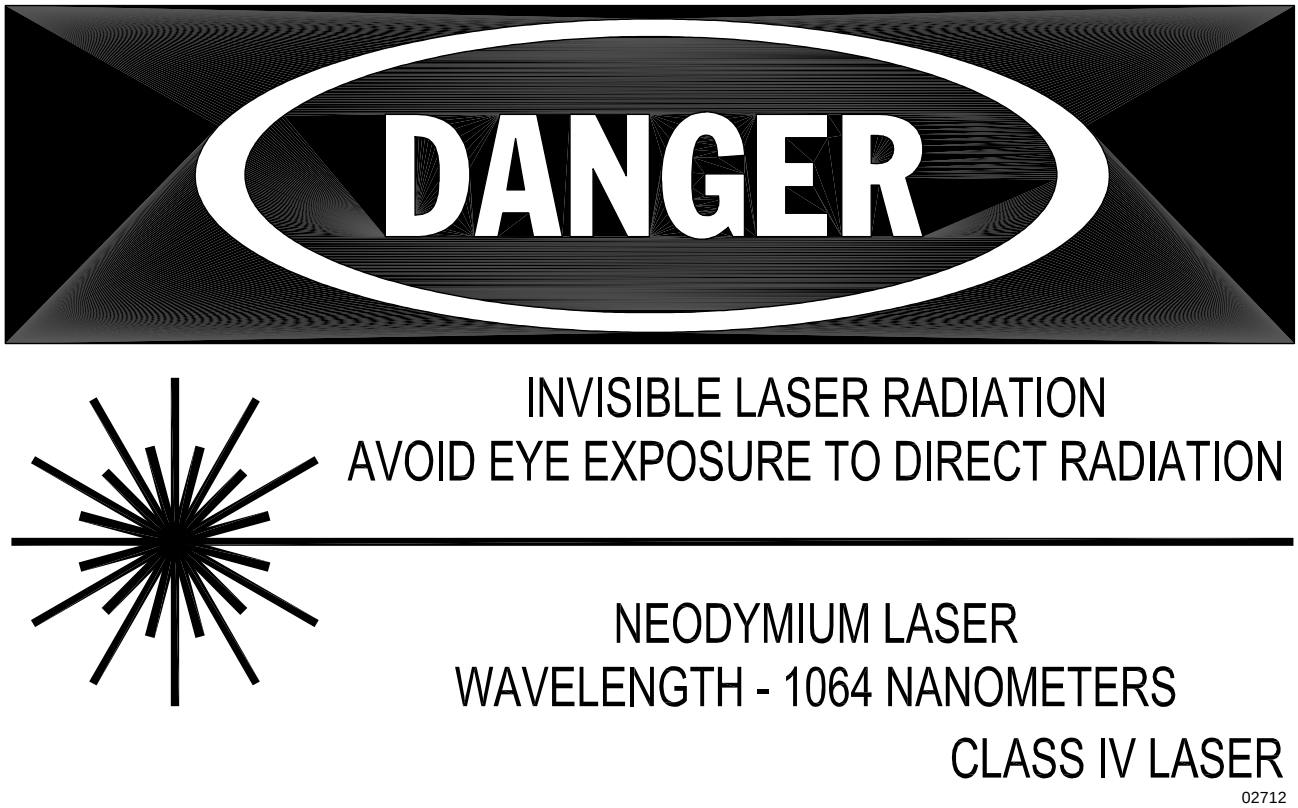
TECHNICAL MANUAL

AVIATION INTERMEDIATE MAINTENANCE MANUAL
UNITS UNDER TEST
FOR
TARGET ACQUISITION DESIGNATION SIGHT (TADS) ASSEMBLY
NIGHT SENSOR ASSEMBLY
DAY SENSOR SUBASSEMBLY
CONTROL PANEL ASSEMBLY
INDIRECT VIEW DISPLAY ELECTRONICS ASSEMBLY
SOLID STATE CAMERA ASSEMBLY-TADS FLIR, DAY TV
TELEVISION SENSOR ASSEMBLY
VISUAL MULTIPLEXER ASSEMBLY
AND
PILOT NIGHT VISION SENSOR (PNVS) ASSEMBLY
NIGHT SENSOR ASSEMBLY
SOLID STATE CAMERA ASSEMBLY-PNVS
VISUAL RELAY/MULTIPLEXER ASSEMBLY

*This manual supersedes TM 9-6625-476-30 dated 1 December 1987; including all changes.

AH-64A ATTACK HELICOPTER

HEADQUARTERS, DEPARTMENT OF THE ARMY
21 AUGUST 2001



Active lasers are used in certain tests. Observe safety precautions. Ensure that laser protection cover is closed. Never look at or along the axis of a laser beam.

Procedures in this manual do not require any firing of the laser into open space. Testing is accomplished in a protective enclosure which prevents exposure to the potentially dangerous laser radiation.

Your supervisor will have laser safety goggles available if any problem presents a possible exposure to the laser radiation. A standard laser safety goggle, NSN 4240-00-258-2054, will provide adequate protection if required. Other laser safety goggles can be used, but should be specific for and labeled with the 1064 nanometer wavelength, and with a neutral density of ND6 or greater.

If you routinely work with rangefinder/designator lasers, you will be included in an occupational vision program in accordance with AR 40-46 and TB MED 524.

WARNING

HIGH VOLTAGE

is used in the operation of this equipment

DEATH ON CONTACT

May result if personnel fail to observe safety precautions. Learn the areas containing high voltage in each piece of equipment. Be careful not to contact high-voltage connections when installing or operating this equipment. Before working inside the equipment, turn power off and ground points of high potential before touching them.
For artificial respiration, refer to FM 21-11.

WARNING

HAZARDOUS SOLVENTS

When you use solvents, be sure that the place you work in is well-ventilated. WEAR GLOVES AND EYE PROTECTION. If you don't have good ventilation, read TB MED 223 and use the recommended respiratory (breathing) protection.

DON'T USE FLAMMABLE SOLVENTS AROUND HEAT, OPEN FLAME, OR SPARKS.

IF YOU GET SOLVENT IN YOUR EYES OR ON YOUR SKIN, FLUSH THE SOLVENT AWAY WITH WATER FOR 15 MINUTES; THEN GET MEDICAL HELP.

Freon reacts with highly active free metals such as sodium, barium, or potassium, and may produce toxic byproducts, fires, or explosions. Do not use Freon near highly active free metals.

WARNING

TOXIC AND FLAMMABLE CHEMICALS

Use the same care for toxic and flammable chemicals as you would for hazardous solvents.

WARNING

CHEMICAL, BIOLOGICAL, AND RADIOLOGICAL CONTAMINATION

Notify you supervisor if you think you have been exposed to chemical, biological, or radiological contamination. TM 9-1300-275/2 gives procedures for decontamination.

WARNING

PNEUMATIC SYSTEMS

PNEUMATIC PRESSURE SHOULD BE TURNED OFF AND SYSTEM BLED DOWN TO PREVENT INJURY TO PERSONNEL AND/OR DAMAGE TO EQUIPMENT.

WARNING

HEAVY OBJECTS

HEAVY OBJECTS LIFTED OR CARRIED MAY REQUIRE MORE THAN ONE PERSON TO PREVENT INJURY TO PERSONNEL AND/OR DAMAGE TO EQUIPMENT.

LIST OF EFFECTIVE PAGES

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NOTE: The portion of the text affected by the changes is indicated by a vertical line in the outer margins of the page. Changes to illustrations are indicated by miniature pointing hands. Changes to wiring diagrams are indicated by shaded areas.

Dates of issue for original and change pages are:

Original 0. . . . .21 August 2001

TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 425, CONSISTING OF THE FOLLOWING:

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TECHNICAL MANUAL

No. 1-6625-476-30

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 21 AUGUST 2001

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AH-64A ATTACK HELICOPTER

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any errors or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms) or DA Form 2028-2 located in the back of this manual directly to: Commander, U.S. Army Aviation and Missile Command, ATTN: AMSAM-MMC-MA-NP, Redstone Arsenal, AL 35898-5000. A reply will be furnished to you. You may also send in your comments electronically to our e-mail address: 2028@redstone.army.mil or FAX us at (256) 842-6546/DSN 788-6546. Instructions for sending an electronic 2028 may be found at the end of this TM immediately preceding the hard copy 2028.

*This manual supersedes TM 9-6625-476-30, dated 1 December 1987, including all changes.

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LIST OF TABLES

HOW TO USE THIS MANUAL

If you cannot find the information you are looking for, you cannot properly do your job. Take a few minutes to look through this manual. You will find it easier to use once you have become familiar with it.

Each chapter and section is set up to lead you through it step by step. For example:

1. On the chapter page, you will see a listing of the sections in that chapter. Listed under the section titles is a listing of the tasks for that section. Find the task (by title) that you have been assigned. Now, look across from the task title and you will find the paragraph and page number for the task. Notice that the chapter number forms part of the page number.

2. Now that you have located the page number, turn to that page and review the task requirements before starting the procedures.

3. Did you notice that each task or job begins with an initial setup?

    a. INITIAL SETUP lists the configuration, test equipment, tools and special tools, materials/parts, military occupational specialty (MOS), references, safety instructions, condition equipment should be in, and general instructions for you to complete the task. FOLLOWUP lists the procedures to be performed after you have completed the basic task.

    b. Now, what exactly does INITIAL SETUP mean to you? The term “INITIAL SETUP” means, “DO THIS FIRST BEFORE STARTING THE TASK.” Review one of the initial setup tables and become familiar with the requirements.

4. An explanation of the initial setup headings is presented below.

    a. Tools and Special Tools. Special tools needed to perform the task. Be sure to acquire all the tools before you start the task.

    b. Materials/Parts. Materials and parts needed to perform the task. Materials can be found in Appendix C. Next to the name of the material listed in the initial setup you will find an item number. This number matches the item number in column (1) of Appendix C. Be sure to acquire all the materials and parts before you start the task.

    c. Personnel Required. MOS required to do the task. This will also tell you the number of persons needed to perform the task.

5. You can also use the table of contents on page i of this manual to locate page number for chapters, sections, and the appendixes.

6. Let’s see if you understand how to find a specific task. Suppose your supervisor wants you to replace a part or assembly.

Here’s how you would find it:

    a. Obtain the correct TM for the task and look up the procedure in the chapter covering the type of task you are to perform.

    b. For example: Replacement is a maintenance task you can find located in the maintenance chapter.

HOW TO USE THIS MANUAL (cont)

c. Looking at the section titles listed in the maintenance chapter index, you should have located the page number for the maintenance procedures. Going to that page you found the section index and located the paragraph and page number of the replacement task.

7. Another approach would be to look in the alphabetical index in the rear of the manual.

CHAPTER 1

INTRODUCTION

1-1. SCOPE.

a. Type of Manual. This manual provides aviation intermediate maintenance (AVIM) supplemental testing instructions for certain units under test (UUT) (figure 1-1) that are a part of the Target Acquisition Designation Sight (TADS) Assembly AN/ASQ-170 and the Pilot Night Vision Sensor (PNVS) Assembly AN/AAQ-11 equipment.

b. Equipment Names. The following items of equipment are covered (refer to appendix B for UUT and test program software part numbers):

Equipment	End Item
Night Sensor Assembly	TADS
Night Sensor Assembly	PNVS
Day Sensor Subassembly	TADS
Control Panel Assembly	TADS
Indirect View Display Electronics Assembly	TADS
Camera Assembly, Solid State - Day TV	TADS
Television Sensor Assembly	TADS
Camera Assembly, Solid State - TADS FLIR	TADS
Visual Multiplexer Assembly	TADS
Camera Assembly, Solid State - PNVS	PNVS
Visual Relay/Multiplexer Assembly	PNVS

1-2. MAINTENANCE FORMS, RECORDS, AND REPORTS.

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-751, The Army Maintenance Management System (TAMMS).

1-2. MAINTENANCE FORMS, RECORDS, AND REPORTS. (CONT)

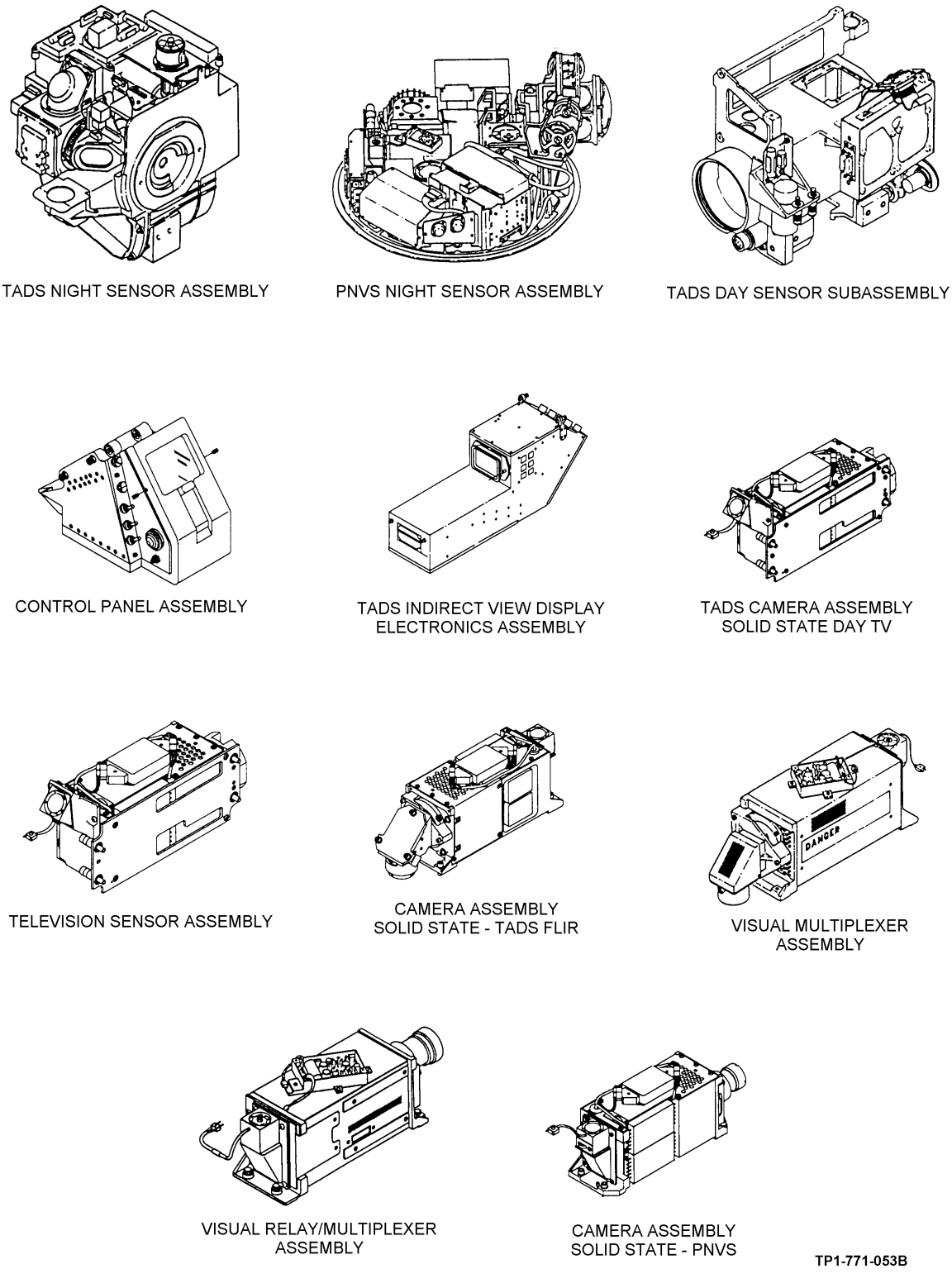


Figure 1-1. Units Under Test

1-3. OFFICIAL NOMENCLATURE, NAMES, AND DESIGNATIONS.

Table 1-1 contains a listing of nomenclature cross-references used in this manual.

1-4. REFERENCES.

Refer to appendix A for a listing of all technical data referenced or used in conjunction with this manual.

1-5. EFFECTIVITY.

This manual replaces all test program instruction documents that were previously used during UUT testing of the seven covered test program sets.

Table 1-1. Official Nomenclature, Names, and Designations

Common Name	Official Nomenclature
EETF	Electronic Equipment Test Facility
E/O Bench Set	Test Dayside Test Bench 2A1
	Test Console Test Bench 2A2
	Nightside Test Bench 2A3
NSA	Night Sensor Assembly
PNVS	Pilot Night Vision Sensor Assembly
TADS	Target Acquisition Designation Sight Assembly

CHAPTER 2

TADS NIGHT SENSOR ASSEMBLY

Section I. PREPARATION FOR TEST

2-1. TEST PREPARATION.

No special procedures are required to prepare the TADS Night Sensor Assembly (NSA) for test. Refer to the UUT/TPS/interface device matrix tables in appendix B to determine the correct UUT test program part number for the TADS NSA. Then refer to the UUT test program for a list of cables, test equipment, and test accessories required to test the TADS NSA.

2-2. UUT DESCRIPTION.

The TADS NSA (figure 2-1) is a forward looking infrared (FLIR) target imaging and designating assembly that converts IR image scenes into video to be used for target designating and tracking. It contains no operating controls or indicators. All components of the TADS NSA that are referenced during the UUT test are shown in the illustrations in Section IV.

2-3. PRECAUTIONS.

The TADS NSA is an electro-mechanical device containing delicate electro-optical components. Use extreme care when handling the TADS NSA to prevent damage to these components. Observe the following general guidelines when lifting or moving it.

a. Weight. The TADS NSA weighs 55 pounds. Always get help when lifting or moving it.

b. Optics. Do not touch optics assemblies with your bare hands. Do not use the optics assemblies for any purpose when lifting the TADS NSA. If you accidentally place any pressure or force on the optics assemblies, you could contaminate or damage them, or cause misalinement. Whenever possible, mount the TADS NSA onto its handling fixture when movement is necessary.

2-3. PRECAUTIONS. (CONT)

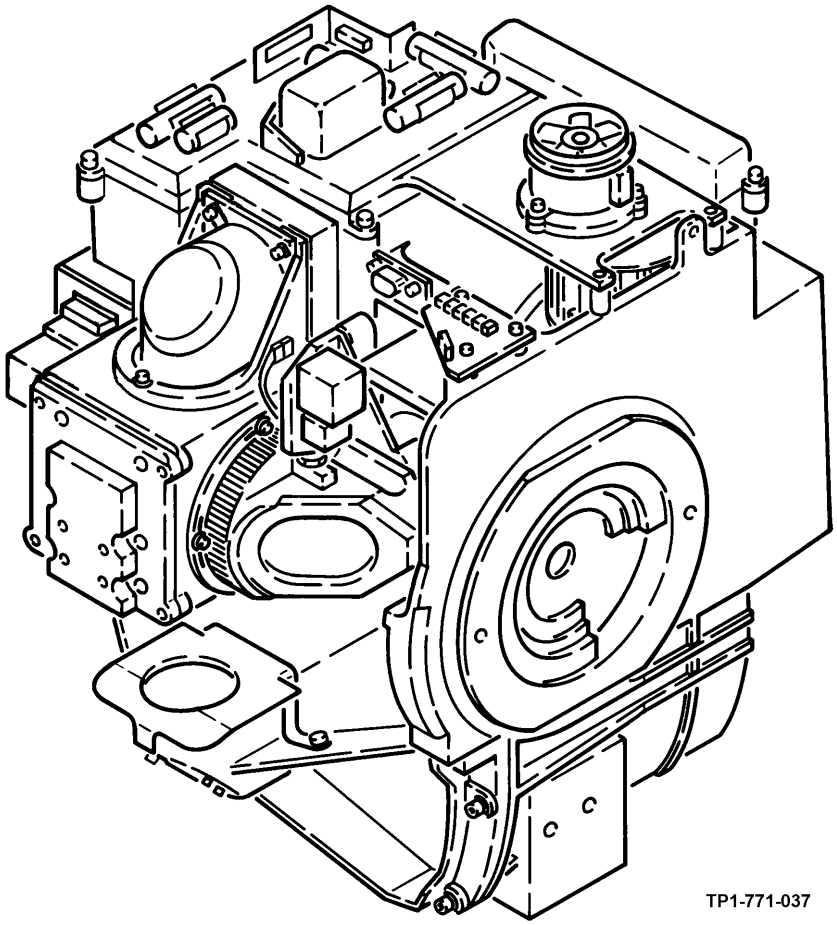


Figure 2-1. TADS Night Sensor Assembly

Section II. DESCRIPTION OF TEST

2-4. GENERAL.

This section describes the UUT test for the TADS NSA. It includes an explanation of the way testing is accomplished and a description of the test.

2-5. TEST CONCEPT.

The UUT test for the TADS NSA is supplemented by procedures in Section III of this chapter, and by illustrations in Section IV. While you are performing the UUT test, message prompts on the VDT will direct you to perform one of the procedures in Section III, or to locate a part of the TADS NSA in Section IV.

a. Procedures. Section III contains procedures to install and remove the TADS NSA and associated adapters from the nightside test bench, to perform boresight displacement measurement, and to operate the EETF pneumatic system. These procedures do not apply to the UUT test until called for by the test program. At the appropriate time during the test, a message prompt on the VDT will direct you to perform the procedures in one or more paragraphs in this section. At that time, turn to the referenced paragraph and perform those procedures, as the program cannot continue until they have been performed.

b. Illustrations. Section IV contains illustrations showing different views of the TADS NSA and calling out components that require some operator action. In addition, the illustrations have warning notes that call your attention to high voltage, moving fans, and high temperature areas on the TADS NSA. At the appropriate time during the test, a message prompt will refer to an illustration in Section IV. Turn to the referenced illustration for assistance while performing the following instructions on the VDT.

2-6. TEST DESCRIPTION.

When the UUT test program has run the selected self-tests and is ready to test the TADS NSA, the following menu will be displayed on the VDT:

SELECT TESTING OPTION FROM MENU BELOW:

AUTOMATICALLY EXECUTE ALL TESTS IN ORDER	(1)	<RETURN>
ELECTRONICS TEST	(2)	<RETURN>
OPTICS TEST	(3)	<RETURN>
BORESIGHT TEST	(4)	<RETURN>
ZOOM TEST	(5)	<RETURN>
AUTOMATIC CONTROL MODULE (ACM) TEST	(6)	<RETURN>
MODULATION TRANSFER FUNCTION (MTF) TEST	(7)	<RETURN>
NOISE EQUIV. TEMP. DIFF.(NETD)/MIN. RES. TEMP.(MRT) TEST	(8)	<RETURN>
SYSTEM INTENSITY TRANSFER FUNCTION NFOY (SIT) TEST	(9)	<RETURN>
ELECTRO-OPTIC NOISE (EON) TEST	(10)	<RETURN>
CHANNEL BALANCE TEST	(11)	<RETURN>
DISPLAY MENU USE INSTRUCTIONS	(12)	<RETURN>
DISPLAY STATUS OF TESTS (PASSED/INCOMPLETE)	(13)	<RETURN>
TERMINATE TESTING	(14)	<RETURN>

Paragraphs a through k below explain test options 1 through 11. Options 12 through 14 are not tests, and do not require explanations.

2-6. TEST DESCRIPTION. (CONT)

a. **AUTOMATICALLY EXECUTE ALL TESTS IN ORDER.** You should normally select this option to begin testing a TADS NSA UUT. Also select it if you are not sure which specific test you want to run. At the AVIM level, the program will run tests 2 through 8. At the depot level, it will run tests 2 through 10. If other menu selections have already been successfully performed, only those that have not passed or have not been selected will be performed. If the TADS NSA passes all tests, an ALL TESTS GO prompt will appear on the VDT.

b. **ELECTRONICS TEST**. This test checks DC supply voltages and periodic waveforms as well as various command and sense voltages that are developed by the UUT. During the test you may be prompted to adjust a potentiometer if a regulated voltage is out of tolerance.

c. **OPTICS TEST**. This test checks optical field-of-view switching and athermalization functions of the UUT and examines the displayed video for narcissus. During the test you may be prompted to adjust up to six potentiometers if an out-of-tolerance condition exists. Some UUT configurations will also provide testing for optical filter selection, built-in-test operation, and various optical mode command functions.

d. **BORESIGHT TEST**. This test checks the boresight of the FUR in all three FOV, and visual multiplexer boresight in the zoom (underscan) mode. If boresight is out of tolerance, you will be directed by the program to adjust the visual collimator lens on top of the scanner assembly. During each boresight test, you will be asked if a white triangle is present on the video monitor, in order to verify that the visual multiplexer vidicon beam current has not drifted out of specification during operational use. If the triangle is not white, you will be directed to replace the visual multiplexer. A dead channel check will also be performed. External boresight used in the TADS auto boresight camera function is also checked. If an out-of-tolerance condition exists, you will be directed by the program to perform channel balance.

e. **ZOOM TEST**. This test checks the electronic magnification function of the visual multiplexer. During this test, the narrow FOV system intensity transfer (SIT) target on the video monitor will increase to twice the size, then return to its original size.

f. **AUTOMATIC CONTROL MODULE (ACM) TEST**. This test checks the ACM to ensure that the FUR can automatically adjust itself to the brightness and contrast of the target and the area around the target. No adjustments are associated with the ACM test.

g. **MODULATION TRANSFER FUNCTION (MTF) TEST**. This test checks the focus of the three FOV in the system. If an out-of-tolerance condition exists, you will be directed to adjust a potentiometer on the focus adjustment pot CCA. It is assumed that if any FOV passes, the visual multiplexer and IR imager are not defective. If all three FOVs fail, or if two FOVs fail after adjustment, you will be directed to adjust the video multiplexer focus ring. If at any time the athermalization test fails for the medium FOV, you will be directed to adjust the IR imager focus ring and to readjust potentiometers on the focus adjustment pot CCA. If, after adjustment, any MTF parameter is still out of tolerance, you will be given the opportunity to repeat any of the adjustments you believe may improve the focus of the system.

h. **NOISE EQUIV. TEMP. DIFF. (NETD)/MIN. RES. TEMP. (MRT) TEST**. This test checks the video noise value, expressed in temperature difference units, of the thermal imaging and detection circuitry used to generate a clear resolvable video output. There are no operator adjustments.

2-6. TEST DESCRIPTION. (CONT)

i. **SYSTEM INTENSITY TRANSFER FUNCTION NFOV (SITN), MFOV (SITM), AND WFOV (SITW) TESTS**.These are depot level tests. They check the FLIR ratio or output video signal to input signal video signal to input thermal signal in all three FOV with the FLIR gain adjusted to maximum and minimum. During these tests, control unit assembly 1A1 in the electronic station is programmed to 11 different temperatures to ensure that the TADS NSA can detect and follow these temperature changes. If a test is out of tolerance, the operator is directed to perform channel balance.

j. **ELECTRO-OPTIC NOISE (EON) TEST**. This is a depot level test. It checks the video output for dark shading when an even temperature noise mask is used. If the test fails, you are directed to perform channel balance. Note that you should run this test when the AVUM work request and supporting documents have identified a TADS NSA as having excessive noise or dark shading problems.

k. **CHANNEL BALANCE TEST**. This procedure is used to detect dead or noisy channels on the video monitor. Routines built into the procedure direct you to perform replacements and/or adjustments as necessary. Perform channel balance as follows:

(1) Perform the full channel balance on all 180 channels when cooler/dewar A29/A30 has been replaced.

(2) Perform a partial channel balance on affected channels when dead or noisy channels have been identified on the video monitor. Also perform a partial channel balance when preamplifier or postamplifier CCAs have been replaced or moved.

Channel balance will only pass if the first and last channels adjusted are good channels. The program will keep track of any bad channels that are encountered during adjustment, and will provide applicable replacement instructions.

2-7. PRETESTING DATA.

Awareness of the following information will help you to successfully test the TADS NSA, and may prevent unnecessary termination of the test.

a. Noise. When power is applied to the scanner assembly and cooler/dewar assembly, they make a considerable amount of noise. This is normal operation, and the program should not be terminated. Also, the scanner assembly does not start at the same time as the cooler/dewar. This increases the operating noise.

b. Lens Movement. During testing of the FOV assembly, the lens rotation is very quick and slams into the stop positions. This is normal operation and the program should not be terminated.

c. Test Program Delays. At times, the UUT test program will appear to have stopped for up to 20 minutes. This is because some portions of the program require this amount of time to execute. During these times, a prompt will appear on the VDT explaining that a program delay is in progress.

d. Cables and Meter Leads. Avoid hanging cables or meter leads in back of the TADS NSA during testing. They could get tangled in the optics assembly and damage to the TADS NSA could result.

2-8. FINAL ACCEPTANCE.

When the TADS NSA has been repaired, repeat the UUT test. If an ALL TESTS GO prompt is received at the end of the test, the TADS NSA is considered to be fully operational.

Section III. TEST PROMPTED PROCEDURES

2-9. GENERAL.

This section contains procedures to be performed in conjunction with the procedures in the UUT test program for the TADS NSA. When the UUT test program directs you to perform a procedure in this manual, locate the referenced paragraph(s) in this section and perform the actions indicated. If you are directed to enter a value into the test program, do so and then press the RETURN key on the VDT as directed in the procedure. If not, press the PROCEED key and the test program will continue.

2-10. NIGHTSIDE TEST BENCH 2A3 BORESIGHT DISPLACEMENT MEASUREMENT.

This paragraph covers the steps required to perform boresight displacement measurement on test bench 2A3.

a. Nightside Alinement Tool Assembly and Insert/Adapter Installation on Nightside Test Bench.

NOTE

Two people are required when performing this task.

(1) Install insert/adapter (1, figure 2-2) on sensor mount assembly (2) as follows:

(a) Push sensor mount handle (3) to unlock position (away from operator).

(b) Position insert/adapter against sensor mount assembly so that alinement pins on insert/adapter mounting surface mate with mounting holes on sensor mount assembly mounting surface.

(c) Lock insert/adapter in place by pulling sensor mount handle to lock position (toward operator).

(d) Make sure clamp assembly (4) is fully open.

2-10. NIGHTSIDE TEST BENCH 2A3 BORESIGHT DISPLACEMENT MEASUREMENT. (CONT)

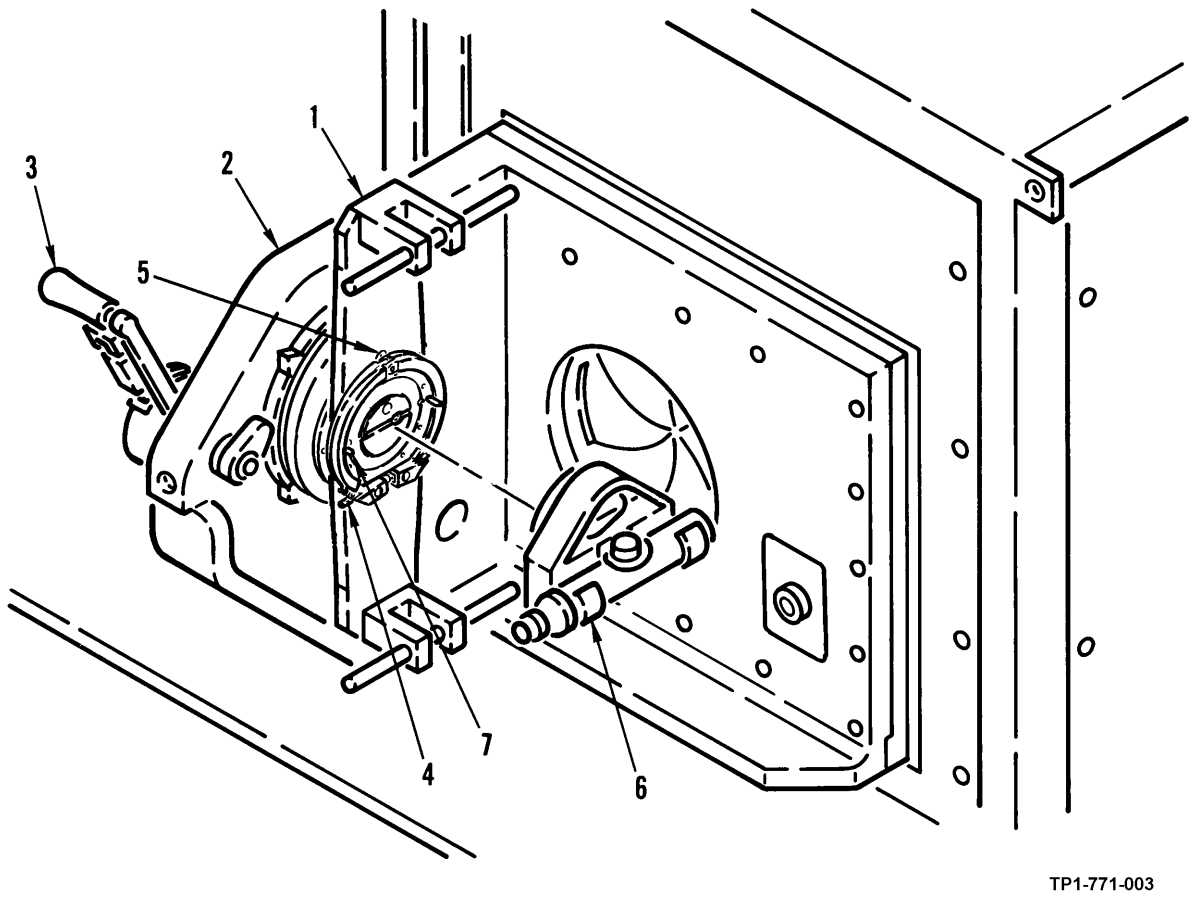


Figure 2-2. Insert/Adapter and Alinement Tool Mounted to Sensor Mount Assembly

CAUTION

EQUIPMENT DAMAGE

Ensure that clamp fitting (5) is inserted in alinement hole on insert/adapter. If it is not properly inserted, damage to clamp assembly could result when securing alinement tool to insert/adapter.

(2) Install alinement tool (6) on insert/adapter (1) as follows:

(a) Aline alinement tool with insert/adapter guide pins (7).

2-10. NIGHTSIDE TEST BENCH 2A3 BORESIGHT DISPLACEMENT MEASUREMENT. (CONT)

CAUTION

EQUIPMENT DAMAGE

When mounting alinement tool, apply equal force to both sides above guide pins. Do not allow it to tilt to one side, or binding and possible damage to guide pins will result.

(a) Mount alinement tool on insert/adapter. Ensure that both mating surfaces are in full contact with each other.

(b) Set torque wrench to 100 in-lb and use torque wrench to tighten clamp assembly. Ensure that alinement tool is secured to insert/adapter by checking for no free movement between them.

b. Boresight Displacement Measurement.

NOTE

If telescope focus cannot be obtained, have nightside alinement tool assembly calibrated by appropriate personnel.

(1) Looking through telescope eyepiece (1, figure 2-3), adjust eyepiece clockwise and counterclockwise until reticle (2) and target (3) are in focus.

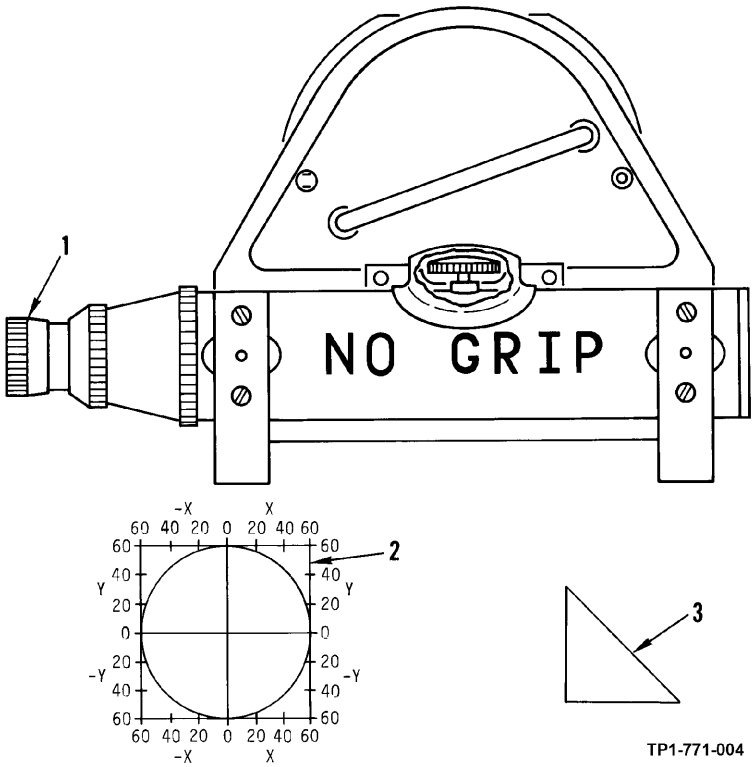


Figure 2-3. Telescope, Reticle, and Target

2-10. NIGHTSIDE TEST BENCH 2A3 BORESIGHT DISPLACEMENT MEASUREMENT. (CONT)

(2) Looking through eyepiece, determine the amount of boresight displacement by comparing target position (1, figure 2-4) to the numbers on the X and Y scales around reticle (2).

NOTE

- A sample target position is shown in figure 2-4.
- Amount of X displacement is equal to point where target passes through X (horizontal) plane of reticle. Amount of Y displacement is equal to point where target passes through Y (vertical) plane of reticle.
- Sample target position is equal to an X displacement of 22 and a Y displacement of 10.

(3) On VDT, type in value of X displacement.

(4) Press RETURN key.

(5) Type in value of Y displacement.

(6) Press RETURN key.

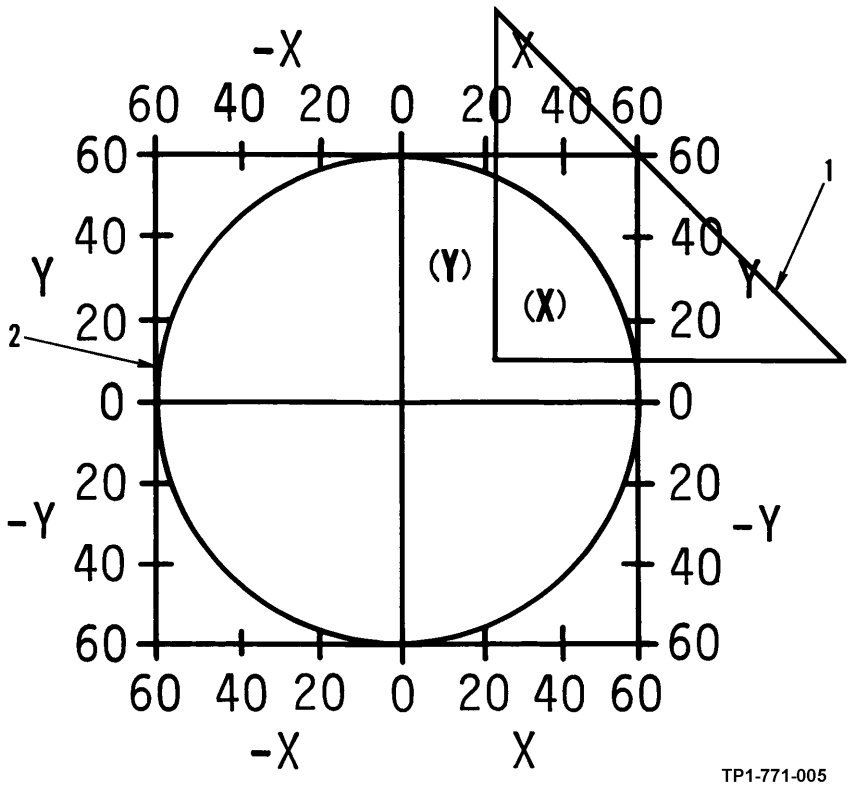


Figure 2-4. X and Y Displacement Measurement Example

2-10. NIGHTSIDE TEST BENCH 2A3 BORESIGHT DISPLACEMENT MEASUREMENT. (CONT)

c. Nightside Alinement Tool Assembly and Insert/Adapter Removal from Nightside Test Bench.

NOTE

Two people are required when performing this task.

(1) Hold alinement tool assembly in place on sensor mount assembly.

(2) Have assistant loosen and disengage clamp assembly securing alinement tool assembly to insert/adapter.

(3) Carefully remove alinement tool assembly and return it to its storage case.

(4) Hold insert/adapter in place on sensor mount assembly.

(5) Have assistant push sensor mount handle to unlock position (away from operator).

(6) Remove insert/adapter from sensor mount assembly.

2-11. TADS NSA INSTALLATION ON NIGHTSIDE TEST BENCH.

This paragraph covers the steps required to remove a TADS NSA from the storage container and install it on the nightside test bench.

NOTE

Prior to installing TADS NSA on test bench, pneumatic system must be shut down. If pneumatic system is already shut down, skip paragraph a and proceed to paragraph b.

a. Pneumatic System Shutdown.

WARNING

MOVING EQUIPMENT

While performing the following procedures, stand clear of open door. Any movement of test bench could cause injury.

(1) On nightside test bench (1, figure 2-5), rotate turnlock fasteners (2) 1/4 turn counterclockwise and open door (3).

2-11. TADS NSA INSTALLATION ON NIGHTSIDE TEST BENCH. (CONT)

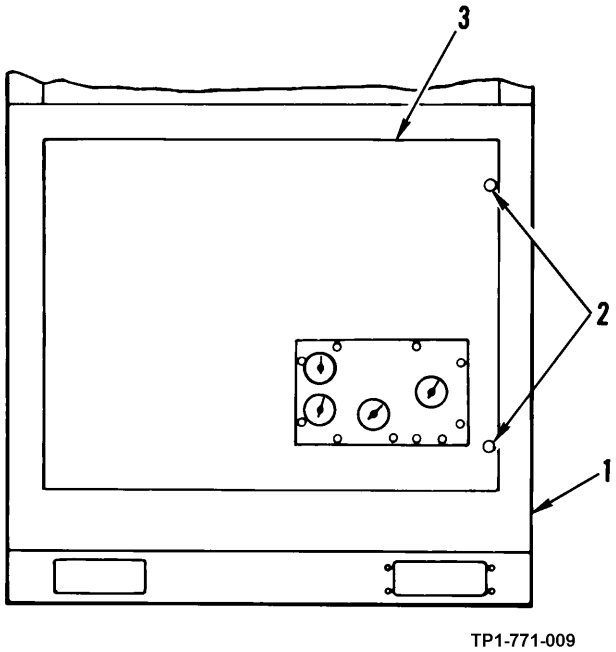


Figure 2-5. Pneumatic Control Panel

NOTE

If EETF air supply is to be shut off, refer to TM 11-6625-3085-12.

(2) On rear of pneumatic control panel (1, figure 2-6), flip toggle valve (2) up (off).

WARNING

HIGH PRESSURE AIR

When deflating pneumatic system, 125 psi air is released. Do not use finger to release air. Ensure that hands and feet are clear of base assembly to prevent injury.

CAUTION

DELICATE EQUIPMENT

When deflating pneumatic system, exercise caution not to damage bleed/ drain valve.

2-11. TADS NSA INSTALLATION ON NIGHTSIDE TEST BENCH. (CONT)

(3) Using flat side of a screwdriver tip, press and hold bleed/drain valve (3). The system should deflate.

(4) Release bleed/drain valve.

(5) On nightside test bench, close door (3, figure 2-5). Push and rotate turnlock fasteners (2) 1/4 turn clockwise.

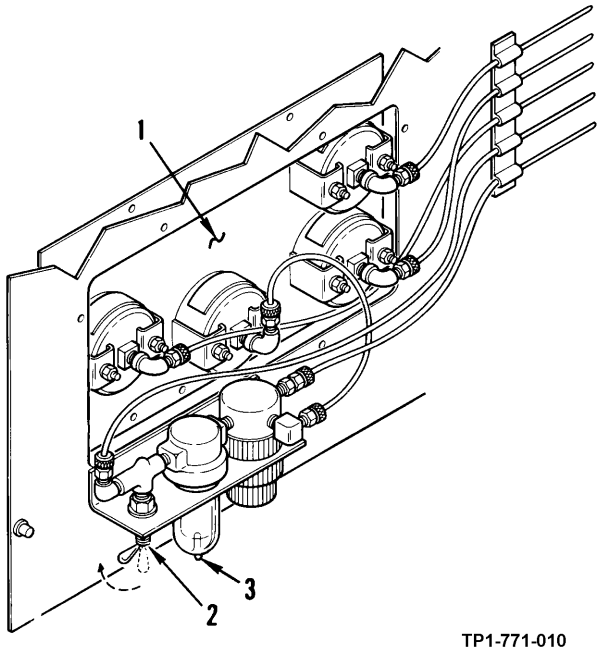


Figure 2-6. Toggle and Bleed/Drain Valve Locations

b. TADS NSA Removal from Shipping and Storage Container.

WARNING

HEAVY OBJECT

- Excessive strain can cause serious injury.
- Don't: Attempt to lift or carry heavy objects alone.
- Do: Get help for lifting or carrying heavy objects.
- If you experience a sudden pain while lifting or discomfort after lifting, get medical help at once.

2-11. TADS NSA INSTALLATION ON NIGHTSIDE TEST BENCH. (CONT)

CAUTION

EQUIPMENT DAMAGE

- Optics are exposed during this task and must be protected from contamination. Careless handling of TADS NSA could result in damaged or contaminated optics assemblies.
- Careless handling of support equipment can damage TADS NSA optics assemblies.
- Never touch optic surfaces with bare hands. Never attempt to lift or move TADS NSA using optic assemblies for support. Any force or pressure on optic assemblies could cause damage or misalinement.

NOTE

Two people are required when performing this task.

(1) Remove inner case assembly from shipping and storage container as follows:

(a) Press pressure reliefs (1, figure 2-7) on container.

(b) Release and unhook container latches (2).

(c) Remove container cover (3) and set aside on clean dry area.

(d) Remove case assembly (4) from container and place on workbench.

(2) Release and disengage latches (5) securing case assembly (top cover) (6) to base assembly (7).

(3) Grasp handles (8) and lift case clear of base assembly. Place case assembly on clean dry surface.

CAUTION

EQUIPMENT DAMAGE

The black foam in the shipping container may dry rot over time creating a dust/powder/grit residue. A potential exists for abrasive damage to optics and mechanical assemblies and degradation of optical performance. Inspect and clean assemblies as required.

(4) Inspect and remove any dust, black powder, or grit from the outside of the inner case cover before opening case cover.

2-11. TADS NSA INSTALLATION ON NIGHTSIDE TEST BENCH. (CONT)

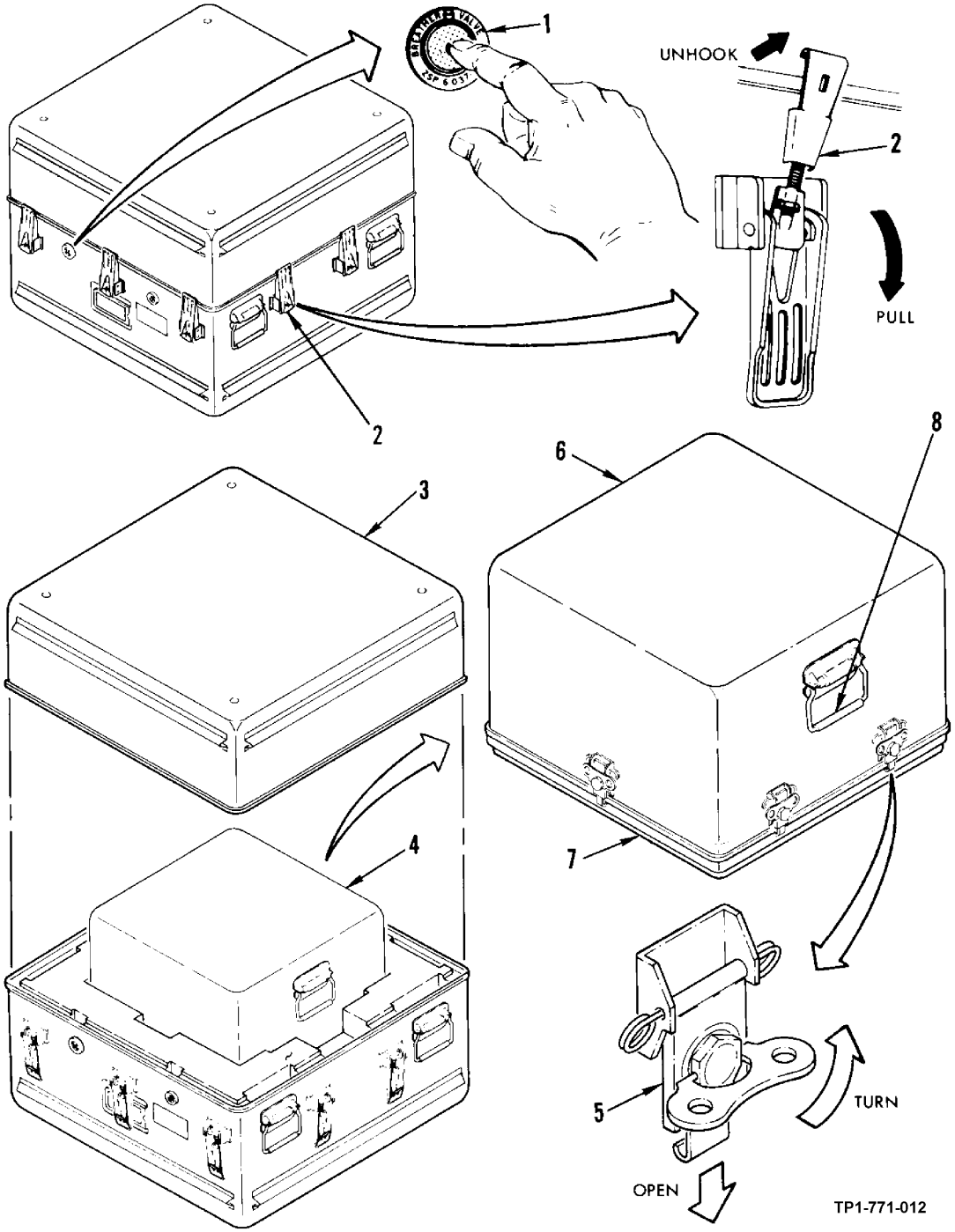


Figure 2-7. Inner Case Removal From Shipping and Storage Container

2-11. TADS NSA INSTALLATION ON NIGHTSIDE TEST BENCH. (CONT)

(5) Prepare UUT handling fixture (1, figure 2-8) for attachment as follows:

(a) Lift (open) locking lever (2) to vertical position to release clamp arm (3).

(b) Loosen thumb locknuts (4).

(c) Slide clamp arm (3) toward locking lever (2) as far as it will go.

CAUTION

EQUIPMENT DAMAGE

While installing handling fixture, use extreme care to prevent damage to optical and mirror assemblies.

(6) Attach handling fixture (1, figure 2-9) to TADS NSA (2) as follows:

(a) Press down on fixture clamp arm (3) near locking lever (4) to raise fixture clamp arm bumper pad (5).

(b) Carefully slide fixture clamp arm bumper pad over edge of TADS NSA casting (6).

(c) Ensure that TADS NSA ballast plates (7) are resting against fixture stop bracket (8) and rubber pad (9).

(d) Firmly seat fixture clamp arm (3) and clamp arm pad (5).

(e) Handtighten thumb locknuts (10) until they start to depress fixture clamp arm (3).

(f) Push (close) fixture locking lever (4) down.

(g) Ensure that fixture locking lever (4) closes firmly at approximately a 90 degree angle from original position.

(h) Try to slightly move handling fixture.

NOTE

If locking lever will not close properly, or if holding fixture can be moved, open locking lever and tighten or loosen thumb locknuts. Repeat steps (c) through (h) above until locking lever can be properly closed and handling fixture will not move on TADS NSA.

2-11. TADS NSA INSTALLATION ON NIGHTSIDE TEST BENCH. (CONT)

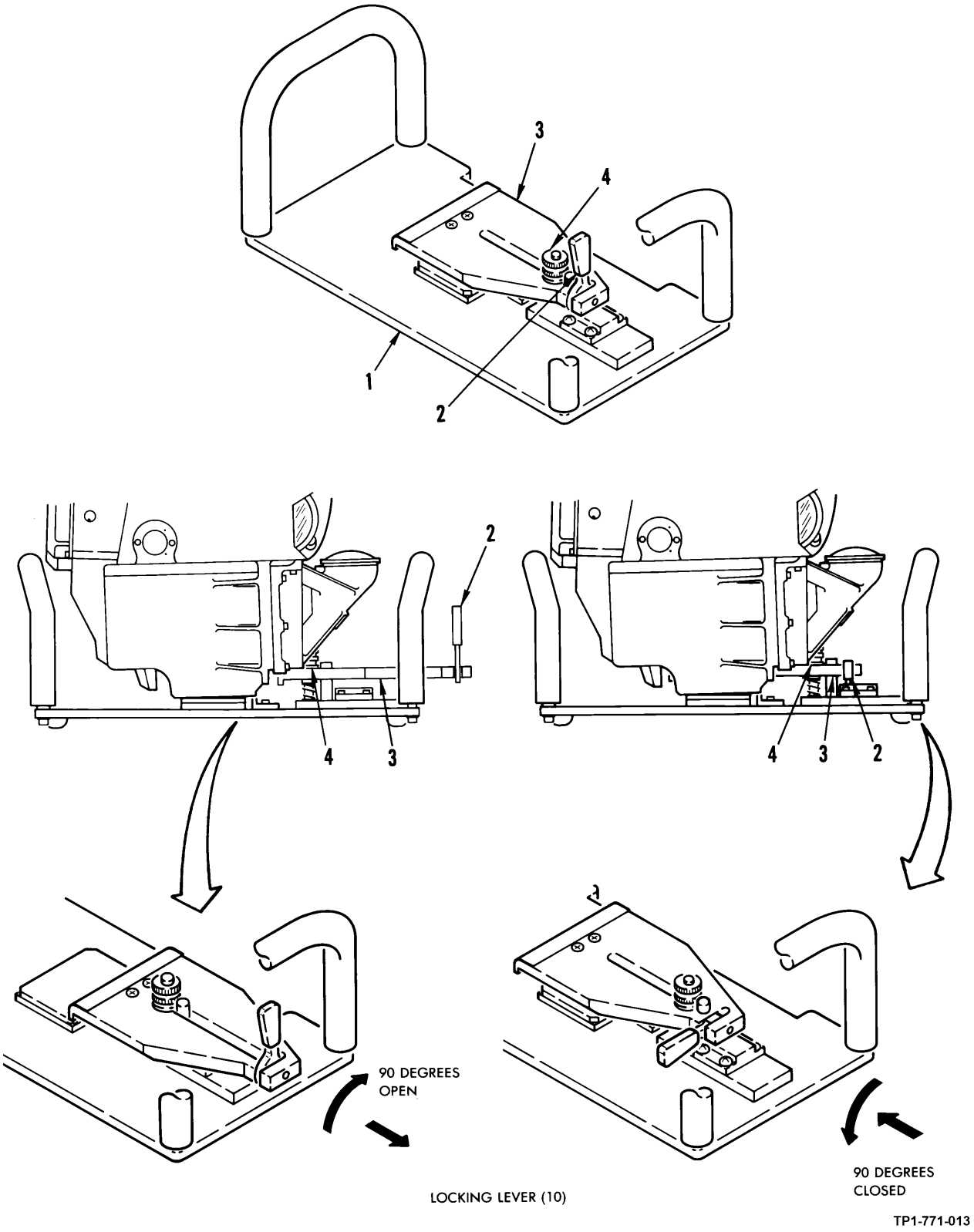


Figure 2-8. UUT Handling Fixture Preparation

2-11. TADS NSA INSTALLATION ON NIGHTSIDE TEST BENCH. (CONT)

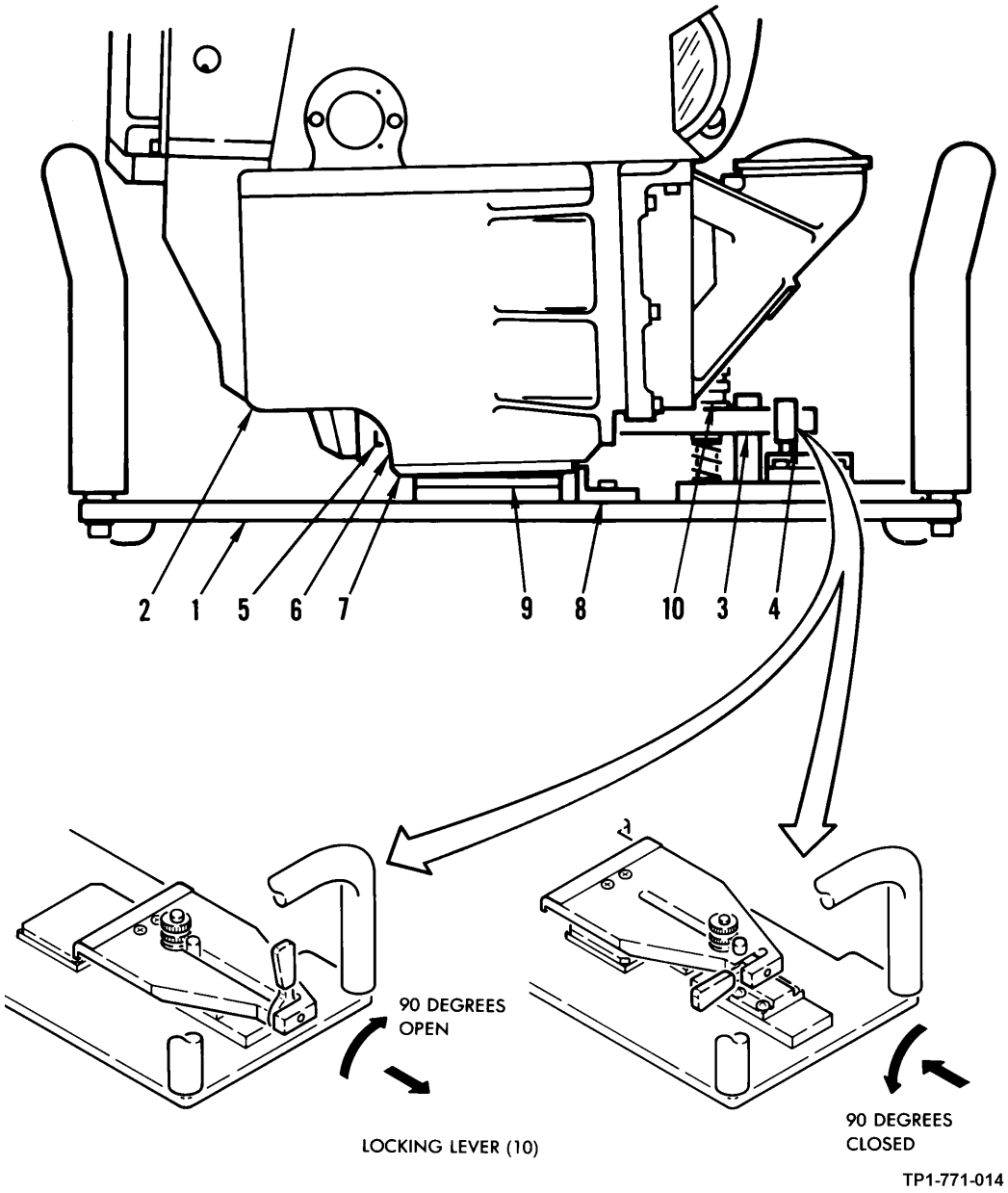


Figure 2-9. Attachment of Handling Fixture to TADS NSA

2-11. TADS NSA INSTALLATION ON NIGHTSIDE TEST BENCH. (CONT)

(7) Grasp handles (1, figure 2-10) of handling fixture (2) and edges of base assembly (3) and reposition TADS NSA on workbench with NSA resting on handling fixture. Base assembly should be hanging off the side of workbench.

(8) Remove base assembly as follows:

NOTE

- Two types of base assemblies are used with the inner case of the NSA shipping and storage container. Type B has a support plate attached to the base assembly with two bolts. Type A has no support plate.
- Do step (a) for Type A base assembly.
- Do step (b) for Type B base assembly.

(a) Hold base assembly in place and loosen clamp pin assembly (4) until clamp halves are clear of mounting flange.

(b) Hold base assembly in place and loosen clamp pin assembly (4) until clamp halves touch bolt heads (5).

(c) Carefully disengage base assembly guide pins (6) from TADS NSA mounting flange guide holes (7).

(d) Remove base assembly.

(9) Reassemble shipping and storage container as follows:

(a) Install case assembly (1, figure 2-11) on base assembly (2).

(b) Engage and lock latches (3).

(c) Grasp handles (4) of case assembly and place in shipping and storage container (5).

(d) Install container cover and close latches (6).

c. TADS NSA and Insert/Adapter Installation on Nightside Test Bench 2A3.

CAUTION

DELICATE EQUIPMENT

- Exercise caution when handling TADS NSA. Do not touch optic lens or large mirror assembly. When placing TADS NSA on workbench, ensure that it is resting on its ballast plates. Do not rest TADS NSA on mirror assembly. This could cause damage.
- Remove alinement tool from insert/adapter before mounting TADS NSA on insert/adapter if it is in place.

2-11. TADS NSA INSTALLATION ON NIGHTSIDE TEST BENCH. (CONT)

(1) Inspect TADS NSA mounting flange for burrs. Remove any burrs found, if possible. If not possible, have flange repaired before continuing.

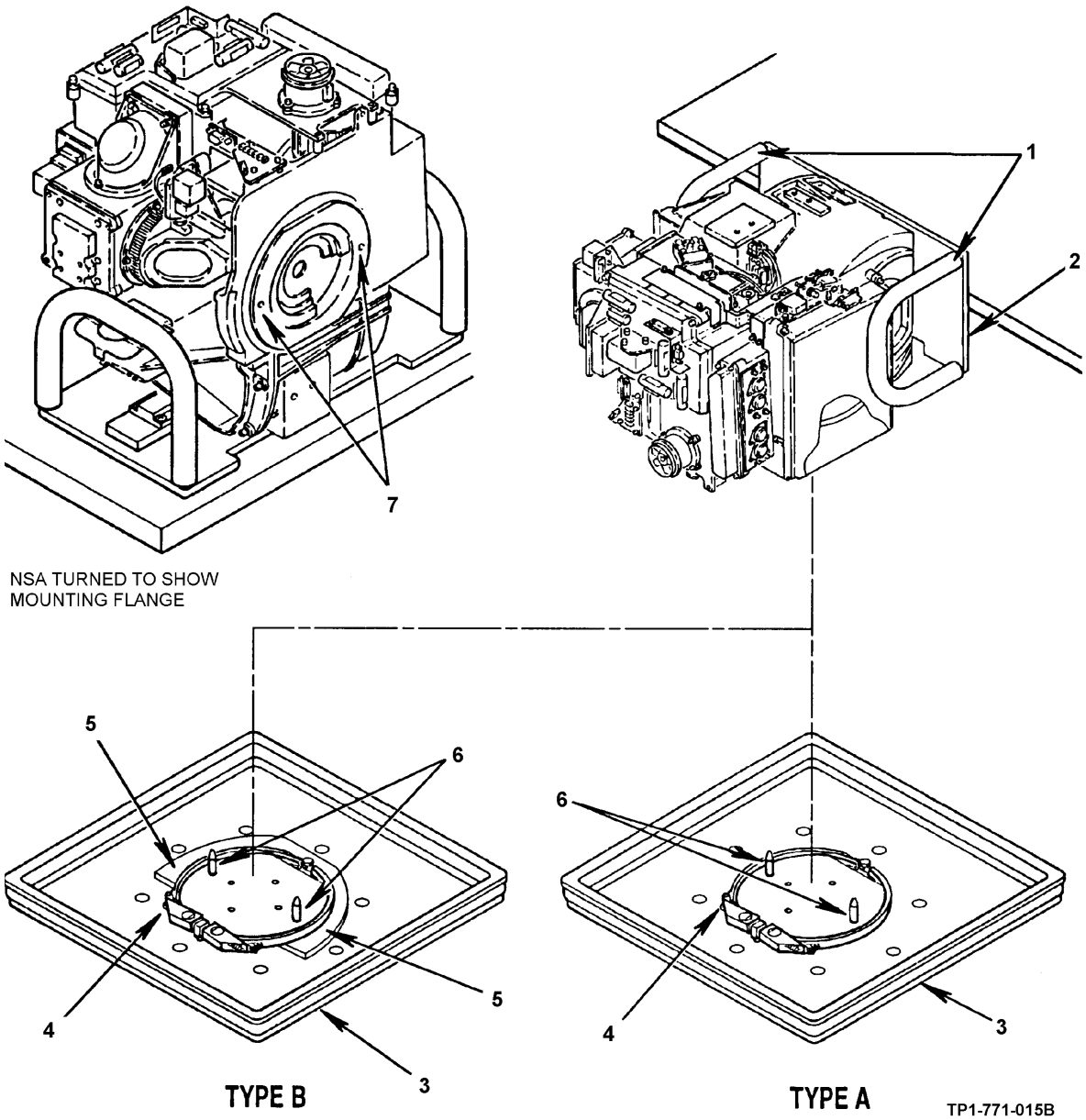


Figure 2-10. Container Base Assembly Removal From TADS NSA

2-11. TADS NSA INSTALLATION ON NIGHTSIDE TEST BENCH. (CONT)

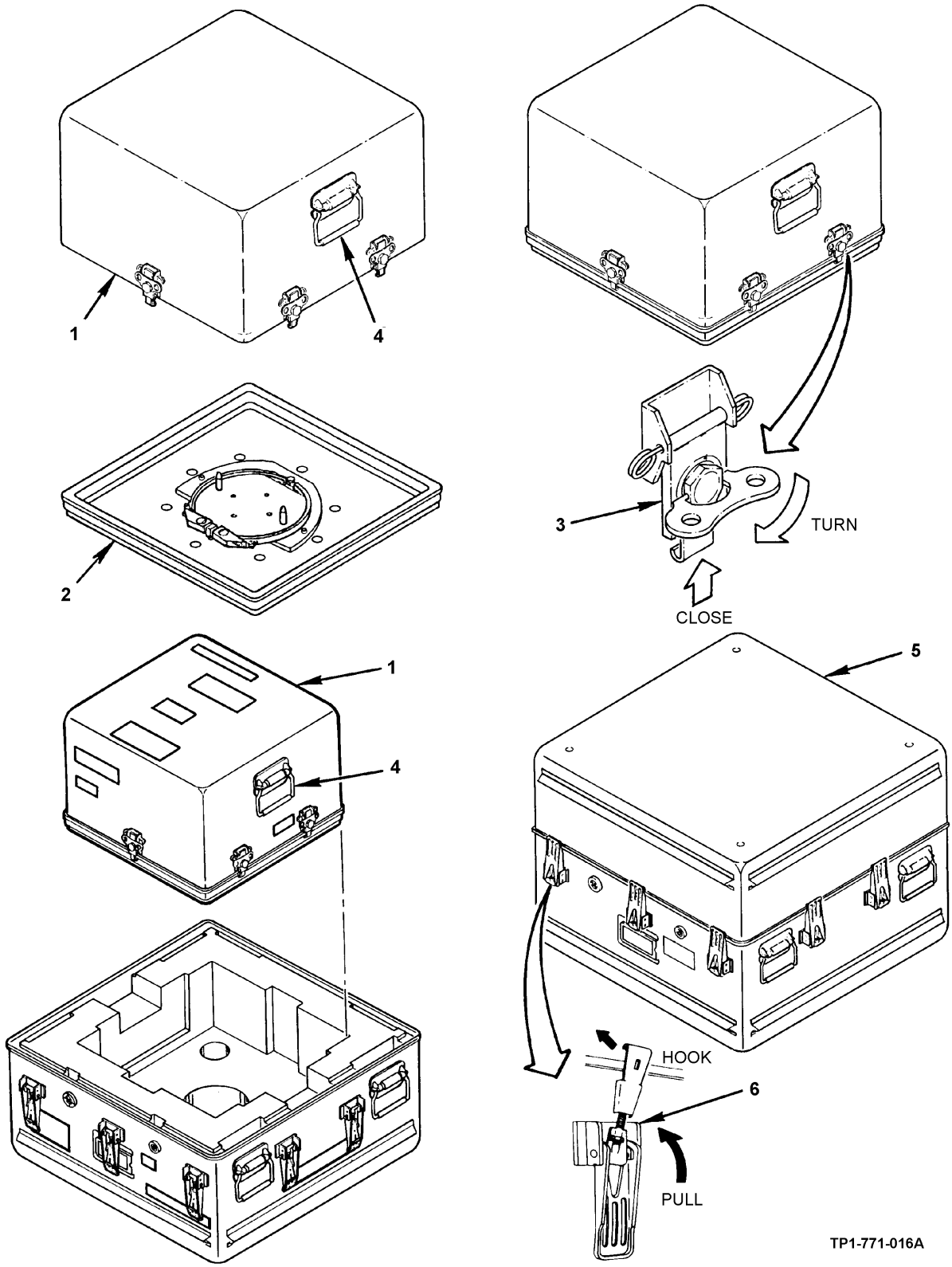


Figure 2-11. Inner Case Installation in Shipping and Storage Container

2-11. TADS NSA INSTALLATION ON NIGHTSIDE TEST BENCH. (CONT)

NOTE

Workbench used to support TADS NSA must have a tabletop that extends at least 3 inches beyond front of bench.

(2) Place TADS NSA on edge of workbench tabletop with mounting flange facing operator.

(3) Aline insert/adapter guide pins (1, figure 2-12) with guide pin holes (2) on TADS NSA mounting flange. Ensure that insert/adapter is oriented with clamp assembly bolt (3) in the down position, as shown. Mount insert/adapter to TADS NSA.

(4) Ensure that clamp guide pin is in guide pin alinement hole (4) of insert/adapter and that insert/adapter mounting surface is flush against TADS NSA mounting surface.

(5) Set torque wrench to 100 in-lb and use torque wrench to tighten clamp assembly. Ensure that insert/adapter is secured to TADS NSA by checking for no free movement between them.

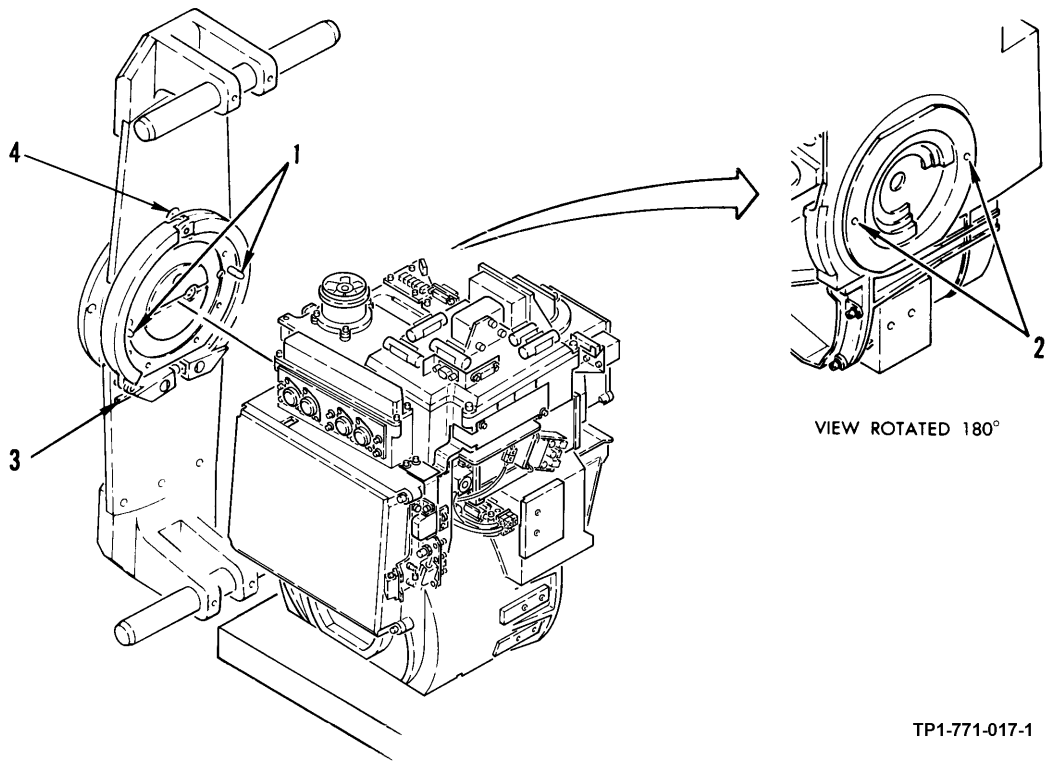


Figure 2-12. Mounting Insert/Adapter to TADS NSA

2-11. TADS NSA INSTALLATION ON NIGHTSIDE TEST BENCH. (CONT)

WARNING

HIGH PRESSURE AIR

Ensure that pneumatic system is shut down. When pneumatic system is inflated, E/O test bench set is capable of movement. If you try to mount TADS NSA with pneumatic system inflated, personal injury or equipment damage may occur.

NOTE

Remove handling fixture from TADS NSA before installing TADS NSA on nightside test bench.

(6) Remove handling fixture as follows:

(a) Hold fixture (1, figure 2-13) in place and open locking lever (2) by lifting it up.

(b) Loosen thumb locknuts (3).

(c) Release clamp pad (4) by pressing down and holding clamp arm (5) near locking lever.

(d) Slide clamp arm toward locking lever as far as it will go.

(e) Carefully remove handling fixture from TADS NSA casting (6).

WARNING

HEAVY OBJECT

- Excessive strain can cause serious injury.
- Don't: Attempt to lift or carry heavy objects alone.
- Do: Get help for lifting or carrying heavy objects.
- If you experience a sudden pain while lifting or discomfort after lifting, get medical help at once.

NOTE

Two people are required when performing this task.

(7) Push sensor mount handle to unlock (away from operator) position. Lift insert/adapter and TADS NSA by the handles of insert/adapter and aline numbered adapter guide pins (1, figure 2-14) with corresponding numbered holes (2) on sensor mount assembly (3). Ensure that guide pin (4) on sensor mount assembly is alined with hole (5) on insert/ adapter.

2-11. TADS NSA INSTALLATION ON NIGHTSIDE TEST BENCH. (CONT)

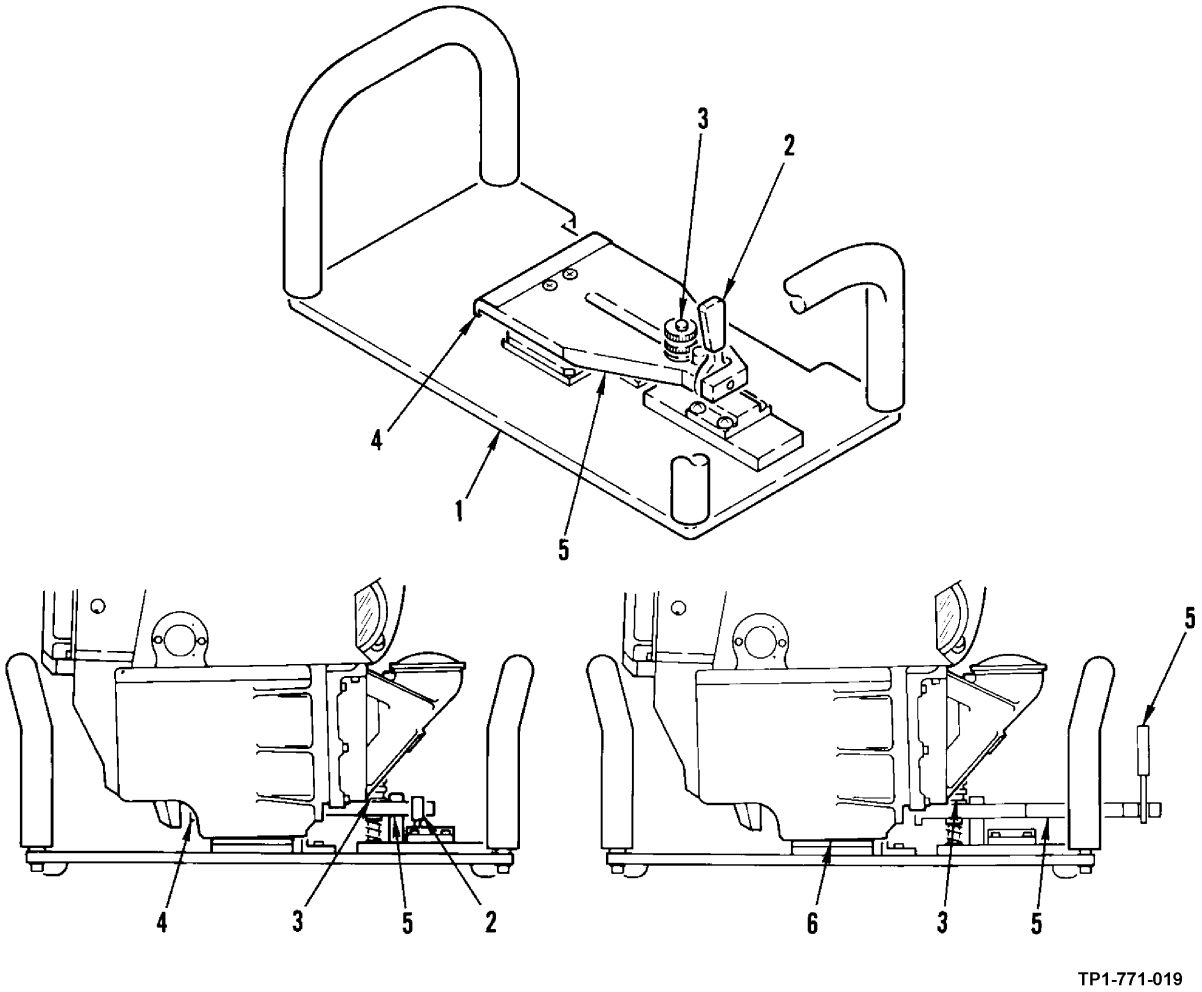


Figure 2-13. Handling Fixture Removal

(8) Mount TADS NSA to sensor mount assembly and pull sensor mount handle (6) toward operator to lock in place. Ensure that TADS NSA and insert/adapter are locked in place before releasing insert/adapter handles.

2-11. TADS NSA INSTALLATION ON NIGHTSIDE TEST BENCH. (CONT)

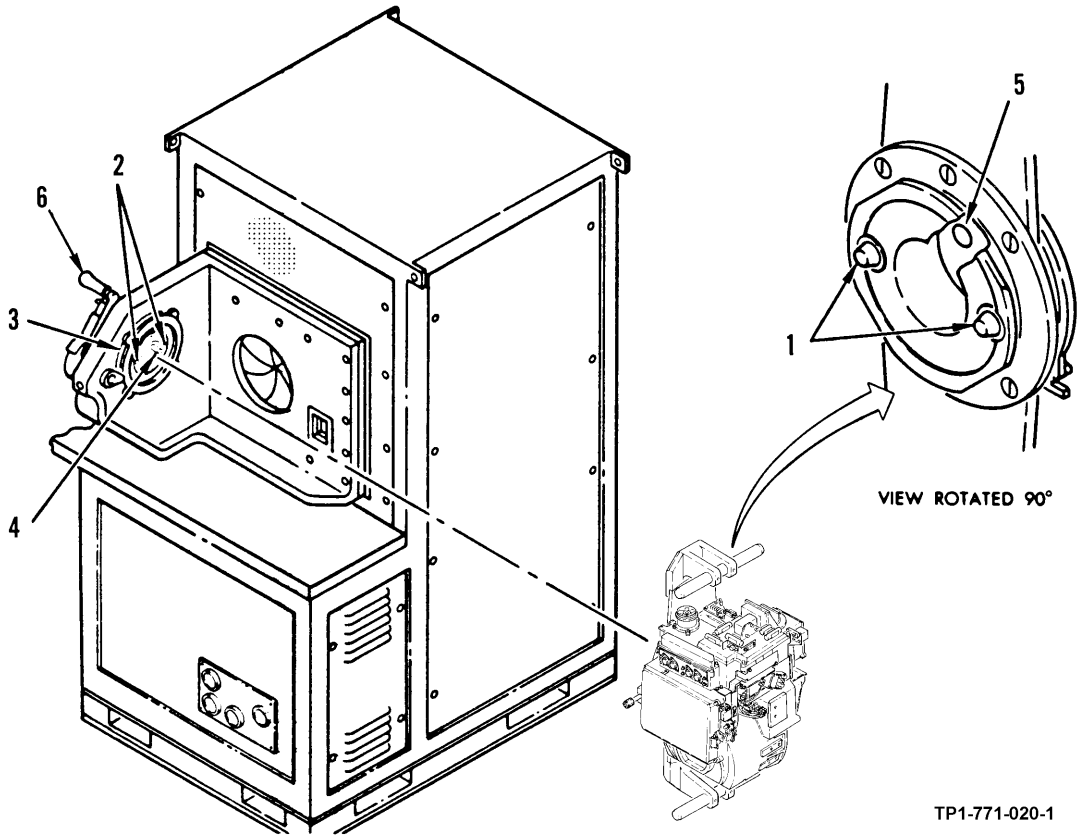


Figure 2-14. Mounting TADS NSA and Insert/Adapter to Nightside Test Bench

d. Pneumatic System Turn-On.

WARNING

HIGH PRESSURE AIR

To prevent injury and equipment damage, do not perform this procedure until all cable connections, switch settings, adapter installation, and UUT mounting have been completed. When pneumatic system is inflated, E/O test bench is capable of movement. If an attempt is made to mount TADS NSA with pneumatic system pressurized, injury or equipment damage may occur. Test bench could move and TADS NSA could be dropped, causing injury or NSA damage.

(1) Verify that van air supply is on (TM 11-6625-3085-12).

2-11. TADS NSA INSTALLATION ON NIGHTSIDE TEST BENCH. (CONT)

(2) On nightside test bench (1, figure 2-15), rotate turnlock fasteners (2) 1/4 turn counterclockwise and open door (3).

WARNING

MOVING EQUIPMENT

Ensure that hands and feet are clear of base assembly to prevent injury. When system is inflated, equipment is capable of movement. Any movement could cause injury if caution is not taken.

(3) On rear of pneumatic control panel (1, figure 2-16), flip toggle valve (2) down (on). System should inflate and stabilize E/O test bench set. Measure gap at all four corners of base and verify that it is 1/4-inch to 3/8-inch. If all four gaps are not equal, refer to TM 11-6625-3081-23-4.

CAUTION

HIGH PRESSURE AIR

To prevent damage to equipment, do not adjust high pressure air above 125 PSI on pneumatic control panel.

(4) On pneumatic control panel (1, figure 2-17), verify that source gage (2) indicates a maximum of 125 PSI. Verify that the other three gages show a PSI indication. Gages will not indicate same pressure.

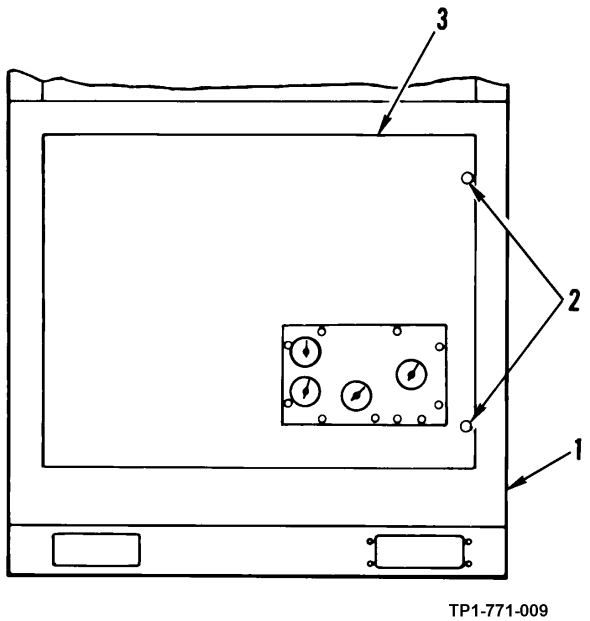


Figure 2-15. Pneumatic Control Panel

2-11. TADS NSA INSTALLATION ON NIGHTSIDE TEST BENCH. (CONT)

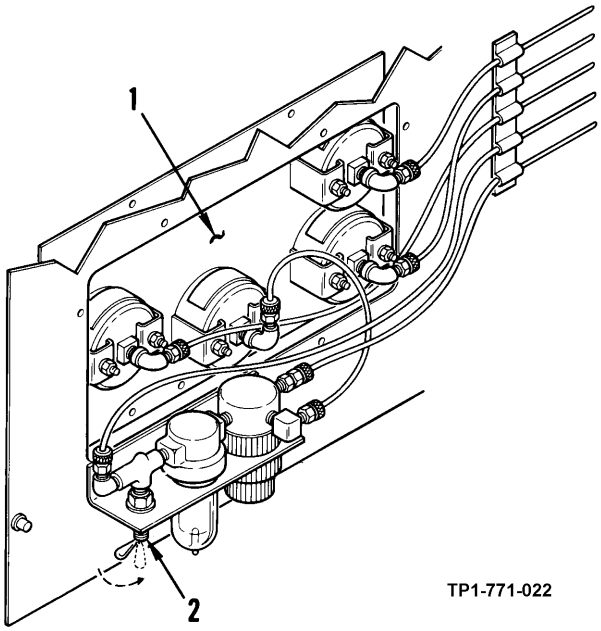


Figure 2-16. Toggle Valve Location

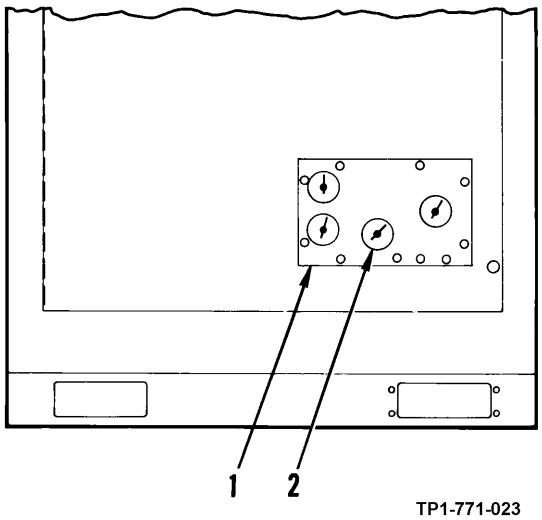


Figure 2-17. Gage Locations

(5) Using flat side of a screwdriver tip, press and hold bleed/drain valve (figure 2-18) to drain any moisture within system. Exercise caution not to damage bleed/drain valve.

(6) Release bleed/drain valve.

2-11. TADS NSA INSTALLATION ON NIGHTSIDE TEST BENCH. (CONT)

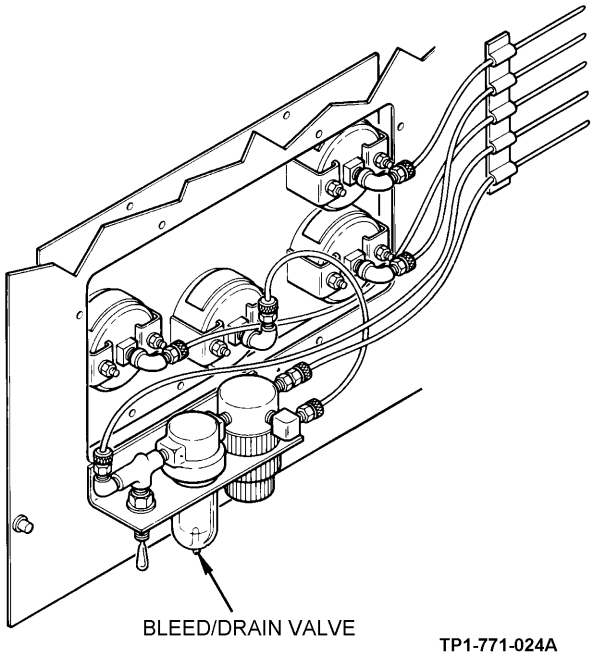


Figure 2-18. Bleed/Drain Valve Location

(7) On nightside test bench, close door (3, figure 2-15). Push and rotate turnlock fasteners (2) 1/4 turn clockwise.

