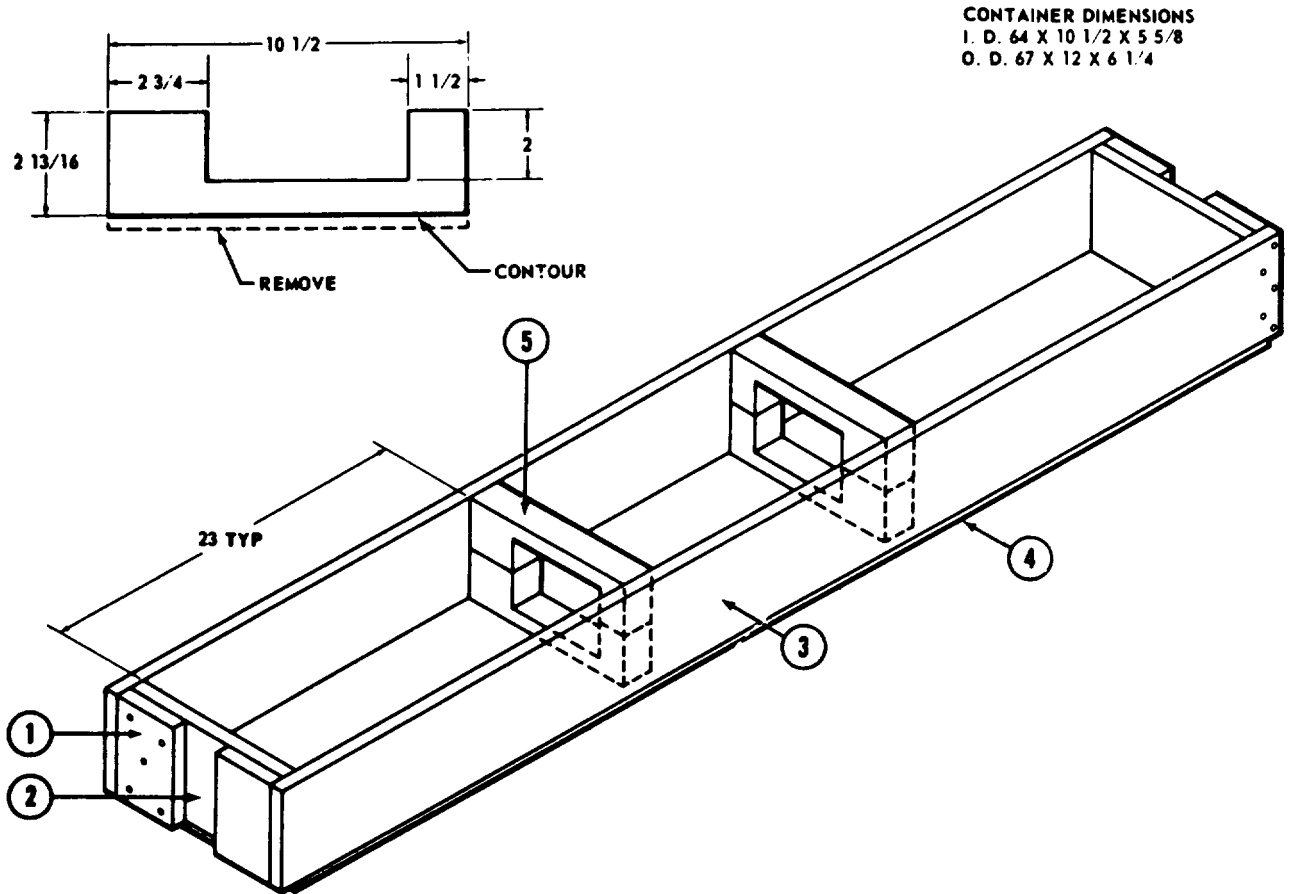


Figure 5-2. Transmission Cover



CONTAINER DIMENSIONS
 I. D. 64 X 10 1/2 X 5 5/8
 O. D. 67 X 12 X 6 1/4

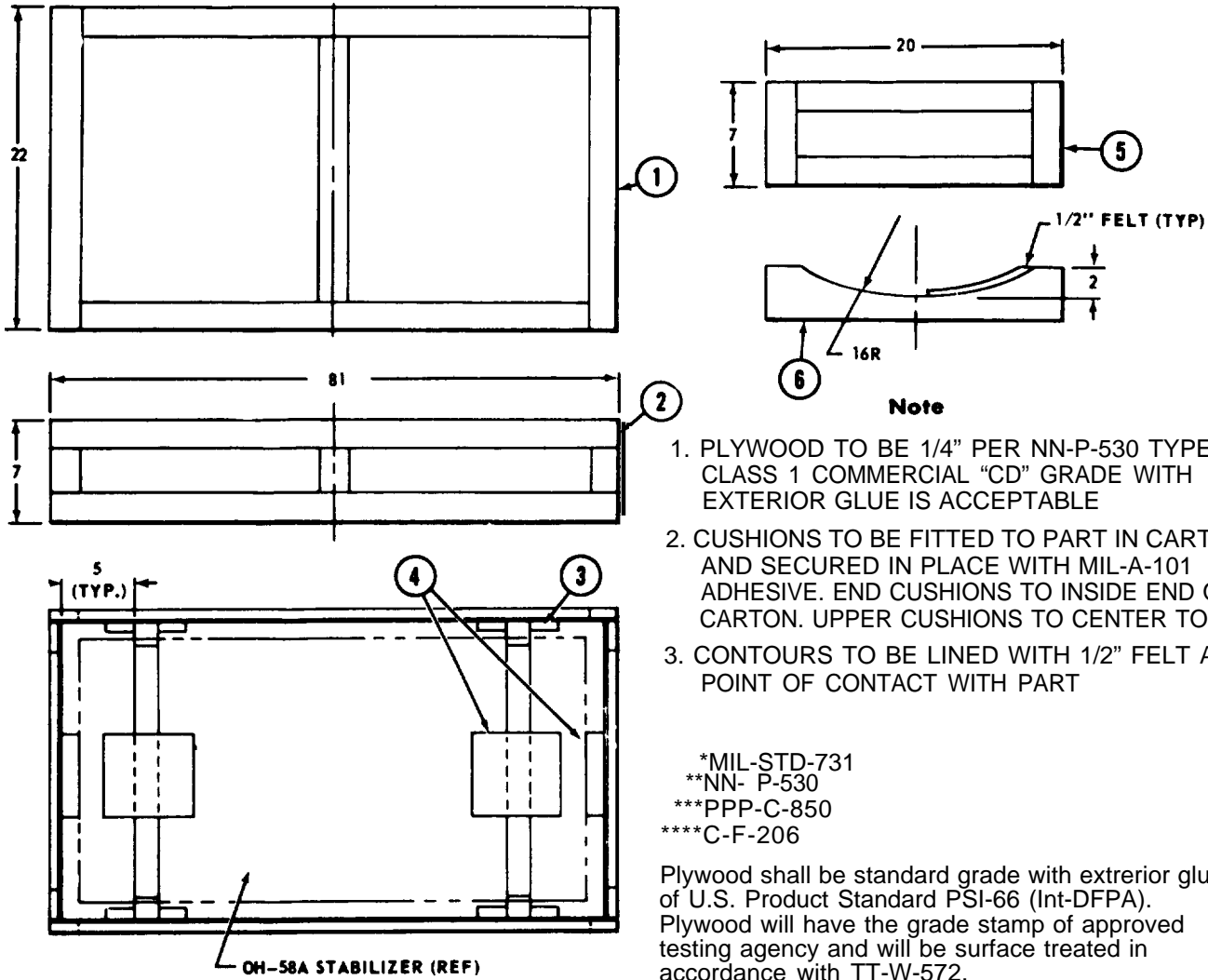
CONTAINER WITH TOP REMOVED

Plywood shall be standard grade with exterior glue of U.S. Product Standard PSI-66 (Int-DFPA). Plywood will have the grade stamp of approved testing agency and will be surface treated in accordance with TT-W-572

*MIL-STD-731
 **NN-P-530
 ***FF-N-105

ITEM	QTY	NOMENCLATURE	MATERIAL
1	4	CLEAT	5-5/8 x 1 x 4 WOOD *
2	2	END	10-1/2 X 1 X 6 WOOD *
3	2	SIDE	67 X 1 X 6 WOOD *
4	1/1	TOP/BOTTOM	65-1/2 X 5/16 X 12 PLYWOOD**
5	4	CONTOUR	10-1/2 x 2 x 4 WOOD*
	A/R	NAILS	***

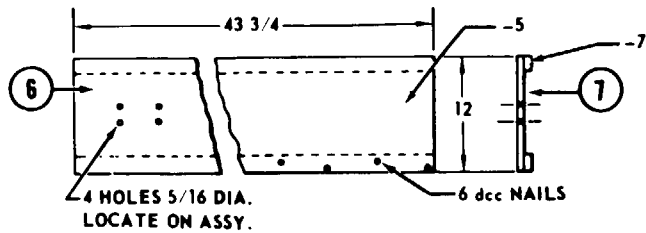
Figure 5-3. Tail Rotor Hub and Blade Container



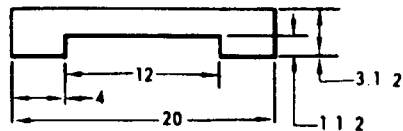
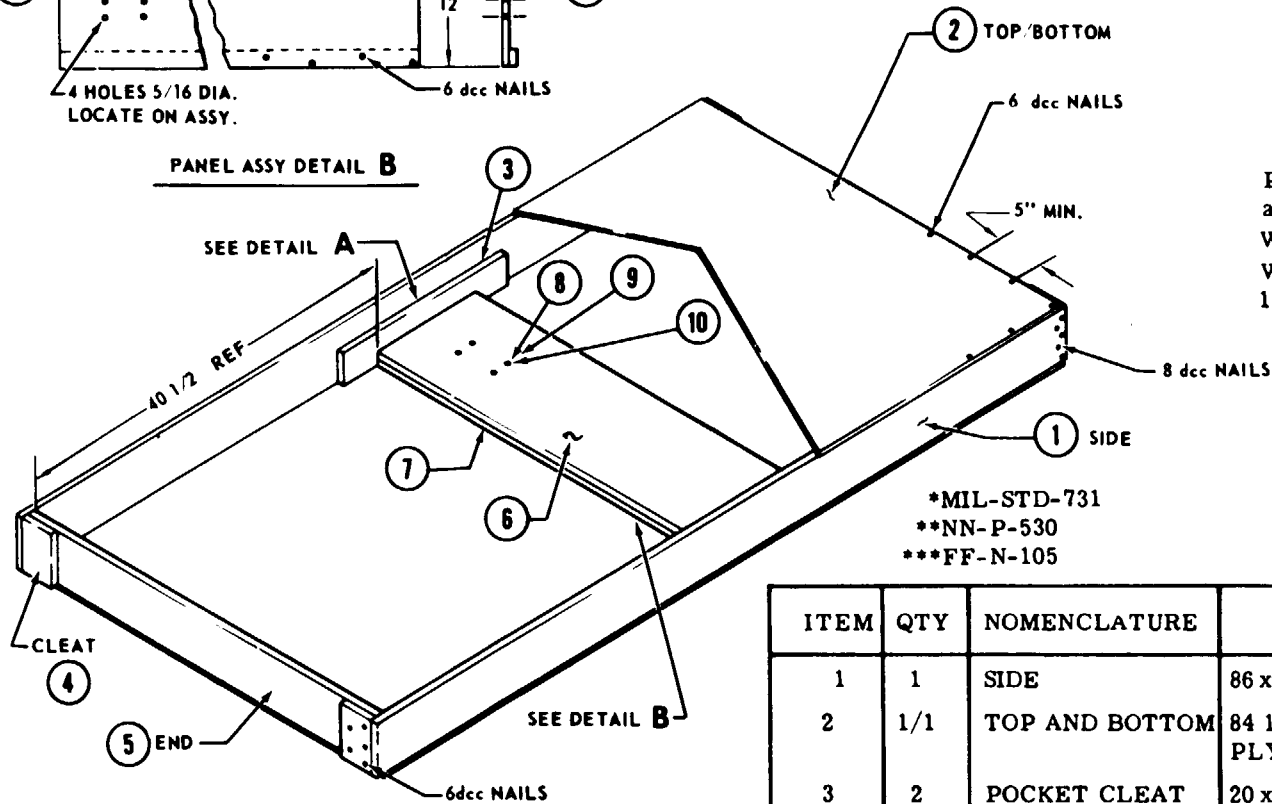
OH-58A STABILIZER (REF)

ITEM	QTY	NOMENCLATURE	MATERIAL
1	1/1	TOP/BOTTOM ASSY	81x22x1/4 PLYWOOD**
2	2	SIDE ASSY	81x7x1/4 PLYWOOD**
3	8	CLEAT	7 x 1 x 2 WOOD*
4	6	CUSHION	6 X 6 X 1 1/2 PLYYSTYRENE***
5	2	END ASSY	20x 7x 1/4 PLYWOOD**
6	2	CONTOUR	20x2 x4 WOOD*
	A/R	NAILS	FF-N-105
	A/R	ADHESIVE	MIL-A-101
	A/R	FELT	1/2 FELT****

