SECTION IV
REMOVAL AND INSTALLATION

4-1. GENERAL.

4-2. This section contains procedures for R/V removal and installation, positioning the R/V trailer, missile handling or MC-1 cranes, and assembly of the R/V work platform at the launch area. Included is the preparation of the trailer and work platform for transportation from the launch area.

4-3. TEST EQUIPMENT AND SPECIAL TOOLS.

4-4. Figures 4-1 and 4-2 list test equipment and special tools necessary to perform removal and installation procedures for the re-entry vehicle system.

TYPE DESIGNATOR	NOMENCLATURE	USE AND APPLICATION
T-304B/C	Multiple Purpose Continuity Test Set	For performing warhead circuits test.
HRU-6E	Adapter Cable Test Set	Used with test set T-304B/C for performing warhead circuits test.
A/E24T-47	Interface Test Set Group	Used for monitoring stray voltage and during pre-mating checkout of R/V.

Figure 4-1. Test Equipment

4-5. POSITIONING CRANES.

4-6. POSITIONING MISSILE-HANDLING CRANE.

4-7. When utilizing the missile handling crane for removal/replacement of the R/V, the crane is positioned in the same location as that used for normal missile handling. (Refer to T.O. 21M-HGM25A-2-2-1.)

4-8. POSITIONING MC-1 CRANE.

Note

Due to construction differences of lox drainage ditch, each organization will locate and mark the most desirable placement of MC-1 crane and R/V trailer at each silo cap. Safety will be of prime concern when determining these locating marks.

4-9. To position the MC-1 crane for R/V recycle, proceed as follows:

a. Position aft end of MC-1 crane near silo mouth (figure 4-3) over locating marks on silo pad.

b. Extend outriggers.

c. Place chocks behind rear wheels.

TYPE DESIGNATOR	NOMENCLATURE	USE AND APPLICATION
	Four-legged Sling Tag lines (4) (two 25 FT and two 35 FT)	To support assembled R/V maintenance platform during removal and installation.
8500U*	Control Hoist (Mesco Sales and Service Corp., Arcadia, Calif.)	To facilitate hoisting.
AN116-14	Clevis (2)	To facilitate hoisting.
KMU-971E	R/V Mating Tool Kit	To tighten or loosen bolts as necessary.
605717-1*	Spin Fin Container (Avco Corp., Stratford, Conn.)	To stow the removed spin fins (TCTO 11N-RV4-526).
ADU-95A/A	R/V Hoisting Adapter	To support the cradle with or without an R/V during lifting and rotating.
ADU-95/E	Shipping and Lifting Adapter	For fastening the R/V to the cradle to prevent axial motion of the R/V during lifting and rotating.
GSU-74/E	R/V Carriage	To support the R/V and/or cradle on R/V trailer.
MMU-36/E	R/V Cradle	To support the R/V during removal, installation, and transportation.
	Safety Belts (4)	To be worn when working around open silomouth.
	Dual Headset	For ground level operations.
	Single Headset	For in-silo operations.
59-202-9053	R/V Maintenance Platform	To provide a convenient working area at silo level 1 for mating and demating operations.
* Manufacturers part number.		

Figure 4-2. Special Tools (Sheet 1 of 2)

TYPE DESIGNATOR	NOMENCLATURE	USE AND APPLICATION
FSN 1190-957-3837	R/V Emergency Recovery Sling	To support R/V under conditions of attitude where standard lifting sling cannot be reached.
FSN 1190-957-3838	Mark 4 Adapter	Permits attachment of emergency recovery sling to Mark 4 R/V

Figure 4-2. Special Tools (Sheet 2 of 2)

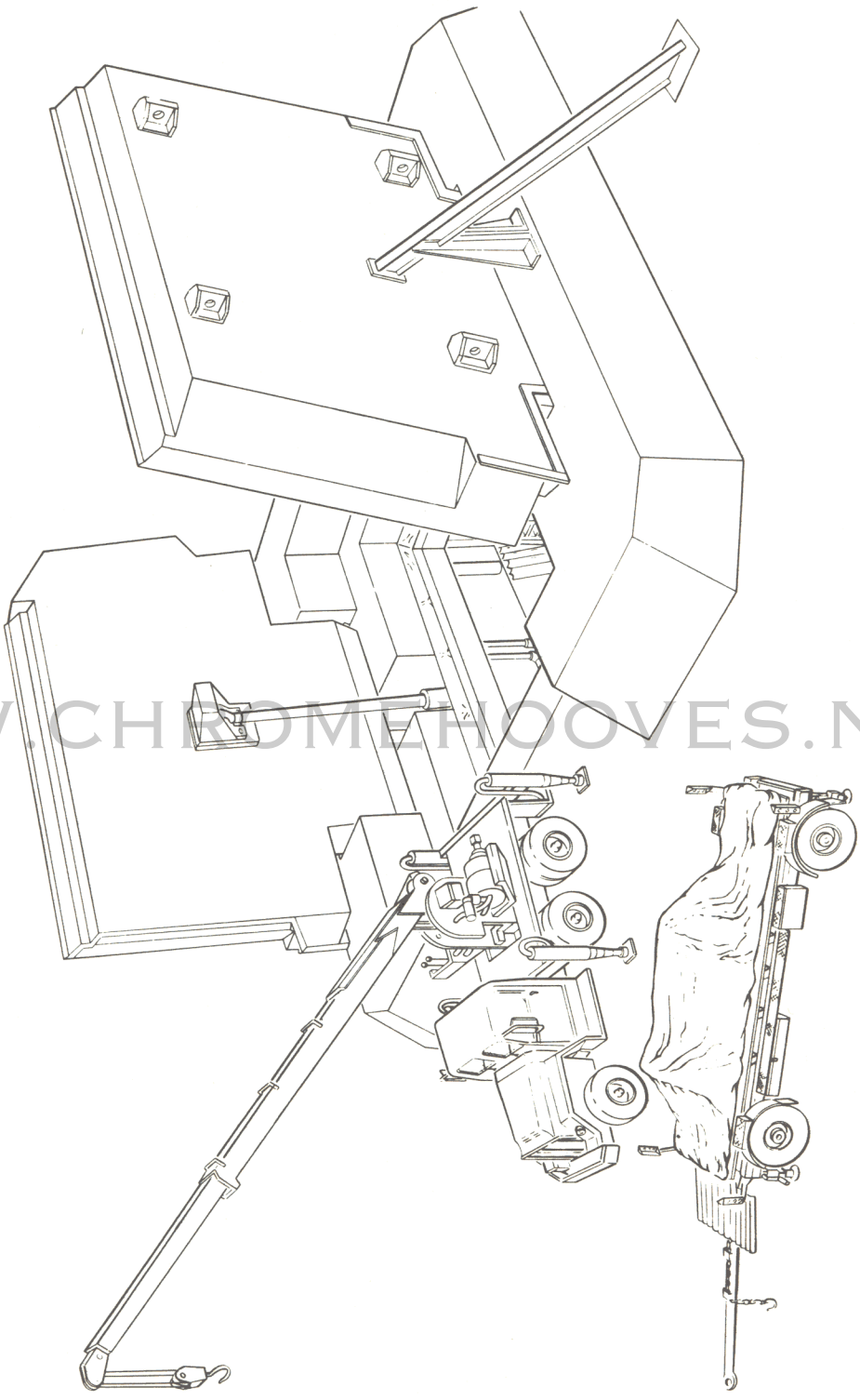

Figure 4-3. Position of MC-1 Crane and R/V Trailer

4-10. DISCONNECTING ELECTRICAL CONNECTORS BETWEEN R/V AND STAGE II.

4-11. To disconnect electrical connectors between R/V and Stage II, proceed as follows:

Note

Access door A2 for missile serial numbers 60-3670 and subsequent.

a. Remove access door A4 from Stage II.

b. Install Stage II maintenance platform set MSU-28(XC-1)/E.

WARNING

Insure that checkout power is off and circuit breakers CB9, CB12, CB58, CB74, and CB259 are in OFF position.

c. Disconnect Stage II interface connector 310P1 from R/V interface receptacle J151 and tape in place to adjoining stage II structure.

d. Disconnect Stage II telemetry connector from R/V push switch connector D-41 (Mark 4, Mod 5B only). Tape in place to adjoining Stage II structure.

e. Remove maintenance platform set.

Note

If emplacement of R/V is to be accomplished immediately, replace access door with two screws on each side.

f. Reinstall access door.

4-12. ASSEMBLY AND INSTALLATION OF RE-ENTRY VEHICLE MAINTENANCE PLATFORM (SILO-MOUTH).

4-13. For assembly of the re-entry vehicle maintenance platform at silomouth, proceed as follows:

a. Remove maintenance platform sections from cargo truck.

b. Position one V-X span assembly vertically and engage two caster brake levers on one ladder frame with foot.

Note

Locking hooks are released by depressing spring-loaded release pins.

c. Release storage locking hook and separate ladder frames to permit extension of V braces.

d. Fully extend braces and interlock center section to form X brace.

e. Engage two caster brake levers on remaining ladder frame with foot.

f. Position ladder platform on fifth rung of each ladder frame and secure four locking hooks.

g. Position platform support braces to second rung of each ladder frame and secure locking hooks.

h. Repeat steps b through g for remaining V-X span assembly.

i. Release four caster brake levers on each V-X span assembly with foot.