(8) Verify that E/O test bench set is floating, and not banging or bottoming out. If it is, refer to TM 11-6625-3081-23-4.

2-12. CHANNEL BALANCE ADAPTER INSTALLATION.

This paragraph covers the steps required to shut down the pneumatic system, remove the TADS NSA from the nightside test bench, remove the insert/adapter from the TADS NSA, install the channel balance adapter on the TADS NSA, and reinstall the TADS NSA on the nightside test bench.

a. Pneumatic System Shutdown. Perform pneumatic system shutdown according to paragraph 2-11a.

b. TADS NSA Removal from Nightside Test Bench.

(1) Disconnect the following cables:

(a) P3 of cable 13083693 from P1 on TADS NSA.

(b) P4 of cable 13083693 from J2 on TADS NSA.

2-12. CHANNEL BALANCE ADAPTER INSTALLATION. (CONT)

WARNING

HEAVY OBJECT

- Excessive strain can cause serious injury.
- Don't: Attempt to lift or carry heavy objects alone.
- Do: Get help for lifting or carrying heavy objects.
- If you experience a sudden pain while lifting or discomfort after lifting, get medical help at once.

CAUTION

DELICATE EQUIPMENT

Ensure that insert/adapter and TADS NSA are held firmly in place prior to unlocking sensor mount handle.

NOTE

Two people are required when performing this task.

(2) Hold insert/adapter and TADS NSA firmly in place.

(3) Push sensor mount handle (figure 2-19) up to unlock position and remove insert/adapter and TADS NSA from sensor mount assembly.

CAUTION

DELICATE EQUIPMENT

When placing TADS NSA on workbench, ensure that TADS NSA is resting on its ballast plates. Do not rest TADS NSA on mirror assembly.

(4) Place TADS NSA on edge of workbench.

(5) Remove insert/adapter (1, figure 2-20) from TADS NSA by loosening clamp assembly (2).

c. TADS NSA/Channel Balance Adapter Installation on Nightside Test Bench.

(1) Place TADS NSA on edge of workbench tabletop with mounting flange facing operator.

(2) Aline channel balance adapter guide pins (1, figure 2-21) with guide pin holes (2) on TADS NSA mounting flange. Ensure that adapter is oriented with clamp assembly bolt (3) in the up position, as shown. Mount adapter to TADS NSA.

(3) Ensure that clamp guide pin is in guide pin alinement hole of adapter and that adapter mounting surface is flush against TADS NSA mounting surface.

2-12. CHANNEL BALANCE ADAPTER INSTALLATION. (CONT)

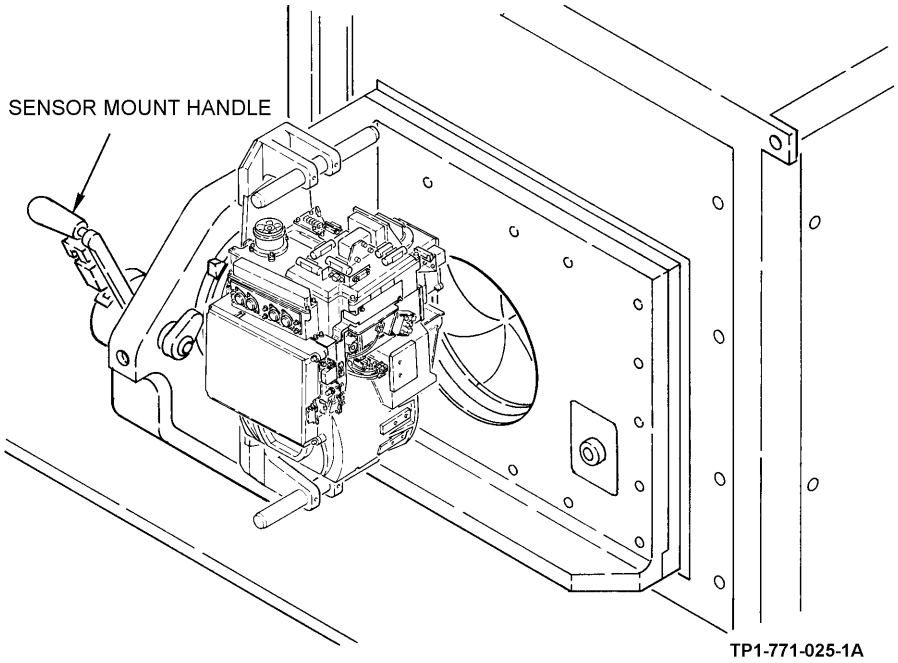


Figure 2-19. Sensor Mount Handle Location

(4) Set torque wrench to 100 in-lb and use torque wrench to tighten clamp assembly. Ensure that adapter is secured to TADS NSA by checking for no free movement between them.

WARNING

HIGH PRESSURE AIR

Ensure that pneumatic system is shut down. When pneumatic system is inflated, E/O test bench set is capable of movement. If an attempt is made to mount TADS NSA with pneumatic system inflated, injury or equipment damage could occur.

(5) Lift TADS NSA by handles (1, figure 2-22) of channel balance adapter and alive numbered guide pins (2) with corresponding numbered holes (3) on sensor mount assembly. Ensure that guide pin (4) on sensor mount assembly is alined with hole (5) in channel balance adapter.

2-12. CHANNEL BALANCE ADAPTER INSTALLATION. (CONT)

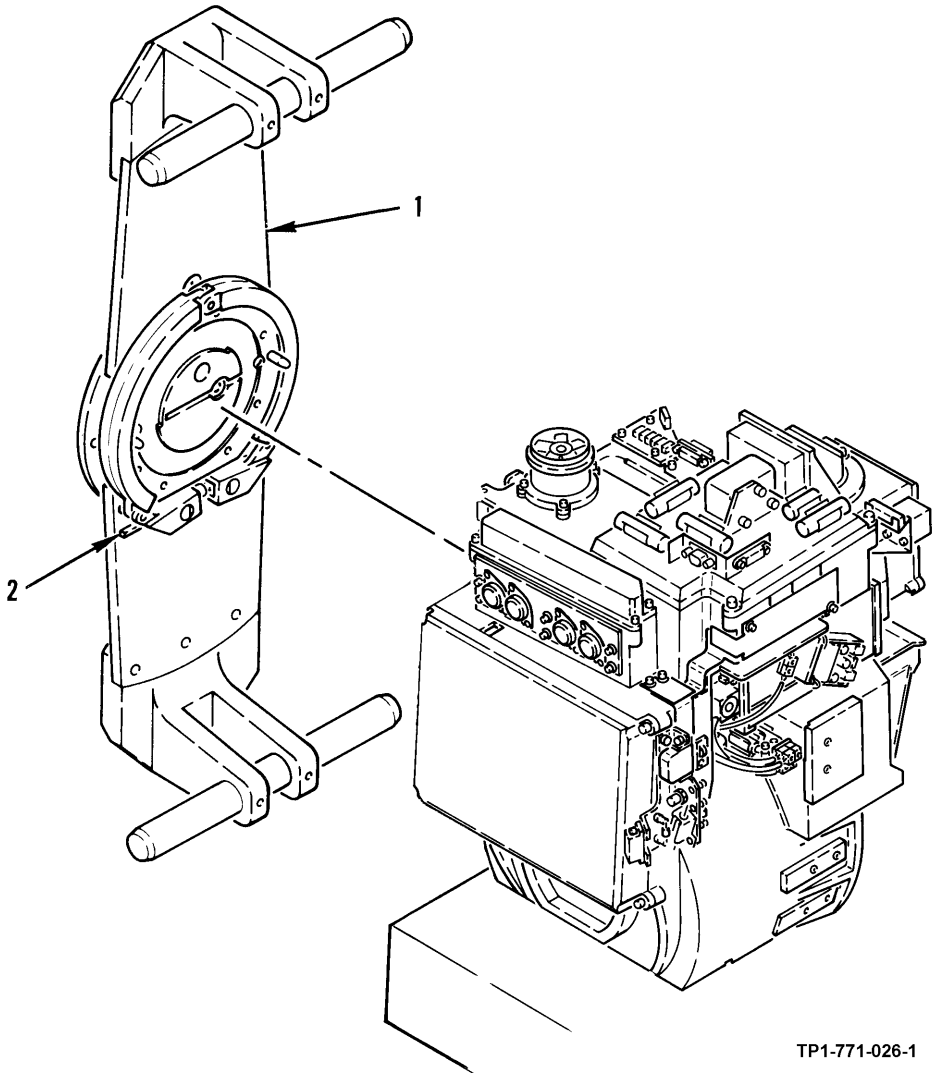


Figure 2-20. Insert/Adapter Removal from TADS NSA

(6) Mount TADS NSA to sensor mount assembly and pull sensor mount handle (6) down to lock TADS NSA in place.

d. Pneumatic System Turn-On. Perform pneumatic system turn-on according to paragraph 2-11d.

2-12. CHANNEL BALANCE ADAPTER INSTALLATION. (CONT)

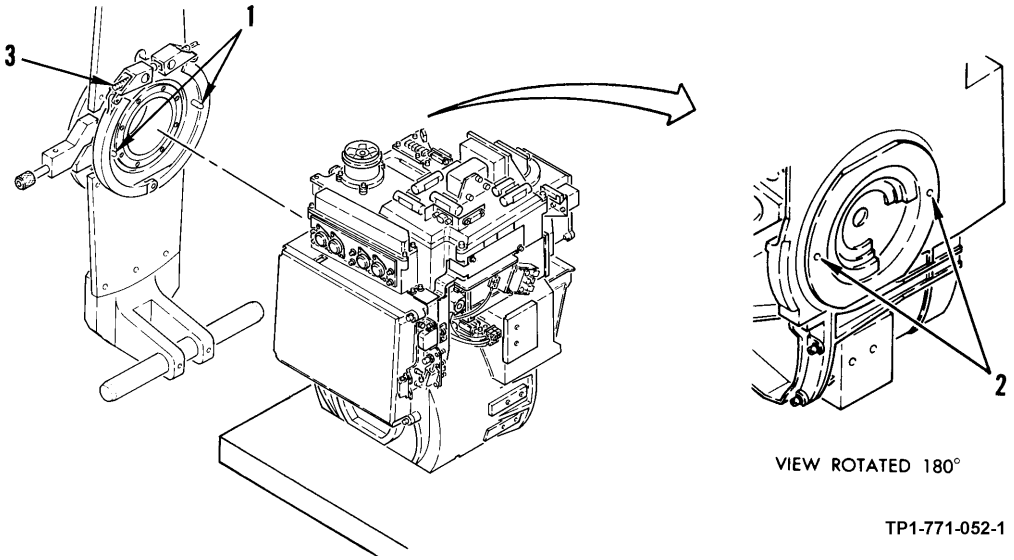


Figure 2-21. Mounting Channel Balance Adapter to TADS NSA

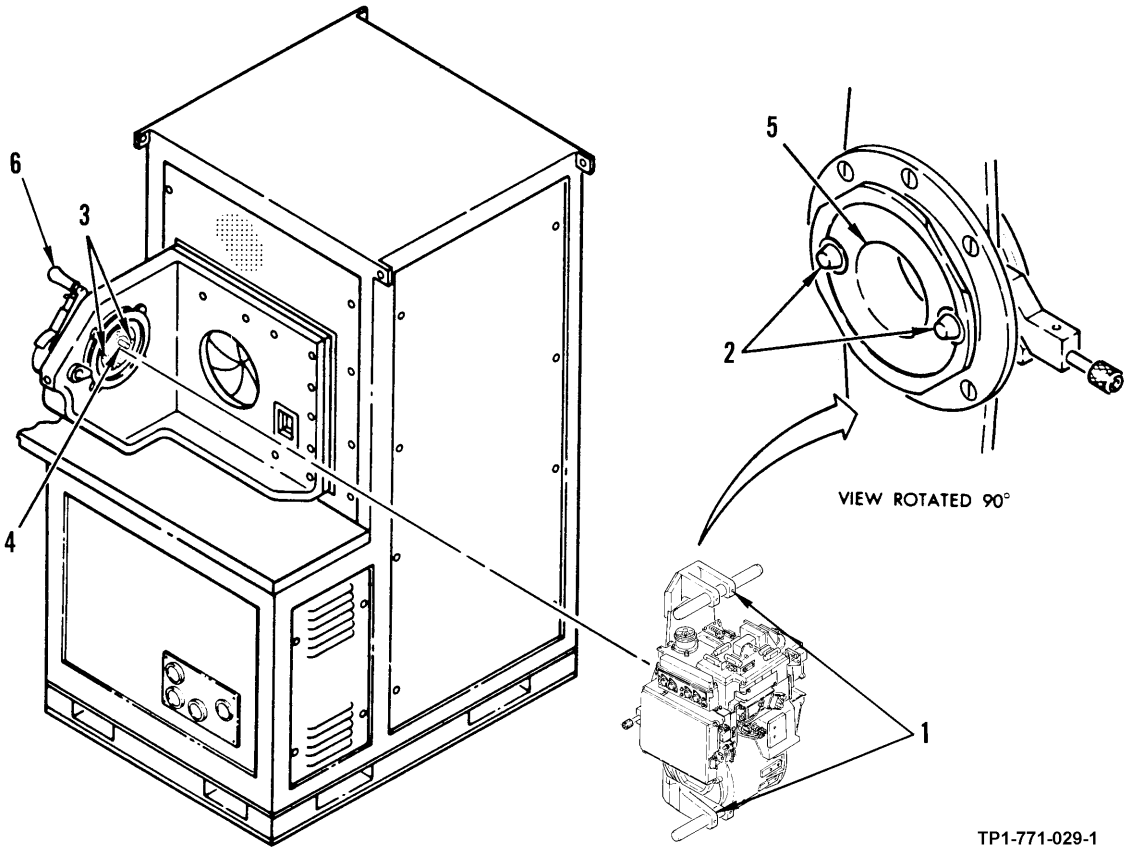


Figure 2-22. Mounting TADS NSA/Channel Balance Adapter to Sensor Mount Assembly

2-13. TADS NSA/CHANNEL BALANCE ADAPTER REMOVAL FROM NIGHTSIDE TEST BENCH.

This paragraph covers the steps required to remove the TADS NSA and channel balance adapter from the nightside test bench, and to remove the adapter from the TADS NSA.

a. Disconnect the following cables:

P3 of cable 13083693 from P1 of TADS NSA
P4 of cable 13083693 from J2 of TADS NSA

WARNING

HEAVY OBJECT

- Excessive strain can cause serious injury.
- Don't: Attempt to lift or carry heavy objects alone.
- Do: Get help for lifting or carrying heavy objects.
- If you experience a sudden pain while lifting or discomfort after lifting, get medical help at once.

CAUTION

DELICATE EQUIPMENT

Ensure that channel balance adapter and TADS NSA are held firmly in place prior to unlocking handle. Exercise caution when releasing sensor mount handle.

NOTE

Two people are required when performing this task.

b. Hold channel balance adapter and TADS NSA firmly in place.

c. Push sensor mount handle on sensor mount assembly up to unlock position and remove channel balance adapter and TADS NSA from sensor mount assembly.

CAUTION

DELICATE EQUIPMENT

When placing TADS NSA on workbench, ensure that it is resting on its ballast plates. Do not rest it on mirror assembly.

d. Place TADS NSA on the edge of workbench.

e. Loosen clamp assembly (1, figure 2-23). Then remove channel balance adapter (2) from TADS NSA (3).

2-13. TADS NSA/CHANNEL BALANCE ADAPTER REMOVAL FROM NIGHTSIDE TEST BENCH. (CONT)

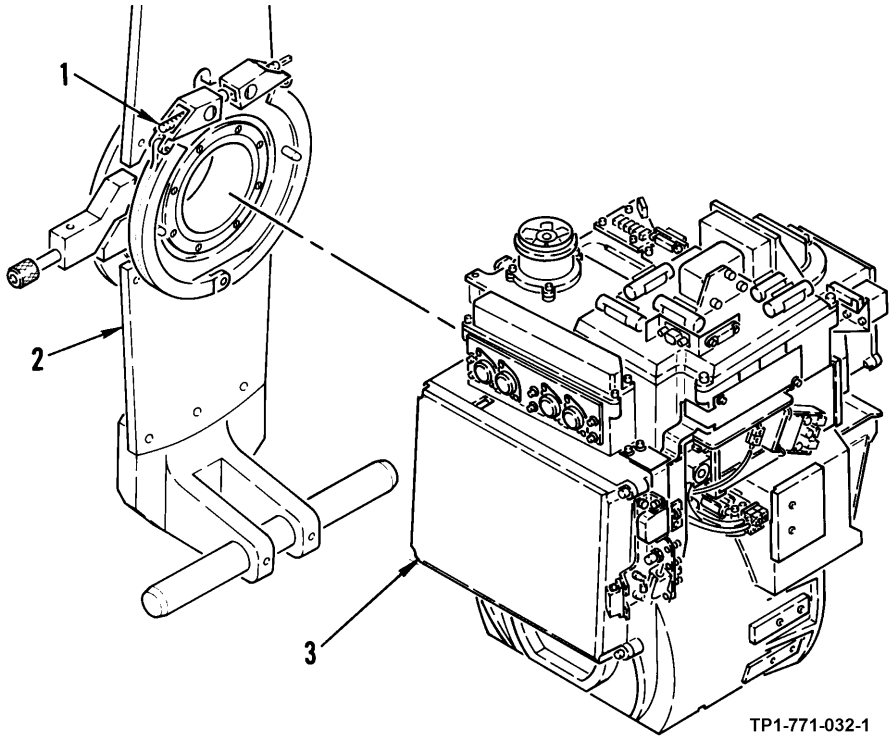


Figure 2-23. Channel Balance Adapter Removal From TADS NSA

NOTE

After removing channel balance adapter from TADS NSA, reinstall handling fixture on TADS NSA. Refer to paragraph 2-11 for installation procedures.

f. To install TADS NSA in shipping and storage container, refer to paragraph 2-14.

2-14. TADS NSA INSTALLATION INTO SHIPPING AND STORAGE CONTAINER.

This paragraph covers the steps required to prepare the shipping and storage container, install the container base assembly on the TADS NSA, remove the handling fixture from the NSA, and install the TADS NSA in the container.

WARNING

HEAVY OBJECT

- Excessive strain can cause serious injury.
- Don’t: Attempt to lift or carry heavy objects alone.
- Do: Get help for lifting or carrying heavy objects.
- If you experience a sudden pain while lifting or discomfort after lifting, get medical help at once.

2-14. TADS NSA INSTALLATION INTO SHIPPING AND STORAGE CONTAINER. (CONT)

CAUTION

EQUIPMENT DAMAGE

- Optics are exposed during this task and must be protected from contamination. Careless handling of TADS NSA could result in damaged or contaminated optics assemblies.
- Careless handling of support equipment can damage TADS NSA optics assemblies.
- Never touch optic surfaces with bare hands.
- Never attempt to lift or move TADS NSA using optics assemblies for support. Any force or pressure on optic assemblies could cause damage or misalinement.

NOTE

Two people are required when performing this task.

a. Remove inner case assembly from shipping and storage container as follows:

(1) Press pressure relief (1, figure 2-24) on container.

(2) Release and unhook container latches (2).

(3) Remove container cover (3) and set aside on clean dry area.

(4) Remove case assembly (4) from container and place on workbench.

b. Release and disengage latches (5) securing case assembly (top cover) (6) to base assembly (7).

c. Grasp handles (8) and lift case clear of base assembly. Place case assembly on clean dry surface.

d. Grasp handles (1, figure 2-25) of handling fixture and position TADS NSA (2) near edge of workbench. NSA clamp mounting flange (3) must be over the side of and clear of the workbench.

e. Install base assembly (4) on TADS NSA as follows:

NOTE

Two types of base assemblies are used with the inner case of the NSA shipping and storage container. Type B has a support plate attached to the base assembly with two bolts. The support plate and two bolts prevent clamp misalinement during installation of base assembly on NSA. Type A has no support plate and the clamp is subject to misalinement during installation of base assembly on NSA.

2-14. TADS NSA INSTALLATION INTO SHIPPING AND STORAGE CONTAINER. (CONT)

(1) For type A base assembly, make sure clamp assembly (5) is loosened until clamp halves are spread far enough to permit installation on NSA clamp mounting flange (3). Also, make sure clamp halves are positioned equally on each side of locating pins (6).

(2) For type B base assembly, make sure clamp assembly (5) is loosened until clamp halves touch bolt heads (7). Also, clamp tab must point to clamp center.

(3) Aline two locating pins (6) on base with mounting holes (8) on TADS NSA clamp mounting flange (3).

(4) Carefully seat base on TADS NSA flange.

(5) Seat clamp assembly (5). Set torque wrench to 35 in-lb and use torque wrench to tighten clamp assembly nut.

2-14. TADS NSA INSTALLATION INTO SHIPPING AND STORAGE CONTAINER. (CONT)

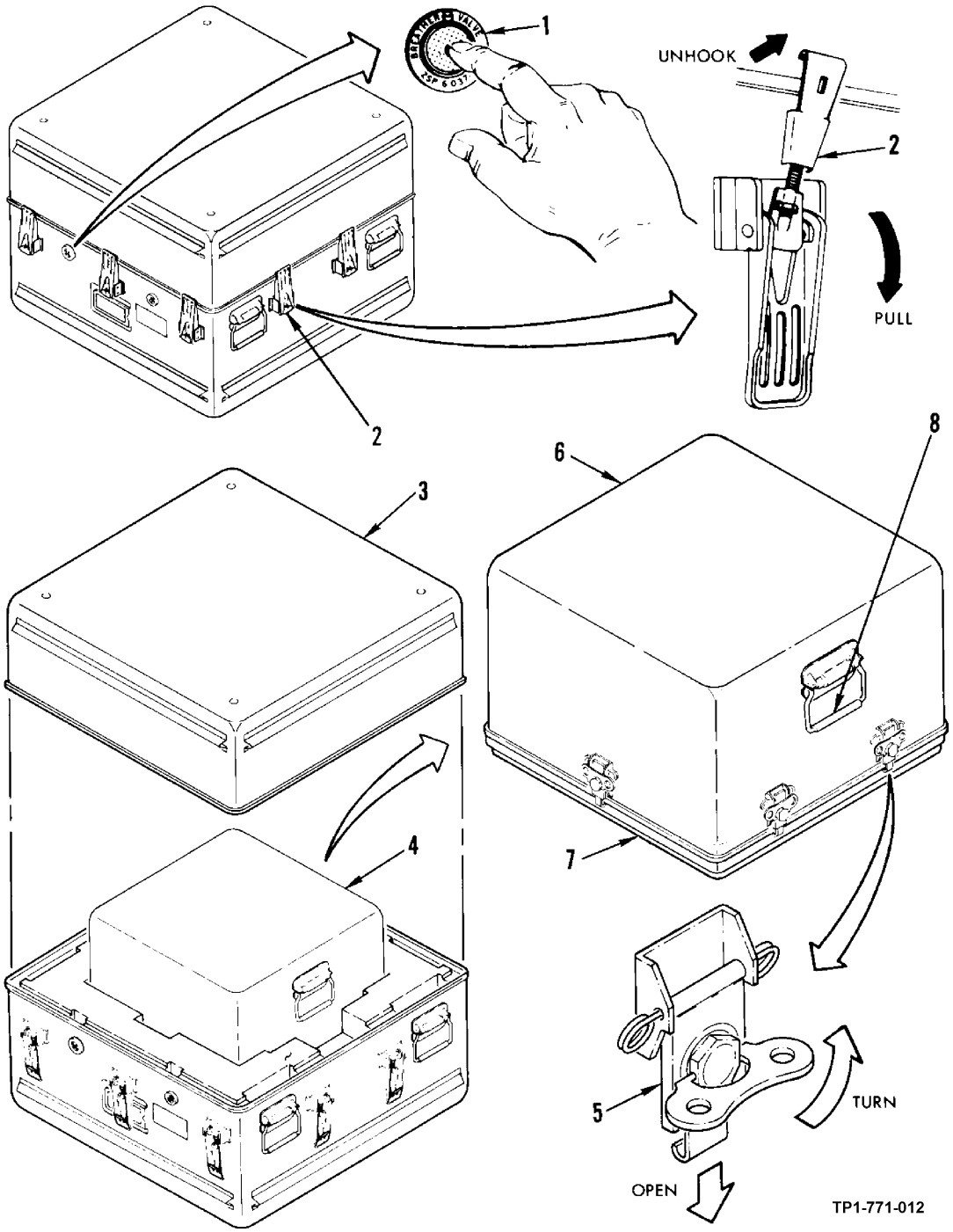


Figure 2-24. Inner Case Removal from Shipping and Storage Container

2-14. TADS NSA INSTALLATION INTO SHIPPING AND STORAGE CONTAINER. (CONT)

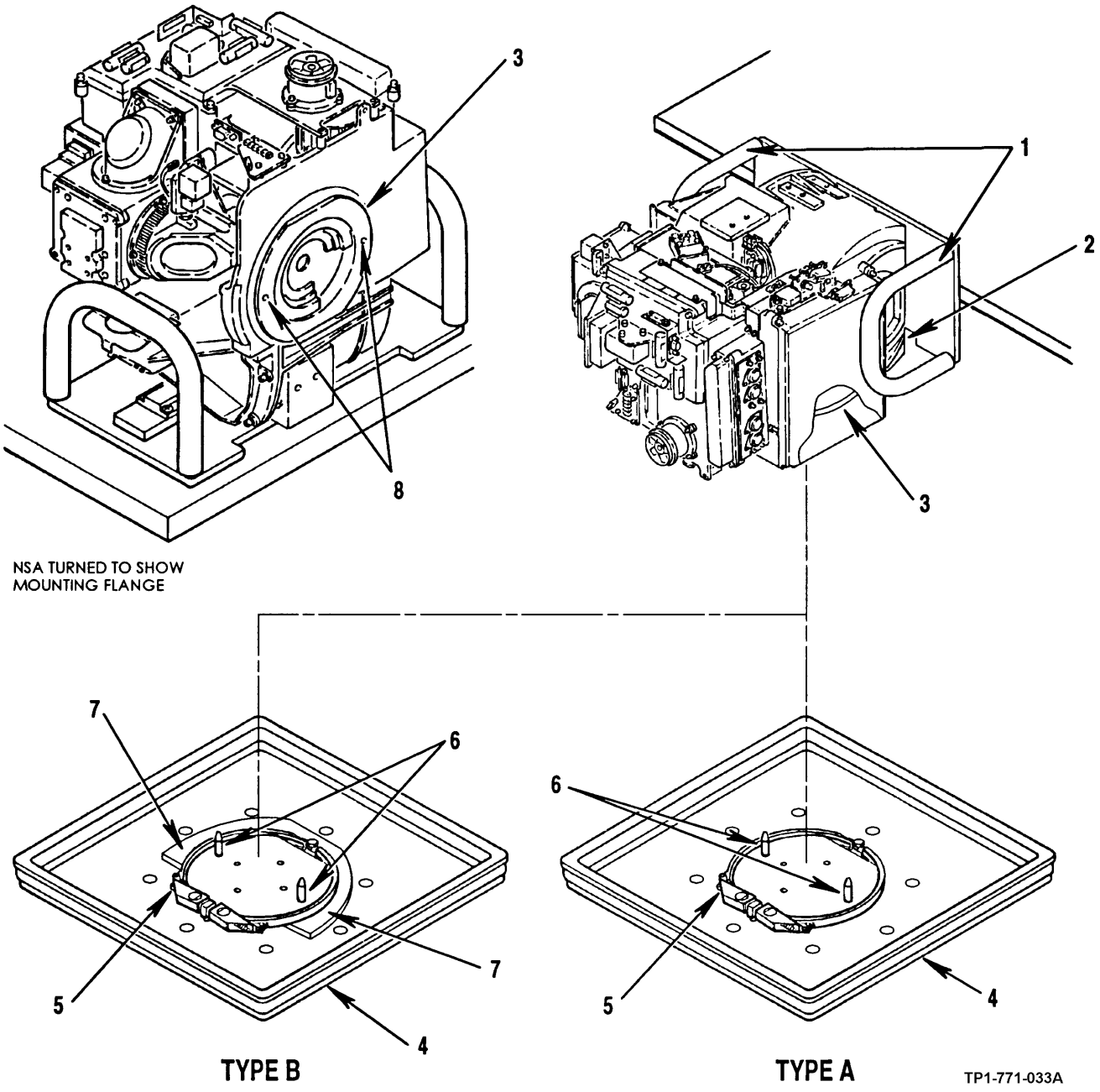


Figure 2-25. Mounting Base Assembly to TADS NSA

2-14. TADS NSA INSTALLATION INTO SHIPPING AND STORAGE CONTAINER. (CONT)

f. Grasping handles (1, figure 2-26) of handling fixture and sides of base assembly (2), reposition TADS NSA on workbench with NSA resting on base assembly.

g. Remove handling fixture as follows:

(1) Hold fixture (1, figure 2-27) in place and open locking lever (2) by lifting it up.

(2) Loosen thumb locknuts (3).

(3) Release clamp pad (4) by pressing down and holding clamp arm (5) near locking lever.

(4) Slide clamp arm toward locking lever as far as it will go.

(5) Carefully remove handling fixture from TADS NSA casting (6).

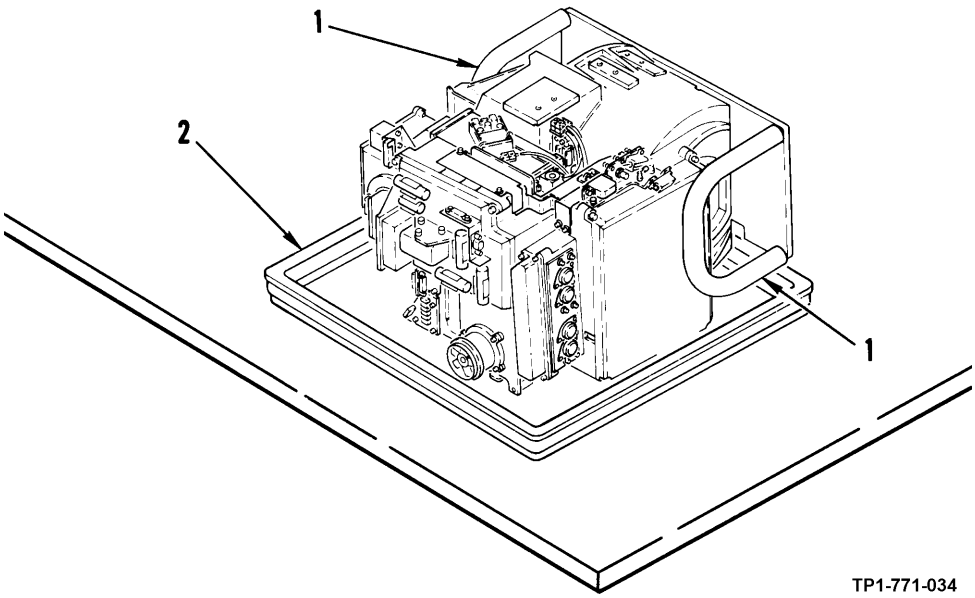


Figure 2-26. TADS NSA Atop Workbench with Base Assembly Installed

2-14. TADS NSA INSTALLATION INTO SHIPPING AND STORAGE CONTAINER. (CONT)

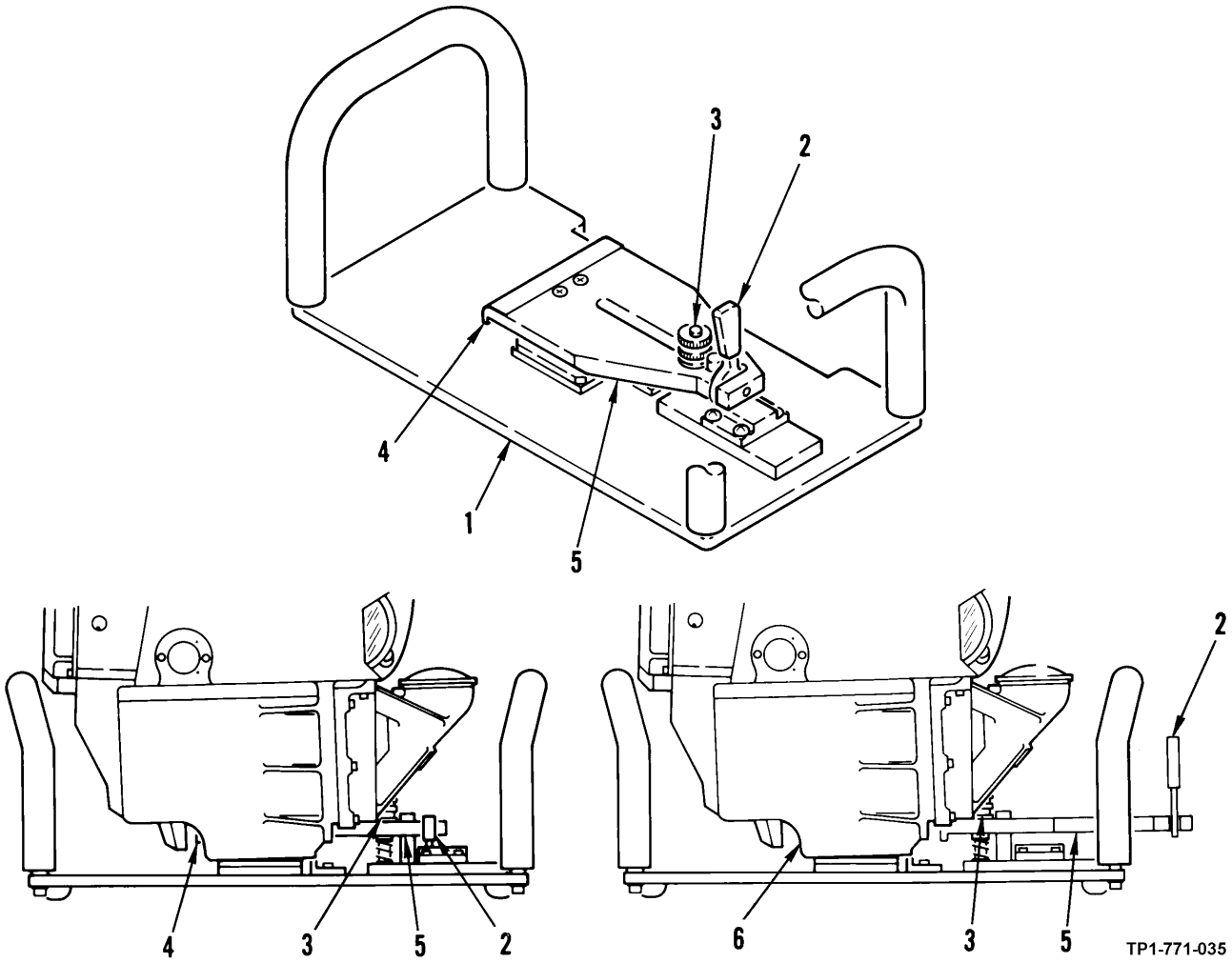


Figure 2-27. Handling Fixture Removal

h. Reassemble shipping and storage container as follows:

(1) Install case assembly (1, figure 2-28) on base assembly (2).

(2) Engage and lock latches (3).

i. Grasp handles (4) of case assembly and place in shipping and storage container (5).

j. Install container cover and close latches (6).

2-14. TADS NSA INSTALLATION INTO SHIPPING AND STORAGE CONTAINER. (CONT)

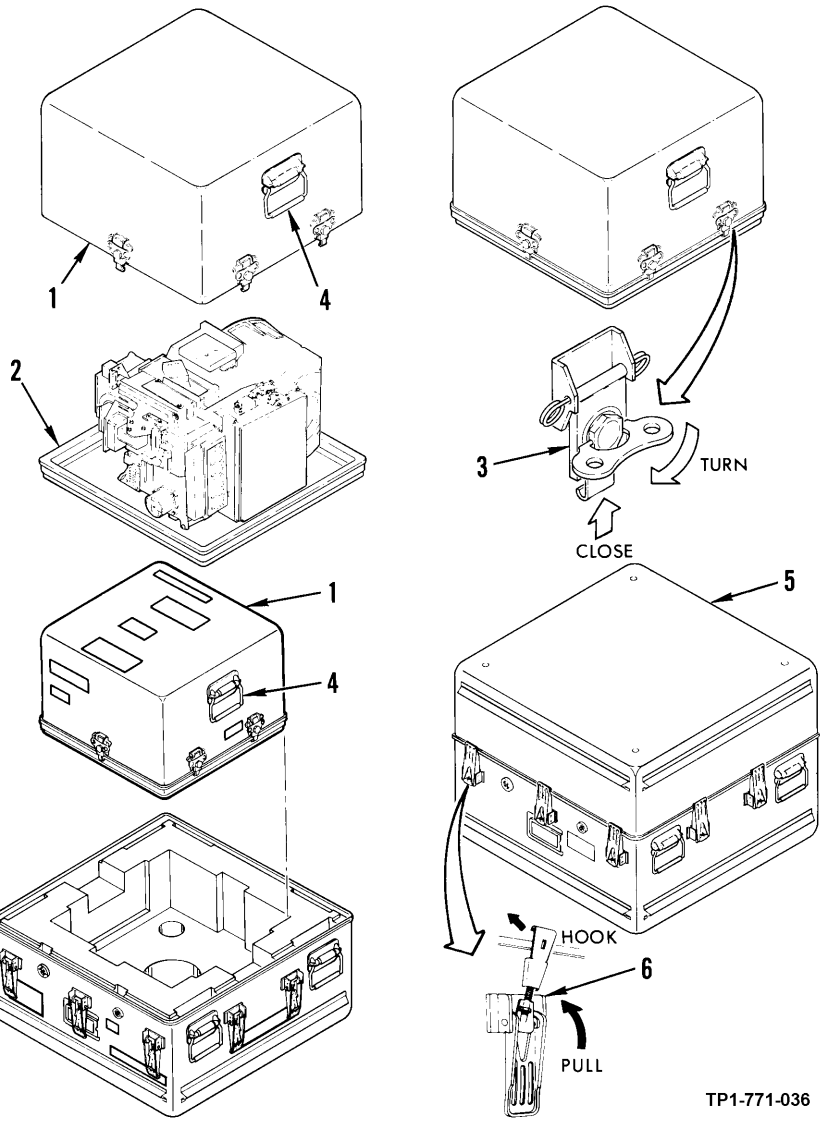


Figure 2-28. Inner Case Installation in Shipping and Storage Container

Section IV. TEST PROMPTED REFERENCES

2-15. GENERAL.

This section contains illustrations to be referred to while you are performing the UUT test. When the UUT test program directs you to refer to an illustration in this manual, locate the illustration and refer to it for assistance while you perform the following instructions on the VDT.

2-15. GENERAL. (CONT)

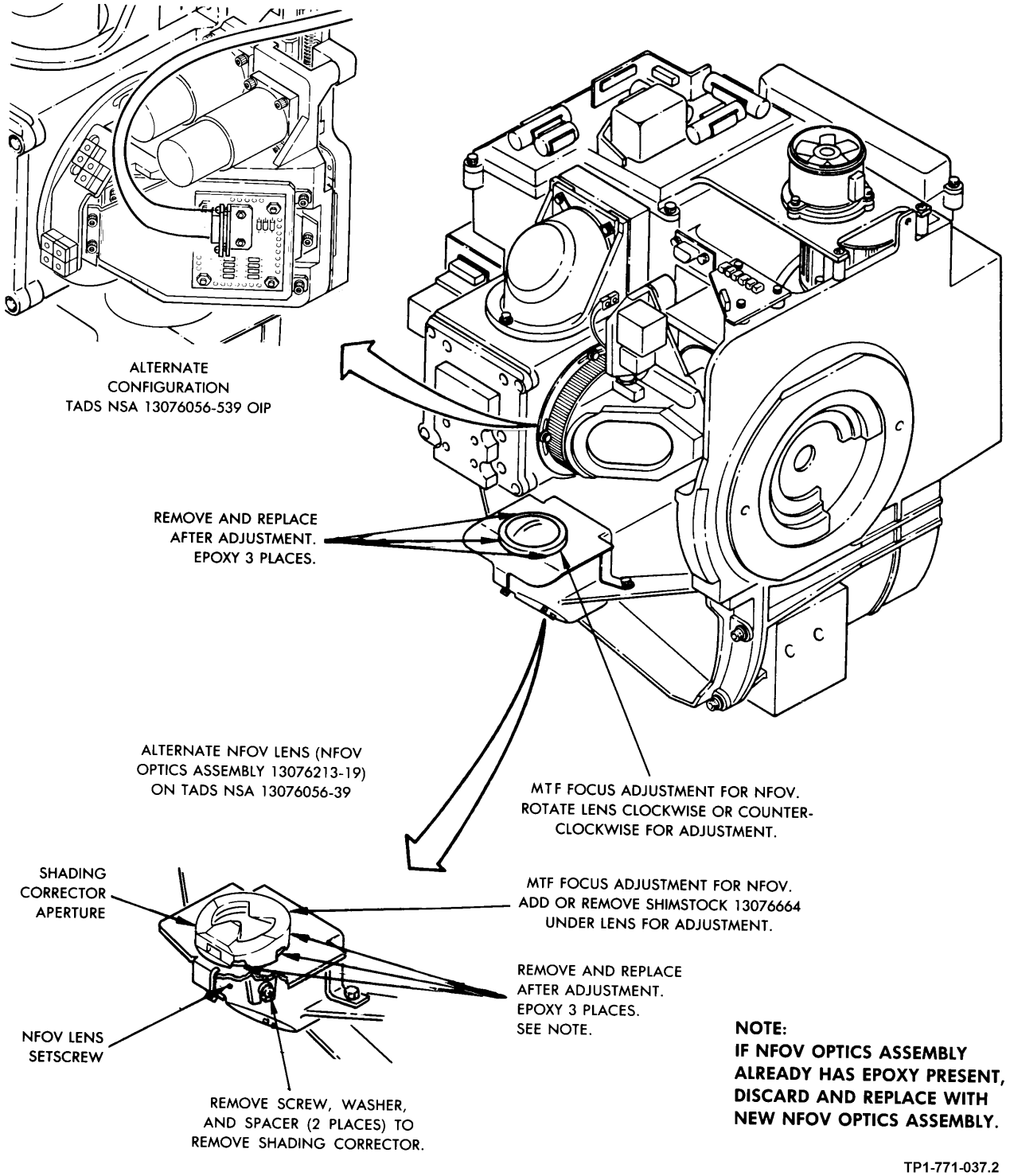


Figure 2-29. TADS Night Sensor Assembly (Sheet 1 of 2)

2-15. GENERAL. (CONT)

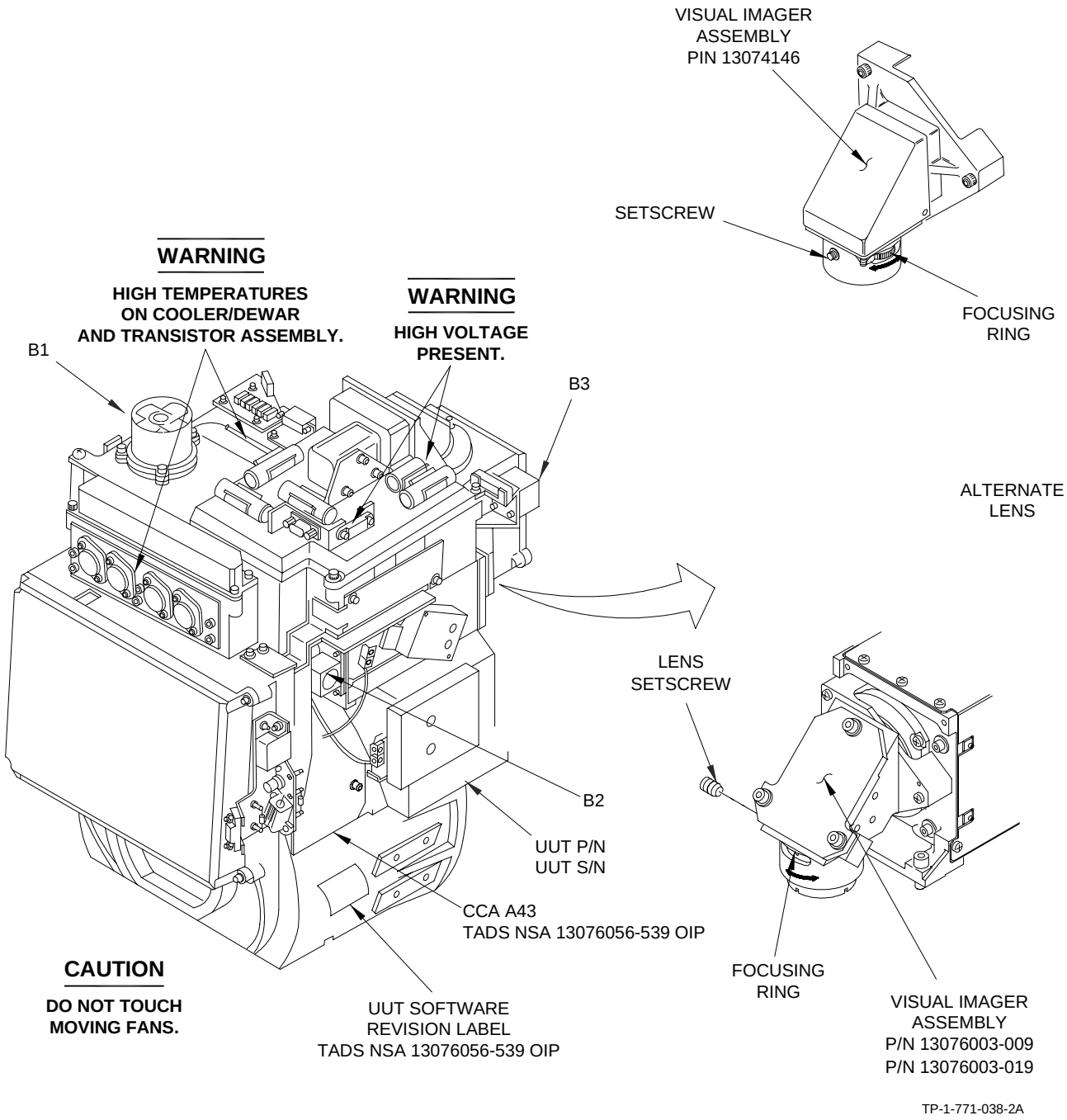


Figure 2-29. TADS Night Sensor Assembly (Sheet 2 of 2)

2-15. GENERAL. (CONT)

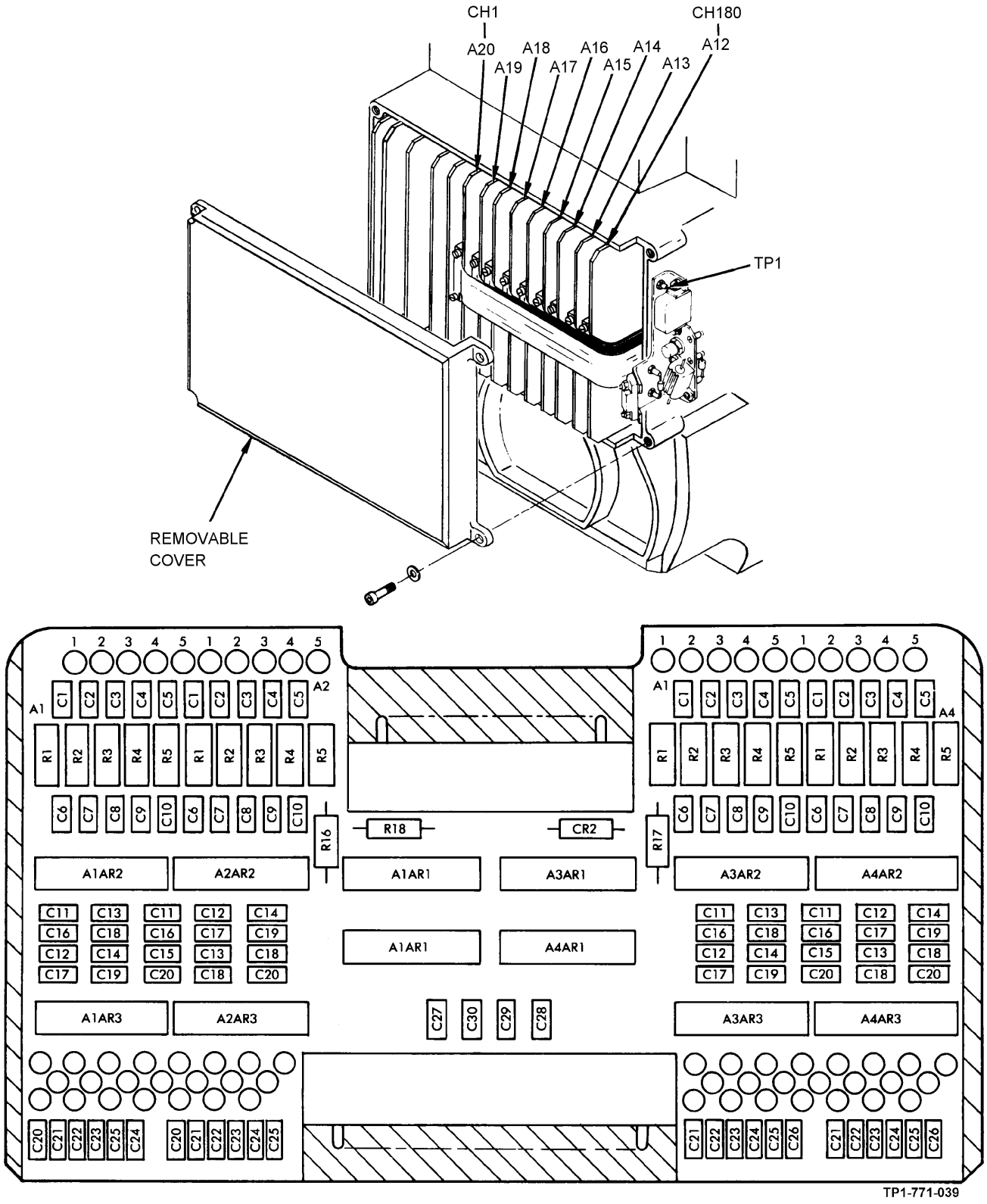


Figure 2-30. Video Post Amplifier-Control Driver CCA Location and Layout

2-15. GENERAL. (CONT)

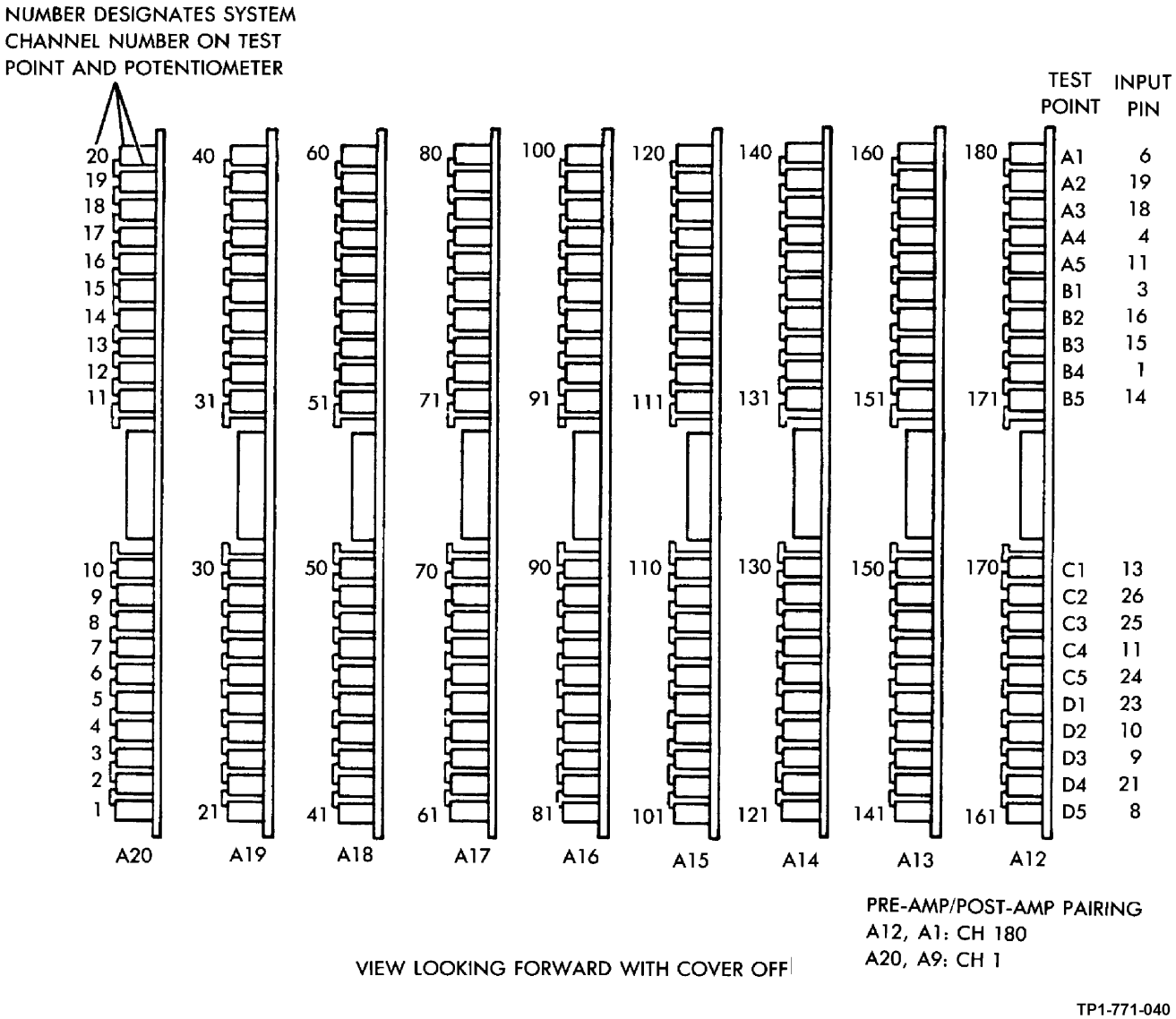


Figure 2-31. Video Post Amplifier-Control Driver CCA Channel Locations

2-15. GENERAL. (CONT)

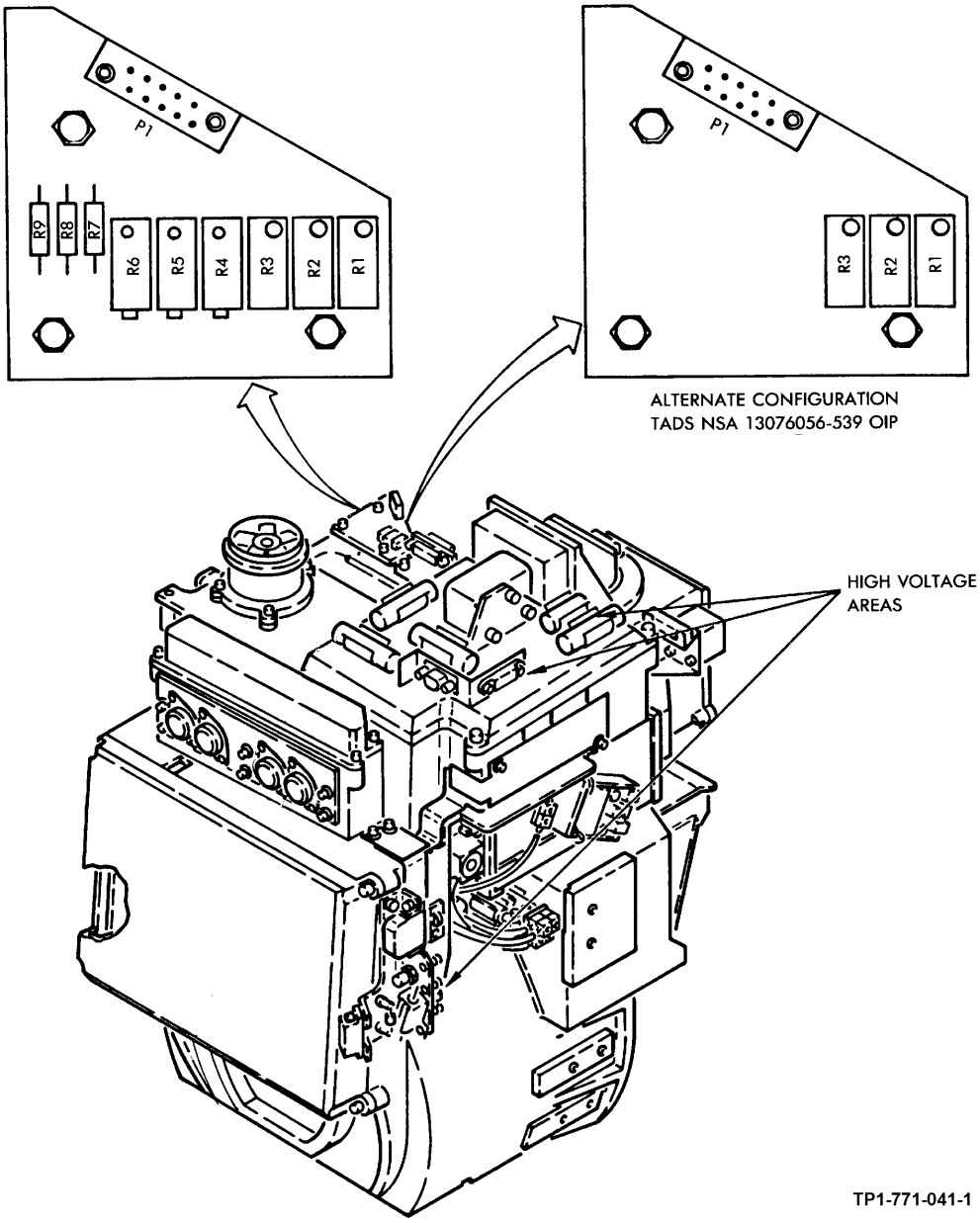


Figure 2-32. Focus Adjust Pot CCA (A37) Location

2-15. GENERAL. (CONT)

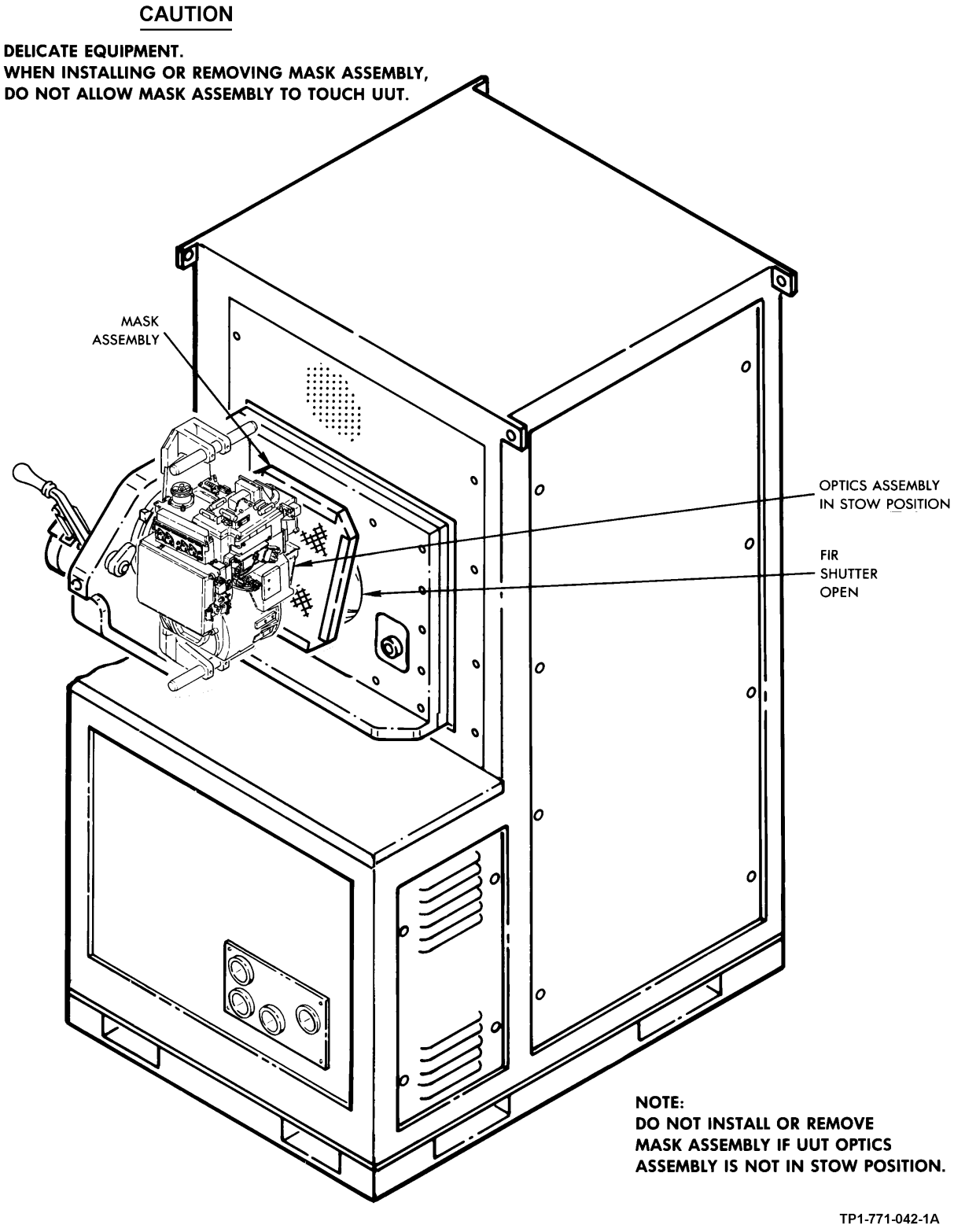


Figure 2-33. Mask Assembly Installation

2-15. GENERAL. (CONT)

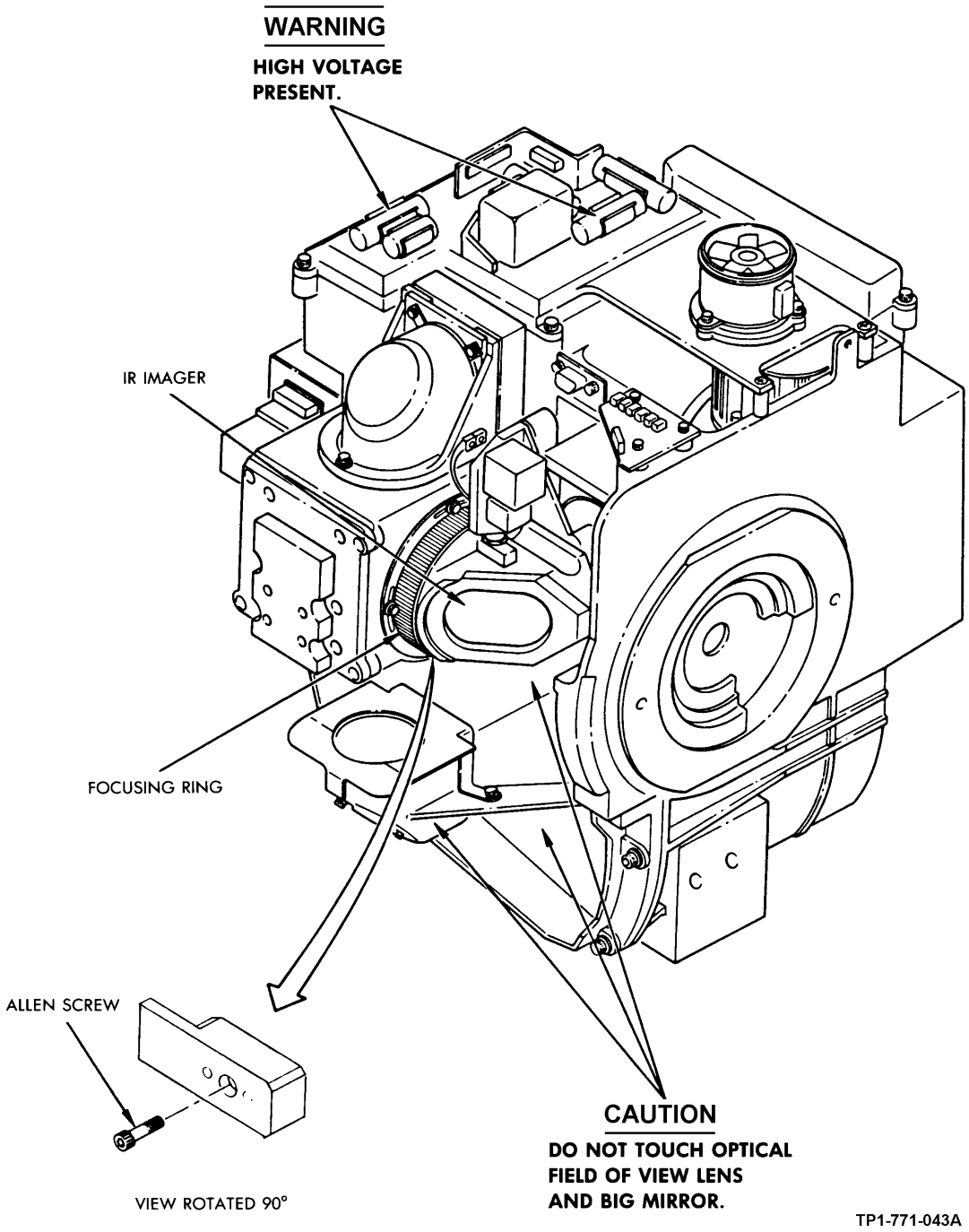


Figure 2-34. IR Imager Adjustment

2-15. GENERAL. (CONT)

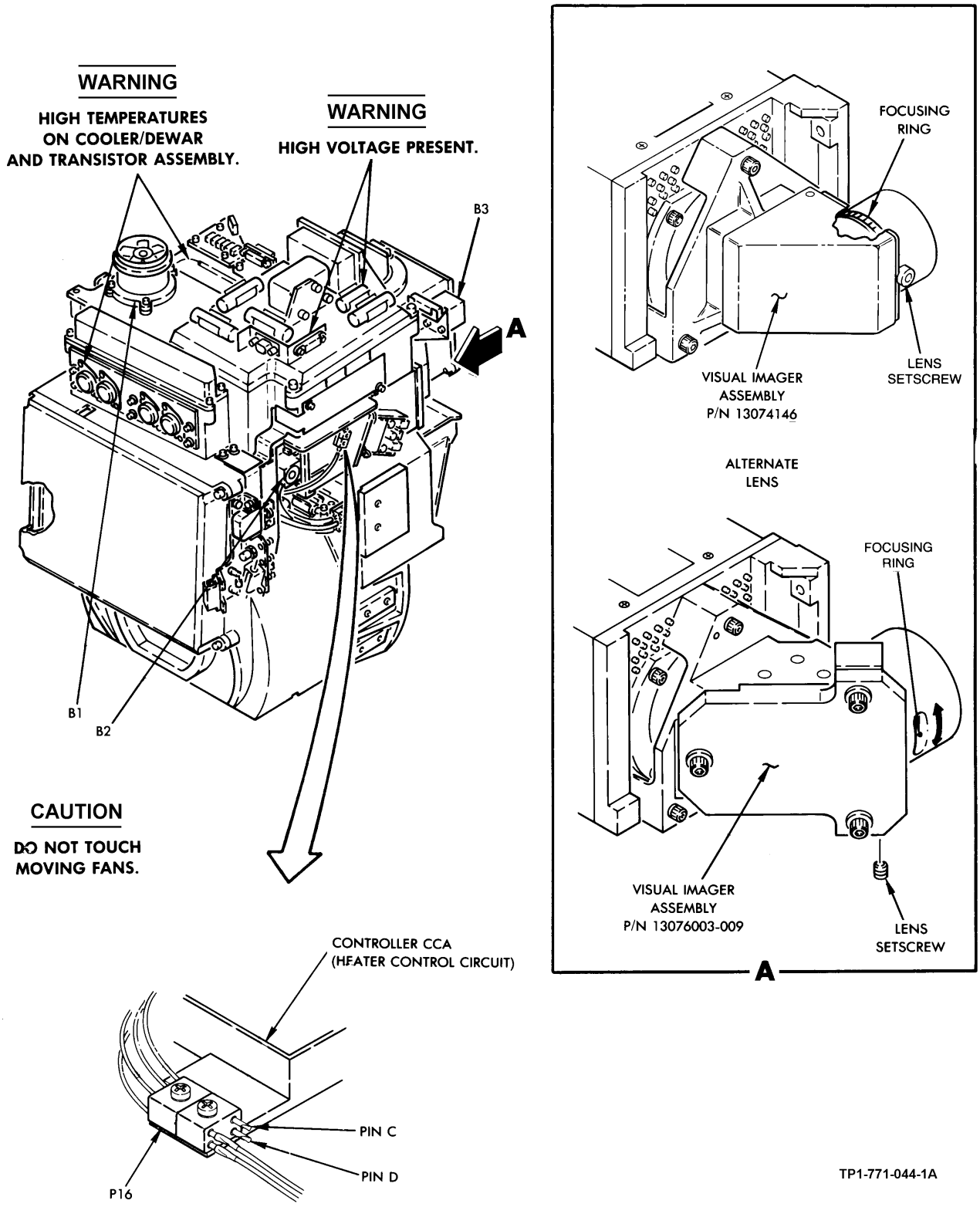


Figure 2-35. Imager Assembly Adjustment (Sheet 1 of 2)

2-15. GENERAL. (CONT)

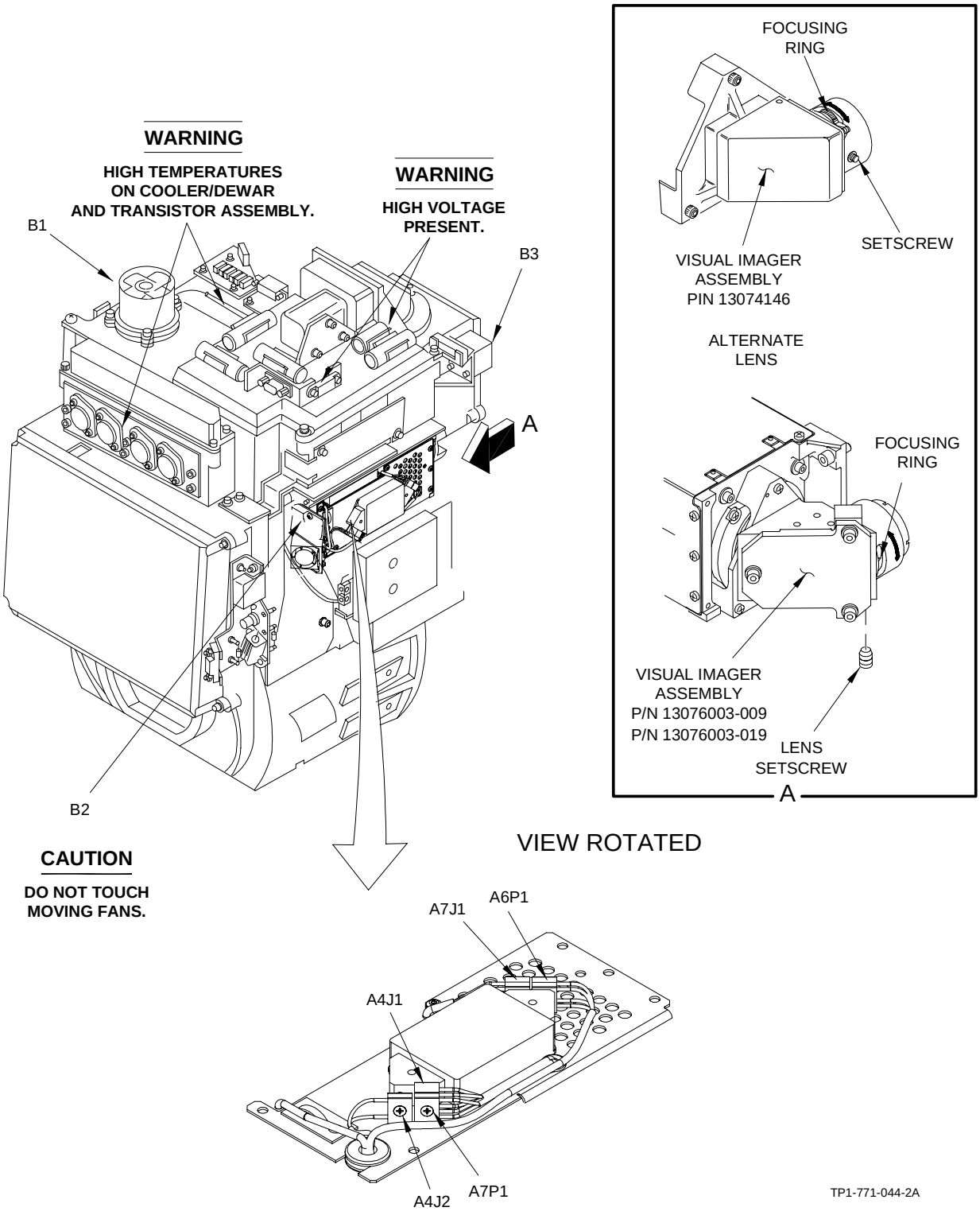


Figure 2-35. Imager Assembly Adjustment (Sheet 2 of 2)

2-15. GENERAL. (CONT)

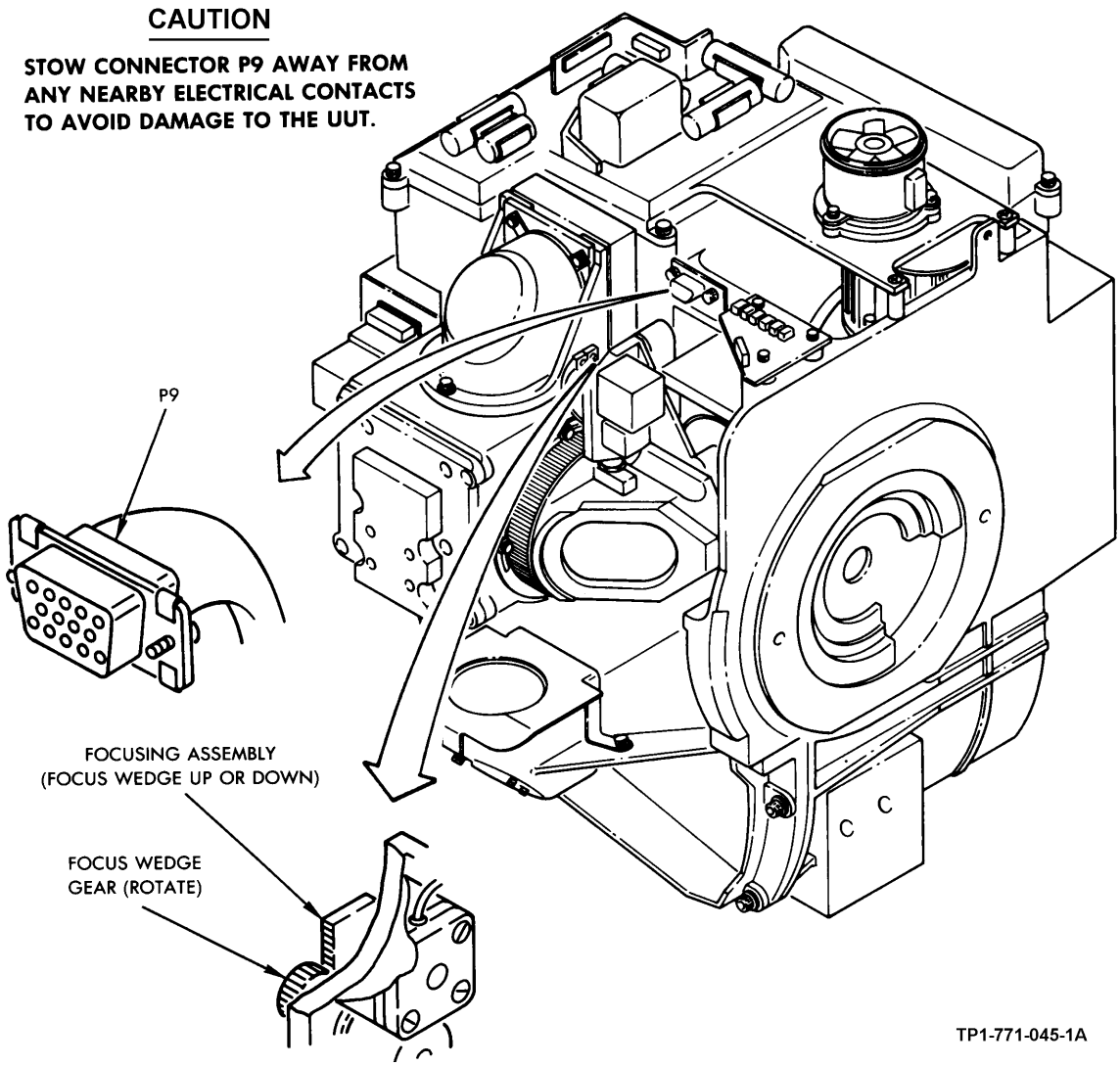


Figure 2-36. Connector P9 and Focusing Assembly Locations

2-15. GENERAL. (CONT)

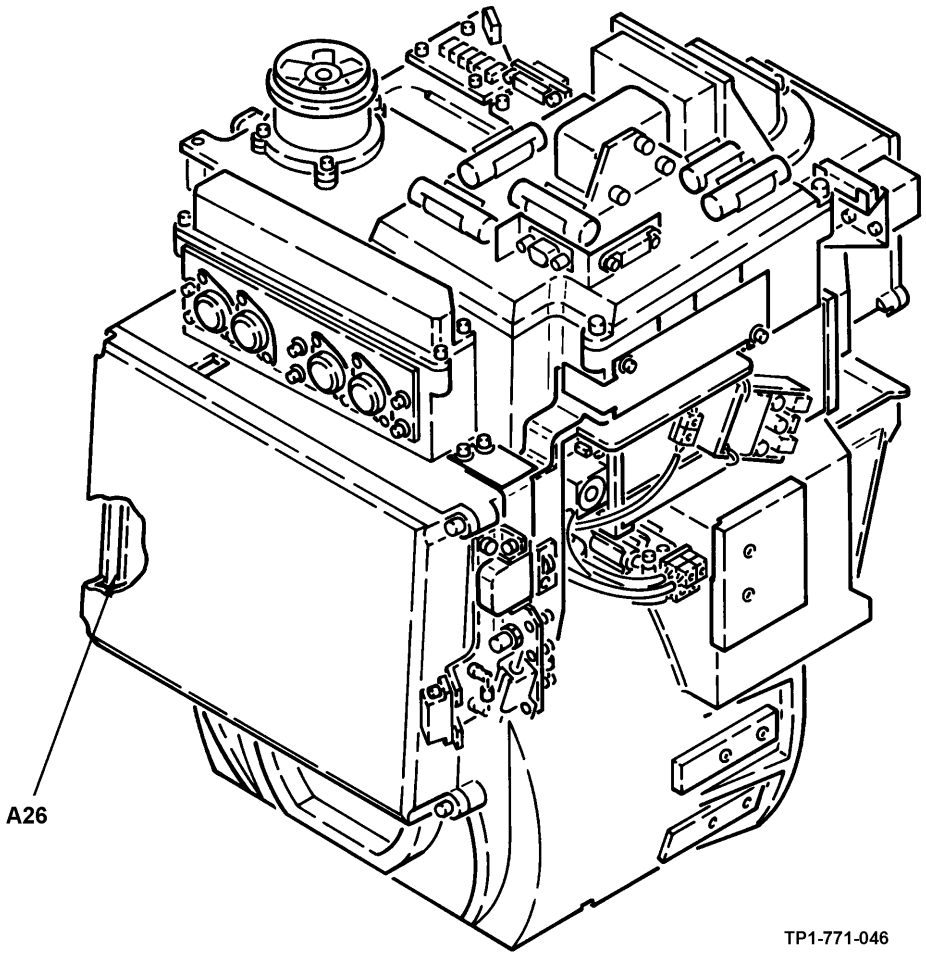


Figure 2-37. Focus Control CCA Location

2-15. GENERAL. (CONT)

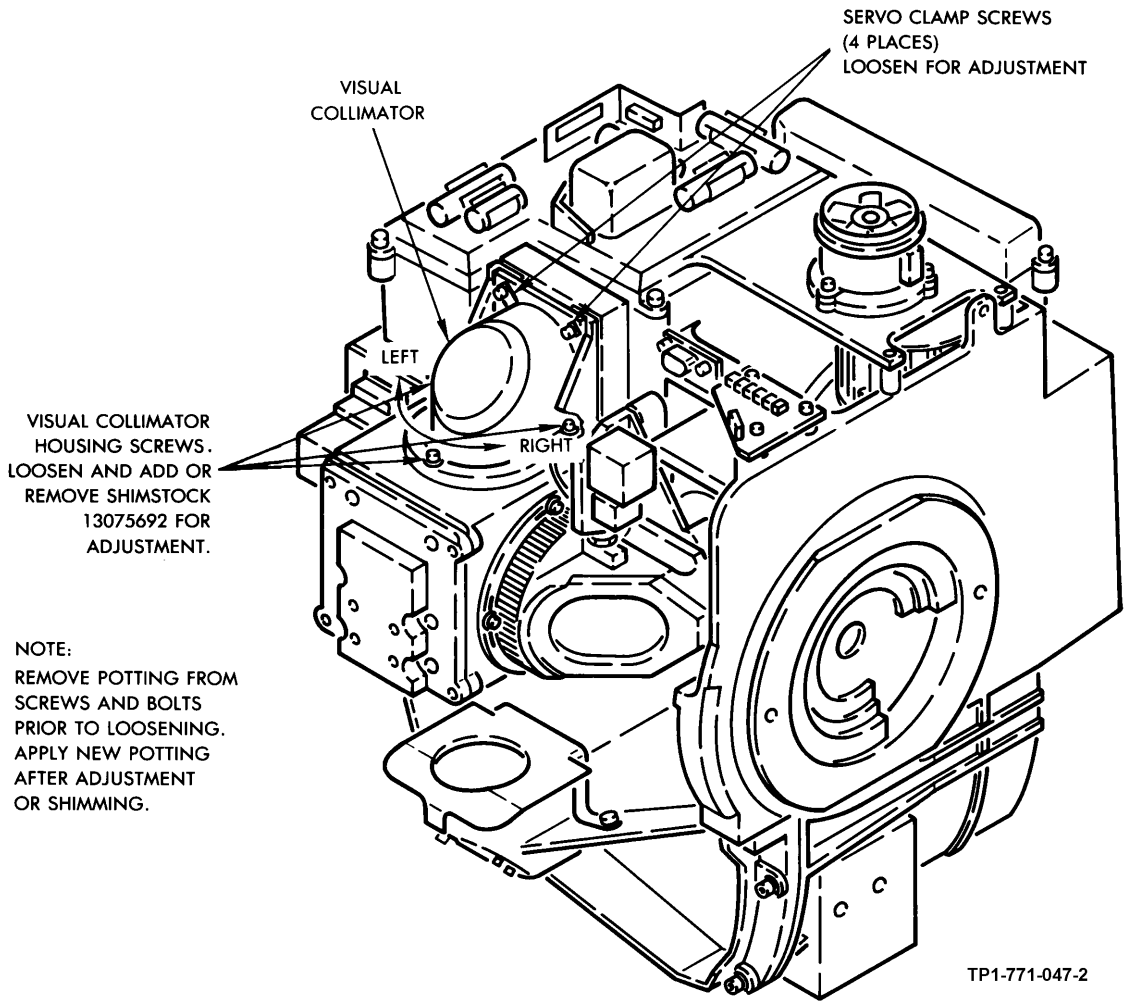


Figure 2-38. Visual Collimator Location for Boresight Adjustment

2-15. GENERAL. (CONT)

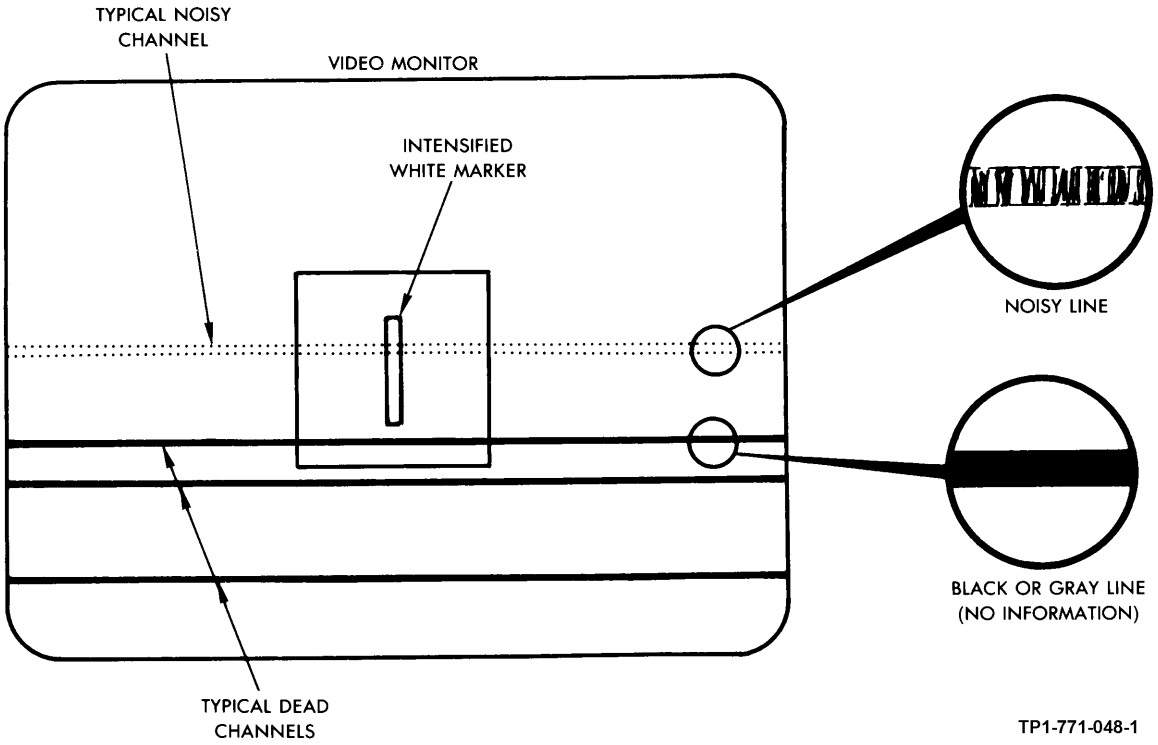


Figure 2-39. Dead Channel Identification

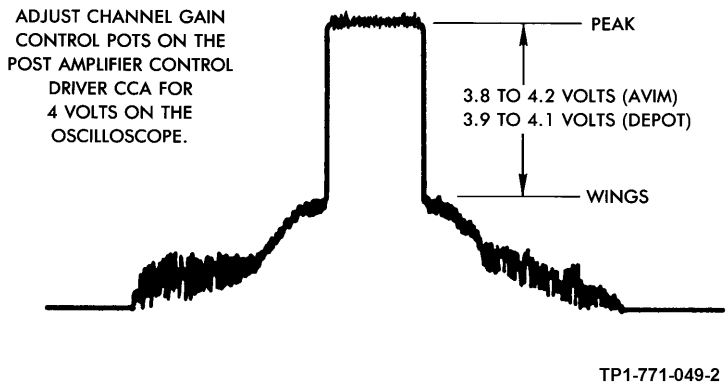


Figure 2-40. Channel Balance Adjustment Waveform

2-15. GENERAL. (CONT)