Figure 5-4. Horizontal Stabilizer Container



PANEL ASSY DETAIL B



POCKET CLEAT
DETAIL A

CONTAINER DIMENSIONS

I.D. 83 x 43 3/4 x 6

O.D. 86 x 45 1/4 x 6 1/4

Note

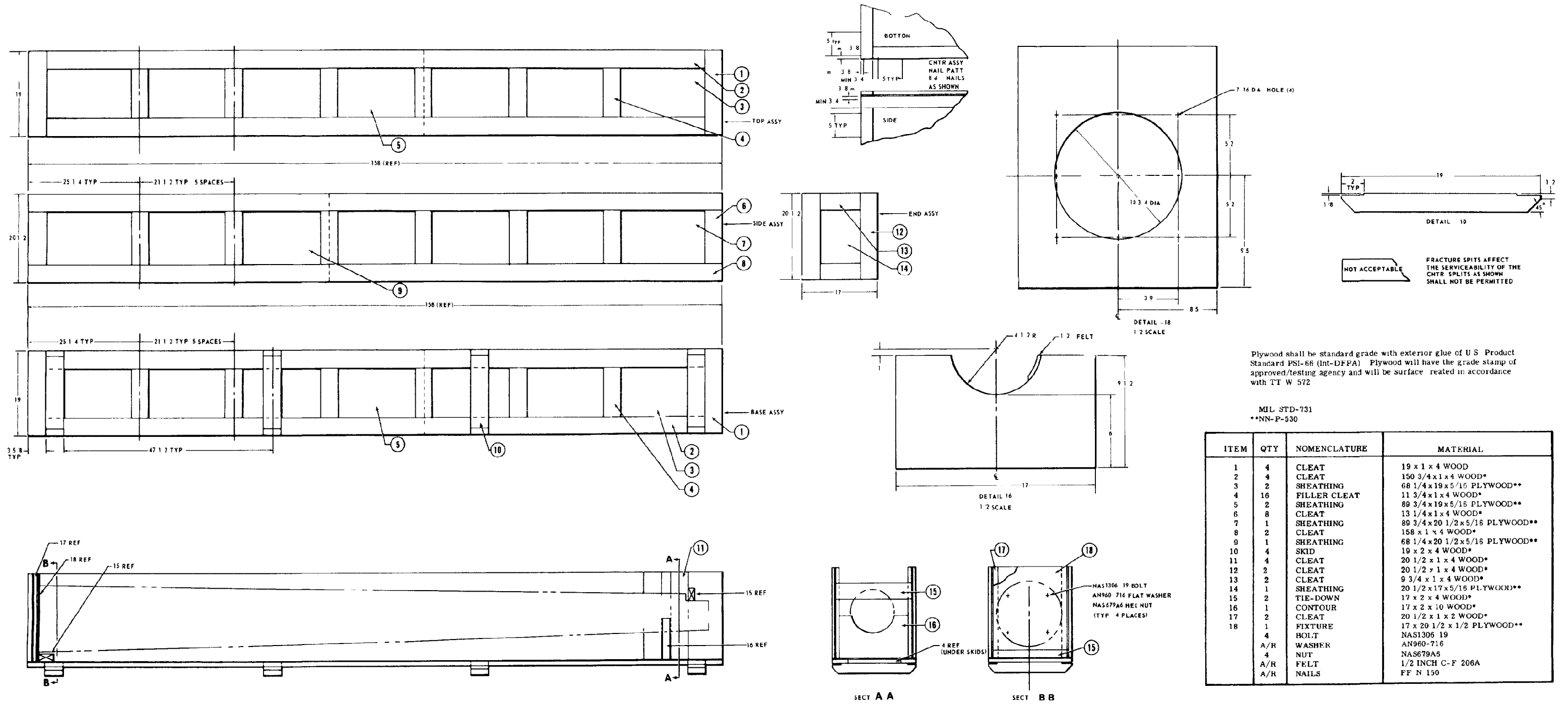
PLYWOOD TO BE 5/16
and 3/4 CD INTERIOR
WITH EXTERIOR GLUE
WOOD TO BE NOMINAL
1 x 2, 1 x 4, 1 x 6

*MIL-STD-731
**NN-P-530
***FF-N-105

ITEM	QTY	NOMENCLATURE	MATERIAL
1	1	SIDE	86 x 16 WOOD*
2	1/1	TOP AND BOTTOM	84 1/2 x 45 1/2 x 5/16 PLYWOOD**
3	2	POCKET CLEAT	20 x 3 1/2 x 3/4 PLYWOOD*
4	4	CLEAT	5 1/2 x 1 x 4 WOOD*
5	1	PANEL	43 3/4 x 1 x 6 WOOD*
6	1	PANEL	43 3/4 x 12 x 3/4 PLYWOOD**
7	2	RISER	43 3/4 x 1 x 2 WOOD*
8	4	BOLT	1/4 x 2 3/4 (NAS1304-38)
9	4	LOCKNUT	1/4 INCH
10	4	FLAT WASHER	1/4 INCH AL
	A/R	NAILS 6 dcc	***
	A/R	NAILS 8 dcc	***

Plywood shall be standard grade with exterior glue of U.S. Product Standard PSI-66 (Int-DFPA). Plywood will have the grade stamp of approved/testing agency and will be surface treated in accordance with TT-W-572.

Figure 5-5. Vertical Fin Container



Plywood shall be standard grade with exterior glue of U S Product Standard PSI-66 (Int-DFPA) Plywood will have the grade stamp of approved/testing agency and will be surface treated in accordance with TT W 572

MIL STD-731
**NN-P-530

ITEM	QTY	NOMENCLATURE	MATERIAL
1	4	CLEAT	19 x 1 x 4 WOOD
2	4	CLEAT	150 3/4 x 1 x 4 WOOD*
3	2	SHEATHING	68 1/4 x 19 x 5/16 PLYWOOD**
4	16	FILLER CLEAT	11 3/4 x 1 x 4 WOOD*
5	2	SHEATHING	89 3/4 x 19 x 5/16 PLYWOOD**
6	8	CLEAT	13 1/4 x 1 x 4 WOOD*
7	1	SHEATHING	89 3/4 x 20 1/2 x 5/16 PLYWOOD**
8	2	CLEAT	158 x 1 x 4 WOOD*
9	1	SHEATHING	68 1/4 x 20 1/2 x 5/16 PLYWOOD**
10	4	SKID	19 x 2 x 4 WOOD*
11	4	CLEAT	20 1/2 x 1 x 4 WOOD*
12	2	CLEAT	20 1/2 x 1 x 4 WOOD*
13	2	CLEAT	9 3/4 x 1 x 4 WOOD*
14	1	SHEATHING	20 1/2 x 17 x 5/16 PLYWOOD**
15	2	TIE-DOWN	17 x 2 x 4 WOOD*
16	1	CONTOUR	17 x 2 x 10 WOOD*
17	2	CLEAT	20 1/2 x 1 x 2 WOOD*
18	1	FIXTURE	17 x 20 1/2 x 1/2 PLYWOOD**
	4	BOLT	NAS1306 19
A/R		WASHER	AN960-716
	4	NUT	NAS679A6
A/R		FELT	1/2 INCH C-F 206A
A/R		NAILS	FF N 150

Figure 5-6 Tailboom Container

SECTION VI

PREPARATION FOR SHIPMENT

6-1. Cleaning.

NOTE

Ground aircraft before doing any work.

a. *General.* Cleaning aircraft before preparing it for shipment is important because residue from exhaust gases, dirt, and contamination of any kind will accelerate corrosion, whether coated with preservative compound or not.

WARNING

Although cleaning compound 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.

b. *Interior.* Thoroughly clean interior of aircraft, using mild soap and water, or cleaning compound (item 8, appendix C) if needed for grease or oil spots.

c. *Plexiglass.*

(1) Clean all transparent plastics with large quantities of mild soap and water.

(2) Gently free all insect specks, caked mud or dirt with the pads of the fingers. Do not use sponges or coarse cloths. Rinse area continuously while removing mud.

CAUTION

Do not use compounds containing any abrasive material, or solutions containing esters, ketones, aromatic hydrocarbons, or chlorinated carbons. Avoid excessive scrubbing of plastic panels during washing operation.

(3) Remove grease or oil with aliphatic naphtha (item 20, appendix C). (DO NOT USE TYPE I.)

(4) Allow surfaces to drip dry.

(5) If further cleaning is required, use (item 6, appendix C). Apply cleaning and polishing compound to plexiglass with a clean, soft cloth. Use another clean, soft cloth to polish en-

tire area until it is clean and dry. Repeated thin applications of cleaning compound provide better protection than infrequent thick applications.

CAUTION

Rotor system contains bearings which are sensitive to many types of petroleum compounds. Do not use any type of solvent to clean parts of pylon installation above top of fuselage. Do not use steam or water under high pressure to clean any part of helicopter.

d. *Exterior.* Clean exterior metal structure by applying a mixture of one part cleaning compound (item 7, appendix C), and three to seven parts water. Use stronger mixtures for exhaust outlet areas and other very dirty surfaces. Wash a small area at a time, and rinse thoroughly with water under pressure. A soft brush (item 5, appendix C) may be used to get in tight places and around laps and fasteners.

e. *Treatment of Aluminum and Magnesium Alloy Corrosion.* Treat aluminum and magnesium alloy corrosion in accordance with chapter 3, section II of TM 55-1500-204-25/1. Apply protective paint finish to affected area immediately after drying of chemical treatment, in accordance with TB 746-93-2.

6-2. Disassembly.

a. C-141 Cargo plane shipment requires removal of components as per table 2-1. This is to be accomplished in accordance with the aircraft Maintenance Manual.

b. C-5 Cargo aircraft shipment requires removal of components. See table 2-1. This is to be accomplished in accordance with the aircraft Maintenance Manual.

c. Manhours required for disassembly are shown in table 2-2.

6-3. Preservation and Packaging.

NOTE

Lubricate in accordance with lubrication chart, the aircraft Maintenance Manual.

a. *General.* This section covers preservation of drive system, engine, fuel system, hydraulic system, main rotor blades, main rotor head and mast assembly, tail rotor assembly, battery, instruments, transparent plastic surfaces, and airframe. Unless otherwise specified, coat bolts, washers, etc., with a light coat of corrosion preventive compound (item 12, appendix C) and reinstall as removed from major component. Use barrier material (item 2 or 3, appendix C), and tape (item 26, appendix C) unless otherwise specified. The sequence of disassembly, preservation and pack-

aging prescribed herein is arranged for maximum operational efficiency; however, it is not imperative that the work be accomplished in the order listed.

b. *Engine, Transmission, and Gearboxes.*

(1) Exercise every precaution to keep engine and its accessories clean. Keep air intake ducts, plenum chambers, and compressor inlet screens clean and free from any foreign materials. When external cleaning is required, use solvent (item 16, appendix C).

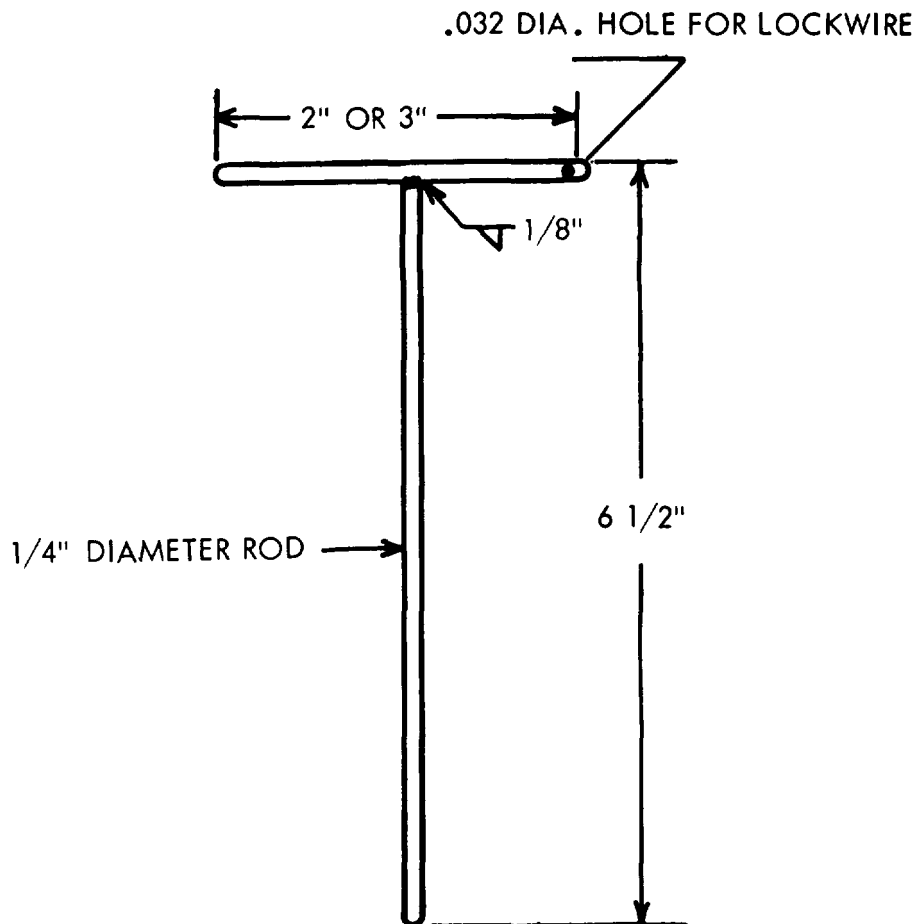


Figure 6-1. T-Handle Work Aid

CAUTION

Do not use contact preservatives of any kind either internally or externally on compressor section.

(2) Service oil tank, transmission, and tail rotor gearbox to normal operating level with standard operating oil.

CAUTION

Do not exceed maximum temperatures and pressures during engine run-up.

(3) If engine has not been started within 24 hours, start it and run at idle until it is operating satisfactorily. Refer to the aircraft Operator's Manual. Use external auxiliary power unit (APU) to motor engine. Accelerate engine to 75 percent of normal operating speed and operate until oil temperature reaches 88° F (191° C), but for no more than five minutes.

NOTE

Rotor blades must be attached to hub when motoring engine above idle speed.

NOTE

Ground run-up, when preparing engine, will complete necessary preservation of transmission and gearboxes.