Note

Insure four locking hooks on plate platform are secured to ladder frames. Position V-X span assemblies as required to permit installation of plate platform.

j. Position V-X span assemblies opposite each other and install plate platforms.

k. Engage four caster brake levers on each V-X span assembly with foot.

l. Install four guard rail supports and secure with locking clips.

m. Install two long guard rail braces above pin stops on ladder frames and secure locking hooks.

n. Install two short guard rail braces in the lower position on V-X span assemblies and secure locking hooks.

o. Attach four-legged sling to crane hook.

p. Raise crane hook and swing four-legged sling over assembled maintenance platform.

q. Connect one leg of four-legged sling to each of the four lifting lugs on the maintenance platform.

r. Attach two 35-foot tag lines to opposite corners of the maintenance platform.

s. Place folded cloth protective skirt on maintenance platform.

CAUTION

Before hoisting R/V maintenance platform, insure that short guard rails are securely installed in the lower position to prevent maintenance platform from collapsing and damaging the R/V or missile.

t. Man tag lines, hoist and swing maintenance platform over the silomouth.

u. Lower maintenance platform to just below the ground level and drop tag lines to to the two technicians at silo level 1.

CAUTION

If an R/V is installed on the missile, use extreme care in lowering the work platform.

Note

During final lowering of the maintenance platform, orient it so that one short guard rail side will be over the missile umbilical lines.

v. Man the tag lines and lower maintenance platform to approximately 4 feet above silo level 1.

w. Remove short guard rail from lower position on the side above umbilical lines.

x. Lower maintenance platform to silo level 1 and lock each caster brake.

y. From the inside out, install the two short guard rails in the upper position.

x. Detach the four-legged sling from maintenance platform lifting lugs.

aa. Remove tag lines and attach to the four-legged sling.

ab. Raise four-legged sling and tag lines to ground level and swing away from the silomouth.

ac. Remove four-legged sling and tag lines from crane hook.

ad. Install cloth skirt around the missile at R/V maintenance platform level.

4-14. ASSEMBLY AND INSTALLATION OF RE-ENTRY VEHICLE MAINTENANCE PLATFORM (SILO TUNNEL).

4-15. To assemble and install the re-entry vehicle maintenance platform through silo tunnel, proceed as follows:

a. Transport re-entry vehicle maintenance platform and cloth skirt to missile silo tunnel entrance.

b. Load re-entry vehicle maintenance platform on personnel elevator and transport to missile silo level 1.

c. Unload re-entry vehicle maintenance platform from personnel elevator and transport to work platform 1 for assembly.

CAUTION

Use extreme care when working near Stage II. Do not strike, scratch, or otherwise damage its finish.

d. Position one of the V-X span assemblies vertically and engage two caster brake levers on one of the ladder frames with foot.

e. Release assembly locking hook and separate ladder frames to permit extension of V braces.

Note

Locking hooks are attached by depressing spring-loaded release pins.

f. Fully extend braces and interlock center section to form X brace.

g. Engage two caster brake levers on other ladder frame with foot.

h. Attach and lock four hooks of ladder platform to fifth ladder rungs.

i. Attach and lock hooks of platform support braces to second rung of each ladder frame.

j. Repeat steps d through i for other V-X span assembly.

k. Release four caster brake levers on ladder frames of each V-X span assembly with foot.

l. Position V-X span assemblies at opposite sides of Stage II.

Note

Insure four locking hooks of plate platform are positioned and attached to ladder frames. Position V-X span assemblies as required to permit installation of plate platform.

m. With two mechanics located on same side of Stage II near ladder frames of each V-X span assembly, install one plate platform on V-X span assemblies.

n. Repeat step m to install other plate platform on opposite side of Stage II.

o. Center re-entry vehicle maintenance platform around Stage II.

p. Engage four caster brake levers on ladder frames of each V-X span assembly with foot.

q. Insert guard rail supports and secure with locking clips.

r. Attach locking hooks of four guard rail braces to ladder frames above pin stops.

s. Install cloth skirt around the missile interface at the re-entry vehicle maintenance platform level.

4-16. POSITIONING R/V TRAILER.

4-17. To position R/V trailer for R/V removal or installation, proceed as follows:

a. Using cargo truck, position R/V trailer near silomouth with aft of trailer facing silo door.

CAUTION

If the brake does not hold, release the brake lever and rotate the lever knob clockwise until braking action is satisfactory.

b. Set the trailer hand brake.

c. Disconnect pneumatic lines, electrical connectors, safety chain, and tow bar of trailer from cargo truck. Stow electrical lines in trailer.

Note

The R/V trailer shall be connected to the front end of the cargo truck during final positioning.

d. Connect tow bar, safety chain, and pneumatic lines to front of truck.

e. Release hand brake and position R/V trailer over locating marks on the silo pad.

CAUTION

If the brake does not hold, release the brake lever and rotate the lever knob clockwise until braking action is satisfactory.

f. Set trailer hand brake.

g. Disconnect pneumatic lines, safety chain, and tow bar of trailer from cargo truck. Drive truck to one side.

h. Connect pneumatic line couplers together and stow in storage rack.

CAUTION

Bleed trailer air tank as soon as possible after disconnecting pneumatic lines from truck. Air pressure must not be left in trailer tank for any reason.

i. Open drain cock on R/V trailer to release pneumatic pressure.

j. Remove gravel deflector and set it aside.

k. Pull quick-release pins to release trailer jacks. Replace quick-release pins in lower holes.

l. Jack trailer until the load is removed from the wheels and trailer rails are approximately level.

m. Remove explosive signs, if applicable, and store in trailer.

4-18. R/V REMOVAL.

4-19. If a replacement R/V is to be installed after removal, certain procedures will be performed or omitted as indicated.

4-20. The following equipment is required to R/V removal and will be hand carried to silo level 1:

a. R/V mating tool kit.

b. Two turnbuckles for shipping and lifting adapter.

c. One single headset.

d. Spin fin container (after incorporation of TCTO 11N-RV4-526).

e. Interface test set group (for R/V removal and replacement only).

4-21. WARHEAD CIRCUITS TEST (MARK 4, MOD 3 Only).

4-22. If a replacement R/V is on the trailer, open the tarpaulin at the rear of the R/V and perform a warhead circuits test. (Refer to paragraph 2-3.)

4-23. LOWERING SHIPPING AND LIFTING ADAPTER TO SILO LEVEL 1.

4-24. To remove the R/V from missile Stage II, proceed as follows:

CAUTION

If a replacement R/V is on trailer, use extreme care when removing tarpaulin to prevent damage to R/V ablative surface.

a. Remove tarpaulin from trailer and set aside.

b. Remove screw from shipping and lifting adapter torus ring and crossbeam of trailer.

c. Support torus ring and remove the two quick-release pins.

d. Place the torus ring in a convenient working area.

e. Detach screws securing torus ring halves together.

f. Attach four-legged sling to crane hook and attach one leg of four-legged sling to each handle on the shipping and lifting adapter torus ring.

g. Raise shipping and lifting adapter torus ring approximately 4 feet above the ground.

h. Secure shipping and lifting adapter halves together using one 35-foot tag line. Insure there is sufficient tag line remaining to adequately control the shipping and lifting adapter torus ring while lowering it to the R/V work platform at silo level 1.

i. Man the tag line and raise shipping and lifting adapter torus ring to a sufficient height to clear all obstacles. Swing the shipping and lifting adapter torus ring over the silomouth.

j. Lower shipping and lifting adapter torus ring to just below the silomouth opening and drop the tag line to one technician on the R/V work platform.

CAUTION

Use care when lowering the shipping and lifting adapter torus ring to prevent damage to the re-entry vehicle or missile airframe.

k. Lower shipping and lifting adapter to a convenient location on the R/V work platform, continually guiding it with the tag line.

l. Detach the four-legged sling and tag line from shipping and lifting adapter torus ring. Attach the tag line to the four legs of the sling and raise sling and tag line to ground level.

m. Remove tag line from the four-legged sling. Remove the four-legged sling from the crane hook and set it aside.

4-25. PREPARING TO REMOVE R/V CRADLE FROM TRAILER.

4-26. To prepare for removal of R/V cradle from trailer (figure 4-4), proceed as follows:

WARNING

Check control hoist for completion of pre-use test. If test has not been completed, perform test in accordance with T. O. 35DA4-3-1 and Safety Supplement T. O. 35DA4-3-1SS-1.

Insure that hoist control is pre-charged to minimum of 100 PSIG and that piston rod is fully retracted. Any evidence of leakage, physical damage, or failure to maintain pressure shall require removal and accomplishment of pre-use test. Failure of the control hoist could injure personnel or damage Re-Entry Vehicle and missile.

a. Install clevis on upper eye of control hoist.

b. Lower crane hook and attach control hoist to crane hook.

c. Install R/V hoisting clevis in lower eye of control hoist and attach control reels to control hoist.