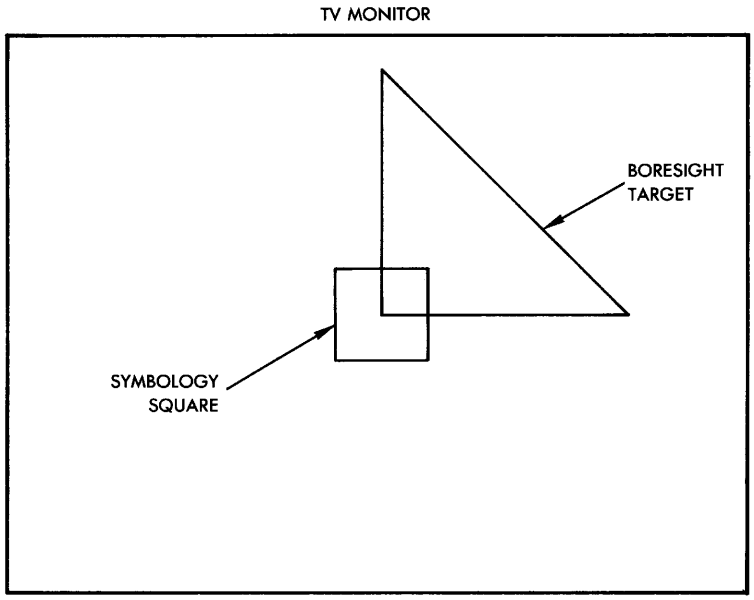


Figure 2-41. Boresight Target

2-15. GENERAL. (CONT)

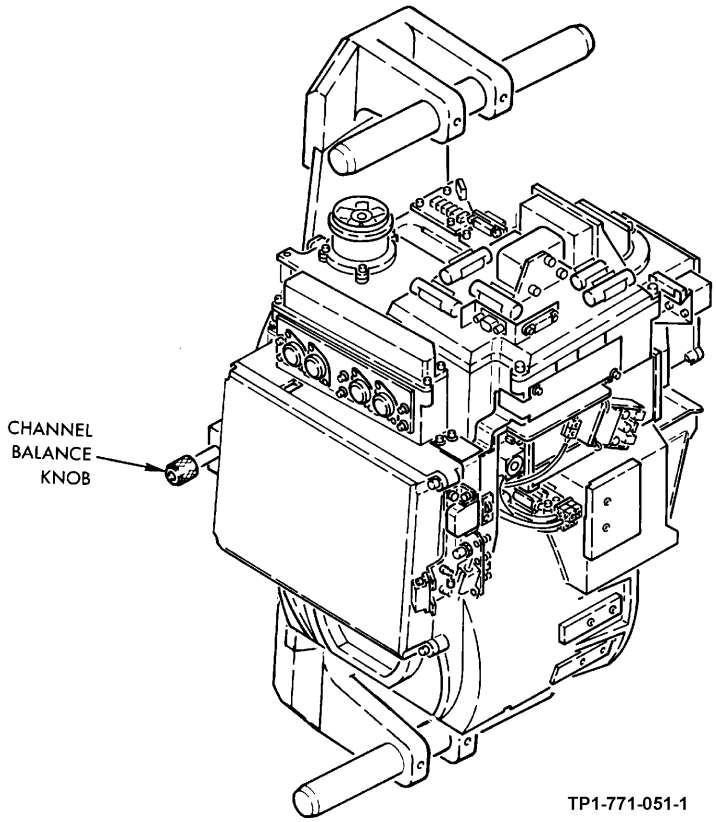


Figure 2-42. Channel Balance Knob Location

2-15. GENERAL. (CONT)

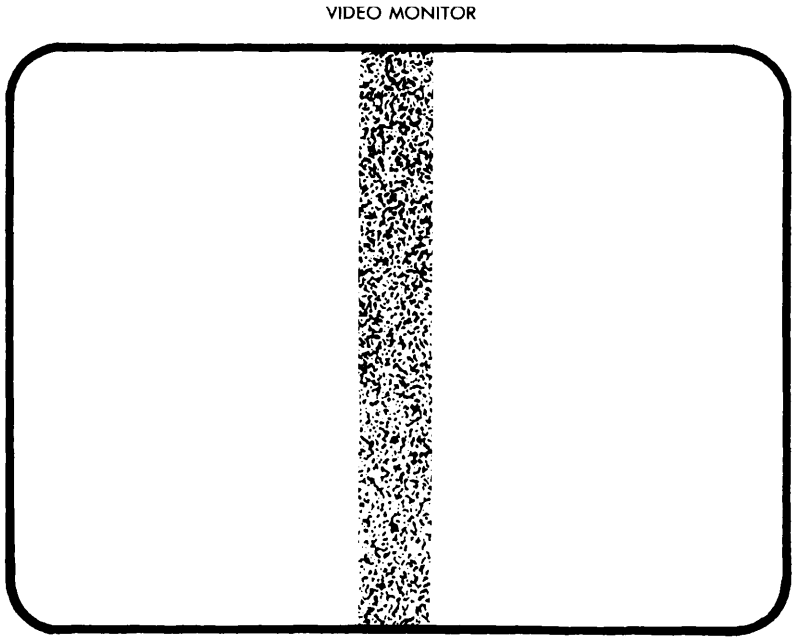


Figure 2-43. Wide Field of View Narcissus Pattern

2-15. GENERAL. (CONT)

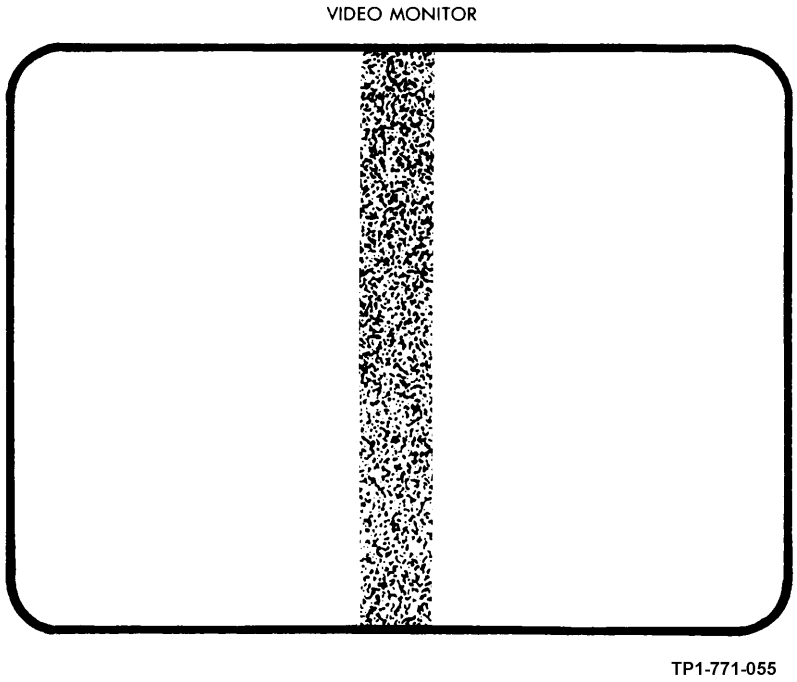


Figure 2-44. Medium Field of View Narcissus Pattern

2-15. GENERAL. (CONT)

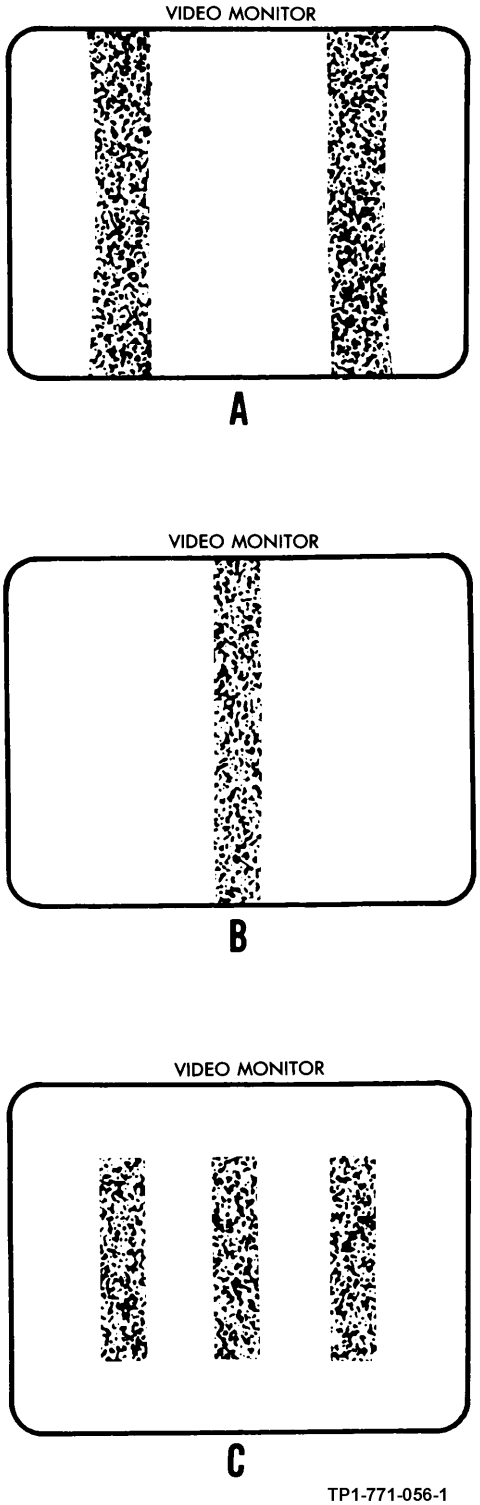


Figure 2-45. Narrow Field of View Narcissus Pattern

2-15. GENERAL. (CONT)

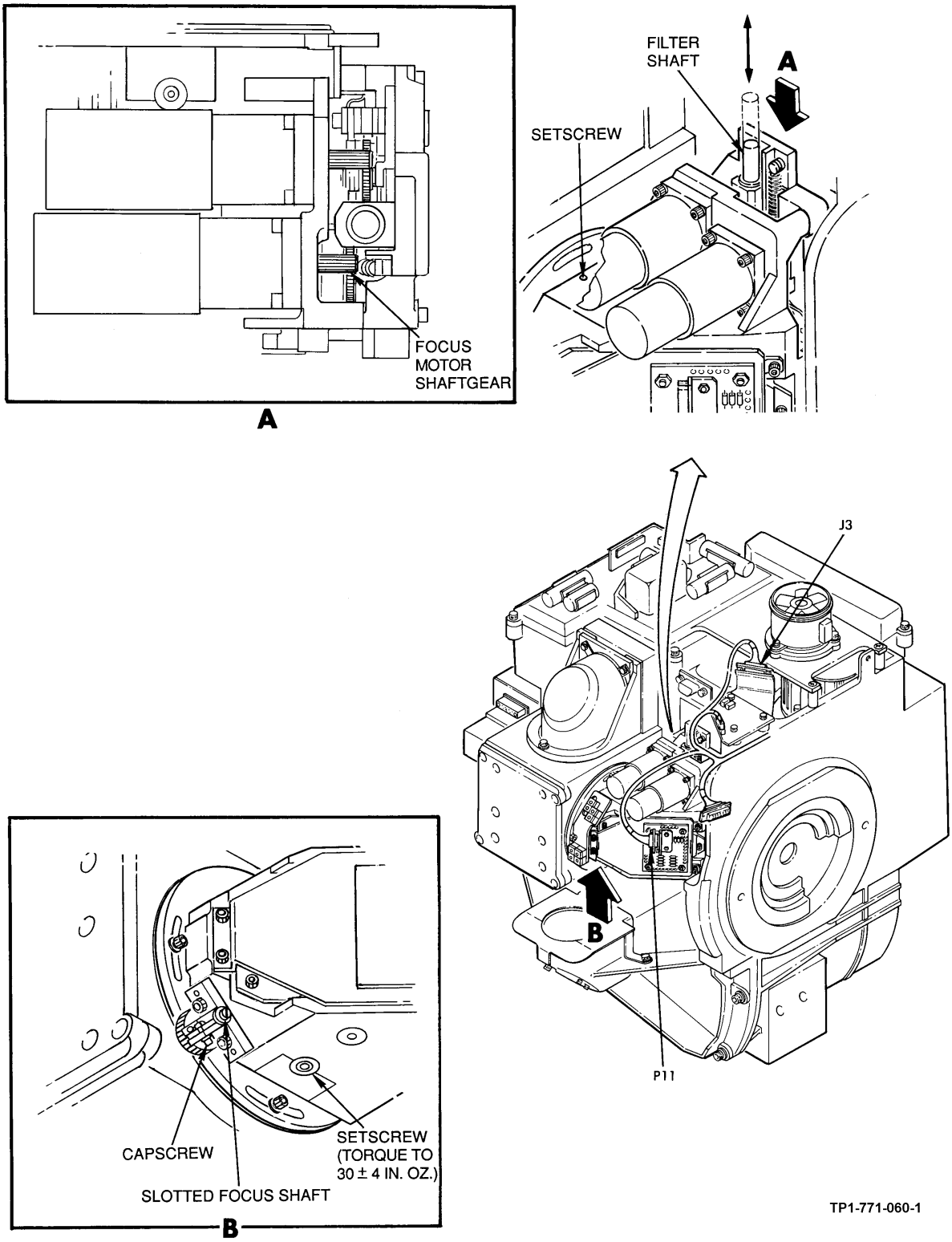


Figure 2-46. OIA Focus Adjustment

2-15. GENERAL. (CONT)

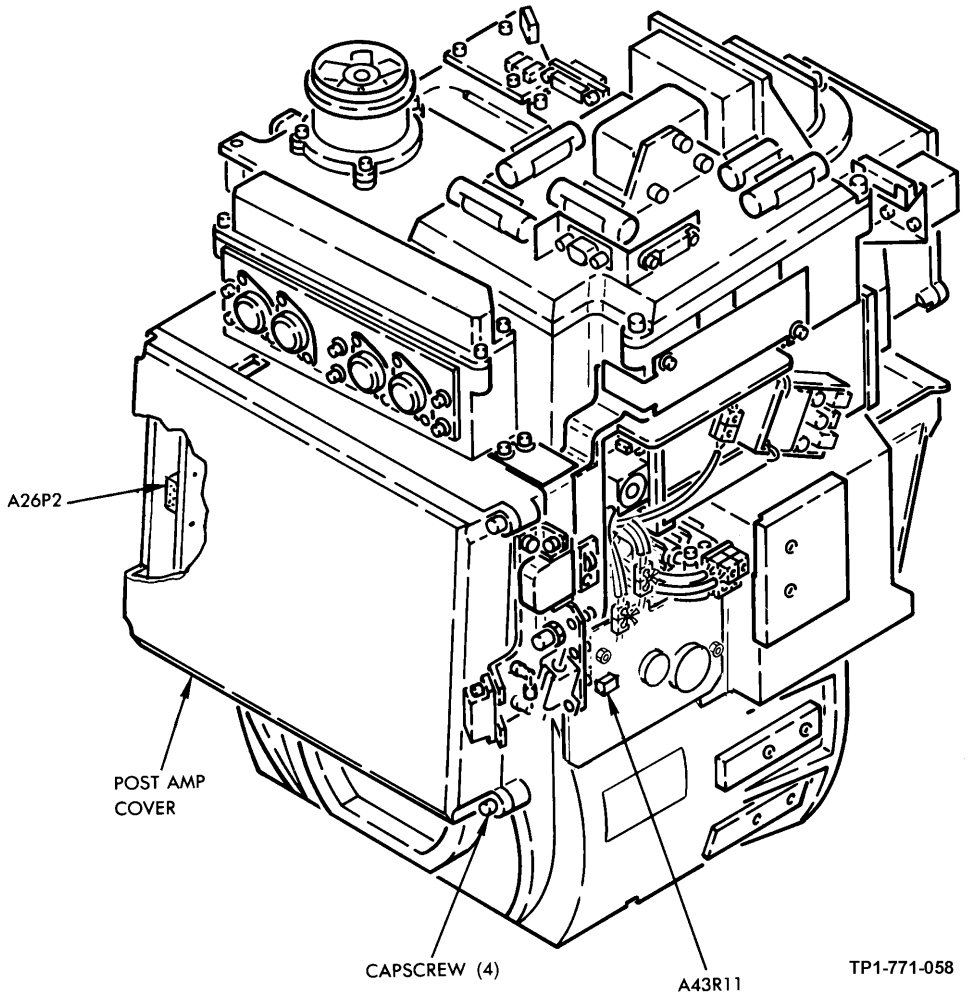


Figure 2-47. Driver CCA Location

2-15. GENERAL. (CONT)

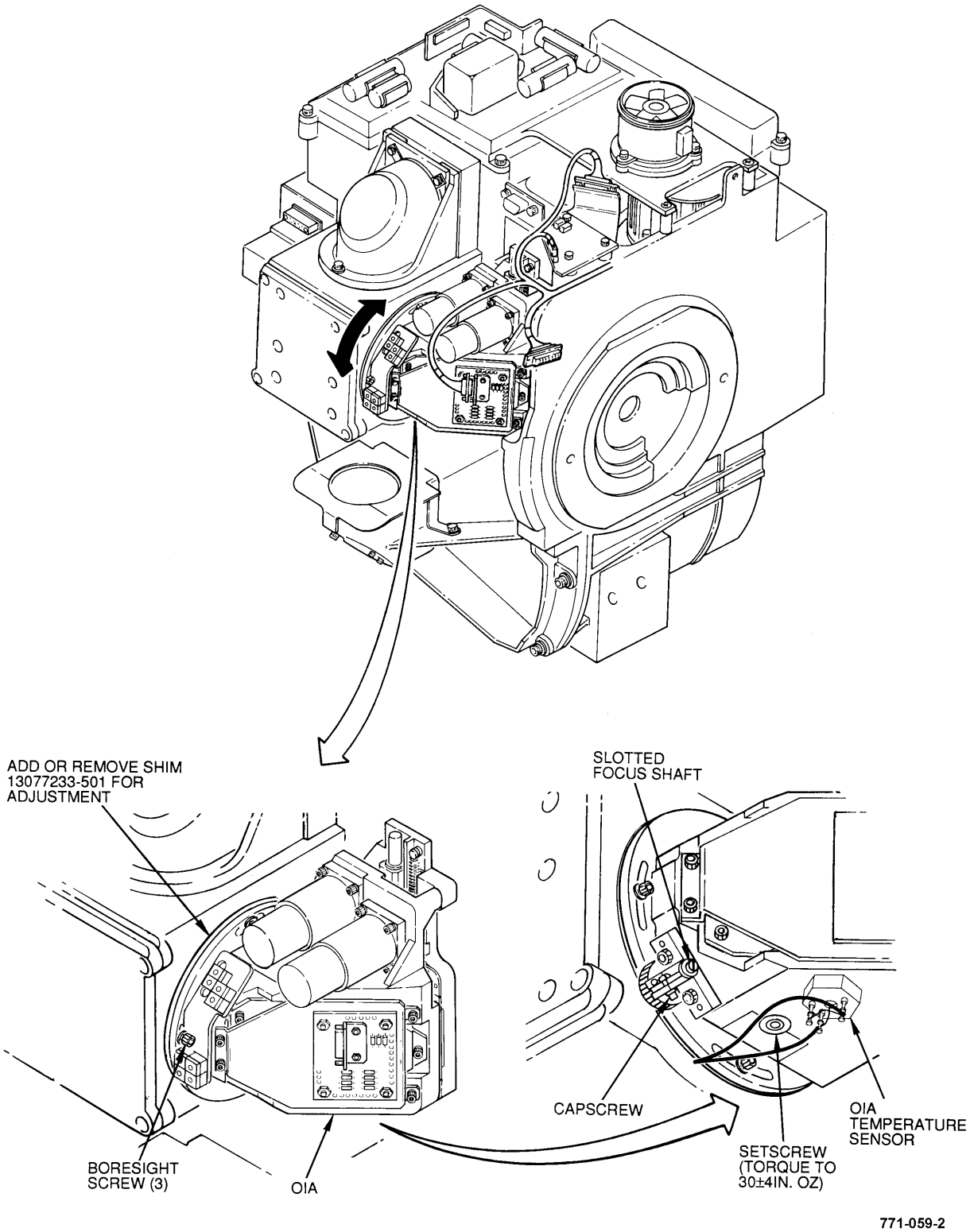


Figure 2-48. OIA Boresight Adjustment

2-15. GENERAL. (CONT)

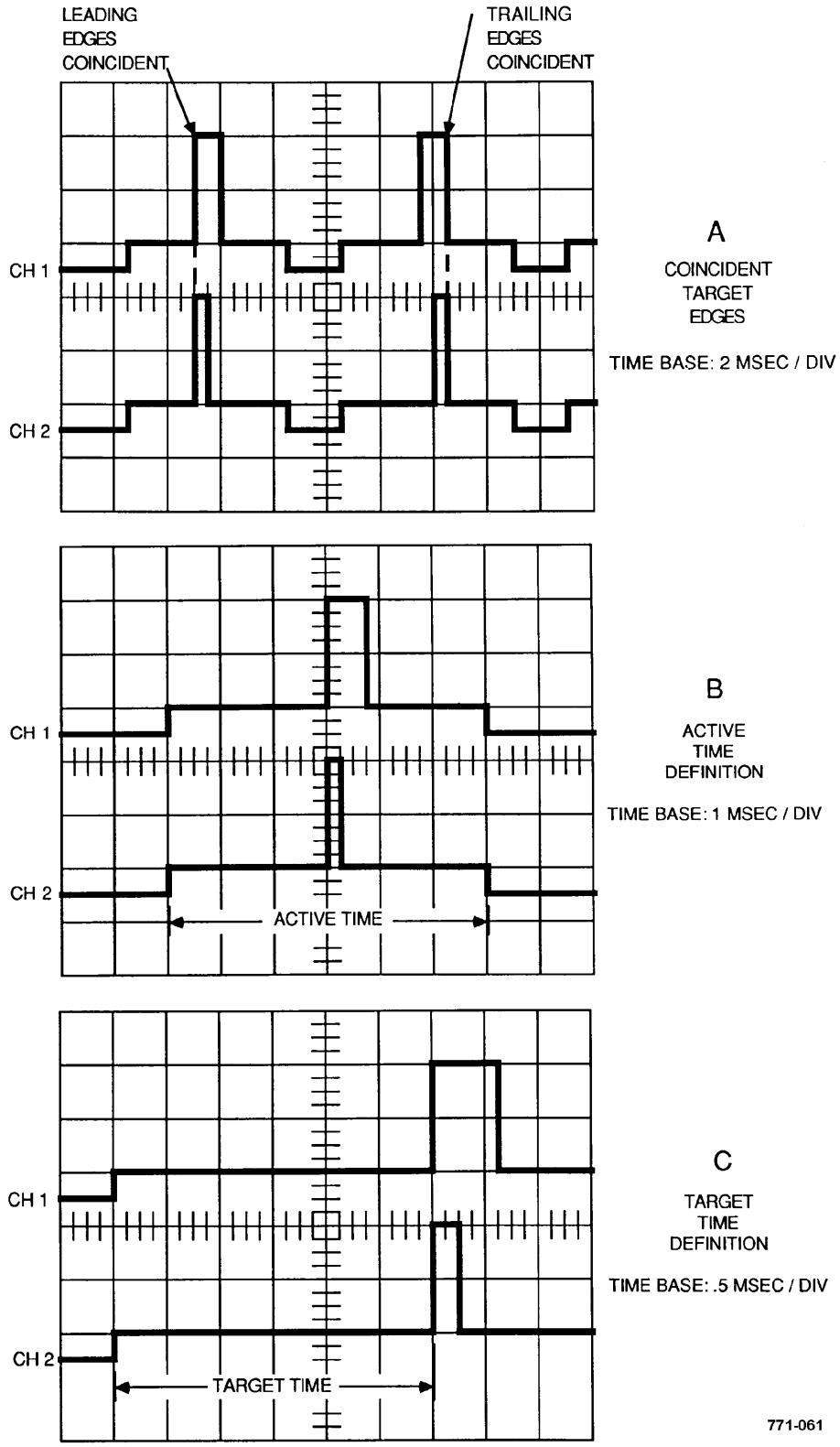


Figure 2-49. OIA Rotation Adjustment

CHAPTER 3

PNVS NIGHT SENSOR ASSEMBLY

Section I. PREPARATION FOR TEST

3-1. TEST PREPARATION.

No special procedures are required to prepare the PNVS Night Sensor Assembly (NSA) for test. Refer to the UUT/TPS/interface device matrix tables in appendix B to determine the correct UUT test program part number for the PNVS NSA. Then refer to the UUT test program for a list of cables, test equipment, and test accessories required to test the PNVS NSA.

3-2. UUT DESCRIPTION.

The PNVS NSA (figure 3-1) is a forward looking infrared (IR) target imaging and designating assembly that converts IR image scenes into video to be used for target designating and tracking. It contains no operating controls or indicators. All components of the TADS NSA that are referenced during the UUT test are shown in the illustrations in section IV.

3-3. PRECAUTIONS.

The PNVS NSA is an electro-mechanical device containing delicate electro-optical components: Use extreme care when handling the PNVS NSA to prevent damage to these components. Observe the following general guidelines when lifting or moving it.

a. Weight. The PNVS NSA weighs 44 pounds. Always get help when lifting or moving it.

b. Optics. Do not touch optics assemblies with your bare hands. Do not use the optics assemblies for any purpose when lifting the PNVS NSA. If you accidentally place any pressure or force on the optics assemblies, you could contaminate them, damage them, or cause misalinement. Whenever possible, mount the PNVS NSA onto its handling fixture when movement is necessary.

3-3. PRECAUTIONS. (CONT)

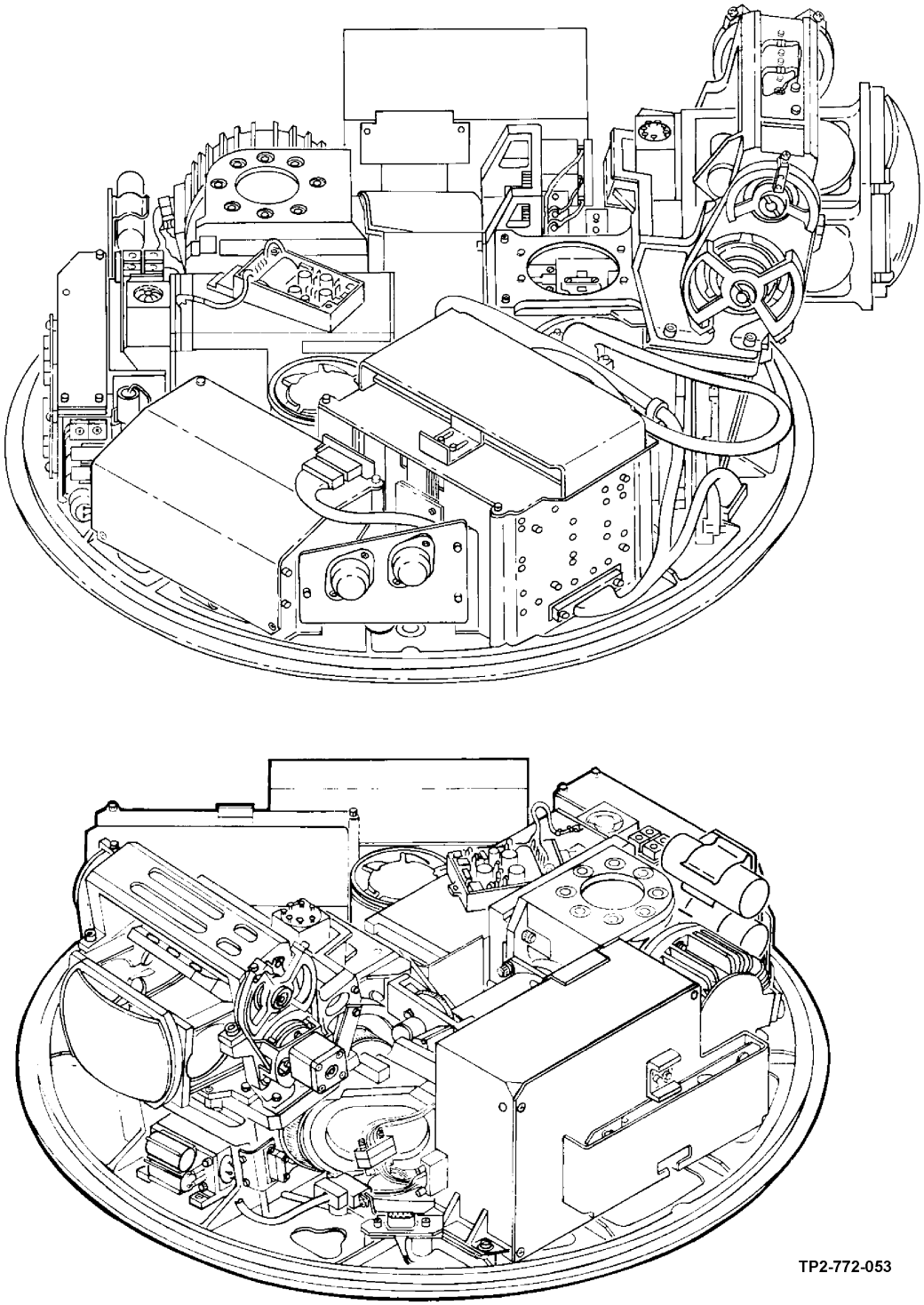


Figure 3-1. PNVS Night Sensor Assembly

Section II. DESCRIPTION OF TEST

3-4. GENERAL.

This section describes the UUT test for the PNVS NSA. It includes an explanation of the way testing is accomplished and a description of the test.

3-5. TEST CONCEPT.

The UUT test for the PNVS NSA is supplemented by procedures in section III of this chapter, and by illustrations in section IV. While you are performing the UUT test, message prompts on the VDT will direct you to perform one of the procedures in section III, or to locate a part of the PNVS NSA in section IV.

a. Procedures. Section III contains procedures to install and remove the PNVS NSA and associated adapters from the nightside test bench, to perform boresight displacement measurement, and to operate the EETF pneumatic system. These procedures do not apply to the VUT test until called for by the test program. At the appropriate time during the test, a message prompt on the VDT will direct you to perform the procedures in one or more paragraphs in this section. At that time, turn to the referenced paragraph and perform those procedures, as the program cannot continue until they have been performed.

b. Illustrations. Section IV contains illustrations showing different views of the PNVS NSA and calling out components that require some operator action. In addition, the illustrations have warning notes that call your attention to high voltage, moving fans, and high temperature areas on the PNVS NSA. At the appropriate time during the test, a message prompt will refer to an illustration in section IV. Turn to the referenced illustration for assistance while performing the following instructions on the VDT.

3-6. TEST DESCRIPTION.

When the VUT test program has run the selected self-tests and the PNVS NSA has passed the cooldown test, the following menu will be displayed on the VDT:

3-6. TEST DESCRIPTION. (CONT)

SELECT TESTING OPTION FROM MENU BELOW:

AUTOMATICALLY EXECUTE ALL TESTS IN ORDER	(1)	<RETURN>
ELECTRONICS TEST	(2)	<RETURN>
BORESIGHT TEST	(3)	<RETURN>
MODULATION TRANSFER FUNCTION (MTF) TEST	(4)	<RETURN>
AUTOMATIC CONTROL MODULE (ACM) TEST	(5)	<RETURN>
NOISE EQUIVALENT TEMPERATURE DIFFERENCE (NETD)/ MINIMUM RESOLVABLE TEMPERATURE (MRT) TEST	(6)	<RETURN>
SYSTEM INTENSITY TRANSFER FUNCTION (SIT) MAX & MIN TEST	(7)	<RETURN>
ELECTRO-OPTIC NOISE (EON) TEST	(8)	<RETURN>
CHANNEL BALANCE TEST	(9)	<RETURN>
DISPLAY MENU USE INSTRUCTIONS	(10)	<RETURN>
DISPLAY STATUS OF TESTS (PASSED/INCOMPLETE)	(11)	<RETURN>
TERMINATE TESTING	(12)	<RETURN>

Paragraphs a through i below explain test options 1 through 9. Options 10 through 12 are not tests, and do not require explanations.

a. **AUTOMATICALLY EXECUTE ALL TESTS IN ORDER**. You should normally select this option to begin testing a PNVS NSA UUT. Also select it if you are not sure which specific test you want to run. At the AVIM level, the program will run tests 2 through 6. At the depot level, it will run tests 2 through 8. If other menu selections have already been successfully performed, however, only those that have not passed or have not been selected will be performed. If the PNVS NSA passes all tests, an ALL TESTS GO prompt will appear on the VDT.

b. **ELECTRONICS TEST**. This test checks the electronics circuits in the NSA. Included is a functional test and timeout check of the cooler. As proper operation of the cooler is essential for accurate optics performance, you should not perform any optics tests until the NSA has successfully completed the electronics test. You can bypass this test when you reenter the program to run individual tests, but only if the cooler temperature sensor indicates that the NSA is cooled.

c. **BORESIGHT TEST**. This test checks boresight. If boresight is out of tolerance, you will be directed by the program to adjust potentiometers on the boresight CCA. During boresight test, you will be asked if a white triangle is present on the video monitor, in order to verify that the visual relay/multiplexer vidicon beam current has not drifted out of specification during operational use. If the triangle is not white, you will be directed to replace the visual relay/multiplexer. If excessive dead or noisy channels are observed, you will be directed by the program to perform channel balance.

d. **MODULATION TRANSFER FUNCTION (MTF) TEST**. This test checks the resolution performance of the PNVS NSA. If MTF is out of tolerance, you will be directed to adjust the IR focus potentiometer, the IR focus ring, or the visual multiplexer lens.

3-6. TEST DESCRIPTION. (CONT)

e. **AUTOMATIC CONTROL MODULE (ACM) TEST**. This test checks the ACM to ensure that the FLIR can automatically adjust itself to the brightness and contrast of the target and the area around the target. No adjustments are associated with the ACM test.

f. **NOISE EQUIVALENT TEMPERATURE DIFFERENCE (NETD)/MINIMUM RESOLVABLE TEMPERATURE (MRT) TEST**. The NETD test measures the RMS noise of the UUT in terms of equivalent input target temperature change. The MRT test measures the minimum target temperature change that is resolvable by the human eye in the displayed target image. There are no operator adjustments.

g. **SYSTEM INTENSITY TRANSFER FUNCTION (SIT) MAX & MIN TEST**. This depot level test measures the transfer function (output video to input temperature change) of the UUT and verifies its dynamic range. It verifies that the maximum gain is sufficiently high to provide viewing of the minimum required target temperature change. It also verifies that minimum gain prevents saturation of the maximum required target temperature change. If the test results are out of tolerance, you will be directed to perform channel balance.

h. **ELECTRO-OPTIC NOISE (EON) TEST**. This depot level test checks the video output for shading when the UUT views a uniform temperature target mask. If the test results are out of tolerance, you will be directed to perform channel balance.

i. **CHANNEL BALANCE TEST**. This procedure is used to detect dead or noisy channels on the video monitor. Routines built into the procedure direct you to perform replacements and/or adjustments as necessary. Perform channel balance as follows:

(1) Perform the full channel balance on all 180 channels when cooler/dewar A29/A30 has been replaced.

(2) Perform a partial channel balance on affected channels when dead or noisy channels have been identified on the video monitor. Also perform a partial channel balance when preamplifier or postamplifier CCAs have been replaced or moved.

Channel balance will only pass if the first and last channels adjusted are good channels. The program will keep track of any bad channels that are encountered during adjustment, and will provide applicable replacement instructions.

3-7. PRETESTING DATA.

Awareness of the following information will help you to successfully test the PNVS NSA, and may prevent unnecessary termination of the test.

a. Noise. When power is applied to the scanner assembly and cooler/dewar assembly, they make a considerable amount of noise. This is normal operation, and the program should not be terminated. Also, the scanner assembly does not start at the same time as the cooler/dewar. This increases the operating noise.

3-7. PRETESTING DATA. (CONT)

b. Mirror Movement. At the beginning of the test, after power is applied but before the gyros have spun up, the elevation mirror position will oscillate. Once the gyro has reached operating speed, no further oscillation should occur.

c. Test Program Delays. At times, the UUT test program will appear to have stopped for up to 20 minutes. This is because some portions of the program require this amount of time to execute. During these times, a prompt will appear on the VDT explaining that a program delay is in progress.

3-8. FINAL ACCEPTANCE.

When the PNVS NSA has been repaired, repeat the UUT test. If an ALL TESTS GO prompt is received at the end of the test, the PNVS NSA is considered to be fully operational.

Section III. TEST PROMPTED PROCEDURES

3-9. GENERAL.

This section contains procedures to be performed in conjunction with the procedures in the VUT test program for the PNVS NSA. When the UUT test program directs you to perform a procedure in this manual, locate the referenced paragraphs) in this section and perform the actions indicated. If you are directed to enter a value into the test program, do so and then press the RETURN key on the VDT as directed in the procedure. If not, press the PROCEED key and the test program will continue.

3-10. NIGHTSIDE TEST BENCH 2A3 BORESIGHT DISPLACEMENT MEASUREMENT.

This paragraph covers the steps required to perform boresight displacement measurement on test bench 2A3.

a. Nightside Alinement Tool Assembly and Insert/Adapter Installation on Nightside Test Bench.

NOTE

Two people are required when performing this task.

(1) Install insert/adapter (1, figure 3-2) on sensor mount assembly (2) as follows:

(a) Push sensor mount handle (3) to unlock position (away from operator).

(b) Position insert/adapter against sensor mount assembly so that alinement pins on insert/adapter mounting surface mate with mounting holes on sensor mount assembly mounting surface.

(c) Lock insert/adapter in place by pulling sensor mount handle to lock position (toward operator).

(d) Make sure clamp assembly (4) is fully open.

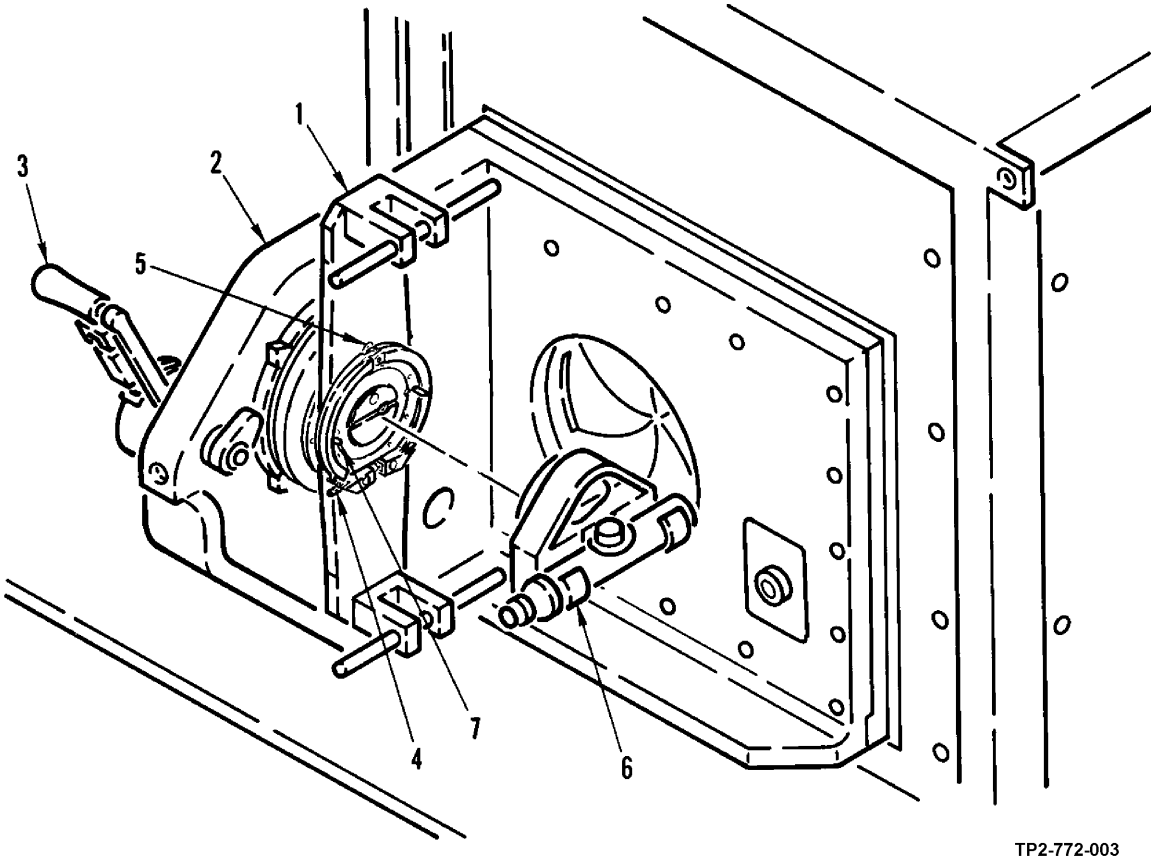


Figure 3-2. Insert/Adapter and Alinement Tool Assembly Mounting to Sensor Mount Assembly

CAUTION

EQUIPMENT DAMAGE

Ensure that clamp fitting (5) is inserted in alinement hole on insert/adapter. If it is not properly inserted, damage to clamp assembly could result when securing alinement tool to insert/adapter.

(2) Install alinement tool (6) on insert/adapter (1) as follows:

(a) Aline alinement tool with insert/adapter guide pins (7).

3-10. NIGHTSIDE TEST BENCH 2A3 BORESIGHT DISPLACEMENT MEASUREMENT. (CONT)

CAUTION

EQUIPMENT DAMAGE

When mounting alinement tool, apply equal force to both sides above guide pins. Do not allow it to tilt to one side, or binding and possible damage to guide pins will result.

(b) Mount alinement tool on insert/adapter. Ensure that both mating surfaces are in full contact with each other.

(c) Set torque wrench to 100 in-lb and use torque wrench to tighten clamp assembly. Ensure that alinement tool is secured to insert/adapter by checking for no free movement between them.

b. Boresight Displacement Measurement.

NOTE

If telescope focus cannot be obtained, have nightside alinement tool assembly calibrated by appropriate personnel.

(1) Looking through telescope eyepiece (1, figure 3-3), adjust eyepiece clockwise and counterclockwise until reticle (2) and target (3) are in focus.

(2) Looking through eyepiece, determine amount of boresight displacement by comparing target position (1, figure 3-4) to numbers on X and Y scales around reticle (2).

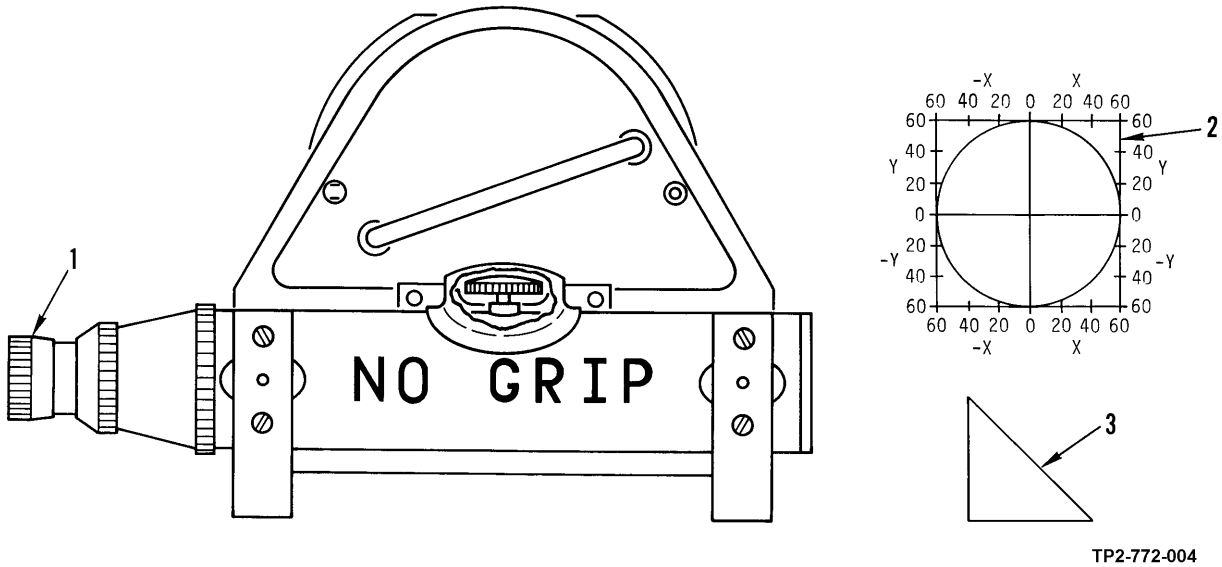


Figure 3-3. Telescope, Reticle, and Target

3-10. NIGHTSIDE TEST BENCH 2A3 BORESIGHT DISPLACEMENT MEASUREMENT. (CONT)

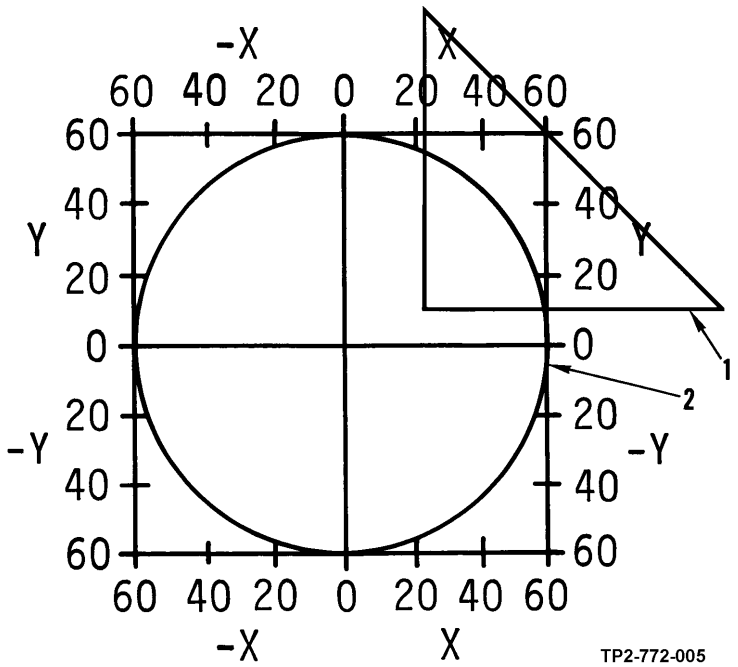


Figure 3-4. X and Y Displacement Measurement Example

NOTE

- A sample target position is shown in figure 3-4.
- Amount of X displacement is equal to point where target passes through X (horizontal) plane of reticle. Amount of Y displacement is equal to point where target passes through Y (vertical) plane of reticle.
- Sample target position is equal to an X displacement of 22 and a Y displacement of 10.

(3) On VDT, type in value of X displacement.

(4) Press RETURN key.

(5) Type in value of Y displacement.

(6) Press RETURN key.

c. Nightside Alinement Tool Assembly and Insert/Adapter Removal from Nightside Test Bench.

NOTE

Two people are required when performing this task.

(1) Hold alinement tool assembly in place on sensor mount assembly.

3-10. NIGHTSIDE TEST BENCH 2A3 BORESIGHT DISPLACEMENT MEASUREMENT. (CONT)

(2) Have assistant loosen and disengage clamp assembly securing alinement tool assembly to insert/adapter.

(3) Carefully remove alinement tool assembly and return it to its storage case.

(4) Hold insert/adapter in place on sensor mount assembly.

(5) Have assistant push sensor mount handle to unlock position (away from operator).

(6) Remove insert/adapter from sensor mount assembly.

3-11. PNVS NSA INSTALLATION ON NIGHTSIDE TEST BENCH.

This paragraph covers the steps required to remove a PNVS NSA from the shipping and storage container and install it on the nightside test bench.

a. Removal of PNVS Turret Assembly from Shipping and Storage Container and Installation on PNVS Turret Holding Fixture.

WARNING

HEAVY OBJECT

- Excessive strain can cause serious injury.
- Don't: Attempt to lift or carry heavy objects alone.
- Do: Get help for lifting or carrying heavy objects.
- If you experience a sudden pain while lifting or discomfort after lifting, get medical help at once.

CAUTION

DELICATE EQUIPMENT

- Use caution when handling the TADS NSA.
- Contact with optical elements or bands can cause damage to equipment.
- Use caution while connecting interface structure insert with mask and window assembly to TADS NSA. Damage to NSA could result if dropped.

NOTE

- The word FRONT stenciled on PNVS turret holding fixture refers to turret shroud window location.
- Two people are required when performing this task.

(1) Obtain PNVS holding fixture (1, figure 3-5) and place near PNVS turret assembly shipping and storage container (2).

(2) Open shipping and storage container as follows:

3-11. PNVS NSA INSTALLATION ON NIGHTSIDE TEST BENCH. (CONT)

(a) Press container pressure relief valve (3).

(b) Open container latches (4).

(c) Remove container lid (5) and set aside in a clean dry area.

CAUTION

EQUIPMENT DAMAGE

The black foam in the shipping container may dry rot over time creating a dust/powder/grit residue. A potential exists for abrasive damage to optics and mechanical assemblies and degradation of optical performance. Inspect and clean assemblies as required.

(d) Inspect and remove any dust, black powder, or grit from PNVS turret before opening shroud.

CAUTION

EQUIPMENT DAMAGE

Ensure that shroud window cover is installed on shroud window before proceeding.

(3) Install PNVS turret assembly on PNVS holding fixture as follows:

(a) Carefully remove turret assembly (1, figure 3-6) from container (2).

(b) Position turret assembly over turret holding fixture (3) with shroud window and cover (4) located directly over the word FRONT stenciled on holding fixture.

(c) Slowly lower turret assembly while ensuring that cable connector (5) feeds through center of turret holding fixture.

CAUTION

EQUIPMENT DAMAGE

Ensure that turret assembly alinement pin farthest from shroud window starts into holding fixture alinement hole before alinement pin nearest shroud window starts into fixture alinement slot. Failure to do so could cause bending of turret alinement pins.

(d) Aline turret alinement pins (6) with holding fixture alinement hole (7) and slot (8).

(e) Seat turret assembly on holding fixture.

3-11. PNVS NSA INSTALLATION ON NIGHTSIDE TEST BENCH. (CONT)

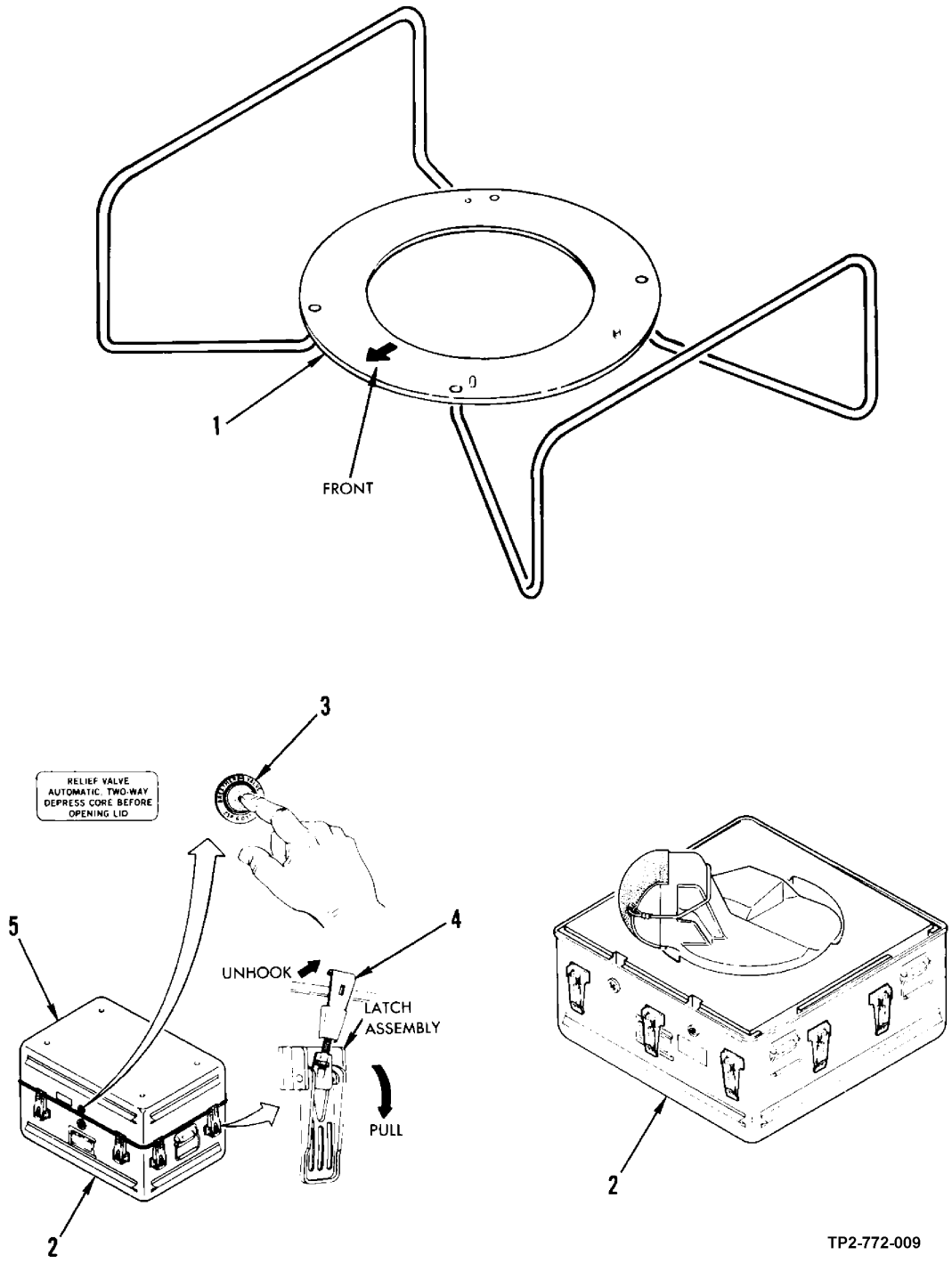


Figure 3-5. PNVS Holding Fixture and Shipping and Storage Container

3-11. PNVS NSA INSTALLATION ON NIGHTSIDE TEST BENCH. (CONT)

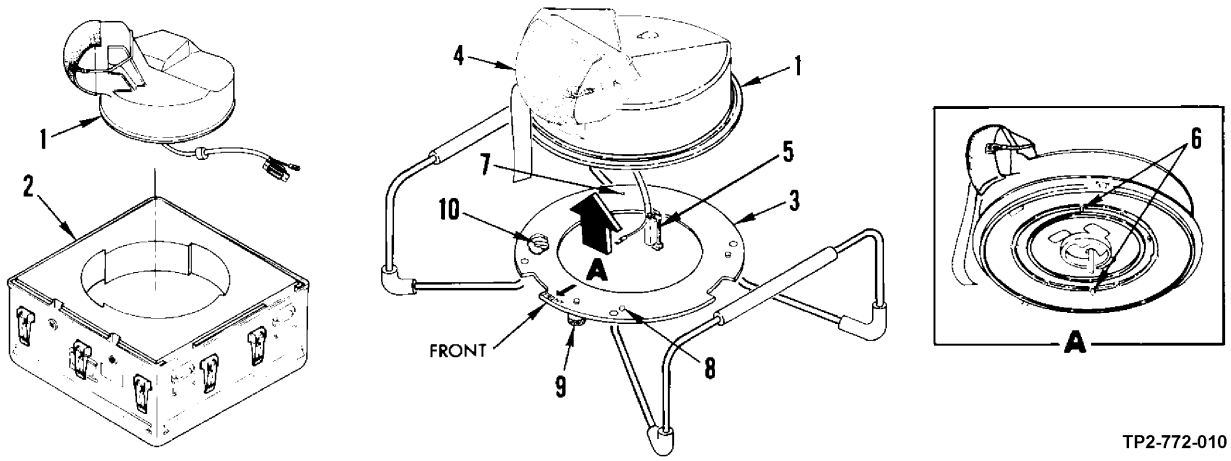


Figure 3-6. PNVS Turret Installation on PNVS Holding Fixture

(f) Hand-tighten three captive screws (9).

(g) Secure cable connector (5) in connector clamp on bottom of holding fixture (10).

b. Removal of PNVS Shroud Assembly from PNVS Turret NSA.

(1) Remove rim clenching clamp as follows:

(a) Remove and discard safety wire (1, figure 3-7) securing latch handle locking ring (2).

(b) Unlock locking ring (2) and pull handle (3) until T-bolt (4) unhooks from its catch (5).

(c) Disengage rim clenching clamp from mated rims (6 and 7) and remove from PNVS turret assembly.

(d) Tag rim clenching clamp and shroud as a matched set.

NOTE

Steps (2) and (3) apply to PNVS serial numbers 00001 through 00013. All other turret bases are marked with a groove.

(2) Locate white alinement stripe painted on shroud near rim.

(3) Using a felt tip pen, put a vertical mark on rim of turret base in line with shroud white alinement stripe.

3-11. PNVS NSA INSTALLATION ON NIGHTSIDE TEST BENCH. (CONT)

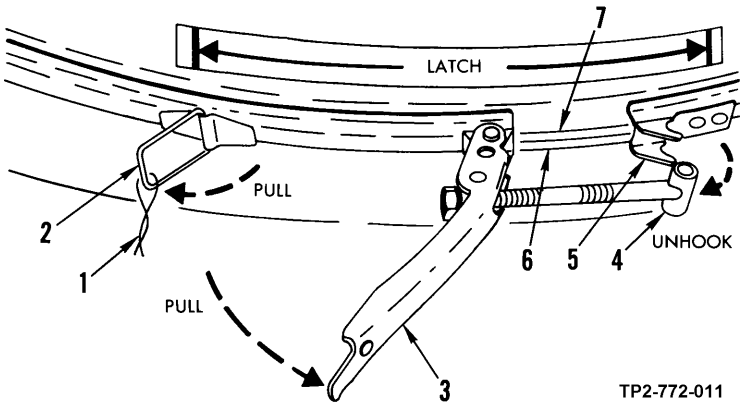


Figure 3-7. Rim Clenching Clamp Removal from PNVS Turret

NOTE

The mark that you made in step (3) will be used to aline shroud to turret base when shroud is reinstalled.

(4) Remove shroud assembly as follows:

CAUTION

DELICATE EQUIPMENT

Use care when lifting shroud assembly to prevent it from catching on PNVS NSA components and from scratching optical surfaces. Remove exactly as instructed.

NOTE

Point (2) in figure 3-8 is bottom surface of shroud balance weight. Point (3) is surface just below bottom edge of shroud window.

(a) Grasp shroud (1, figure 3-8) at points (2) and (3). Do not press against PNVS window cover assembly (4).

(b) Lift shroud straight up, approximately 1/2 inch. This action separates shroud from alinement pins.

(c) Tilt point (2) approximately 20 to 30 degrees, as shown.

(d) With shroud tilted, slowly lift shroud along a sloped path.

3-11. PNVS NSA INSTALLATION ON NIGHTSIDE TEST BENCH. (CONT)

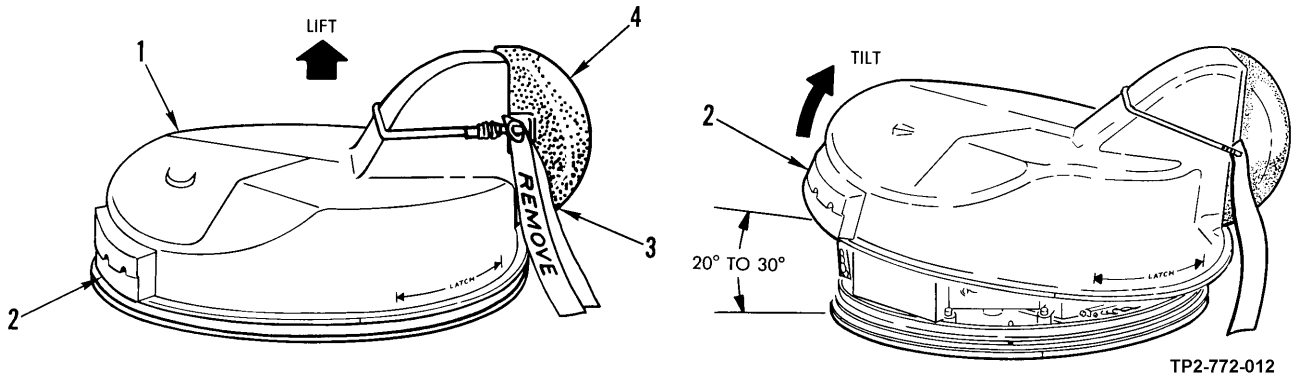


Figure 3-8. Shroud Assembly Tilting Prior to Removal from PNVS NSA

NOTE

Steps (e) and (f) require two persons. One person must support shroud assembly while second person disconnects connector P1.

(e) Continue lifting shroud (1, figure 3-9) along a sloped path until shroud clears NSA elevation mirror assembly, then support shroud so that it is clear of cable connector P1 (2).

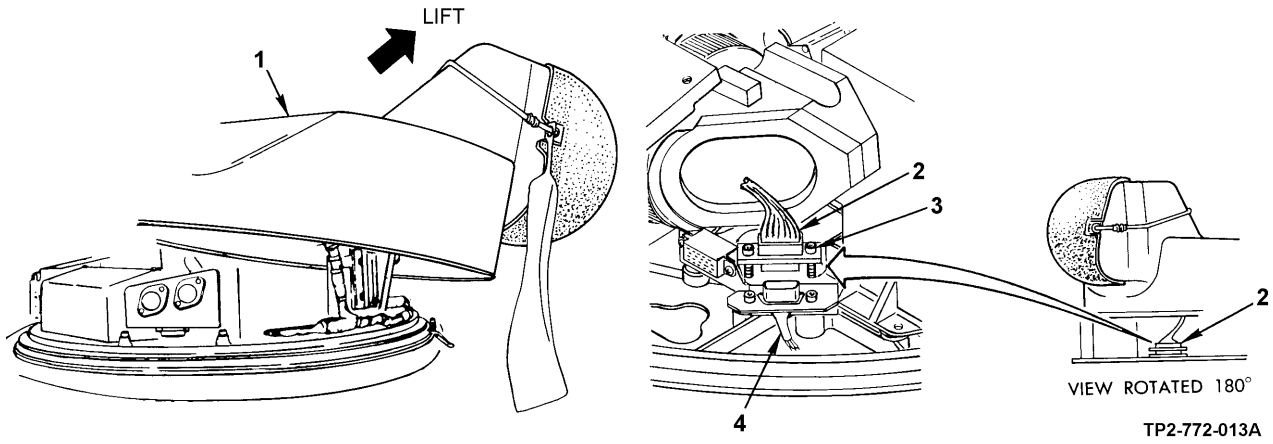


Figure 3-9. Shroud Cable Connector P1 Removal from PNVS NSA

3-11. PNVS NSA INSTALLATION ON NIGHTSIDE TEST BENCH. (CONT)

CAUTION

DELICATE EQUIPMENT

Do not touch any optical surface after removal of shroud assembly. Dirt from your hands (sweat and body oil) on optical surfaces causes an unnecessary cleaning task. Excessive cleaning will wear away coating on optical surfaces. Do not touch steel bands on mirror assemblies. The bands could bend or stretch and cause poor operation.

(f) Loosen two screwlocks (3) securing cable connector P1 (2) and disconnect P1 from J4 (4).

(g) Remove shroud from PNVS NSA and place it on a clean, dry surface for temporary storage.

c. Mounting Interface Structure Insert on PNVS NSA.

WARNING

SHARP EDGES

Use extreme caution when handling PNVS NSA. The edges of elevation mirror drive bands are sharp and may be harmful if contact is made.

(1) Remove Allen screws (1, figure 3-10) and remove mask and window assembly (2) from interface structure insert (3).

(2) Remove PNVS NSA from PNVS turret holding fixture as follows:

(a) Remove PNVS NSA cable connector (1, figure 3-11) from connector clip (2) on turret holding fixture (3).

(b) Loosen three captive screws (4) and jiggle screws to ensure that they hang freely.

(c) Lift and remove PNVS NSA (5) from turret holding fixture.

(d) Place PNVS NSA on workbench on dunnage at least 2 inches high to protect cable assembly.

3-11. PNVS NSA INSTALLATION ON NIGHTSIDE TEST BENCH. (CONT)

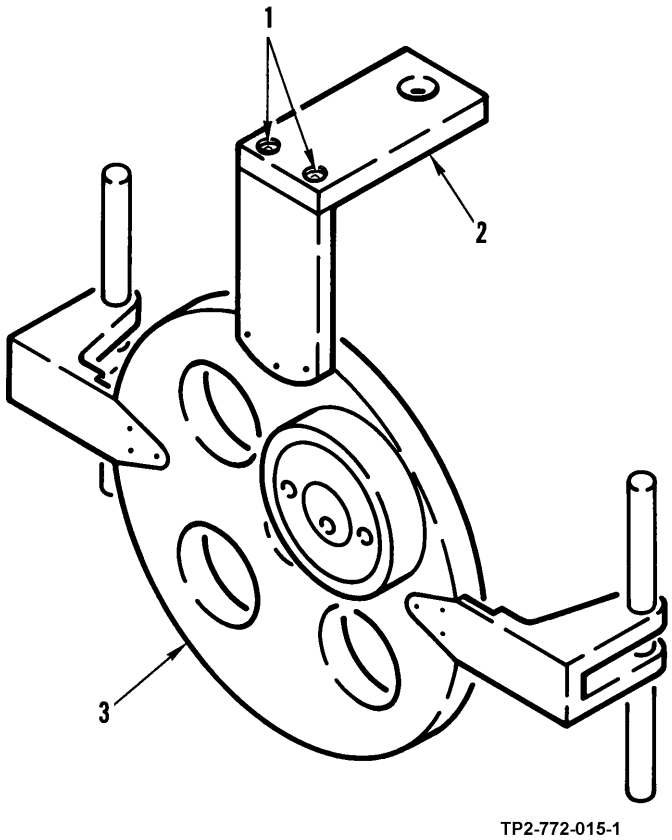


Figure 3-10. Interface Structure Insert Mask and Window Assembly Removal

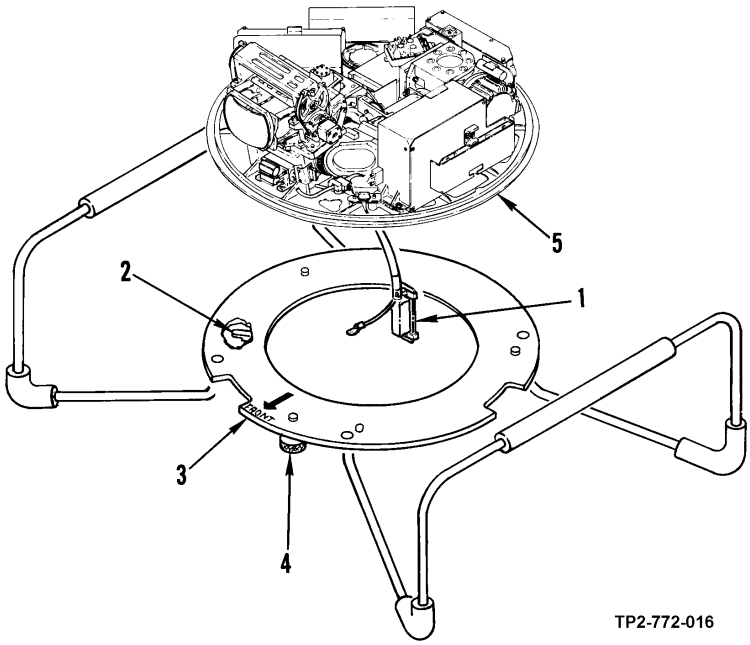


Figure 3-11. PNVS NSA Removal from PNVS Turret Holding Fixture

3-11. PNVS NSA INSTALLATION ON NIGHTSIDE TEST BENCH. (CONT)

CAUTION

DELICATE EQUIPMENT

Use caution while attaching interface structure insert and mask and window assembly to TADS NSA. Damage to PNVS NSA could result if dropped.

(3) Attach interface structure insert to PNVS NSA as follows:

(a) Balance PNVS NSA on its side (rim) on workbench with mirror pointing up.

(b) Position interface structure insert (1, figure 3-12) to aline NSA alinement pins (2).with corresponding hole and slot on interface structure insert.

(c) Insert NSA cable connector (3) through center hole of interface structure insert.

(d) Secure interface structure insert to NSA by tightening five captive Allen screws (4).

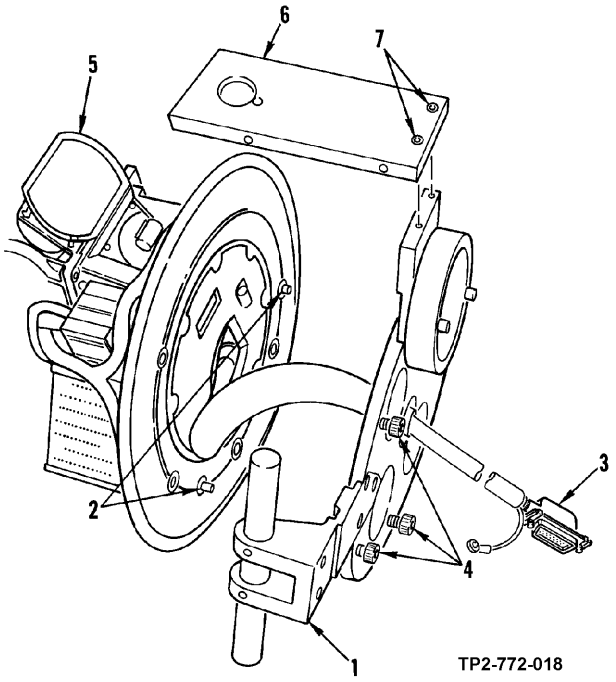


Figure 3-12. Interface Structure Insert Installation on PNVS NSA

3-11. PNVS NSA INSTALLATION ON NIGHTSIDE TEST BENCH. (CONT)

CAUTION

DELICATE EQUIPMENT

Use caution when mounting mask and window, assembly. Contact with optical components and drive bands can cause equipment damage.

(4) Lay interface structure insert down on dunnage, being careful not to damage cable connector (3).

(5) Move elevation mirror (5) fully downward toward NSA housing to protect it from damage.

(6) Reinstall mask and window assembly (6) to interface structure insert by reinstalling Allen screws (7) removed in step (1) above.

d. Pneumatic System Shutdown.

WARNING

MOVING EQUIPMENT

While performing the following procedures, stand clear of open door. Any movement of E/O test bench could cause injury.

(1) On nightside test bench (1, figure 3-13), rotate turnlock fasteners (2) 1/4 turn counterclockwise and open door (3).

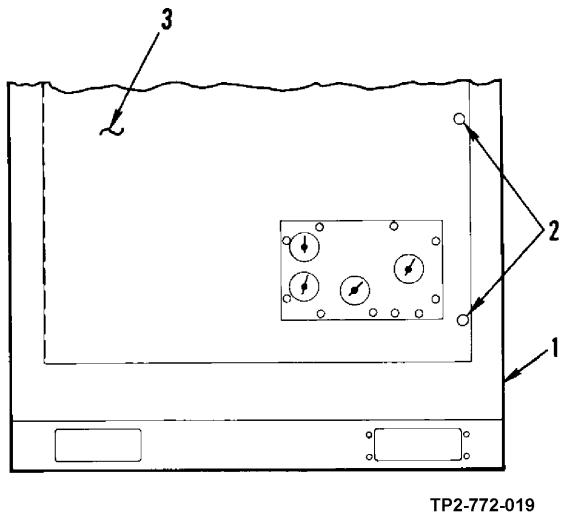


Figure 3-13. Pneumatic Control Panel

3-11. PNVS NSA INSTALLATION ON NIGHTSIDE TEST BENCH. (CONT)

NOTE

If EETF air supply is to be shut off, refer to TM 11-6625-3085-12.

(2) On rear of pneumatic control panel (1, figure 3-14), flip toggle valve (2) up (off).

WARNING

HIGH PRESSURE AIR

When deflating pneumatic system, 125 psi air is released. Do not use finger to release air. Ensure that hands and feet are clear of base assembly to prevent injury.

CAUTION

DELICATE EQUIPMENT

When deflating pneumatic system, exercise caution not to damage bleed/drain valve.

(3) Using flat side of a screwdriver tip, press and hold bleed/drain valve (3). System should deflate.

(4) Release bleed/drain valve.

(5) On nightside test bench, close door (3, figure 3-13). Push and rotate turnlock fasteners (2) 1/4 turn clockwise.

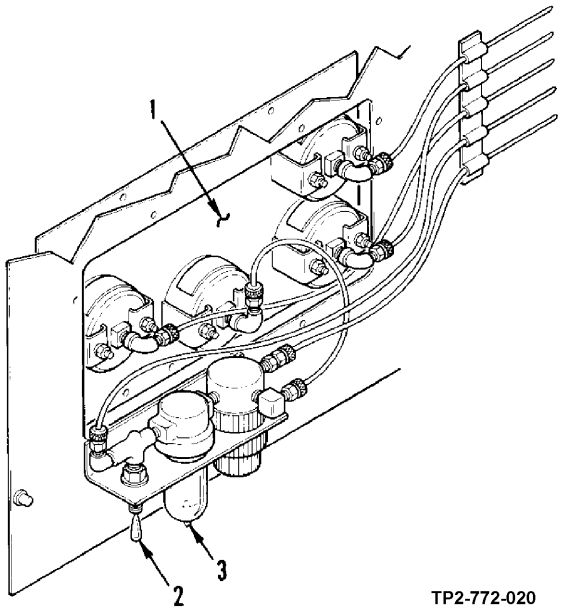


Figure 3-14. Toggle and Bleed/Drain Valve Locations

3-11. PNVS NSA INSTALLATION ON NIGHTSIDE TEST BENCH. (CONT)

e. Mounting PNVS NSA to Nightside Test Bench Sensor Mount Assembly. Mount PNVS NSA to test bench sensor mount assembly as follows:

WARNING

HEAVY OBJECT

- Don't: Attempt to lift or carry heavy objects alone.
- Do: Get help for lifting or carrying heavy objects.
- If you experience a sudden pain while lifting or discomfort after lifting, get medical help at once.

CAUTION

EQUIPMENT DAMAGE

When mounting PNVS NSA, do not allow anything to come in contact with elevation mirror.

(1) Push sensor mount handle (1, figure 3-15, sheet 1) to unlock position.

(2) Lift PNVS NSA,(2) by handles (3) of interface structure insert (4) and aline with sensor mount assembly (5).

(3) Mount PNVS NSA to sensor mount assembly. Unlatch sensor mount handle (1) and pull to lock position, to secure NSA in place.

(4) Insert PNVS NSA cable connector P1 (6) through hole (7) in sensor mount assembly.

(5) Connect P3 (8) of TPS cable 13083693-19 to PNVS NSA cable connector P1 (6).

(6) Insert P6 (9) of TPS cable 13083693-19 through hole (7) in sensor mount assembly and connect to J4 (10) on PNVS NSA.

(7) Insert P4 (11) of TPS cable 13083693-19 through hole (7) in sensor mount assembly and connect to J1 (12) on PNVS NSA.

(8) If long version of cable assembly 13083693-19 is used, clamp it to the sensor mount assembly using cable clamp (13). If short version is used, clamping is not necessary.

3-11. PNVS NSA INSTALLATION ON NIGHTSIDE TEST BENCH. (CONT)

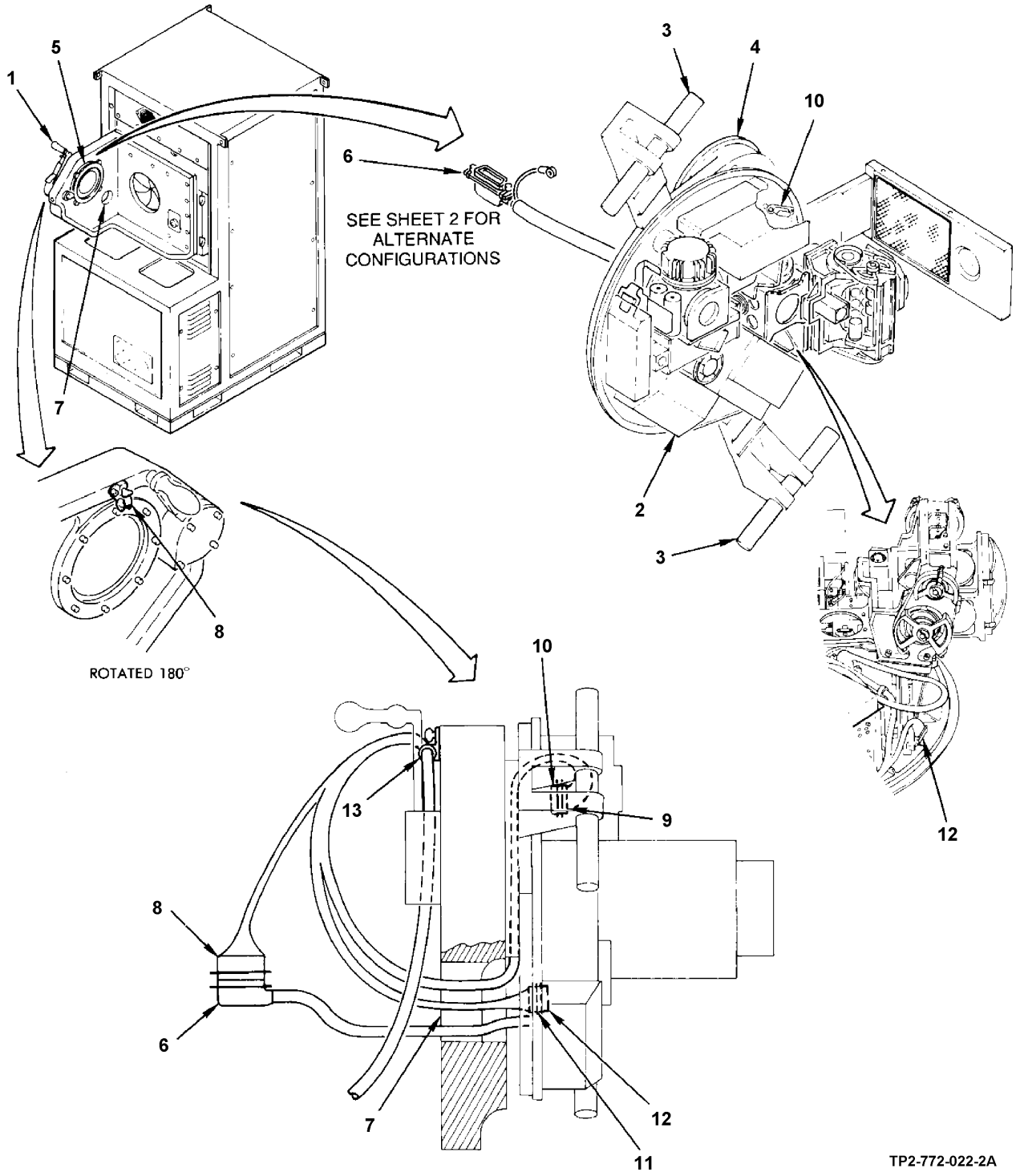
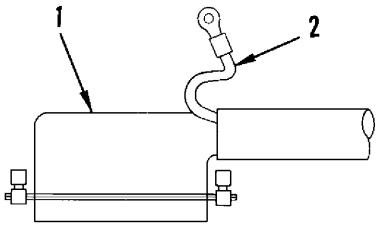


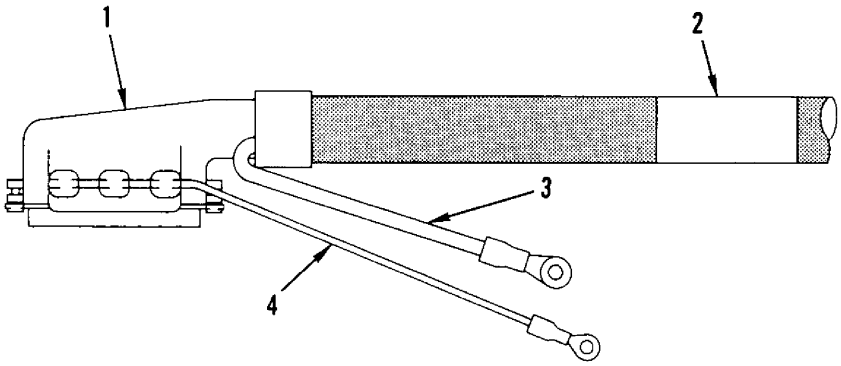
Figure 3-15. Mounting of PNVS NSA to Nightside Test Bench (Sheet 1 of 2)

3-11. PNVS NSA INSTALLATION ON NIGHTSIDE TEST BENCH. (CONT)



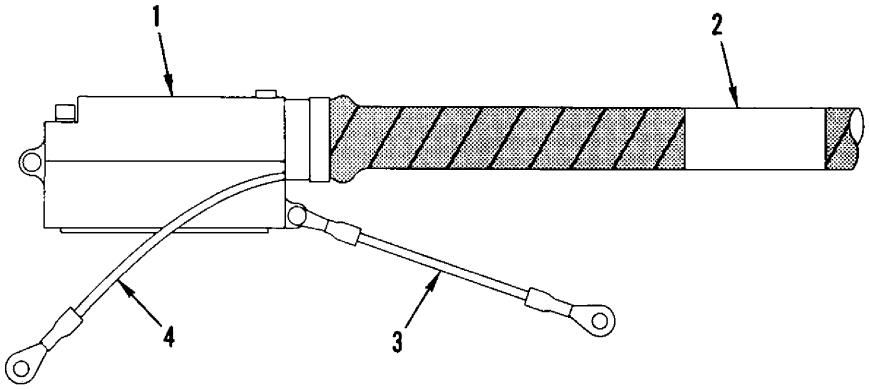
13080284-019
(NON-EMI CONFIGURATION)

1. BLACK RUBBER BACKSHELL
2. BLACK GROUNDSTRAP



13080284-029
(EMI CONFIGURATION)

1. BLACK RUBBERIZED BACKSHELL
2. EMI COATING
3. BLACK GROUNDSTRAP
4. EMI STRAP BONDED TO BACKSHELL



13080284-039 OR -049
(EMI CONFIGURATION)

1. METAL CASTING BACKSHELL
2. EMI COATING
3. EMI STRAP BOLTED TO BACKSHELL
4. BLACK OR WHITE GROUDSTRAP

TP2-772-055

Figure 3-15. Mounting of PNVS NSA to Nightside Test Bench (Sheet 2 of 2)

3-11. PNVS NSA INSTALLATION ON NIGHTSIDE TEST BENCH. (CONT)

f. Pneumatic System Turn-On.

WARNING

HIGH PRESSURE AIR

To prevent injury and equipment damage, do not perform this procedure until all cable connections, switch settings, adapter installation, and UUT mounting have been completed. When pneumatic system is inflated, E/O test bench is capable of movement. If an attempt is made to mount TADS NSA with pneumatic system pressurized, injury or equipment damage may occur. Test bench could move and TADS NSA could be dropped causing injury or damage.

(1) Verify that van air supply is on (TM 11-6625-3085-12).

(2) On nightside test bench (1, figure 3-16), rotate turnlock fasteners (2) 1/4 turn counterclockwise and open door (3).

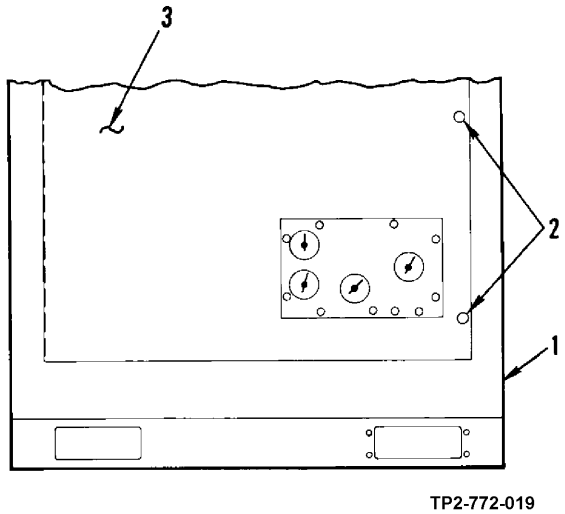


Figure 3-16. Pneumatic Control Panel

3-11. PNVS NSA INSTALLATION ON NIGHTSIDE TEST BENCH. (CONT)

WARNING

MOVING EQUIPMENT

Ensure that hands and feet are clear of base assembly to prevent injury. When system is inflated, equipment is capable of movement. Any movement could cause injury if caution is not taken.

(3) On rear of pneumatic control panel (1, figure 3-17), flip toggle valve (2) down (on). System should inflate and stabilize E/O test bench set. Measure gap at all four corners of base and verify that it is 1/4-inch to 3/8-inch. If all four gaps are not equal, refer to TM 11-6625-3081-23-4.

CAUTION

HIGH PRESSURE AIR

To prevent damage to equipment, do not adjust high pressure air above 125 PSI on pneumatic control panel.

(4) On rear of pneumatic control panel (1, figure 3-18), verify that source gage (2) indicates a maximum of 125 PSI. Verify that the other three gages show a PSI indication. Gages will not indicate same pressure.

(5) Using flat side of a screwdriver tip, press and hold bleed/drain valve (figure 3-19) to drain any moisture within the system. Exercise caution not to damage bleed/drain valve.