WARNING

Ensure ignition system has been off for at least five minutes before removing igniter lead, to dissipate all energy stored in condenser. Ground igniter lead to engine using insulated screwdriver.

(4) Disconnect cable to ignition exciter.

(5) Allow engine to cool sufficiently to prevent auto-ignition.

(6) Cover air intake, exhaust stacks, and all engine openings with barrier material (item 3, appendix C) and secure with tape (item 26, appendix C) if fuel system is not to be preserved.

NOTE

Do not cover fuel and oil openings with tape above. Tape adhesive is soluble in petroleum compounds, which can cause contamination.

(7) Tag engine and cyclic stick as follows: LUBRICATION SYSTEM PRESERVED WITH OPERATING LUBRICANT. Record extent of engine preservation in log book.

NOTE

Do not drain and purge fuel system if helicopter is scheduled for "FLY-OFF at DESTINATION". Fill fuel tanks to 75 percent of capacity with JP-5 fuel, and attach a tag to fuel filler cap so stating. Torque igniter and exciter leads in accordance with the aircraft Maintenance Manual.

c. *Fuel System.* Fuel system may be preserved by one of two methods. The method to be used is determined by availability of preservative oil, equipment, or inert gas.

WARNING

In the interest of safety of personnel and equipment, the following precautions must be observed while preparing fuel tanks for shipment. Aircraft and ail equipment used in performing the operation must be properly grounded. This includes defueling equipment, work stands, purging equipment, and any powered or pneumatic devices. Equip work stands with static discharge plate of copper or zinc plate, affixed so personnel can contact plate before coming in contact with aircraft. High static electrical charges are created by contact and separation of unlike substances, or by any sort of motion of persons or material, and are a constant source of danger when generated in presence of fuels or flammable vapors. Do not drain fuel tanks near end of work day, and then allow to stand "empty" overnight. Such action could make a perfect set of conditions for producing explosive vapors. The fact is the system is not completely empty. Residue fuel drains down the sides of the tank, forms puddles, and volatilizes. If the critical fuel-air ratio develops, an explosion could be set off by a spark. The remedy is to avoid a lapse of time between draining and purging.

(1) *Primary method.* If an oil tank of at least 90-gallon capacity and an adequate supply of lubricating oil (item 19, appendix C) are available, preserve as follows:

(a) Defuel fuel tanks.

(b) The flashpoint of empty fuel cells may be reduced by pouring five gallons of diesel fuel into fuel tank. Allow oil to remain in

tank 10 to 15 minutes before draining.

NOTE

Reduction of flashpoint in purging operations reduces amount of lubricating oil necessary when an assembly line operation is set up.

(c) When tank is completely drained, close drain valve and fill tank with diesel fuel. Allow oil to remain in fuel tank for at least 8 to 10 hours, or overnight.

(d) Disconnect igniter lead at igniter, and place plastic cap over ceramic connector. Prevent lead from twisting while removing nut. Separate lead from igniter by pulling straight out without any rotational motion. Disconnect exciter input lead.

CAUTION

Observe starter time restriction (35 seconds when temperature is 90° F (32° C)).

(e) Move twist grip to IDLE DETENT. Motor engine with starter (use APU if available) and continue until fuel-free oil flows from engine combustor fuel overboard drain line. Move twist grip to OFF position and lock, cease motorizing engine, and turn boost pump OFF.

(f) Connect igniter and exciter input leads; torque in accordance with the aircraft Maintenance Manual.

(g) Remove oil from fuel tank and save to flush other tanks.

(h) After two to three hours, test fuel tanks with combustible gas indicator for fuel vapors. If an unsafe condition exists, discard drained lubricating oil, and reflush with fresh oil until a safe reading is obtained.

(i) Attach tag to cyclic stick and fuel filler cap: THIS FUEL SYSTEM HAS BEEN PRESERVED WITH MIL-L-6081 , GRADE 1010 LUBRICATING OIL. NO FLUSHING REQUIRED DURING DEPRESERVATION; FILL TANKS WITH STANDARD OPERATING FUEL.

(2) *Alternate method.* If proper equipment is not available, or lubricating oil supply is limited, use the following procedure to preserve fuel system:

(a) Drain all fuel from fuel system and close drains.

(b) Pour approximately five gallons of lubricating oil into fuel tank.

(c) Drain oil from fuel tank.

(d) Purge fuel tank with CO2 or nitrogen as follows:

CAUTION

Use only dehydrated air.

1. With drains and vents open and filler cap off, introduce into filler neck a reduced pressure air hose supplying air through a ¼-inch orifice at approximately 50 psi. Purge fuel tank for approximately one-half hour. Close all drains.

2. Introduce into fuel filler neck CO2 or nitrogen from a tank set to discharge at a rate of not more than one pound of purging gas per minute.

3. Use at least three pounds of CO2 or nitrogen to purge fuel cells.

4. After purging fuel tank, wait approximately three hours, then test tank for dangerous fuel vapors with combustible gas indicator. If an unsafe condition exists, use additional purging gas until a satisfactory test is made.

5. Preserve fuel cell by coating all interior surfaces with lubricating oil (item 19, appendix C).

6. Attach tag to cyclic stick and fuel filler cap stating: FUEL SYSTEM HAS BEEN PRESERVED WITH MIL-L-6081 , GRADE 1010 LUBRICATING OIL. NO FLUSHING REQUIRED DURING DEPRESERVATION. FILL TANK WITH STANDARD OPERATING FUEL.

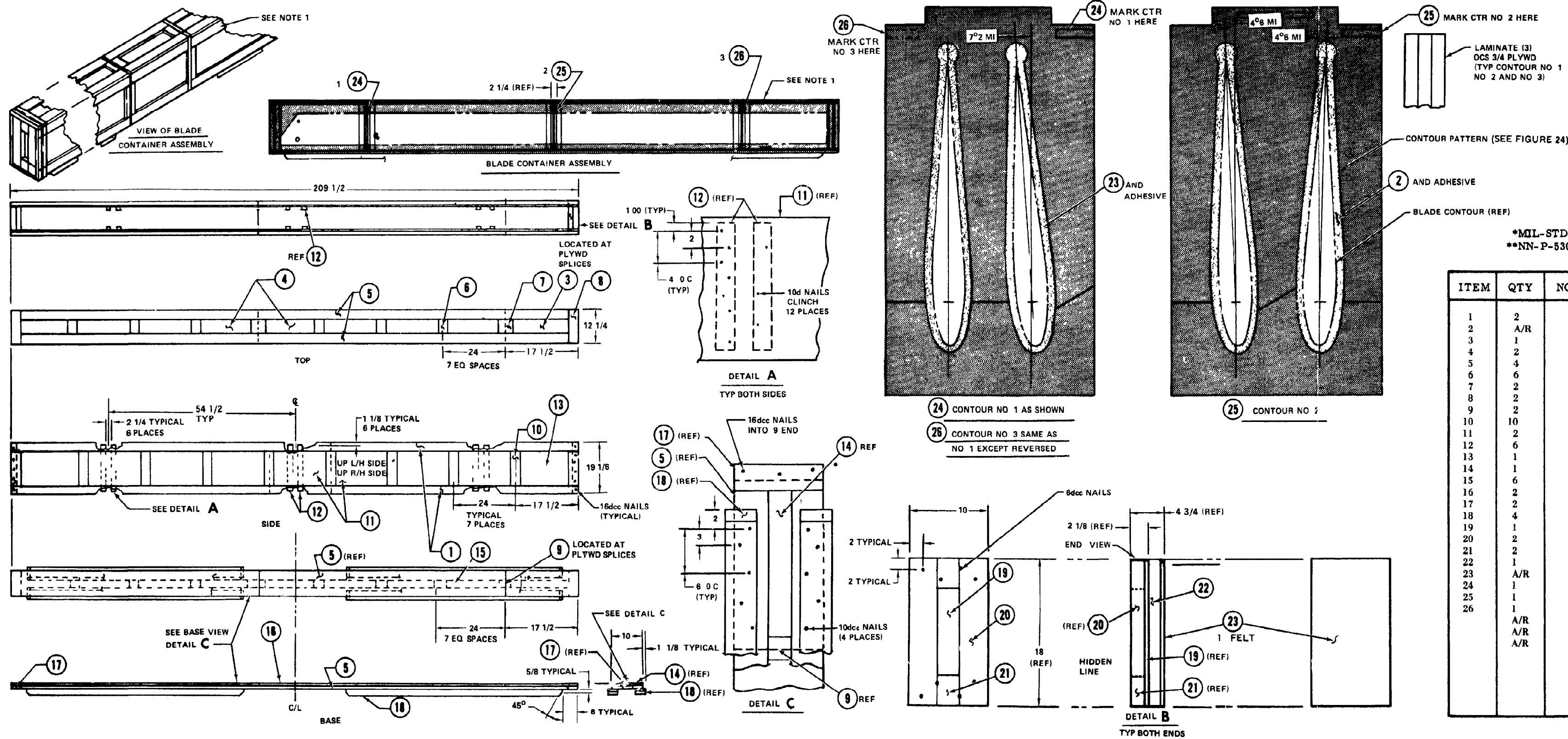
d. *Battery.*

WARNING

Ensure battery switch on overhead panel is in OFF position prior to working on battery.

(1) The nickel-cadmium battery contains an electrolyte composed of potassium hydroxide, a strong alkali, which will corrode both aluminum and magnesium.

(2) If serviceable, the nickel-cadmium battery will not deteriorate if left standing for a long period of time whether wet or dry, charged or uncharged; therefore, ship all nickel-cadmium batteries fully charged and wet.



Note

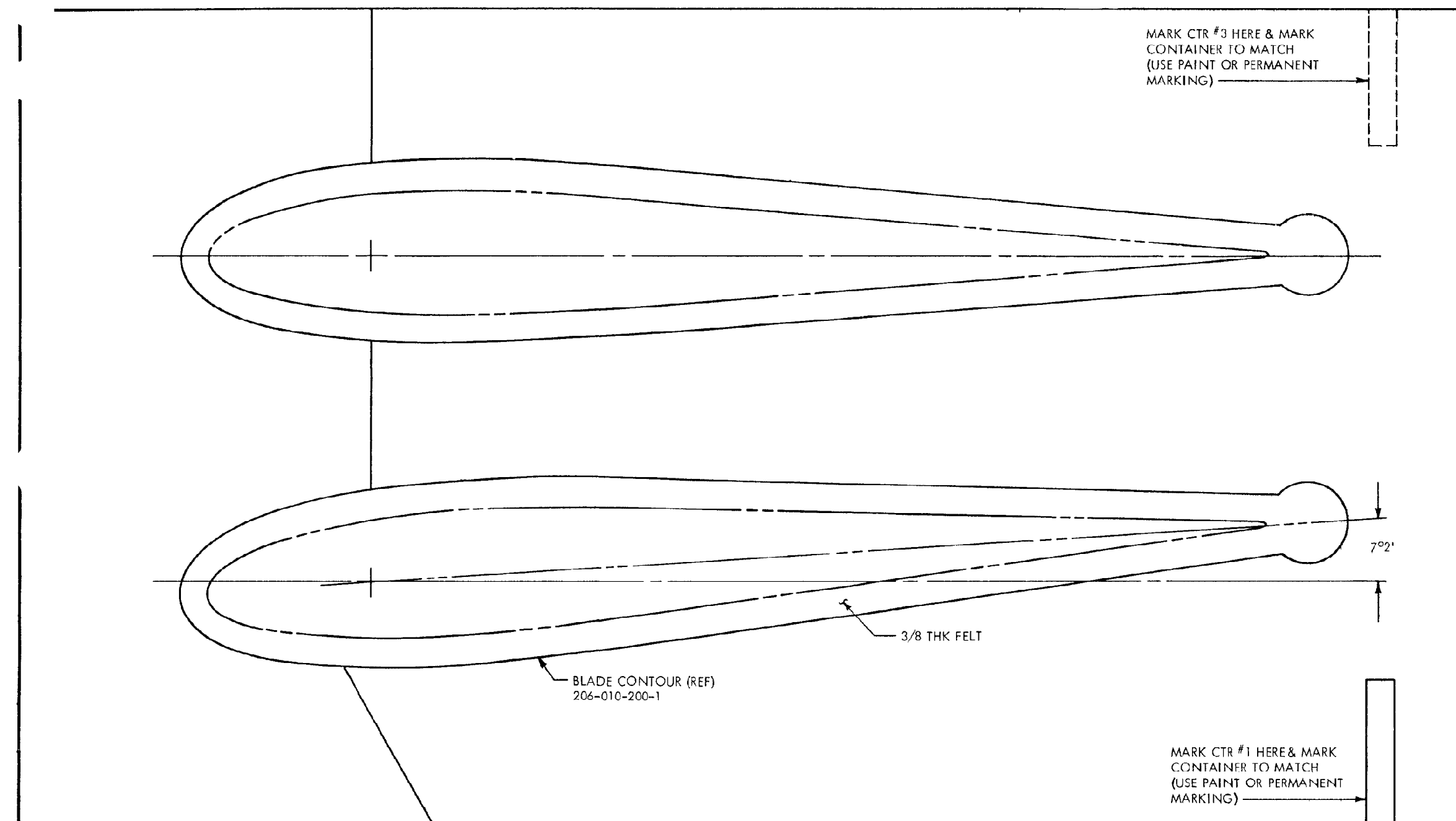
- 1 All Plywood shall be graded ext-per NN-P530 or COML Grade with exterior glue
- 2 All wood shall be Group II or III
- 3 All nails not clinched shall be cement coated
- 4 Wood screws shall be 10 x 2 1/2, spaced 18 inches apart for securing top

Plywood shall be standard grade with exterior glue of U S Product Standard PSI-66 (Int-DFPA) Plywood will have the grade stamp of approved/testing agency and will be surface treated in accordance with TT-W-572