NOTE

If a replacement R/V is on the trailer, perform steps d through h.

d. Remove jumper assembly from R/V and stow on cleat of trailer bed.

e. Remove rear crossbeam quick-release pin and lower crossbeam.

f. At replacement R/V, remove roll stop assemblies from trailer rails.

g. Loosen replacement R/V carriage roller adapter clamps and roll carriage to rail stops at end of trailer rails.

h. Tighten carriage roller adapter clamps.

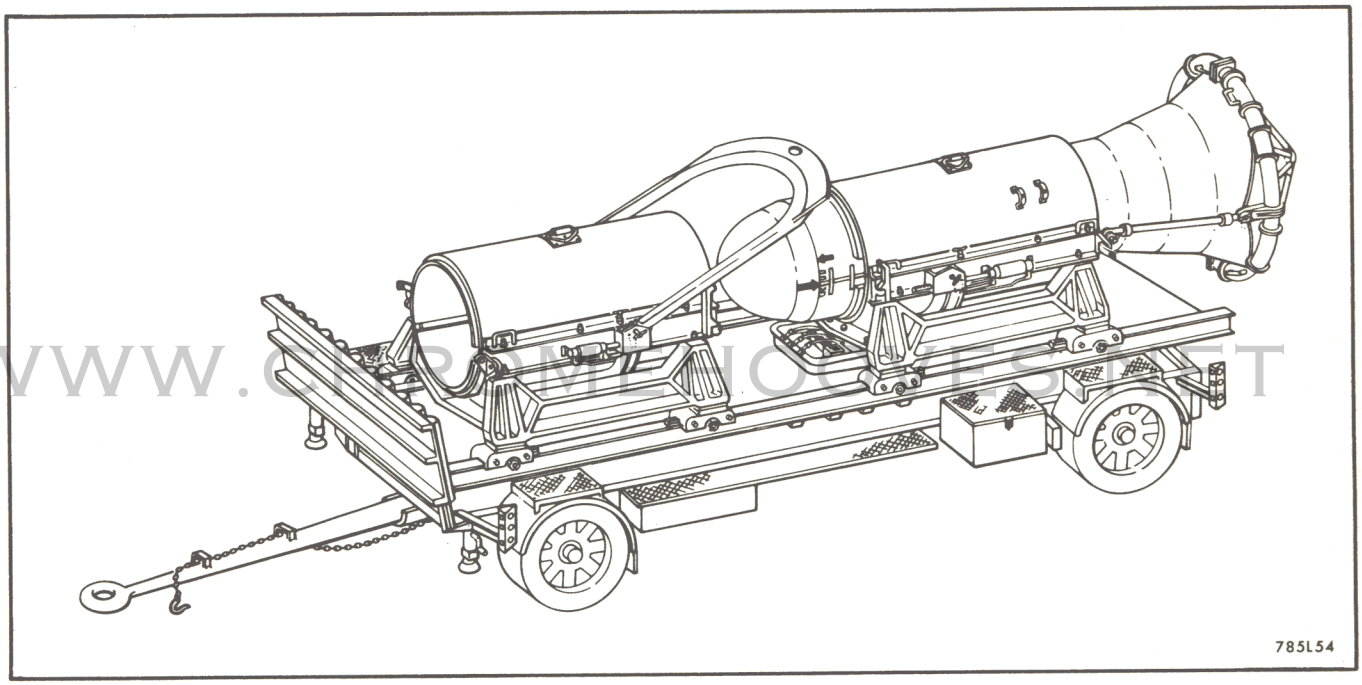

Figure 4-4. Position of R/V and Empty Cradle on Trailer

4-27. REMOVING R/V CRADLE FROM TRAILER.

4-28. To remove R/V cradle from trailer, proceed as follows:

a. Detach captive screws securing hoisting adapter to 15-degree brackets.

b. Remove handpump from shelf on carriage.

Note

If handpump hoses are not disconnected from cradle, omit step c. Observe the color coding on the hoses and couplings to insure proper connection.

c. Remove dust caps from handpump hoses and cradle couplings. Connect hoses to cradle couplings.

d. Detach five short screws on each side of R/V cradle and retract the two long screws approximately 2 inches.

e. Using handpump, rotate the hoisting adapter to a vertical position.

f. Detach captive screws securing adapter supports in up position; lower adapter supports and secure in down position.

CAUTION

When using the MC-1 crane, a minimum boom angle of 33 degrees and a boom length of 30 feet must be maintained when handling an R/V. Crane hook and boom speed must not exceed 10 feet per minute.

g. Position control hoist directly over hoisting adapter and attach adapter to control hoist with clevis.

Note

While performing the following step, allow sufficient slack in the control cables to allow the cradle to be rotated to the vertical position.

h. Extend the control reel cables and secure one to each shipping and lifting adapter torus ring bracket, using cloth tape, pressure sensitive tape, or other suitable securing material.

i. Detach four captive screws securing R/V cradle to carriage.

WARNING

Before hoising R/V cradle, insure that all personnel are clear of cradle path and crane boom.

CAUTION

Do not raise the cradle higher than hydraulic hoses permit.

j. Remove roll stop blocks and release carriage brakes.

k. Hoist R/V cradle clear of carriage.

l. Lock carriage brakes.

m. Manually guide R/V cradle to unobstructed area.

n. Position R/V cradle with R/V hoisting adapter pivot point approximately 5 feet above the ground.

o. Retract shipping and lifting adapter quick-release pins clear of inner ears of R/V cradle to prevent damage to R/V.

4-29. POSITIONING R/V CRADLE OVER R/V.

4-30. To position R/V cradle over R/V (figure 4-5), proceed as follows:

a. Turn control valve on handpump and rotate R/V cradle to a vertical position.

CAUTION

Wrap the hoses clockwise around the cradle to prevent damage to the hoses.

b. Secure handpump in clamps on upper half of R/V cradle.

CAUTION

Insure that the two cradle halves can be separated 2 inches and that the two quick-release pins are securely installed.

c. Extend control hoist rod approximately 2 inches.

d. Attach one 25-foot and one 35-foot tag line to each rear cradle handle.

WARNING

Safety belts will be worn and attached to safety barrier when working within safety barrier. Extreme care must be taken while personnel are manning tag lines.

e. Position R/V cradle directly over R/V. Insure that top half of cradle is located on right side with respect to yellow 0-degree line on R/V.