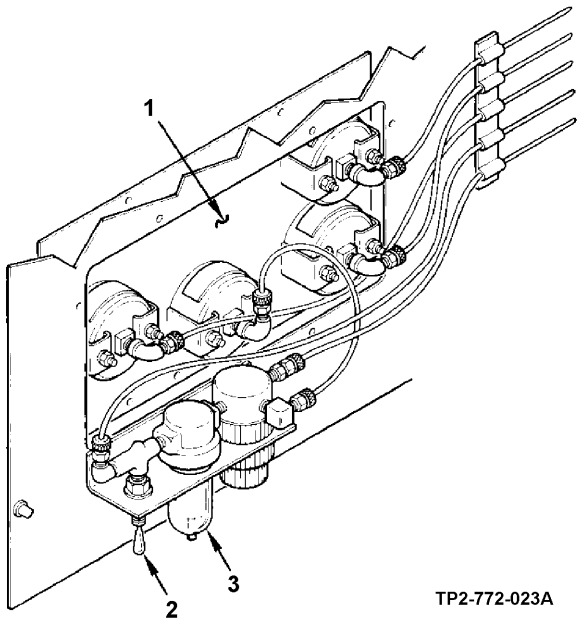


Figure 3-17. Toggle Valve and Bleed/Drain Valve Locations

3-11. PNVS NSA INSTALLATION ON NIGHTSIDE TEST BENCH. (CONT)

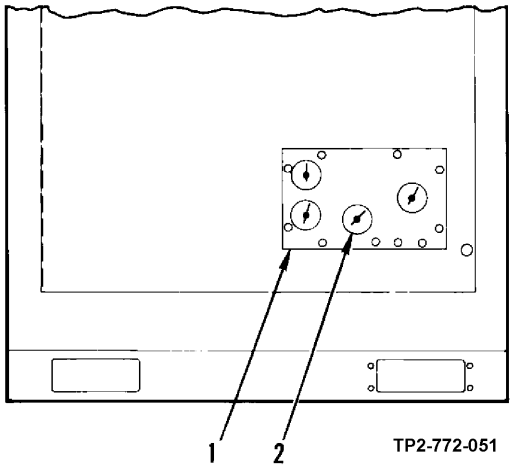


Figure 3-18. Gage Locations

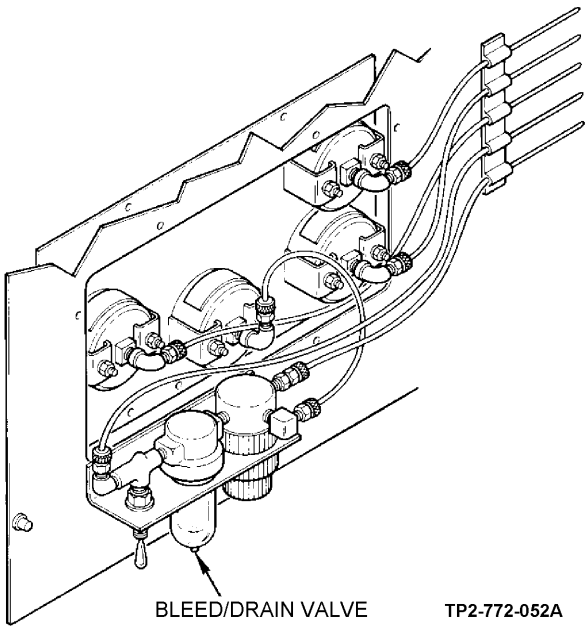


Figure 3-19. Bleed/Drain Valve Location

(6) Release bleed/drain valve (figure 3-19).

(7) On nightside test bench, close door (3, figure 3-16). Push and rotate turnlock fasteners (2) 1/4 turn clockwise.

(8) Verify that E/O test bench set is floating, and not banging or bottoming out. If it is, refer to TM 11-6625-3081-23-4.

3-11. PNVS NSA INSTALLATION ON NIGHTSIDE TEST BENCH. (CONT)

g. Cooling. Assemble the cooling adapter, if necessary. Attach the cooling air hose to the cooling air outlet and to the cooling adapter. Adjust the adapter to direct the cooling air onto the cooler/dewar (figure 3-30).

3-12. PNVS NSA REMOVAL FROM NIGHTSIDE TEST BENCH.

This paragraph covers the steps required to remove the PNVS NSA from the nightside test bench and place it in the shipping and storage container.

a. Cooling. Remove the cooling air hose from the cooling air outlet and the cooling adapter. Remove and stow the cooling adapter.

b. Pneumatic System Shutdown. Perform pneumatic system shutdown according to paragraph 3-11d.

c. PNVS NSA Removal from Nightside Test Bench.

NOTE

Two people are required to perform this task.

(1) Disconnect following connectors of cable assembly 13083693-19:

P3 from P1 of PNVS NSA
P4 from J1 of PNVS NSA
P5 from terminal box
P6 from J4 of PNVS NSA

3-12. PNVS NSA REMOVAL FROM NIGHTSIDE TEST BENCH. (CONT)

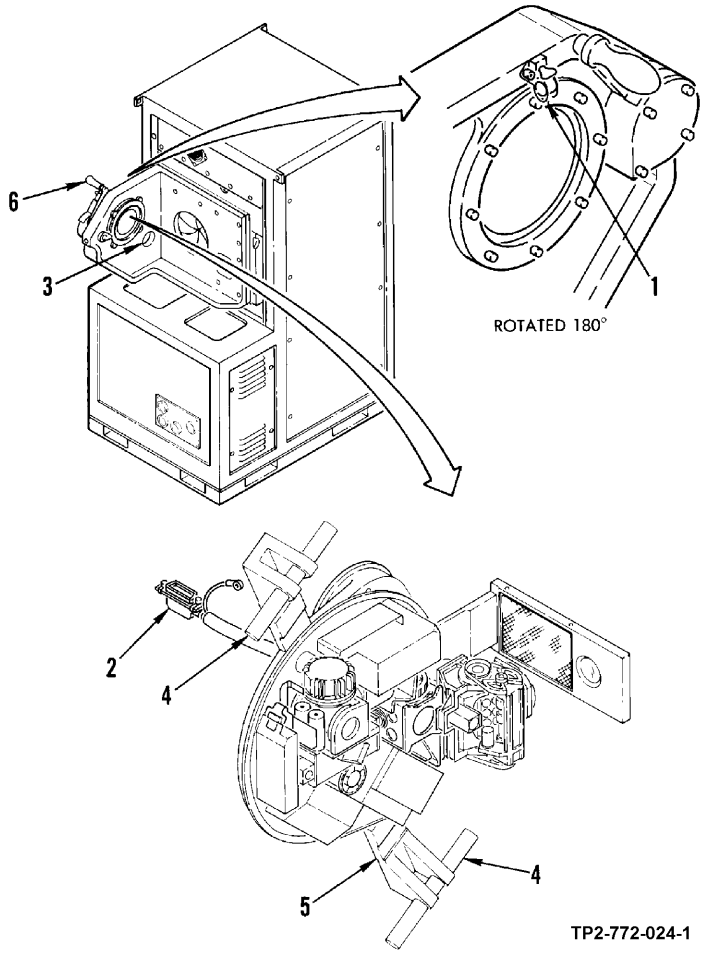


Figure 3-20. PNVS NSA Removal from Nightside Test Bench

(2) Open clamp (1, figure 3-20) on sensor mount assembly and remove cable 13083693-19.

WARNING

HEAVY OBJECT

- Don't: Attempt to lift or carry heavy objects alone.
- Do: Get help for lifting or carrying heavy objects.
- If you experience a sudden pain while lifting or discomfort after lifting, get medical help at once.

(3) Remove PNVS NSA from test bench as follows:

(a) Remove PNVS NSA cable connector P1 (2) from hole in sensor mount

(b) Hold PNVS NSA in place using handles (4) of interface structure insert (5).

3-12. PNVS NSA REMOVAL FROM NIGHTSIDE TEST BENCH. (CONT)

(c) Push sensor mount handle (6) up to unlock position.

(d) Remove PNVS NSA and place on workbench tabletop on dunnage at least 2 inches high to protect PNVS NSA cable connector J1.

d. Mounting PNVS NSA on PNVS Turret Holding Fixture.

WARNING

SHARP EDGES

Use extreme caution when handling PNVS NSA. The edges of elevation mirror drive bands are sharp and may be harmful if contact is made.

CAUTION

DELICATE EQUIPMENT

- Use caution while removing interface structure insert with mask and window assemblies from PNVS NSA. Damage to equipment could result if dropped.
- Use caution when handling PNVS NSA. Contact with optical elements or bands can cause damage or misalinement to equipment.

(1) Move elevation mirror (1, figure 3-21) downward toward NSA housing to protect it from damage.

(2) Remove two Allen screws (2) and remove mask and window assembly (3) from interface structure insert (4).

(3) Remove interface structure insert from NSA as follows:

(a) Balance NSA (5) on its side (rim) with elevation mirror (1) pointing up.

(b) Loosen five captive Allen screws (6) securing interface structure insert (3) to NSA (6).

(c) Carefully separate interface structure insert from NSA, taking care not to bend NSA guide pins (7).

(d) Remove NSA cable (8) from center hole of interface structure insert.

(4) Install PNVS NSA on turret holding fixture as follows:

(a) Position NSA (1, figure 3-22) over holding fixture (2) located directly over the word FRONT stenciled on holding fixture.

3-12. PNVS NSA REMOVAL FROM NIGHTSIDE TEST BENCH. (CONT)

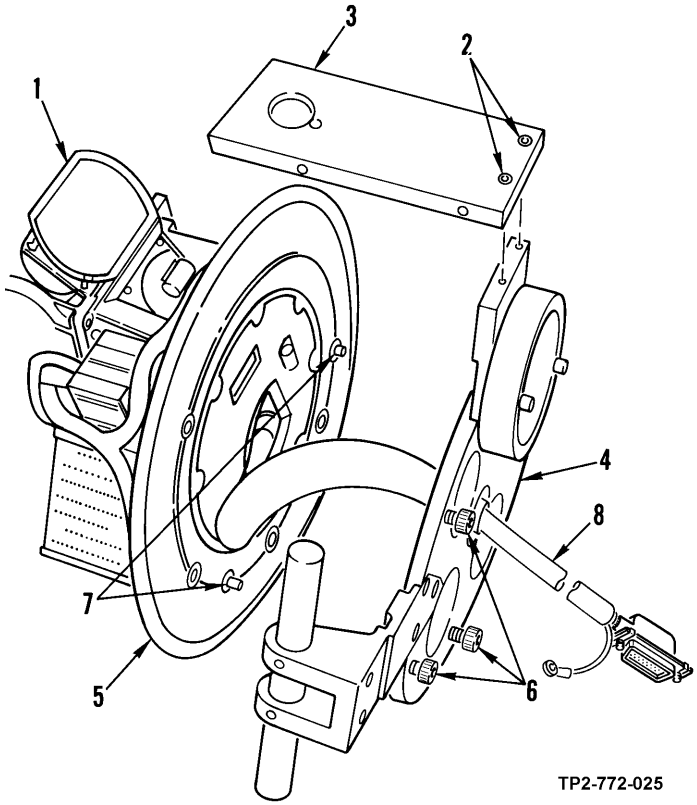


Figure 3-21. Removal of Interface Structure Insert from PNVS NSA

(b) Slowly lower NSA while ensuring that cable connector (3) feeds through the center of holding fixture.

CAUTION

DELICATE EQUIPMENT

Ensure that NSA alinement pin farthest from elevation mirror starts into holding fixture alinement hole before NSA alinement pin nearest elevation mirror starts into holding fixture alinement slot. Failure to do could cause bending of NSA alinement pins.

(c) Aline NSA alinement pin (4) farthest from elevation mirror (5) with holding fixture alinement hole (6).

(d) Aline NSA alinement pin (7) nearest elevation mirror with holding fixture alinement slot (8).

(e) Seat NSA on holding fixture.

3-12. PNVS NSA REMOVAL FROM NIGHTSIDE TEST BENCH. (CONT)

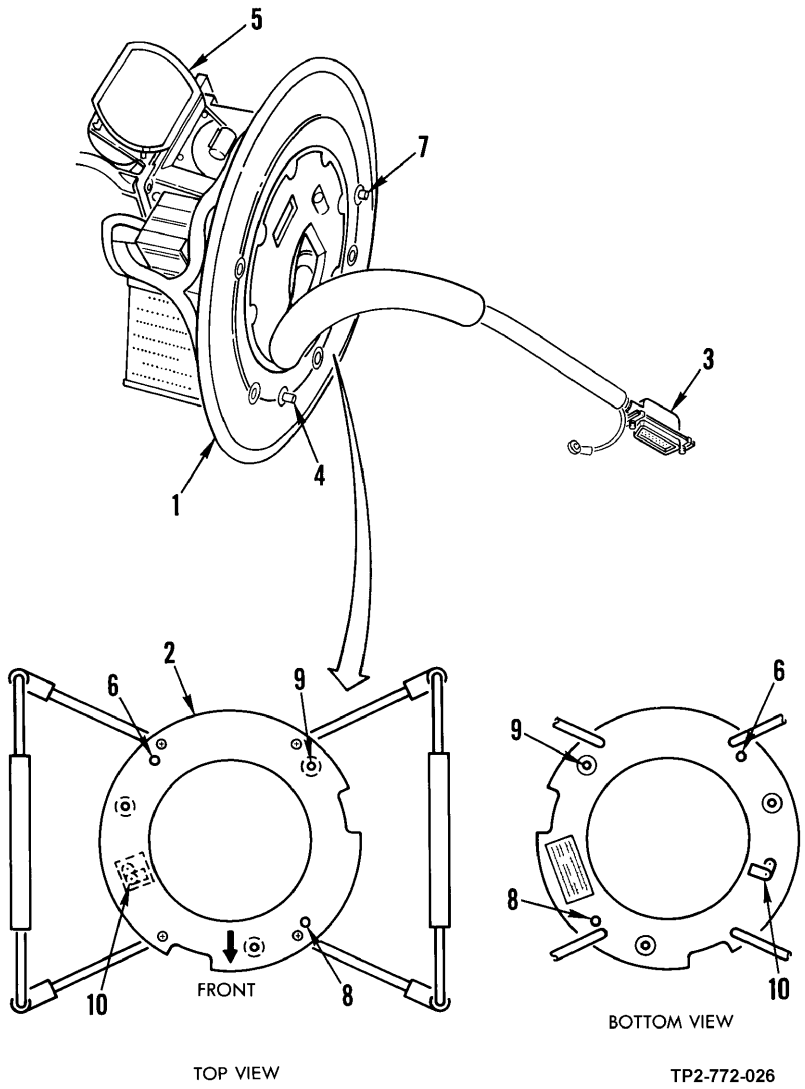


Figure 3-22. Mounting PNVS NSA on PNVS Turret Holding Fixture

(f) Hand-tighten three captive screws (9).

(g) Secure NSA cable connector (3) in connector clamp (10) on bottom of holding fixture.

e. Installation of PNVS Shroud Assembly on PNVS NSA.

3-12. PNVS NSA REMOVAL FROM NIGHTSIDE TEST BENCH. (CONT)

CAUTION

DELICATE EQUIPMENT

- Do not touch surface of elevation mirror when checking position of mirror. Anything on your hands that gets on mirror surface will cause an unwanted cleaning task. Cleaning too often will wear away coating on mirror surface.
- Elevation mirror must be at its highest point to prevent damage to it when installing PNVS shroud assembly.
- Do not touch any of the mirror assembly steel bands. The bands might bend or stretch and cause poor operation.
- Use care when installing PNVS shroud assembly so that you do not scratch coating on mirror.

(1) Inspect all exposed optic components for contamination. Refer to TM 1-5855-265-20 for optics cleaning instructions.

(2) On PNVS NSA, position elevation mirror (1, figure 3-23) at its upper limit of travel by applying upward pressure on elevation mirror support (2).

(3) Locate white vertical line or groove (3) in line with PNVS NSA alinement pin (4) on NSA rim (5).

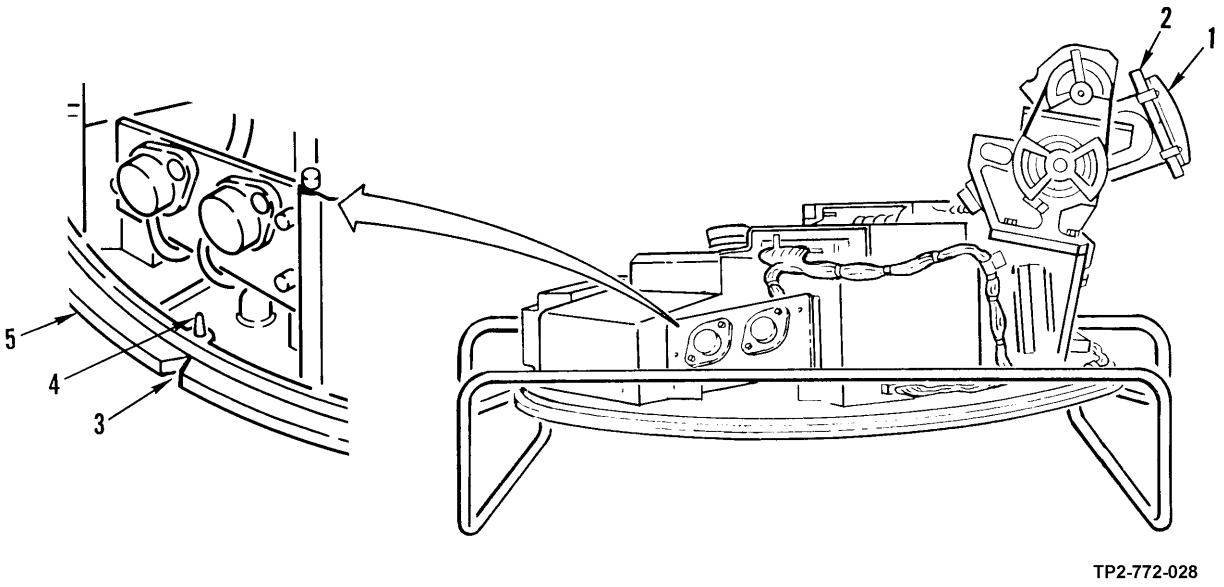


Figure 3-23. Mirror and Vertical Line or Groove Locations

3-12. PNVS NSA REMOVAL FROM NIGHTSIDE TEST BENCH. (CONT)

NOTE

If white line and groove are missing, mark a vertical line on rim of PNVS NSA with a felt tip pin in line with center of the NSA alinement pin.

(4) Install PNVS shroud assembly as follows:

NOTE

Point (1) in figure 3-24 refers to bottom surface of shroud balance weight. Point (2) refers to shroud surface just below bottom edge of shroud window.

(a) Grasp shroud at points (1 and 2, figure 3-24), ensuring that you do not apply pressure to window cover assembly (3).

(b) Tilt shroud balance weight (1) up 20 to 30 degrees.

(c) Position tilted shroud directly above PNVS NSA with shroud window cover (3) directly above elevation mirror (4).

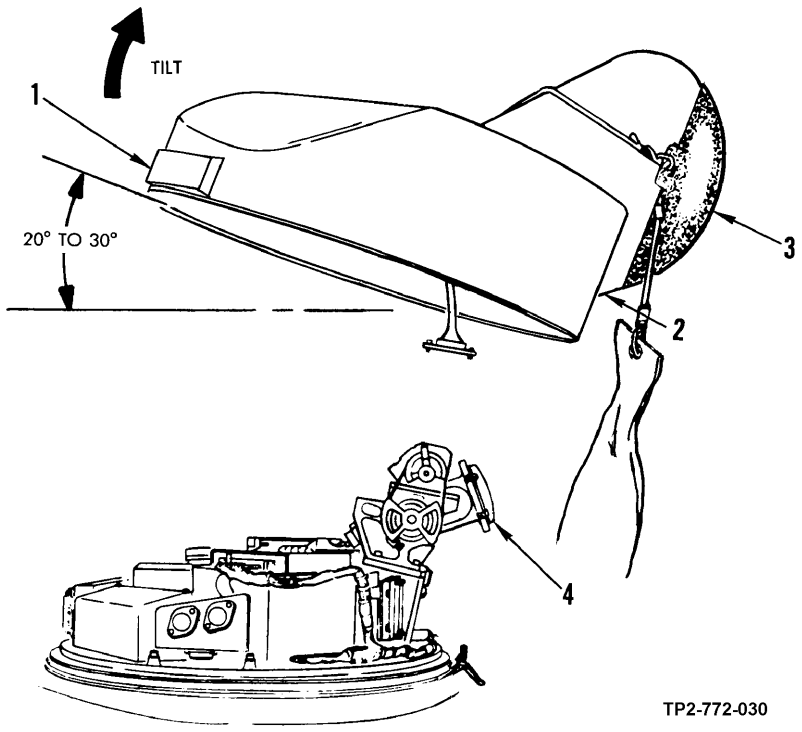


Figure 3-24. Shroud Tilting Prior to Installation on PNVS NSA

3-12. PNVS NSA REMOVAL FROM NIGHTSIDE TEST BENCH. (CONT)

(d) Carefully lower shroud along a sloped direction toward PNVS NSA. Stop when shroud rim area (1, figure 3-25) under window cover is no more than 6 inches above NSA mounting base (2).

NOTE

Steps (e) and (f) require two persons. One person must support shroud assembly while second person connects and tightens connector P1.

(e) Connect shroud connector P1 (3) to PNVS NSA connector P1 (4).

(f) Alternately tighten connector screwlock screws (5).

(g) Continue lowering shroud along a sloped direction and stopping when shroud rim (1, figure 3-26) under window cover is approximately 1/2 inch above mounting base rim (23) of PNVS NSA.

(h) On PNVS turret serial numbers 00001 through 00013, aline white alinement stripe (3) on shroud with pin mark (4) on NSA rim.

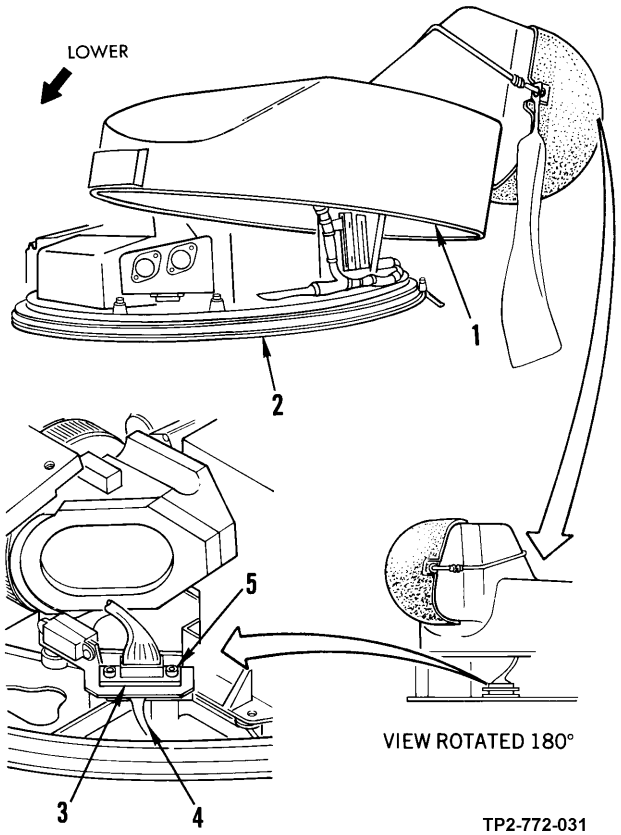


Figure 3-25. Shroud Cable Connector P1 Installation on PNVS NSA

3-12. PNVS NSA REMOVAL FROM NIGHTSIDE TEST BENCH. (CONT)

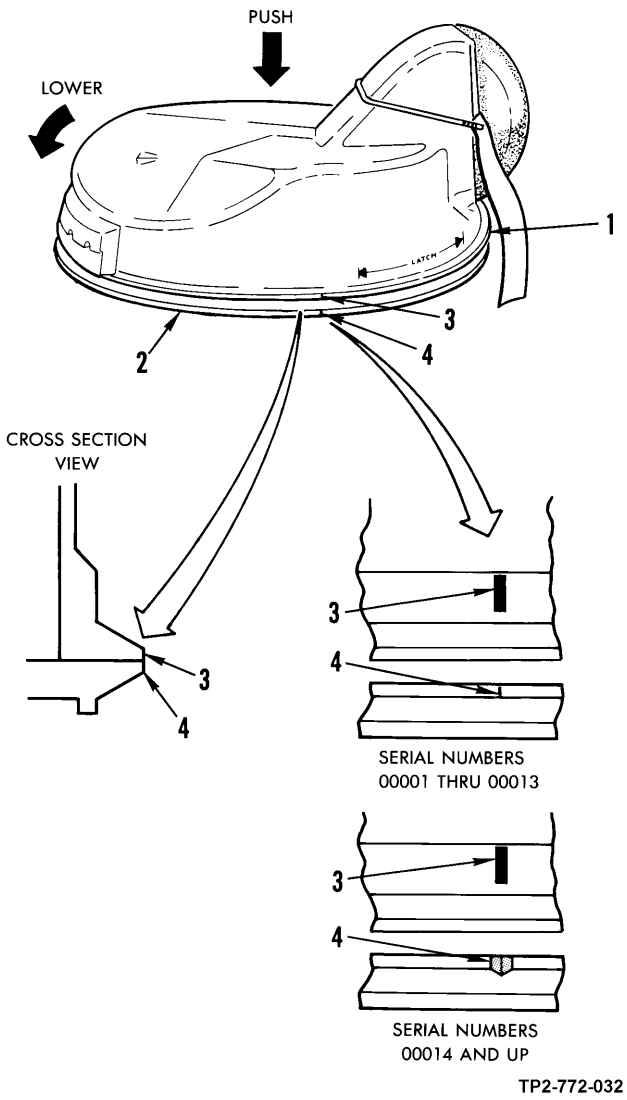


Figure 3-26. Shroud Alinement with PNVS NSA Mounting Base

(i) On PNVS turret serial numbers 00014 and up, alive white alinement stripe (3) on shroud with groove (4) on NSA rim.

(j) Seat shroud on NSA base, ensuring that shroud rim mates evenly with NSA rim at all areas.

(5) Install rim clenching clamp in accordance with TM 1-5855-265-20.

3-12. PNVS NSA REMOVAL FROM NIGHTSIDE TEST BENCH. (CONT)

f. Removal of PNVS Turret from Turret Holding Fixture and Installation in Shipping and Storage Container.

(1) Open shipping and storage container as follows:

(a) Press pressure relief valve (1, figure 3-27) on container (2).

(b) Open container latches (3).

(c) Remove container lid (4).

(2) Remove PNVS turret assembly from PNVS holding fixture as follows:

(a) Disconnect turret cable connector (1, figure 3-28) from holding fixture connector clamp (2).

(b) Loosen three captive screws (3) securing turret (4) to holding fixture (5). Jiggle screws to ensure that they are free from turret.

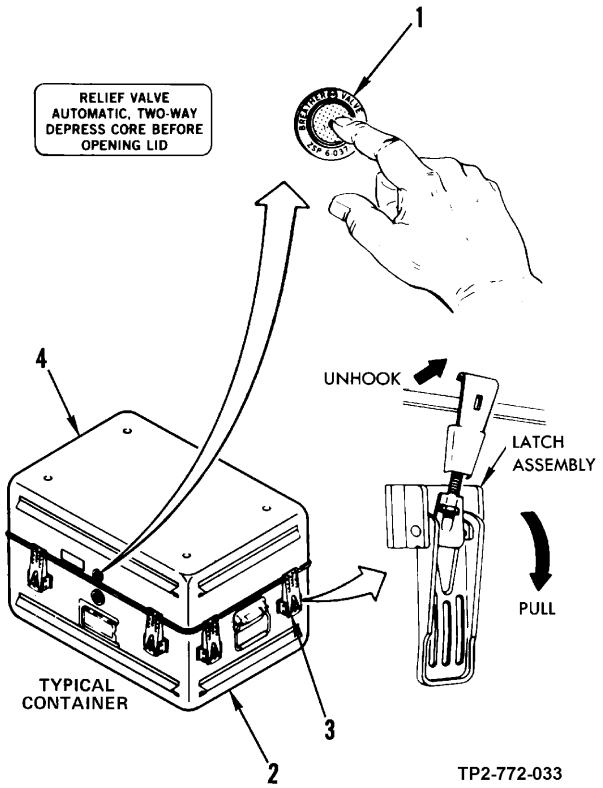


Figure 3-27. Shipping and Storage Container Lid Removal

3-12. PNVS NSA REMOVAL FROM NIGHTSIDE TEST BENCH. (CONT)

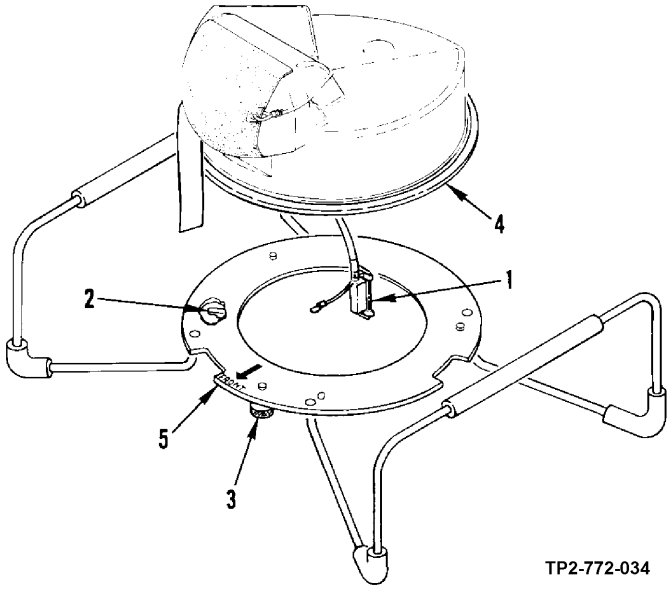


Figure 3-28. PNVS Turret Removal from PNVS Holding Fixture

(3) Carefully remove PNVS turret from holding fixture.

(4) Place PNVS turret (1, figure 3-31) in shipping and storage container

(5) Reinstall container lid (3).

(6) Close container latches (4).

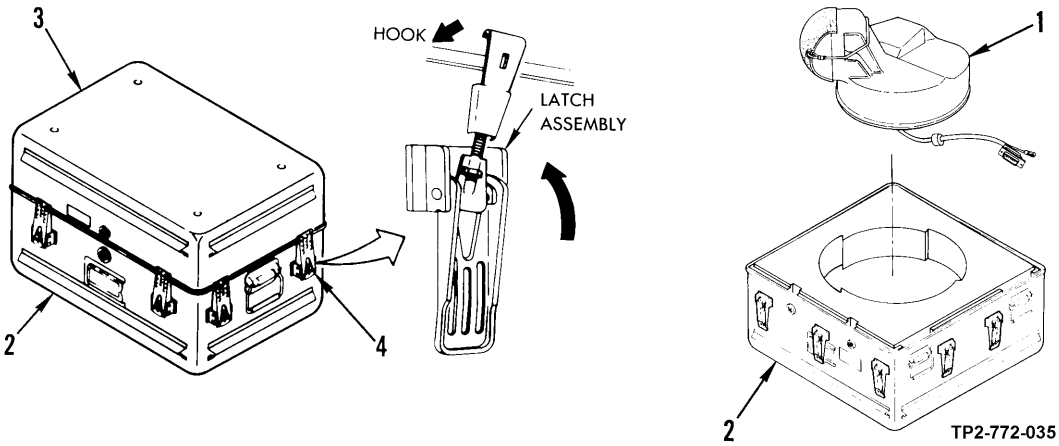


Figure 3-29. PNVS Turret Installation in Shipping and Storage Container

Section IV. TEST PROMPTED REFERENCES

3-13. GENERAL.

This section contains illustrations to be referred to while you are performing the UUT test. When the UUT test program directs you to refer to an illustration in this manual, locate the illustration and refer to it for assistance while you perform the following instructions on the VDT.

3-13. GENERAL. (CONT)

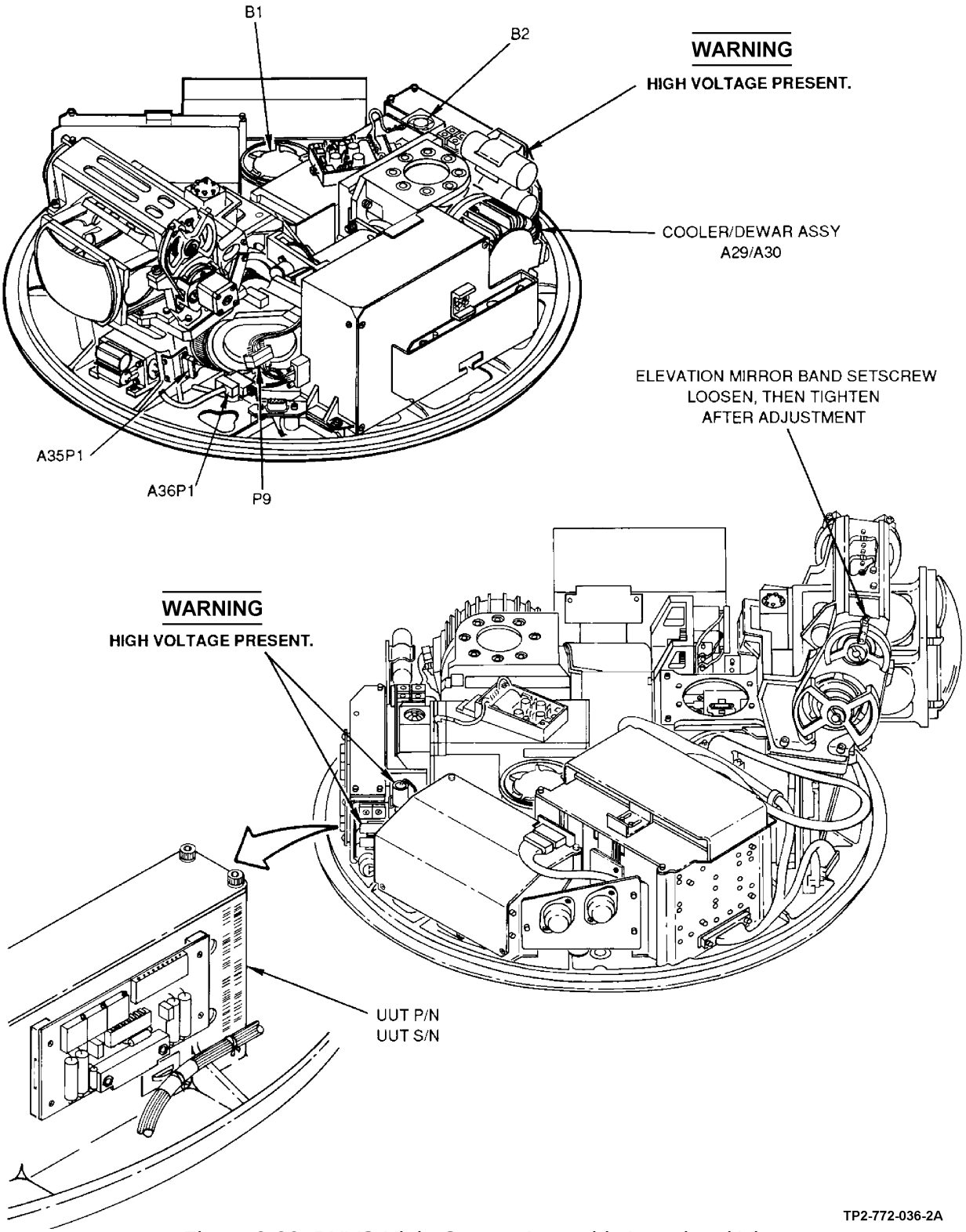


Figure 3-30. PNVS Night Sensor Assembly Locational View

3-13. GENERAL. (CONT)

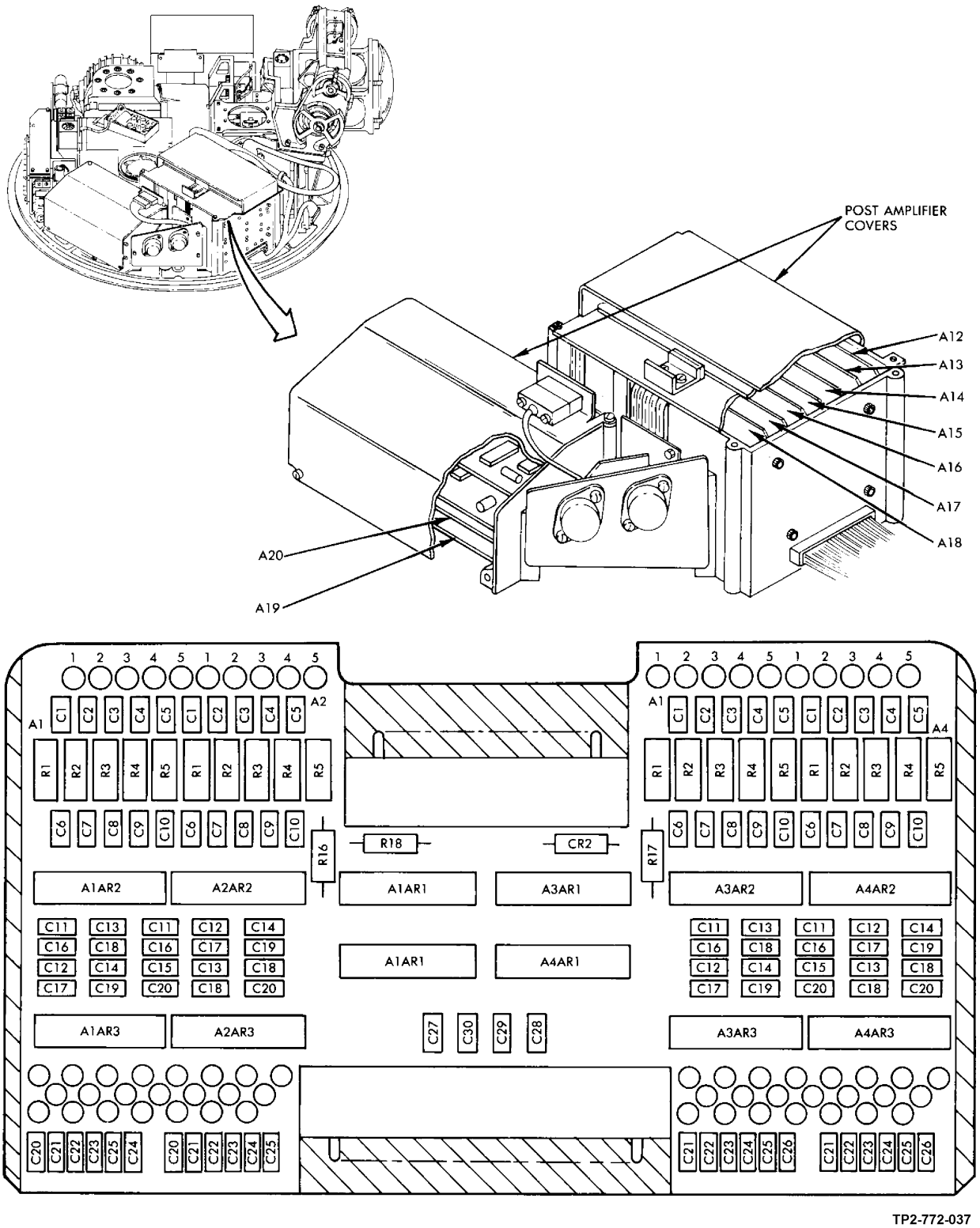


Figure 3-31. Post Amplifier Control Driver CCA Component Locations

3-13. GENERAL. (CONT)

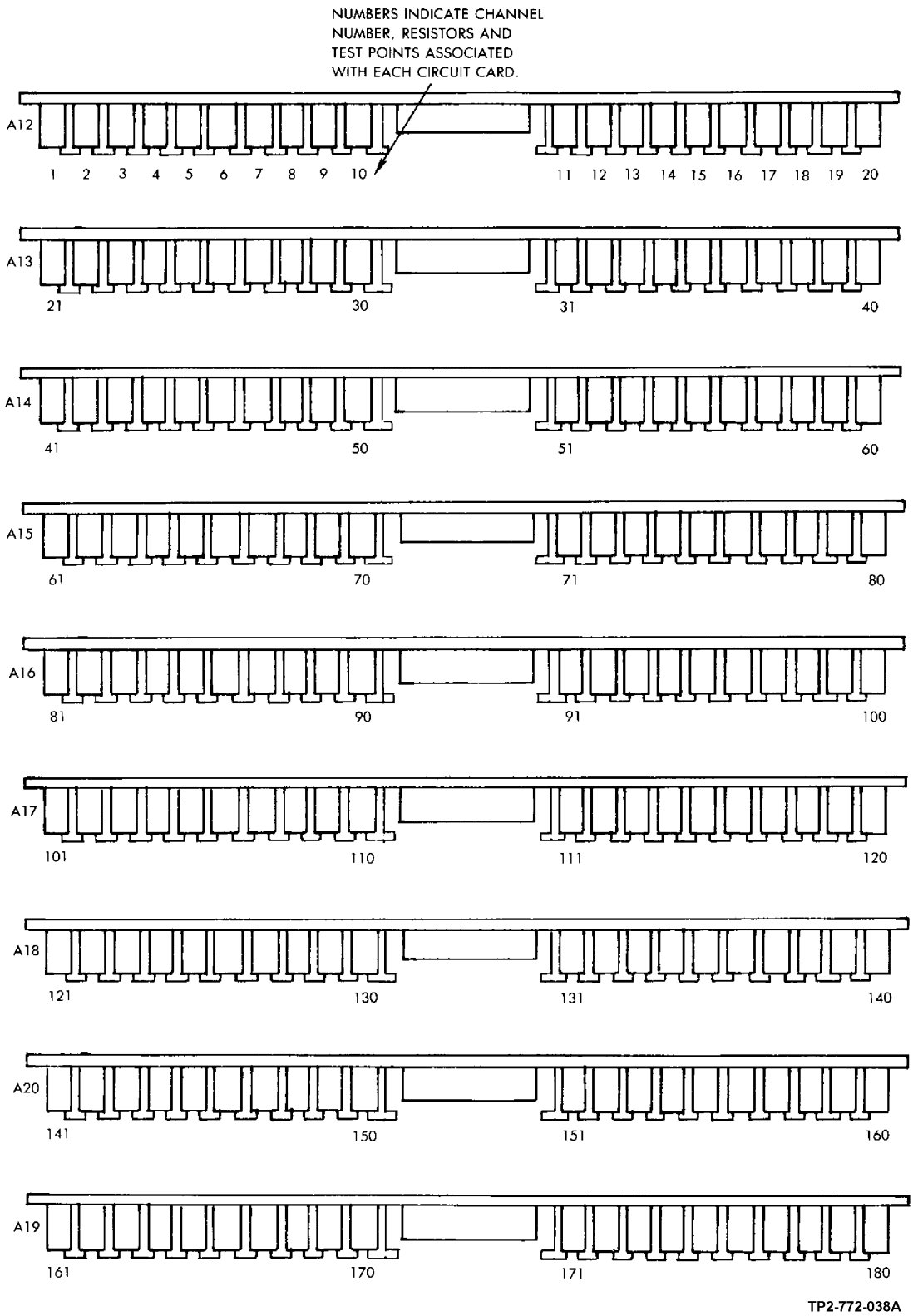


Figure 3-32. Post Amplifier Control Driver CCA Channel Locations

3-13. GENERAL. (CONT)

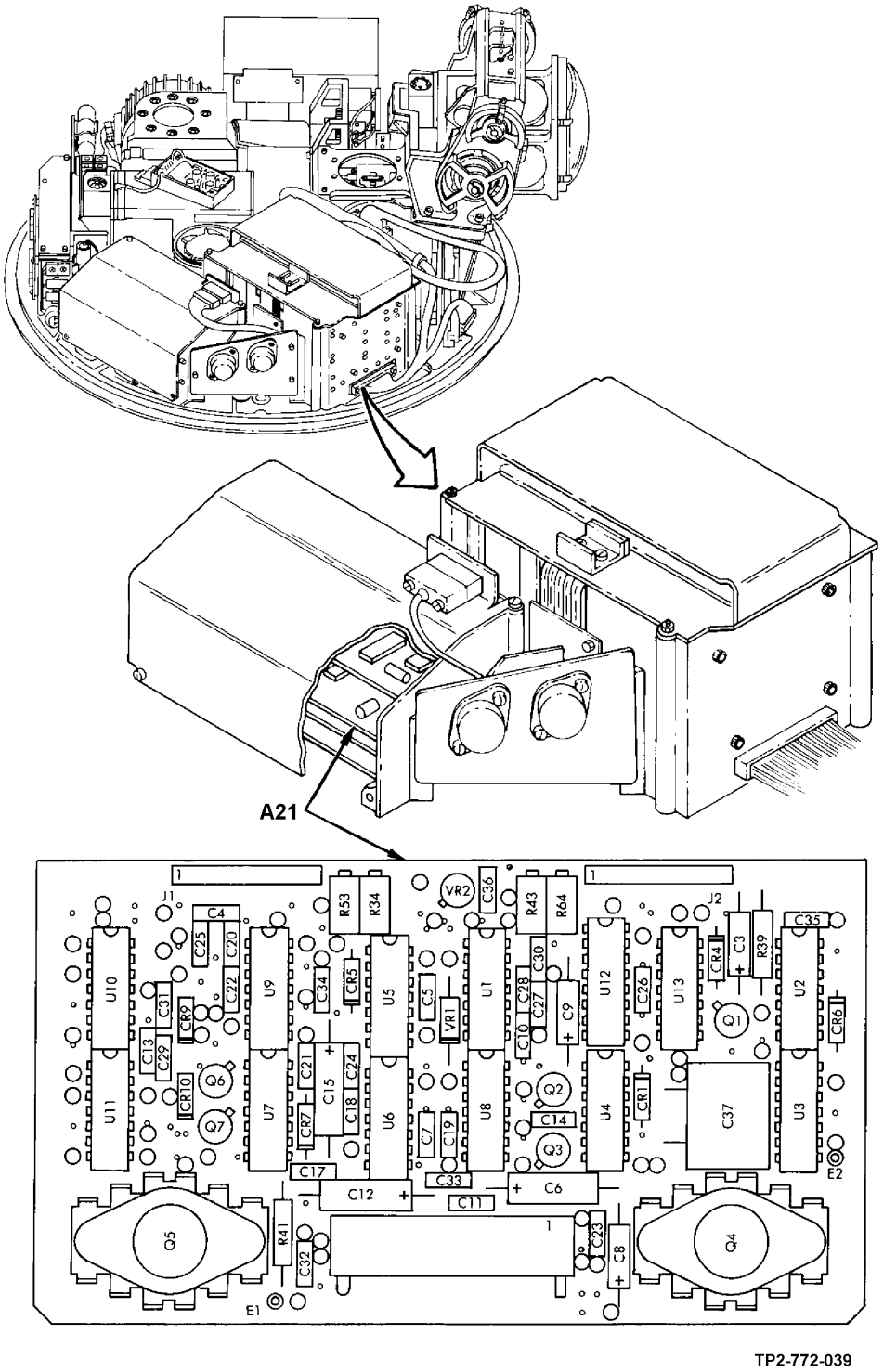


Figure 3-33. Automatic Control Module CCA Component Locations

3-13. GENERAL. (CONT)

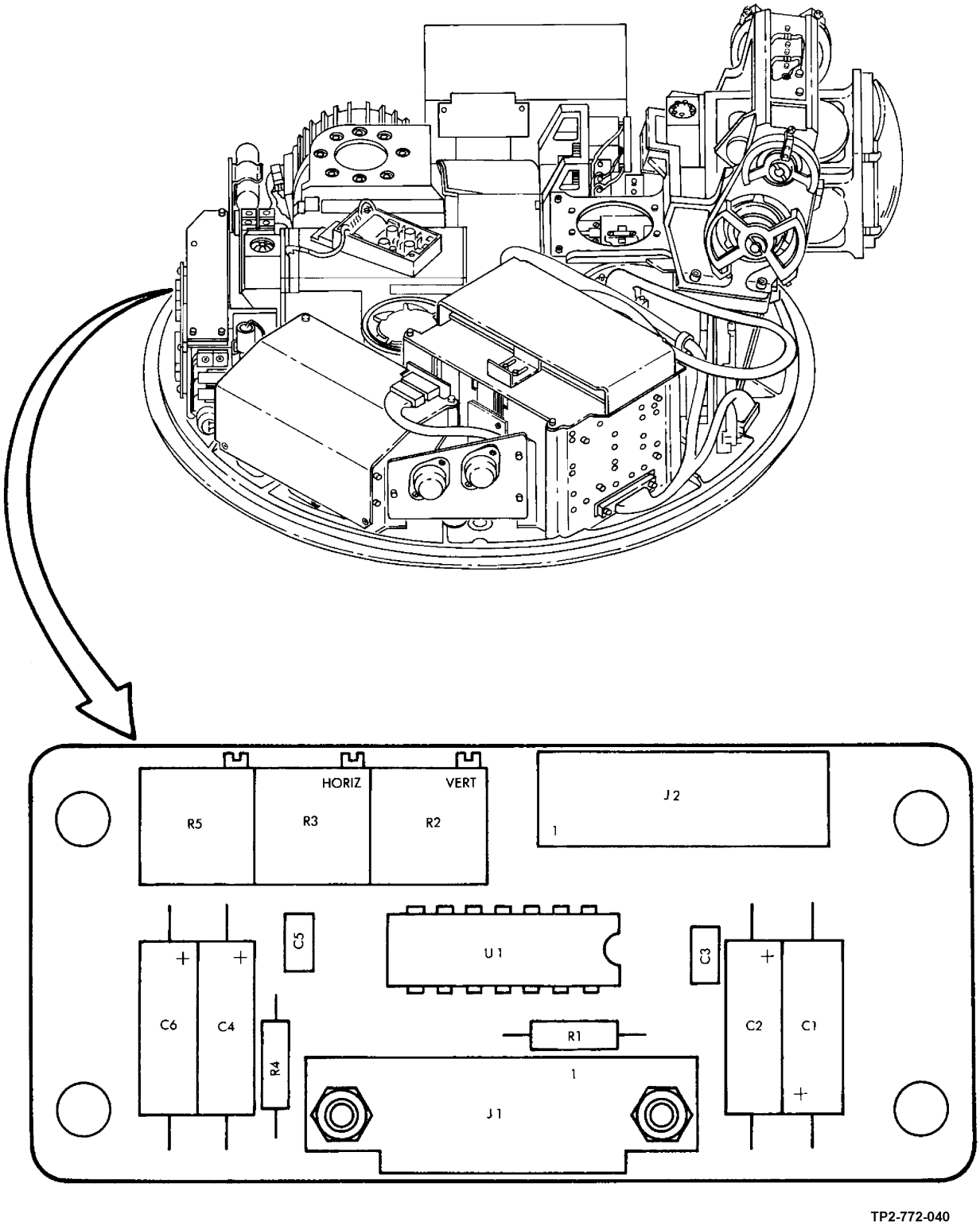


Figure 3-34. Boresight CCA Component Locations

3-13. GENERAL. (CONT)

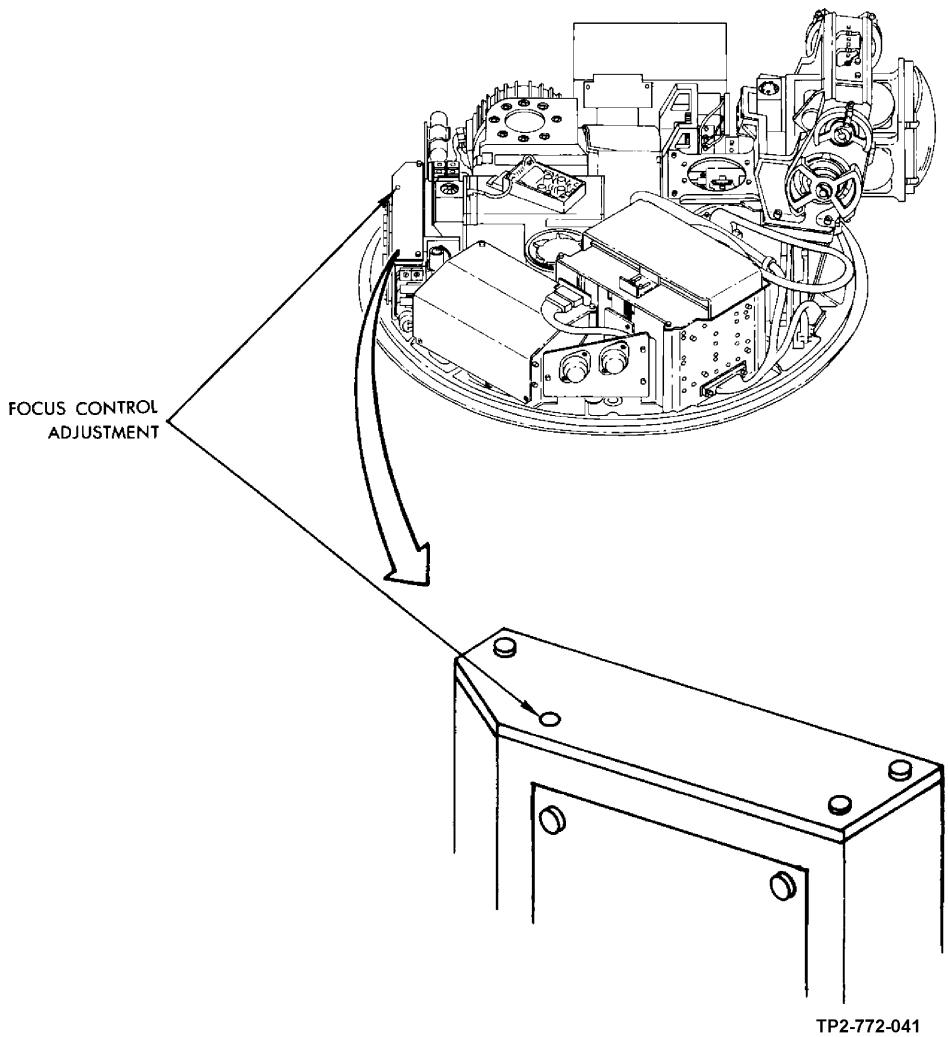


Figure 3-35. Focus Control Adjustment Location

3-13. GENERAL. (CONT)

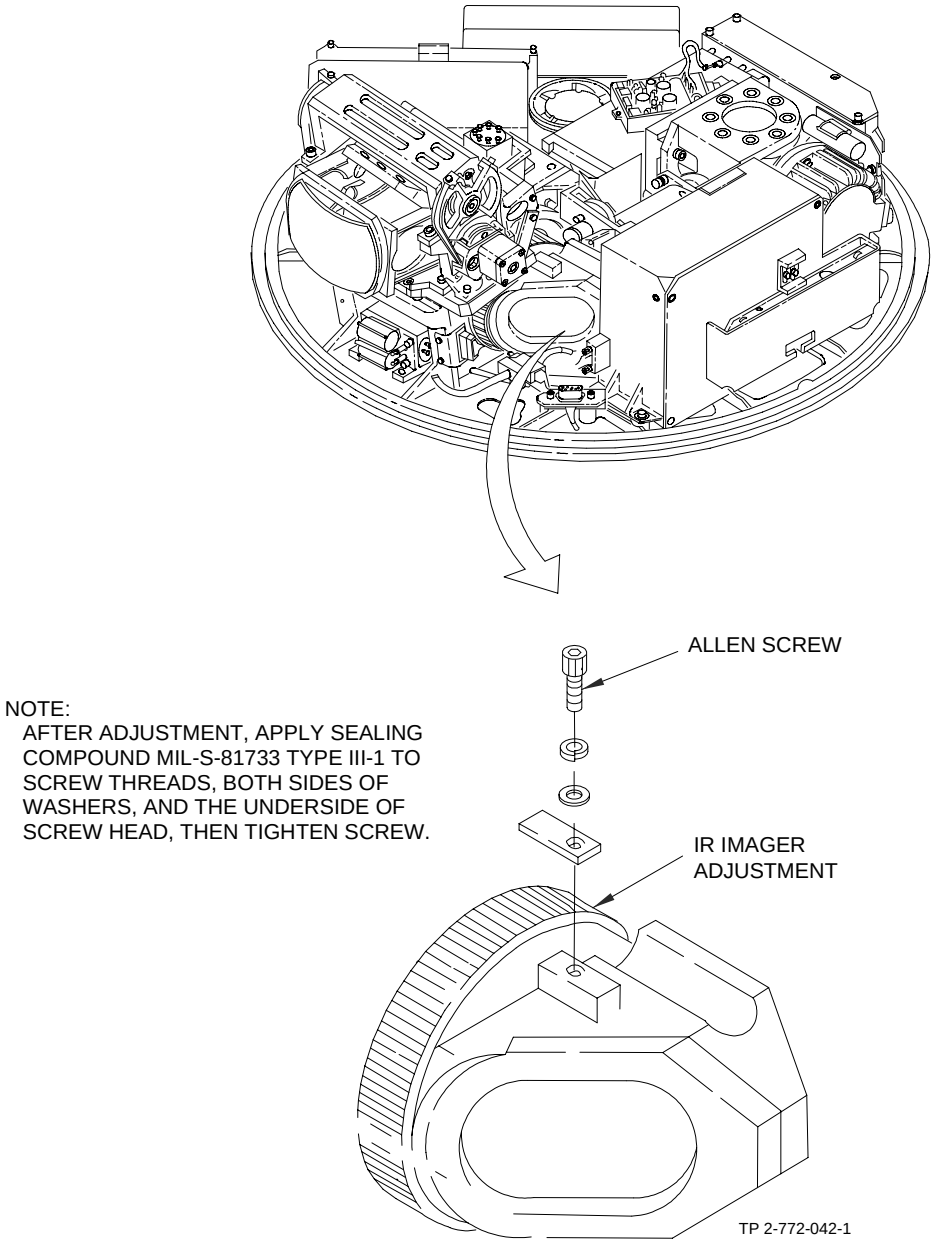


Figure 3-36. IR Imager Adjustment Location (Sheet 1 of 2)

3-13. GENERAL. (CONT)

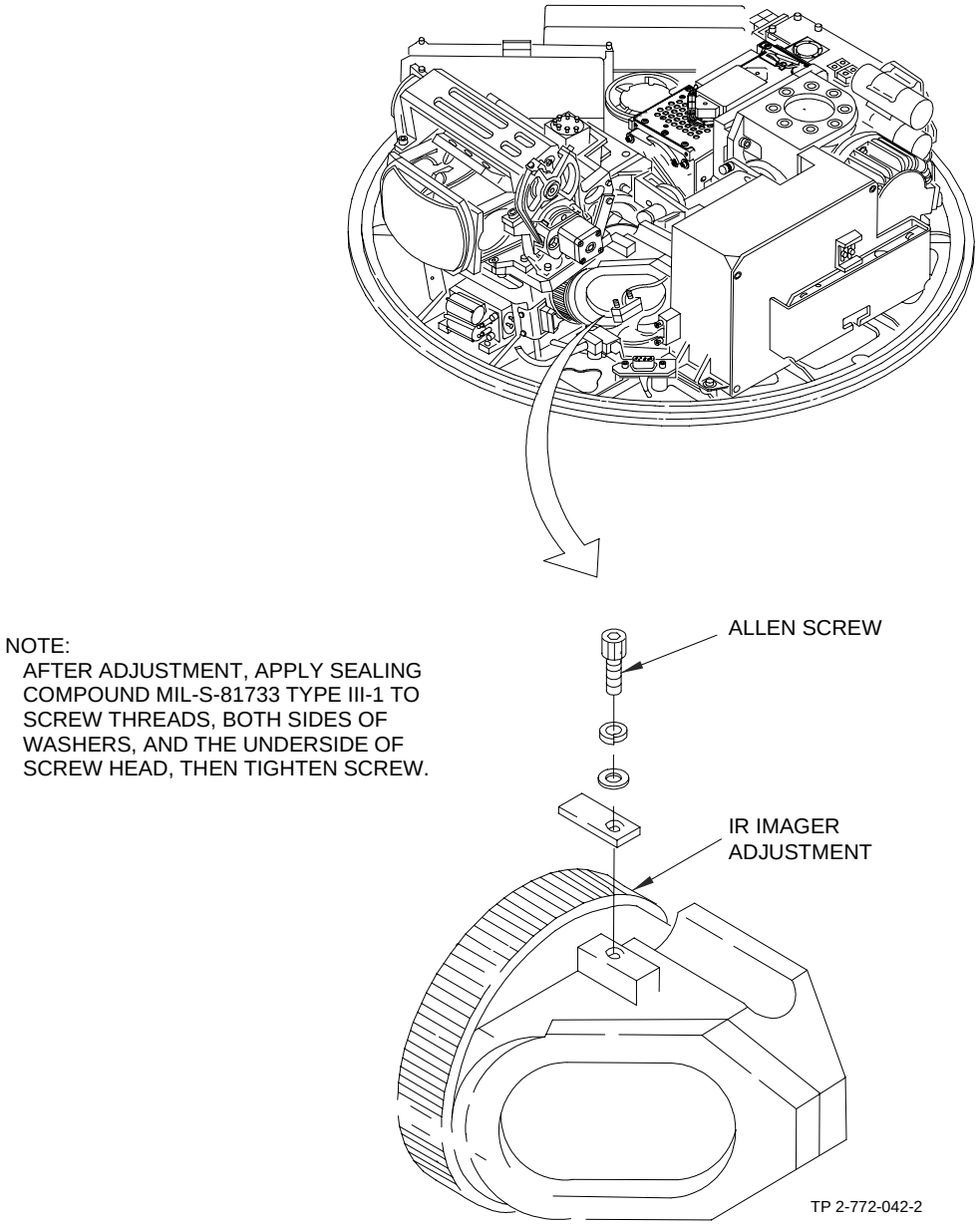


Figure 3-36. IR Imager Adjustment Location (Sheet 2 of 2)

3-13. GENERAL. (CONT)

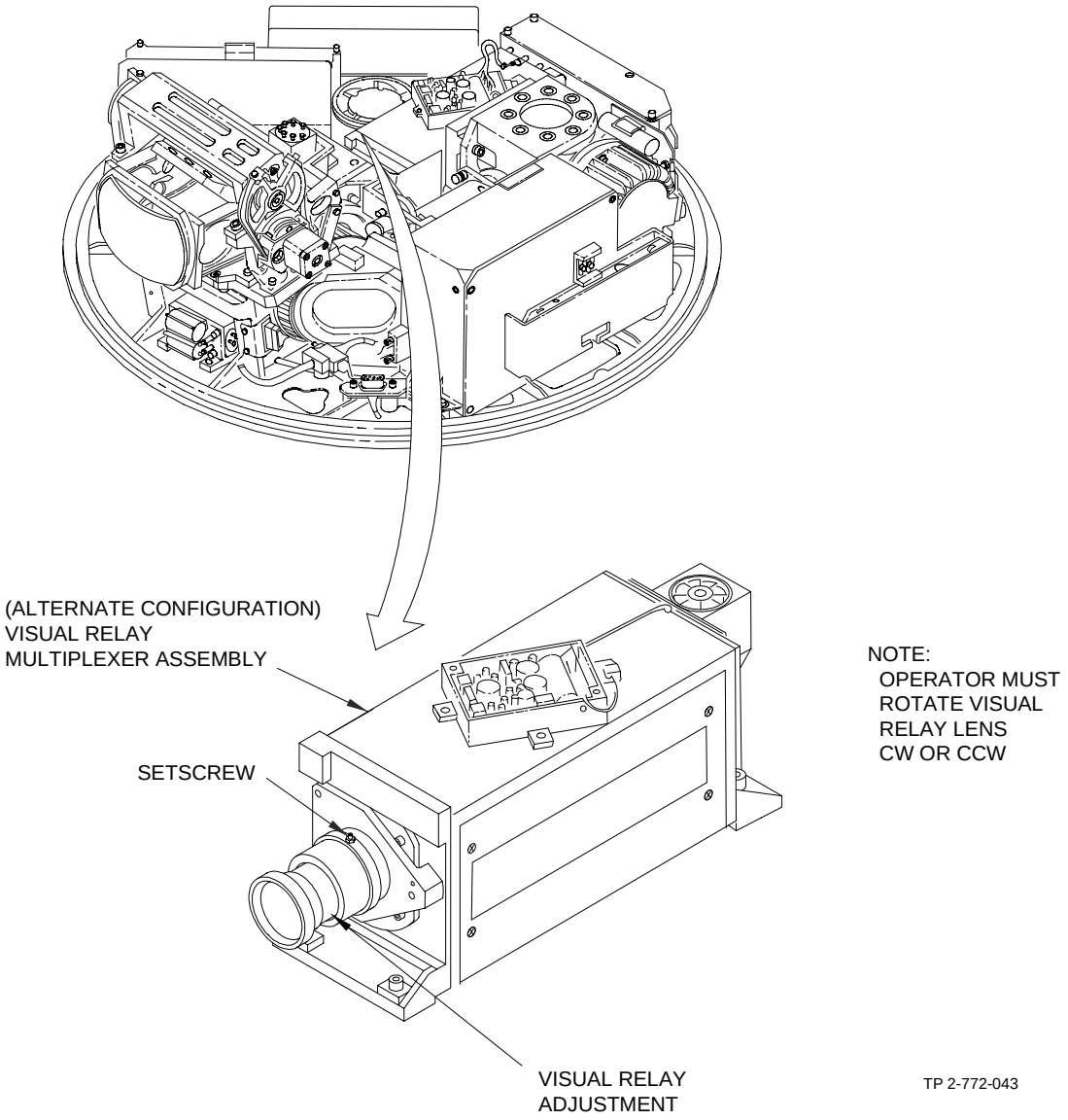


Figure 3-37. Visual Relay Focus Adjustment (Sheet 1 of 2)

3-13. GENERAL. (CONT)

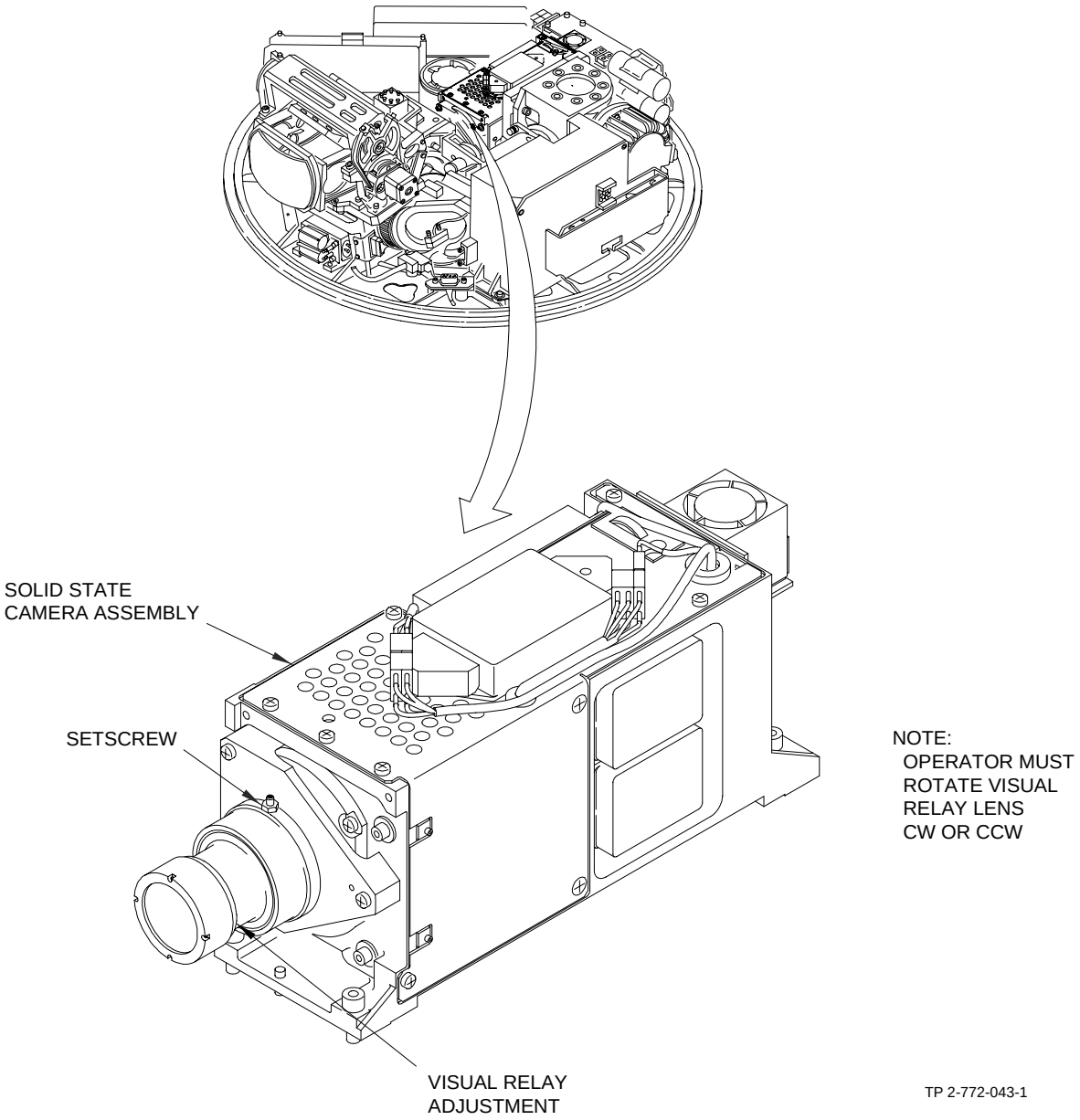


Figure 3-37. Visual Relay Focus Adjustment (Sheet 2 of 2)

3-13. GENERAL. (CONT)

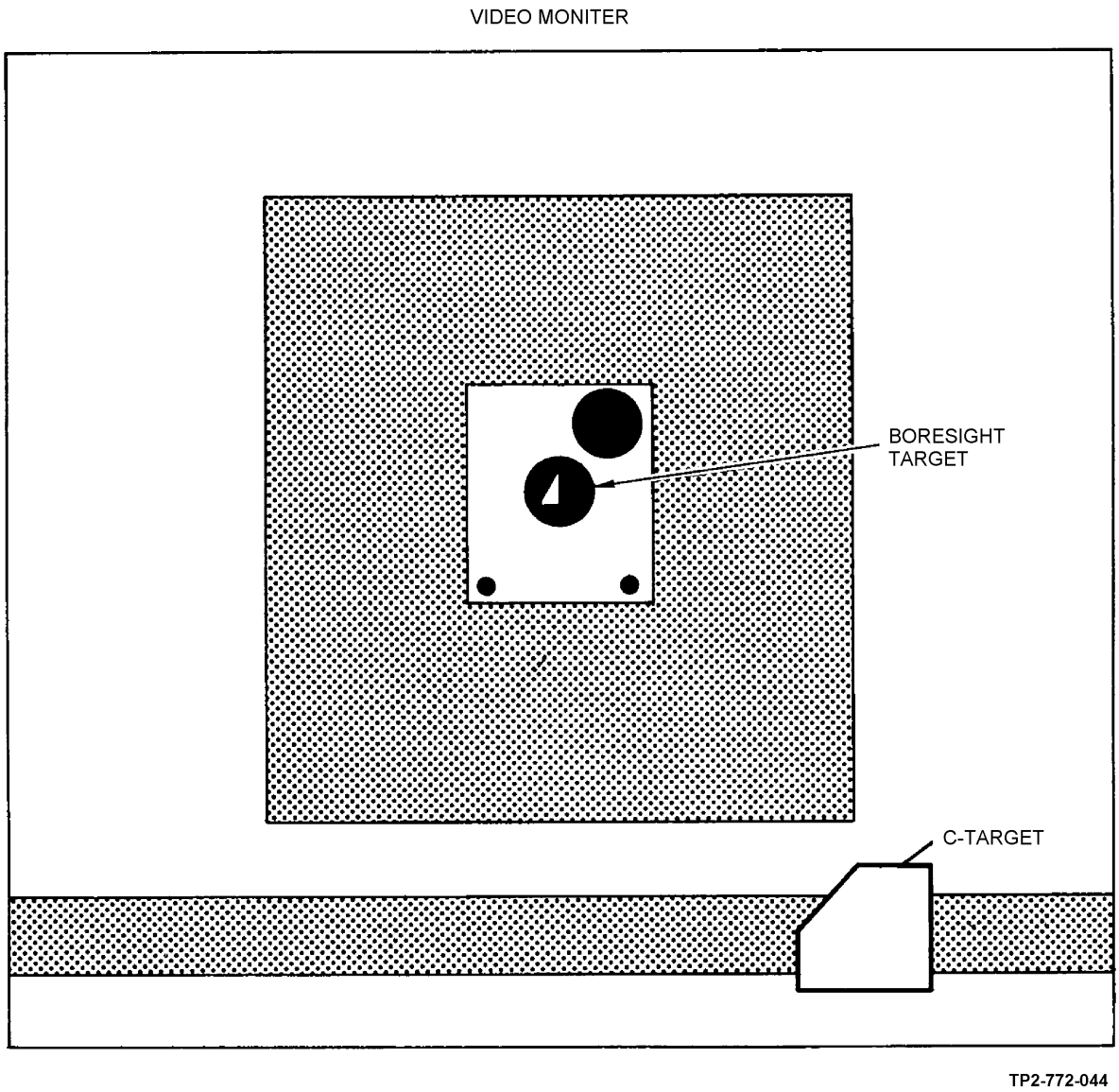


Figure 3-38. Boresight Target

3-13. GENERAL. (CONT)

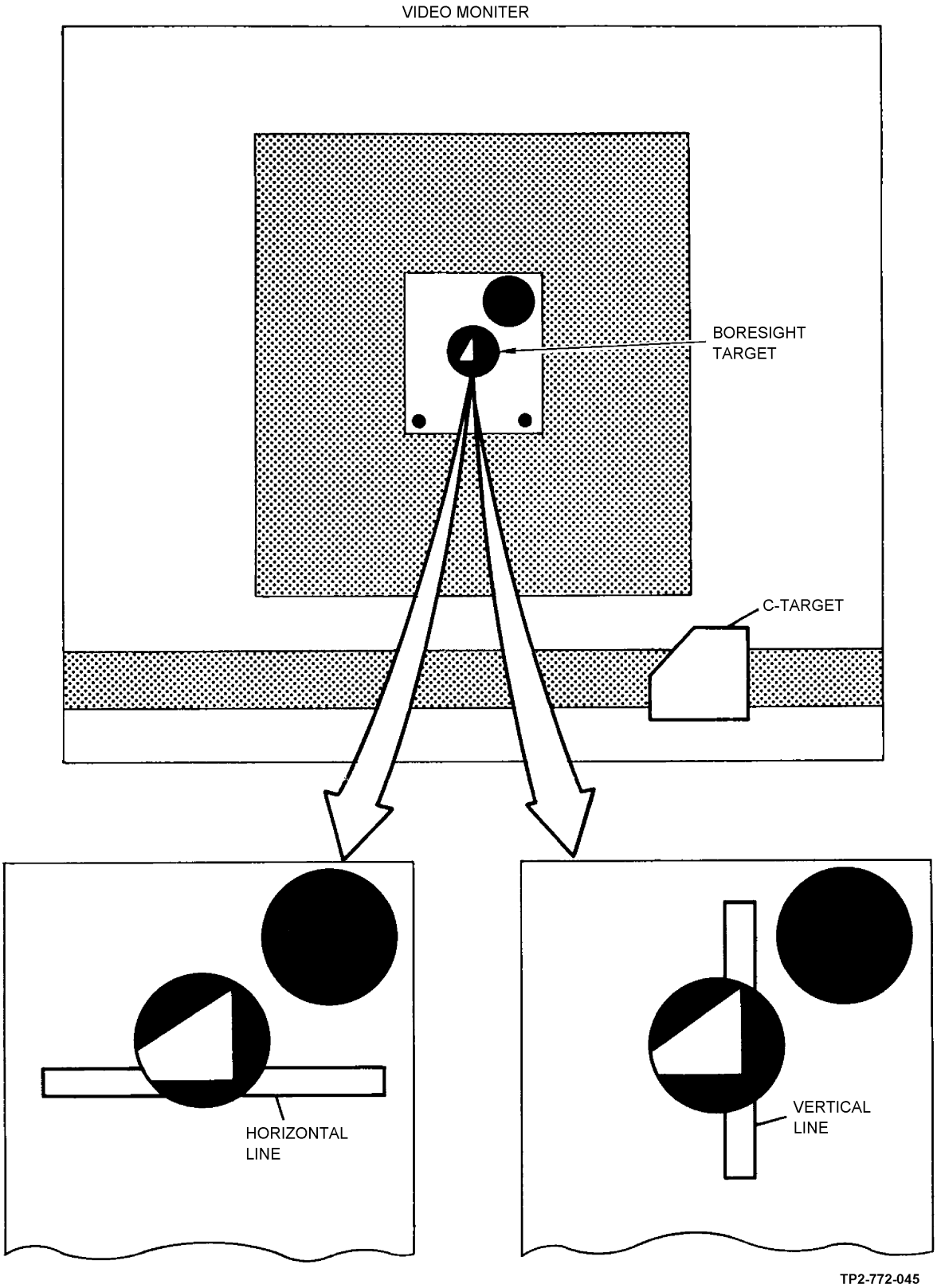


Figure 3-39. Correct Adjustment of Boresight Target

3-13. GENERAL. (CONT)

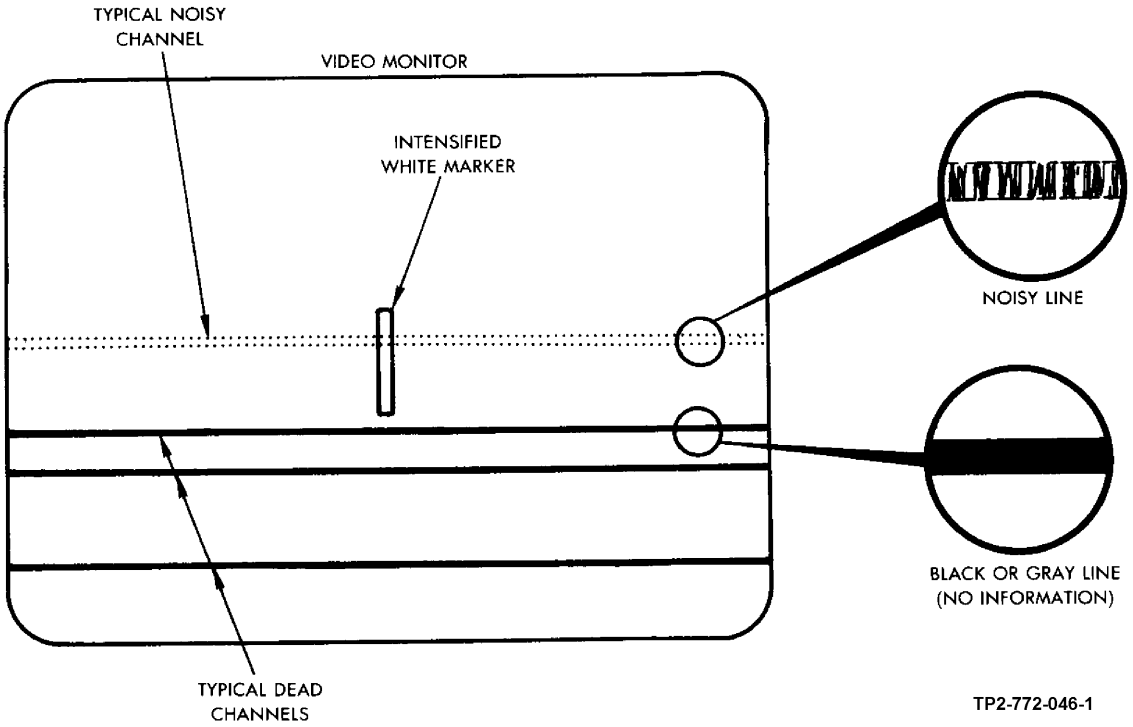


Figure 3-40. Dead Channel Identification Examples

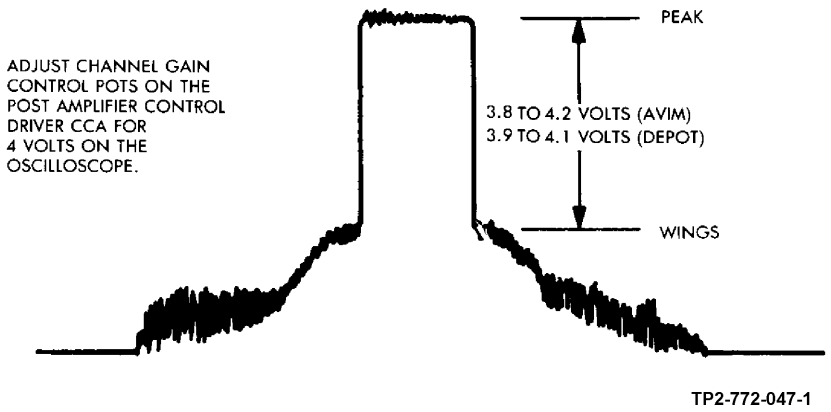


Figure 3-41. Channel Balance Adjustment Waveform

3-13. GENERAL. (CONT)

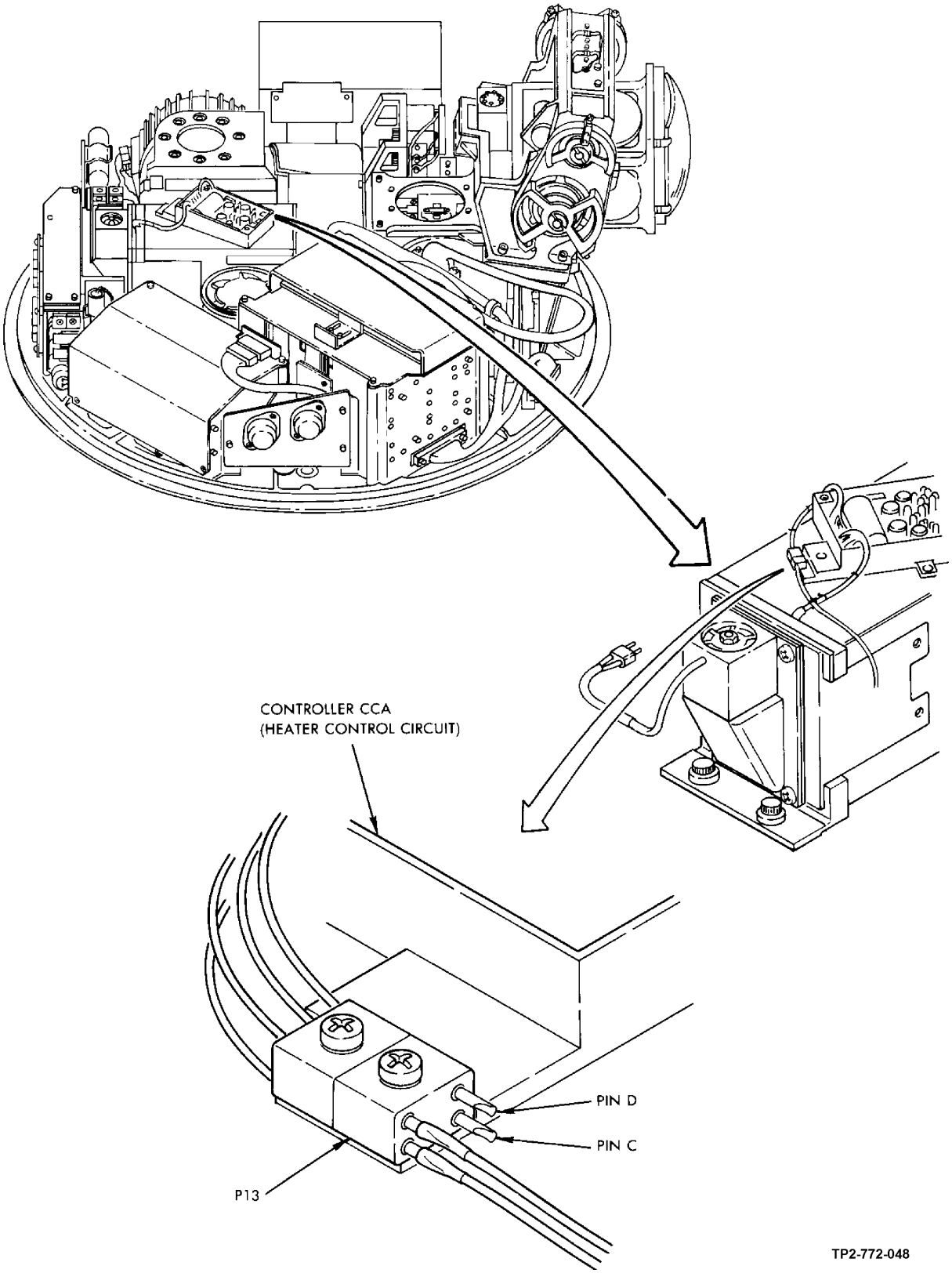


Figure 3-42. Visual Relay/Multiplexer, Controller CCA, and Test Point Locations

3-13. GENERAL. (CONT)

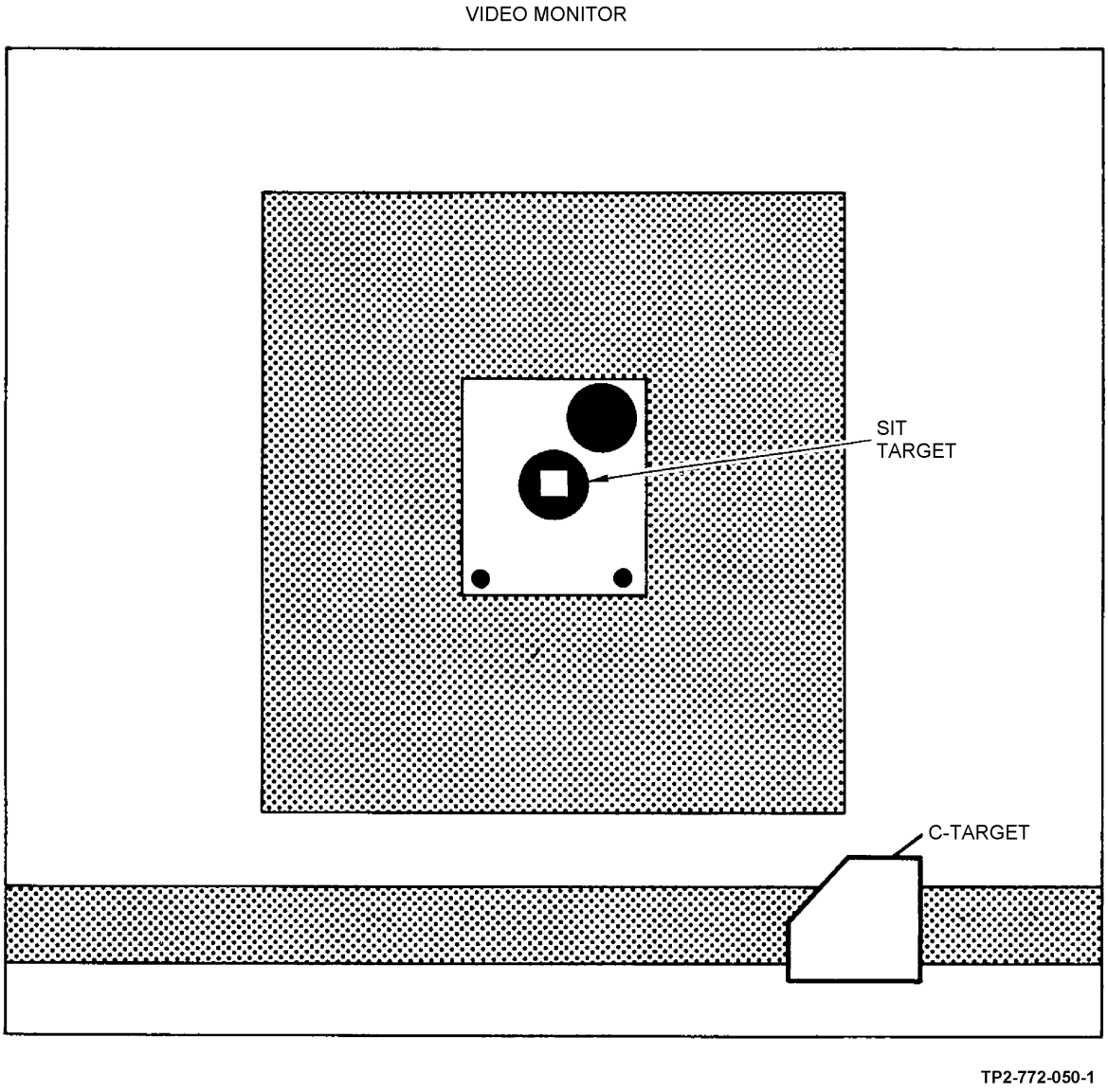


Figure 3-43. SIT Target

3-13. GENERAL. (CONT)

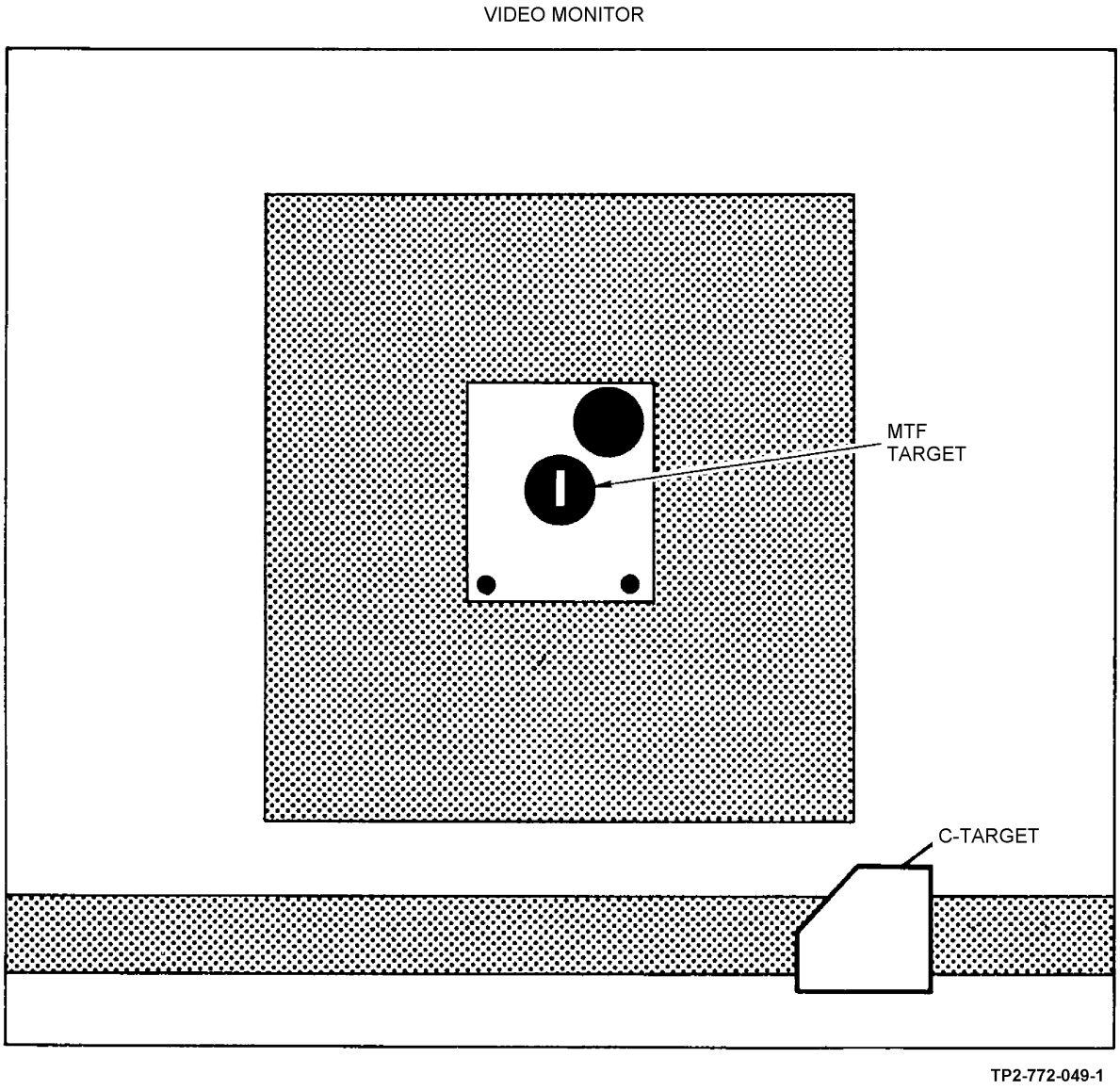


Figure 3-44. MTF Target

3-13. GENERAL. (CONT)

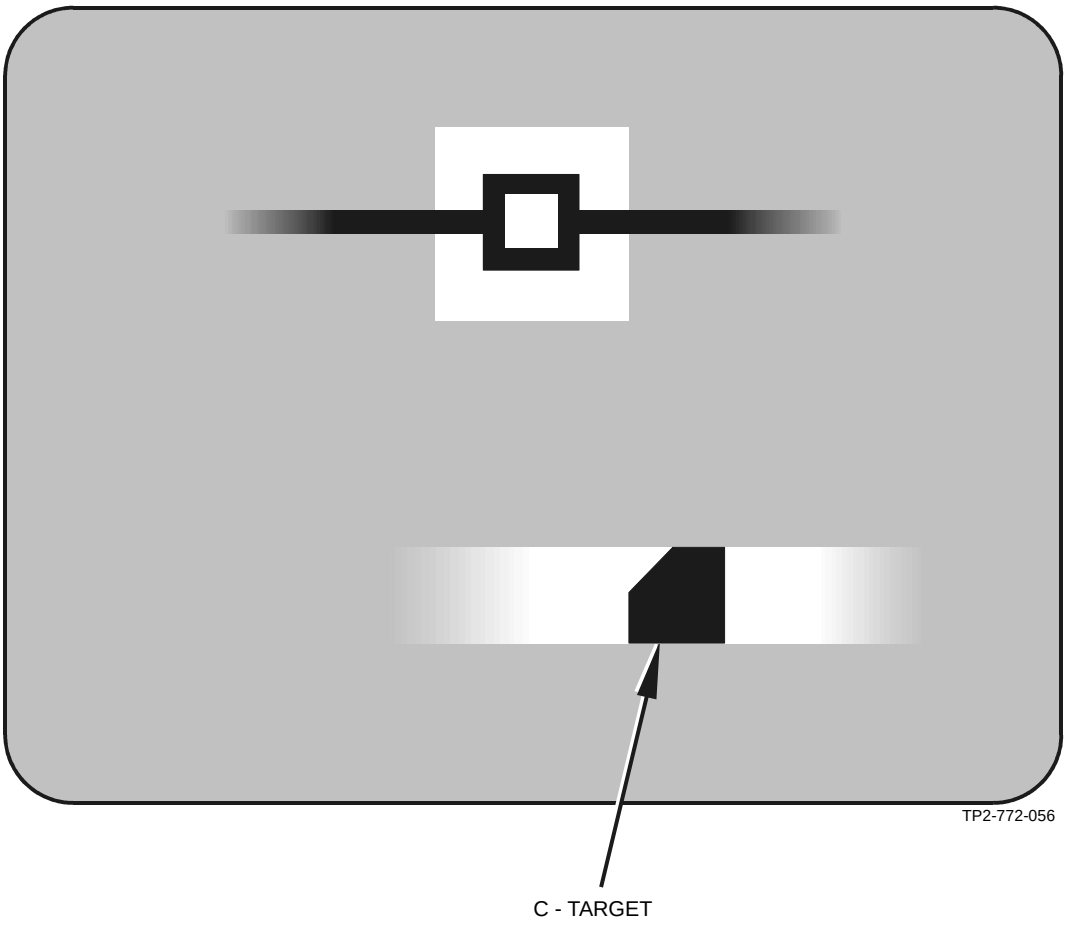


Figure 3-45. Targets for Beam Saturation Test

CHAPTER 4

DAY SENSOR SUBASSEMBLY

Section I. PREPARATION FOR TEST

4-1. TEST PREPARATION.