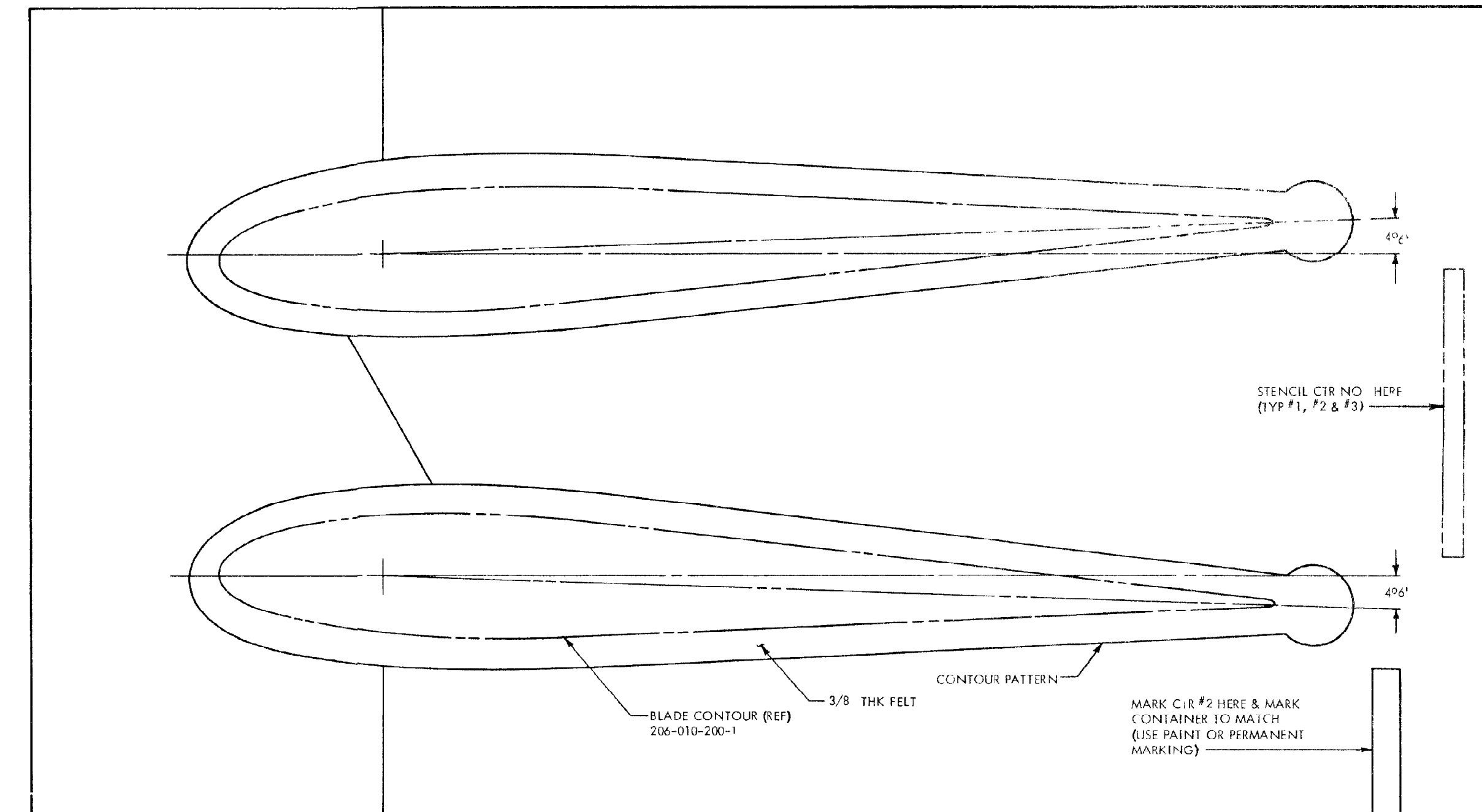
*MIL-STD-731
**NN-P-530

ITEM	QTY	NOMENCLATURE	MATERIAL
1	2	CLEAT	209 1/2 x 1 x 4 WOOD MIL STD 731*
2	A/R	FELT	3/8 THICK C F 206**
3	1	SHEATHING	17 1/2 x 12 1/4 x 3/8 PLYWOOD**
4	2	SHEATHING	96 x 12 1/4 x 3/8 PLYWOOD**
5	4	CLEAT	202 1/4 x 4 x 1 WOOD*
6	6	CLEAT	5 x 4 x 1 WOOD*
7	2	CLEAT	5 x 6 x 1 WOOD*
8	2	CLEAT	12 1/4 x 4 x 1 WOOD*
9	2	CLEAT	2 3/4 x 6 x 1 WOOD*
10	10	CLEAT	11 7/8 x 4 x 1 WOOD*
11	2	SHEATHING	96 x 19 1/8 x 3/8 PLYWOOD**
12	6	BLOCKING	16 7/8 x 2 x 1 WOOD*
13	1	SHEATHING	17 1/2 x 19 1/8 x 3/8 PLYWOOD**
14	1	SHEATHING	17 1/2 x 10 x 3/8 PLYWOOD**
15	6	CLEAT	2 3/4 x 1 WOOD*
16	2	SHEATHING	96 x 10 x 3/8 PLYWOOD**
17	2	CLEAT	10 x 4 x 1 WOOD*
18	4	SKID	77 1/2 x 4 x 2 WOOD*
19	1	SHEATHING	18 x 10 x 1/2 PLYWOOD**
20	2	CLEAT	18 x 4 x 2 WOOD*
21	2	CLEAT	2 3/4 x 4 x 2 WOOD*
22	1	BLOCKING	18 x 10 x 2 WOOD*
23	A/R	FELT	1 THICK C F 206
24	1	CONTOUR	18 x 10 x 2 1/4 PLYWOOD**
25	1	CONTOUR	18 x 10 x 2 1/4 PLYWOOD**
26	1	CONTOUR	18 x 10 x 2 1/4 PLYWOOD**
	A/R	ADHESIVE	EC 847 (3M)
	A/R	WOOD SCREW	10 x 2 1/2
	A/R	STRAPPING	3/8 x .028 THK STEEL QQ S 781

Figure 6-2 Main Rotor Blade Box



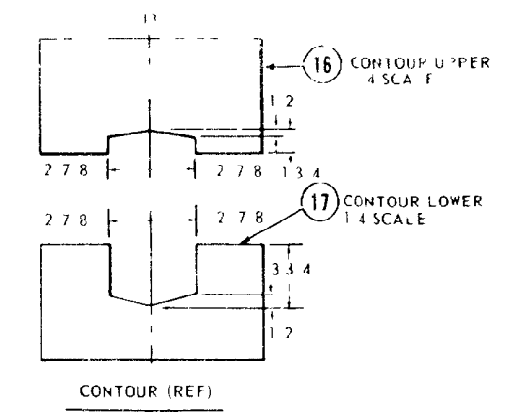
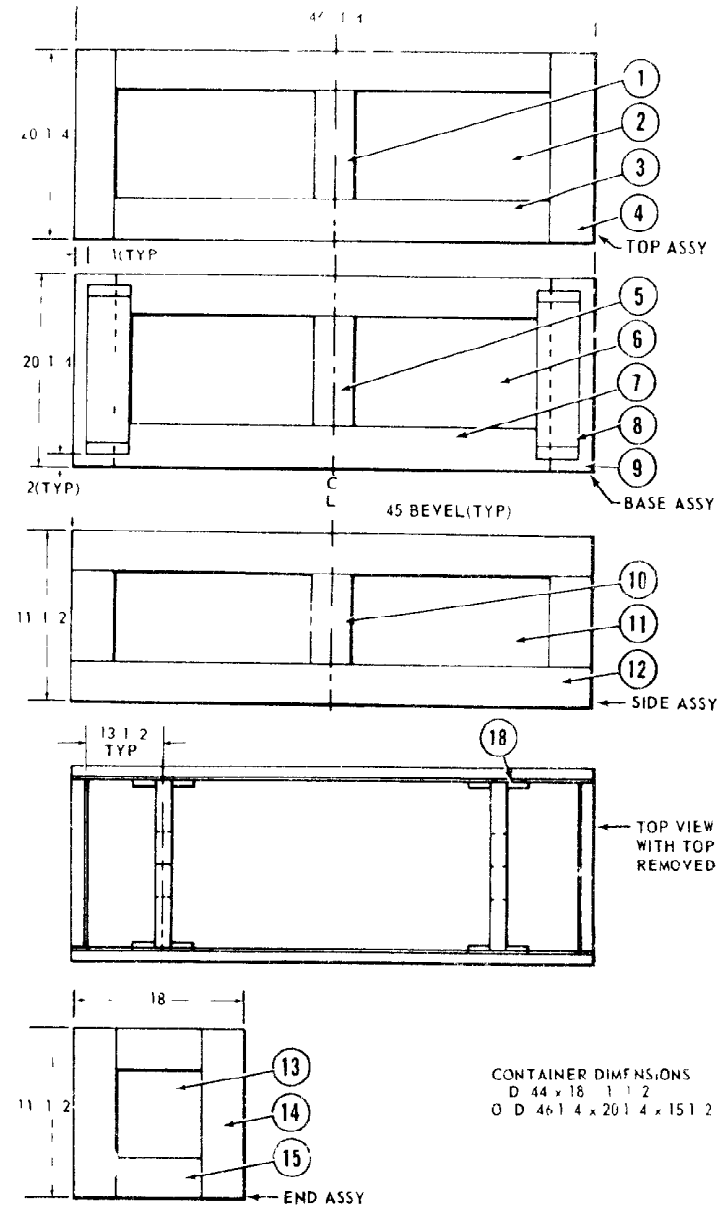
- 24 CONTOUR NO 1 (AS SHOWN)
- 26 CONTOUR NO 3 (SAME AS NO 1 EXCEPT REVERSED)



- 25 CONTOUR NO 2

HULL SCALE
USE AS TEMPLATE

Figure 6-3 Main Rotor Blade Contour



Note

- 1 PLYWD NN-P-530 TYP 2 CLASS 1 WEATHER RESISTANT CD GRADE WITH EXTERIOR GLUE IS ACCEPTABLE
- 2 CONTOURS TO BE LINED WITH 1/2 FELT C-F-206 AT POINTS OF CONTACT WITH PPP-C-84" WITH GRADE A BARRIER OVERWRAP MAY BE USED AS ALTERNATE
- 3 SKIDS TO BE NAILED ON BASE ASSY WITH NO 10d NAILS DRIVEN FROM WOOD SIDE AND CLIP CHED (1) INCH EDGE DISTANCE WITH (3) INCH STAGGER SPACING (TYP)

Pl, wood shall be standard grade with exterior glue of U S Product Standard PSI-66 (Int-D, PA)
 Plywood will have the grade stamp of approved/testing agency and will be surface treated in accordance with TT-W-572

*MIL-STD-731
 **NN-P-530

ITEM	QTY	NOMENCLATURE	MATERIAL
1	1	CLEAT	13x1x4 WOOD *MIL-STD-731
2	1	SHEATHING	46 1/4x20 1/4x3/8 PLYWD **NN-P-530
3	2	CLEAT	39x1x4 WOOD *
4	2	CLEAT	20 1/4x1x4 WOOD *
5	1	CLEAT	13x1x4 WOOD *
6	1	SHEATHING	46 1/4x20 1/4x3/8 PLYWD **
7	2	CLEAT	39x1x4 WOOD *
8	2	SKID	16 1/4x2x4 WOOD *
9	2	CLEAT	20 1/4x14 WOOD *
10	3	CLEAT	4 1/4x1x4 WOOD *
11	1	SHEATHING	46 1/4x11 1/2x3/8 PLYWD **
12	2	CLEAT	46 1/4x14 WOOD *
13	2	SHEATHING	11 1/2x18x3/8 PLYWD **
14	2	CLEAT	11 1/2x1x4 WOOD *
15	2	CLEAT	10 3/4x1x4 WOOD *
16	2	CONTOUR UPPER	18x2x6 WOOD *
17	2	CONTOUR LOWER	18x2x6 WOOD *
18	8	CLEAT	11 1/2x1x4 WOOD *

SHIPPING AND STORAGE CONTAINER OH-58A M/R HUB ASSEMBLY

Fig 116 54 Main Motor Hub Container

WARNING

Extreme care should be taken to keep electrolyte from coming in contact with clothing, skin, or eyes.

(3) Remove battery and thoroughly clean its exterior, battery shelf, quick-disconnect plug, vent hoses, and cables with a solution of five ounces of boric acid crystals dissolved in one gallon of water. Rinse with clean water and allow to dry.

(4) Install vent hoses and reinstall battery.

(5) Cover quick-disconnect receptacle on side of battery with tape (item 26, appendix C), cover plug with barrier material (item 2, appendix C), and secure plug to airframe with tape (item 26, appendix C).

d. 1. ATAS Launcher. Preserve and package. Refer to TM 9-1440-431-23.

e. Hydraulic System.

(1) Fill hydraulic reservoir to normal operating level, check system for leaks, and repair as necessary.

(2) Coat exposed portions of hydraulic actuator rods with a light coat of hydraulic preservative fluid (item 29, appendix C).

f. Main Rotor Blades.

CAUTION

When removing blade, do not change position of latch nut on leading edge of blade. This nut determines alignment position of blade.

(1) Color code all parts for ease of reassembly, then remove main rotor blade from grips. Install T-handle work aid (fig. 6-1) and lock blocks between hub and mast prior to removing blades, while protecting mast with barrier material (item 2, appendix C).

(2) Apply corrosion preventive compound (item 12, appendix C) sparingly to bolt holes in root end of blade and all exposed metal surfaces.

(3) Wrap root end and that portion of blade which rests within cradles with barrier material (item 2, appendix C) and secure with tape (item 26, appendix C).