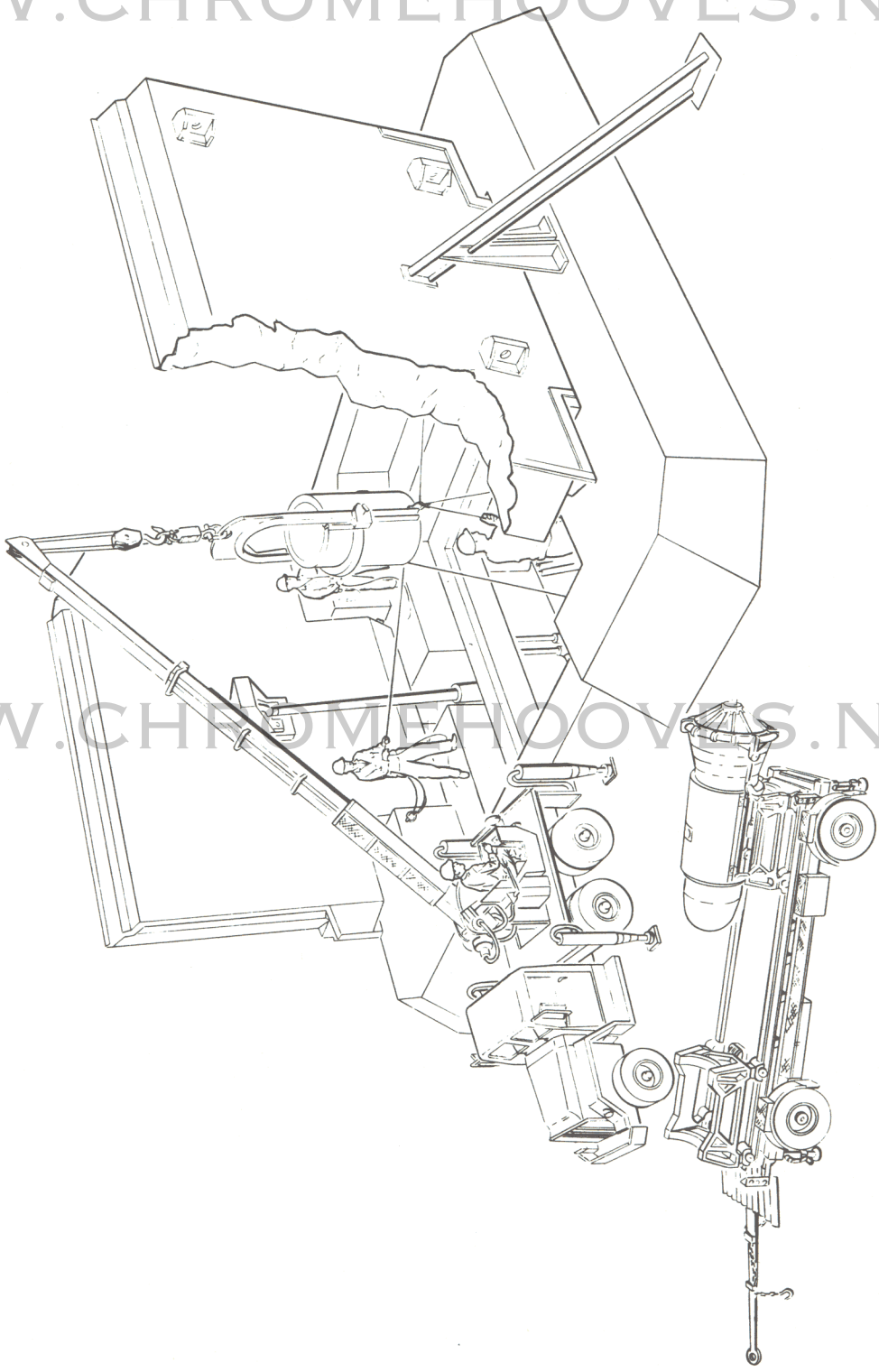

Figure 4-5. Lowering R/V Cradle in Silo

Note

The two 35-foot tag lines will be manned by the two technicians at the silomouth. The two 25-foot tag lines will be dropped to the technician at level 1. Technician at silomouth may secure tag lines to safety barrier after cradle has been positioned on R/V.

f. Drop two 25-foot tag lines to technicians on R/V maintenance platforms.

g. Lower R/V cradle and guide it with tag lines from below. Rotate the cradle back and forth if necessary.

Note

Control hoist may be used for minor adjustments necessary to align the VERT CRADLE mark on R/V with lower edge of cradle.

h. Adjust cradle until its lower edge is aligned with VERT CRADLE mark on R/V.

i. Remove the two 25-foot tag lines from the R/V cradle.

j. Manually rotate cradle until turnbuckle attachment clevis on cradle is aligned with yellow 0-degree mark on R/V.

Note

Perform step k only after incorporation of TCTO 11N-RV4-526.

k. Remove screws securing detachable spin fins to R/V. Place screws and fins in spin fin container.

4-31. ATTACHING SHIPPING AND LIFTING ADAPTER TO CRADLE AND R/V.

4-32. To attach shipping and lifting adapter to cradle and R/V, proceed as follows:

a. Remove 12 of the bolts securing R/V to Stage II by removing first bolt located to left of red target line of Stage II and every other bolt thereafter.

b. Place bolts and washers in R/V mating tool kit.

CAUTION

Use care not to damage the R/V spin fins while installating the torus ring. If TCTO 11N-RV4-526 has been incorporated, insure the detachable spin fins have been removed.

c. Position one half of shipping and lifting adapter torus ring on R/V hoisting adapter, aligning turnbuckle clevis with yellow 0-degree mark on adapter assembly.

d. Loosen the setscrews in one turnbuckle. Adjust the turnbuckle to the proper length and position in the clevises on the cradle and torus ring half. Secure with the two quick-release pins.

e. Position second half of torus ring on R/V adapter and secure both torus ring halves together with eight screws.

f. Repeat step e for the remaining turnbuckle.

Note

One technician will insure that cradle clevis remains aligned with yellow 0-degree line on R/V while cradle bolts are tightened.

g. Tighten turnbuckles simultaneously. Visually inspect through the sighting hole at each end of the turnbuckle legs to insure that threads are visible. Securely tighten setscrews at each end of turnbuckle legs.

h. Tighten the second lowest bolt on each side of cradle simultaneously, then tighten the lowest bolt on each side.

4-33. SEPARATING R/V FROM STAGE II AND INSTALLING ON TRAILER.

4-34. To separate R/V from Stage II and install on trailer (figure 4-6), proceed as follows:

a. Remove remaining bolts securing R/V to Stage II.

CAUTION

Insure that all bolts between R/V and Stage II have been removed.

b. Place bolts and washers in R/V mating tool kit.

c. Attach a 25-foot tag line to the torus ring handle. Attach another 25-foot tag line to opposite torus ring handle.

d. While manually guiding, hoist R/V approximately 6 inches from Stage II.

e. Insure that all cabling between R/V and Stage II has been disconnected.

f. Man all tag lines and hoist R/V to ground level.

g. Position R/V to an unobstructed area so that hand pump can be reached from ground.

h. Remove handpump from cradle clamps. Rotate R/V to a horizontal position.

CAUTION

If a replacement R/V is on the trailer, insure that the carriage is properly positioned to receive the damated R/V.

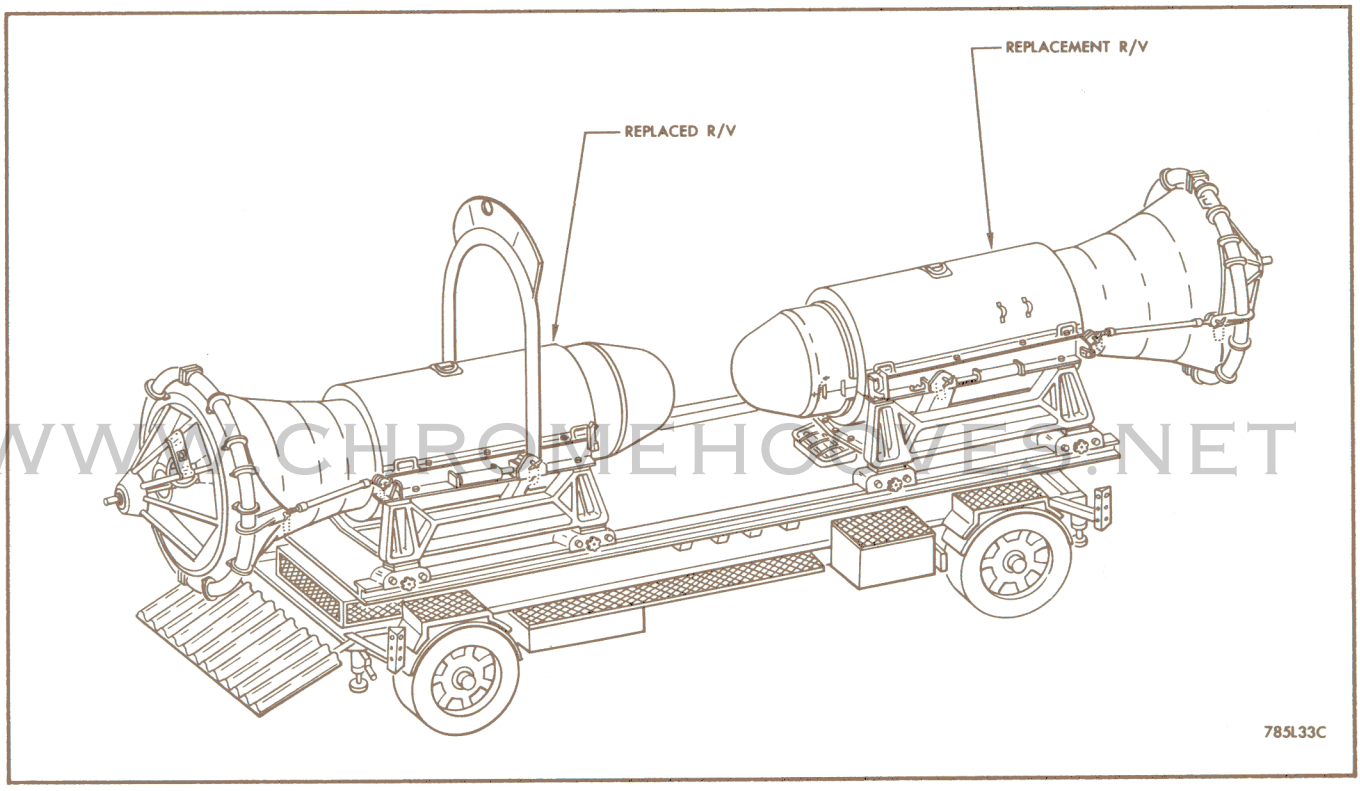

Figure 4-6. Position of Replaced and Replacement R/V on Trailer

i. Position R/V approximately 2 inches above carriage on trailer. Manually orient the cradle to carriage.

j. Release carriage brakes.

CAUTION

Be careful not to snag hydraulic lines between cradle and carriage.

k. Untape hoist control reels and lower R/V onto carriage using hoist control. Lower crane hook until hoist control piston rod is fully retracted.

l. Lock carriage brakes.

m. Secure cradle in carriage with four captive screws, one at each corner of cradle.

n. Remove tag lines from R/V cradle.

Note

If difficulty is encountered when tightening cradle bolts, retract hydraulic rams.

o. Tighten the remaining six short and two long cradle screws.

Note

If a replacement R/V is on the trailer, do not perform steps p, q, t or u.

p. Remove control hoist from hoisting adapter and crane. Stow control hoist.

q. Position and secure hoisting adapter 15-degree brackets in up position. Lower hoisting adapter to stops and secure.