No special procedures are required to prepare the day sensor subassembly for test. Refer to the UUT/TPS/interface device matrix tables in appendix B to determine the correct UUT test program part number for the day sensor subassembly. Then refer to the UUT test program for a list of cables, test equipment, and test accessories required to test the day sensor subassembly.

4-2. UUT DESCRIPTION.

The day sensor subassembly (figure 4-1) is a subassembly of the TADS day sensor subassembly. It is a casting containing optics and electronic subassemblies, and clamps to the left side of the TADS turret assembly.

4-3. PRECAUTIONS.

The day sensor subassembly is an electro-mechanical device containing delicate electro-optical components. Use extreme care when handling the day sensor subassembly to prevent damage to these components. Observe the following general guidelines when lifting or moving it.

a. Weight. The day sensor subassembly with its subassemblies weighs approximately 35 pounds. Always get help when lifting or moving it.

b. Optics. Do not touch optics assemblies with your bare hands. Do not use the optics assemblies for any purpose when lifting the day sensor subassembly. If you accidentally place any pressure or force on the optics assemblies, you could contaminate them, damage them, or cause misalinement.

c. Sharp Edges. The day sensor subassembly casting contains many sharp edges. Use extreme care when moving it.

4-3. PRECAUTIONS. (CONT)

d. Wiring Harnesses. When moving the day sensor subassembly, do not pinch or pull the wiring harnesses. Do not allow them to chafe against the casting. Do not allow the connectors to become disconnected during movement.

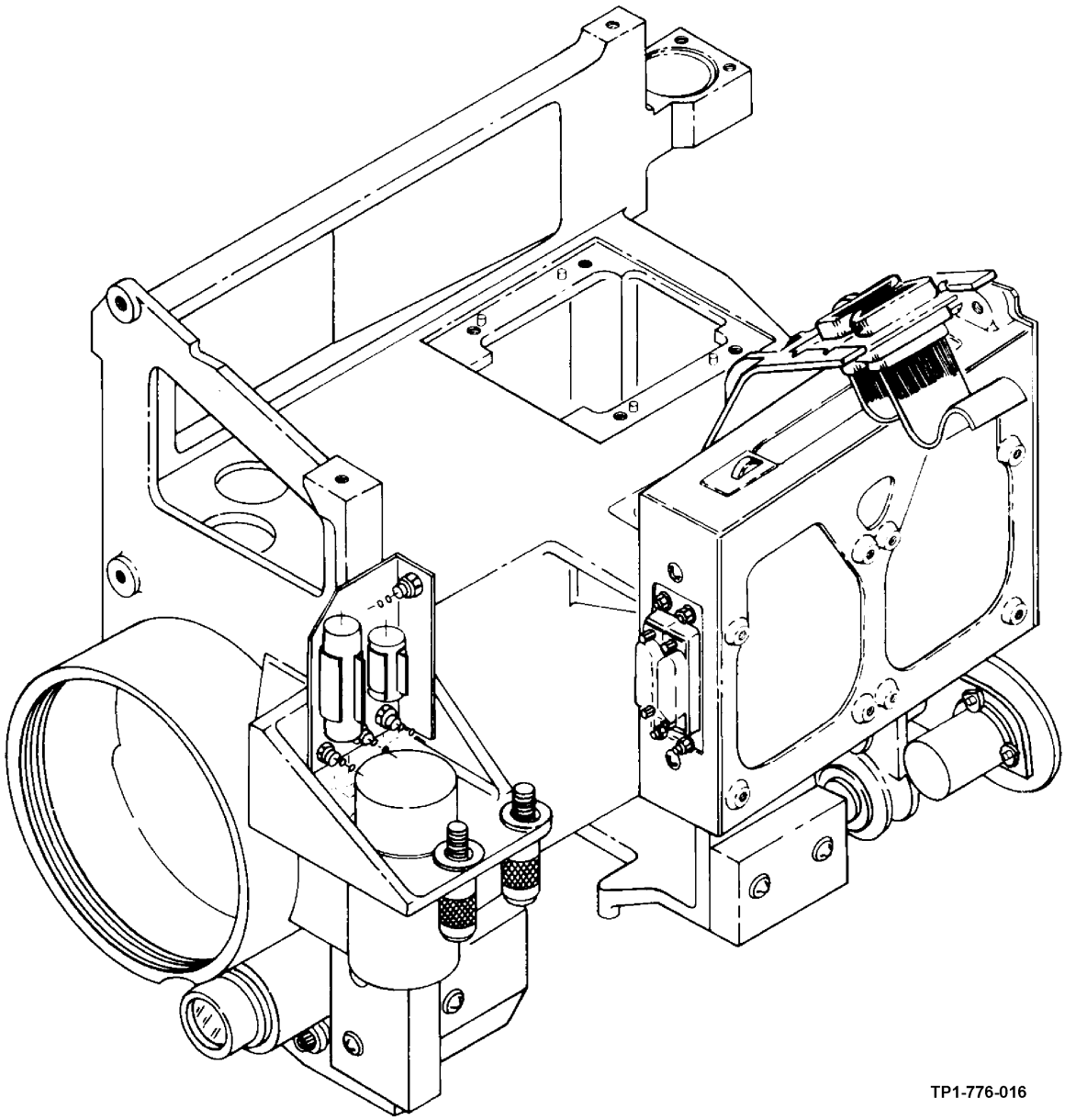


Figure 4-1. Day Sensor Subassembly

Section II. DESCRIPTION OF TEST

4-4. GENERAL.

This section describes the UUT test for the day sensor subassembly. It includes an explanation of the way testing is accomplished and a description of the test.

4-5. TEST CONCEPT.

The UUT test for the day sensor subassembly is supplemented by procedures in section III of this chapter, and by illustrations in section IV. While you are performing the UUT test, message prompts on the VDT will direct you to perform one of the procedures in section III, or to locate a part of the day sensor subassembly in section IV.

a. Procedures. Section III contains procedures to install and remove the day sensor subassembly and the insert/adapter from the dayside test bench. These procedures do not apply to the UUT test until called for by the test program. At the appropriate time during the test, a message prompt on the VDT will direct you to perform the procedures in one or more paragraphs in this section. At that time, turn to the referenced paragraph and perform those procedures, as the program cannot continue until they have been performed.

b. Illustrations. Section IV contains illustrations showing the locations of key components of the day sensor subassembly, the mounting locations of certain items, the test setup when using the transit level, lens accept/reject criteria, and locational information for the resolution target and reticle alinement. At the appropriate time during the test, a message prompt will refer to an illustration in section IV. Turn to the referenced illustration for assistance while performing the following instructions on the VDT.

4-6. TEST DESCRIPTION.

When the UUT test program has run the selected self-tests and is ready to test the day sensor subassembly, the following menu will be displayed on the VDT:

SELECT DESIRED MENU OPTION FROM LIST BELOW:

1. RUN HARNESS TEST
2. RUN ELECTRICAL TEST
3. RUN OPTICAL TEST
4. RUN ALL TESTS

ENTER OPTION NUMBER AND PRESS <RETURN>.

4-6. TEST DESCRIPTION. (CONT)

Paragraphs a through d below explain test options 1 through 4.

a. **RUN HARNESS TEST**. This test performs continuity checks of wiring harnesses J1 in the day sensor subassembly.

b. **RUN ELECTRICAL TEST**. This test momentarily applies electrically operated item mounted on the day sensor subassembly to determine if it is operational.

c. **RUN OPTICAL TEST**. This is an operator assisted test. The program switches the day sensor subassembly into each field of view (FOV). A message prompt on the VDT asks you to confirm the lens configuration and to check for dirty, scratched, or contaminated optics. The program will pass or fail the day sensor subassembly depending upon your input.

d. **RUN ALL TESTS**. You should normally select this option to begin testing a day sensor subassembly UUT. When this option is selected, the test program will sequence through the harness test, the electrical test, and the optical test.

4-7. PRETESTING DATA.

Awareness of the following information will help you to successfully test the day sensor subassembly, and may prevent unnecessary termination of the test.

a. Mirror Movement. During testing of the FOV assemblies, the mirror rotation is very quick and slams into the stop positions. This is normal operation and the program should not be terminated.

b. Gear Rotation. During testing of the FOV assemblies, gears rotate and make considerable noise. This is normal operation and the program should not be terminated.

c. Hanging Cables. Ensure that any hanging cables do not get tangled in the optics assemblies and gears. Damage to the equipment could result if they do.

4-8. FINAL ACCEPTANCE.

When the day sensor subassembly has been repaired, repeat the UUT test. If an ALL TESTS GO prompt is received at the end of the test, the day sensor subassembly is considered to be fully operational.

Section III. TEST PROMPTED PROCEDURES

4-9. GENERAL.

This section contains procedures to be performed in conjunction with the procedures in the UUT test program for the day sensor subassembly. When the UUT test program directs you to perform a procedure in this manual, locate the referenced paragraph(s) in this section and perform the actions indicated.

4-10. DAY SENSOR SUBASSEMBLY INSTALLATION ON DAYSIDE TEST BENCH.

This paragraph covers the steps required to install the insert/adapter on the day sensor subassembly and install them both on the dayside test bench.

a. Day Sensor Subassembly Removal from Shipping and Storage Container.

WARNING

HEAVY OBJECTS

- Excessive strain can cause serious injury.
- Don't: Attempt to lift or carry heavy objects alone.
- Do: Get help for lifting or carrying heavy loads.
- If you experience a sudden pain while lifting or discomfort after lifting, get medical help at once.

CAUTION

EQUIPMENT DAMAGE

- Optics are exposed during this task and must be protected from contamination. Careless handling of day sensor subassembly could result in contaminated optic assemblies.
- Careless handling of support equipment can also damage optic assemblies.
- Never touch optic surfaces with bare hands.
- Never attempt to lift or move day sensor subassembly using optic assemblies for support.
- Any force or pressure on optic assemblies could cause damage or misalinement.

4-10. DAY SENSOR SUBASSEMBLY INSTALLATION ON DAYSIDE TEST BENCH. (CONT)

NOTE

Two people are required when performing this task.

(1) Remove inner case assembly from shipping and storage container as follows:

(a) Press pressure relief (1, figure 4-2) on container.

(b) Release and unhook container latches (2).

(c) Remove container cover (3) and set aside on clean dry surface.

(d) Remove case assembly (4) from container and place on workbench.

CAUTION

EQUIPMENT DAMAGE

The black foam in the shipping container may dry rot over time creating a dust/powder/grit residue. A potential exists for abrasive damage to optics and mechanical assemblies and degradation of optical performance. Inspect and clean assemblies as required.

(e) Inspect and remove any dust, black powder, or grit from the outside of the inner case cover before opening inner case cover.

(2) Release and disengage latches (5) securing case assembly (6) to base assembly (7).

(3) Grasp handles (8) and lift case assembly clear of base assembly. Place case assembly on a clean dry surface.

4-10. DAY SENSOR SUBASSEMBLY INSTALLATION ON DAYSIDE TEST BENCH. (CONT)

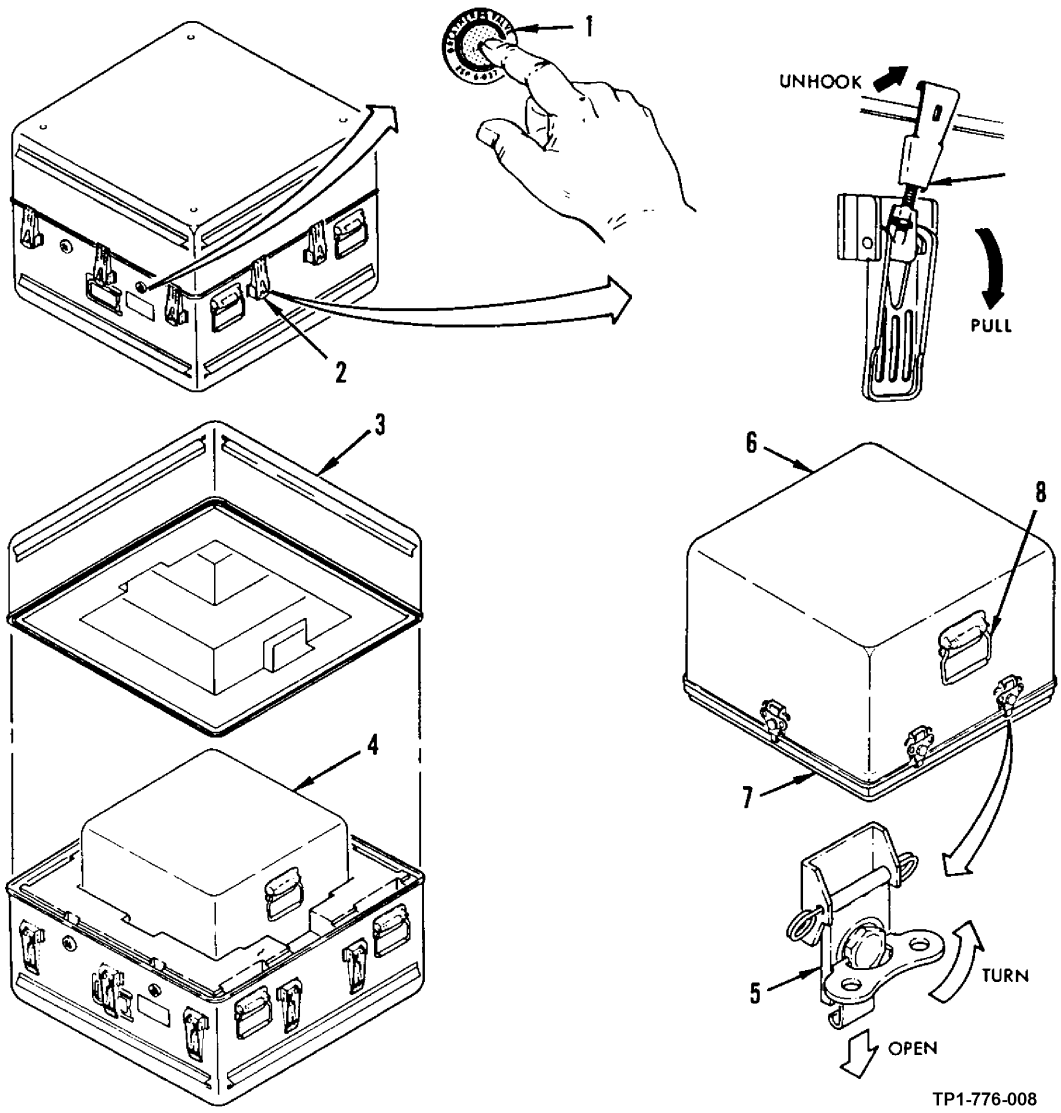


Figure 4-2. Inner Case Removal from Shipping and Storage Container

4-10. DAY SENSOR SUBASSEMBLY INSTALLATION ON DAYSIDE TEST BENCH. (CONT)

(4) Remove day sensor subassembly from base assembly (1, figure 4-3) as follows:

NOTE

Two types of base assemblies are used with the inner case of the DSA shipping and storage container. Type B has a support plate attached to the base assembly with two bolts. Type A has no support plate.

(a) For type A base assembly, loosen clamp assembly (2) by loosening and turning clamp bolt counterclockwise enough to allow day sensor subassembly (3) to be removed.

(b) For type B base assembly, loosen clamp assembly (2) by loosening and turning clamp bolt counterclockwise until clamp halves touch bolt heads (4).

(c) Grasp day sensor subassembly with both hands. Gently lift it straight up until guide pins (5) are out of guide holes in day sensor subassembly mounting flange.

b. Day Sensor Subassembly Installation on Insert/Adapter.

(1) Ensure that optics cover (1, figure 4-4) is mounted on large lens.

(2) Orient day sensor subassembly (2) so that large lens is pointing down. Carefully place day sensor subassembly onto workbench tabletop (3) as shown.

(3) If necessary, loosen clamp assembly (4) by loosening and turning clamp bolt counterclockwise. There should be at least 2 inches between clamp bolt's inner surfaces.

(4) Orient insert/adapter so that clamp bolt is on the right and pointing down, as shown.

(5) Aline guide holes (5) on day sensor subassembly with guide pins (6) on insert/adapter and mount insert/adapter to day sensor subassembly.

(6) Set torque wrench to 100 in-lb and-tighten clamp assembly (4) with torque wrench. Ensure that day sensor subassembly is properly secured to insert/adapter by checking for no free movement between the two.

c. Day Sensor Subassembly and Insert/Adapter Installation on Dayside Test Bench.

(1) Make sure nothing is mounted to sensor mount assembly. Remove optics covers from sensor mount optics, if present.

4-10. DAY SENSOR SUBASSEMBLY INSTALLATION ON DAYSIDE TEST BENCH. (CONT)

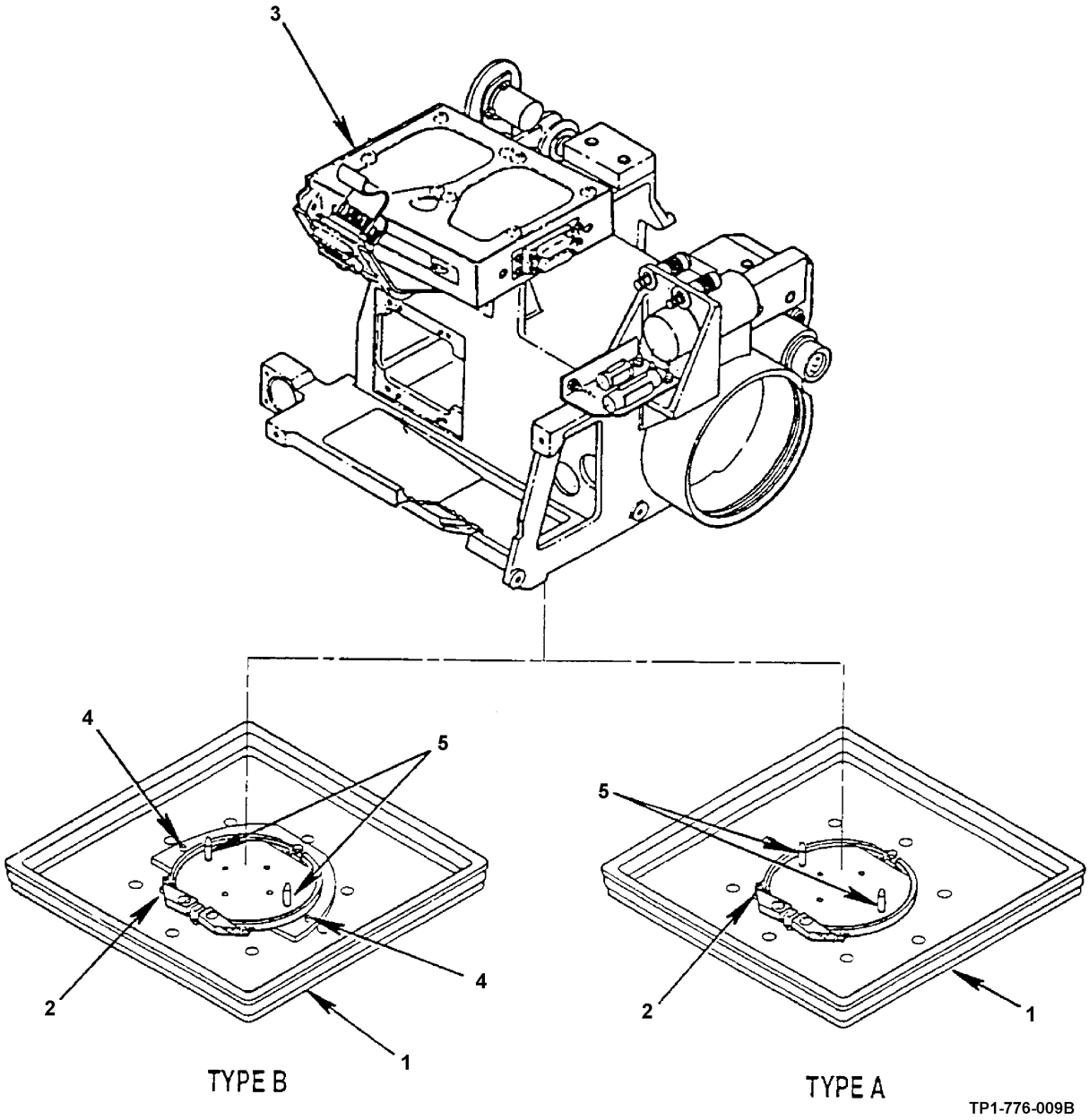


Figure 4-3. Day Sensor Subassembly Removal from Base Assembly

4-10. DAY SENSOR SUBASSEMBLY INSTALLATION ON DAYSIDE TEST BENCH. (CONT)

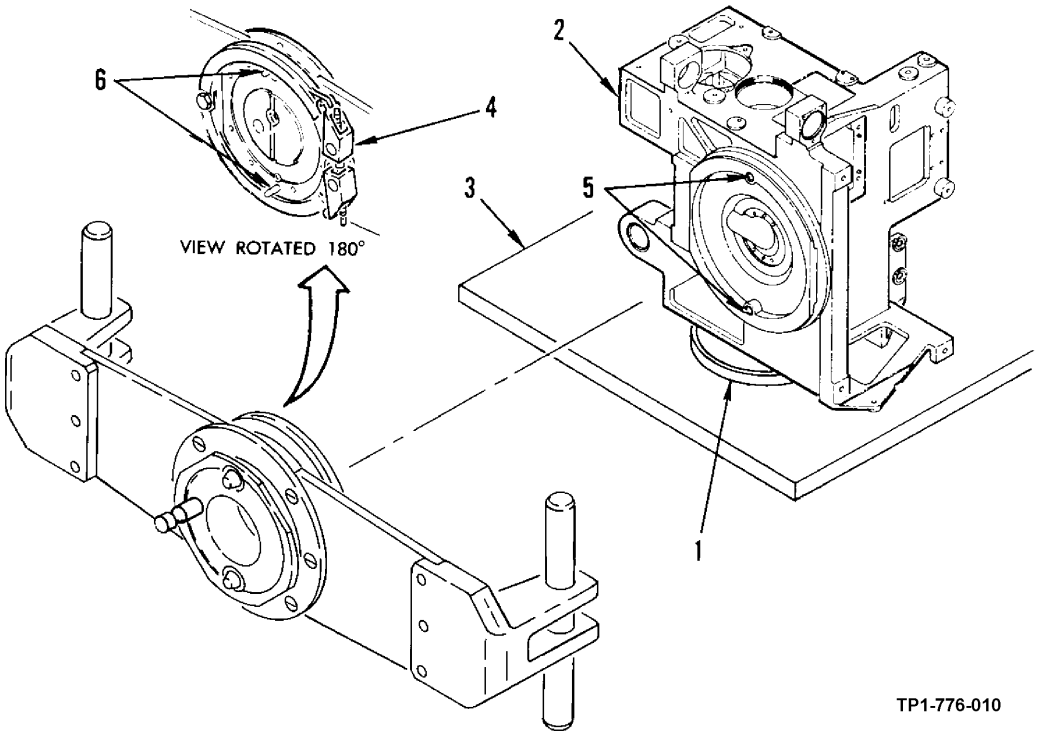


Figure 4-4. Mounting of Insert/Adapter to Day Sensor Subassembly

(2) Push sensor mount handle (1, figure 4-5) to the unlock (away from operator) position.

(3) Lift day sensor subassembly and insert/adapter handles of insert/ adapter and alive numbered insert/adapter guide pins (2) with corresponding numbered holes (3) on sensor mount assembly.

(4) Ensure that guide pin (4) on insert/adapter is alined with hole (5) on sensor mount assembly.

(5) Mount day sensor subassembly and insert/adapter to sensor mount assembly and pull sensor mount handle (1) to the lock (toward operator) position. Ensure that day sensor subassembly and insert/adapter are firmly locked in place before releasing insert/adapter handles.

d. Reassembling of Shipping and Storage Container.

(1) Reinstall case assembly (1, figure 4-6) on base assembly (2).

(2) Engage and lock latches (3).

(3) Grasp handles (4) of case assembly and place in shipping and storage container.

(4) Reinstall container cover (5) and close latches (6).

4-10. DAY SENSOR SUBASSEMBLY INSTALLATION ON DAYSIDE TEST BENCH. (CONT)

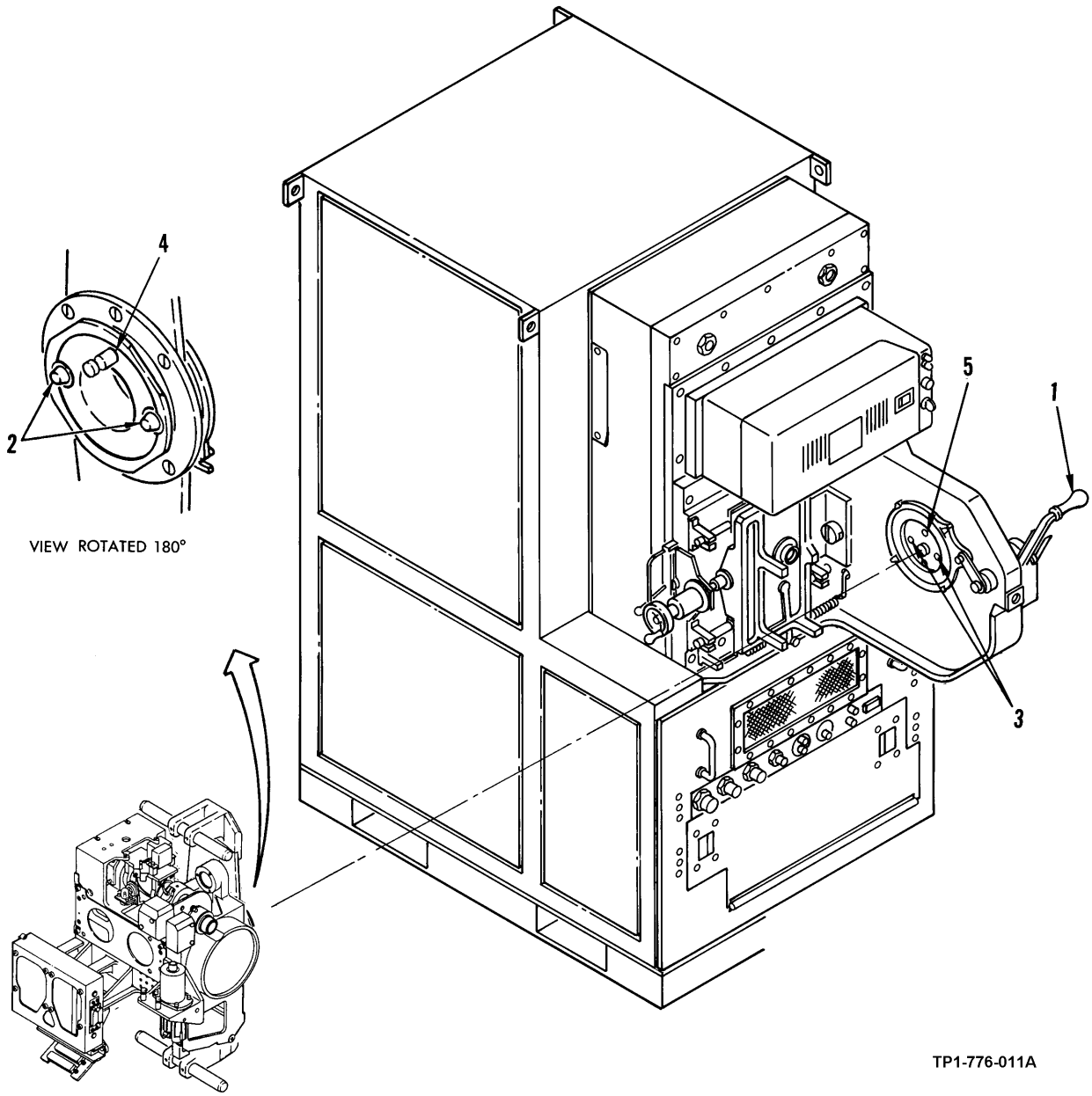


Figure 4-5. Mounting of Day Sensor Subassembly and Insert/Adapter to Sensor Mount Assembly

4-10. DAY SENSOR SUBASSEMBLY INSTALLATION ON DAYSIDE TEST BENCH. (CONT)

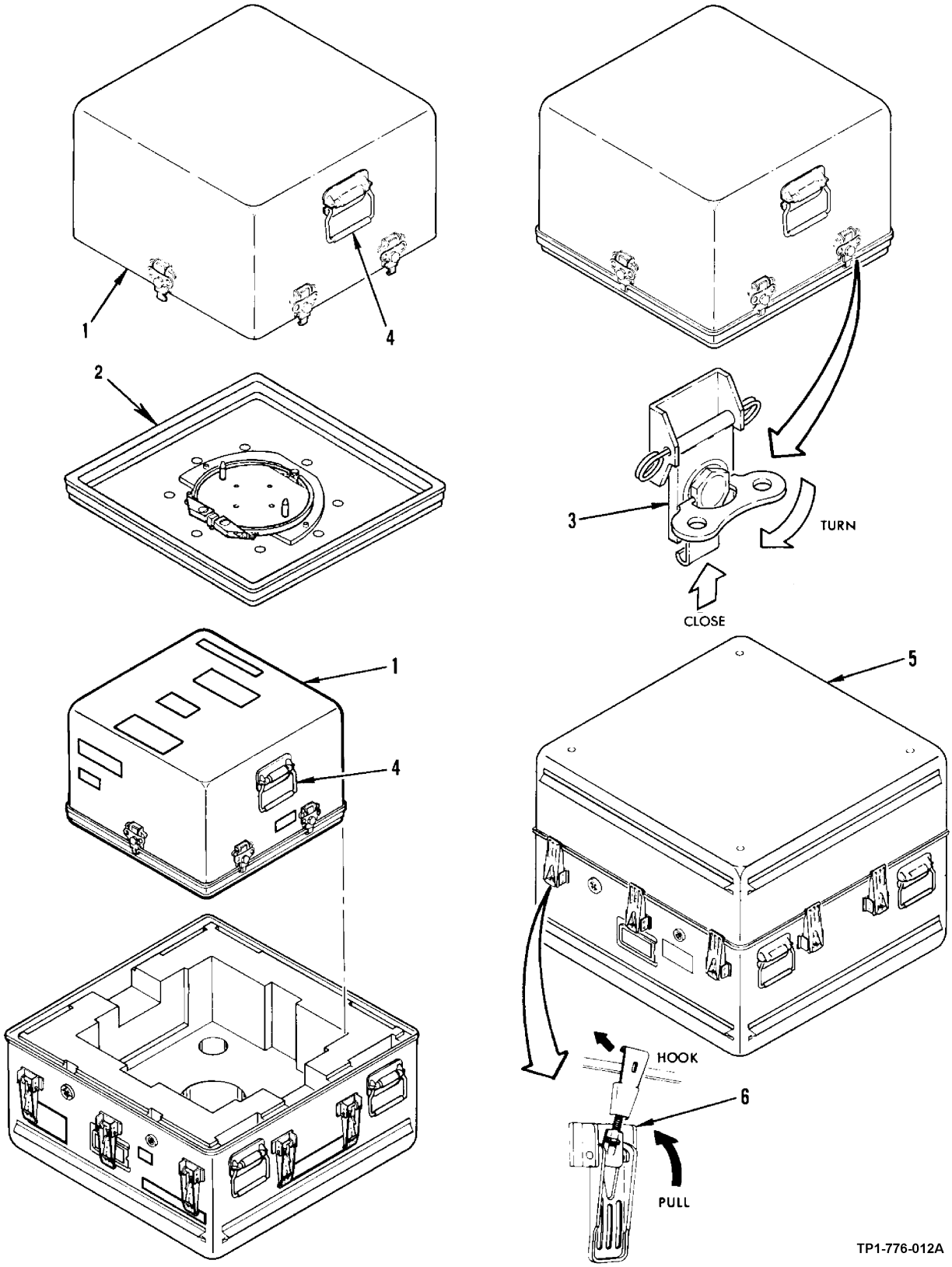


Figure 4-6. Reassembly of Shipping and Storage Container

4-11. DAY SENSOR SUBASSEMBLY REMOVAL FROM DAYSIDE TEST BENCH.

This paragraph covers the steps required to remove the day sensor subassembly from the dayside test bench and install it in the shipping and storage container.

a. Preparation of Shipping and Storage Container.

WARNING

HEAVY OBJECTS

- Excessive strain can cause serious injury.
- Don't: Attempt to lift or carry heavy objects alone.
- Do: Get help for lifting or carrying heavy loads.
- If you experience a sudden pain while lifting or discomfort after lifting, get medical help at once.

NOTE

Two people are required when performing this task.

(1) Remove inner case assembly from shipping and storage container as follows.

(a) Press pressure relief (1, figure 4-7) on container.

(b) Release and unhook container latches (2).

(c) Remove container cover (3) and set aside on clean dry surface.

(d) Remove case assembly (4) from container and place on workbench.

(2) Release and disengage latches (5) securing case assembly (6) to base assembly (7).

(3) Grasp handles (8) and lift case assembly clear of base assembly. Place case assembly on clean dry surface.

4-11. DAY SENSOR SUBASSEMBLY REMOVAL FROM DAYSIDE TEST BENCH. (CONT)

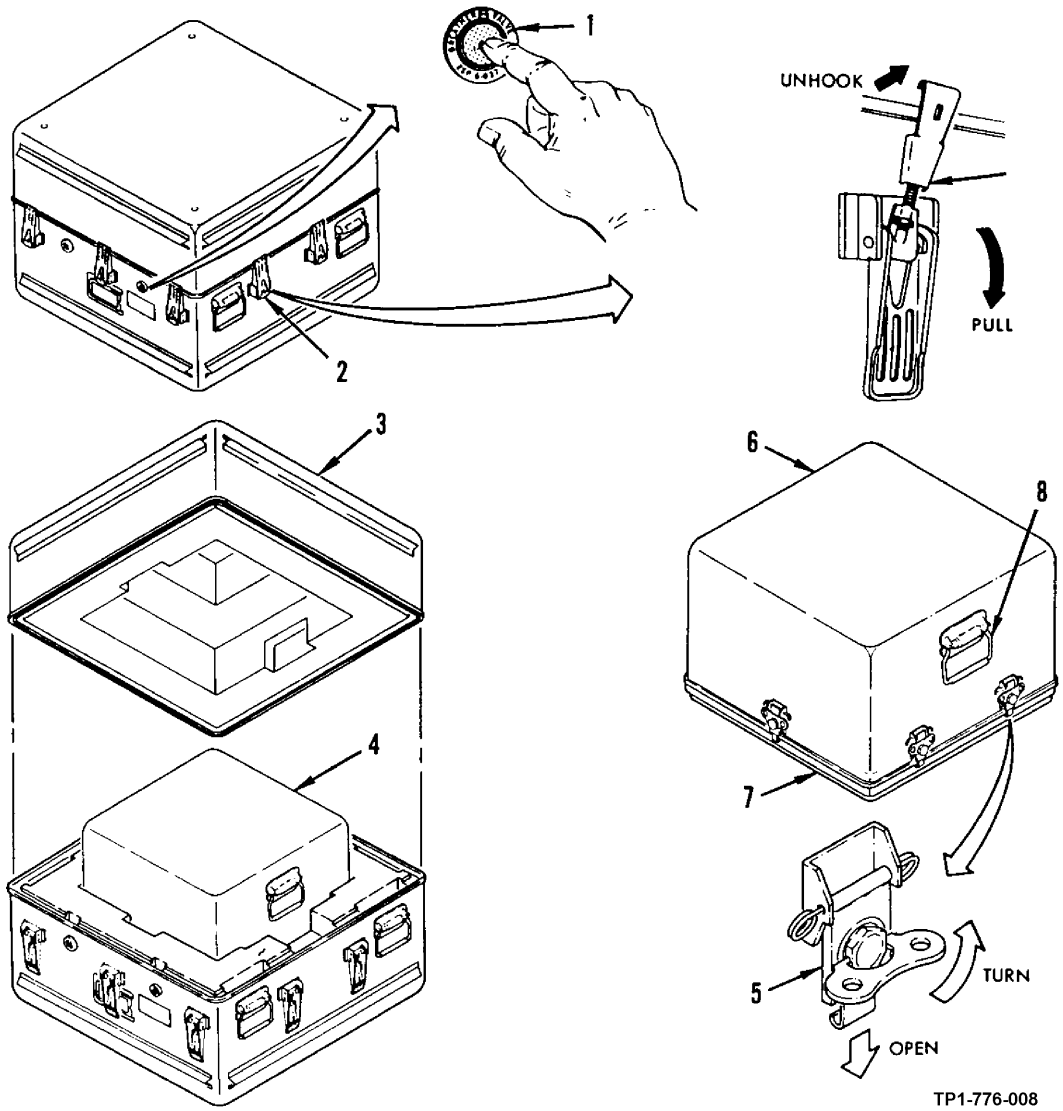


Figure 4-7. Inner Case Removal from Shipping and Storage Container

4-11. DAY SENSOR SUBASSEMBLY REMOVAL FROM DAYSIDE TEST BENCH. (CONT)

b. Day Sensor Subassembly Removal from Dayside Test Bench.

CAUTION

EQUIPMENT DAMAGE

- Optics are exposed during this task and must be protected from contamination. Careless handling of day sensor subassembly could result in contaminated optic assemblies.
- Careless handling of support equipment can also damage optic assemblies.
- Never touch optic surfaces with bare hands.
- Never attempt to lift or move day sensor subassembly using optic assemblies for support.
- Any force or pressure on optic assemblies could cause damage or misalinement.

NOTE

Two people are required when performing this task.

(1) Ensure that all cables have been removed from the day sensor subassembly.

(2) Hold insert/adapter (1, figure 4-9) in place on sensor mount (2).

(3) Push sensor mount handle (3) to unlock position (away from operator).

(4) Remove insert/adapter and day sensor subassembly from sensor mount.

(5) Orient day sensor subassembly so that large lens is pointing down. Place day sensor subassembly on workbench tabletop.

(6) Loosen clamp assembly securing insert/adapter to day sensor subassembly and remove insert/adapter.

4-11. DAY SENSOR SUBASSEMBLY REMOVAL FROM DAYSIDE TEST BENCH. (CONT)

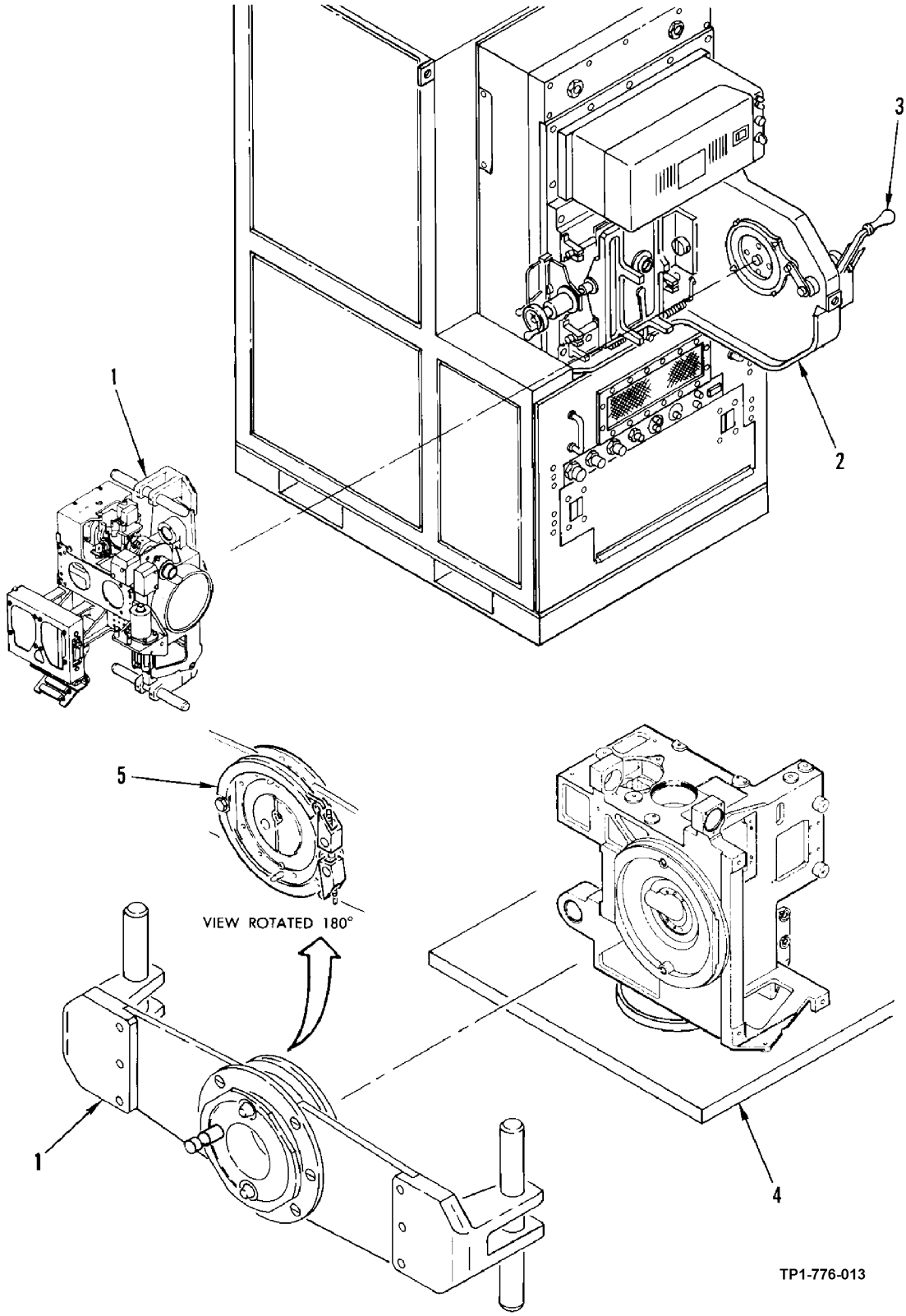


Figure 4-8. Day Sensor Subassembly Removal From Dayside Test Bench

4-11. DAY SENSOR SUBASSEMBLY REMOVAL FROM DAYSIDE TEST BENCH. (CONT)

c. Installation of Day Sensor Subassembly in Shipping and Storage Container.

(1) Install day sensor subassembly on base assembly (1, figure 4-9) as follows:

NOTE

Two types of base assemblies are used with the inner case of the DSA shipping and storage container. Type B has a support plate attached to the base assembly with two bolts. The support plate and two bolts prevent clamp misalinement during installation of day sensor subassembly on base assembly. Type A has no support plate and the clamp is subject to misalinement during installation of day sensor subassembly on base assembly.

(a) For type A base assembly, make sure clamp assembly (2) is loosened until clamp halves are spread far enough to permit installation of day sensor subassembly clamp mounting flange (3) on base assembly (1). Also, make sure clamp halves are positioned equally on each side of locating pins (4).

(b) For type B base assembly, make sure clamp assembly (2) is loosened until clamp halves touch bolt heads (5). Also, clamp tab must point to clamp center.

(c) Aline guide holes (6) on day sensor subassembly with guide pins (4) on base assembly.

(d) Lower day sensor subassembly onto base assembly until the two mating surfaces are firmly in contact.

(e) Seat clamp assembly (2) on flanges. Set torque wrench to 35 in-lb and tighten clamp assembly (2). Ensure that day sensor subassembly is properly secured to base assembly by checking for no free movement between day sensor subassembly and base assembly.

(2) Install case assembly (7) on base assembly as follows:

(a) Grasp handles (8) of case assembly and carefully lower it onto base assembly.

(b) Engage and lock case assembly latches (9).

(3) Grasp handles (8) of case assembly and place it inside shipping and storage container.

(4) Close container cover (10).

(5) Hook and secure container latches (11).

4-11. DAY SENSOR SUBASSEMBLY REMOVAL FROM DAYSIDE TEST BENCH. (CONT)

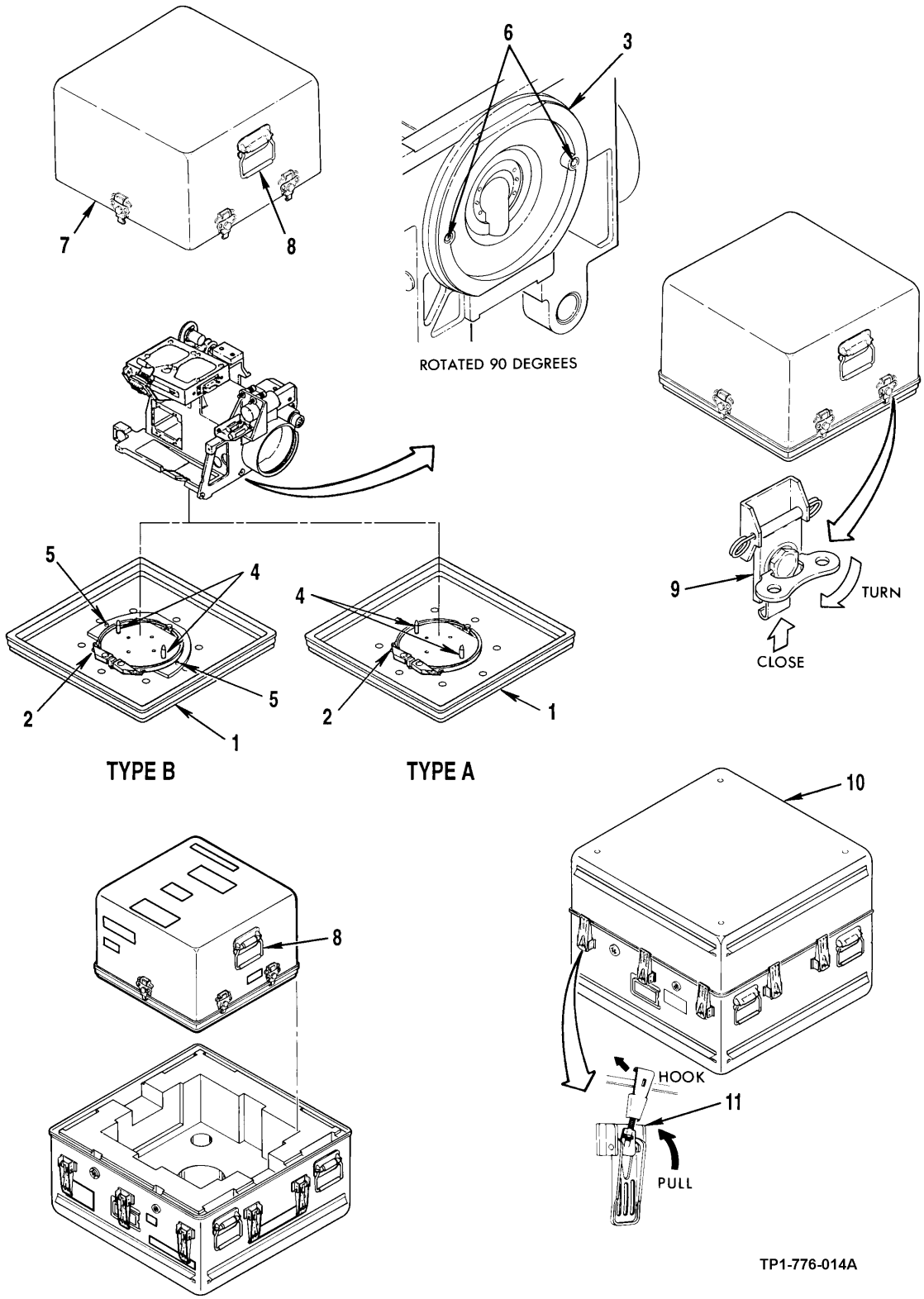


Figure 4-9. Installation of Day Sensor Subassembly in Shipping and Storage Container

Section IV. TEST PROMPTED REFERENCES

4-12. GENERAL.

This section contains illustrations to be referred to while you are performing the UUT test. When the UUT test program directs you to refer to an illustration in this manual, locate the illustration and refer to it for assistance while performing the following instructions on the VDT.

4-12. GENERAL. (CONT)

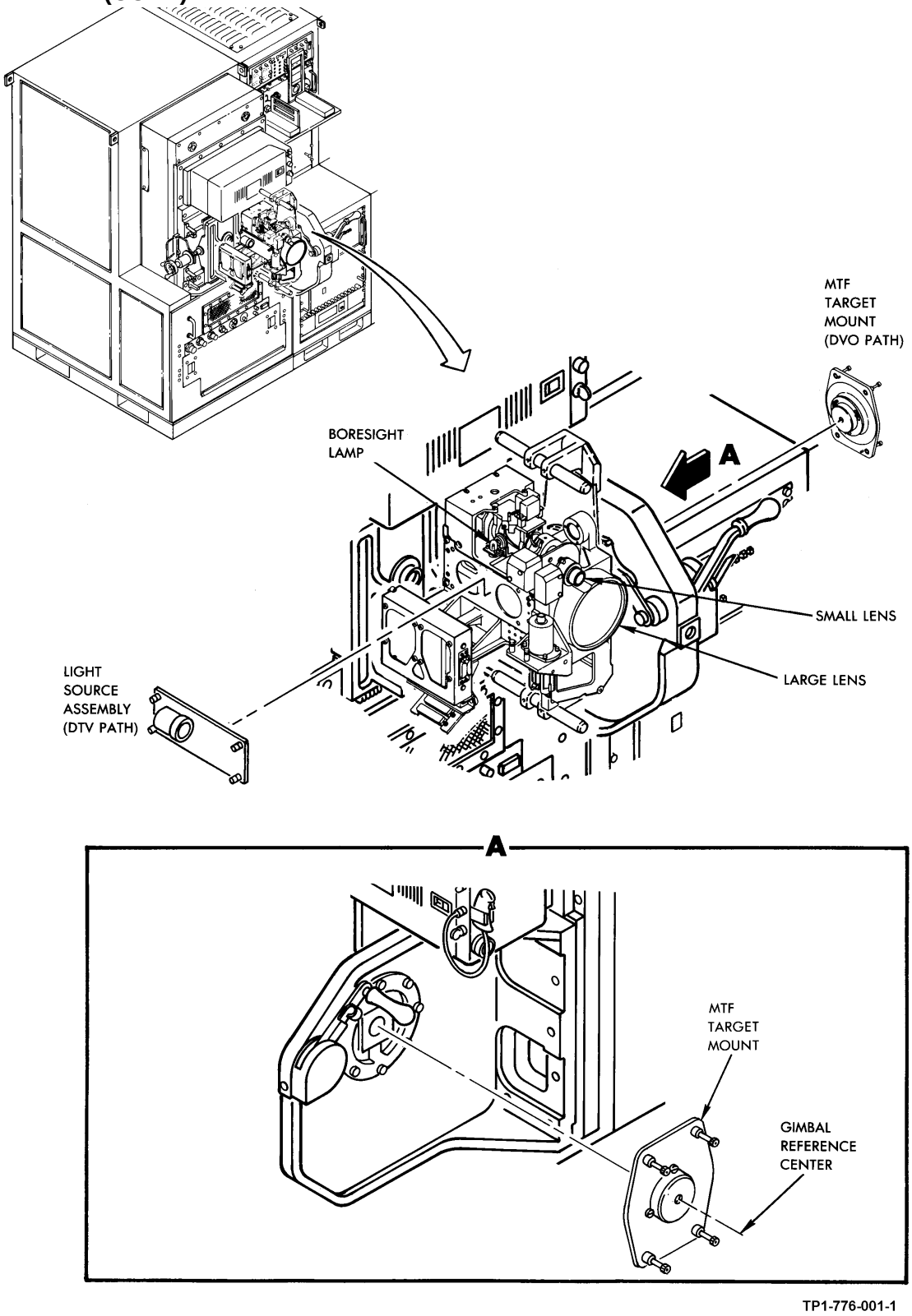


Figure 4-10. Day Sensor Subassembly Locational Diagram

4-12. GENERAL. (CONT)

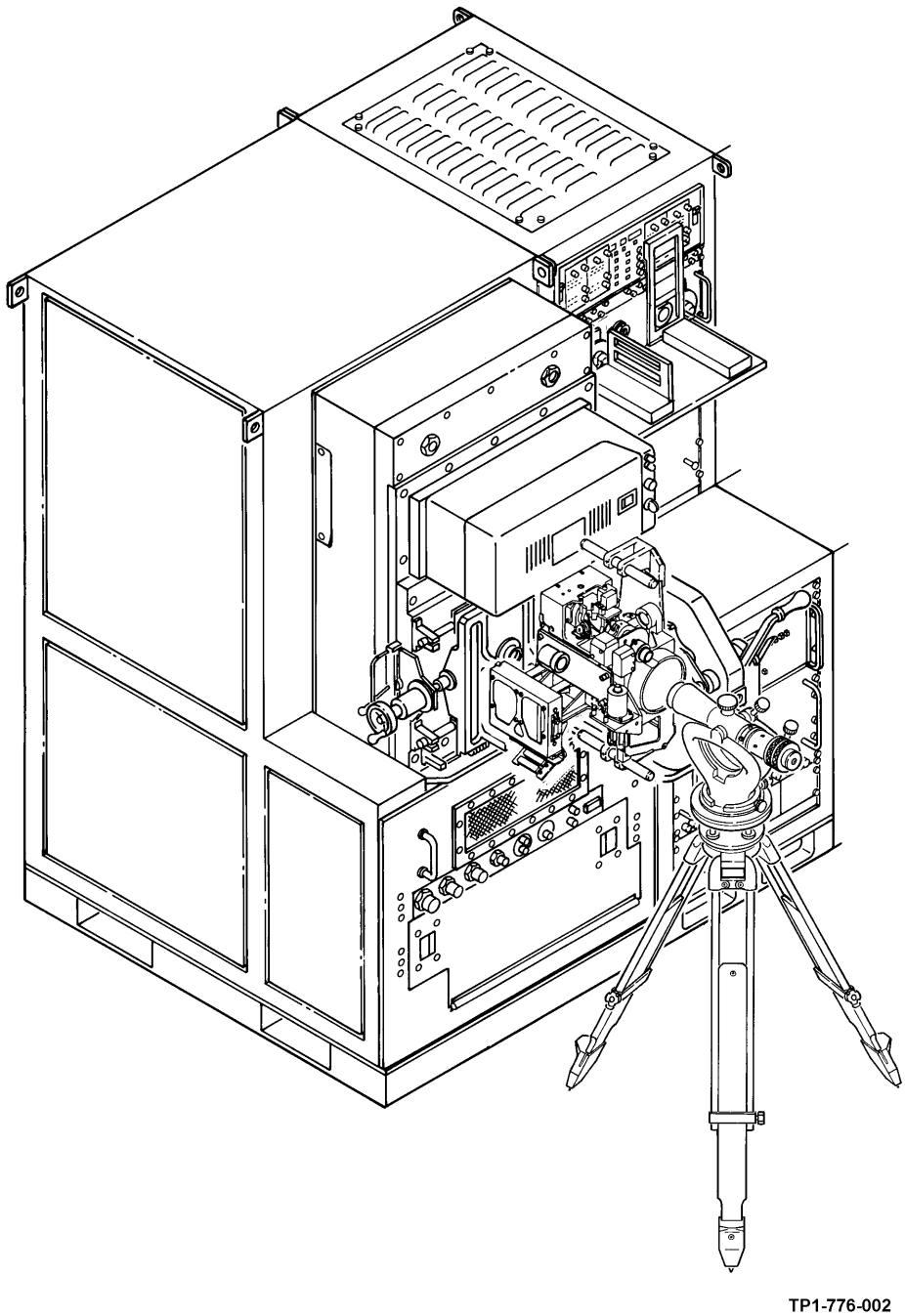


Figure 4-11. 24 Power Transit Level Setup

4-12. GENERAL. (CONT)

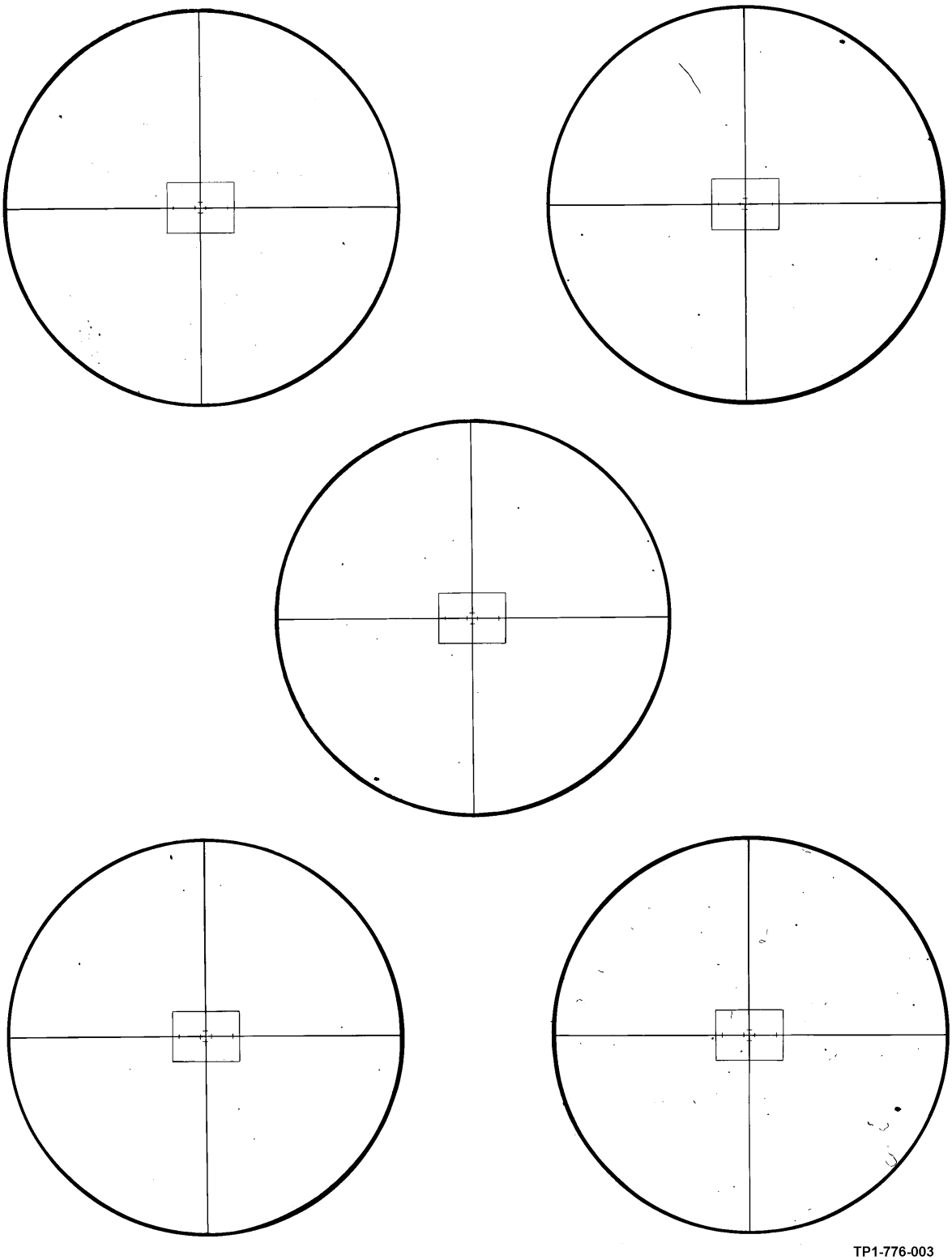


Figure 4-12. NFOV Path Accept Criteria

4-12. GENERAL. (CONT)

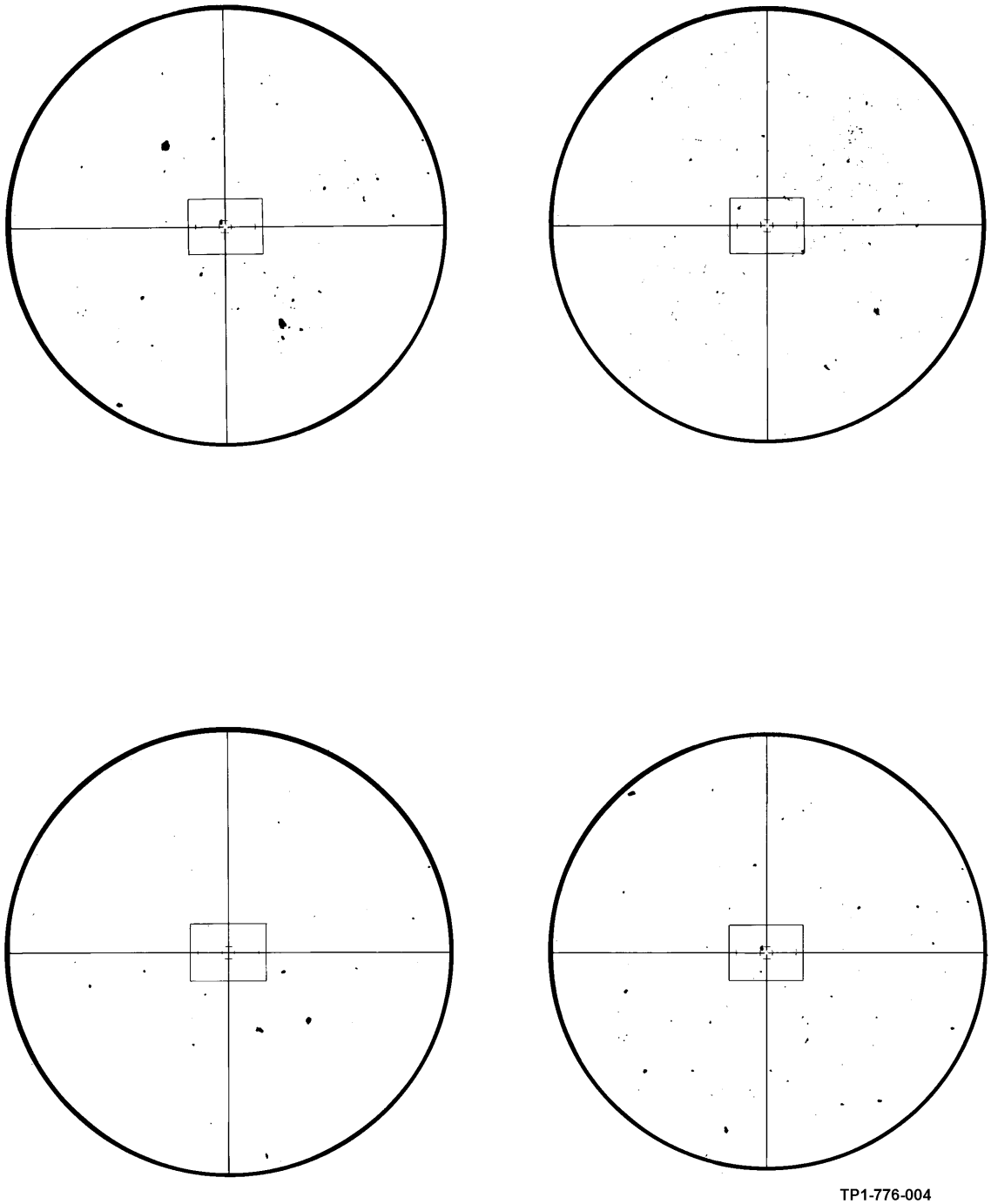


Figure 4-13. NFOV Path Reject Criteria

4-12. GENERAL. (CONT)

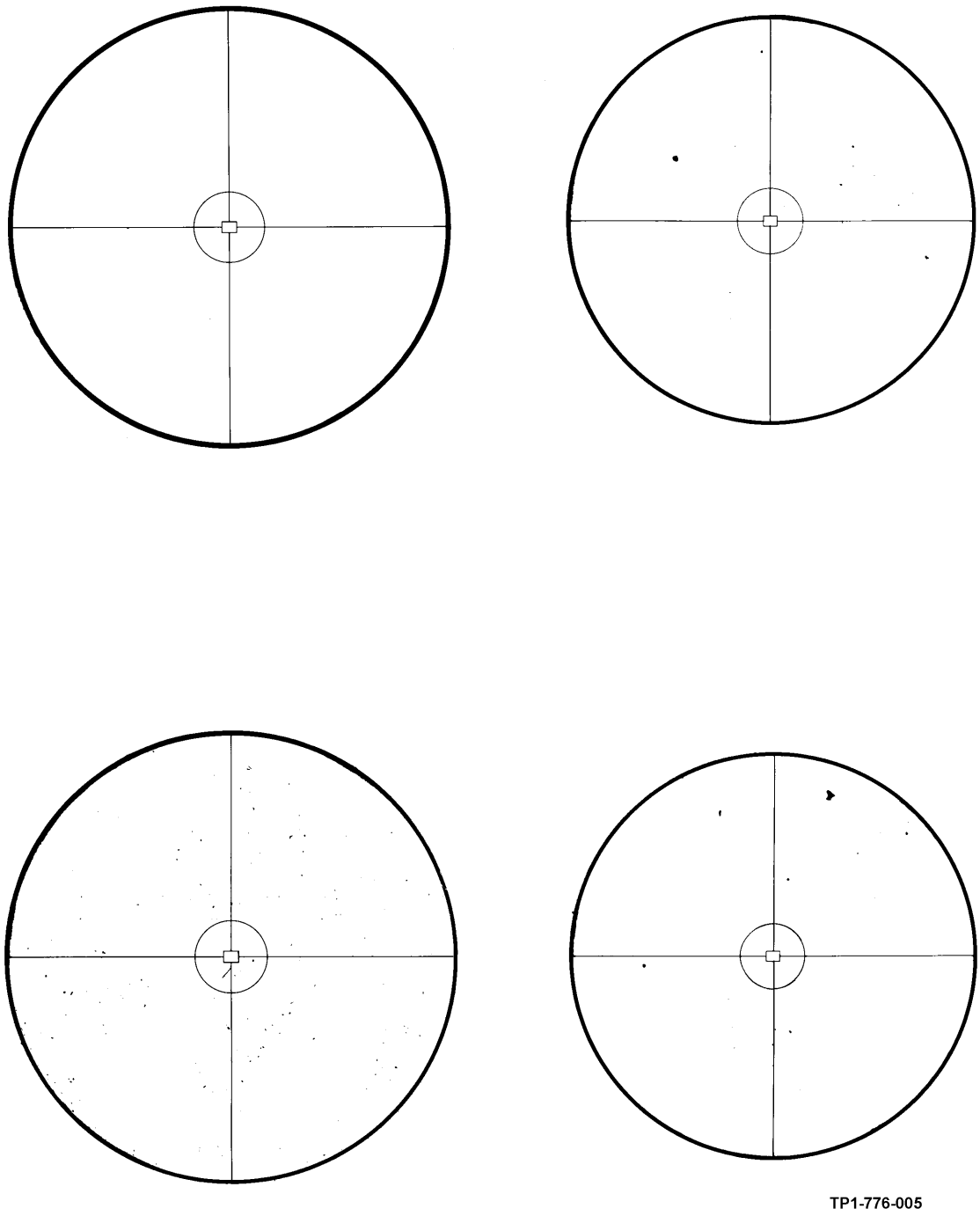


Figure 4-14. WFOV Path Accept Criteria

4-12. GENERAL. (CONT)

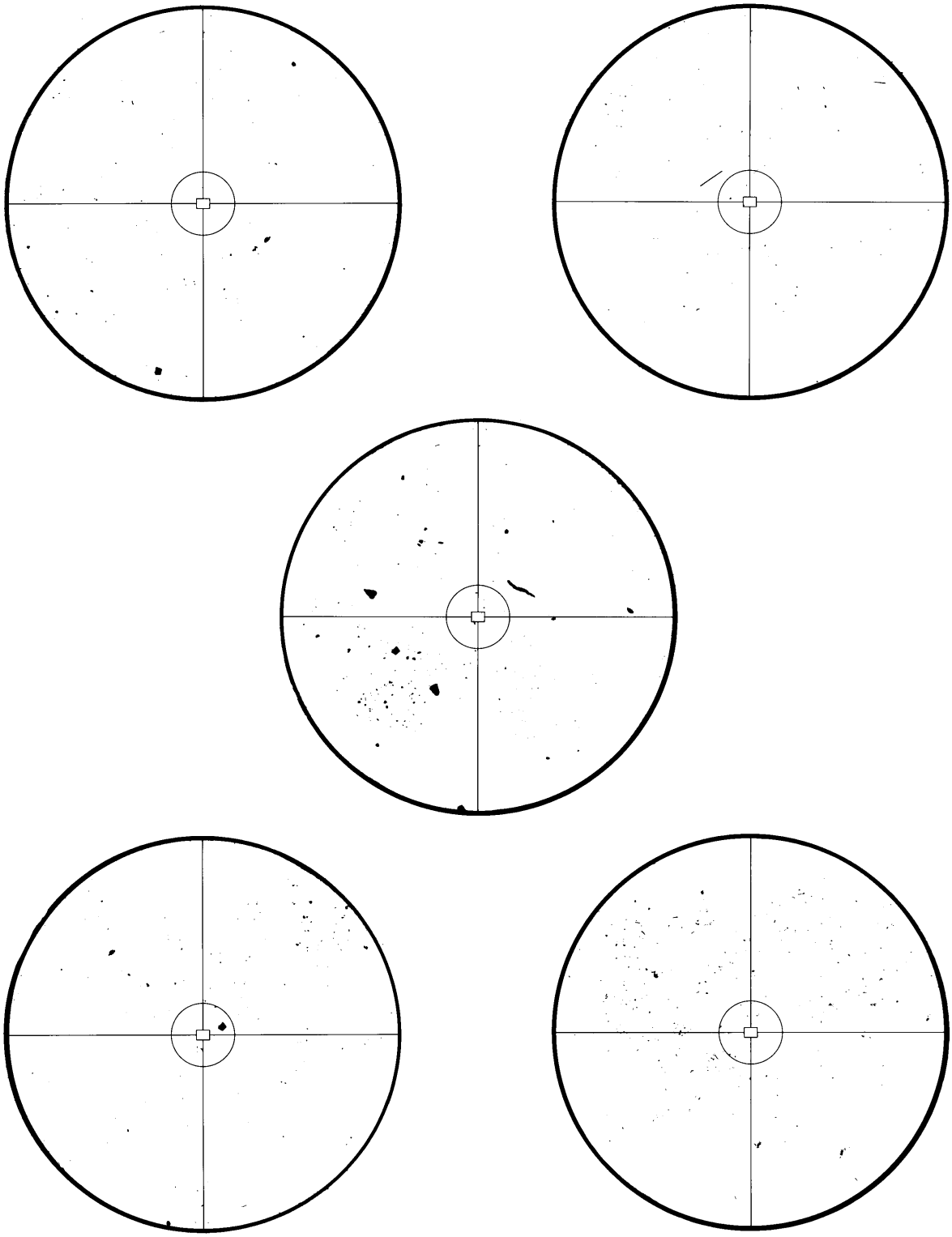


Figure 4-15. WFOV Path Reject Criteria

4-12. GENERAL. (CONT)

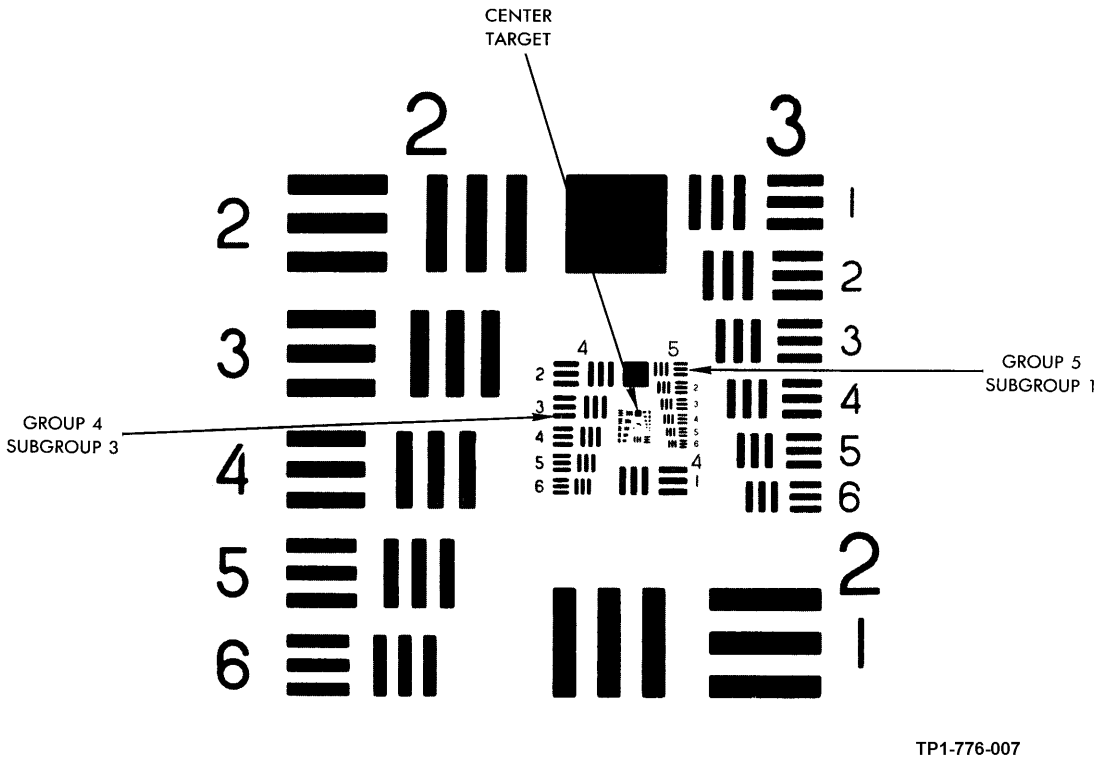


Figure 4-16. Resolution Target

4-12. GENERAL. (CONT)

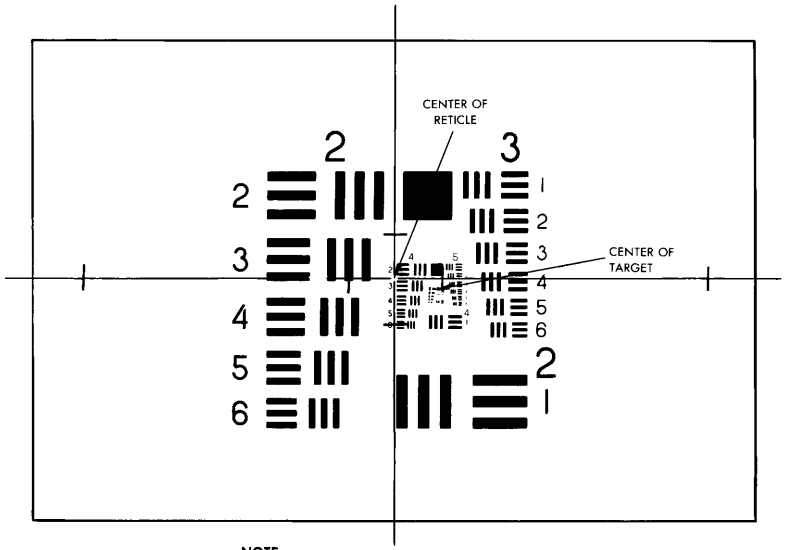


Figure 4-17. DVO Spiral Reticle Alinement

CHAPTER 5

CONTROL PANEL ASSEMBLY

Section I. PREPARATION FOR TEST

5-1. TEST PREPARATION.

No special procedures are required to prepare the control panel assembly for test. Refer to the UUT/TPS/interface device matrix tables in appendix B to determine the correct UUT test program number for the control panel assembly. Then refer to the UUT test program for a list of cables, test equipment, and test accessories required to test the control panel assembly.

5-2. UUT DESCRIPTION.

The control panel assembly (figure 5-1) mounts to the upper optical relay column assembly. It contains the heads out display, switches, and adjustment knobs used to control brightness, contrast, and focus, and for the selection of video and filters. All controls are operated during the UUT test to determine if they are faulty or operational. The controls are shown in the illustrations in section IV. All other components of the control panel assembly that are referenced during the UUT test are shown in the illustrations in section IV.

5-3. PRECAUTIONS.

Observe the following precautions when testing the control panel assembly.

a. Electric Shock. The control panel assembly operates with a 16,000-volt potential on the cathode ray tube (CRT) anode and a 4,000-volt focus voltage potential. During yoke alinement, it is possible to receive a deadly electric shock. Observe all warning notes on the VDT and on the illustrations in section IV when performing this procedure.

b. Component Damage. Components on the optical signal analyzer (OSA) and on the control pane assembly can be damaged when you place the control panel assembly into the OSA or remove it. Observe all cautions on the illustrations in section IV when performing this action. The reticle glass can be damaged when inserting it into the control panel assembly CRT screen area, and the high voltage connector cap can be damaged when tightening the adjacent connector. Use caution at all times when working with equipment.

5-3. PRECAUTIONS. (CONT)

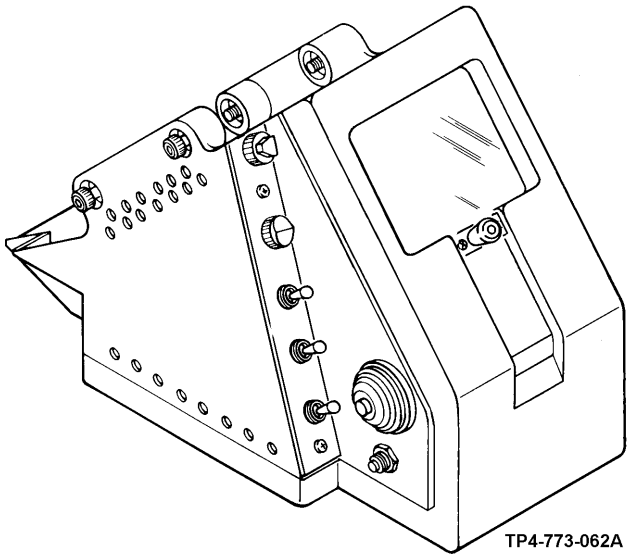


Figure 5-1. Control Panel Assembly

Section II. DESCRIPTION OF TEST

5-4. GENERAL.

This section describes the UUT test for the control panel assembly. It includes an explanation of the way testing is accomplished, a description of the test, and pretesting data.

5-5. TEST CONCEPT.

The UUT test for the control panel assembly is supplemented by procedures in section III of this chapter, and by illustrations in section IV. While you are performing the UUT test, message prompts on the VDT will direct you to perform one of the procedures in section III, or to refer to an illustration in section IV.

a. Procedures. Section III contains procedures to remove the control panel assembly from the and storage container and to replace it in the container. These procedures do not apply to the UUT test until called for by the test program. At the appropriate time during the test, a message prompt on the VDT will direct you to perform a set of procedures in this section. At that time, turn to the referenced paragraph and perform those procedures, as the program cannot continue until they have been performed.

5-5. TEST CONCEPT. (CONT)

b. Illustrations. Section IV contains illustrations that supplement the UUT test procedures on the VDT. The procedures cannot be successfully accomplished unless you refer to the appropriate illustrations when directed by message prompts. In addition to showing you how to make an adjustment or locate a component, many of the illustrations contain explanatory data, cautions relating to equipment damage, and warnings relating to shock hazards. At the appropriate time during the UUT test, a message prompt will refer to an illustration in section IV. Turn to the referenced illustration for assistance while performing the following instructions on the VDT.