(4) Secure blades in main rotor blade box. See figures 6-2 and 6-3.

g. Main Rotor Group (Less Blades).

(1) When shipping by vessel, prepare as follows:

(a) The main rotor group consists of rotor blades, hub, swashplate, and mast; however, for the purpose of this paragraph, blades are neglected. (If further disassembly is required, refer to crated shipment.)

(b) Apply light coat of corrosion preventive compound (item 12, appendix C) to main rotor blade retaining bolt holes and other exposed metal surfaces of hub grips. Install rotor blade retaining bolts (coated with dry lubricant), washers, and nuts exactly as removed. Wrap rotor hub grips with barrier material (item 2, appendix C) and secure with tape (item 26, appendix C).

(c) To immobilize main rotor hub, install lock blocks on each side of rotor mast, and wedge in place. Secure lock blocks with 2x2 lumber, 12 inches long, in place with tape (item 26, appendix C) while protecting mast with barrier material (item 2, appendix C).

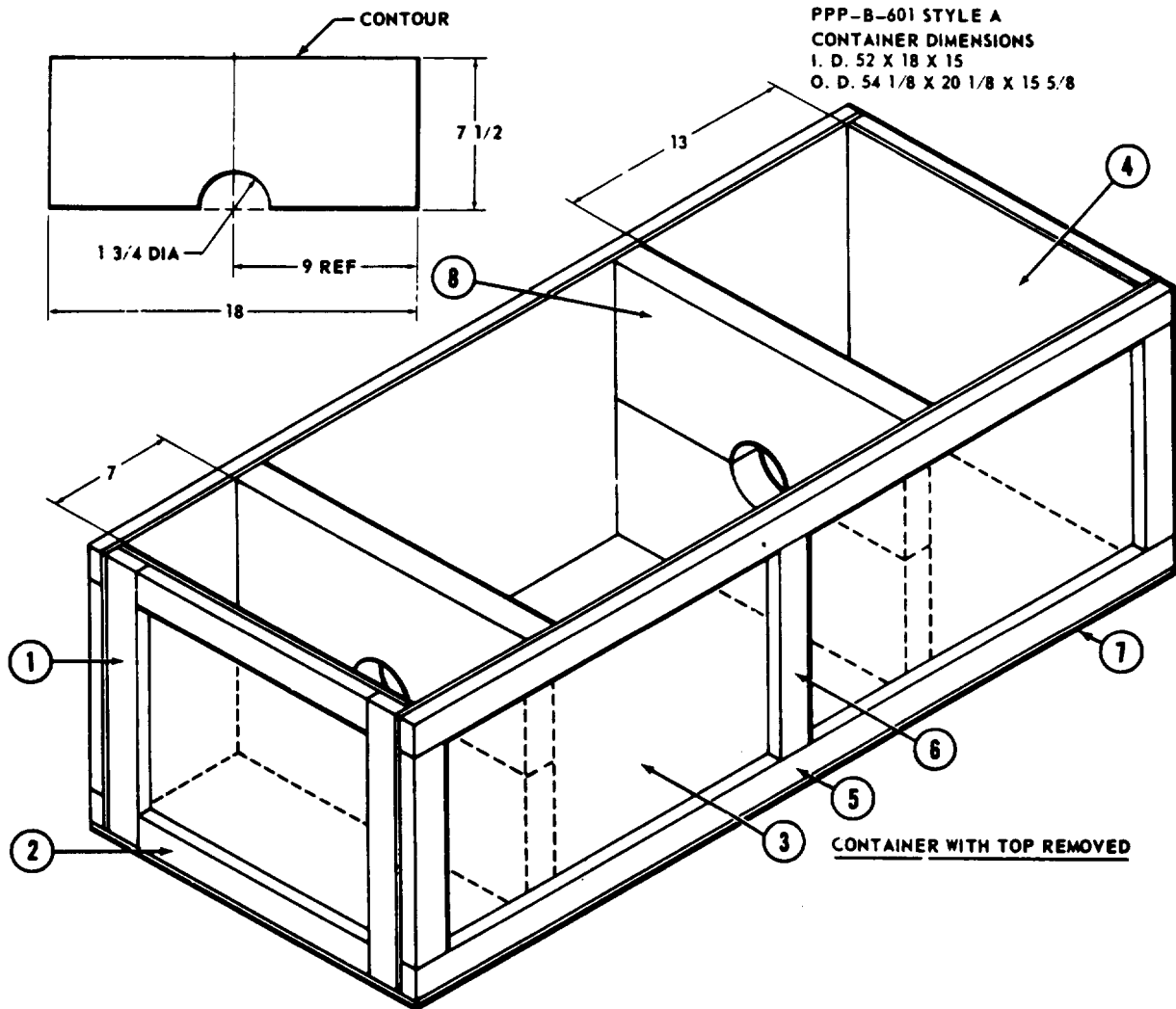
(d) Wrap entire main rotor group, down to fuselage, with barrier material (item 3, appendix C) secured to top of fuselage with tape (item 26, appendix C) so that entire assembly is sealed against entry of water. Lash this cover snugly to hub and mast assembly with 1/8-inch nylon rope and tape.

(2) When shipping by air, or if crated with mast removed, prepare as follows:

(a) Preserve main rotor hub splines with corrosion preventive compound (item 12, appendix C), wrap with barrier material (item 2, appendix C), and secure wrap with tape (item 26, appendix C).

(b) The usual packing procedure is to wrap main rotor hub in polyethylene sheeting, or blankets, and secure cushioned hub to floor of helicopter passenger compartment with nylon straps.

(c) If shipping instructions stipulate use of a plywood container, cushion wrapped hub with cushioning material (item 28, appendix C) or other available materials (refer to para. 1-3e), and pack hub in main rotor hub container. See figure 6-4. Secure to floor of helicopter.



Plywood shall be standard grade with exterior glue of U.S. Product Standard PSI-66 (Int-DFPA). Plywood will have the grade stamp of approved/testing agency and will be surface treated in accordance with TT-W-572.

*WOOD MIL-STD-731
 **PLYWOOD NN-P-530

ITEM	QTY	NOMENCLATURE	MATERIAL
1	4	CLEAT *	1 x 2 x 15
2	4	CLEAT *	1 x 2 x 14-1/2
3	2	SIDES **	54 x 15 x 5/16
4	2	ENDS *	18 x 15 x 5/16
5	2	CLEAT *	54 x 1 x 2
6	6	CLEAT *	11-1/2 x 1 x 2
7	1/1	TOP/BOTTOM **	54 x 20 x 5/16
8	4	CONTOUR *	18 x 2 x 8 WOOD
	A/R	NAILS FF-N-105	

Figure 6-5. Mast and Swashplate Container

NOTES

- 1 PAINT ALL COMPONENTS WITH YELLOW, ZINC CHROMATE PRIMER MIL SPEC #8585
- 2 MARKING DESIGNATIONS MARKINGS ARE SHOWN ON APPROXIMATE LOCATIONS. DESIRED LOCATIONS MAY BE ALTERED SLIGHTLY FOR EASE OF FABRICATION LOCATIONS SHALL BE CLEARLY VISIBLE AND UNIFORM THROUGHOUT

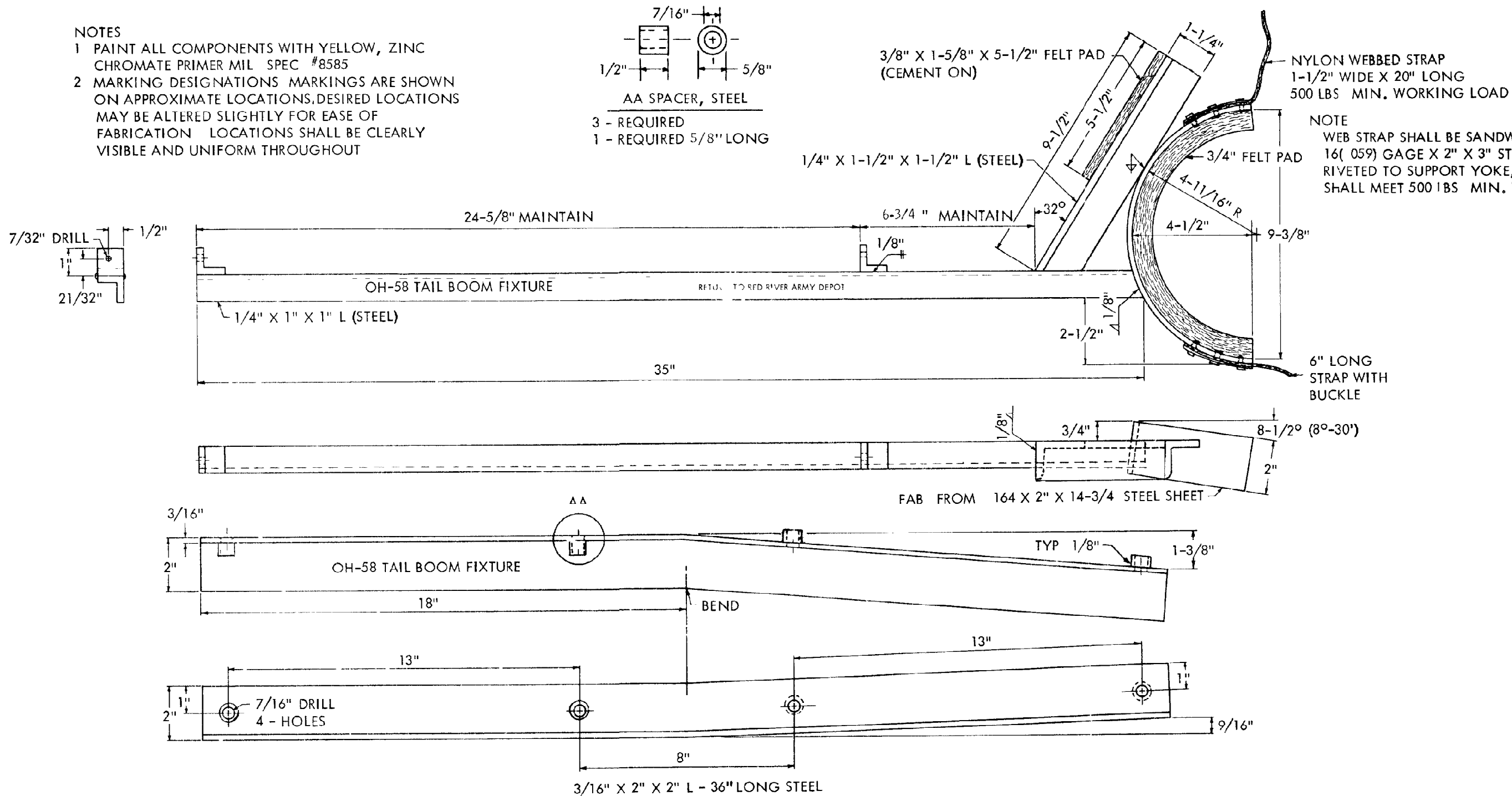
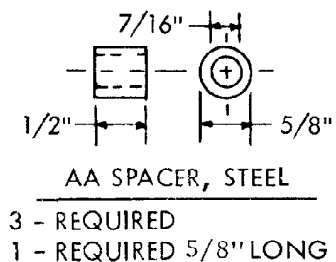


Figure 6-6 Tail Boom Attachment Fixture



Figure 6-7. TailBoom Attachment Fixture Installation

(d) Preserve main rotor mast splines and threads with corrosion preventive compound (item 12, appendix C), wrap with barrier material (item 2, appendix C), and secure wrap with tape (item 26, appendix C).

(e) Cushion, package, and stow main rotor mast and swashplate. Refer to subparagraph (b) above. Under unusual circumstances, or when crated, pack assembly in Mast and Swashplate container. See figure 6-5.

CAUTION

The aircraft technical inspector must ascertain that government verification inspection is accomplished for mast removal, and transmission adapter or transmission cover plate assembly installation, during preparation for shipment or storage of aircraft. Objective evidence that verification inspection was accomplished is by a decal or seal with aircraft technical Inspector's inked stamp affixed on transmission adapter or cover, and transmission case is never uncovered except when absolutely necessary.

h. Horizontal Stabilizer.

(1) Remove horizontal stabilizer, place screws and washers in a waterproof bag (item 21, appendix C) and attach. to tailboom with tape (item 26, appendix C).

(2) Coat exposed metal surfaces with corrosion preventive compound (item 12, appendix C).

(3) Wrap stabilizer with barrier material (item 2, appendix C) and secure wrap with tape (item 26, appendix C). Adequately cushion with cushioning material (item 28, appendix C).

i. Vertical Stabilizer.

(1) Remove vertical stabilizer, and replace mounting bolts and washers on tail boom.

(2) Coat exposed metal surfaces with corrosion preventive compound (item 12, appendix C).

(3) Wrap vertical stabilizer with barrier material (item 2, appendix C) and secure with tape (item 26, appendix C). Cushion as necessary with Cushioning Material (item 28, appendix C).

j. Tail-Light Support Assembly,

(1) Remove tail-light support assembly, cushion adequately and stow in passenger compartment.

(2) Replace screws and washers in tailboom.

k. Tail Rotor Control Tube. Coat exposed metal surfaces of removed tailboom control tube with corrosion preventive compound (item 12, appendix C). Wrap entire tube with barrier material (item 2, appendix C), and secure wrap with tape (item 26, appendix C).

l. TailBoom.

(1) Coat attachment fittings, bolts, washers, nuts, and exposed metal surfaces with corrosion preventive compound (item 12, appendix C), and install hardware in tailboom exactly as removed.

(2) Coat tail rotor shaft, including splines, with the same preservative, wrap with barrier material (item 2, appendix C), and secure with tape (item 26, appendix C).

m. Tail Rotor Group.