Note

If it is not necessary to disconnect hoses, omit step r.

r. Disconnect handpump hoses from cradle. Install dust caps on hoses and cradle couplings.

s. Stow handpump on carriage shelf.

t. Install tarpaulin over R/V.

u. Prepare trailer for transportation from launch area. (Refer to paragraph 4-62.)

4-35. R/V INSTALLATION.

CAUTION

Prior to mechanical mating of R/V, verify that checkout of single point ground system has been accomplished in accordance with T.O. 21M-HGM25A-2-10-2.

4-36. If the R/V is a replacement, certain procedures will be performed or omitted as indicated.

Note

If an emplacement R/V is to be installed, perform paragraphs 4-5 through 4-9 and 4-12 through 4-17 before proceeding.

4-37. The following equipment is required and will be hand carried to silo level 1:

a. R/V mating tool kit.

b. One single headset.

c. Detachable spin fins and container (TCTO 11N-RV4-526).

d. Interface test set group.

e. Mating bolts and washers.

4-38. WARHEAD CIRCUITS TEST (MARK 4, MOD 3 ONLY).

4-39. Open the tarpaulin (if installed) at the rear of the R/V and perform a warhead circuits test. (Refer to paragraph 2-3.)

4-40. TRANSFERRING HOISTING ADAPTER TO REPLACEMENT R/V CRADLE.

4-41. The following procedures will be used only when a replacement R/V is to be installed on Stage II. To transfer hoisting adapter to replacement R/V cradle, proceed as follows:

a. Remove handpump from shelf of carriage containing replacement R/V.

Note

If it is not necessary to connect hoses, omit steps b and c.

b. Remove dust caps from handpump hoses and cradle couplings.

Note

Observe the color coding on the hoses and couplings to insure proper connection.

c. Connect handpump hoses to their respective cradle couplings.

d. Insure that cradle rams are in the fully extended position.

e. With the crane supporting the hoisting adapter, remove two quick-release pins securing adapter to the cradle containing replaced R/V.

CAUTION

Manually guide hoisting adapter when transferring to cradle containing replacement R/V.

f. Raise hoisting adapter clear of cradle and reinstall quick-release pins in cradle.

g. Rotate hoisting adapter 180 degrees so that adapter securing blocks face the 15-degree brackets on cradle containing replacement R/V.

h. Position hoisting adapter above cradle.

i. Remove two quick-release pins and lower hoisting adapter so that adapter pinion teeth engage those of the cradle racks.

j. Install quick-release pins to secure hoisting adapter to cradle.

4-42. REMOVING R/V FROM TRAILER.

4-43. To remove R/V from trailer (figure 4-7), proceed as follows:

Note

Check the control hoist for evidence of leaks and physical damage. Insure that control hoist is pre-charges to a minimum of 100 PSIG and piston rod is fully retracted.

If R/V is a replacement, omit steps a through g.

a. Install clevis in upper eye of control hoist.

b. Lower crane hook, attach control hoist to crane hook, and attach control reels to control hoist.

CAUTION

Use extreme care when removing tarpaulin so as not to damage ablative material of R/V.

c. Remove tarpaulin from R/V and set aside. Disconnect jumper assembly and stow on cleat of trailer bed.

d. Remove roll stop blocks from trailer rails.

e. Remove handpump from carriage shelf.

Note

If it is not necessary to connect hoses, omit steps f and g.

f. Remove dust caps from hoses and cradle couplings.

g. Connect handpump hoses to cradle couplings.

h. Detach three short screws on each side at forward end of R/V cradle and retract two long screws approximately 2 inches.

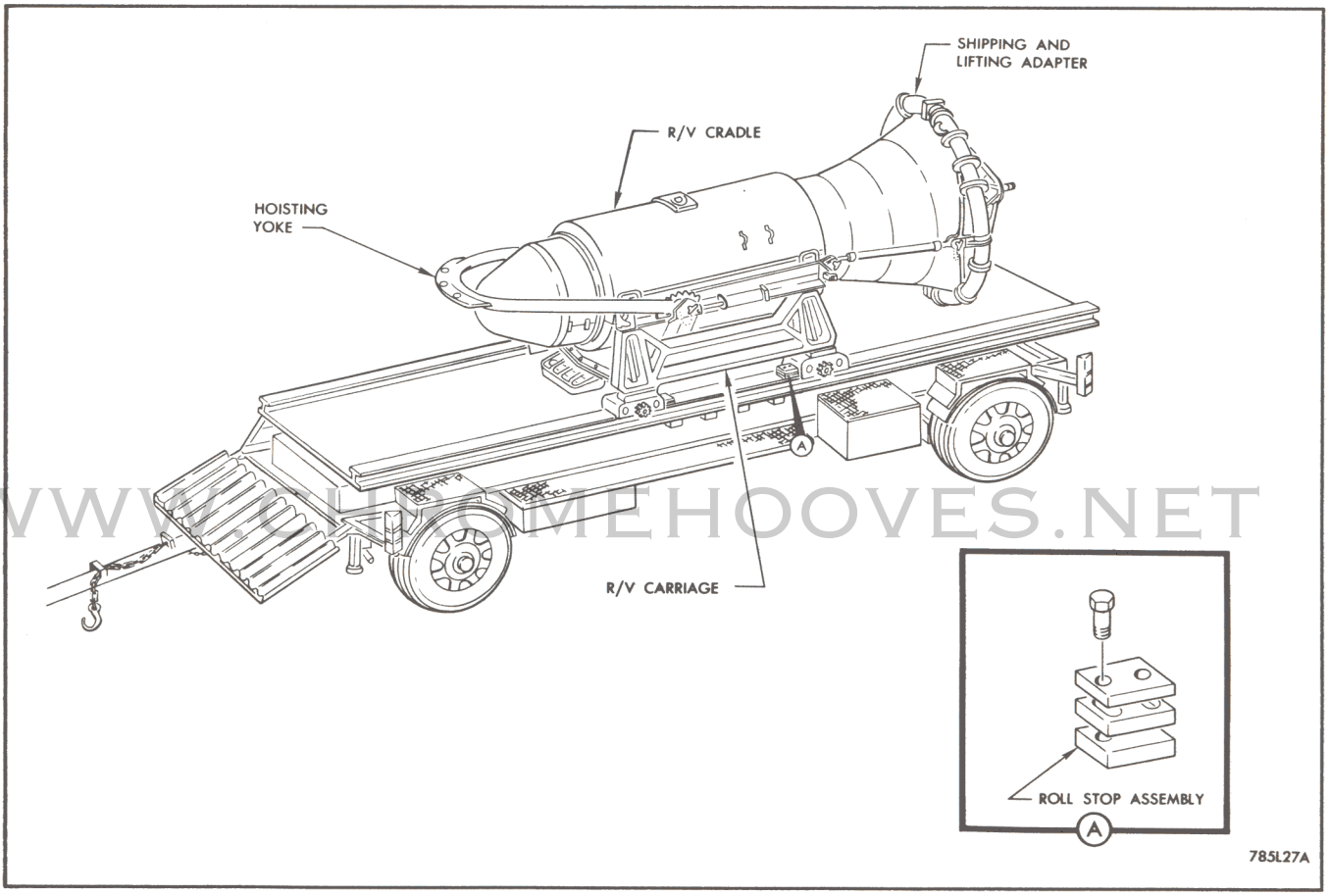

Figure 4-7. Position of R/V and Handling Equipment on R/V Trailer

Note

Omit steps i and j for replacement R/V.

i. Detach captive screws securing hoisting adapter to 15-degree brackets.

j. Using handpump, raise the hoisting adapter to a vertical position.

k. Remove bolts from the 15-degree brackets and secure brackets in down position.

1. Remove bag containing 24 mating bolts and washers from R/V adapter and hand carry to silo level 1.

m. Remove pin part number 3404171, from push switch and insure that plunger is flush against aft flare cover (Mark 4, MOD 5B only).

n. Inspect exposed surface of the R/V for any damage.

o. Inspect R/V adapter mating surface for damage or foreign material.

Note

Omit steps p and q for replacement R/V.

p. Maneuver crane boom and hoist hook as necessary to center the control hoist over the hoisting adapter.

q. Attach control hoist to hoisting adapter with clevis.

Note

While performing the following step, allow sufficient slack in control cable to rotate R/V to the vertical position.

r. Extend the control hoist control reels and secure one to each cradle shipping and lifting adapter torus ring bracket, using cloth tape, pressure sensitive tape, or other suitable securing material.

s. Detach four captive screws, one at each corner of cradle, securing cradle to carriage.

t. Check to insure pawl-loc pins are properly installed through the cradle halves.

u. Attach one 35-foot tag line to each of the two rear cradle handles. Attach one 25-foot tag line to the handle on the torus ring, and a second 25-foot tag line to the opposite handle of the torus ring.

CAUTION

A minimum boom angle of 33 degrees and a maximum boom length of 30 feet must be maintained whenever the MC-1 crane is handling the R/V. Crane hook and boom speeds must not exceed 10 feet per minute.