5-6. TEST DESCRIPTION.

Three kinds of tests are performed by the UUT test program. These tests are described in the following paragraphs.

a. Control Panel Test. The test program measures resistance and continuity of all potentiometers an switches.

b. Prealinement. The test program measures the size, centering, focus, and rotation of the heads-out display video at the 875 and 525 line rates. You are instructed to adjust any parameter that is out of tolerance.

c. E/O Algorithms. This is a depot measurement. The test program compares the values obtained in the prealinement tests with fixed values. CRT brightness is measured.

5-7. PRETESTING DATA.

At times, the UUT test program will appear to have stopped for up to 1 hour. This is because some portions of the program require this amount of time to execute. During these times, a prompt will appear on the VDT explaining that a program delay is in progress.

5-8. FINAL ACCEPTANCE.

When the control panel assembly has been repaired, repeat the UUT test. If an ALL TESTS GO prompt is received at the end of the test, the control panel assembly is considered to be fully operational.

Section III. TEST PROMPTED PROCEDURES

5-9. CONTROL PANEL ASSEMBLY REMOVAL FROM SHIPPING AND STORAGE CONTAINER.

WARNING

HEAVY OBJECT

- Excessive strain can cause serious injury.
- Don’t: Attempt to lift or carry heavy objects alone.
- Do: Get help for lifting or carrying heavy objects.
- If you experience a sudden pain while lifting or
- discomfort after lifting, get medical help at once.

NOTE

Two people are required when performing this task.

a. Press container pressure relief valve (1, figure 5-2).

b. Open container latches (2).

c. Remove container lid (3) and set aside in a clean dry area.

d. Carefully remove control panel assembly (4) from container.

CAUTION

EQUIPMENT DAMAGE

The black foam in the shipping container may dry rot over time creating a dust/powder/grit residue. A potential exists for abrasive damage to optics and mechanical assemblies and degradation of optical performance. Inspect and clean assemblies as required.

e. Inspect and remove any dust, black powder, or grit from the control panel assembly before opening.

f. Replace container lid on container and secure latches.

5-9. CONTROL PANEL ASSEMBLY REMOVAL FROM SHIPPING AND STORAGE CONTAINER. (CONT)

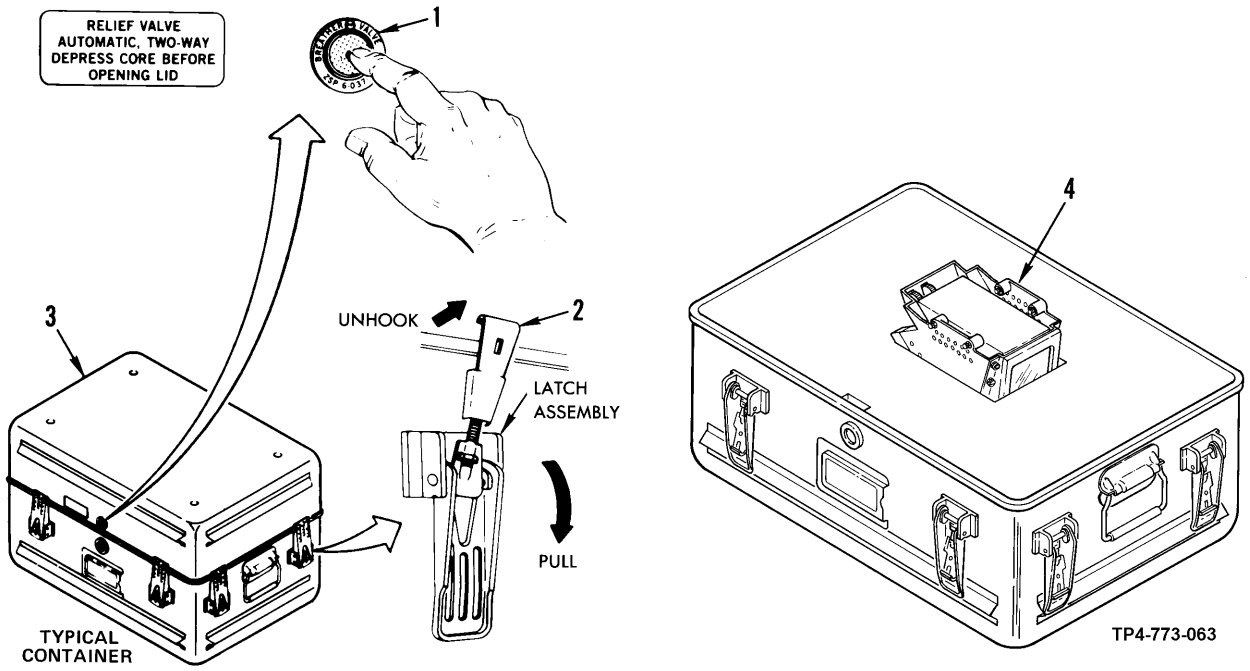


Figure 5-2. Control Panel Assembly Removal from Shipping and Storage Container

5-10. INSTALLATION OF CONTROL PANEL ASSEMBLY IN SHIPPING AND STORAGE CONTAINER.

WARNING

HEAVY OBJECT

- Excessive strain can cause serious injury.
- Don't: Attempt to lift or carry heavy objects alone.
- Do: Get help for lifting or carrying heavy objects.
- If you experience a sudden pain while lifting or discomfort after lifting, get medical help at once.

NOTE

Two people are required when performing this task.

a. Open container latches (1, figure 5-3).

b. Remove container lid (2) and set aside in a clean dry area.

5-10. INSTALLATION OF CONTROL PANEL ASSEMBLY IN SHIPPING AND STORAGE CONTAINER. (CONT)

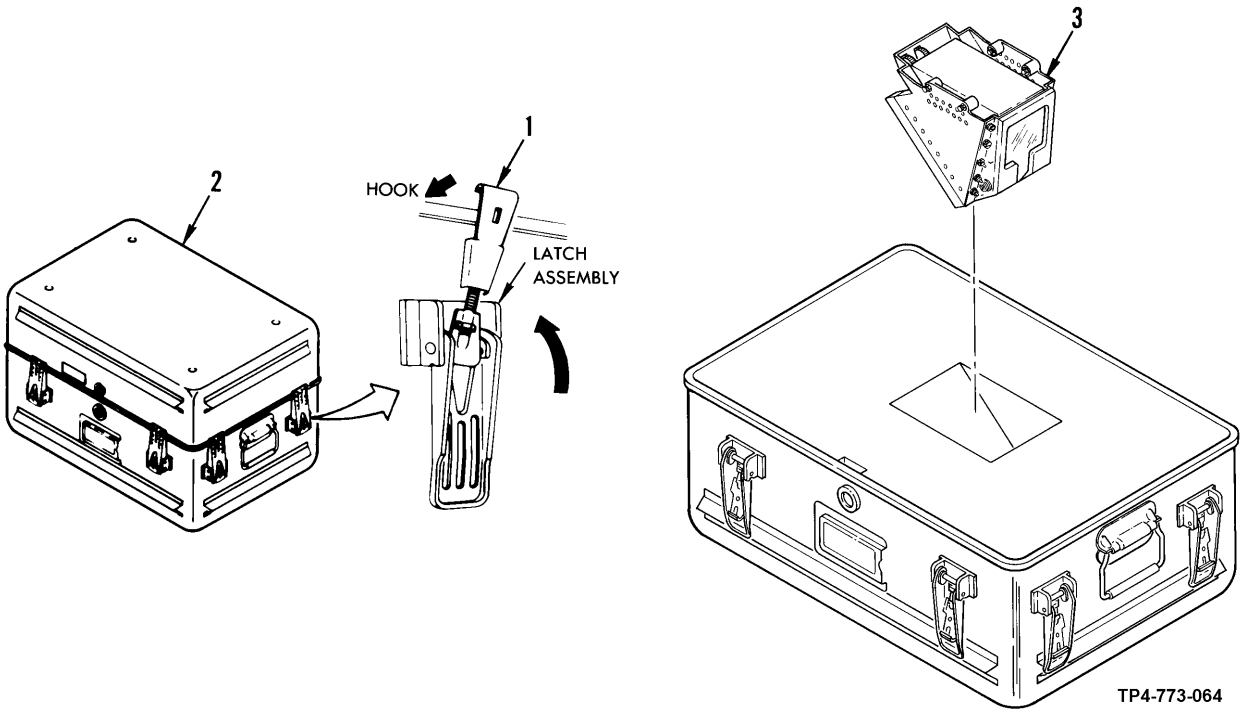


Figure 5-3. Control Panel Assembly Installation into Shipping and Storage Container

c. Carefully lower control panel assembly (3) into container

d. Replace container lid on container and secure latches.

Section IV. TEST PROMPTED REFERENCES

5-11. GENERAL.

This section contains illustrations to be referred to while you are performing the UUT test. When the UUT test program directs you to refer to an illustration in this manual, locate the illustration and refer to it for assistance while you perform the following instructions on the VDT.

5-11. GENERAL. (CONT)

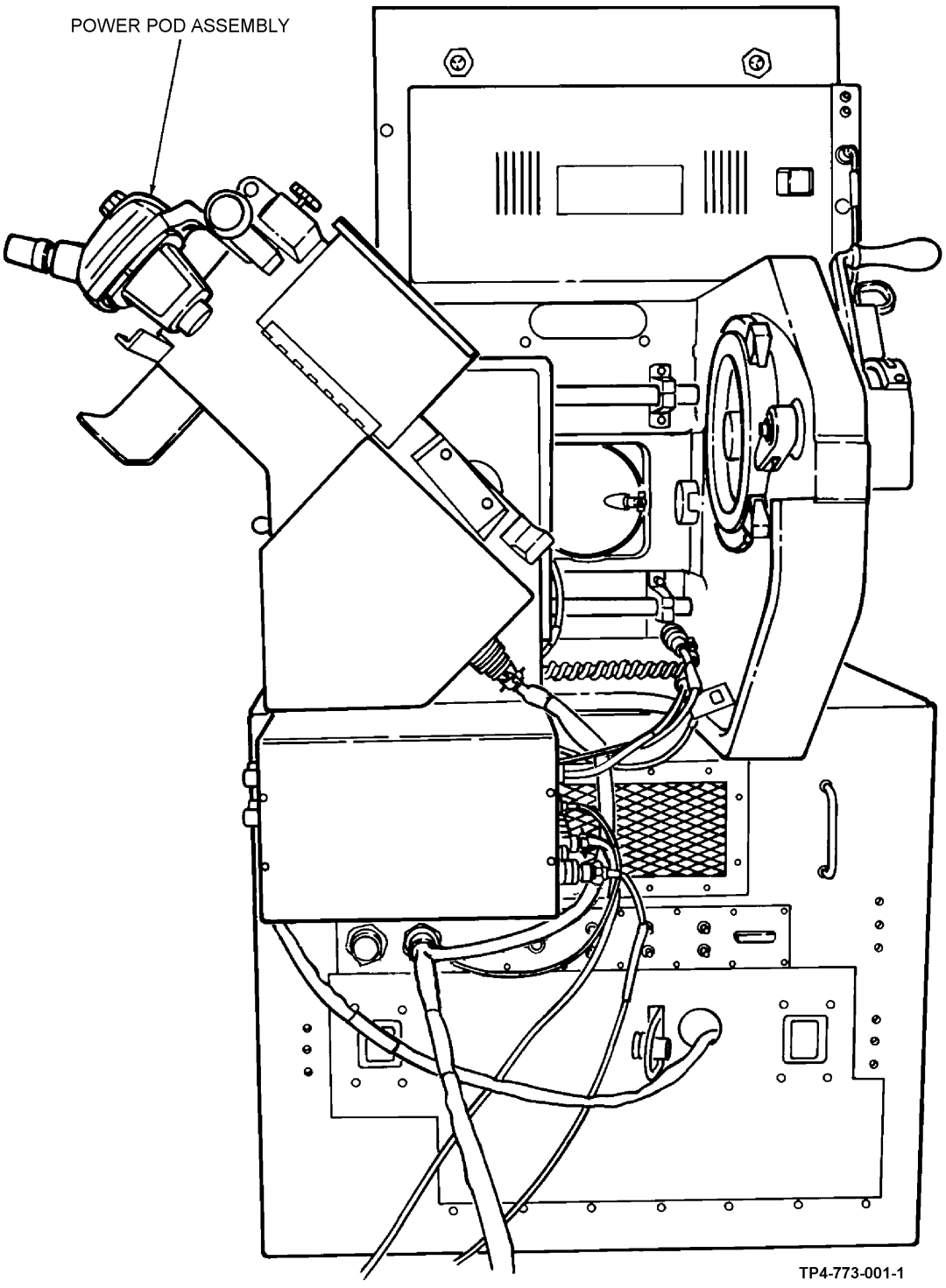


Figure 5-4. Control Panel Assembly Installation

5-11. GENERAL. (CONT)

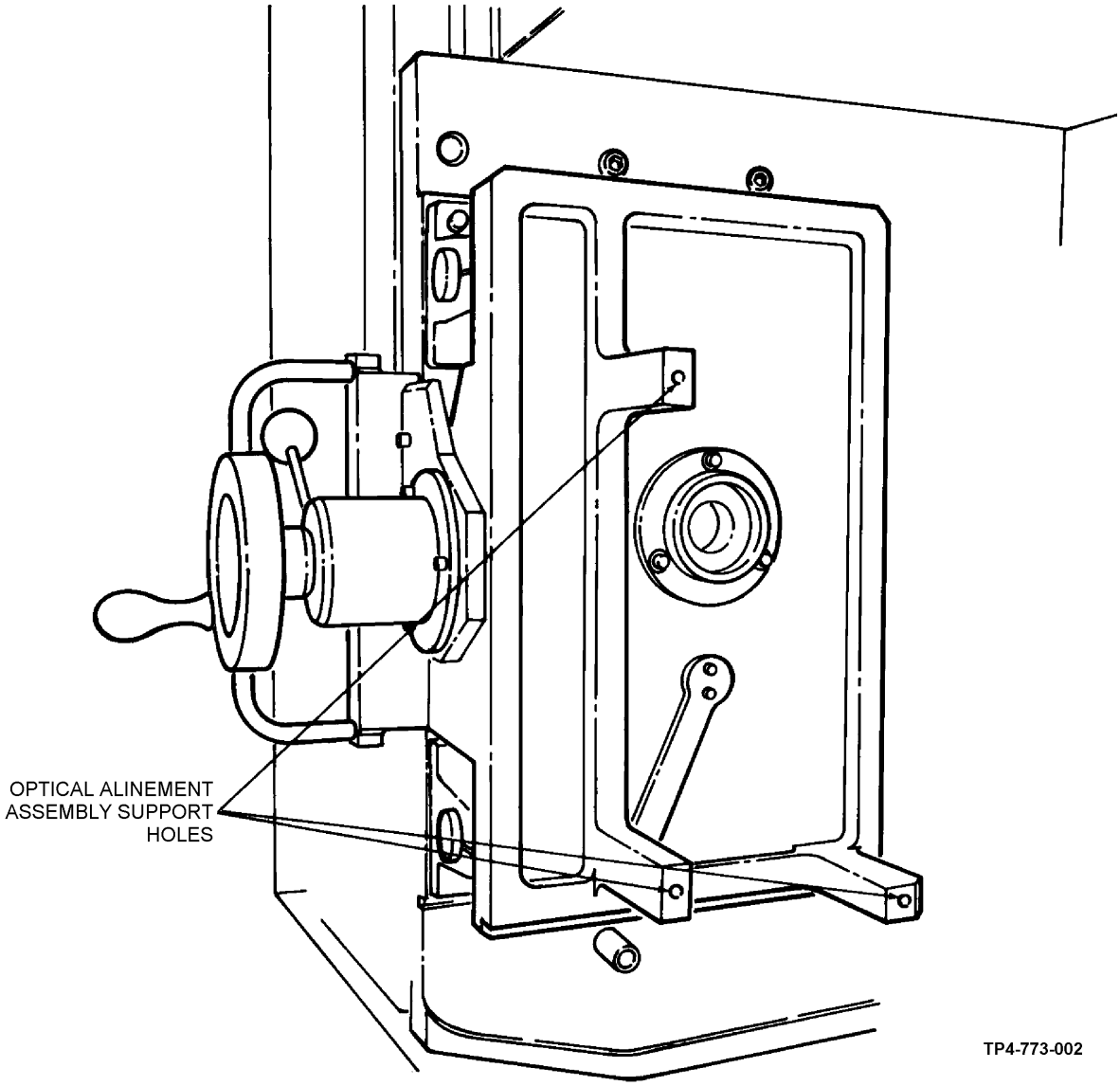


Figure 5-5. Dayside Sensor Mount Assembly Support Hole Locations

5-11. GENERAL. (CONT)

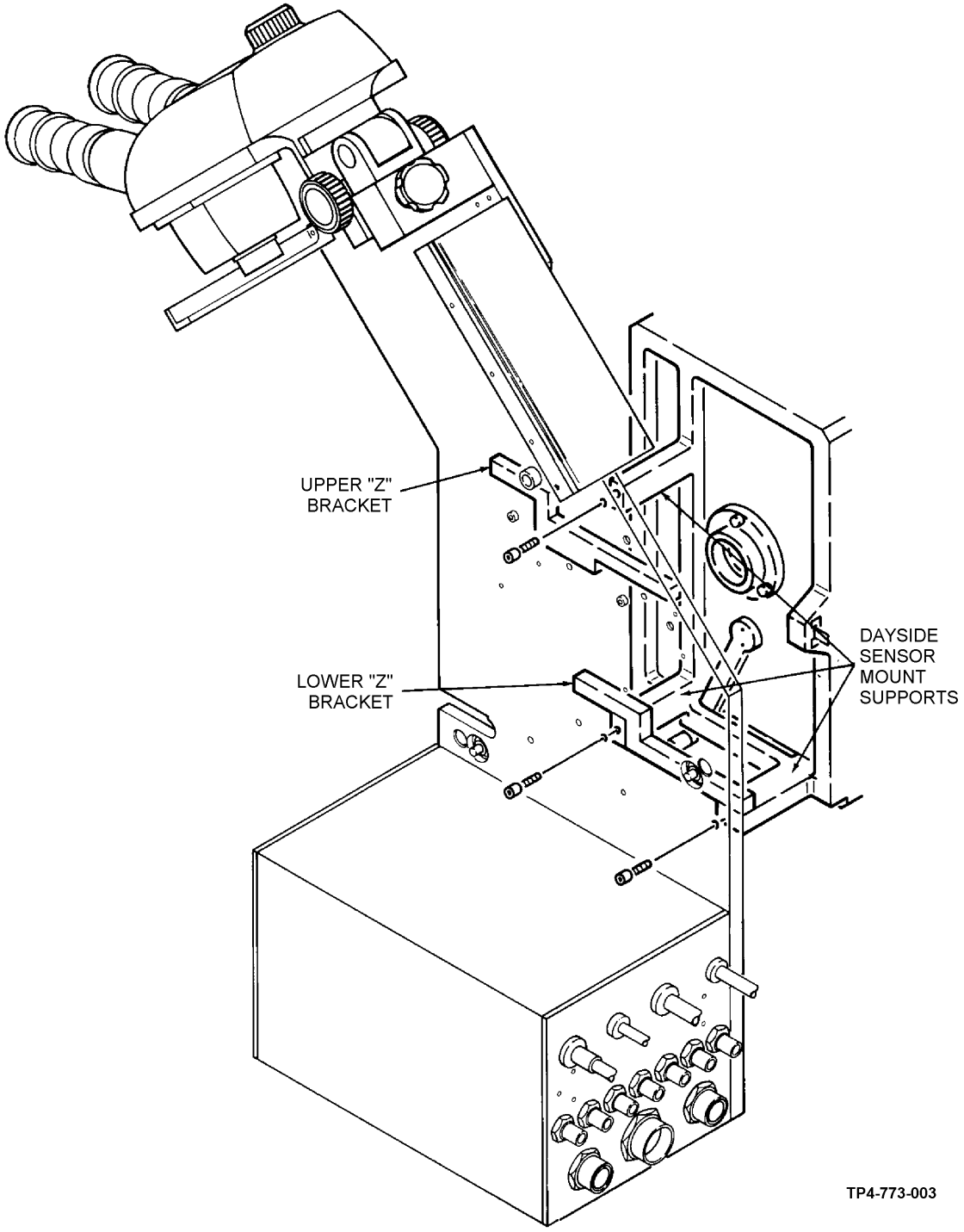


Figure 5-6. Optical Alinement Assembly Installation (Sheet 1 of 2)

5-11. GENERAL. (CONT)

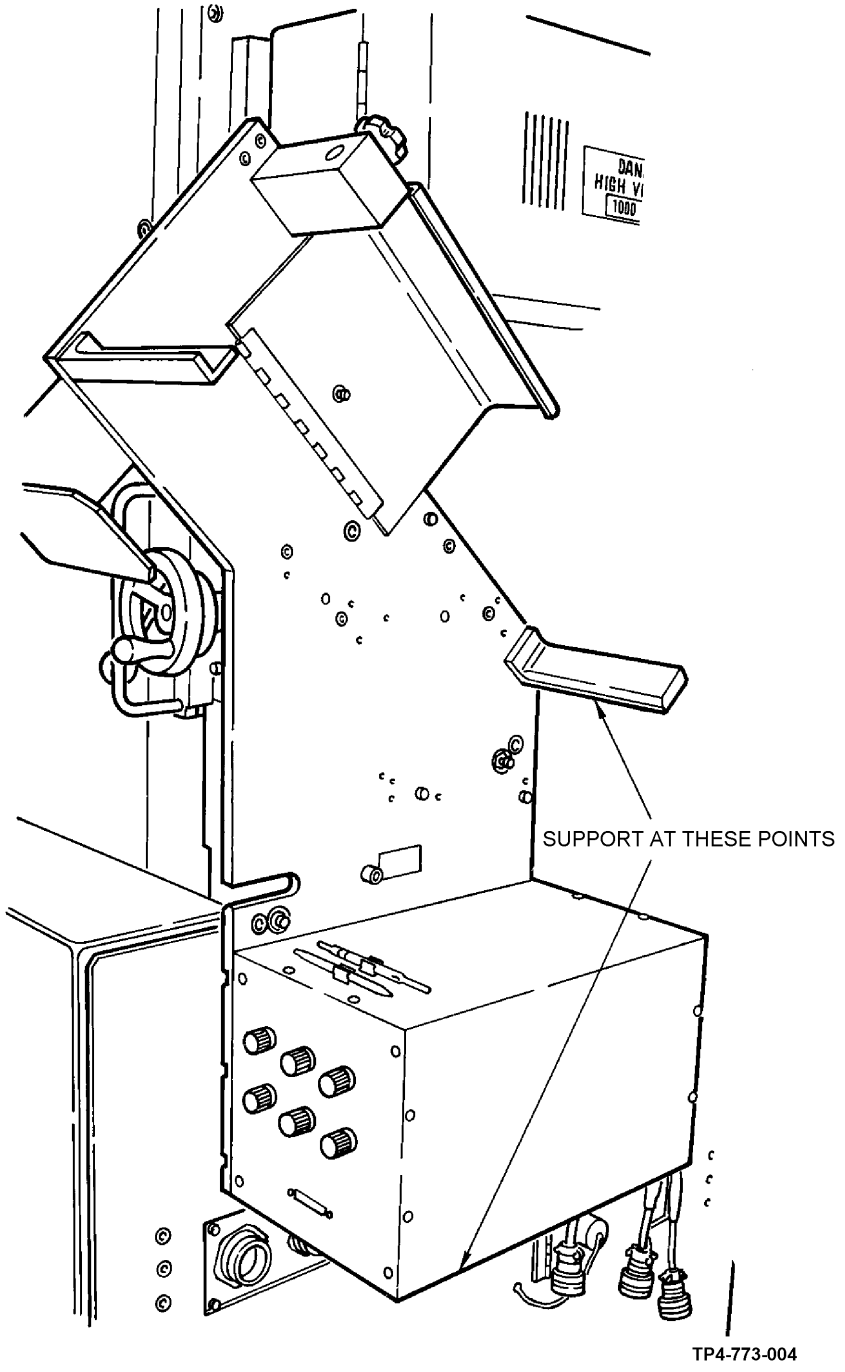


Figure 5-6. Optical Alinement Assembly Installation (Sheet 2 of 2)

5-11. GENERAL. (CONT)

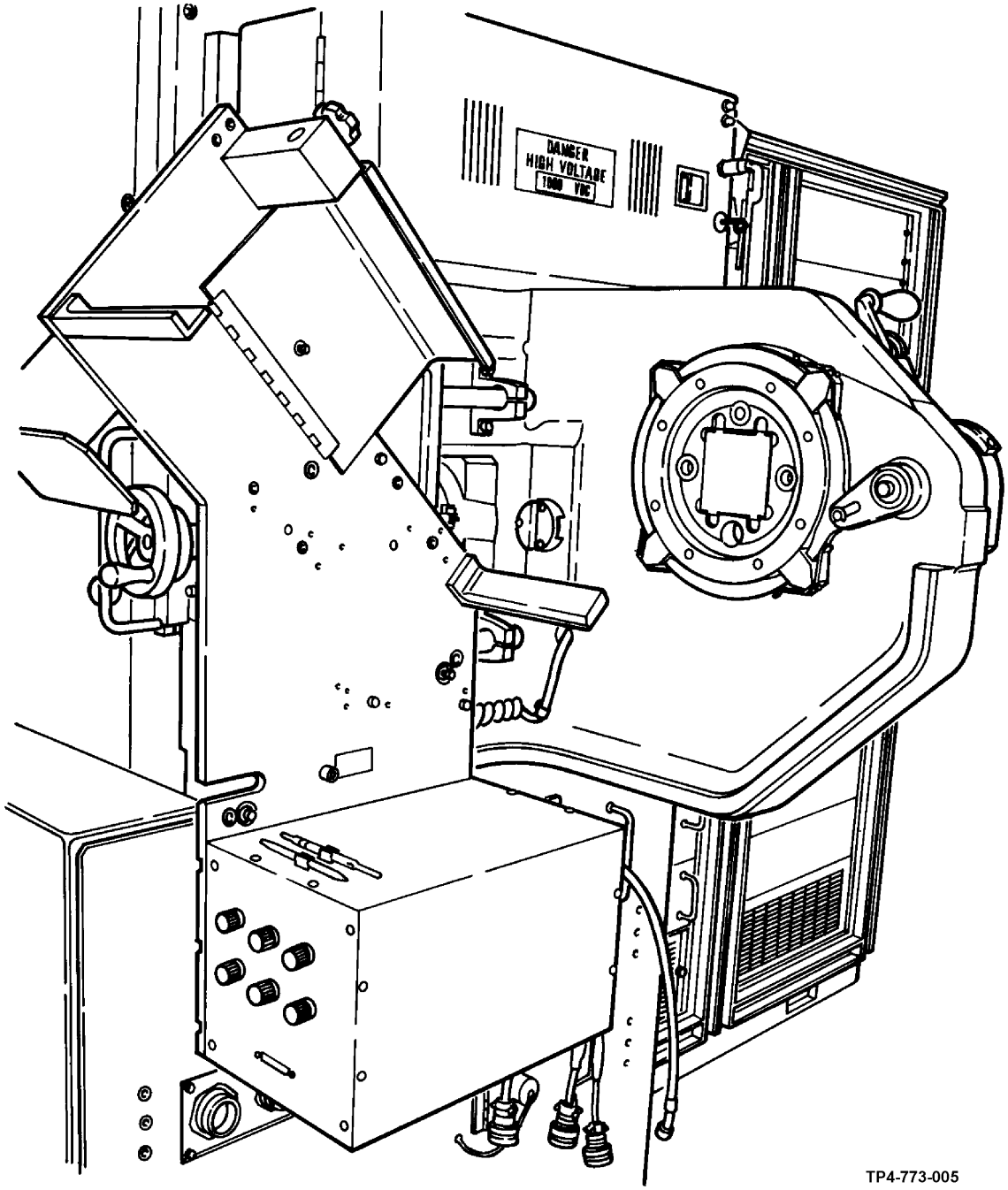


Figure 5-7. Optical Alinement Assembly Installed Position

5-11. GENERAL. (CONT)

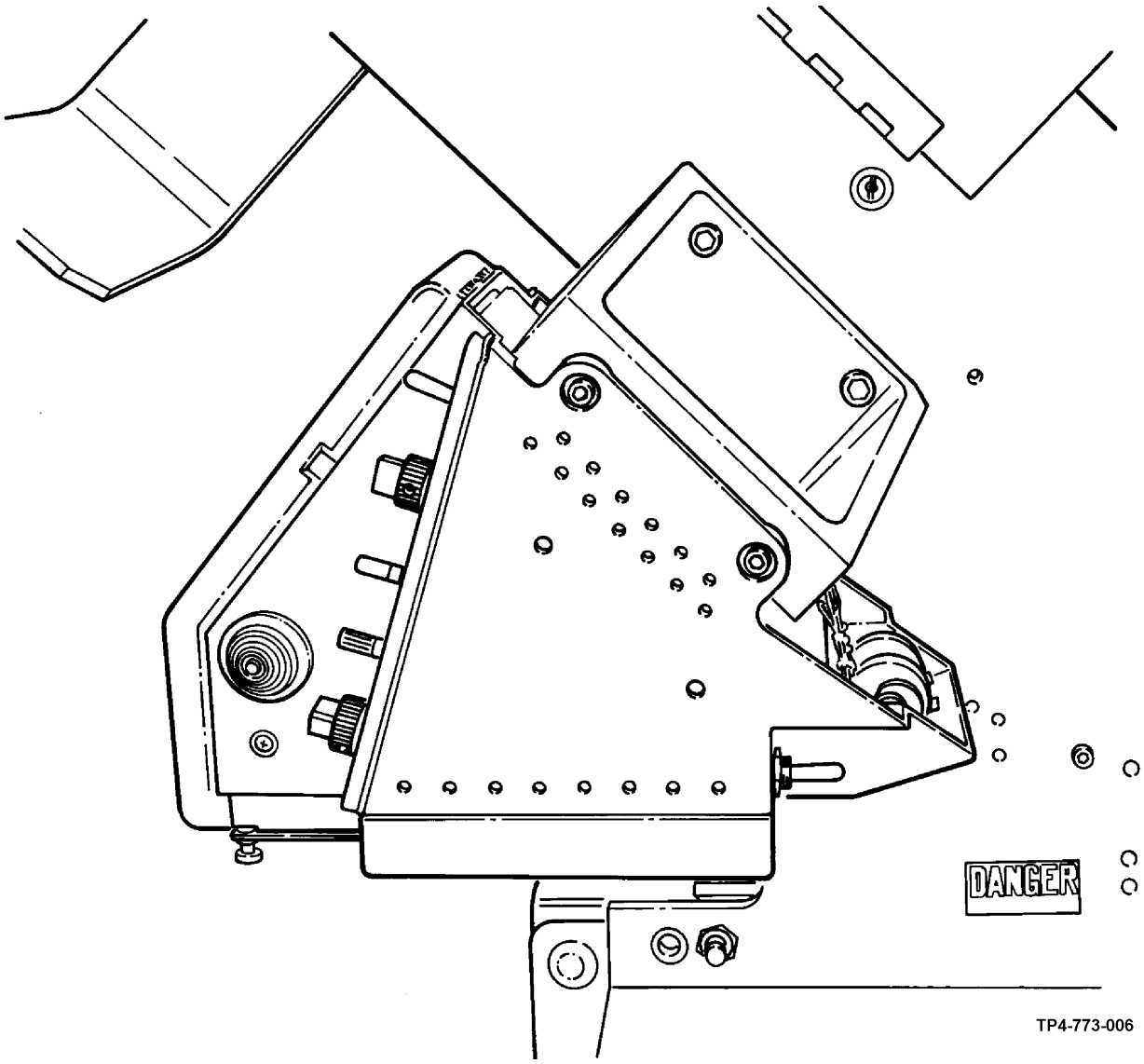


Figure 5-8. Control Panel Assembly Installed in Control Panel Test Position (Left Mounting Holes)

5-11. GENERAL. (CONT)

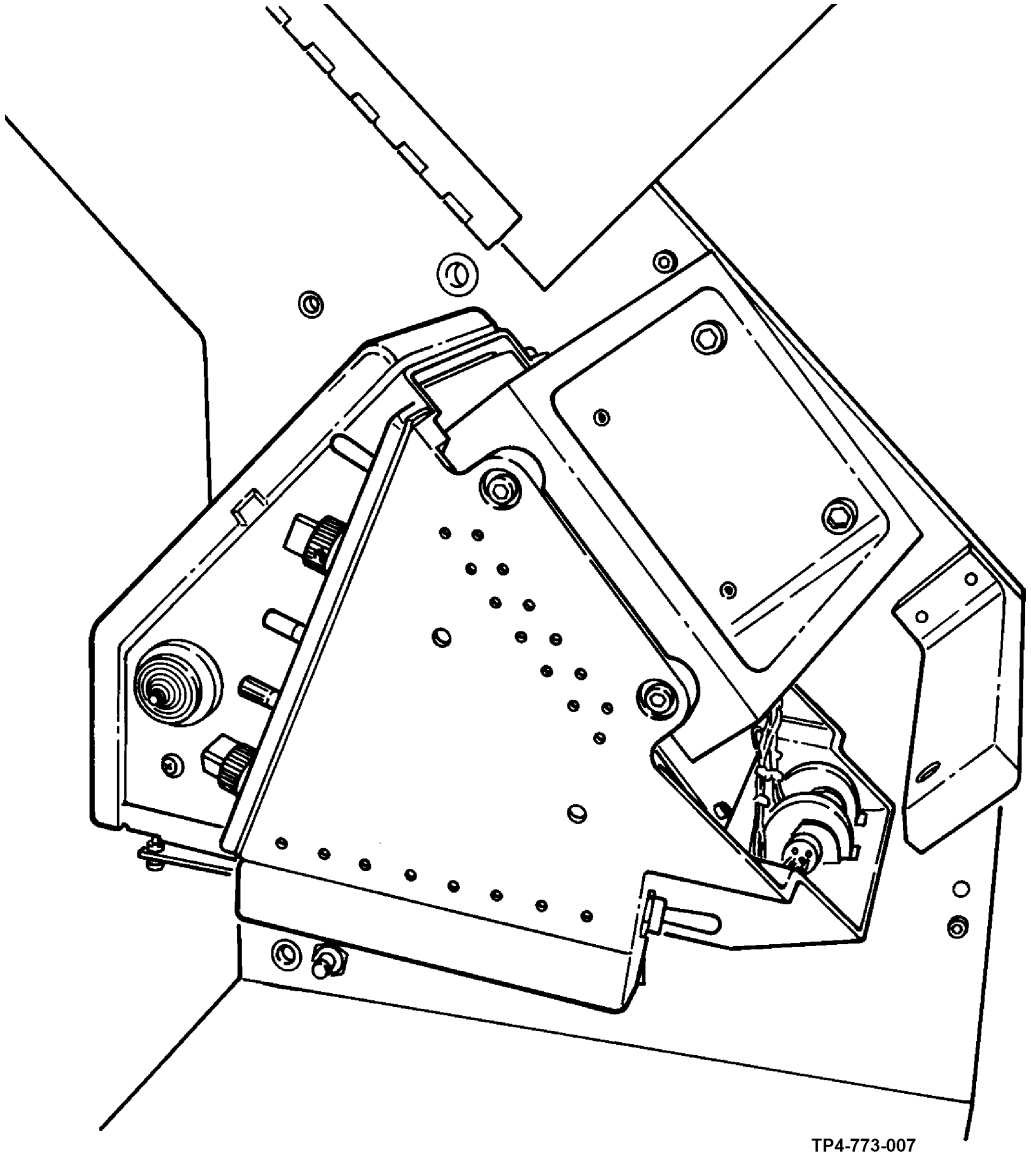


Figure 5-9. Control Panel Assembly Installed in Electrical Test and Alinement Position (Right Mounting Holes)

5-11. GENERAL. (CONT)

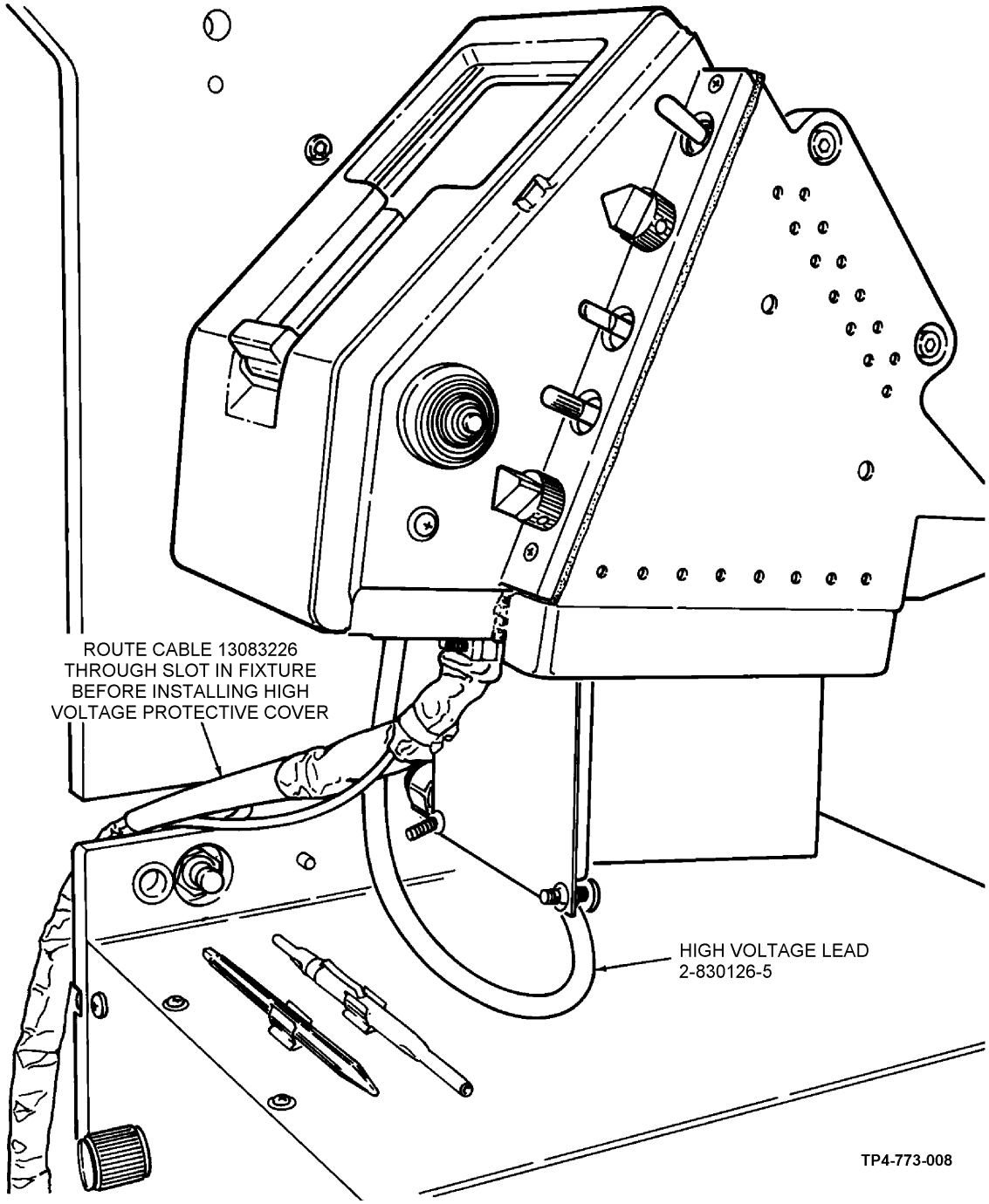


Figure 5-10. Control Panel Assembly Cable Installation

5-11. GENERAL. (CONT)

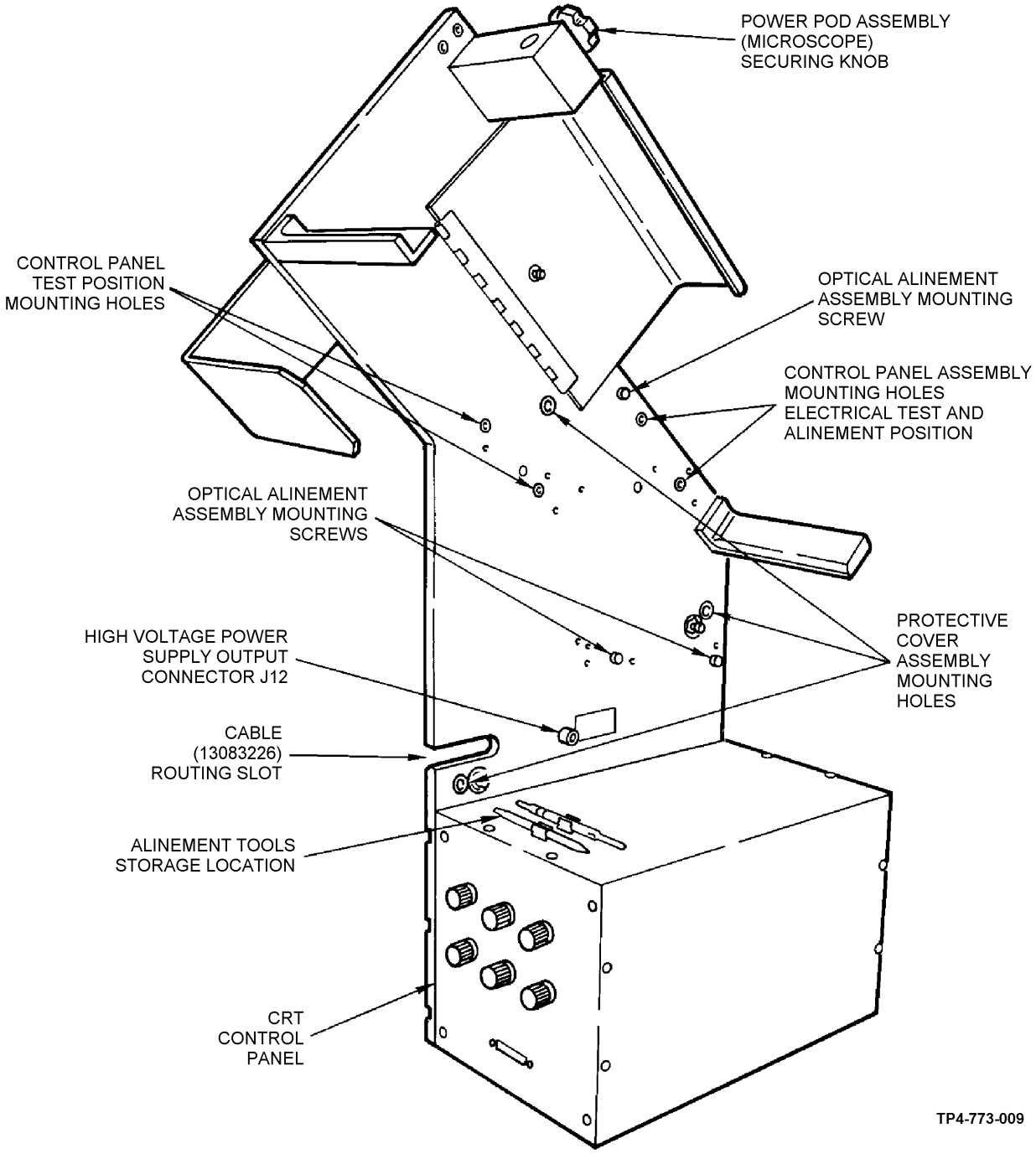


Figure 5-11. Optical Alinement Assembly (Without Power Pod Installed)

5-11. GENERAL. (CONT)

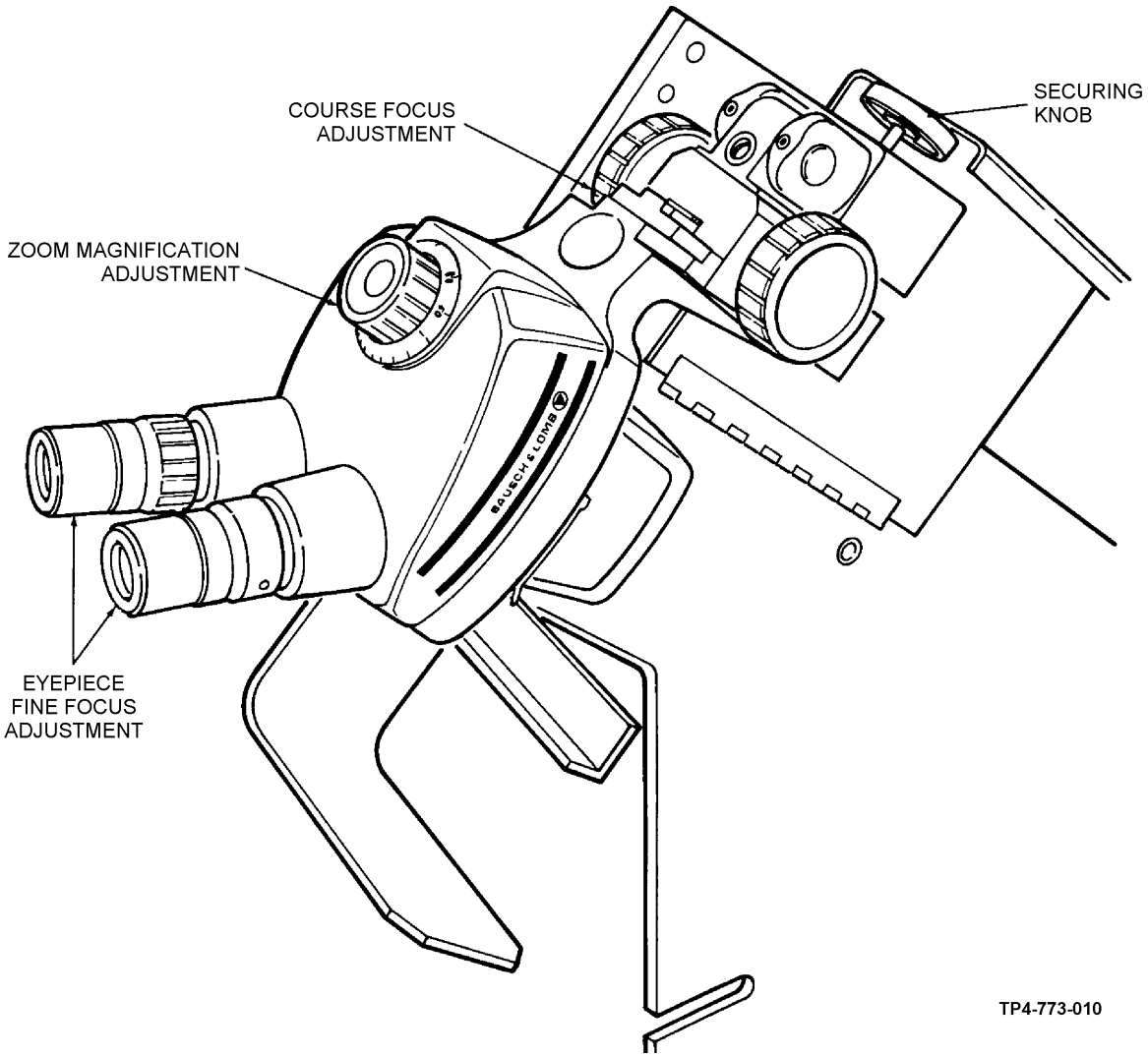


Figure 5-12. Power Pod Assembly (Microscope) Adjustment Locations

5-11. GENERAL. (CONT)

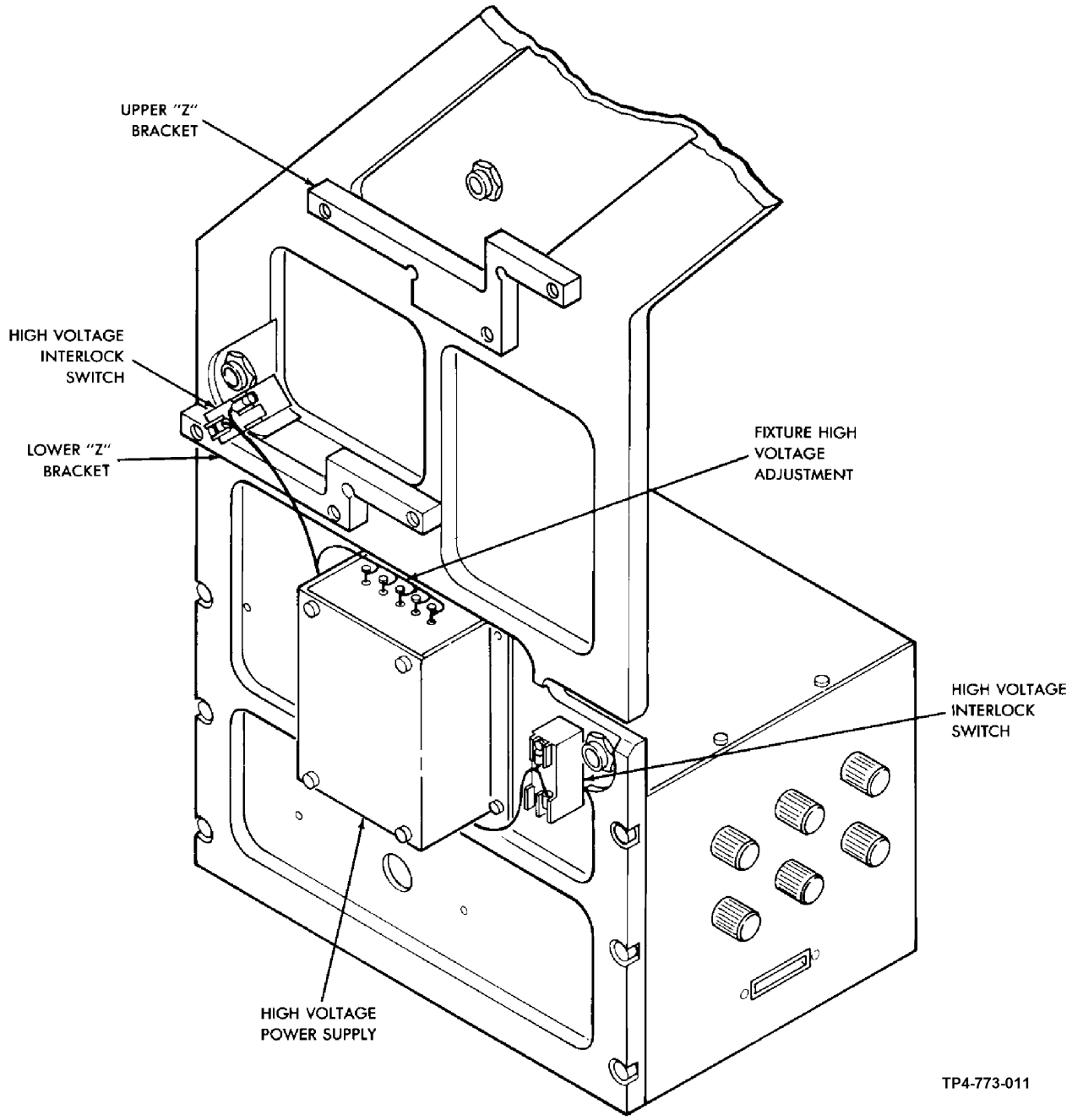


Figure 5-13. Optical Alinement Assembly (Rear View)

5-11. GENERAL. (CONT)

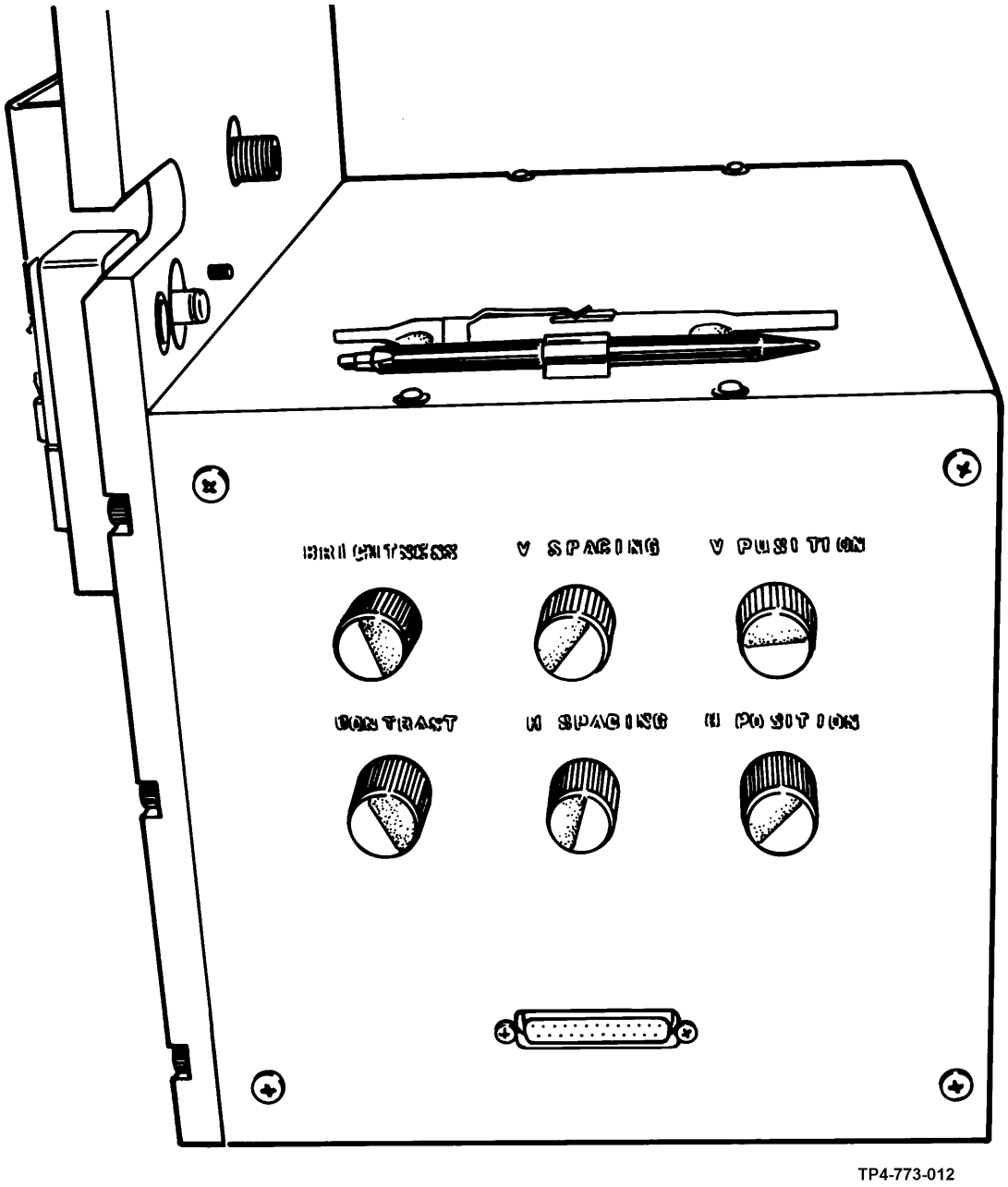


Figure 5-14. Optical Alinement Assembly CRT Controls

5-11. GENERAL. (CONT)

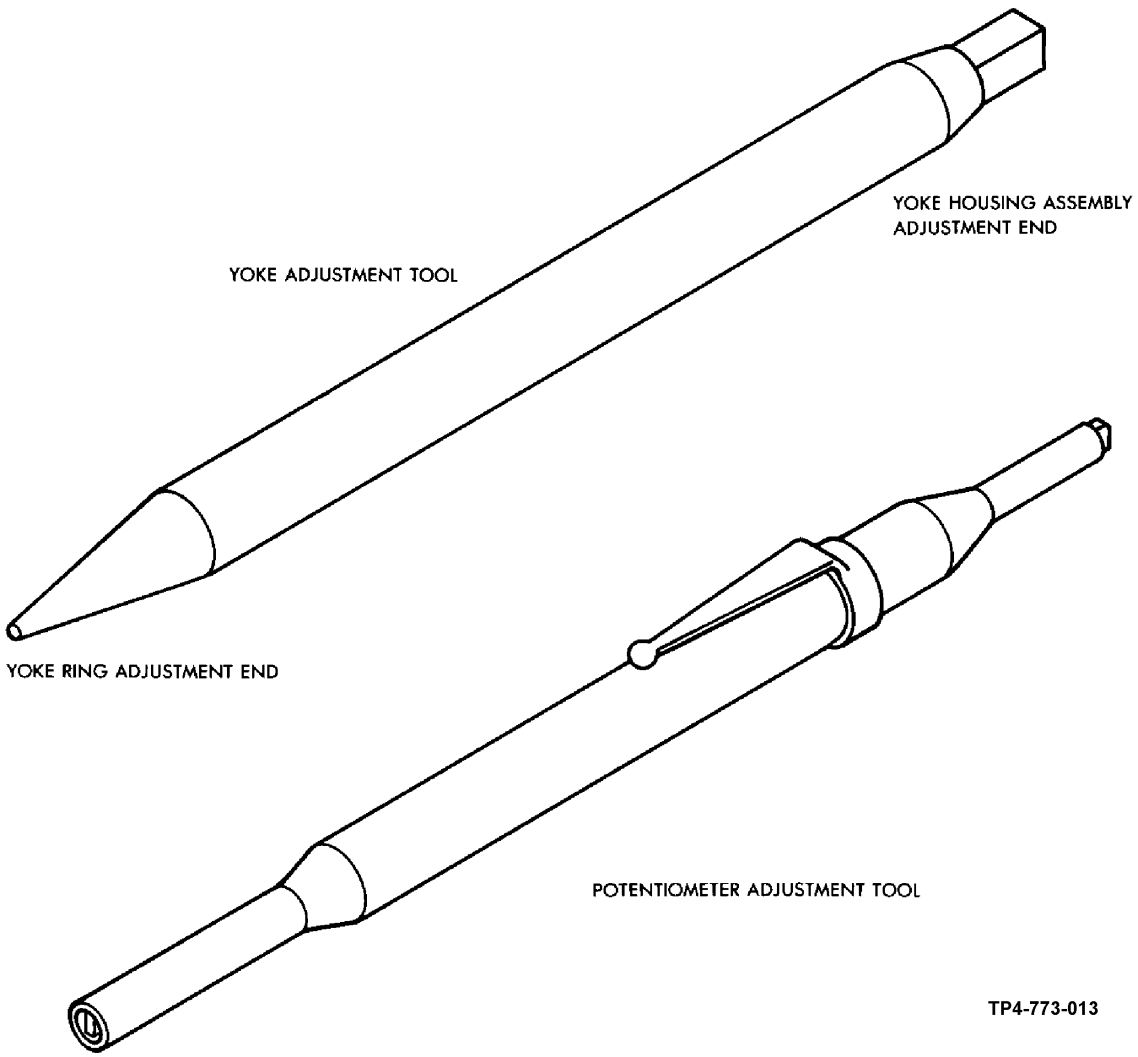


Figure 5-15. Control Panel Assembly Adjustment Tools

5-11. GENERAL. (CONT)

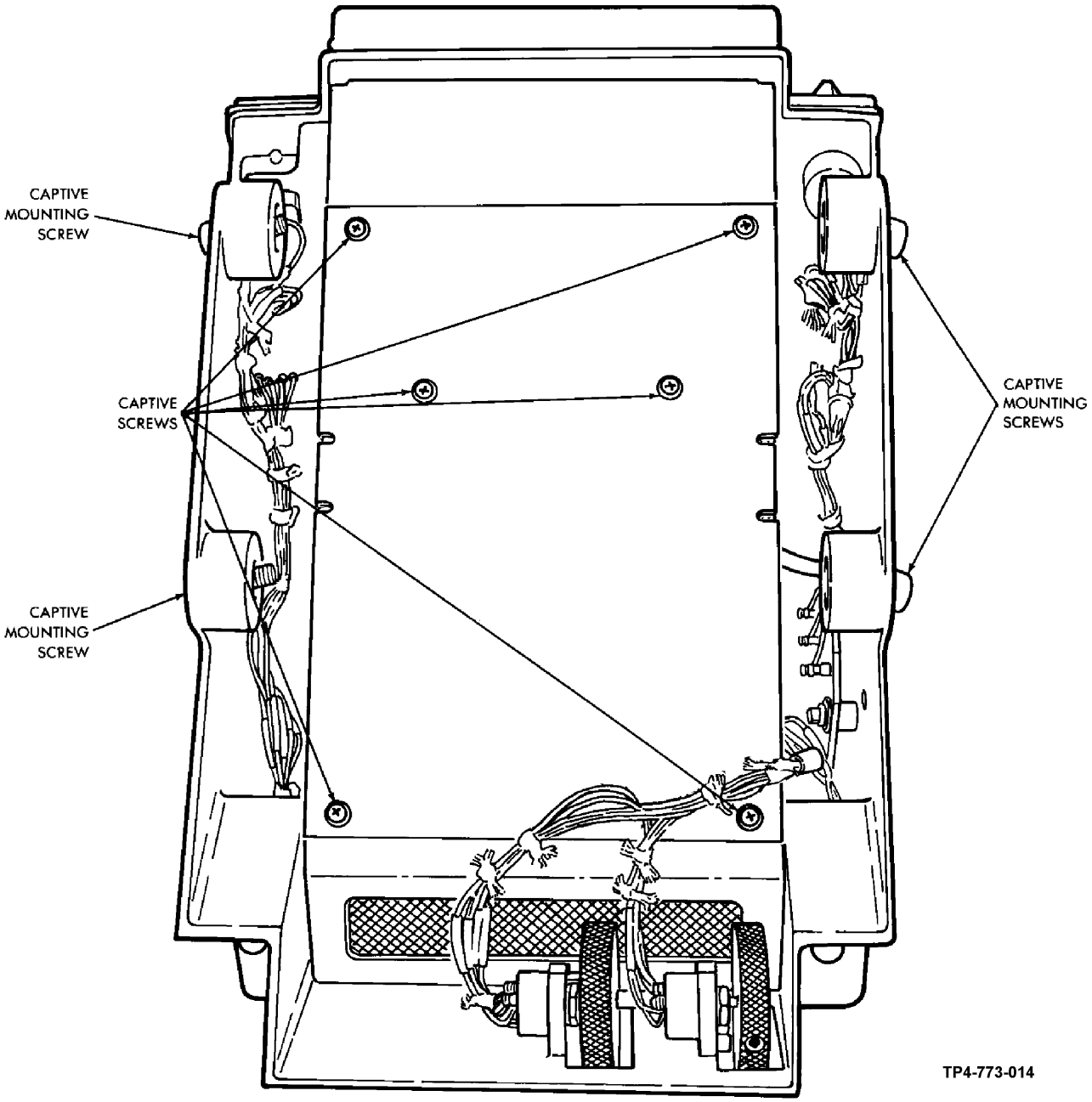


Figure 5-16. Control Panel Assembly Top Cover

5-11. GENERAL. (CONT)

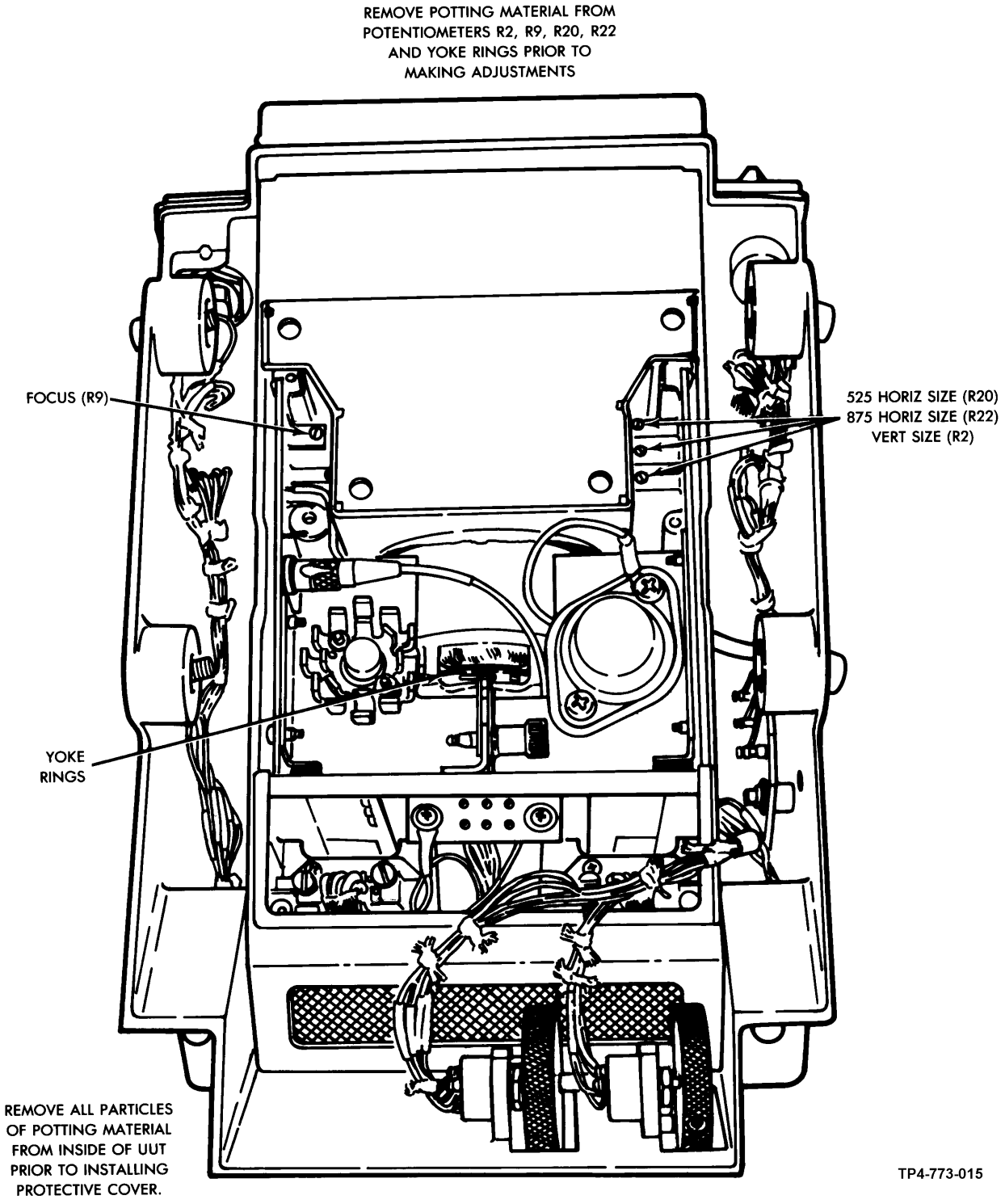


Figure 5-17. Control Panel Assembly Adjustment Potentiometer Locations

5-11. GENERAL. (CONT)

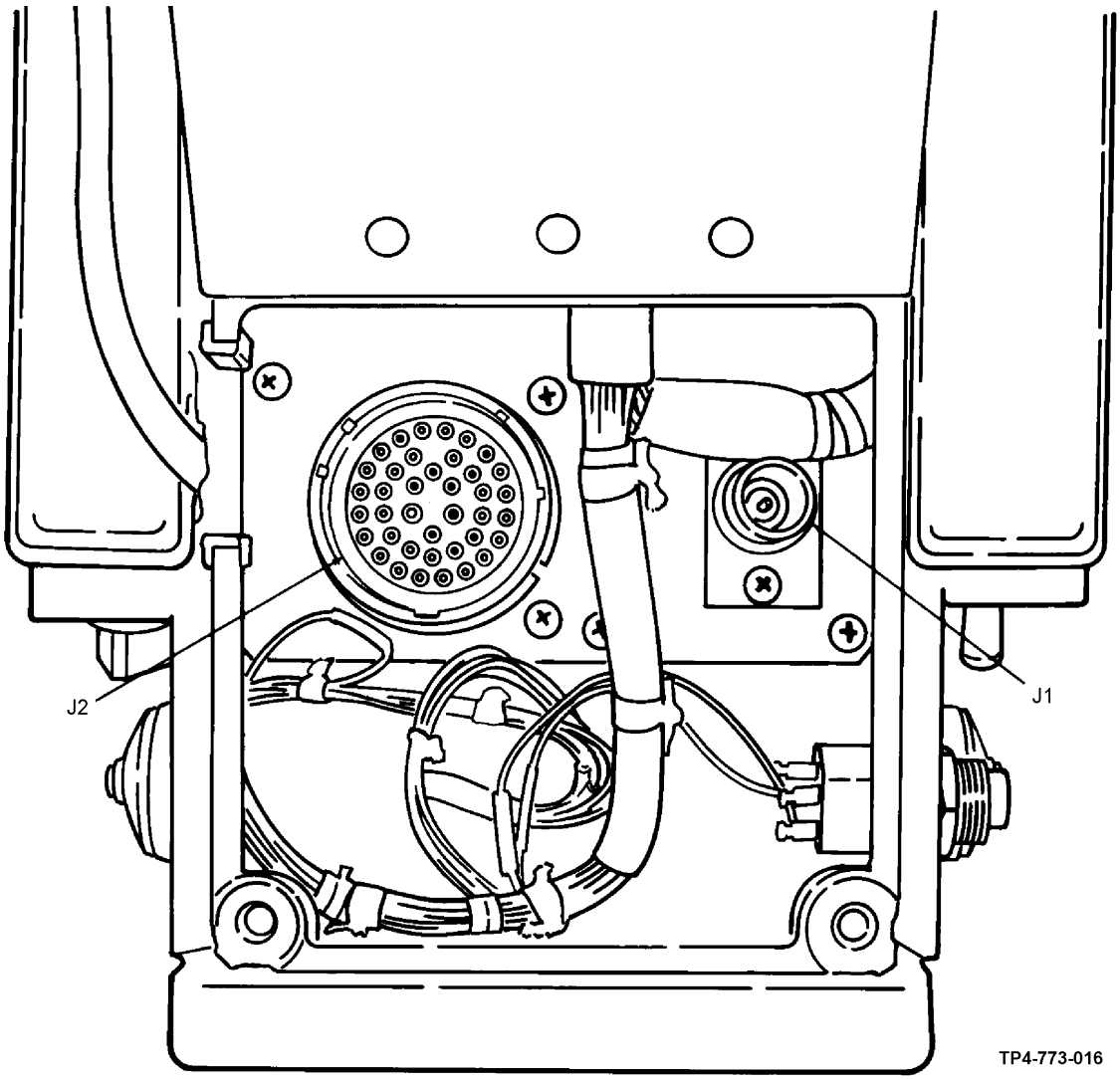


Figure 5-18. Control Panel Assembly Connector J1 and J2 Locations

5-11. GENERAL. (CONT)

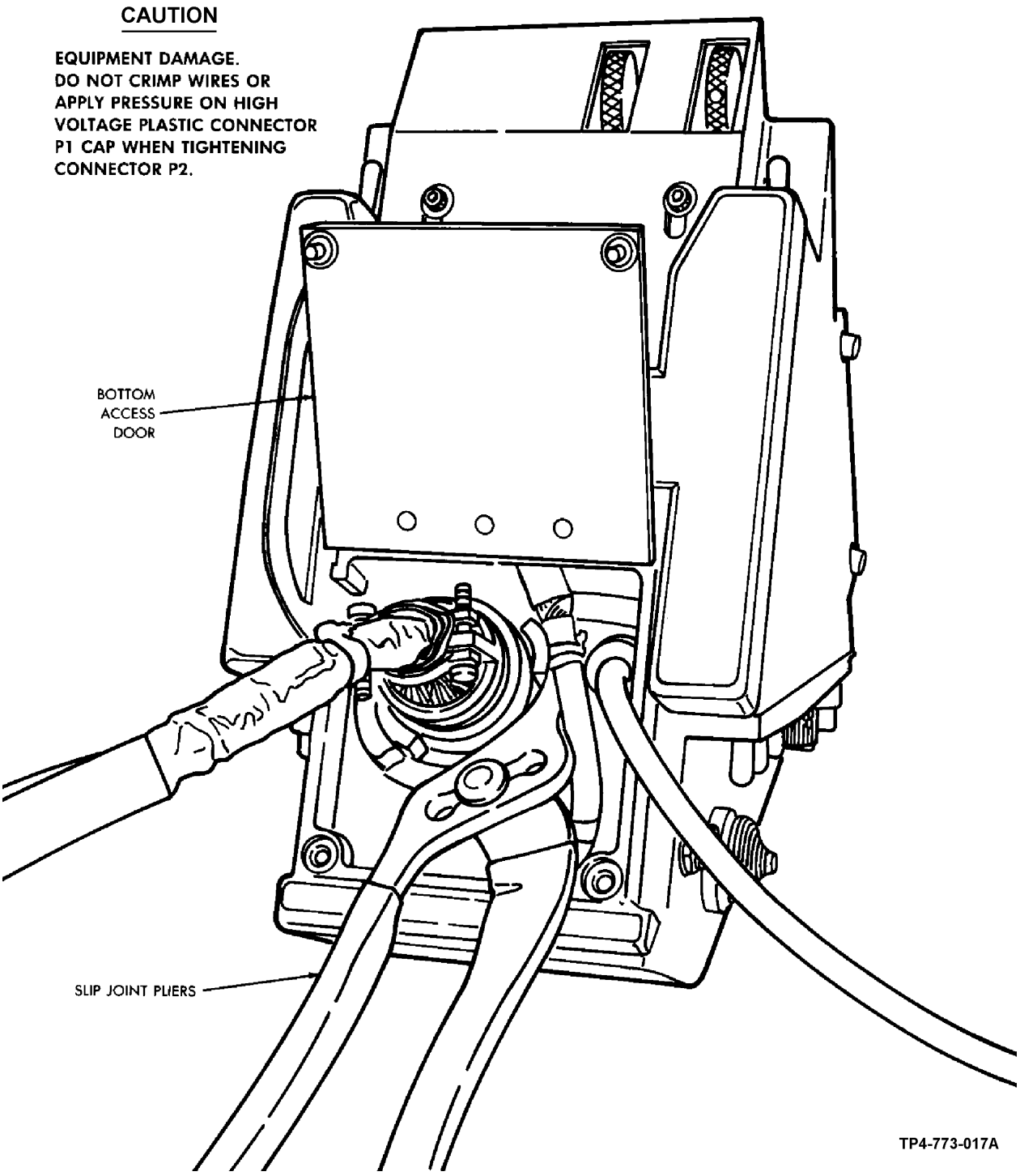


Figure 5-19. Control Panel Assembly Connectors P1 and P2 Locations

5-11. GENERAL. (CONT)

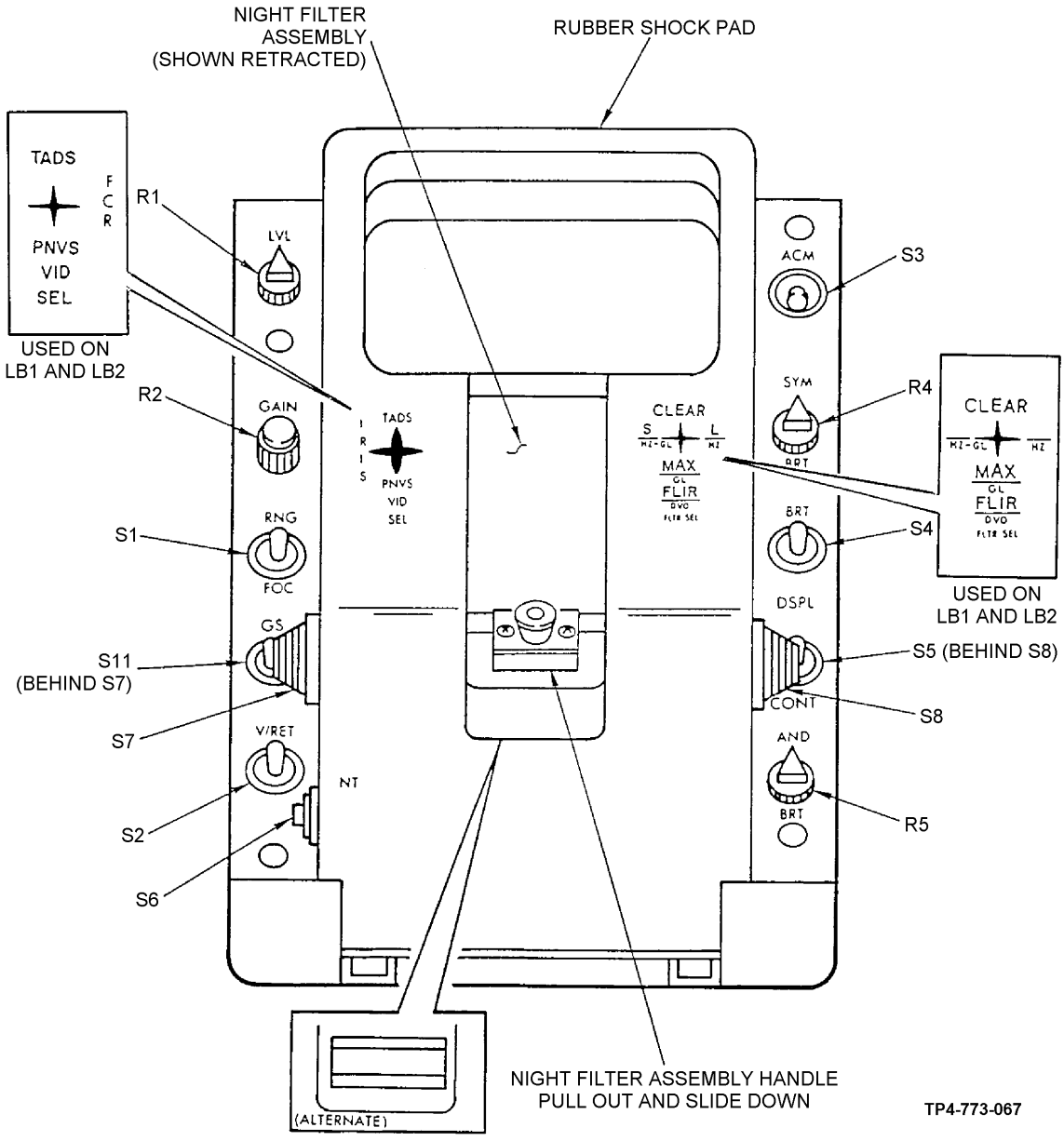


Figure 5-20. Control Panel Assembly Night Filter Location

5-11. GENERAL. (CONT)

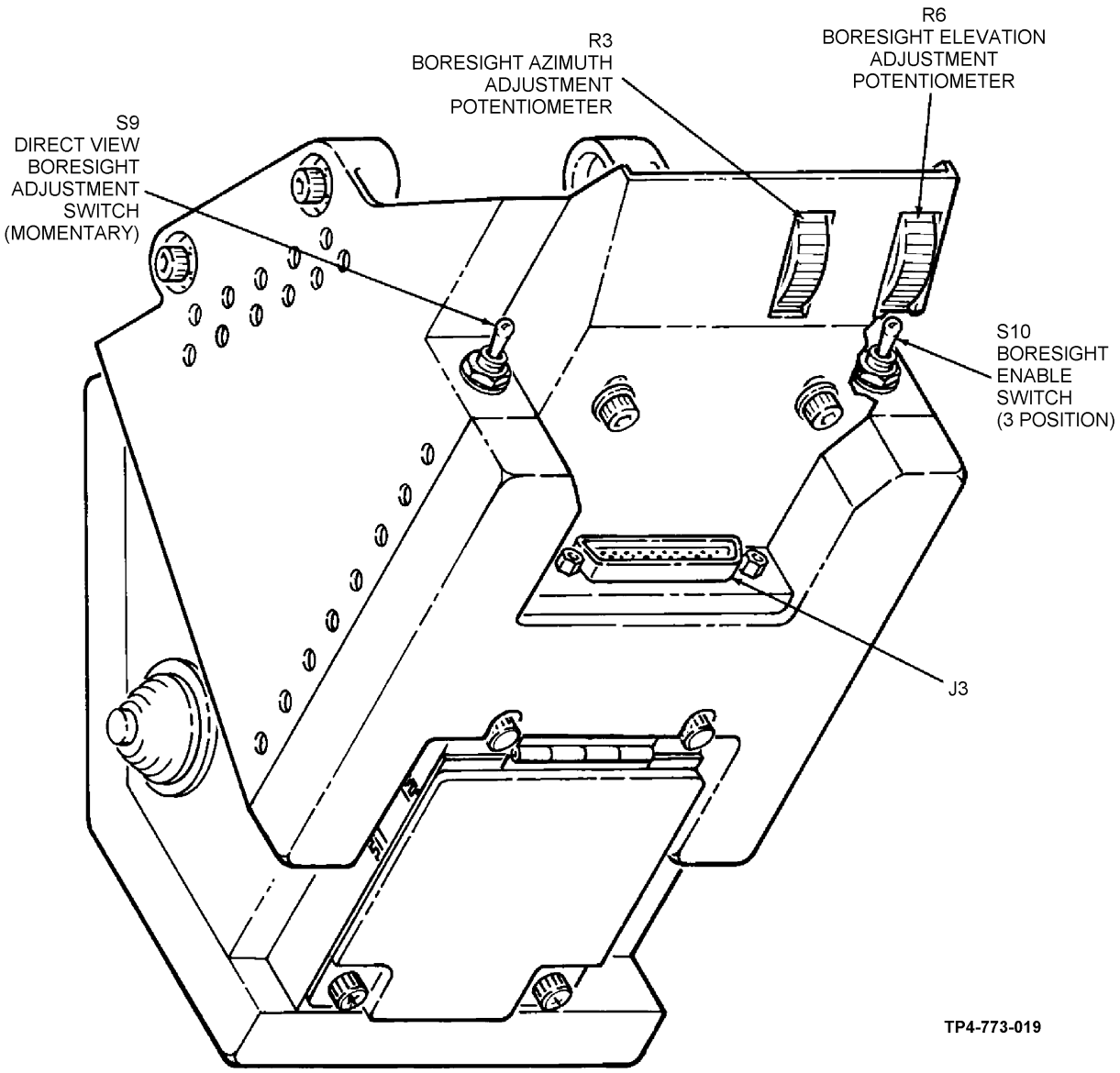


Figure 5-21. Control Panel Assembly Boresight Control Locations

5-11. GENERAL. (CONT)

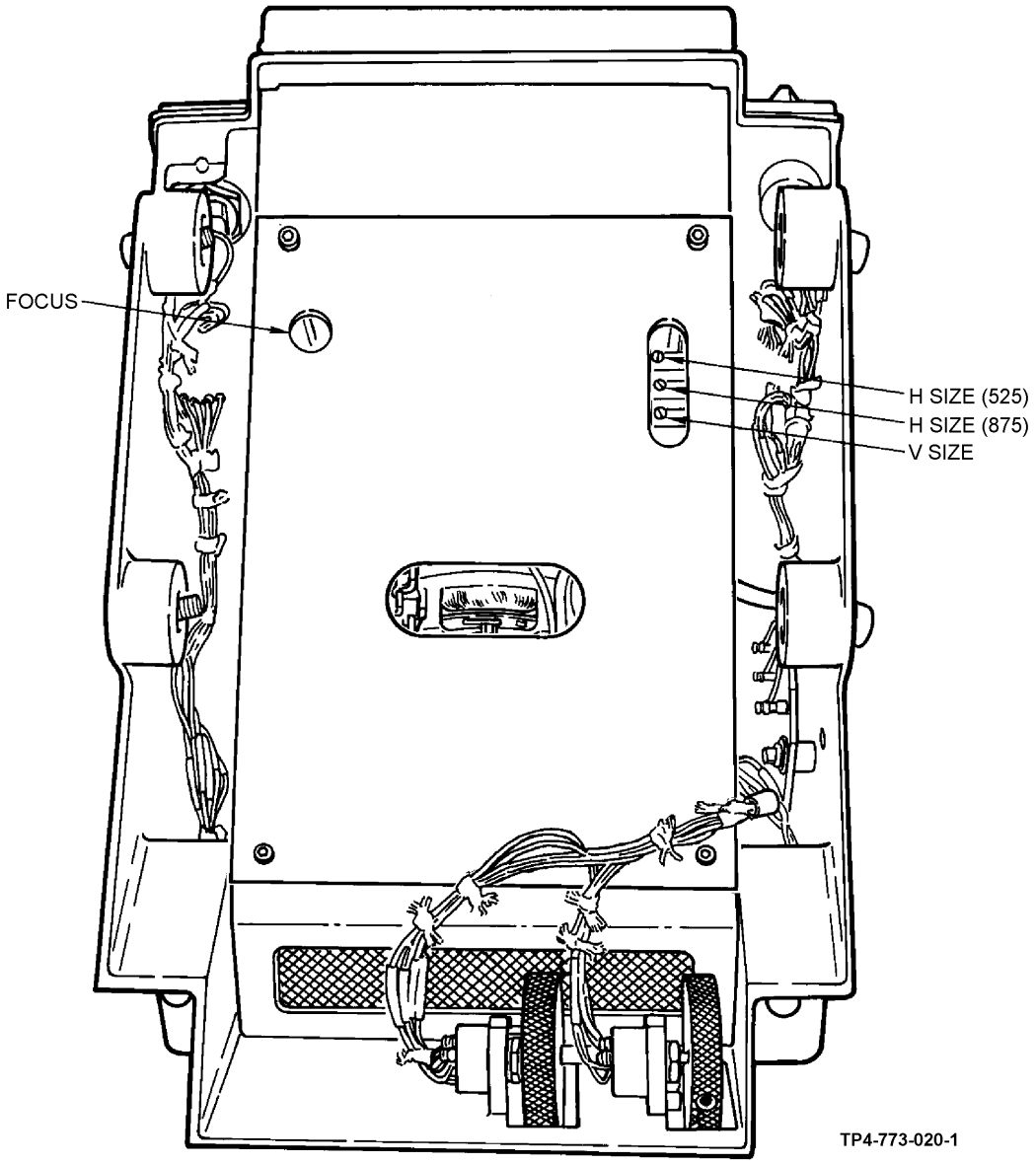


Figure 5-22. Control Panel Assembly with Adjustment Cover Installed

5-11. GENERAL. (CONT)