(1) Wrap entire tail rotor group, including tail rotor blades, with barrier material (item 3, appendix C), and secure with tape (item 26, appendix C), so as to firmly secure, but not damage them.

(2) . Make two cushions to fit between tail rotor blades and tailboom. Roll cushioning material (item 28, appendix C) into a cylinder approximately eight inches in diameter and eight inches long. Secure blades and cushioning material to tailboom with tape (item 26, appendix C).

(3) If the shipment is to be by cargo plane:

(a) Cover all openings in tailboom and fuselage with barrier material (item 3, appendix C) and secure with tape (item 26, appendix c).

(b) Install dolly wheels on forward end of skid tubes, see figure 2-4, prior to removing tail boom.

(c) Secure tailboom on top of fuselage, using tailboom attachment fixture. See figures 6-6 and 6-7.

(d) Furnish new bolts, nuts, and washers for reassembly.

(4) If the shipment is to be by crate.

CAUTION

The longeron fittings on tailboom are aluminum alloy forgings; neither scratches nor gouges on any surface or slightest elongation of bolt holes can be permitted on these highly stressed fittings. The steel plate must be smooth and flat in area of contact with longeron fittings and insulated from them by two thicknesses of MIL-B-121, grade A barrier material.

(a) Remove tailboom from fuselage, and secure in cradle, see figure 5-6, lined with barrier material (item 2, appendix C). Bolt tailboom forward support to end bulkhead of tailboom. Do not use tailboom attaching bolts to secure tailboom to forward support. Place these bolts, washers and nuts in a waterproof bag (item 21, appendix C), identify, and attach to tail boom.

(b) Insert each bolt with head on longeron fitting, and nut against steel plate. Use aluminum washer or phenolic fiber washer under bolt head. Use self-locking nut (elastic stop nut or equal), or castellated nut with cotter pin.

n. Exhaust Stacks.

(1) Remove engine cowling, cushion adequately with cushioning material (item 28, appendix C), and stow in passenger compartment.

(2) Remove exhaust stacks; replace clamp on exhaust stack flange.

(3) Wrap the exhaust stacks in barrier material (item 2, appendix C), cushion as necessary with cushioning material (item 28, appendix C), and secure with tape (item 26, appendix C). Stow exhaust stacks in passenger compartment.

(4) Cover engine exhaust ports with barrier material (item 3, appendix C), and secure with tape (item 26, appendix C).

(5) Replace engine cowling with barrier material (item 3, appendix C), and secure barrier material with tape (item 26, appendix C).

o. Skid Landing Gear. Coat exposed metal surfaces of skid landing gear with corrosion preventive compound (item 11, appendix C).

p. Fuselage.

(1) Cover all plexiglass with barrier material (item 3, appendix C), and secure with tape (item 26, appendix C), ensuring that no tape contacts plexiglass.

(2) Coat all exposed metal surfaces with corrosion preventive compound (item 12, appendix C), and cover with barrier material (item 3, appendix C), secured with tape (item 26, appendix C).

(3) Group all technical manuals, handbooks, equipment log books, maintenance and historical records (required to be shipped with the aircraft in accordance with AR 750-31 and TM 38-750) first aid packs, magnetic compass, headsets, microphones, clocks, and fire extinguishers. Wrap in barrier material (item 2, appendix C), and pack in a fiberboard box conspicuously marked to identify contents. Place container on pilot's seat, and secure in place using safety belt and shoulder harness. Roll loose ends of belts, and secure with tape (item 26, appendix C). Secure copilot's safety belt and shoulder harness in like manner.

(4) Install pitot tube cover, and secure with tape (item 26, appendix C). If cover is not available, wrap pitot tube with barrier material (item 2, appendix C), and secure with tape (item 26, appendix C). Close static vents (2) with barrier material (item 2, appendix C), and secure with tape (item 26, appendix C). Attach a red cloth streamer to fuselage in area of each static vent, so that streamer is clearly visible from exterior of helicopter.

(5) Deenergize circuit breaker panels.

(6) Inflate handling wheel tires in accordance with the aircraft Maintenance Manual, and secure wheels in passenger compartment of helicopter.

(7) Secure overhead instrument lights to overhead panel fixture.

(8) Lock collective pitch and cyclic controls in accordance with Operator's Manual.

(9) Firmly secure removed components stowed in cargo compartment.

(10) Close all doors and windows, and secure all cowling, inspection panels and covers. Close fresh air heater inlet and ram air ventilating grill with barrier material (item 3, appendix C), and secure wrap with tape (item 26, appendix C). Refer to paragraph 2-5(l) concerning special procedures for vents.

(11) Pad anti-collision, landing, and position/navigation lights with cushioning material (item 28, appendix C), and secure with tape (item 26, appendix C).

Section VII

TACTICAL SHIPMENT OF OH-58 HELICOPTER

7-1. General. The concept of tactical aircraft shipment assumes expediency. Helicopters must be ready to perform their mission immediately after delivery, thus, little or no disassembly is implied. This, coupled with the most expedient method of shipment, the cargo plane, suggests the Air Force C-5, the C-141, or the C-130 as the prime carriers. Depending upon the time frame and the number of helicopters involved, barge or cargo vessel could be employed where some disassembly might be acceptable to permit a greater cargo density.

7-2. Military Cargo Planes.

a. C-5. The Air Force C-5 is the largest cargo aircraft. Its cargo compartment measures 1448 inches long, 228 inches wide, and 162 inches high. It will carry thirteen OH-58's in flyable configuration. Cargo restraint criteria are: 3G forward, 1 1/2G aft, 2G vertical, and 1 1/2G lateral.

b. C-141. Its cargo compartment is 971 inches long, 123 inches wide, and 109 inches high. It will carry four assembled OH-58's. Cargo restraint criteria are: 4G forward, 1 1/2G aft, 2G vertical, and 1 1/2G lateral.

c. C-130. Dimensions of the C-130 cargo compartment are 492 inches long, 119 inches wide, and 108 inches high. Two OH-58's can be carried on transportability skids. Cargo restraint criteria are: 8G forward, 1 1/2G aft, 4G vertical, and 1 1/2G lateral.

7-3. Functions of Cargo Aircraft Crew. Refer to paragraph 2-3.

7-4. Functions of Army Loading Unit. Refer to paragraph 2-4.

7-5. Preparing the OH-58 Helicopter. Refer to paragraph 2-5.

7-6. Preparing Cargo Aircraft. Refer to paragraph 2-6.

7-7. Loading Procedures.

a. C-5.

(1) The maximum number of OH-58's which may be loaded in a tactical configuration into a C-5 is thirteen. Their positioning in the C-5 is shown in figure 2-2.

(2) Eight people are needed for the Army loading team. One person is required at the rotor blade extremities to ensure clearance as the helicopter as-

cends the ramp to prevent the blade from striking the ground and/or hitting the cargo plane ceiling. One person should be on each side of the ramp ahead of the OH-58 to check side clearance. Four people at the tail will guide the OH-58 as it progresses up the ramp and into the cargo plane on its ground handling wheels.

(3) Make a towing bridle by looping a 5000 pound nylon strap around each end of the cross-tube nearest cargo aircraft. Two straps are required on each side. Bring the ends together to form a triangular bridle (fig. 2-4) with winch hook UP.

(4) Winch helicopter up ramp with electric winch and snatch blocks. Rigging and operating winch and snatch blocks is a function of the cargo aircraft crew under the direction of cargo aircraft loadmaster while the main task of Army personnel is to maneuver the helicopter as directed by the loadmaster.

(5) Place metal skid strips under aft end of skid tubes as they approach ramp hinge to protect cargo floor.

(6) When the helicopter reaches the horizontal section of the cargo floor, release the tow cable and manually maneuver it into tiedown position.

CAUTION

Two persons must monitor the main rotor blade position at all times while bearing in mind that any rotation of the main blade produces a corresponding movement of the tail rotor blades.

(7) Do not locate helicopters so closely together that crew members cannot move along the sides within the cargo plane. A clearance of 4 inches between the homing antenna of one helicopter and the fuselage of the adjacent one is required.

(8) Skids should rest on a piece of plywood to avoid damage to the cargo floor.

b. C-141. Flyable OH-58's cannot be transported in this cargo plane. Refer to Table 2-1 for minimum disassembly and paragraph 2-8 for Loading.

c. C-130. Three OH-58's may be carried in a C-130 only if all disassembly is performed as shown in Table 2-1, maximum disassembly, C-141. Loading will be as per C-141.

7-8. Tiedown.

a. Refer to paragraph 2-11 *a* thru *c* and Table 2-3.

b. Main rotor blades will be immobilized in the C-5 by securing the rear blade to a pedestal on the tail boom and the front blade tethered to the floor of the cargo plane.

7-9. Unloading Procedures.

a. Refer to paragraph 2-12 *a* (1) thru (3).

b. One person with a drop-line should be at each end of the main rotor blade to control it as the OH-58 exits the cargo plane.

7-10. Barge Shipment. Though the movement of helicopters has been successfully achieved by certain types of barges, it certainly cannot be considered expedient. There are two barge systems.

a. Lash Lighter. This is a relatively thin-skinned double-hulled box with a water-tight hatch cover. It may be of steel or fiberglass construction. The inner skin is not water-tight. The Lighter can carry as much as 370 long ton (LT) of cargo at a draft of just over 8 feet; however, the density of helicopter loads would not cause the Lighter to draw more than five or six feet. Its dimensions are: 61.5 feet long, 29.5 feet wide, and 10.1 feet high. It will accommodate eight OH-58 helicopters with main rotor head and blades removed from one and horizontal stabilizer removed from three. Do this in accordance with Section VI.

b. Seabee Barge. Water tight and double-hulled, the Seabee Barge is the same width though half the length of the standard US commercial river

barge. Its dimensions are 90 feet long, 30.2 feet wide, and 11.2 feet high. It will carry 834 LT at a draft of 10.5 feet (empty is 1.75 feet). This barge will carry at least the quantities of helicopters as the LASH barge; however, it will carry them without disassembly.

c. Disassembly and Preservation. Disassembly and preservation of OH-58's for maximum barge shipment will be in accordance with that for vessel or air shipment. Where space permits, blade containers will be used; otherwise, blades will be cushioned and placed on the barge deck then the helicopters placed over them.

d. Storage. A further application of the Seabee concept is that of stowing complete helicopters (with blades) in place of barges on the lower deck of the vessel. It has been demonstrated that helicopters may be landed on the top deck for subsequent stowage below. Either the main or lower deck of the Seabee vessel offers 45,000 square feet of protected storage with an overhead height of 19 feet 3 inches on the lower deck. Loading may be accomplished either by positioning the OH-58 on the stern elevator or by flying them directly onto the "top deck of the vessel. From here they may be rolled aft to the elevator to be positioned below.

e. Tiedown. Because there are no floor tiedown inserts on the Lash barge, these will have to be welded to the floor as required. The Seabee barge has a limited number, but others will have to be added for helicopter securement. Tiedown pattern will be as shown in fig 2-13.

7-11. Vessel Shipment. Refer to Section III.

APPENDIX A
PRESERVATION CHECKSHEET FOR OH-58
HELICOPTER SHIPMENTS
VESSEL SHIPMENT

NOTE

The activity preparing the helicopter for shipment may use this Appendix as a guide in writing a checksheet to fit particular shop practices, working conditions, and available manpower. Checksheets are only a record of what has been accomplished. Reference to the manual is required to determine how an operation should be accomplished.

ITEM NO.	ITEM DESCRIPTION	MECH	INSP
PRESERVATION STATUS			
1.	Serial number of aircraft.		
2.	Date of receipt.		
3.	Date of preliminary inspection.		
4.	Preservation applied at reception.		
5.	Date preservation completed.		
6.	Date shipped.		
ATAS ARMAMENT SYSTEM			
1.	Ground helicopter prior to doing any work.		
2.	Remove impulse cartridges and ATAS launcher.		
AIRFRAME			
1.	Deleted.		
2.	Clean interior of helicopter.		
3.	Clean plexiglass with soap and water. Remove grease with TT-N-95, Type II aliphatic naphtha. DO NOT USE TYPE 1. Polish with MIL-C-18767 cleaning and polishing compound.		
4.	Clean other exterior surfaces (less Main and Tail Rotor Groups) with a solution of MIL-C-25769 cleaning compound. Do not allow solution to dry on aircraft.		
5.	Wash rotor blades with mild soap and water. Rinse thoroughly.		
6.	Lubricate helicopter as necessary.		

ITEM NO.	ITEM DESCRIPTION	MECH	INSP
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7. Inspect aircraft for corrosion, and treat as necessary.
8. Service engine, main transmission and tail rotor gear box to normal operating level.
9. Service hydraulic system to normal operating level with hydraulic fluid. Repair any leaks, as necessary.

ENGINE TRANSMISSION AND TAIL ROTOR GEAR BOX

1. Check air intake ducts, plenum chambers and compressor inlet screens to see that they are clean and free of foreign material.
2. Fill oil tank, transmission, and gear box to normal operating level.
3. Perform engine warm up. (Rotor blades are installed for this operation.)

WARNING

Do not use contact preservatives of any kind either internally or externally on the compressor section.

FUEL SYSTEM

1. Drain fuel tank.
2. Close drain valves, add 5 gallons of MIL-L-6081, grade 1010 lube oil to tanks, allow to set to 10-15 minutes, and drain.
3. Close drain valves and fill tanks with MIL-L-6081, grade 1010 lube oil. Allow to remain in tanks 8-10 hours.
4. Ground igniter to dissipate energy in condenser.
5. Disconnect igniter lead at igniter.
6. Turn boost pump ON. Move twist-grip to IDLE DETENT, and motor engine with APU. (Observe starter time-restriction.)
7. When fuel-free oil flows from engine combustor fuel overboard drain line, move twist-grip to OFF position and lock. Cease motoring engine, and turn boost pump OFF.
8. Reinstall igniter lead and cable to ignition exciter. Torque in accordance with maintenance manual.
9. Remove oil from tank, and place in container for reuse.
10. Test tank for presence of fuel vapor; if present, flush as necessary with new oil until safe reading is obtained.