Guide the R/V manually until it is clear of the carriage. Do not raise the R/V higher than the hydraulic hoses permit. The tag lines must be manned after the R/V clears the carriage.

v. Release carriage brakes.

w. Using crane, carefully and slowly hoist R/V clear of trailer and carriage.

x. Lock carriage brakes.

y. Man tag lines. Swing R/V to an unobstructed area between crane and trailer and position approximately 10 feet from ground.

4-44. POSITIONING R/V ON STAGE II.

4-45. To position the R/V on Stage II (figure 4-8), proceed as follows:

a. Turn control valve on handpump and rotate R/V cradle to a vertical position.

CAUTION

Wrap the hoses clockwise around the cradle to prevent damage to the hoses.

b. Secure handpump in cradle clamps.

c. Extend control hoist piston rod approximately 2 inches.

d. Inspect Stage II interface for presence of foreign material or damage.

e. Raise and position R/V over silomouth.

Note

The two 35-foot tag lines will be manned by technicians at silomouth. The two 25-foot tag lines will be dropped to the technicians at silo level 1. Technicians at silomouth may secure tag lines to safety barriers after R/V has been set on missile interface.

f. Drop two 25-foot tag lines to technicians on work platform.

g. Lower R/V to 2 inches above Stage II. Align 0-degree mark on R/V with red target line on Stage II.

h. Align two positioning dowels on Stage II with two positioning holes of R/V adapter.

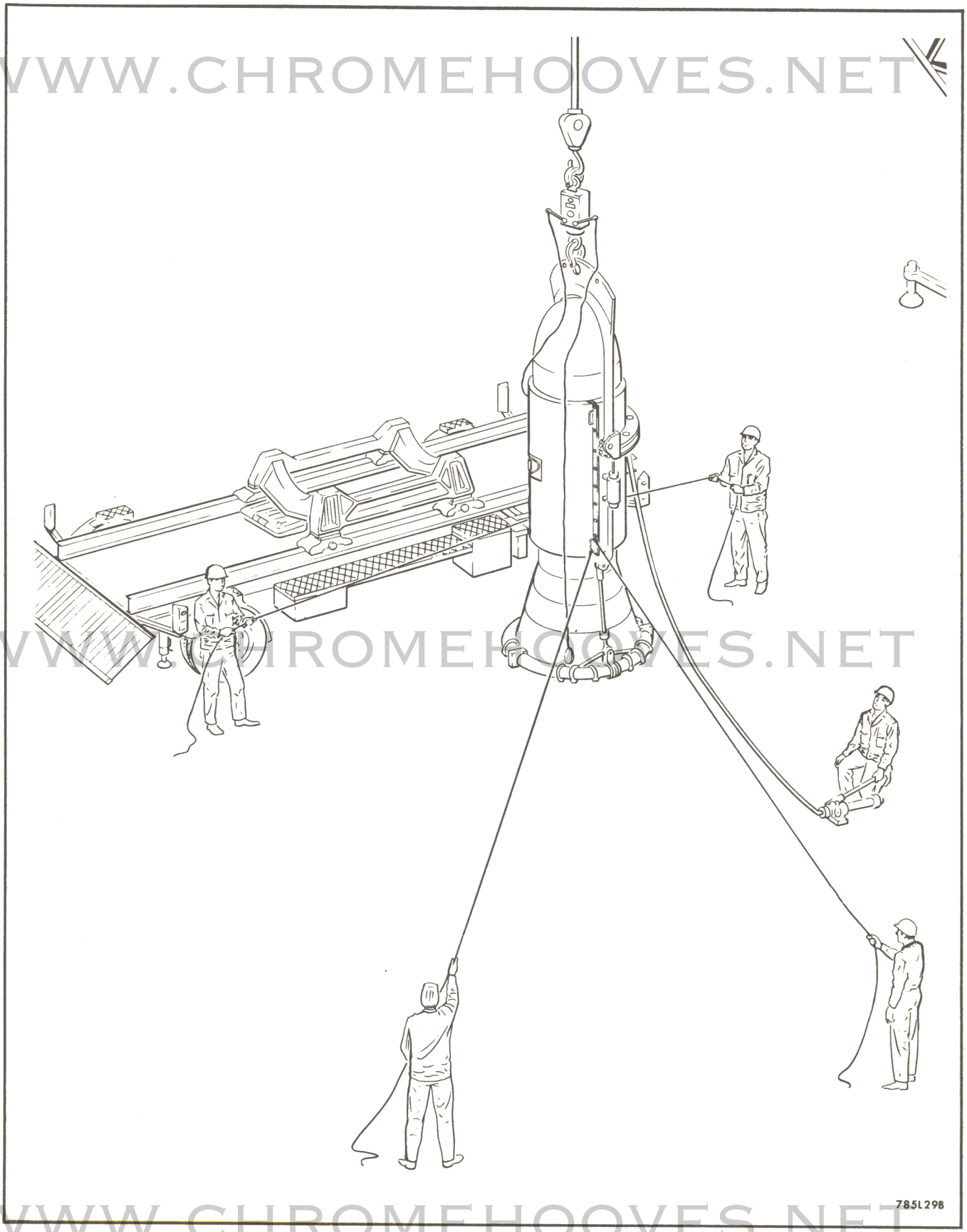

Figure 4-8. Rotating R/V to Vertical Position

i. Using hoist control, lower R/V onto Stage II.

4-46. SECURING R/V TO STAGE II.

4-47. To secure R/V to Stage II (figure 4-9), proceed as follows:

CAUTION

Washers must be installed with countersink toward bolt heads to prevent damage to equipment.

a. Install and tighten 12 bolts and washers in exposed holes of R/V adapter.

b. Detach the 25-foot tag lines from the torus ring.

c. Lower crane hook until control hoist begins to retract.

d. Detach eight captive screws that secure torus ring halves together.

Note

The control hoist may be used for minor adjustments necessary to relieve tension on the turnbuckles.

e. Loosen two setscrews of one turnbuckle. Remove turnbuckle and set aside.

f. Remove the corresponding torus ring half and set aside.

g. Loosen two setscrews of the remaining turnbuckle. Remove turnbuckle and set it aside.

h. Remove the remaining torus ring half and set it aside.

i. Detach the two lowest cradle bolts on each side of cradle.

CAUTION

Washers must be installed with countersink toward bolt heads to prevent damage to equipment.

j. Install and tighten remaining bolts and washer.

k. Torque all bolts to 180 inch-pounds.

4-48. REMOVING R/V CRADLE FROM R/V AND INSTALLING ON TRAILER.

4-49. To remove R/V cradle from R/V and install on trailer, proceed as follows:

a. Separate R/V cradle halves for removal from R/V.

b. Attach one 25-foot tag line to each rear cradle handle.