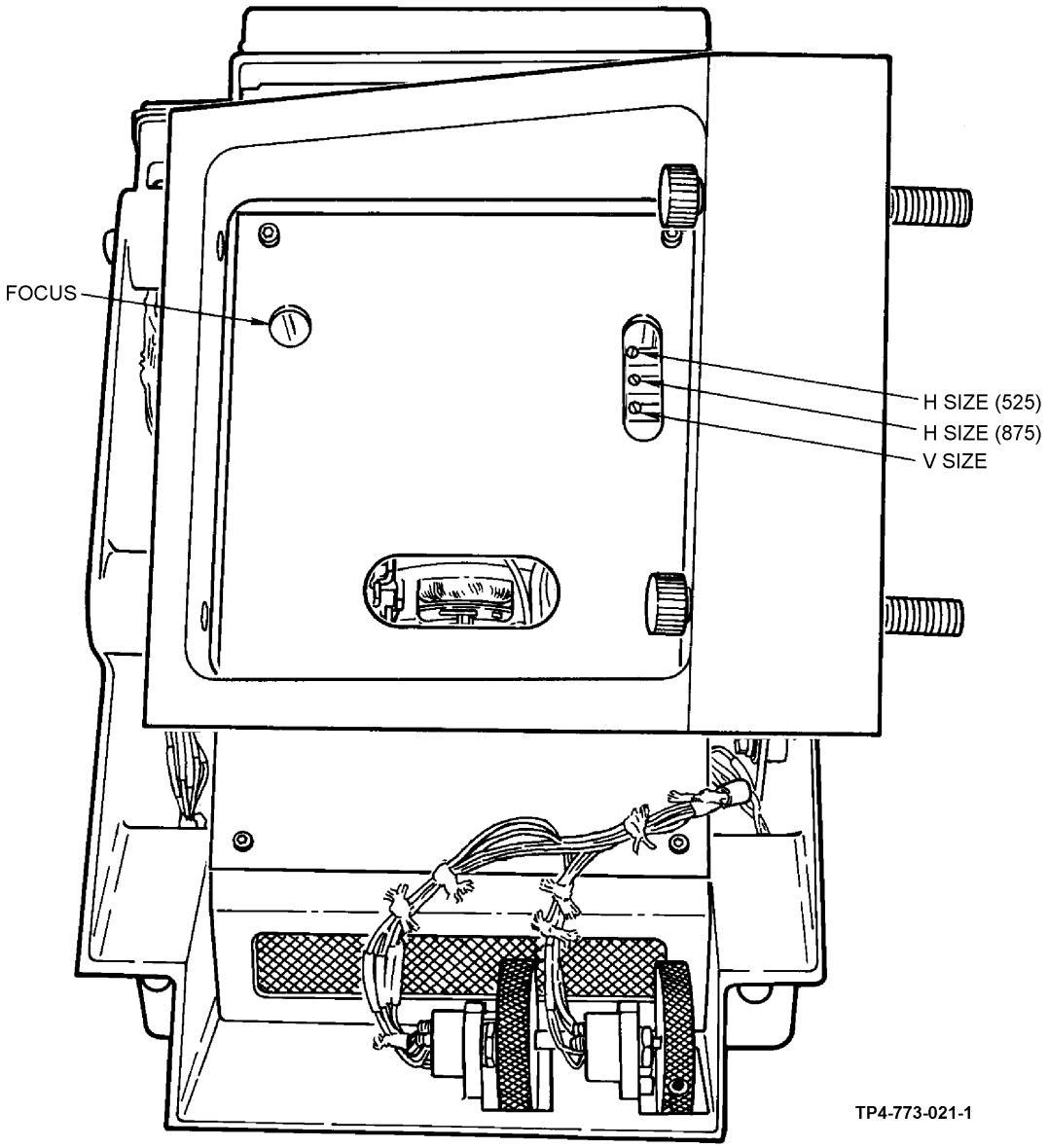


Figure 5-23. Control Panel Assembly with Mounting Bracket and Adjustment Cover Installed

5-11. GENERAL. (CONT)

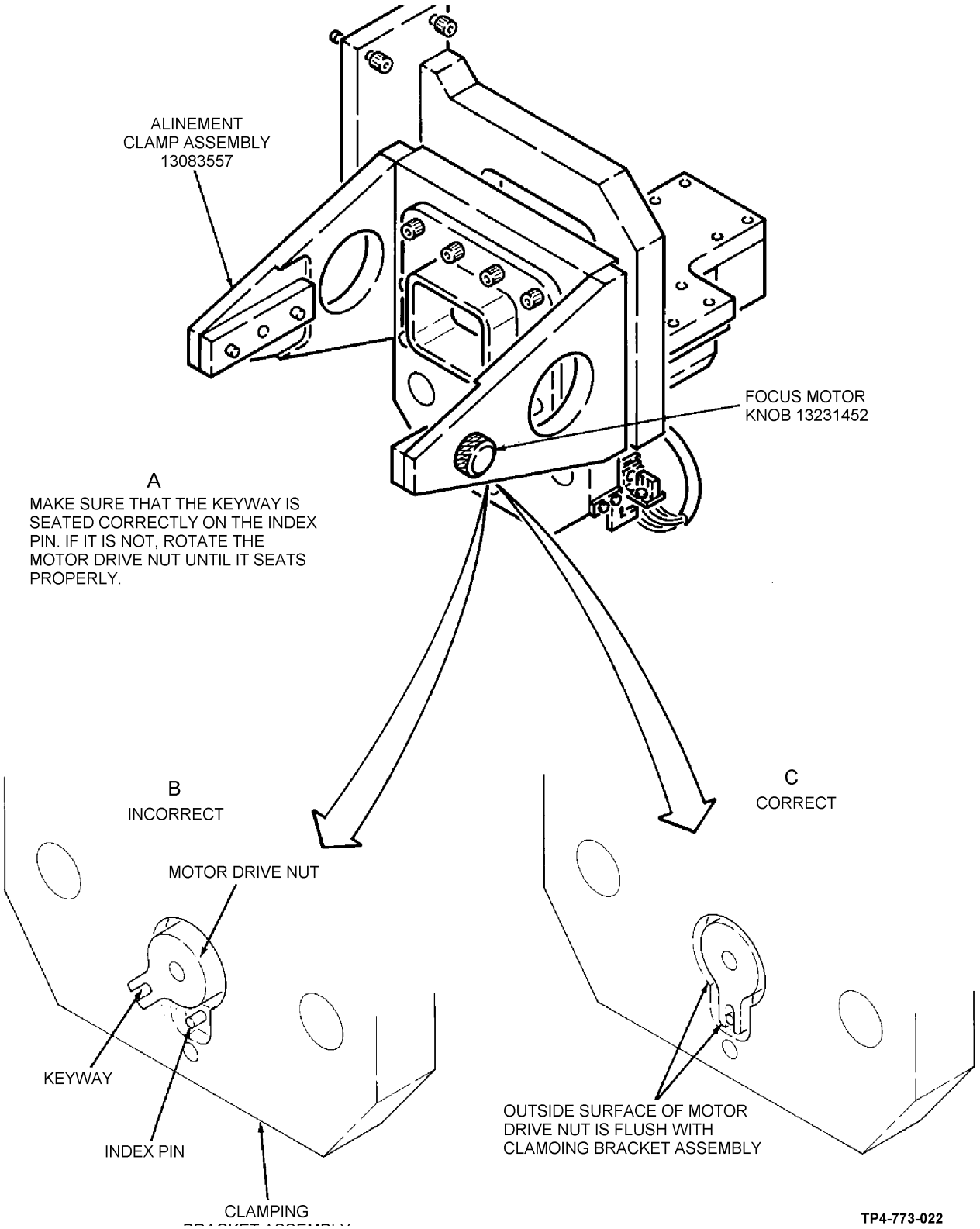


Figure 5-24. Mounting Bracket (Focus Motor) Assembly

5-11. GENERAL. (CONT)

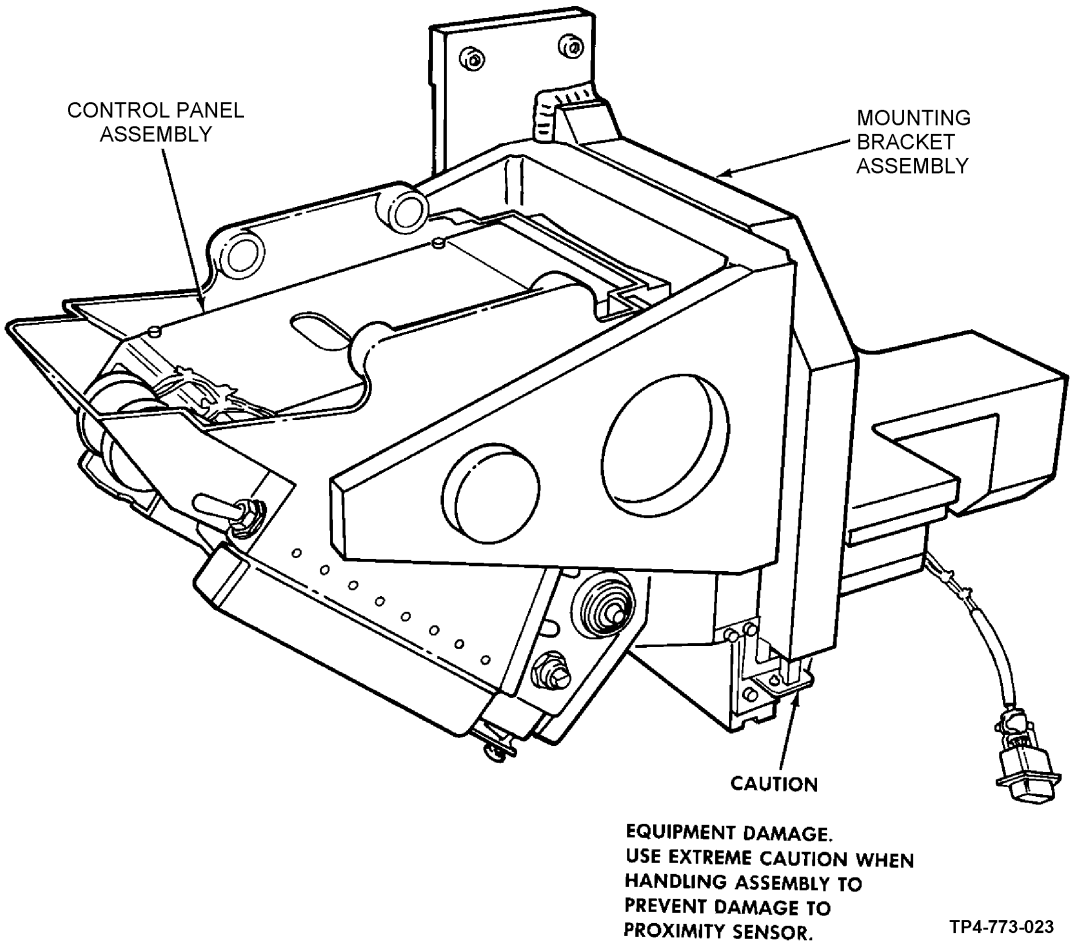


Figure 5-25. Control Panel Assembly and Attaching Focus Motor Mounting Bracket Assembly

5-11. GENERAL. (CONT)

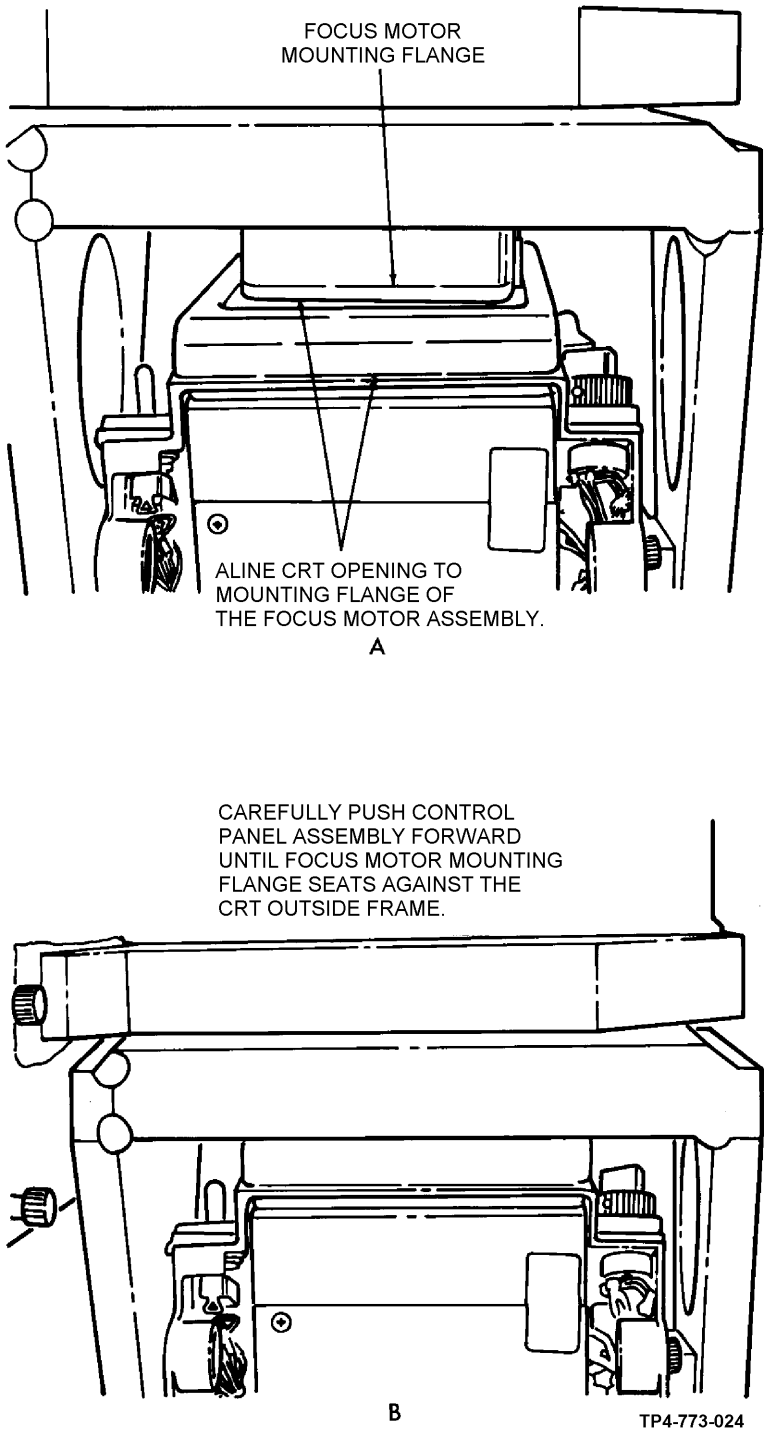


Figure 5-26. Control Panel Assembly Installation into Focus Motor Mounting Bracket Assembly

5-11. GENERAL. (CONT)

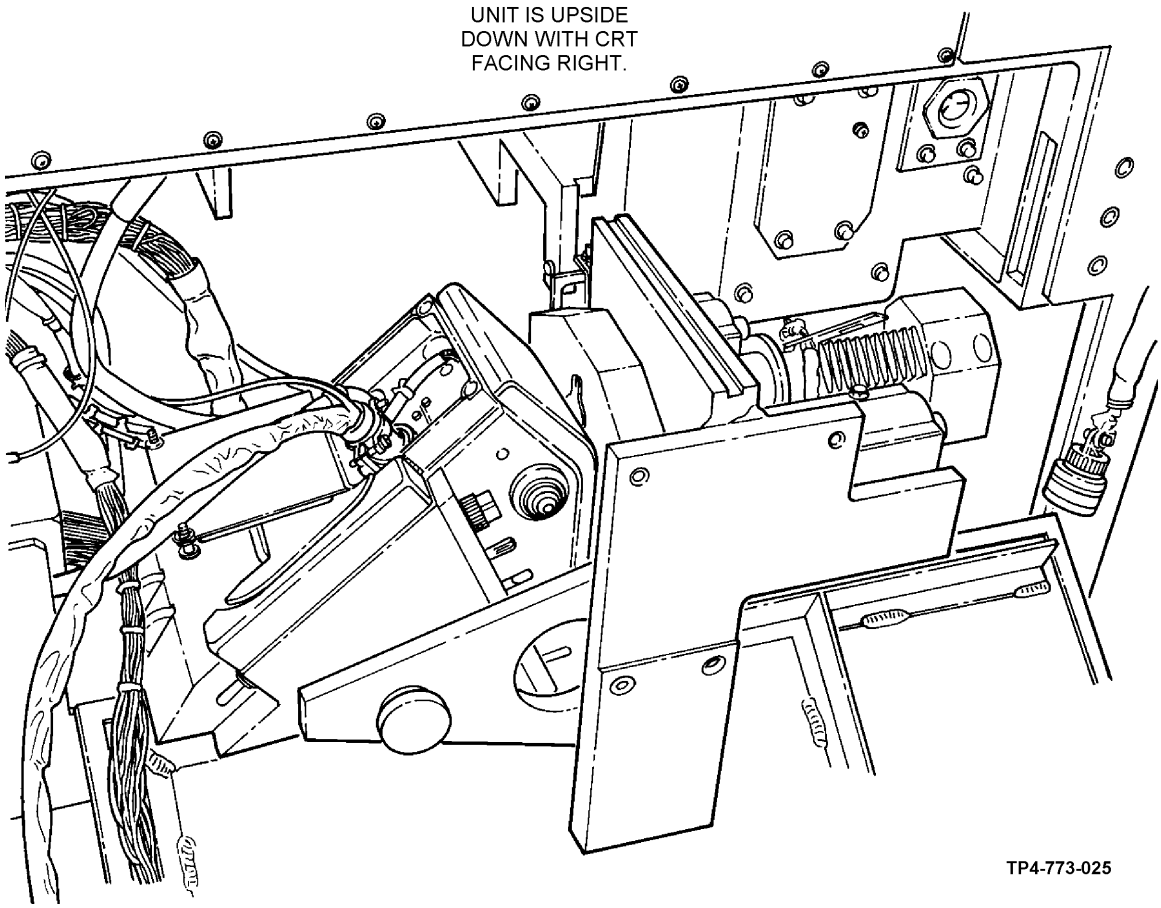


Figure 5-27. Control Panel Assembly Installed in Focus Motor Mounting Bracket in Proper Position for Cable Installation

5-11. GENERAL. (CONT)

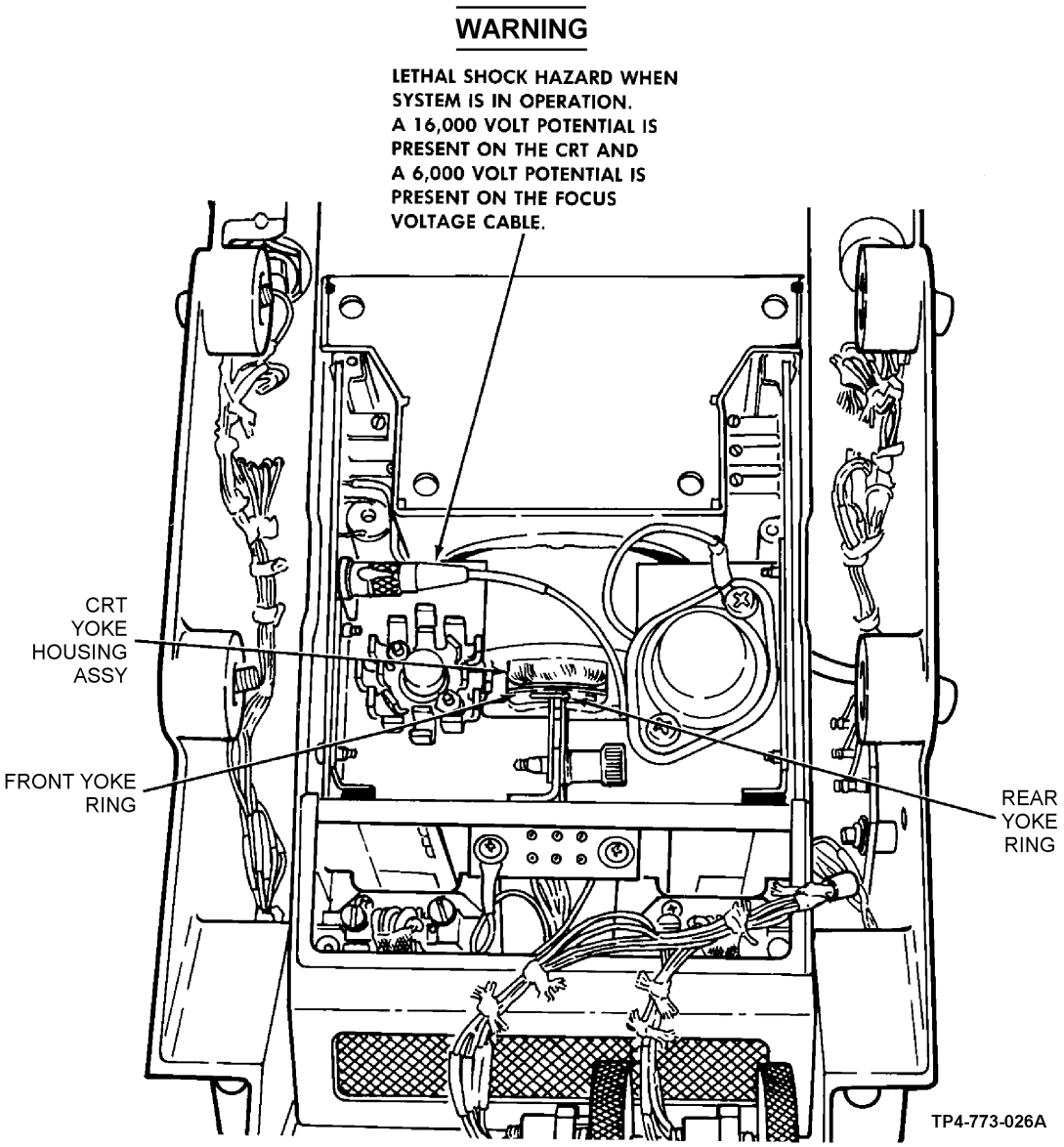


Figure 5-28. Control Panel Assembly CRT Yoke Alinement Locations

5-11. GENERAL. (CONT)

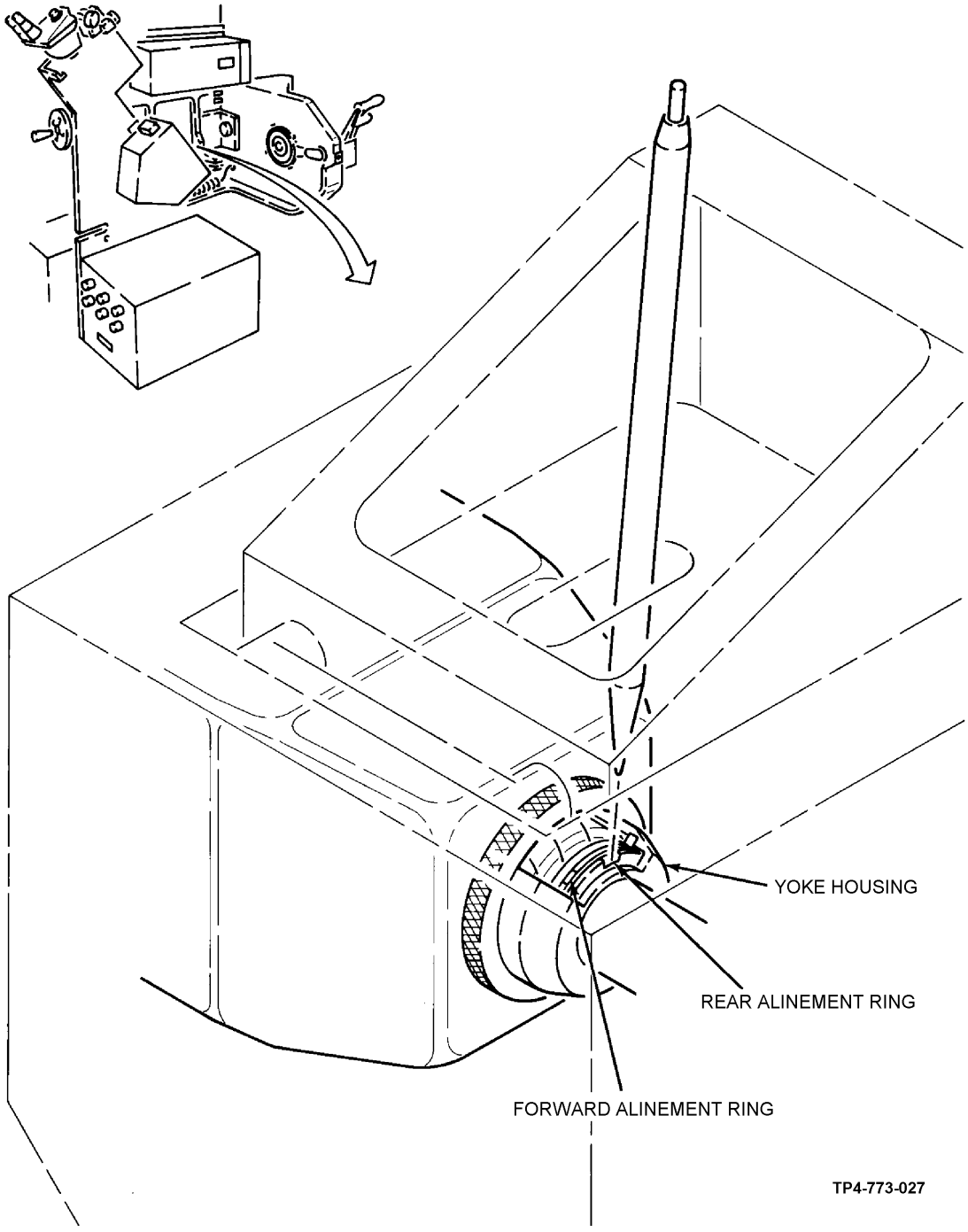


Figure 5-29. Control Panel Assembly CRT Yoke Alinement Rings Adjustment

5-11. GENERAL. (CONT)

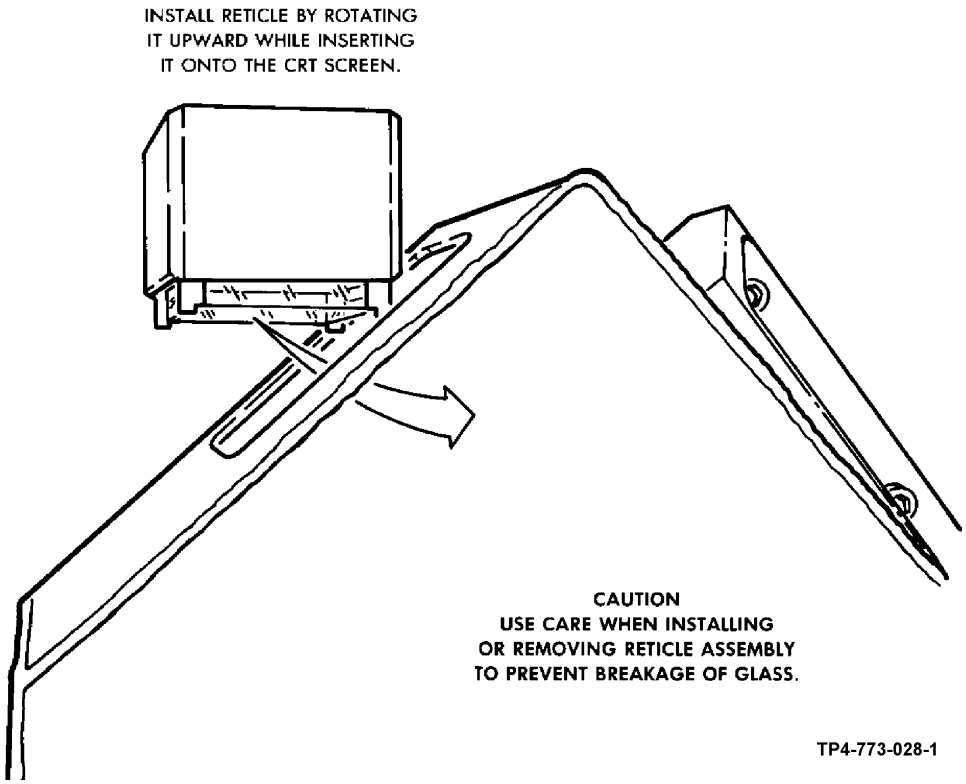


Figure 5-30. Proper Installation of Reticle Assembly onto CRT Screen

5-11. GENERAL. (CONT)

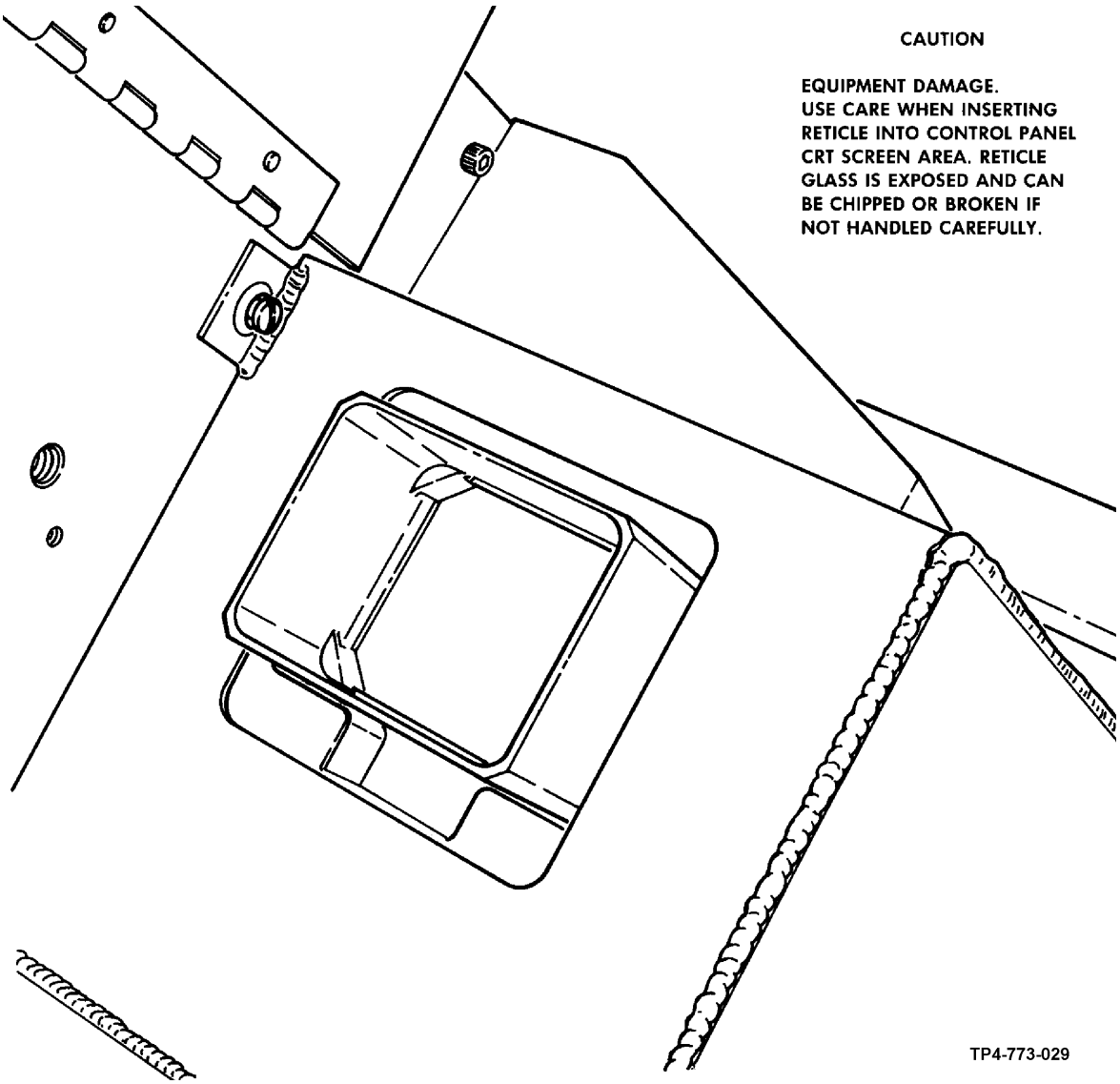


Figure 5-31. Control Panel Assembly Reticle Installation

5-11. GENERAL. (CONT)

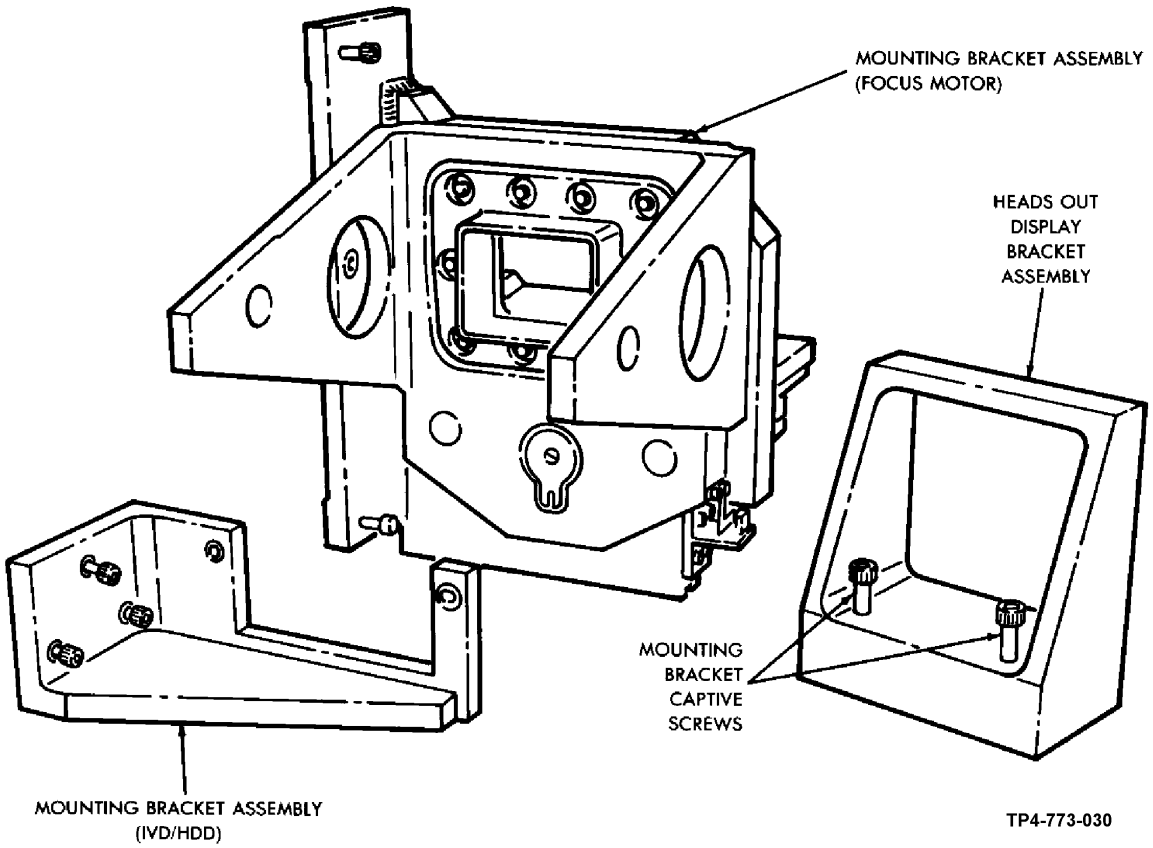


Figure 5-32. Control Panel Assembly Mounting Brackets

5-11. GENERAL. (CONT)

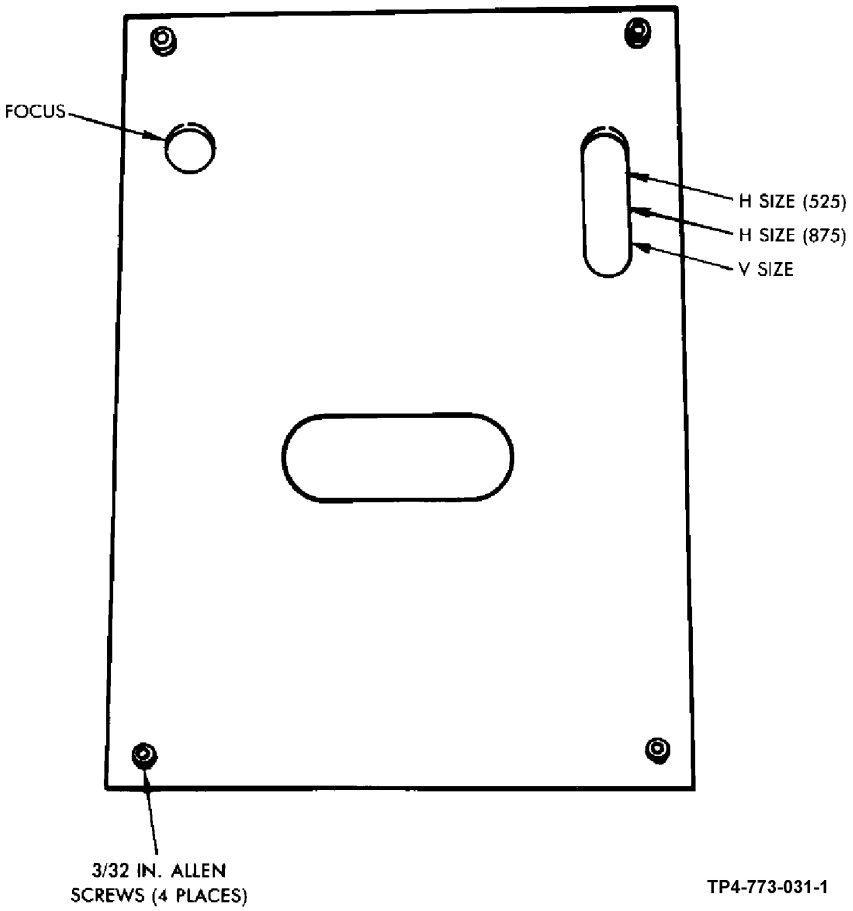


Figure 5-33. Control Panel Assembly Adjustment Cover Assembly 13073117

5-11. GENERAL. (CONT)

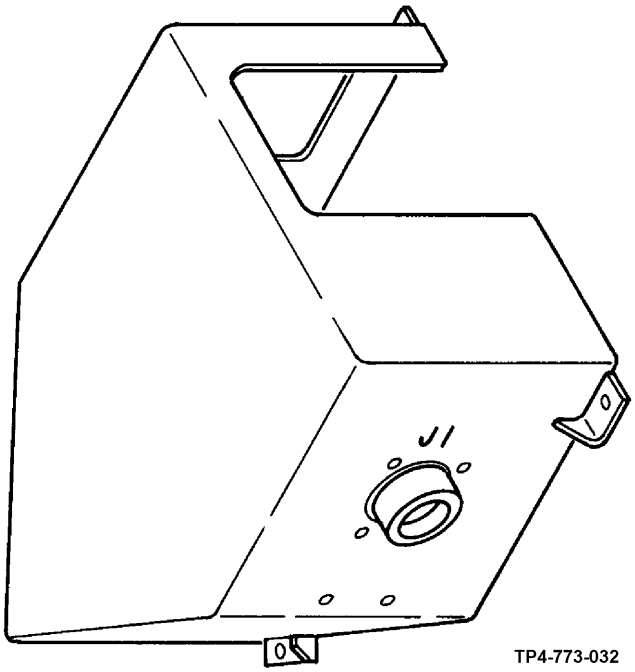


Figure 5-34. Control Panel Assembly Protective Cover Assembly 13230921

5-11. GENERAL. (CONT)

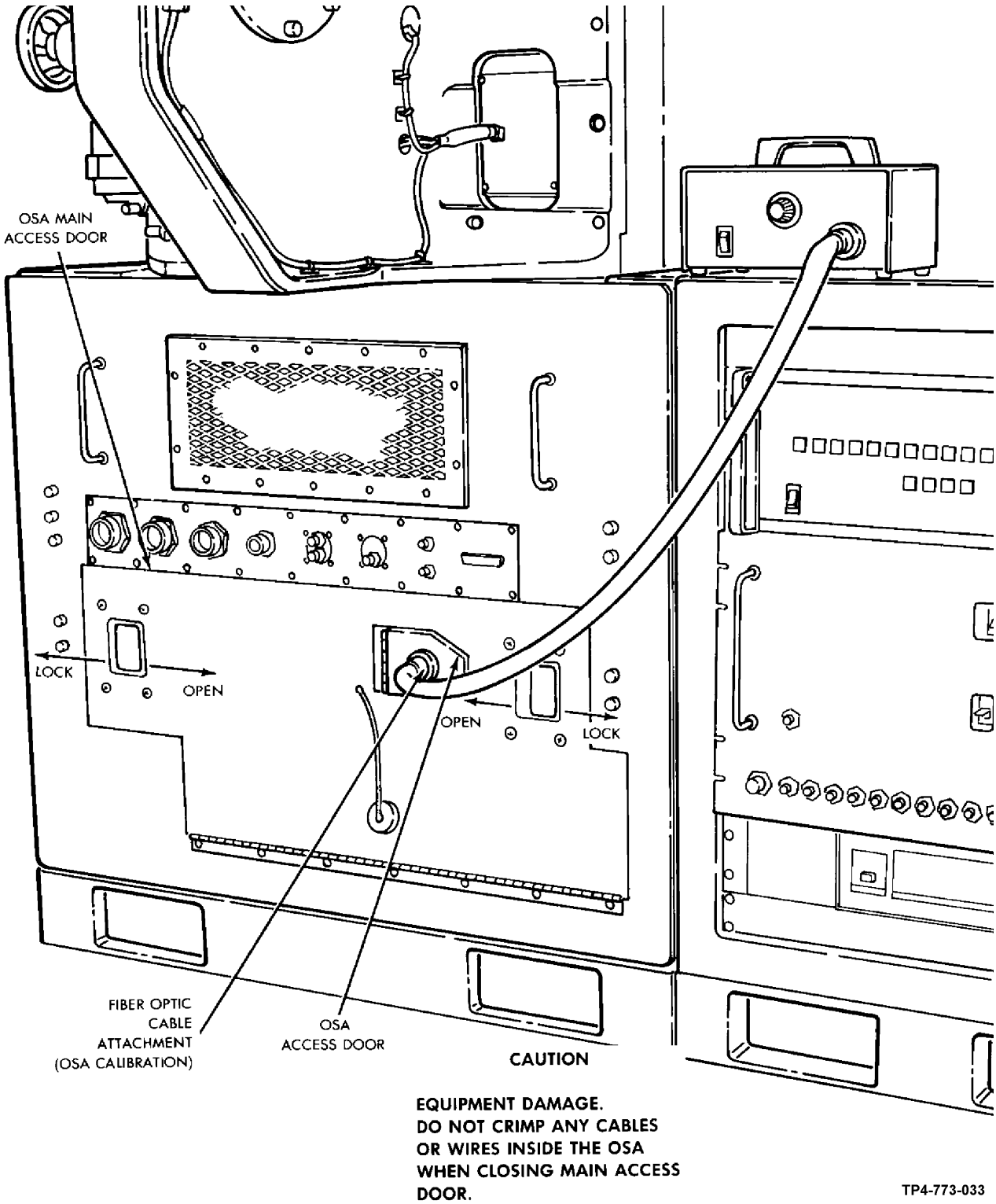


Figure 5-35. Optical Signal Analyzer Door Locations

5-11. GENERAL. (CONT)

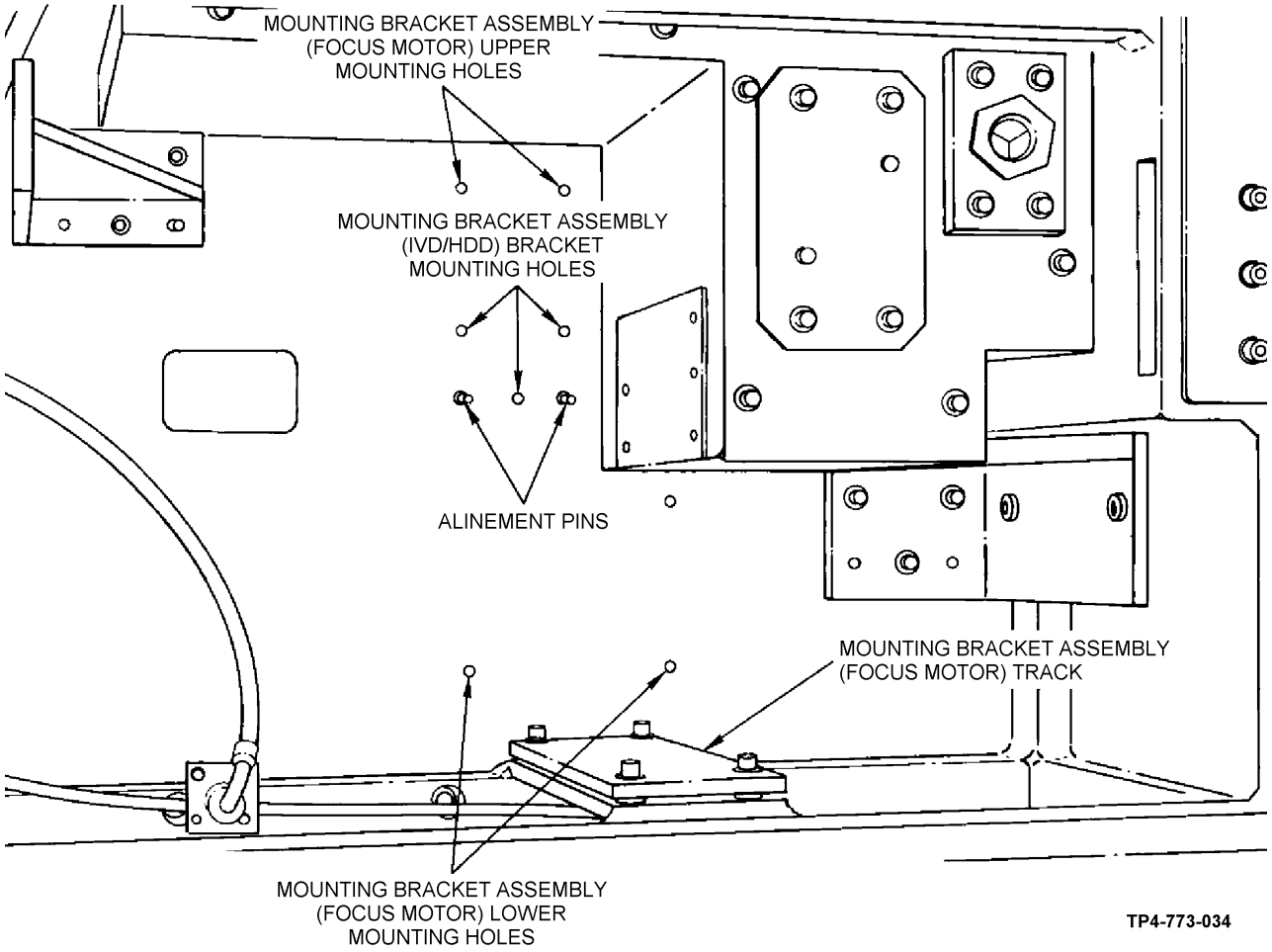


Figure 5-36. Optical Signal Analyzer Bracket Mounting Positions

5-11. GENERAL. (CONT)

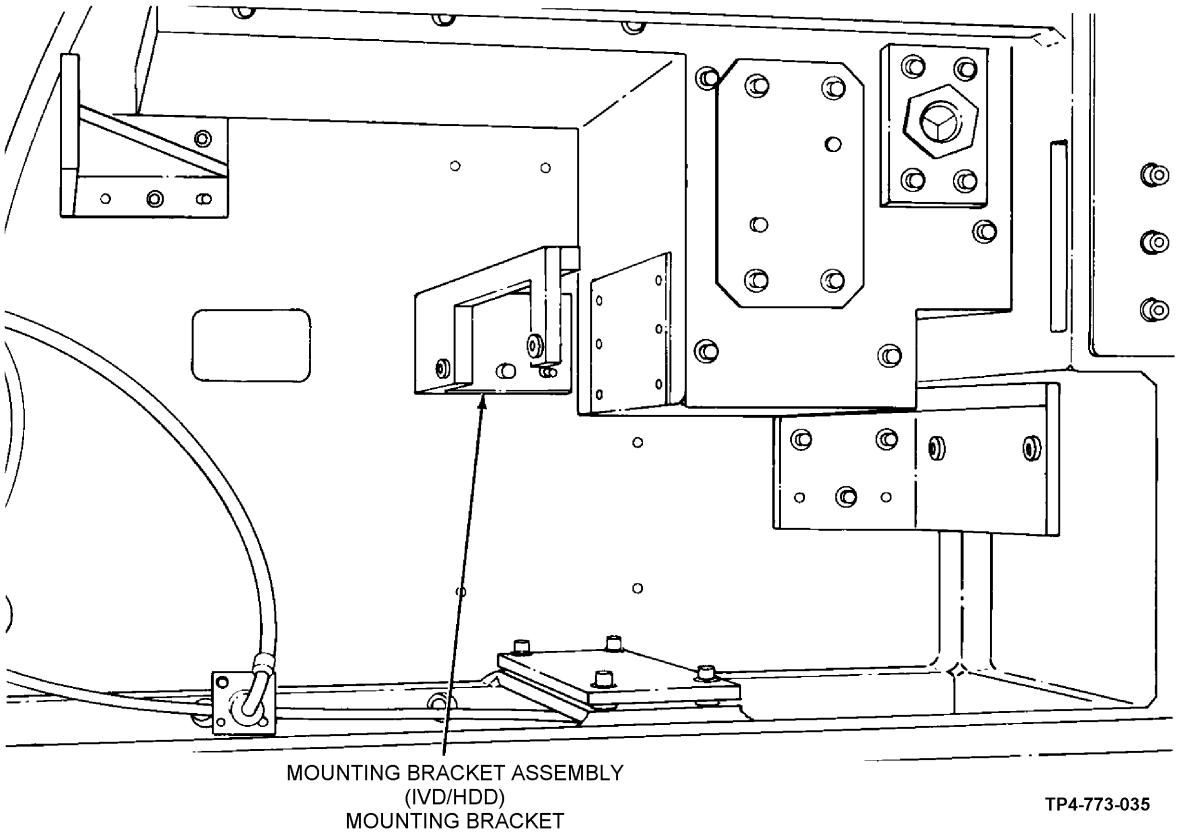


Figure 5-37. Mounting Bracket Assembly (IVD/HDD) Installed

5-11. GENERAL. (CONT)

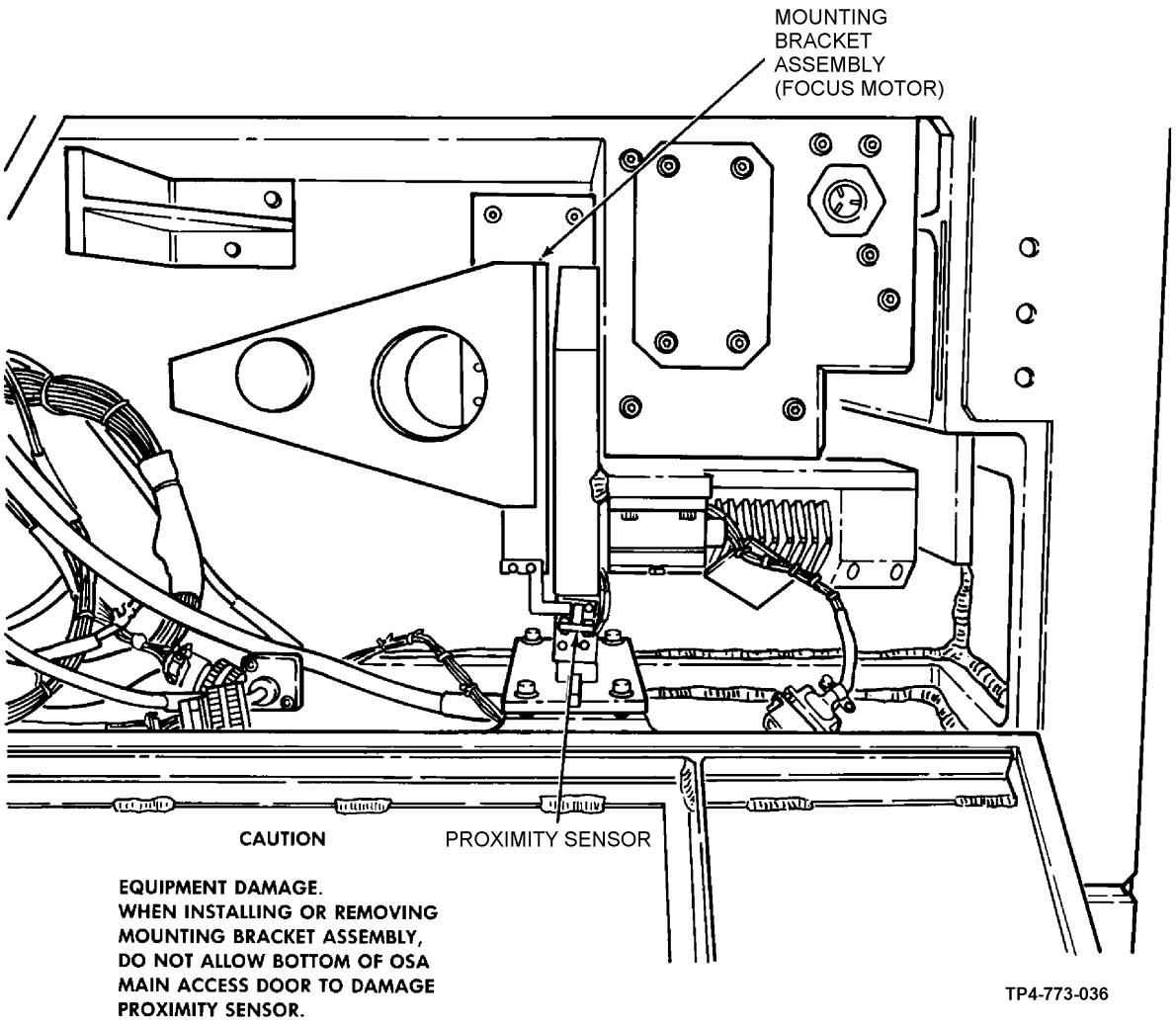


Figure 5-38. Mounting Bracket Assembly (Focus Motor) in Installed Position

5-11. GENERAL. (CONT)

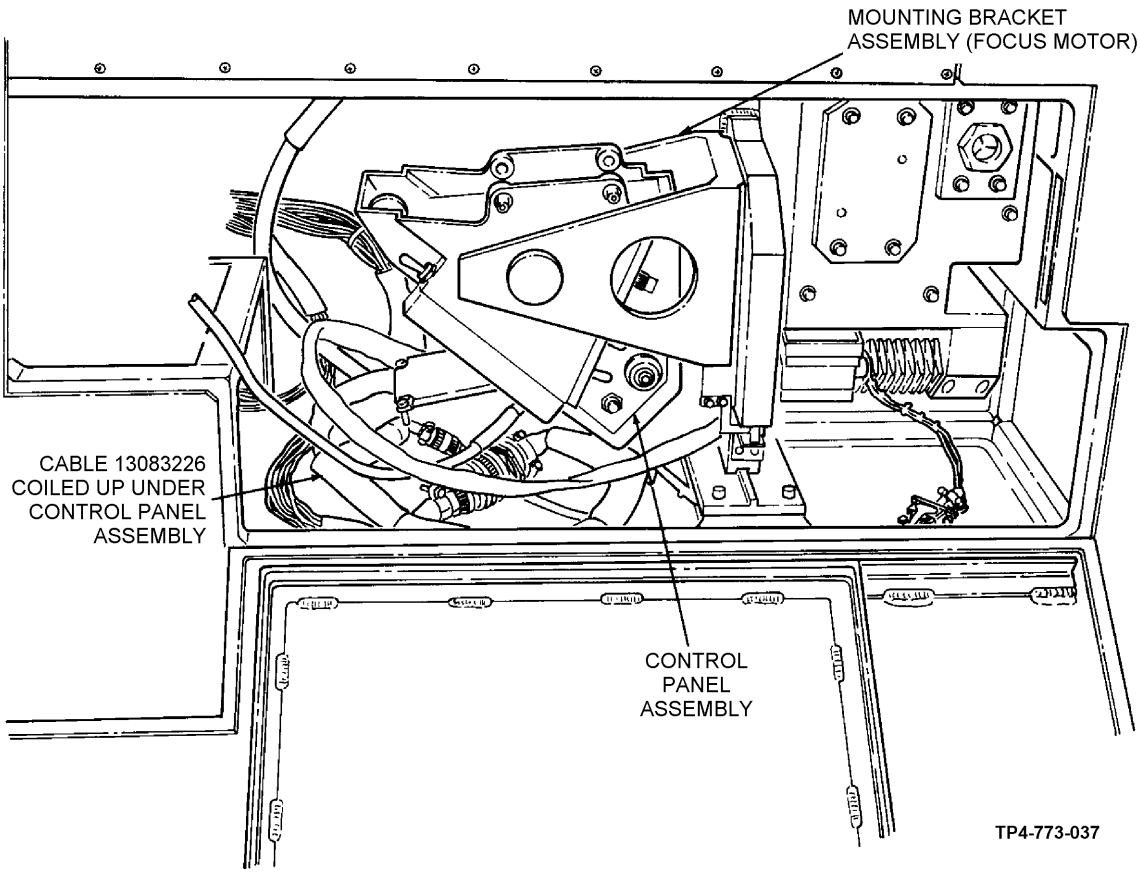


Figure 5-39. Mounting Bracket Assembly (Focus Motor) and Control Panel Assembly Properly Installed

5-11. GENERAL. (CONT)

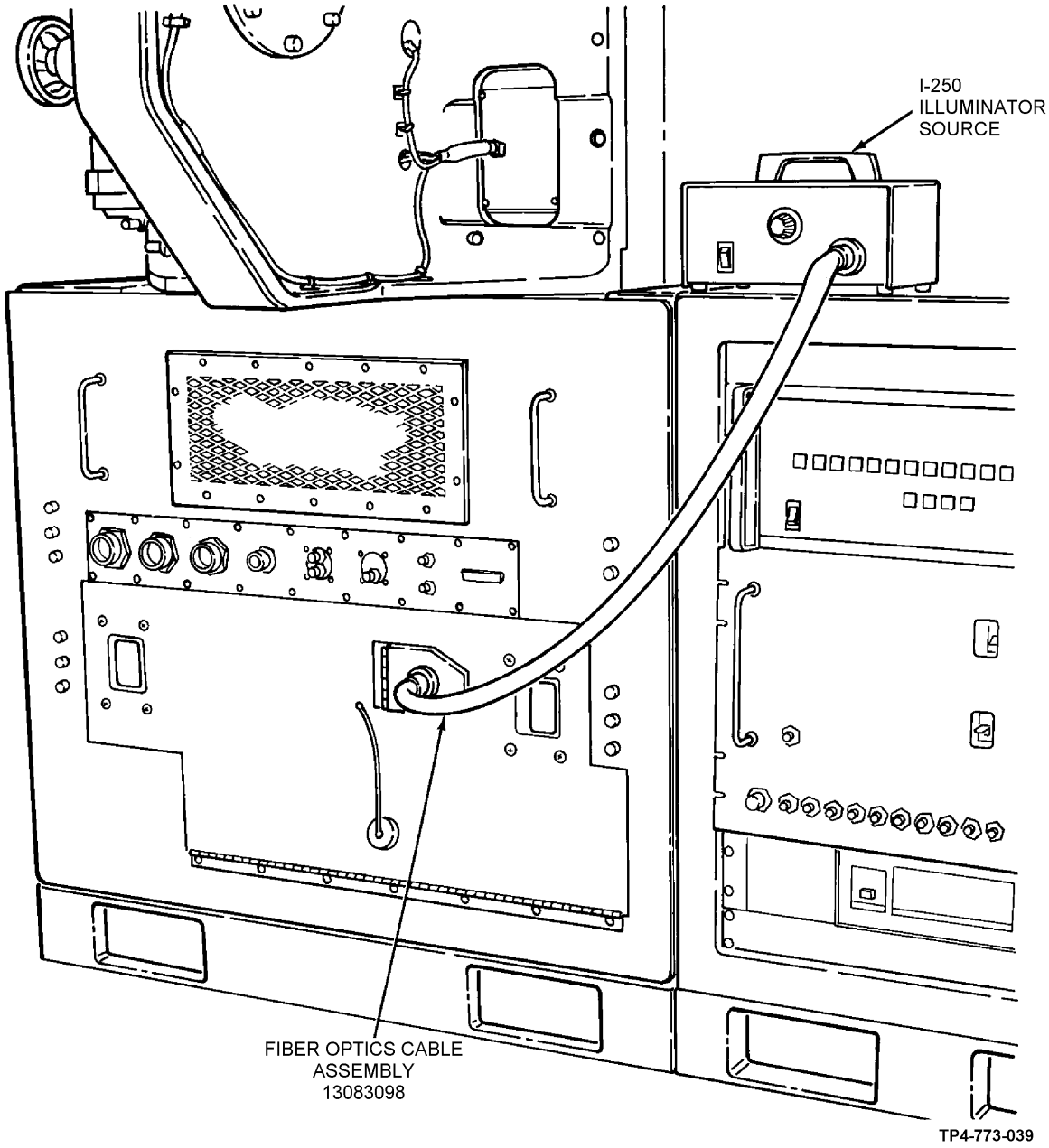


Figure 5-40. Optical Signal Analyzer High Voltage Cable Termination (W13 13081942)

5-11. GENERAL. (CONT)

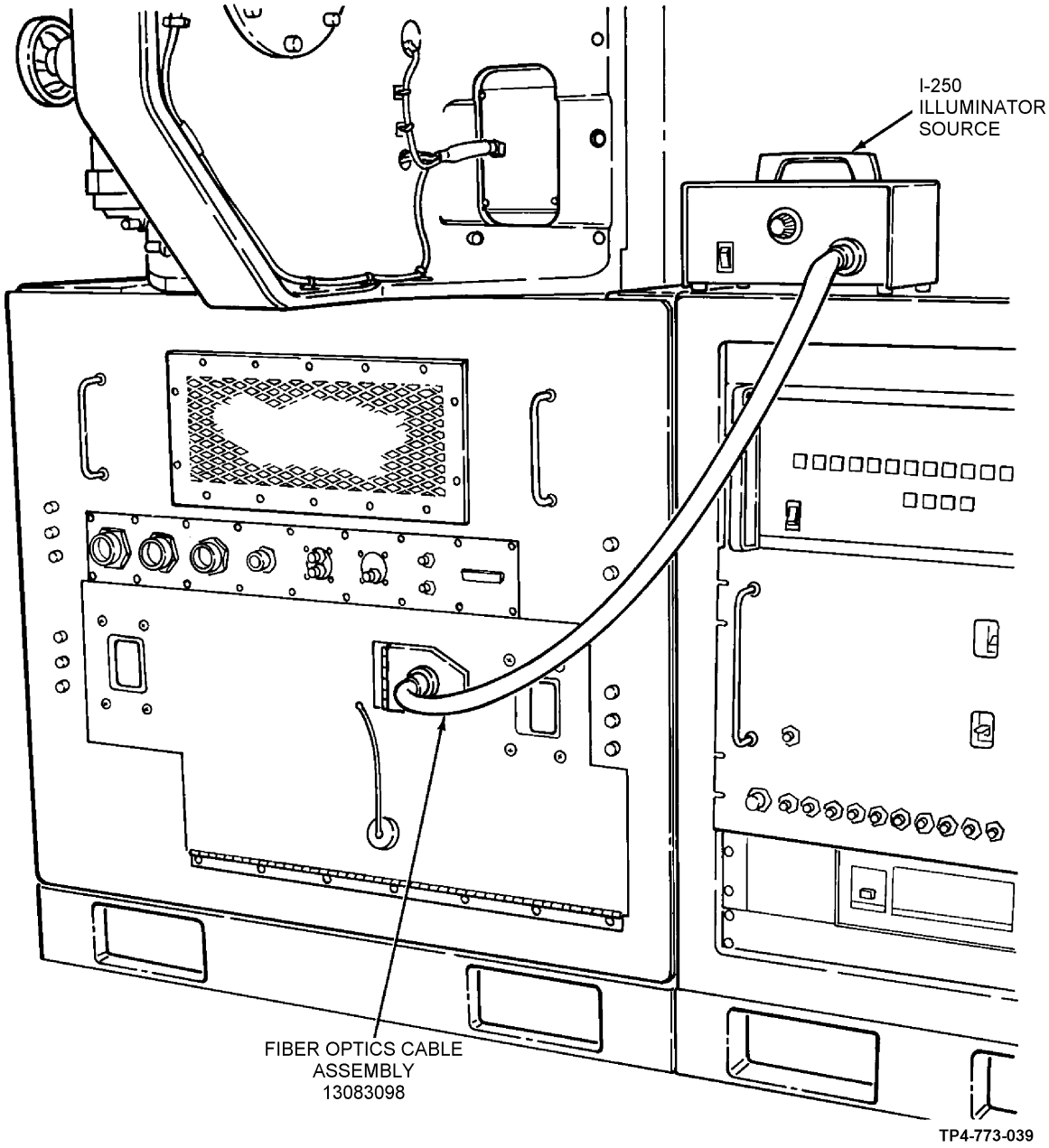


Figure 5-41. Illuminator Source I-250 Installed on Optical Signal Analyzer Door

5-11. GENERAL. (CONT)

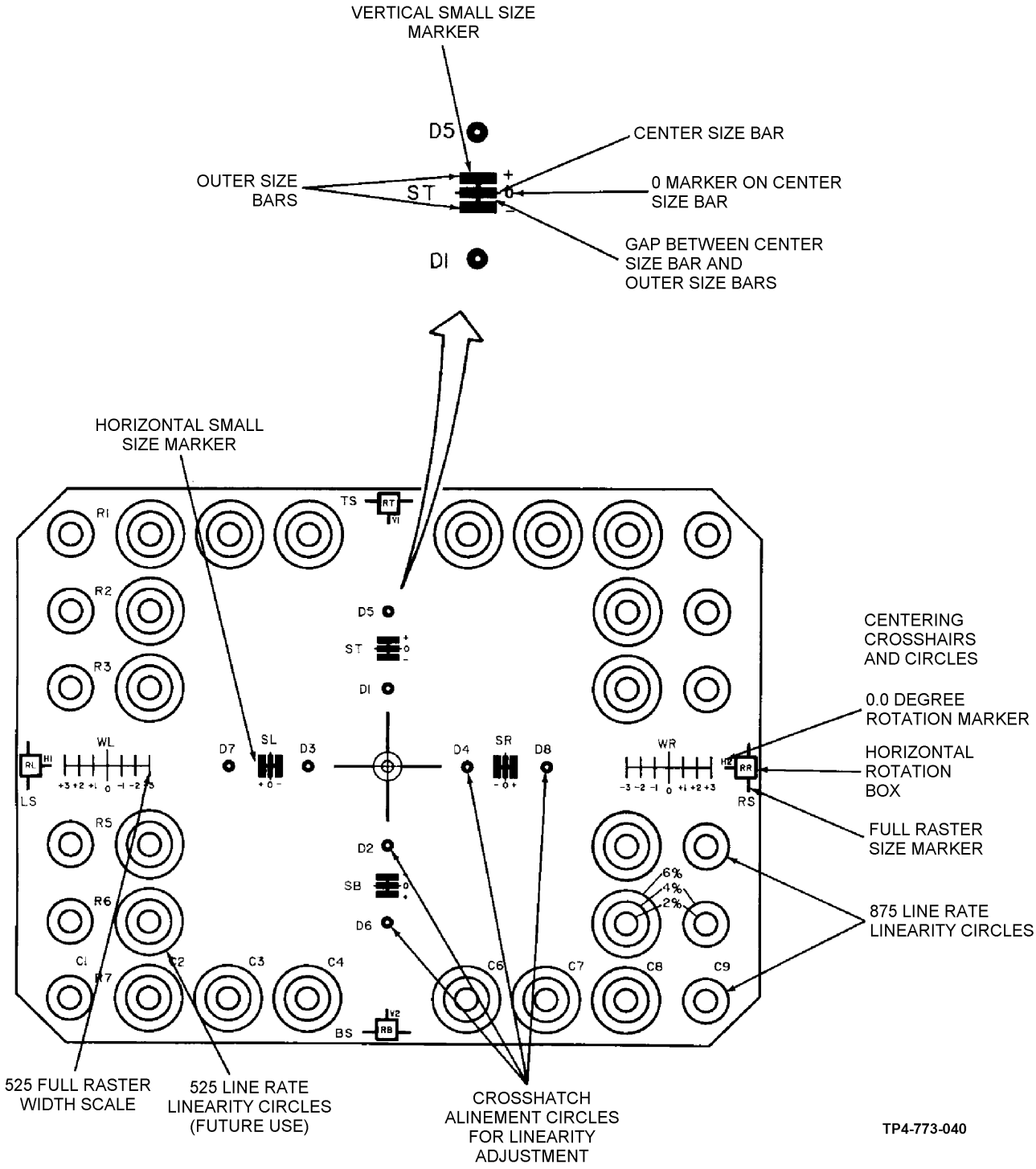


Figure 5-42. Reticle Pattern Descriptions

5-11. GENERAL. (CONT)

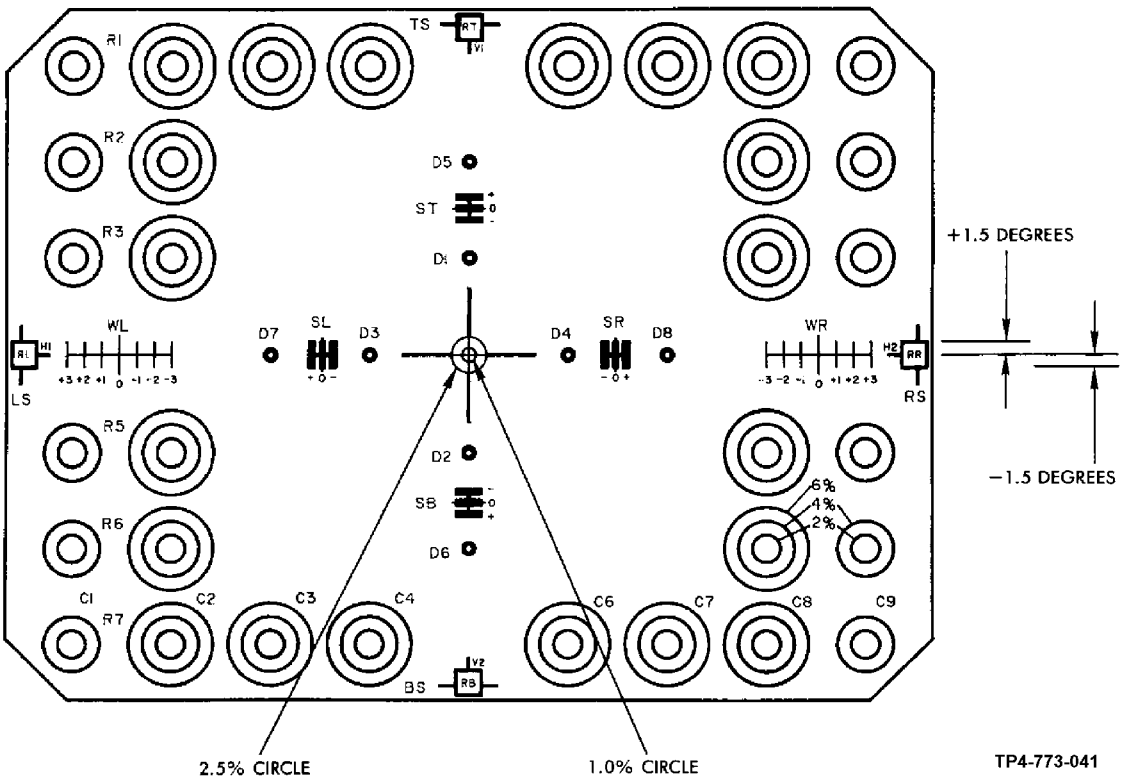


Figure 5-43. Reticle Pattern Dimensions

5-11. GENERAL. (CONT)

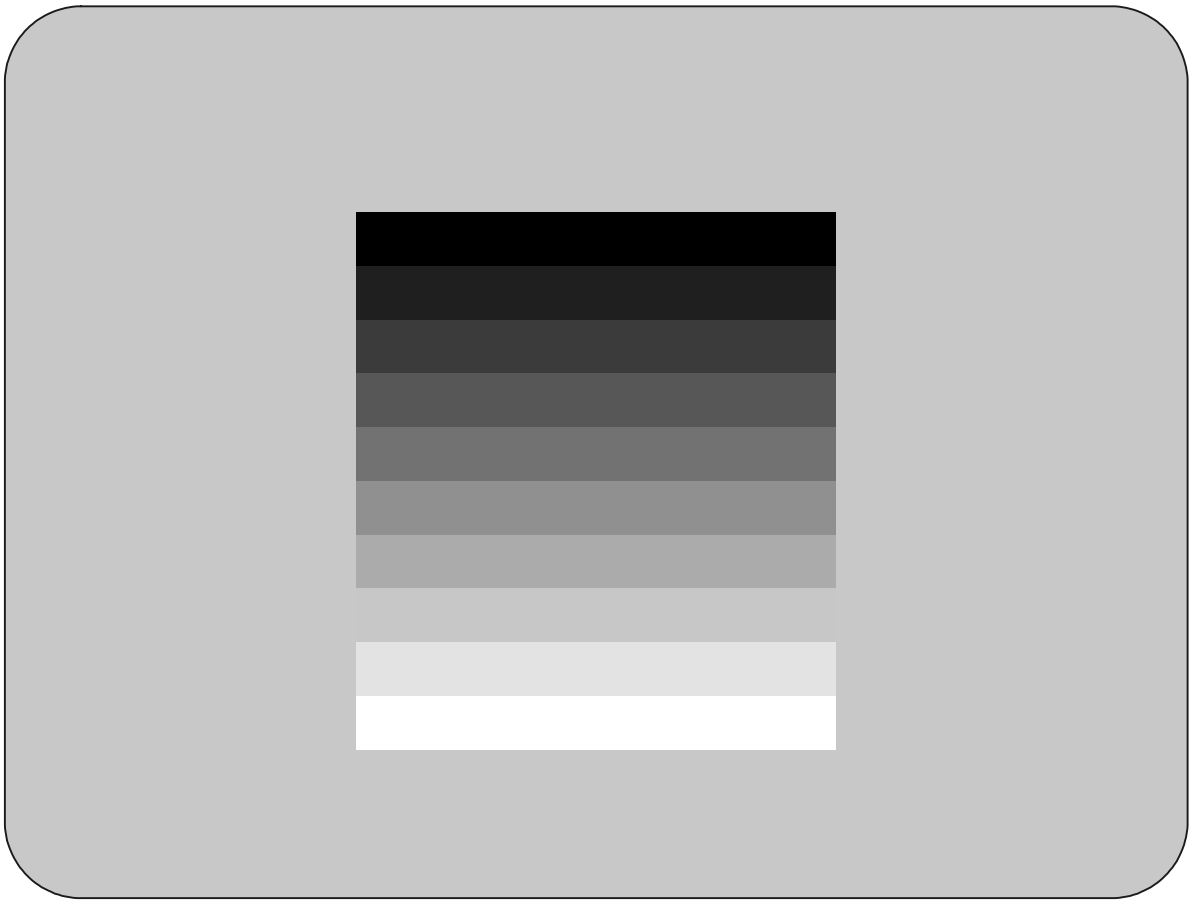


Figure 5-44. Control Panel Assembly CRT Gray Scale Display

5-11. GENERAL. (CONT)

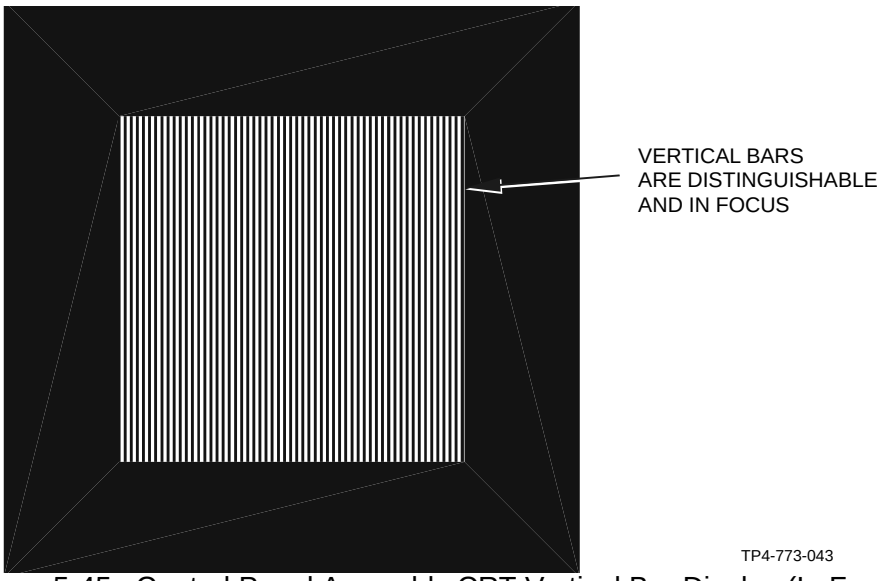


Figure 5-45. Control Panel Assembly CRT Vertical Bar Display (In Focus)

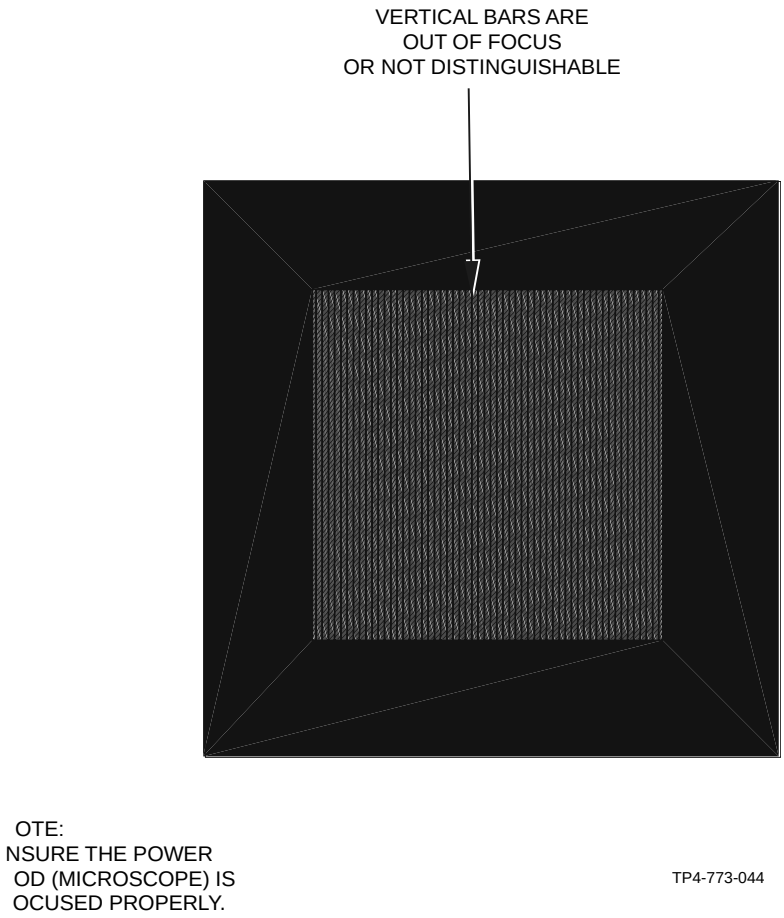


Figure 5-46. Control Panel Assembly CRT Vertical Bar Display (Out of Focus)

5-11. GENERAL. (CONT)

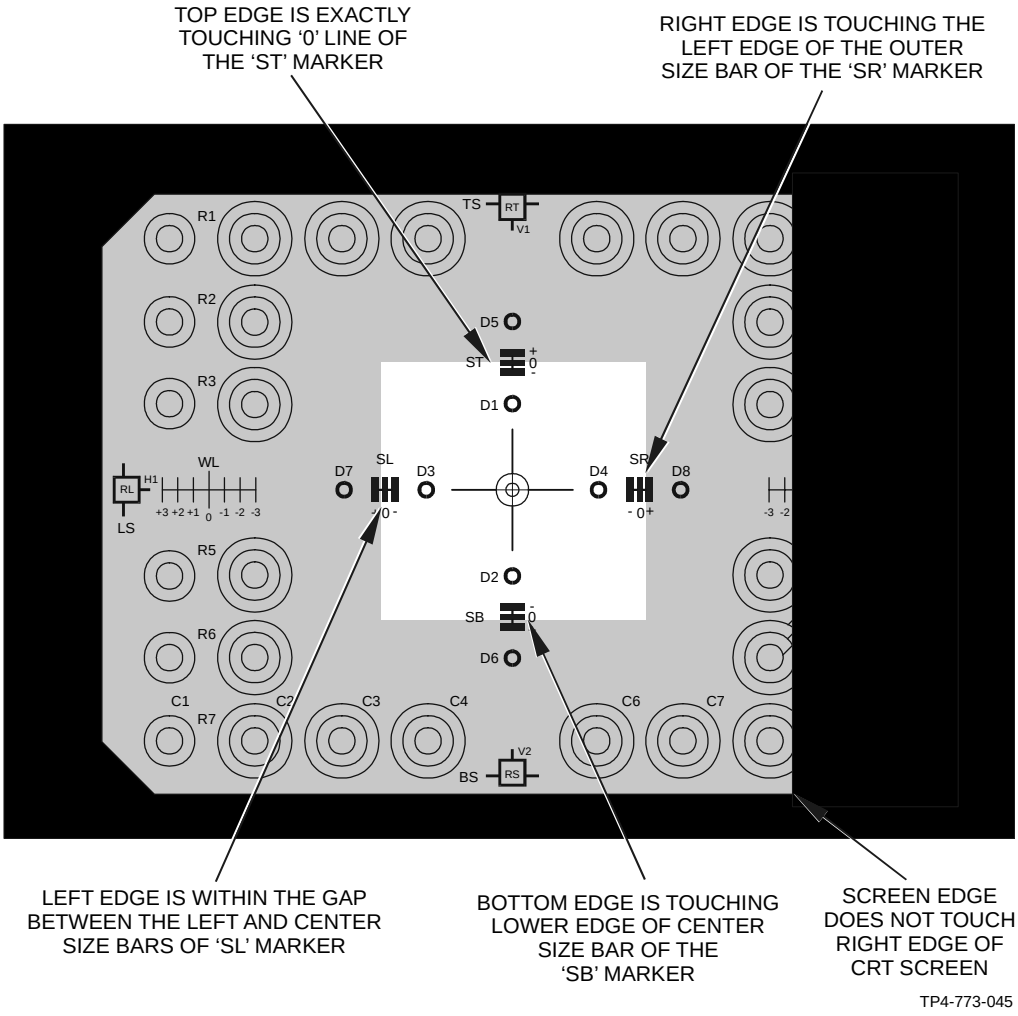


Figure 5-47. Control Panel Assembly CRT Display, 525 Line Rate - Size Box Example

5-11. GENERAL. (CONT)

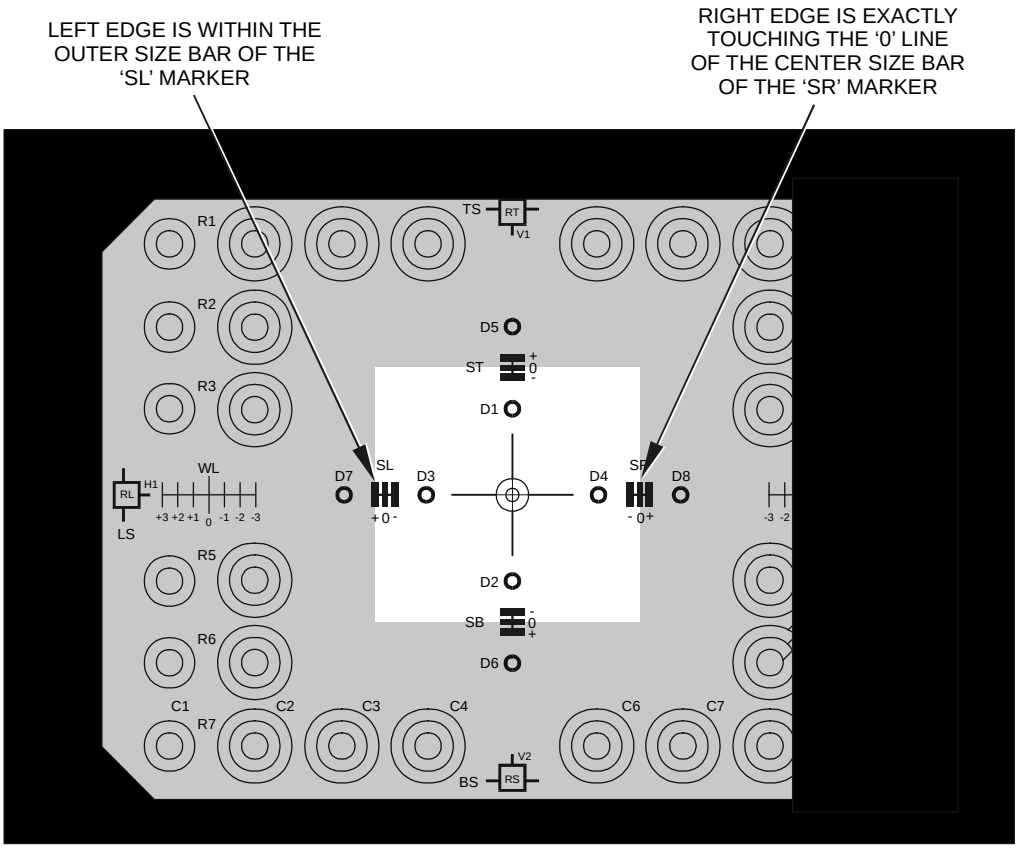


Figure 5-48. Control Panel Assembly Display, 525 Line Rate - Horizontal Left Shift

5-11. GENERAL. (CONT)

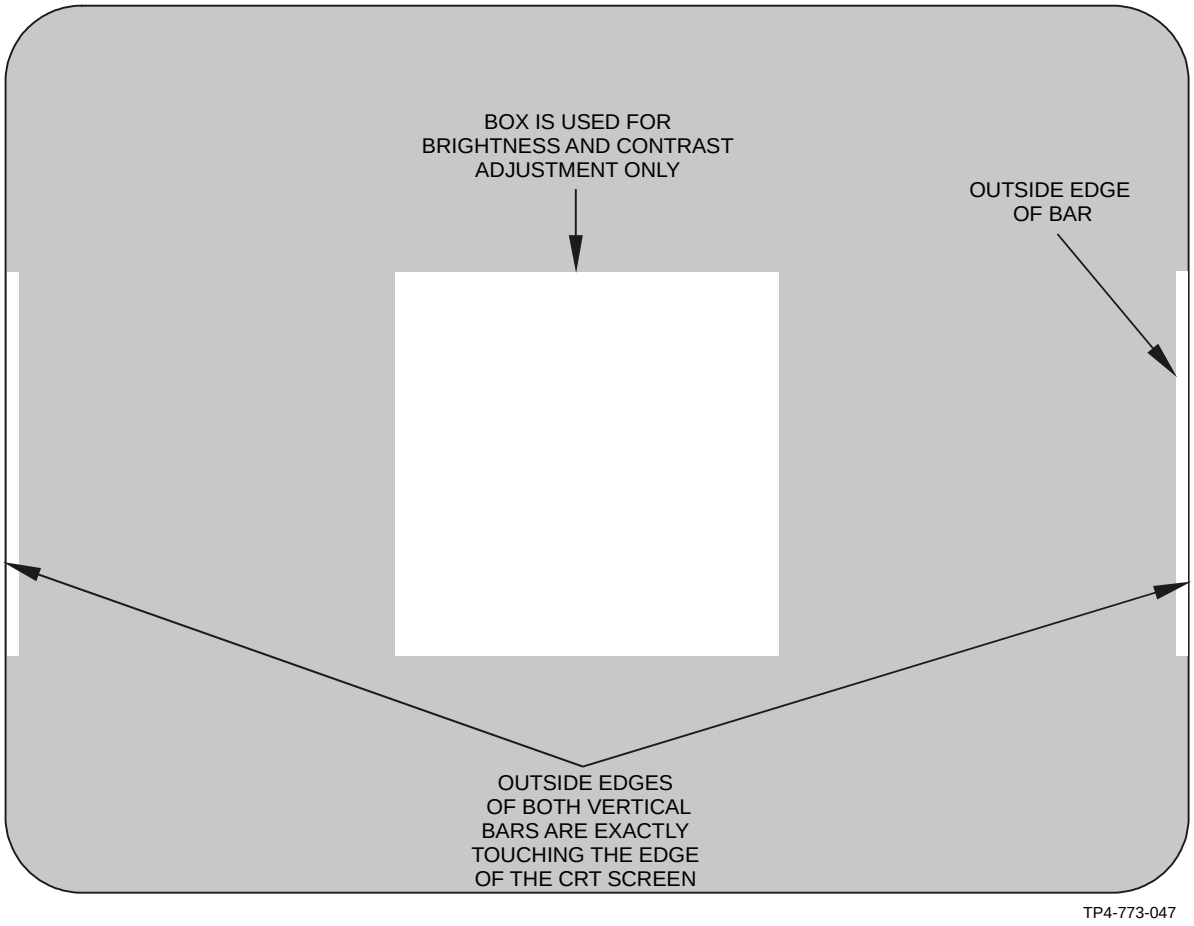


Figure 5-49. Control Panel Assembly CRT Display, Horizontal Size Adjustment - In Alinement

5-11. GENERAL. (CONT)

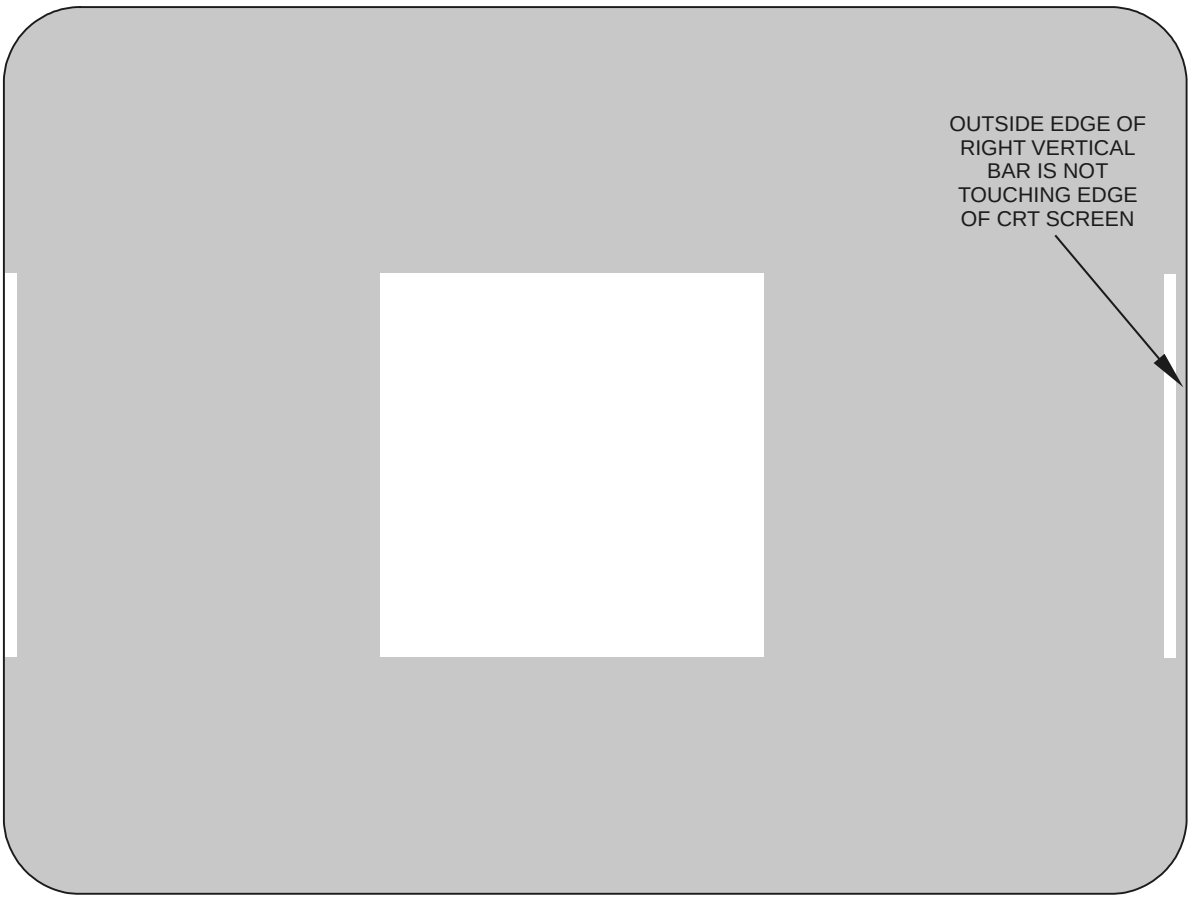
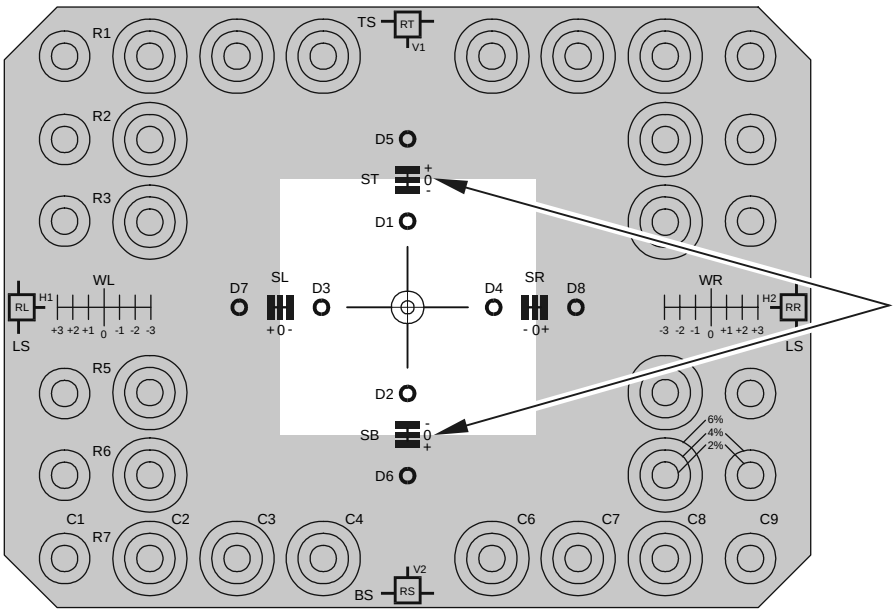


Figure 5-50. Control Panel Assembly CRT Display, Horizontal Size Adjustment - Out of Alinement (875 Line Rate)

5-11. GENERAL. (CONT)



TOP AND BOTTOM EDGES OF DISPLAYED BOX INTERSECT THE VERTICAL SIZE MARKERS THROUGH THE CENTER BAR AT THE '0' MARKER.