ITEM NO.	ITEM DESCRIPTION	MECH	INSP
11.	Tag fuel filler cap and the cyclic stick with the following: THIS FUEL SYSTEM HAS BEEN PRESERVED WITH MIL-L-6081, GRADE 1010 LUBRICATING OIL. NO FLUSHING REQUIRED. Record extent of fuel system preservation in aircraft log book.		
12	Cover all engine openings with MIL-B-131 barrier material, and secure with tape. Do not use tape to cover fuel and oil openings.		

BATTERY

1. Check battery to see if serviceable and fully charged

CAUTION

Tape vent hales before cleaning with boric acid.

2. Remove battery, and clean with a 5 percent solution of boric acid. Reinstall battery.
3. Close quick-disconnect plug opening on side of battery. Wrap quick-disconnect plug with grade A barrier material and tape to airframe.

HYDRAULIC SYSTEM

1. Coat exposed portions of hydraulic actuator rods with a light coat of MIL-H-6083 hydraulic preservative fluid.

MAIN ROTOR BLADES

1. Color code and remove main rotor blades in accordance with maintenance manual.

CAUTION

When removing blades, do not change position of latch nut on leading edge of blades. These nuts determine alignment position of blades.

2. Lightly coat retaining bolt holes and exposed metal surfaces on the root end of main rotor blades with MIL-C-16173, grade 2 preservative.
3. Wrap root end of blade with MIL-B-121, grade A barrier material, and secure with PPP-T-60, type IV tape. In addition, wrap those areas of blade that come in contact with saddles in rotor blade box with grade A barrier material.
4. Pack blades in main rotor blade box.

ITEM NO.	ITEM DESCRIPTION	MECH	INSP
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MAIN ROTOR GROUP (LESS MAIN ROTOR BLADES)

1. Coat main rotor blade retaining bolt hole, nuts, washers and other exposed metal surfaces of the rotor grip with MIL-C-11796, Class 3 corrosion preventive compound. Install main rotor retaining bolt grip exactly as removed.
2. Wrap rotor grips with MIL-B-121, grade A barrier material, and secure wrap with PPP-T-60, type IV tape.
3. Wrap entire main rotor group down to fuselage with MIL-B-121 barrier material. Secure each wrapping with PPP-T-60, type IV tape and secure barrier material to fuselage with same. Do not contact plexiglass.

TAIL ROTOR GROUP

1. Wrap tail rotor group with MIL-B-131 barrier material, and secure with PPP-T-60, type IV tape.
2. Place cushions (PPP-C-1797) between tail rotor blades and tail boom. Secure with tape.

SKID LANDING GEAR

1. Secure ground handling wheels in passenger compartment, if shipped with helicopter.
2. Coat exposed metal portions of the skid landing gear with MIL-C-16173, grade 1 corrosion preventive compound.

FUSELAGE

1. Coat all attachment fittings and bare metal surfaces with MIL-C-16173, grade 2 preservative, wrap with MIL-B-121, grade A barrier material, and secure with PPP-T-60, type IV tape.
2. Cover plexiglass surfaces with MIL-B-131 barrier material (scrim side out), and secure wrap to fuselage with PPP-T-60, type IV tape. Do not allow tape to contact plexiglass.
3. Deenergize circuit breaker panels.
4. Lock collective pitch and cyclic controls.
5. Secure utility lights to panel fixture.
6. Pack technical manuals, historical records, first aid kits, clocks, magnetic compasses, and fire extinguishers in a fiberboard box, and secure to pilot's seat. Secure disassembled components within passenger compartment, in accordance with Air Force restraint requirement.

ITEM NO.	ITEM DESCRIPTION	MECH	INSP
7.	Close all openings on fuselage with grade A barrier material and tape. This includes fresh air heater inlet, ram air ventilating grill, doors, windows, cowling, inspection panels, and covers. Install pitot tube cover.		
8.	Cushion anti-collision lights and secure with tape.		
9.	Install tiedown shackles to jack pads.		

APPENDIX B**DEPRESERVATION CHECK SHEET FOR OH-58 HELICOPTER
VESSEL SHIPMENT****NOTE**

The preservation checksheet in appendix A must be read and understood prior to depreservation operation. The activity preparing helicopter for shipment is also responsible for writing depreservation checksheet. The following may be used as a guide.

ITEM NO.	ITEM DESCRIPTION	MECH	INSP
1.	Ground aircraft.		
	ENGINE, TRANSMISSION AND TAIL ROTOR GEAR BOX		
1.	Check engine transmission and gear boxes for proper oil level.		
2.	Remove covers, all tape and barrier material from engine.		
	FUEL SYSTEM		
	Fill fuel tank with operating fuel. No flushing required.		
	BATTERY		
1.	Turn battery switch to OFF position on instrument panel.		
2.	Remove barrier material and tape.		
3.	Connect quick-disconnect plug to battery.		
	MAIN ROTOR GROUP		
1.	Remove all barrier material and tape.		
2.	Remove preservative compound with P-D-680 solvent.		
3.	Reinstall blades in accordance with the aircraft Maintenance Manual.		
	FUSELAGE		
1	Remove all covers, barrier material, and tape: open all doors and windows, and ventilate. Remove preservative with a clean cloth dampened with solvent.		

ITEM NO.	ITEM DESCRIPTION	MECH	INSP
2.	Energize circuit breaker panel.		
3.	Unlock collective pitch and cyclic controls.		
4.	Unpack and install records, headset microphone, first aid packs, and fire extinguishers in designated locations.		
5.	Remove tiedown shackles from jack pads.		

TAIL ROTOR GROUP

1. Remove all barrier material, cushioning material, and tape.

VENT

CAUTION

Remove all caps, plugs, or barrier material and red cloth streamers from the following vents, pipes, lines or drains and ascertain that each vent or drain is operable:

1. Battery vent tubes.
2. Fuel vent pipe.
3. Static vents.
4. Oil tank drain lines.
5. Engine compartment drain line.

ATAS ARMAMENT SYSTEM

1. Install ATAS launcher and impulse cartridges.
2. Connect battery as required.

APPENDIX C

CONSUMABLE MATERIALS

NOTE

Method of shipment dictates items and amounts used. A drum of specific oil is identified by a certain National Stock Number (NSN), while a quart of the same oil will have a different NSN. In the same manner, any given material may have differences in length, width, thickness, or other variations, and so will have more than one NSN. Thus the NSNs in the following tables are for guidance only.

ITEM	NATIONAL STOCK NUMBER	NOMENCLATURE	MILITARY SPECIFICATION
1	8105-00-274-2390	Bag, Packing, Water Vaporproof	MIL-B-117, Type II, Class C
2	8135-00-753-4661	Barrier Material, Grease-proof, Waterproofed, Flexible (36" by 100 yards)	MIL-B-121, Type 1 Grade A, Class 2
3	8135-00-282-0565	Barrier Material, Water Vaporproof, Flexible (36" by 200 yards)	MIL-B-131, Class 1
4	6810-00-281-9827	Boric acid flakes (potassium hydroxide) (1 pound bottle)	O-C-265
5	7920-00-051-4384	Brush (5-3/8" diameter of brush part at block)	MIL-B-5612, Type III, Size 1
6	7930-00-634-5340	Cleaning and polishing compound, Transparent plastic aircraft material	MIL-C-18767
7	6850-00-826-0818	Cleaning compound, aircraft surface, alkaline, waterbase (5 gallon can)	MIL-C-25769
8	6850-00-033-8851	Cleaning compound, solvent, trichlorotrifluoroethane (10 gallon can)	MIL-C-81302, Type II
9	8030-00-174-2607	Coating sprayable, strippable, (55 gallon drum)	MIL-C-6799 Type 1

TM 55-1500-338-S

ITEM	NATIONAL STOCK NUMBER	NOMENCLATURE	MILITARY SPECIFICATION
10	8030-00-231-2353	Corrosion preventive compound petroleum base, hot application (5 lb can)	MIL-C-11796, Class 3
11	8030-00-231-2345	Corrosion preventive compound solvent cut back, cold application (1 gallon can)	MIL-C-16173, Grade 1
12	8030-00-244-1297	Corrosion preventive compound solvent cut back, cold application (1 gallon can)	MIL-C-16173, Grade 2
13	8030-00-526-1605	Corrosion preventive compound solvent cut back, cold application (5 gallon can)	MIL-C-16173, Grade 4
14	8135-00-664-0057	Cushioning material uncompressed bound fiber for packaging (2" x 24" x 72")	PPP-C-1120, Type IV, Class A
15	8135-00-300-4905	Cushioning material unicellular polypropylene foam (.375 by 40 inches by 165 feet)	MIL-C-1797, 1/4" x 30" x 223'
16	6850-00-285-8011	Dry cleaning solvent, (55 gallon drum)	P-D-680, Type II
17	9150-00-252-6383	Hydraulic fluid, petroleum base, aircraft, missile and ordinance (1 qt can)	MIL-H-5606
18	6640-00-142-9438	Insecticide, Dichlorvos strips, 2 inch (10" long x 2" wide)	MIL-I-51323, Type III
19	9150-00-231-6676	Lubricating oil, aircraft, turbine engine, petroleum base (55 gallon drum)	MIL-L-6081, Grade 1010
20	6810-00-238-8119	Naphtha, aliphatic (1 gallon can)	TT-N-95, Type II

ITEM	NATIONAL STOCK NUMBER	NOMENCLATURE	MILITARY SPECIFICATION
21	8135-00-579-6488	Plastic film, polyethylene. 0006	L-P-378
22	6840-00-089-4664	Rodenticide, bait block, diphacin paraffin (40-8 oz. blocks per carton)	Fed Code 27633 Part N788
23	9320-00-232-2474	Rubber, latex foam sponge	MIL- R-5001, Type II, Class Firm
24	9350-00-143-8600	Synthetic rubber sheets 5/8 inch thick	MIL-R-6855, Class 2, Grade 50
25	8135-00-885-3510	Tape, Pressure-sensitive, adhesive for preservation and sealing (2-1/2 inches x 36 yards)	MIL-T-43115
26	8135-00-266-5016	Tape pressure-sensitive (2 inches x 60 yards)	PPP-T-60, Type IV, Class 1
27	8135-00-180-5922	Polyethylene foam sheeting 1-1/4 inch x 48 inches x 60 inches	MI L- C-1 752
28	8135-00-300-4905	Cushioning material, resilient, low density, unicellular, polypropylene	PPP-C-1797
29	9150-00-935-9807	Hydraulic fluid, preservative petroleum base (1 qt can)	MIL-H-6083
30	8115-00-205-6835	Fiberboard box, remountable plywood sheathed crate	PPP-B-636

APPENDIX D

SPECIAL TOOLS AND EQUIPMENT

National Stock Number	Part Number	Item Description	NICP
5120-00-177-9403	T101444	Tab Bending	
5120-00-398-4225	T101445	Tab Gage	
1730-00-099-8099	T100220	Main Rotor Sling	
5120-00-262-8491	41 W1853	Strap Wrench, Oil Filter	
1730-00-294-3031 or 1730-00-967-9556	601364-1	Towbar, Aircraft	
1730-00-540-2343	MIL-J-8246 Type A-2	Jack, Hydraulic Hand	
4910-00-204-3170	GGG-91 Type II, CL A	Tire Gage	
1730-00-178-9231	206-050-127-11	Ground Handling Wheels (Left)	
1730-00-178-9232	206-050-127-12	Ground Handling Wheels (Right)	
5850-00-503-0334	MS28925-7	Tracking Device - Light	
4920-00-178-0712	T101536	Tracking Device - Reflectors	
1730-00-571-9012	T100089	Transmission Cover	
	Local Mfg	T-Handle Work Aid	
4030-00-185-0490	AN116-10	Tiedown Shackle	
	Local Mfg	Hoisting Adapter	
1740-00-181-4350	2051440	Air Transportability Fixture (fig. 2-11)	
1730-00-168-5555	1730-MKC-001	Tail Boom Attachment Fixture	
1740-00-464-5745	68SAVAE-D-0300-1	Dolly Wheels	
	68SAVAE-D-0231	Tail Boom Shipping Rack, Truck (UH-1)	
	69SAVAE-D-0065	Shipping Support, Truck (UH-1)	
1730-00-168-1466	1730QTP002	L and P Device	
6665-00-542-1442		Combustible Gas Indicator	

APPENDIX E

QUARANTINE INSPECTION

1. Scope and Purpose. This appendix provide procedures necessary to prepare aircraft (including removed components which are packed separately) for quarantine inspection and reprocessing of such equipment at destination. This appendix is not a directive; it was derived from existing regulations and is presented in a convenient form for your information. AR 40-12 and TM 5-632 should be checked periodically for possible changes.

2. Preparation of Materiel for Quarantine Inspection.

- a. All equipment, and/or containers will be completely free of soil when loaded on ships or aircraft.
- b. All containers, such as CONEX, sea vans, and other containers will be cleared of all spilled grain, food and soil before being loaded with retrograde cargo or returned empty to CONUS.
- c. Wooden containers and packing material will be inspected for termites, wood borers, and other insect infestations, before being packed in larger containers or loaded on ships or aircraft. Under no circumstances will infested wood or packing material be used.
- d. All containers and packing material will be inspected immediately prior to packing to assure the absence of rodents, snakes, and other animals and insects.
- e. Only authorized packing material will be used. In no instance will native grasses or fiber be used. All packing material will be stored to prevent infestation by insects and rodents.
- f. Dichlorvos strips will be attached to the interior of each closed container, wood or metal, in excess of 10 cubic feet, at a rate of 5 linear inches of strips per CONEX. Initial procurement will be two inch strips which should be used at the rate of 3 per CONEX. Equal or lesser amounts should be used for smaller containers. Crates or boxes with small vent holes and aircraft that cannot be completely sealed will have slightly larger amounts used per container.