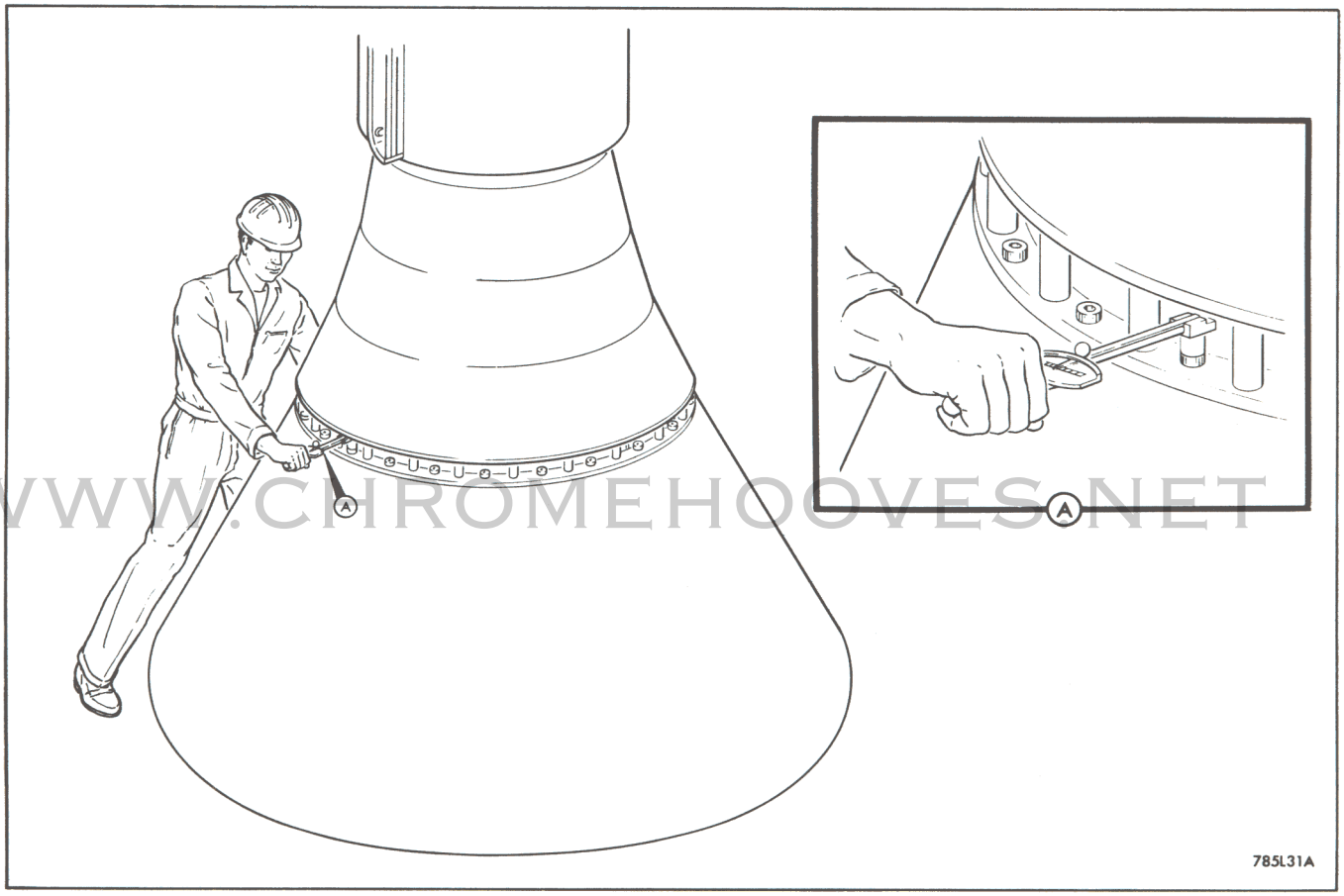

Figure 4-9. Securing R/V to Missile

Note

One 25-foot and one 35-foot tag line should now be attached to each rear cradle handle.

WARNING

Before hoisting the cradle, insure that the two quick-release pins that secure the cradle halves together are installed.

c. Man all tag lines.

Note

While removing the cradle from the R/V, rotate the cradle using the tag lines, to insure that the rubber cradle lining is free from the R/V.

d. Carefully hoist cradle clear of R/V. Raise to ground level and position cradle in an unobstructed area between crane and trailer.

e. Inspect R/V ablative material.

Note

If TCTO 11N-RV4-526 has been incorporated on the R/V, perform steps f through h.

f. Remove one detachable spin fin from container and install on R/V with three screws.

g. Torque screws to 15 inch-pounds.

h. Repeat steps f and g for remaining spin fin.

i. Lower the cradle to a convenient working position approximately 5 feet above the ground. (This distance is measured between the hoisting yoke pivot point and the ground.)

j. Remove handpump from cradle clamps and rotate cradle to a horizontal position.

k. Using the crane, position the cradle 2 inches directly above the carriage on the trailer.

CAUTION

Manually orient cradle over carriage. Insure that captive screws on cradle are aligned with tapped holes in carriage.

l. Release the carriage brakes.

m. Using the control hoist, lower cradle onto carriage and secure the four captive screws.

n. Lock carriage brakes.

o. Remove control hoist from hoisting adapter.

p. Remove clevises and control hoist and stow equipment.

4-50. SECURING R/V CRADLE ON TRAILER.

4-51. To secure R/V cradle on trailer, proceed as follows:

a. Remove tag lines from cradle.

b. Detach captive screws securing 15-degree brackets. Secure brackets in the up position.

c. Using handpump, lower hoisting adapter to the 15-degree brackets and secure.

d. Secure all captive screws on the cradle.

e. Stow handpump on shelf of carriage.

f. Position the carriage against roll stops on trailer for transport and install rollstop blocks. Tighten the roller adapter clamps.

g. Secure rear crossbeam to trailer rails.

4-52. HOISTING SHIPPING AND LIFTING ADAPTER TORUS RING AND STORING ON TRAILER.

4-53. To hoist shipping and lifting torus ring adapter from silo level 1 and store on trailer, proceed as follows:

a. Attach four-legged sling assembly to crane hook and fasten the four legs together using a 35-foot tag line.

b. Swing four-legged sling over silomouth and lower to R/V work platform.

c. Remove tag line and attach one leg of the sling to each shipping and lifting adapter torus ring handle.

CAUTION

Insure that there is a sufficient length of tag line to control the shipping and lifting adapter torus ring halves to ground level.

d. Secure the shipping and lifting adapter torus ring halves together with tag line.

e. Man tag line and hoist shipping and lifting adapter halves to ground level.

f. Remove four-legged sling from shipping and lifting adapter torus ring halves and crane.

g. Secure the torus ring halves together with seven captive screws. One screw will be used to secure torus ring to trailer crossbeam.

h. Remove the two quick-release pins from the clevises on the torus ring.

i. Manually position torus ring at rear of cradle and secure with two quick-release pins. Secure torus ring to trailer crossbeam with remaining screw of torus ring.

Note

If a recycled R/V is on the trailer, perform steps j and k to prepare it for transport.

j. Position the replaced R/V on the trailer, tighten the roller adapter clamps, and install the roll stop blocks.

k. Secure the jumper assembly between the R/V and trailer.

l. Prepare trailer for transportation from launch area. (Refer to paragraph 4-62.)

Note

The using organization has the option of removing the R/V maintenance platform through the silomouth or the silo tunnel.

4-54. REMOVAL OF R/V MAINTENANCE PLATFORM (SILOMOUTH).

4-55. To hoist R/V maintenance platform from silo level 1 through silomouth, proceed as follows:

Note

Missile access door must be reinstalled after maintenance platform has been removed.

a. Attach four-legged sling to crane hook.

b. Attach two 35-foot tag lines to four-legged sling and lower sling to R/V work platform.

c. Remove tag lines from four-legged sling.

d. Attach four-legged sling to R/V maintenance platform lifting lugs.

e. Attach a 35-foot tag line to each of two opposite corners of the maintenance platform.

f. Remove cloth skirt from around missile. Fold and set to one side on R/V maintenance platform.

CAUTION

The two short guard rails must be repositioned to prevent the two main sections from folding and damaging the R/V when the platform is raised.

g. Remove the two short guard rails.

Note

The guard rail in quadrant A will be installed after platform is raised.

h. Install one guard rail to the lower legs on quadrant C side of the silo.

CAUTION

Extreme care must be taken during platform removal to prevent damage to the R/V or missile.

i. Raise maintenance platform approximately 4 feet. Install remaining guard rail to lower legs.

j. Man all tag lines.

k. Raise R/V maintenance platform to ground level.

l. Lower maintenance platform to an unobstructed area.

m. Disconnect four-legged sling from crane hook and maintenance platform. Stow four-legged sling.

n. Remove two tag lines from maintenance platform and stow on truck.

4-56. REMOVAL OF R/V MAINTENANCE PLATFORM (SILO TUNNEL).

4-57. To remove R/V maintenance platform through silo tunnel, proceed as follows:

CAUTION

Use extreme care when working near the R/V or Stage II. Do not strike, scratch or otherwise damage finished surfaces.

Note

Locking hooks are released by depressing spring-loaded release pins. Upon completing checkout of installed R/V and removal of maintenance platform, re-install missile access door.

a. Remove cloth skirt from around missile.

b. Release locking hooks of four guard rail braces and remove guard rail braces.

c. With two mechanics located on same side of Stage II near ladder frame of each V-X span assembly, lift and remove plate platform from V-X span assemblies.

d. Repeat step c on opposite side of Stage II for removal of other plate platform from V-X span assemblies.

e. Release four caster brake levers on ladder frames of each V-X span assembly.

f. Position V-X span assemblies to permit disassembly.

g. Engage four caster brake levers on ladder frames of the V-X span assembly to be disassembled.

h. Release two locking hooks of platform support braces attached to ladder rungs nearest hinged section of ladder platform.

i. With two mechanics located near each ladder frame, lift and remove ladder platform from ladder rungs.

CAUTION

Hinged section of ladder platform will cause ladder platform to fold when freed from ladder frames. Be careful to prevent free fall of ladder platform.

j. Release two caster brake levers on one of the ladder frames.

k. Grasp two V brace releases at interlocked section of X brace and disengage V brace interlocks.

l. Position platform support braces vertically and fold V-X span assembly. Secure assembly locking hook.

m. Release two caster brake levers on other ladder frame.

n. Repeat steps h through m for disassembly of other V-X span assembly.

o. Transport R/V maintenance platform to personnel elevator.

p. Load R/V maintenance platform in personnel elevator and lower to missile silo tunnel entrance.

q. Unload R/V maintenance platform from personnel elevator and transport to ready maintenance room.

4-58. DISASSEMBLY OF R/V MAINTENANCE PLATFORM (GROUND LEVEL).

4-59. For disassembly of R/V maintenance platform at ground level, proceed as follows:

a. Engage four caster brake levers on ladder frames of each V-X span assembly.

b. Remove two short guard rail braces between lower portion of V-X span assemblies.

c. Remove two long guard rail braces from V-X span assemblies.

d. Remove locking clips from four guard rail supports.

e. Remove four guard rail supports.

f. Release locking hooks and remove two plate platforms.

g. Release locking hooks and remove platform support braces from second rung of each ladder of one V-X span assembly.

h. Release locking hooks and remove ladder platform from fifth rung of ladder.

i. Release two caster brake levers on one ladder frame.

j. Unlock and collapse interlocking center section and fold ladder frames together.

k. Lock storage hook.

l. Release two caster brake levers on remaining ladder frame.

m. Repeat steps g thru l for remaining V-X span assembly.