NOTE

All accessible areas within an aircraft will be considered a closed container.

- (1) Dichlorvos strips operate by the release of vapor, and should not be used in open containers.
- (2) The following supply information is furnished:

NSN	ITEM DESCRIPTION	U/I	NICP
6840-00-142-9438	Insecticide, Dichlorvos Strip 2-inch	144/case	DGSC

- g. Retrograde aircraft will be treated as follows:

NOTE

All accessible areas within an aircraft will be considered a closed container.

(1) Dichlorvos strips 2-inch, will be used for insect control in aircraft that have been sealed while being processed for return to the United States. Dichlorvos strips of varying lengths may be available and the number of strips should be varied accordingly, i.e. one 5-inch strip can be used in lieu of six 2-inch strips or two 5-inch strips, etc. The insecticide strips will be used as follows:

AIRCRAFT	DOSAGE	
OH-58 Helicopter	5-inch strip 2	2-inch strip 5

When multiple numbers of strips are used they will be suspended in different sites rather than in a single location.

(2) One each, rodenticide, bait block diphacin paraffin, 8 oz., NSN 6840-00-142-9438, will be placed near the door of the aircraft. The red tape that is attached to the block will be led to the outside of the aircraft in such a manner as to be clearly visible when the door is sealed.

h. All open containers of more than 10 cubic feet that will be shipped separately will be treated as follows: Rodenticide, bait-block diaphacin paraffin, 8 ounces (NSN 6840-00-089-4664, 20 pound box), will be used in containers.

(1) One block will be placed near the center of each CONEX or applicable smaller container. The red tape attached to the block will be led to the outside of the container in such a manner as to be clearly visible when the container is closed.

(2) Large vans of the Sea-Land type will be treated as follows:

(a) Three blocks to be used per loaded van, evenly spaced throughout the length of the van. The block nearest to the door to have its red tape led to the outside so as to be clearly visible.

(b) Empty vans meeting the following conditions do not require the use of bait blocks. Vans which have been swept out and sealed by the van line operator, are free from holes through which rodents could gain entry, and have tight fitting doors. Empty vans not meeting all of the above conditions require one bait block.

i. Large items of equipment such as tanks, trucks, aircraft, etc., will have the enclosed areas treated in accordance with the subparagraph *f* and *g* above.

NOTE

All accessible areas of an aircraft to include the tail boom will be treated.

i. Supplies and equipment should be available in the command.

k. In the event these instructions vary with the command regulations regarding shipment of retro-grade cargo, the command entomologist should be consulted. Technical assistance and advice regarding these instructions should be obtained from the command entomologist.

l. The following should be noted and personnel handling insecticides and rodenticides be properly instructed.

WARNING

Personnel involved in application of dust and placing of bait blocks will wear rubber gloves, protective clothing and respirators as recommended by the post surgeon or safety officer.

3. Deprocessing of Treated Material.

a. Collection and disposal of insecticides and rodenticides will be accomplished during deprocessing of the aircraft.

(1) All containers and vehicles which have red tape extending from them have been treated with two percent diazinon dust, and contain one or more blocks of rodenticide, diaphacin paraffin, with red tape attached. Removal of this material is necessary before individual items are unpacked or equipment processed.

(2) The procedures will be as follows:

(a) When opening a container treated with insecticide dust or rodenticide bait blocks, a vacuum cleaner will be used to collect the insecticide dust as individual item or packages are removed from the container. The insecticide dust should be removed from each package.

(b) After all contents of the container have been moved and cleaned, the inner surfaces of the container will be vacuumed to remove all remaining dust.

(c) All rodenticide bait blocks will be removed during deprocessing.

(d) All dust, dichlorvos strips, and bait blocks will be stored in separate closed containers for collection by the post engineer and proper disposal.

(e) Personnel involved in removing the dust and bait blocks will wear gloves, protective clothing and respirators as recommended by the post surgeon or safety officer.

b. The post engineer or post surgeon should be notified immediately if living or dead insects, rodents, or other animals found during deprocessing.

APPENDIX F

Not Applicable

APPENDIX G

HEAT SHRINK FILM HELICOPTER PROTECTIVE COVERING

for

OH-58A/OH-58C

G-1. PURPOSES: These instructions are prepared to assist personnel in the installation of protective covering on the OH-58 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 helicopter from corrosion, saltwater 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 Commanders' decision on the amount of protection required will be based on the resources available and the below deck environment of the vessel used for shipment. For helicopters shipped below deck, it is approved to partially cover the helicopter and/or partially shrink the film cover.

c. Protective covering will be applied to those helicopters being shipped by tractor-trailer truck on highways. The level of protective covering required for short distance shipments by military truck will be determined by the shipper.

d. The helicopter will be disassembled, preserved, and prepared for shipment in accordance with Chapter 3 or Chapter 4 of this manual, as applicable.

e. Installation of protective covering is the responsibility of the shipper.

f. When applying the protective covering, heat shrink film, sufficient working space around the helicopter will be provided to move the maintenance stands, ladders, supplies and equipment.

g. In addition to the equipment listed in Table G-1, it is essential that an adequate number of maintenance stands are available for preparation and covering of aircraft. There should be two stands for each aircraft being prepared at a given time. For the uncovering process, a single maintenance stand will be adequate.

h. Insure that adequate waste receptacles are available for waste film and cushioning materials — for both covering and uncovering 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 OH-58 will require approximately 85 ft. of 14 ft. wide heat shrink film, two rolls of heat shrink tape, 1/2 roll of cushioning material, five plastic vents, five pounds of propane, and 200 ft of polyester strapping.

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 lb.	Each	RR-C-910/2	8120-00-530-5225
Knife, Safe-t-Cut	Each	Model 100HD	7330-01-255-3444
Gloves, Safety, Leather	Pair	A-A-50022	8415-00-269-0433
Cushioning Material 1/4" x 30" x 255'	Roll	PPP-C-1797	8135-00-300-4905
Vent, White Plastic, Stick-on, Air	Each	Airlette Corp	8115-01-255-3445
Strapping polyester 1/2"	Roll	R40 (62780)	8135-00-956-2151
Combustible Gas Indicator	Each		6665-00-941-6554

k. The optimum number of personnel for the covering procedure is three per aircraft. One helicopter will require 3 persons approximately 5 hours to cover, with experience, elapsed time can be reduced to 4 hours. Adverse weather conditions and/or dirty (oily) helicopters will increase the optimum number. It is highly recommended that personnel become thoroughly familiar with the heat shrink process prior to working on a helicopter. This can be accomplished by applying the general procedure to available objects such as boxes or crates for practice.

G-3. SAFETY: The below minimum safety procedures will be followed to insure a safe heat shrink operation.

a. Comply with all safety procedures outlined in applicable chapters three or four of this manual.

b. Ground the helicopter in accordance with TM 55-1520-228-23.

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.

g. The helicopter will be covered outdoors if environmental conditions permit. The covering procedures maybe 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 compartment. 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 huge 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 tore-seal heat shrink film.

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

m. Table G-2, safety checksheet will recompleted prior to the use of the heat cannon. The completed checksheet will be attached to DA Form 2408-13.

WARNING

Composite main rotor and tail rotor blades, rubber, plexiglass, and plastic surfaces, 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 Three or Four 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 covers in accordance with either Chapter Three or Four of this manual as applicable.

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

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

e. Seal Vents. Locate all fuel filler ports, drains, and vents, and battery vents. Seal with heat shrink tape and film. These areas must remain sealed throughout the heat shrink process.

f. 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 maybe used to protect the film from sharp edges such as the trailing edge of the Horizontal Stabilizer. 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 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 and underneath main rotor head.

TABLE G-2
SAFETY CHECKLIST

Item	Item Description	Mech	Insp
1.	Ground Helicopter in accordance with TM 55-1520-228-23.		
2.	Fire truck/Fire Fighting Equipment ready for use. TM 55-1500-338-S		
3.	Adjust fuel levels. TM 55-1500-338-S		
4.	Cover fuel access, vent and drain areas. TM 55-1500-338-S		
5.	Perform test with M-6 combustible gas indicator. TM 55-1500-338-S		
6.	Working area well ventilated. TM 55-1500-338-S		
AFTER COVERING COMPLETE			
7.	Inspect covering seams for complete bonding. TM 55-1500-338-S		
8.	Remove seal from fuel vent areas and tape film openings. TM 55-1500-338-S		
9.	Make Handling Instructions entry on DD Form 1387-2 "Fuel in Tanks". Attach form to helicopter cover. TM 55-1500-338-S		

4 Padding over tail rotor head and blade grips.

5 Padding over edges of exhaust stocks.

6 Padding around pitot tube.

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

1 Complete padding of main rotor blades.

2 Complete padding of tail rotor blades.

3 Padding of antennae.

4 Padding of fuel filler ports, vents and drains.

G-5. APPLICATION OF FILM

NOTE

Insure that the provisions of Appendix F, quarantine inspection, and customs clearance is obtained for the aircraft prior to the application of heat shrink protective film.

a. Shrink Film Characteristics. The shrink film is provided in a bulk roll, It is a white, opaque, 7 mil thick, polyethylene that contains an ultra-violet inhibitor. The white color is used to reflect the sun to maintain a lower inside temperature, When heated to approximately 325 degree 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 degree F approximately 12 inches from the cannon, The heat cannon has safety features designed to automatically shut off the flame if it is dropped. The open flame is safe for use on aircraft when the procedures of this appendix are strictly adhered to.

c. After the aircraft has been prepared as in paragraph G-4 above, it is ready for the application of the film. The film cover is created by first visually dividing the helicopter into sections. Film sections are cut from the bulk roll with a safety knife to piece together a complete cover. The pieces are held together with heat shrink tape until they are fused together. There is no hard and fast procedure for this phase of the process. The following is a workable procedure:

NOTE

Because the film is subject to damage from handling on rough surfaces it is recommended that a piece of film approximately 14' X 30' be cut and secured to the ground as a measuring and cutting work surface.

WARNING

Insure that adequate maintenance stands are available and all personnel are thoroughly familiar with no step areas prior to covering the helicopter.

(1) Determine sections such as small protrusions, antennae, tail rotors, stabilizers, and main rotor controls, 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.

(2) The larger sections to be wrapped include the blades and the fuselage.

(a) The fuselage can be sectionalized by using the width of the bulk film and cutting it to a length equivalent to the helicopter circumference for the section being wrapped (plus overlap).

(b) Each of the main rotor blades will require a piece of film 20' x 4'.

(3) Large void areas in the film covering are to be avoided. This can be done by using polyester strapping. For example, voids near transmissio and engine cowls maybe eliminated by wrapping horizontally and tying the strapping snug. Also to prevent voids, slits maybe cut in large pieces of covering to allow previously covered small protrusions to stick through. Covering on these protrusions will be then fused to the larger piece.

WARNING

Prior to operating the heat cannon, insure that all requirements of paragraph 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 the heat along the seam. As the film becomes soft, pat the seam gently with a safety gloved hand (the film is HOT).

CAUTION

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

(3) Repeat this process until all seams are fused.

(4) After film has cooled, test seams for proper bonding by trying to pull seams apart with fingernails. If seam comes loose. reseal it.

e. Shrinking Film.

(1) After all the seams have been fused and the helicopter has been completely enclosed in film, the shrinking process should be accomplished. To shrink the film, hold the heat gun 8 to 12 inches from the surface and move the gun evenly along the surface. Apply just enough heat to soften the film. After the heat is removed, the film will shrink to a glove tight fit.

(2) If a hole is inadvertently burned through, it may easily repaired by fusing piece of film to the damaged area and/or repairing with heat shrink tape.

f. Inspection. When the shrinking process is completed and allowed to set for approximately 30 minutes, inspect the helicopter covering to determine if any areas require further shrinking. Insure that all seams are completely fused and that no holes are present. Repairs may be made as required by applying the procedure in paragraph G-5e above. Insure good seals around landing gear and other protrusions.

WARNING

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

G-6. FUEL AND BATTERY 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 inspection of the covering has been completed, the covering must be ventilated. Ventilators are to be placed to allow a flow of air through the covering. Each aircraft will require approximately five ventilators. They should be placed to allow air to flow through the helicopter. At least one vent will be required at each low point on the helicopter to drain condensation. The vents are applied by peeling the backing off the adhesive surface and pressing the vent to the shrink film. The cover is then removed and the center hole is cut in the shrink film. The vent cover is then replaced and secured with tape.

G-8. HOISTING: If the helicopter is being hoisted on a vessel or truck, use the applicable procedures in this manual. If the film is damaged it may be repaired with two inch heat shrink tape and/or a piece of heat shrink film taped to the cover.

G-9. TIEDOWN POINTS: After loading the aircraft, restrain in accordance with either chapter three or four of this manual as appropriate.

G-10. 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-11. 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 Defence Reutilization and Marketing Service DLA.

G-12. DEPRESERVATION: Depreserve helicopter in accordance with this manual.

This manual is published for the use of all concerned.

By Order of the Secretary of the Army:

Official:
PAUL T. SMITH
Major General, United States Army
The Adjutant General

BERNARD W. ROGERS
General, United States Army
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BE EXACT. PIN-POINT WHERE IT IS

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO
6	2-1 a		
B1		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 key to figure 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 gasket but it doesn't fit. Supply says I got what I ordered, so the NSN is wrong. Please give me a good NSN

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