4-60. PREPARING R/V MAINTENANCE PLATFORM FOR TRANSPORTATION.

4-61. To prepare R/V maintenance platform for transportation, proceed as follows:

a. Place disassembled sections of R/V maintenance platform onto bed of cargo truck.

CAUTION

Use extreme care in securing the disassembled sections to prevent movement and subsequent damage during transportation.

b. Secure disassembled sections.

4-62. PREPARING R/V TRAILER FOR TRANSPORTATION.

4-63. To prepare R/V trailer for transportation, proceed as follows:

CAUTION

If R/V is on the trailer, use caution when installing the tarpaulin to prevent scratching the R/V ablative surface.

a. Install the tarpaulin over the trailer and secure.

b. Using jack handles, retract the trailer jacks. Remove jack quick-release pins, raise the jacks, and stow jack handles on pins. Secure jacks with the quick-release pins.

CAUTION

Insure that the drain cock is closed. The braking system is inoperative with the drain cock open.

Note

After the jacks are raised, the static ground must make contact with the road surface.

c. Close drain cock.

d. Install gravel deflector and secure with four quick-release pins.

e. Connect tow bar, insert pintle hook safety pin, and connect safety chain to cargo truck.

f. Disconnect pneumatic lines from each other.

CAUTION

The pneumatic lines must be properly connected before towing trailer.

g. Make pneumatic connections from trailer to cargo truck, connecting emergency line first.

h. Check that brakes function properly.

i. Make electrical connections from trailer to cargo truck and check that all lights work properly.

j. Release trailer manual brake lever.

k. Install explosive signs on the trailer (if applicable).

4-64. REMOVAL AND REPLACEMENT OF TYPICAL R/V AGE ASSEMBLY.

4-65. To remove and replace a typical R/V AGE assembly (figure 4-10), proceed as follows:

CAUTION

Use extreme care during this procedure to prevent damage to connector pins on assembly.

a. Press latch-release buttons (1) under both handles (2) and pull lower ends of handles outward.

b. Pull R/V AGE assembly (3) along tracks (4) until track latches (5) engage holes in tracks.

c. Lift assembly from tracks and set assembly aside.

d. Install replacement R/V AGE assembly on tracks, aligning locator holes (6) with locator pins (7).

e. Press track latches on both tracks and push assembly into rack.

f. Push handles down until lower ends engage latch release mechanism.

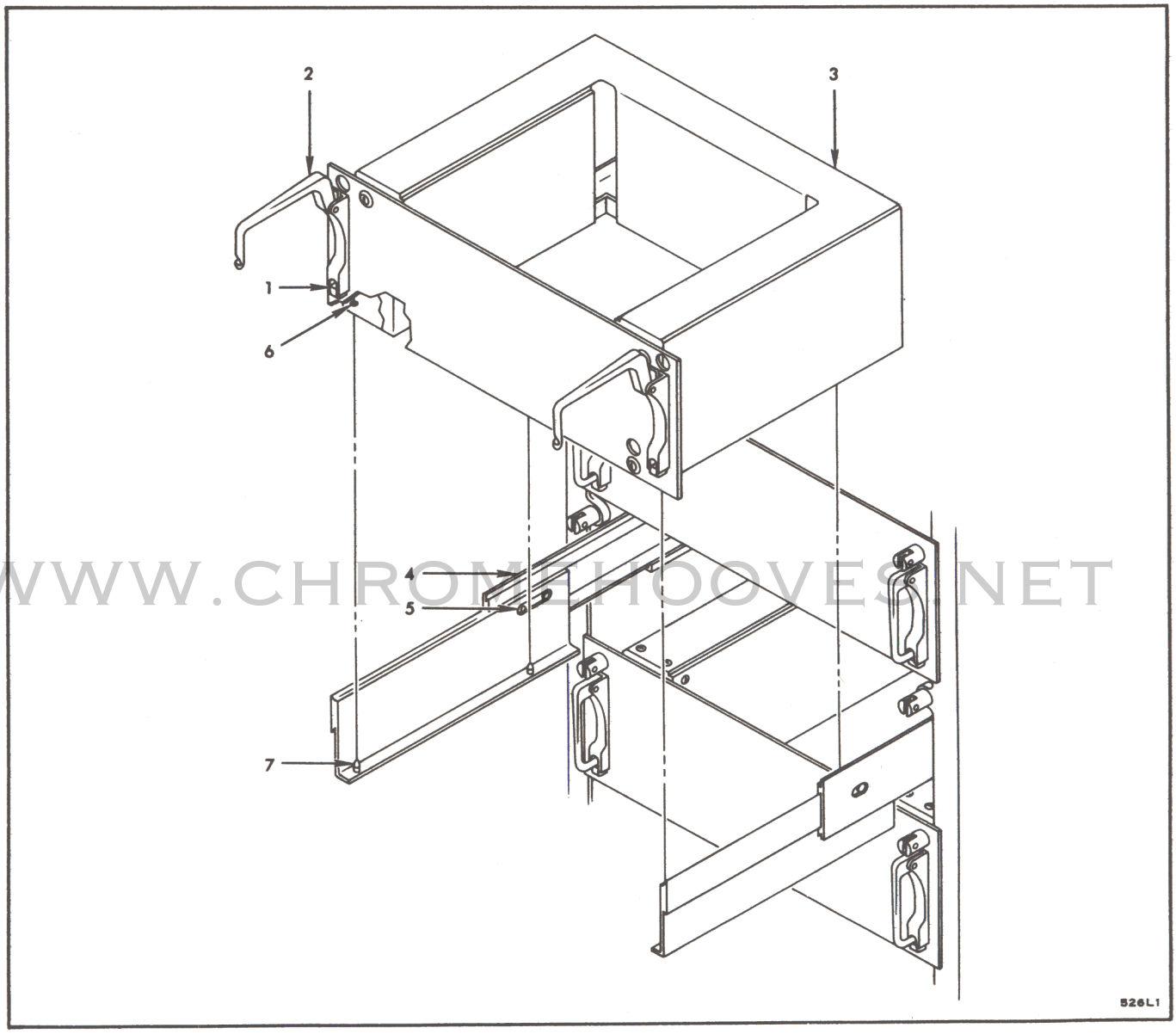

Figure 4-10. Typical R/V AGE Assembly Removal and Installation

4-66. REMOVAL AND REPLACEMENT OF TYPICAL INDICATOR LAMP.

4-67. To remove and replace a typical indicator lamp (figure 4-11), proceed as follows:

a. Insert arms of removal tool, P/N60D2, into access holes on both sides of lamp cover.

b. Squeeze removal tool lightly and withdraw cover from case. Set cover aside.

c. Reinsert removal tool arms into case until lips of tool snap over rear edge of lamp assembly.

d. Withdraw lamp assembly from case and remove defective lamp from assembly.

e. Insert replacement lamp onto lamp assembly.

f. Insert lamp assembly into case, aligning key with keyway inside case.

CAUTION

Do not force cover into place. If cover cannot be inserted all the way, remove cover and rotate 180 degrees.

g. Insert cover in case with access holds on the sides.

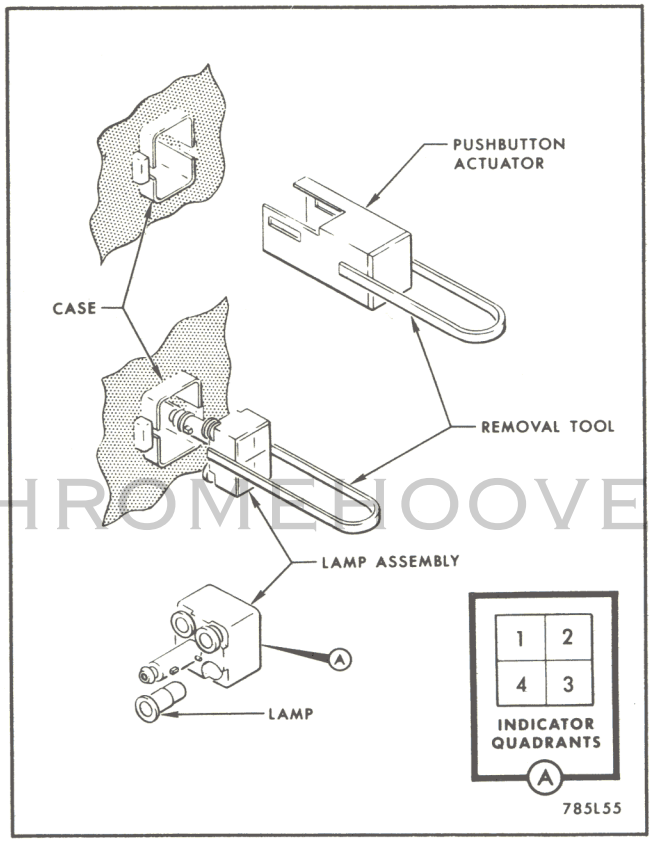

Figure 4-11. Typical Indicator Lamp Removal and Installation