ADJUST VERTICAL SIZE ONLY FOR THIS 825 LINE RATE ALINEMENT TEST.

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Figure 5-51. Control Panel Assembly CRT Display, Vertical Size Prealinement Box (875 Line Rate)

5-11. GENERAL. (CONT)

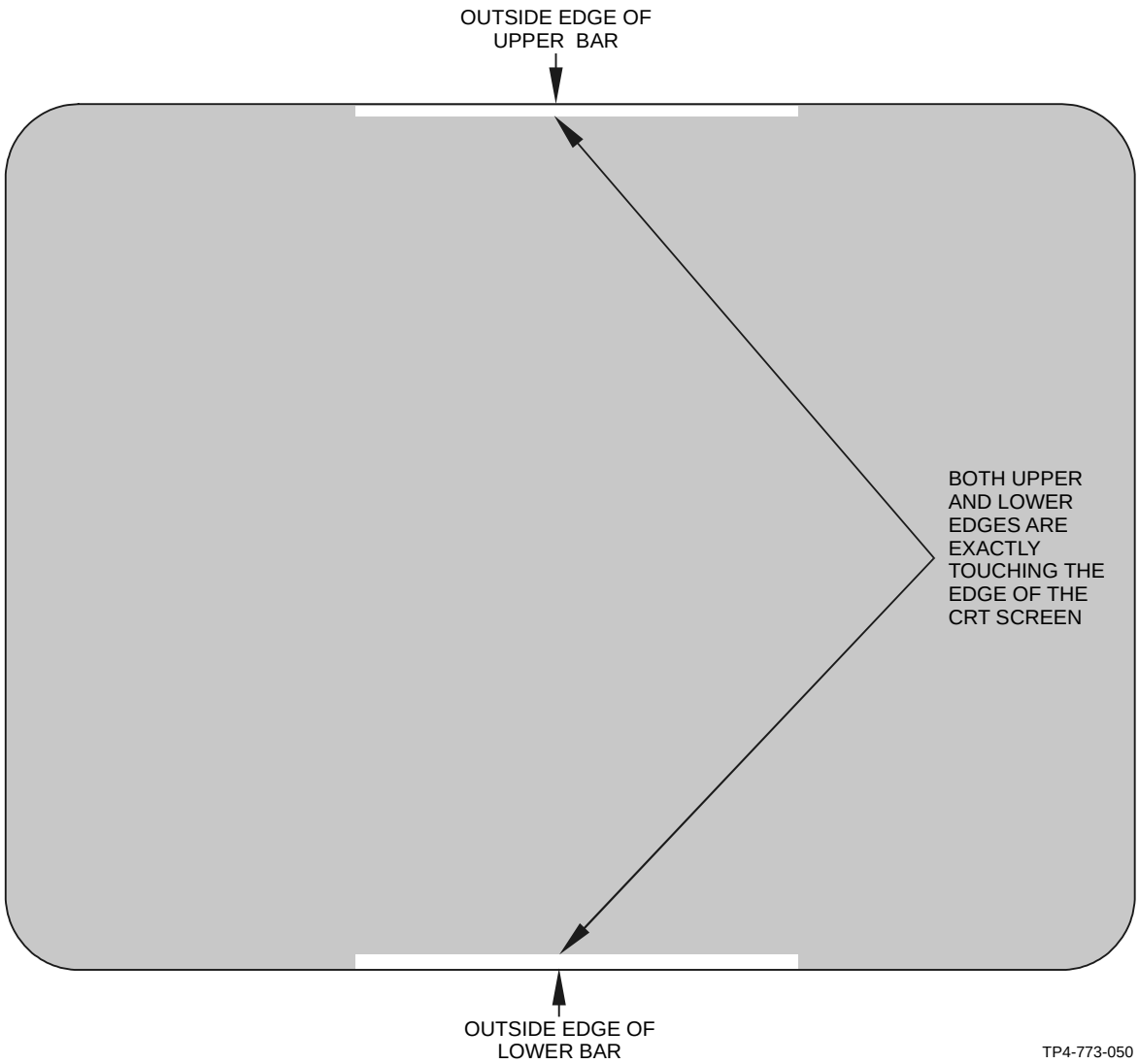


Figure 5-52. Control Panel Assembly CRT Display, Vertical Size Adjustment - In Alinement (875 Line Rate)

5-11. GENERAL. (CONT)

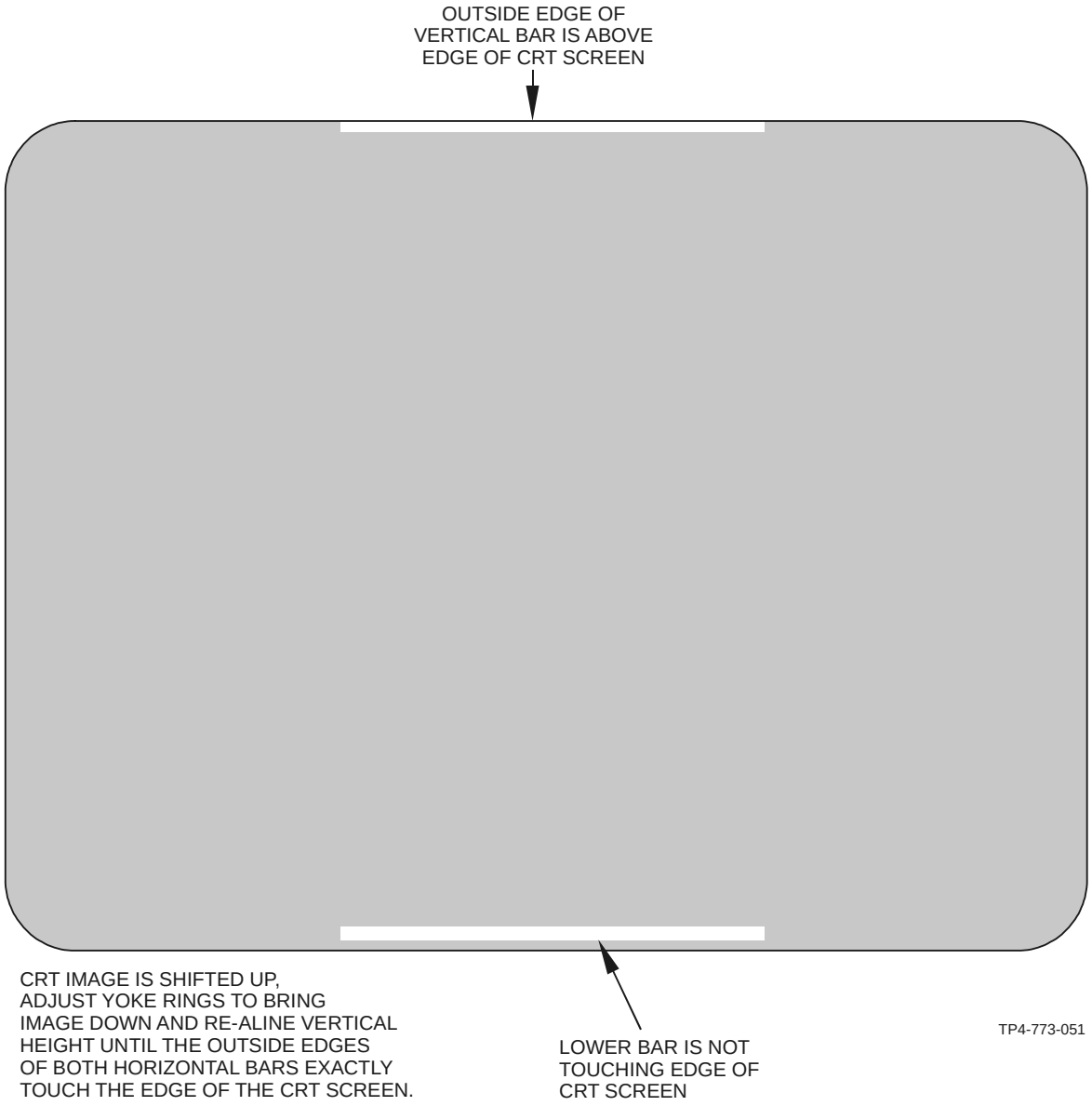


Figure 5-53. Control Panel Assembly CRT Display, Vertical Size Adjustment - Out of Alinement (875 Line Rate)

5-11. GENERAL. (CONT)

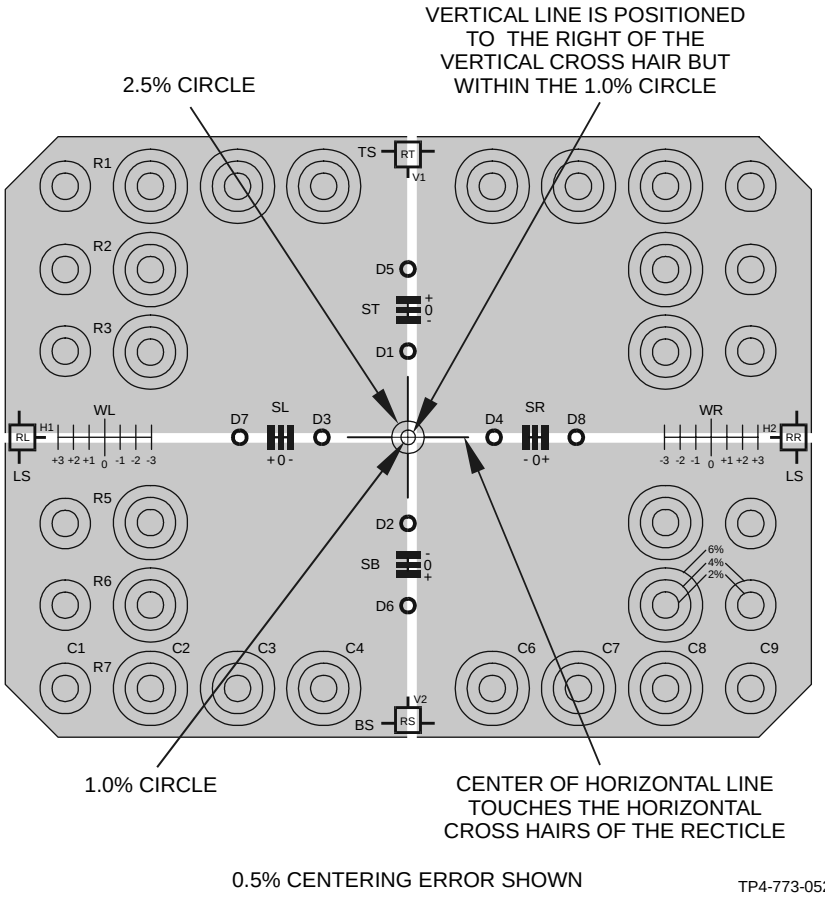


Figure 5-54. Control Panel Assembly CRT Display, Centering Test - Horizontal Error

5-11. GENERAL. (CONT)

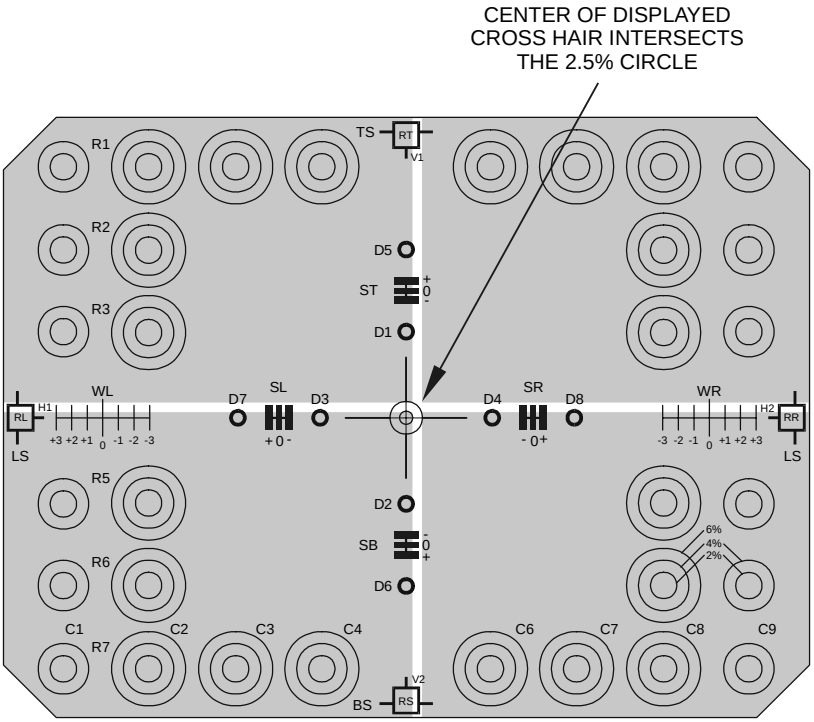
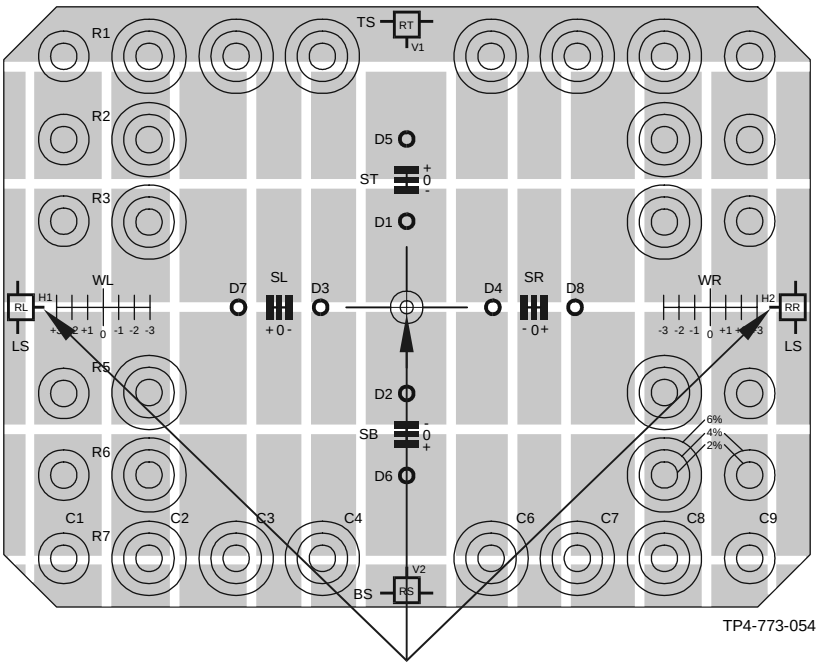


Figure 5-55. Control Panel Assembly CRT Display, Vertically and Horizontally Off-Center

5-11. GENERAL. (CONT)



HORIZONTAL LINE THROUGH
CENTER OF CROSSHAIRS AND
WITHIN THE TOP AND BOTTOM
EDGES OF 'RL' AND 'RR'
ROTATION BOXES

0.0 DEGREE ROTATION ERROR SHOWN

Figure 5-56. Control Panel Assembly CRT Display, Rotation Test

5-11. GENERAL. (CONT)

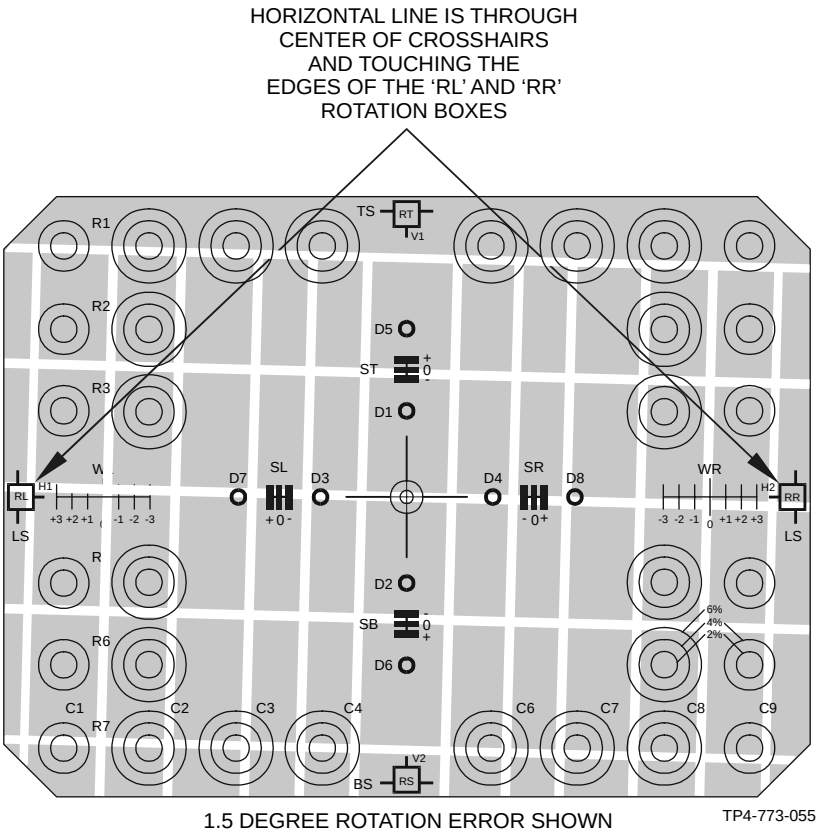


Figure 5-57. Control Panel Assembly CRT Display, Rotation Error

5-11. GENERAL. (CONT)

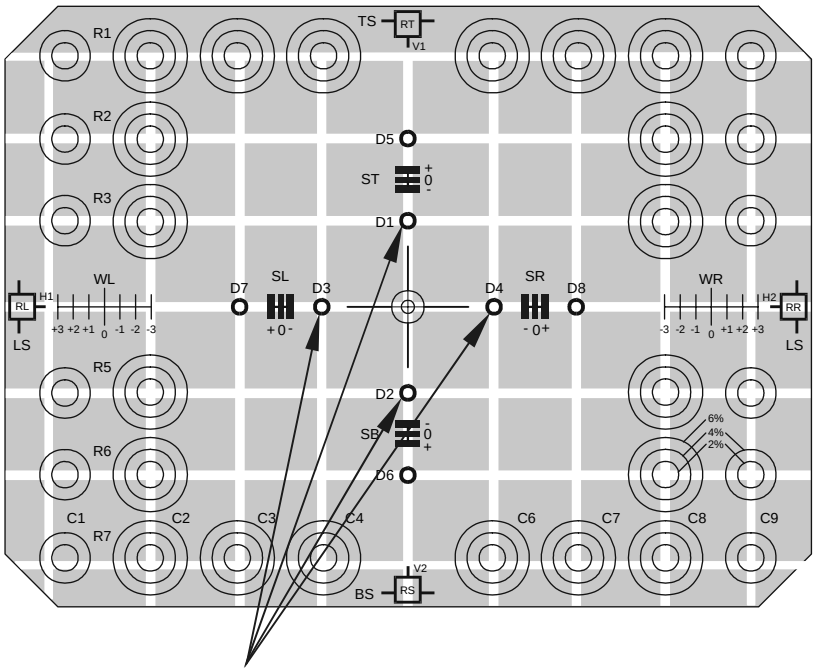


Figure 5-58. Control Panel Assembly CRT Display, Linearity Test - Crosshatch Adjustment

5-11. GENERAL. (CONT)

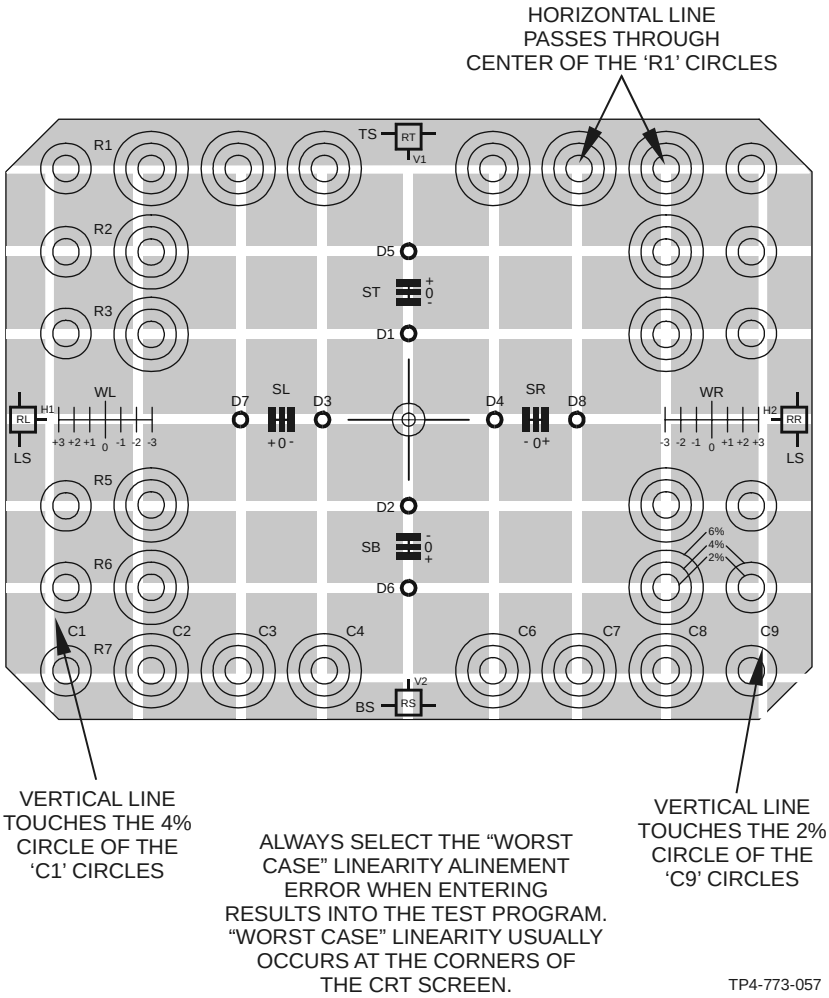
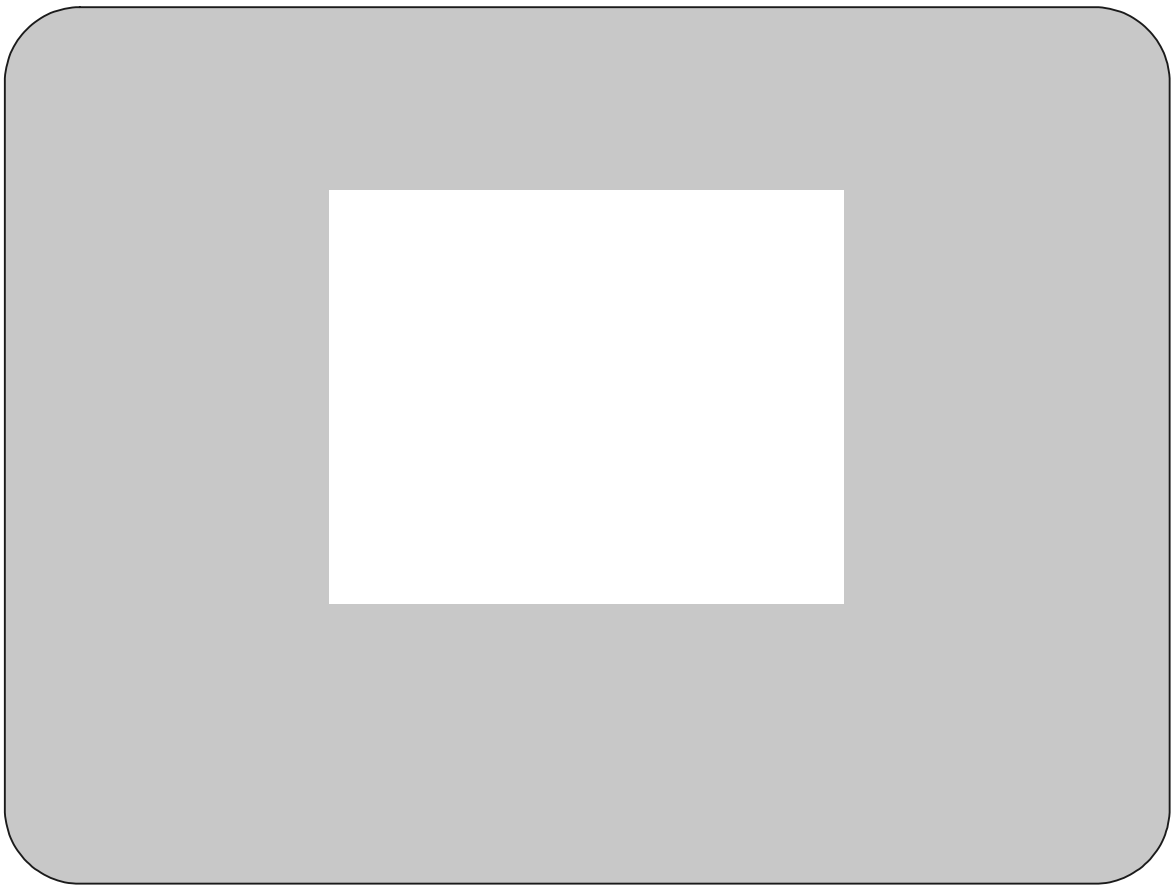


Figure 5-59. Control Panel Assembly CRT Display, Linearity Examples

5-11. GENERAL. (CONT)



WINDOW SIZE IS APPROXIMATE
AND MAY VARY SLIGHTLY
IN SIZE.

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Figure 5-60. Control Panel Assembly CRT Display, Window Display

5-11. GENERAL. (CONT)

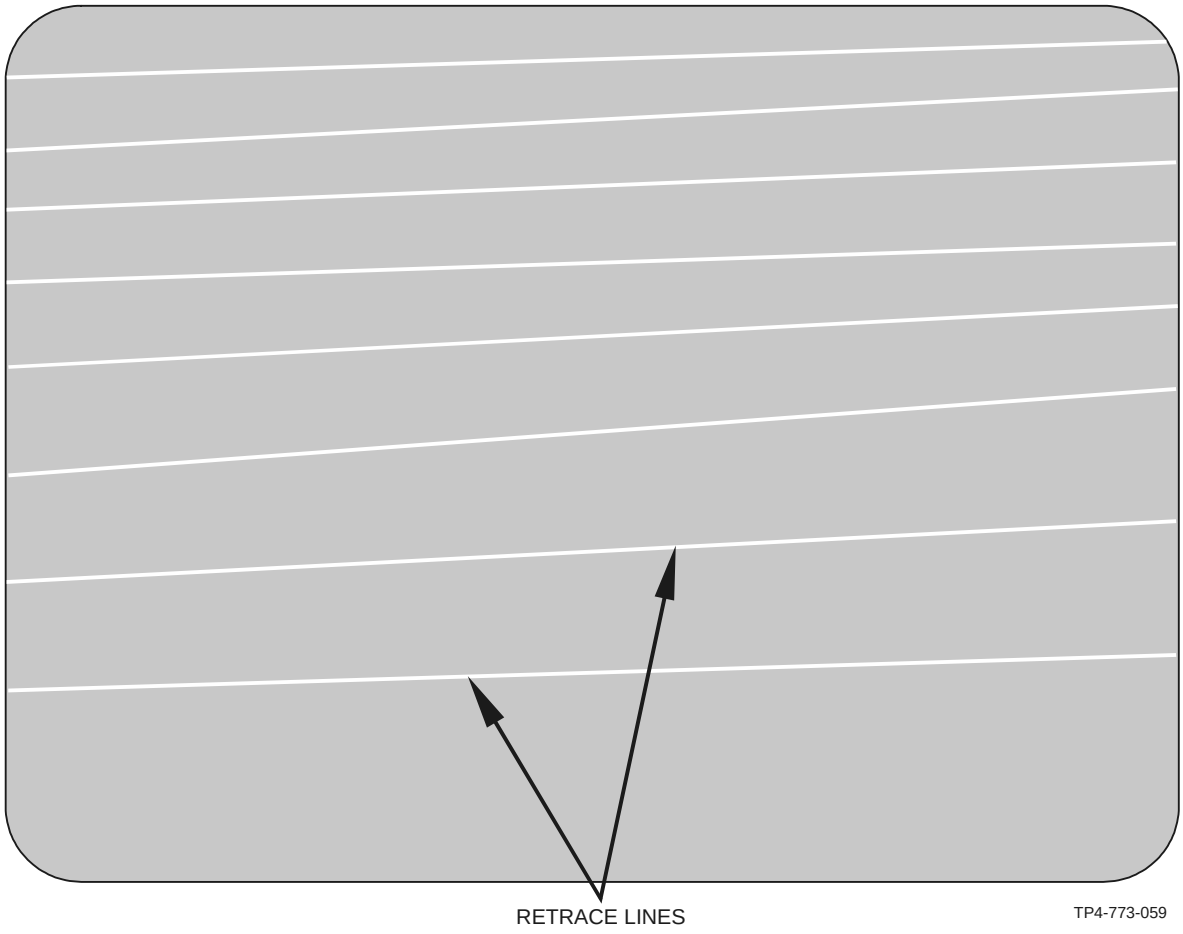


Figure 5-61. Control Panel Assembly CRT Display, Linearity Examples

5-11. GENERAL. (CONT)

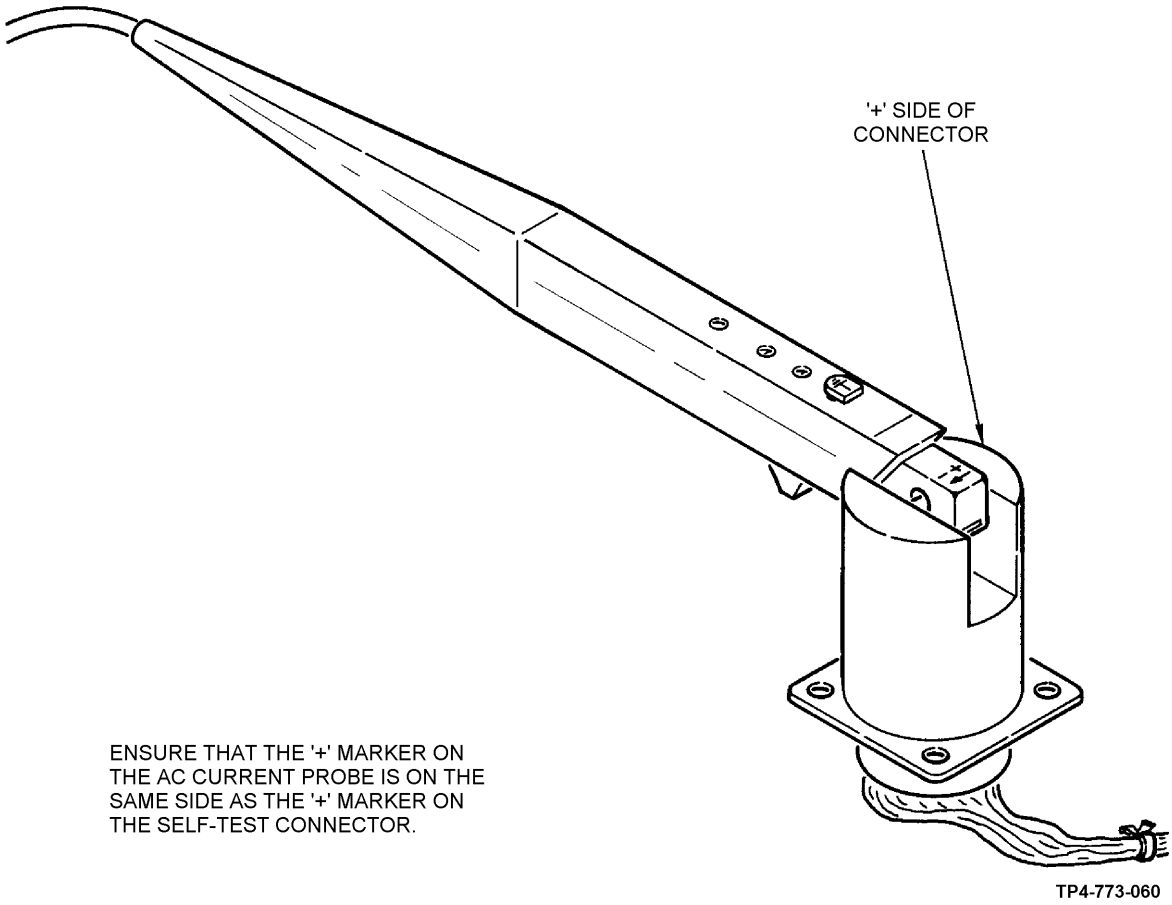


Figure 5-62. Proper Installation of Current Probe

5-11. GENERAL. (CONT)

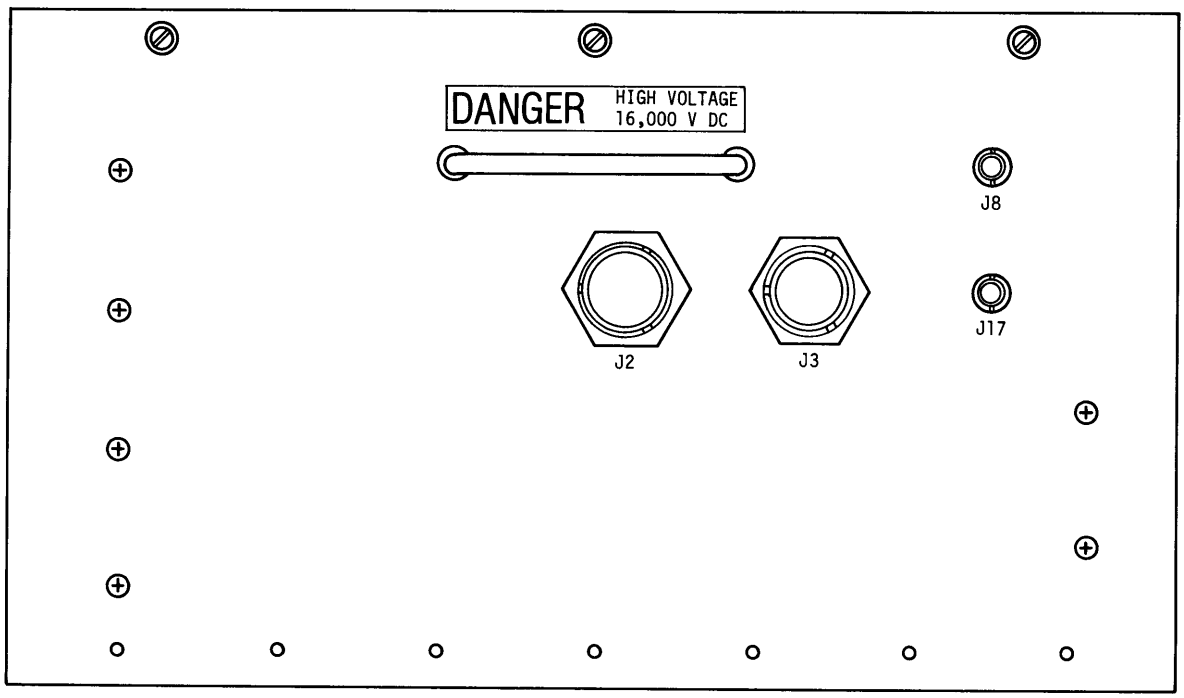


Figure 5-63. Optical Signal Analyzer Panel

CHAPTER 6

INDIRECT VIEW DISPLAY ELECTRONICS ASSEMBLY

Section I. PREPARATION FOR TEST

6-1. TEST PREPARATION.

No special procedures are required to prepare the indirect view display (IVO) electronics assembly for test. Refer to the UUT/TPS/ interface device matrix tables in appendix B to determine the correct UUT test program number for the IVO electronics assembly. Then refer to the UUT test program for a list of cables, test equipment, and test accessories required to test the IVD electronics assembly.

6-2. UUT DESCRIPTION.

The IVD electronics assembly (figure 6-1) is an assembly containing 11 CCAs, a CRT, and associated electronic components. It mounts to the TADS lower optical relay column and provides the heads out display with control electronics and video.

6-3. PRECAUTIONS.

Observe the following precautions when testing the IVD electronics assembly:

a. Electric Shock. The IVD electronics assembly operates with a 16,000-volt potential on the C7-anode and a 4,000-volt focus voltage potential. During yoke alinement, it is possible to receive a deadly electric shock. Observe all warning notes on the VDT and on the illustrations in section IV when performing this procedure.

b. Component Damage. Components on the optical signal analyzer and on the IVD electronics assembly can be damaged when you place the IVD electronics assembly into the OSA or remove it. Observe all cautions on the illustrations in section IV when performing this action. The reticle glass can be damaged when inserting it into the IVD electronics assembly CRT screen area, and the high voltage connector cap can be damaged when tightening the adjacent connector. Use caution at all times when working with equipment.

6-3. PRECAUTIONS. (CONT)

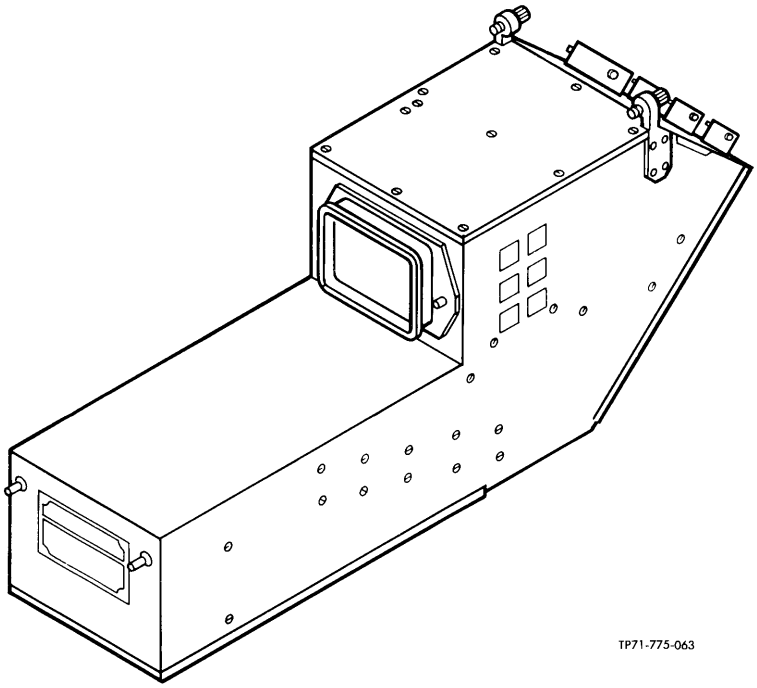


Figure 6-1. IVD Electronics Assembly

Section II. DESCRIPTION OF TEST

6-4. GENERAL.

This section describes the UUT test for the IVD electronics assembly. It includes an explanation of the way testing is accomplished, a description of the test, and pretesting data.

6-5. TEST CONCEPT.

The UUT test for the IVD electronics assembly is supplemented by procedures in section III of this chapter, and by illustrations in section IV. While you are performing the UUT test, message prompts on the VDT will direct you to perform one of the procedures in section III, or to refer to an illustration in section IV.

6-5. TEST CONCEPT. (CONT)

a. Procedures. Section III contains procedures to remove the IVO electronics assembly from shipping and storage container and to replace it in the container. These procedures do not apply to the UUT test until called for by the test program. At the appropriate time during the test, a message prompt on the VDT will direct you to perform a set of procedures in this section. At that time, turn to the referenced paragraph and perform those procedures, as the program cannot continue until they have been performed.

b. Illustrations. Section IV contains illustrations that supplement the UUT test procedures on the VDT. The procedures cannot be successfully accomplished unless you refer to the appropriate illustrations when directed by message prompts. In addition to showing you how to make an adjustment or locate a component, many of the illustrations contain explanatory data, cautions relating to equipment damage, and warnings relating to shock hazards. At the appropriate time during the UUT test, a message prompt will refer to an illustration in section IV. Turn to the referenced illustration for assistance while performing the following instructions on the VDT.

6-6. TEST DESCRIPTION.

Three kinds of tests are performed by the UUT test program. These tests are described below.

a. Electrical Test. The test program measures resistances, voltages, and time intervals of circuits inside the IVO electronics assembly.

b. Prealinement. The test program measures the size, centering, focus, and rotation of electronics assembly video at the 875 and 525 line rates. You are instructed to adjust any parameter that is out of tolerance.

c. E/O Algorithms. This is a depot measurement. The test program compares the values obtained in the pre-alinement tests with fixed values. CRT brightness is measured.

6-7. PRETESTING DATA.

At times, the UUT test program will appear to have stopped for up to 1 hour. This is because some portions of the program require this amount of time to execute. During these times, a prompt will appear on the VDT explaining that a program delay is in progress.

6-8. FINAL ACCEPTANCE.

When the IVD electronics assembly has been repaired, repeat the UUT test. If an ALL TESTS GO prompt is received at the end of the test, the IVD electronics assembly is considered to be fully operational.

Section III. TEST PROMPTED PROCEDURES

6-9. IVD ELECTRONICS ASSEMBLY REMOVAL FROM SHIPPING AND STORAGE CONTAINER.

WARNING

HEAVY OBJECT

- Excessive strain can cause serious injury.
- Don't: Attempt to lift or carry heavy objects alone.
- Do: Get help for lifting or carrying heavy objects.
- If you experience a sudden pain while lifting or discomfort after lifting, get medical help at once.

NOTE

Two people are required when performing this task.

a. Press container pressure relief valve (1, figure 6-2).

b. Open container latches (2).

c. Remove container lid (3) and set aside in a clean dry area.

d. Carefully remove IVD electronics assembly (4) from container.

CAUTION

EQUIPMENT DAMAGE

The black foam in the shipping container may dry rot over time creating a dust/powder/grit residue. A potential exists for abrasive damage to optics and mechanical assemblies and degradation of optical performance. Inspect and clean assemblies as required.

e. Inspect and remove any dust, black powder, or grit from IVD electronics assembly before testing.

f. Replace container lid on container and secure latches.

6-9. IVD ELECTRONICS ASSEMBLY REMOVAL FROM SHIPPING AND STORAGE CONTAINER. (CONT)

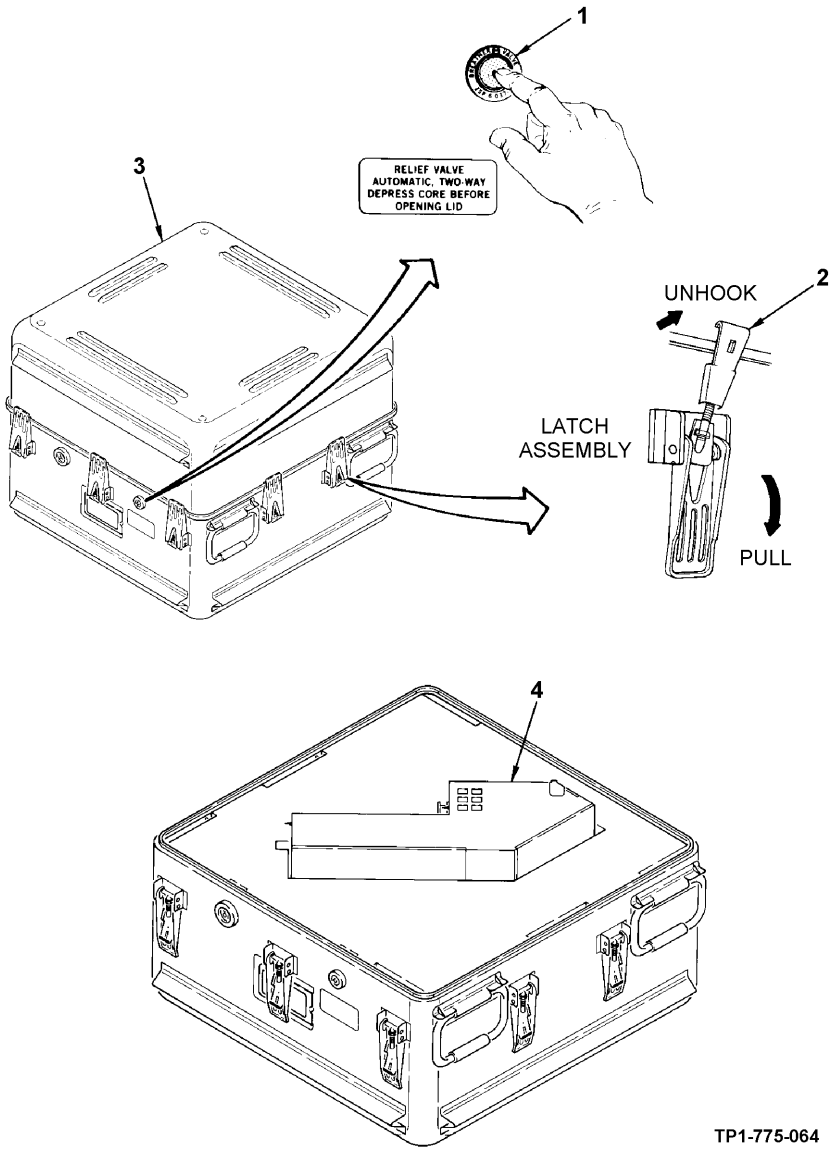


Figure 6-2. IVD Electronics Assembly Removal From Shipping and Storage Container

6-10. INSTALLATION OF IVD ELECTRONICS ASSEMBLY IN SHIPPING AND STORAGE CONTAINER.

WARNING

HEAVY OBJECT

- Excessive strain can cause serious injury.
- Don’t: Attempt to lift or carry heavy objects alone.
- Do: Get help for lifting or carrying heavy objects.
- If you experience a sudden pain while lifting or discomfort after lifting, get medical help at once.

NOTE

Two people are required when performing this task.

a. Open container latches (1, figure 6-3).

b. Remove container lid (2) and set aside in a clean dry area.

c. Carefully lower IVD electronics assembly (3) into container

d. Replace container lid on container and secure latches.

6-10. INSTALLATION OF IVD ELECTRONICS ASSEMBLY IN SHIPPING AND STORAGE CONTAINER. (CONT)

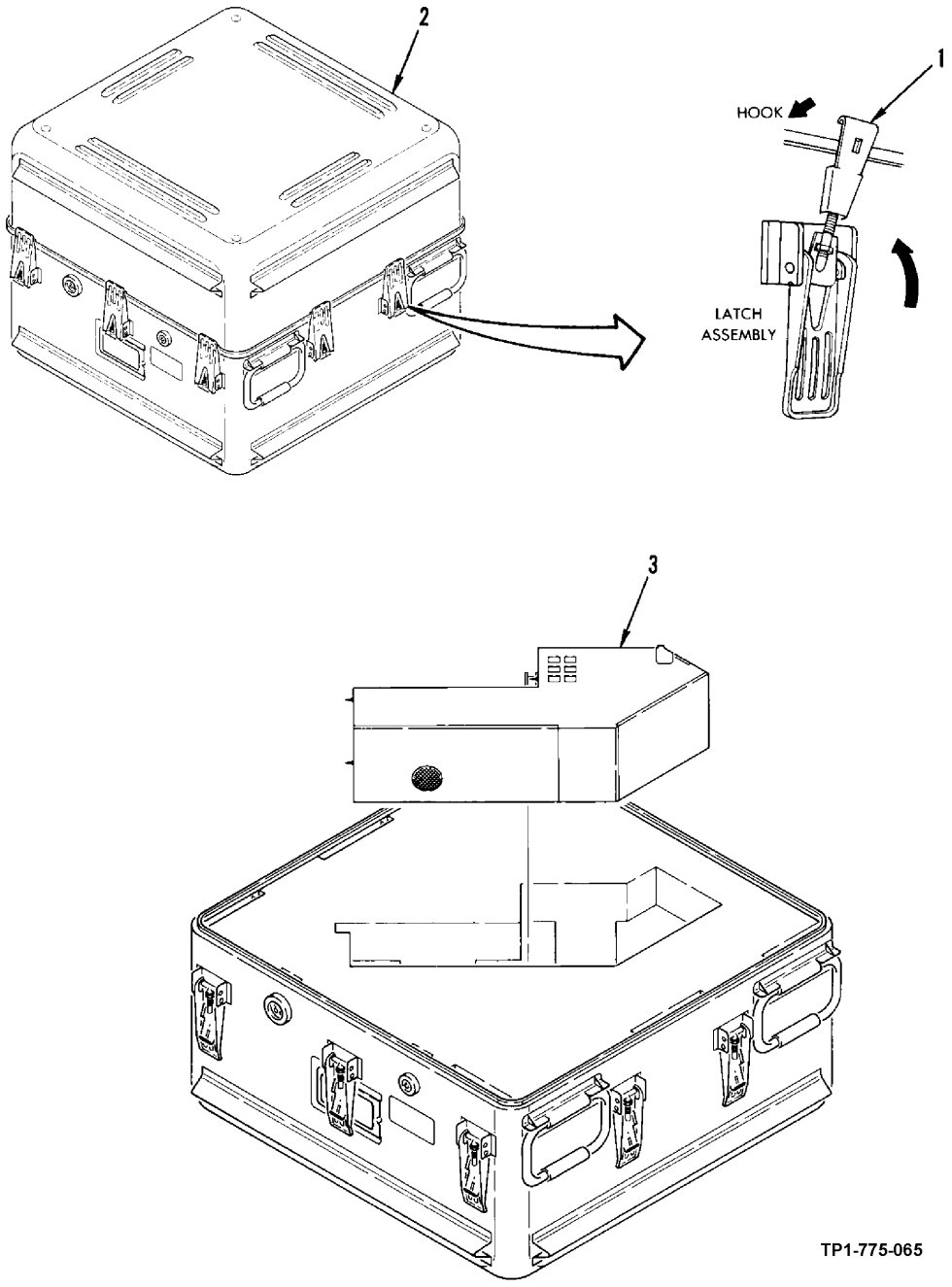


Figure 6-3. IVD Electronics Assembly Installation into Shipping and Storage Container

Section IV. TEST PROMPTED REFERENCES

6-11. GENERAL.

This section contains illustrations to be referred to while you are performing the UUT test. When the UUT test program directs you to refer to an illustration in this manual, locate the illustration and refer to it for assistance while you perform the following instructions on the VDT.

6-11. GENERAL. (CONT)

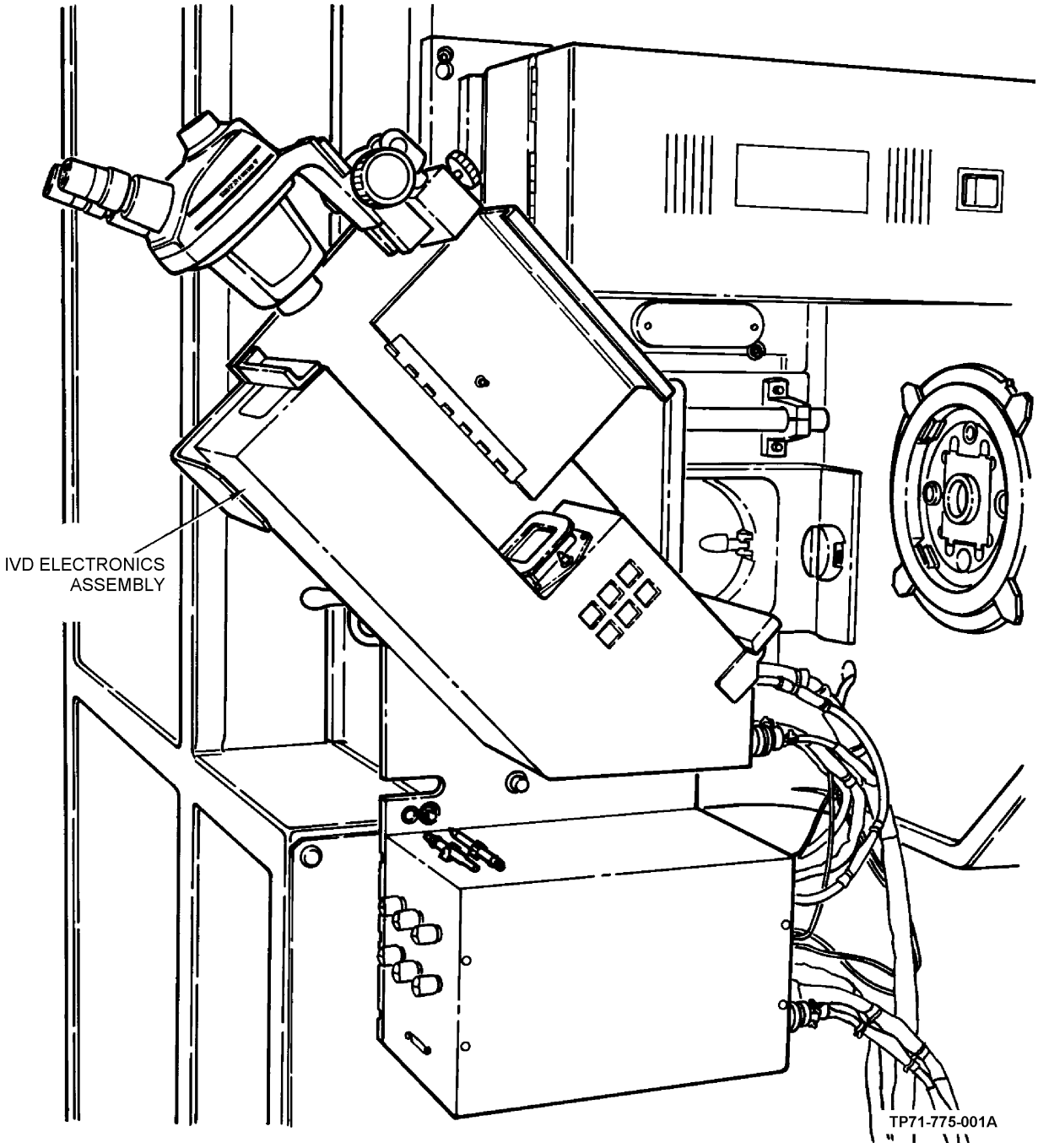


Figure 6-4. IVD Electronics Assembly Installation

6-11. GENERAL. (CONT)

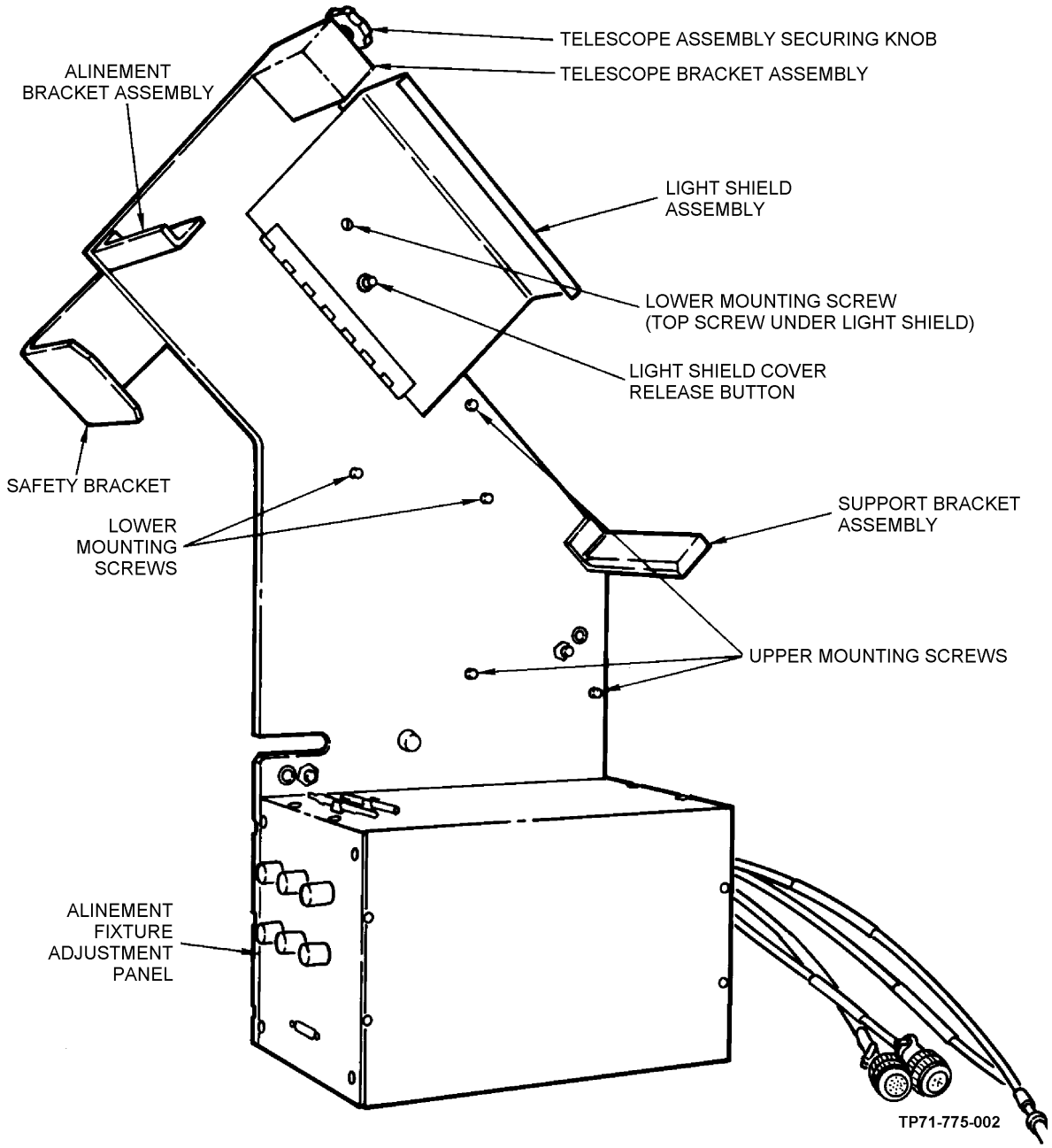


Figure 6-5. Optical Alinement Assembly (Without Power Pod Installed)

6-11. GENERAL. (CONT)

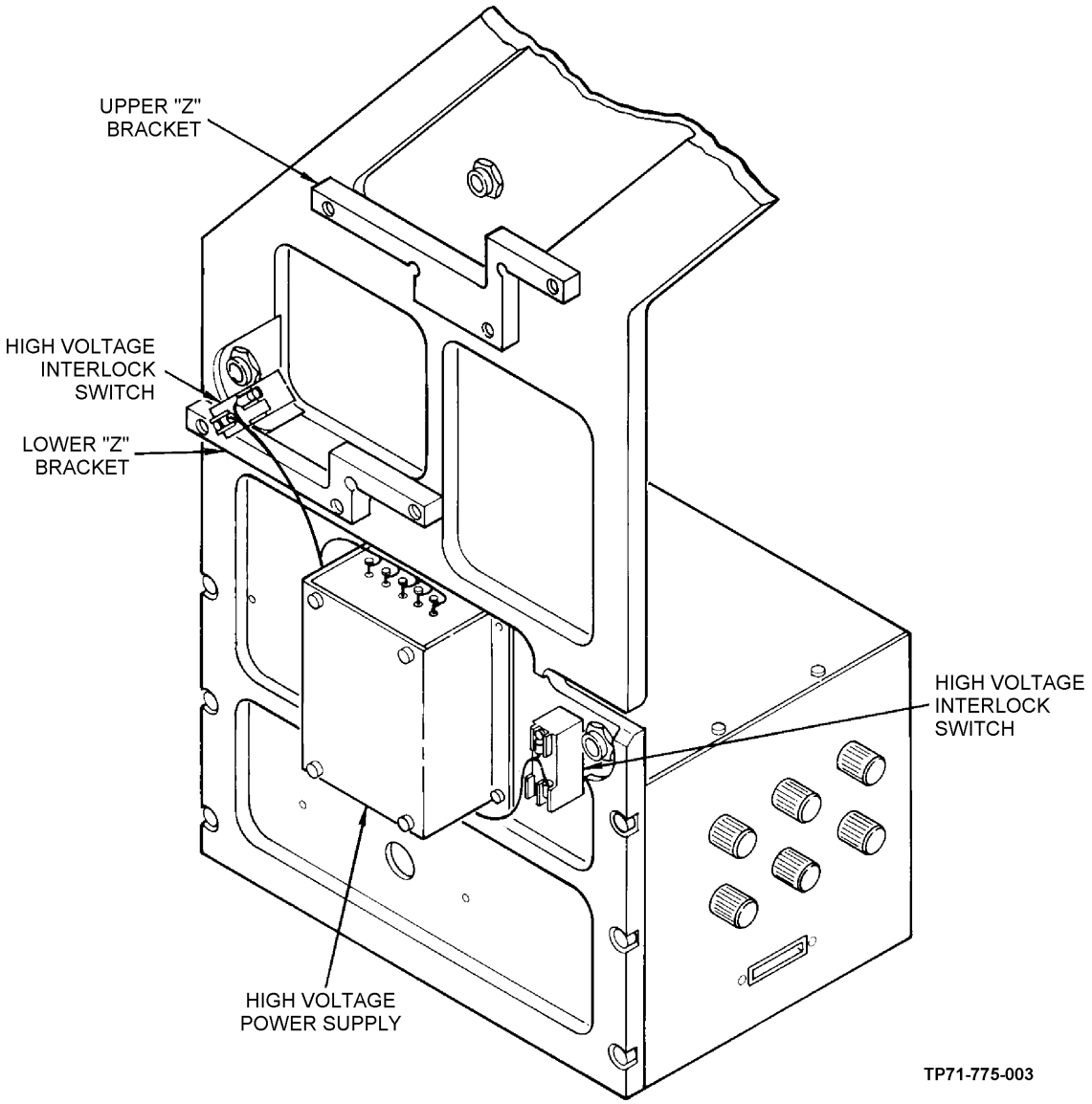


Figure 6-6. Optical Alinement Assembly (Rear View)

6-11. GENERAL. (CONT)

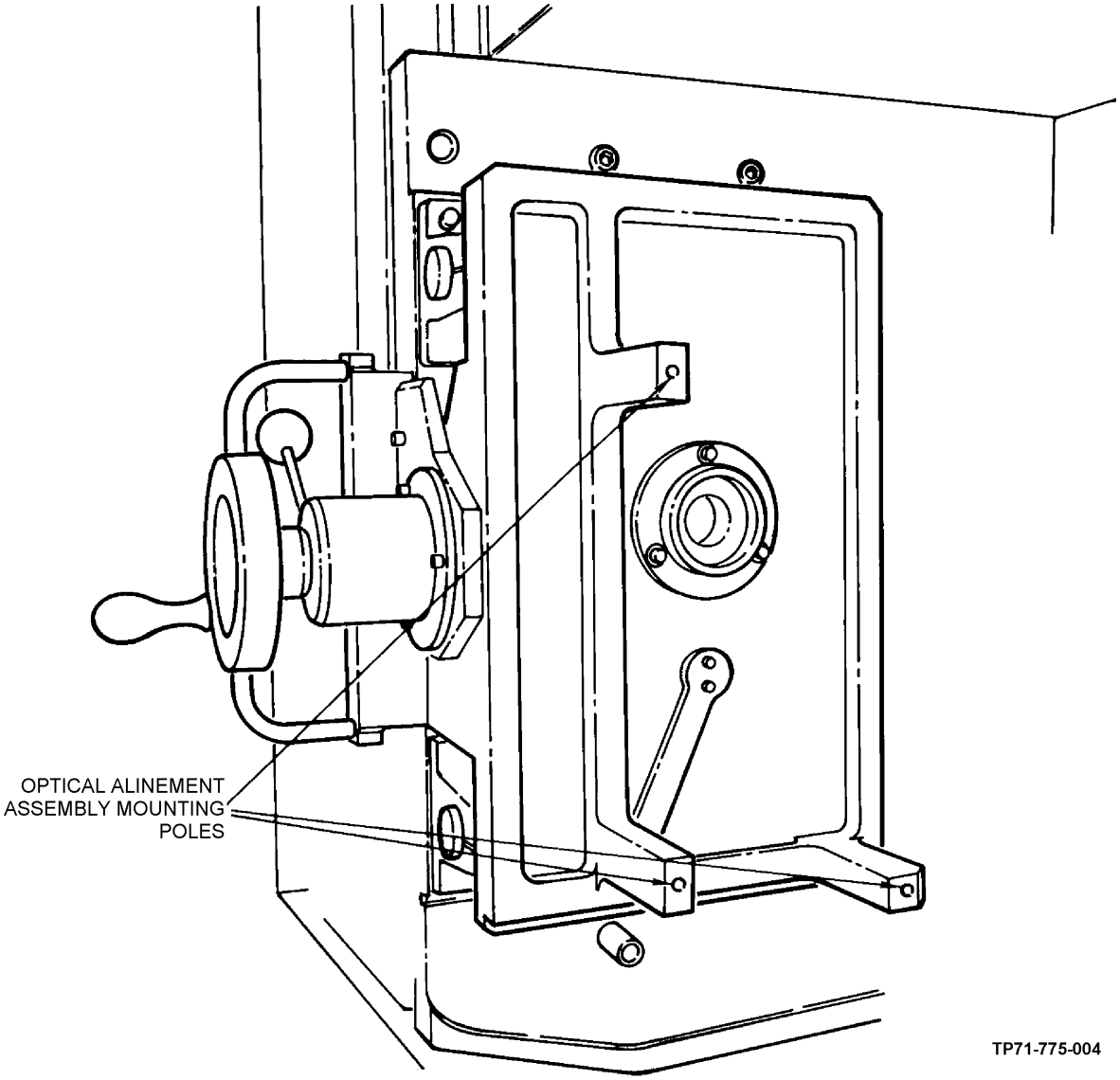


Figure 6-7. Dayside Sensor Mount Assembly Support Hole Locations

6-11. GENERAL. (CONT)

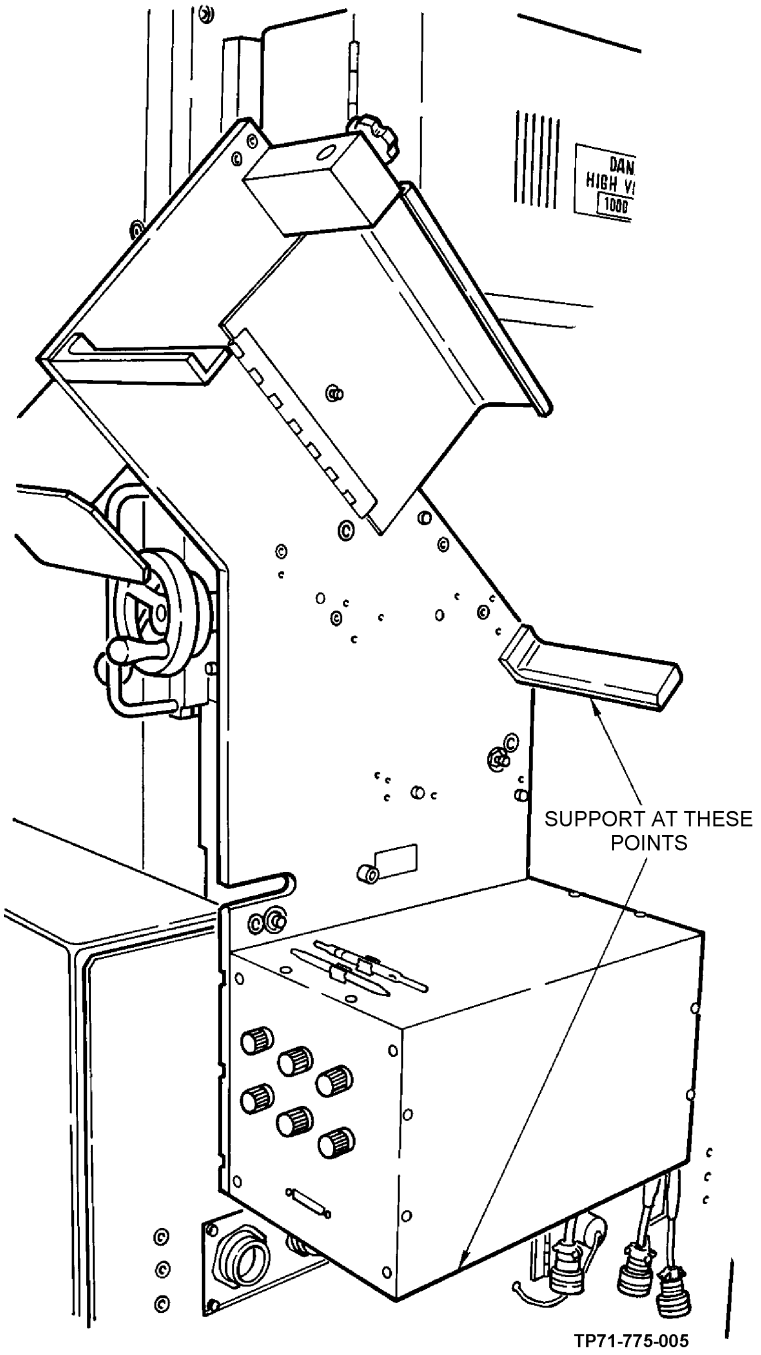


Figure 6-8. Optical Alinement Assembly Installation

6-11. GENERAL. (CONT)

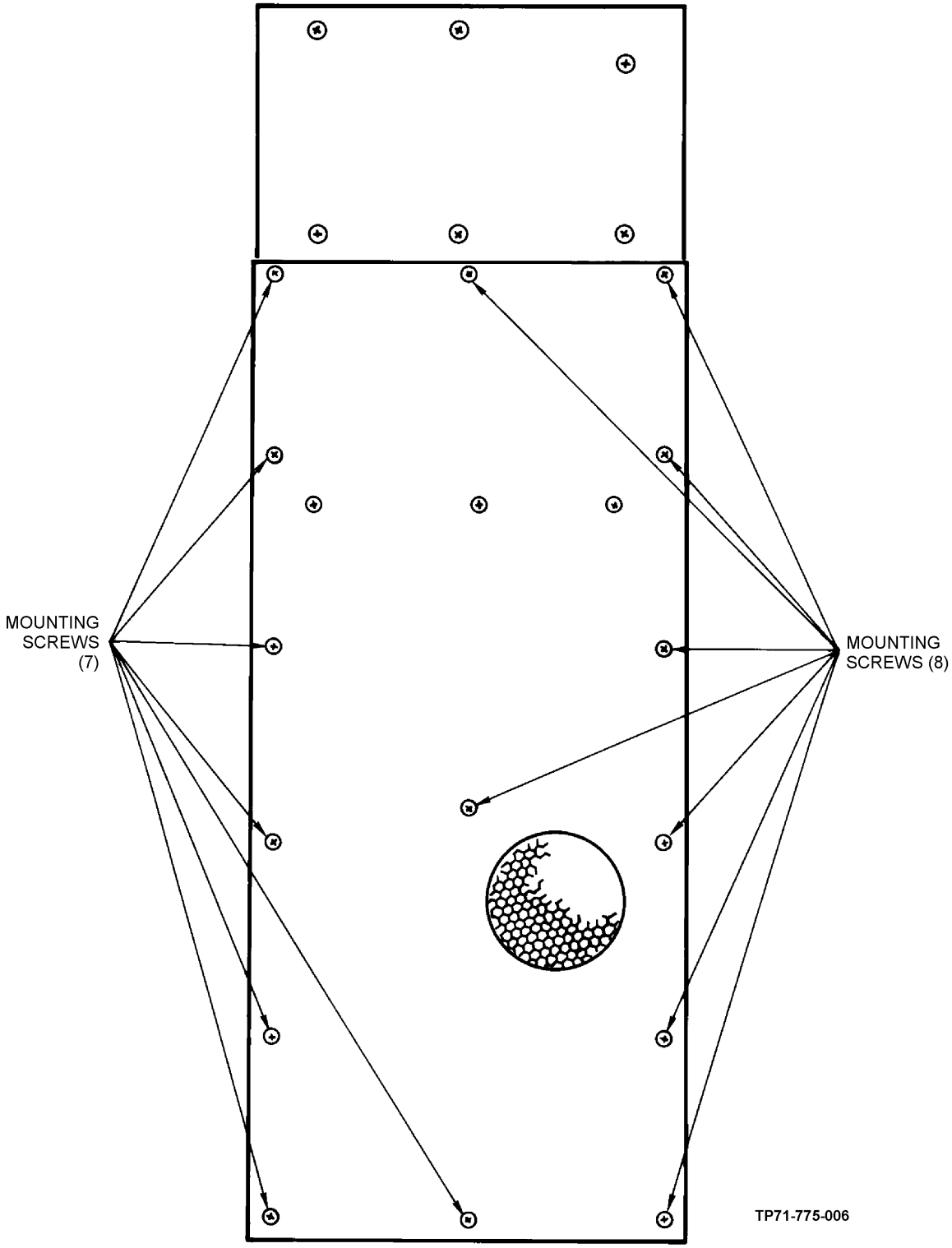


Figure 6-9. IVD Electronics Assembly Bottom Cover

6-11. GENERAL. (CONT)

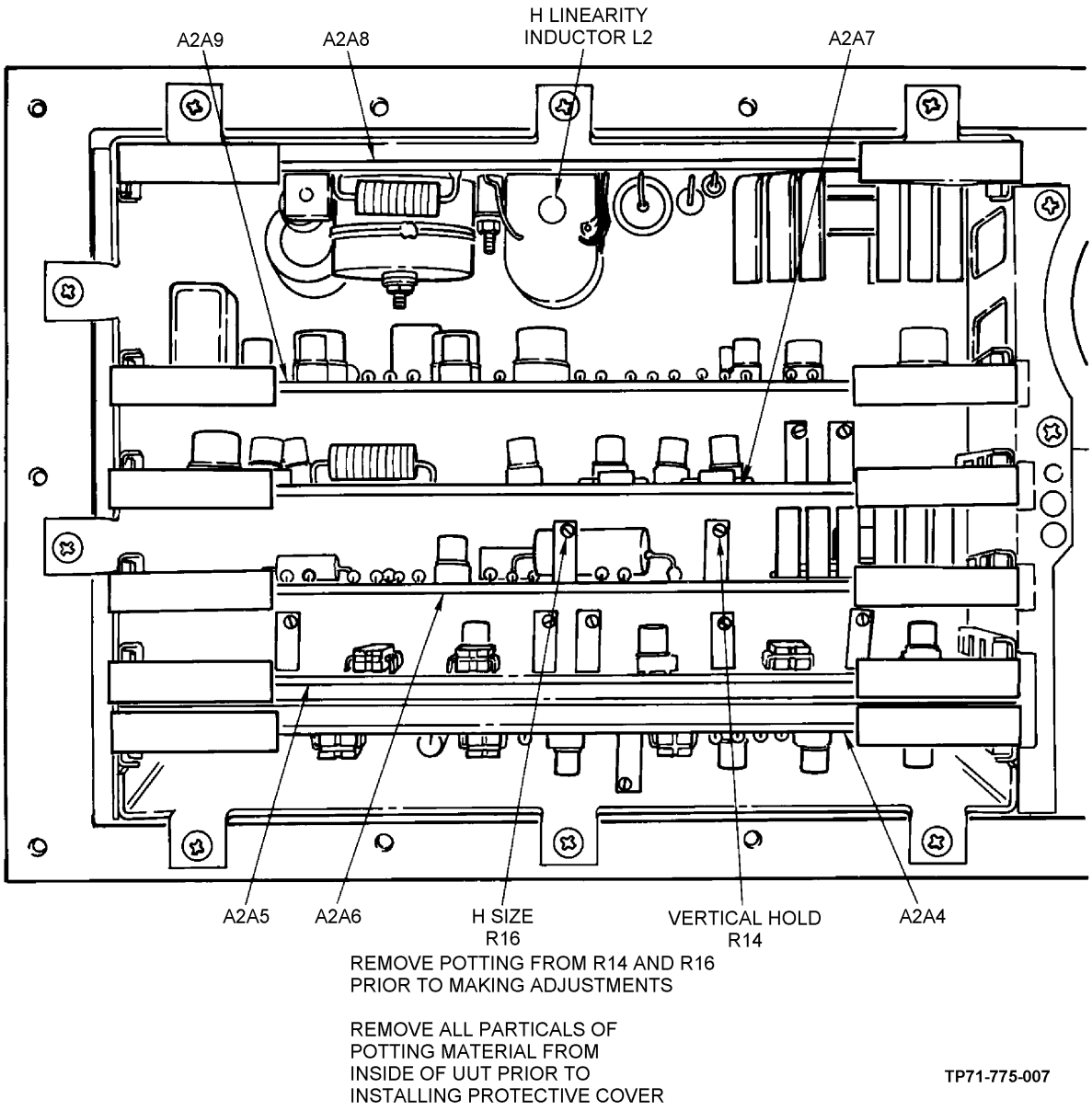


Figure 6-10. IVD Electronics Assembly Component Locations

6-11. GENERAL. (CONT)

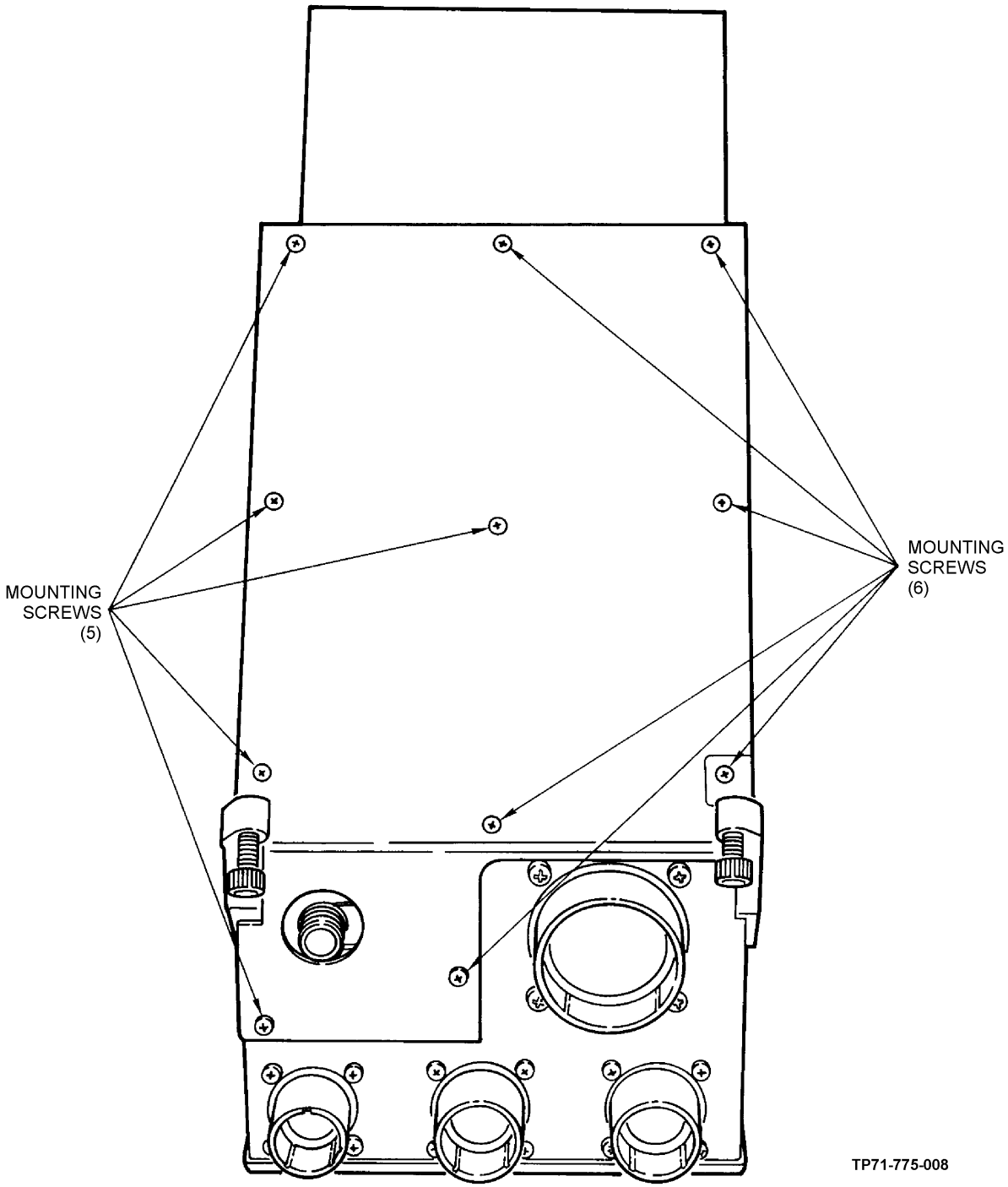


Figure 6-11. IVD Electronics Assembly Top Cover

6-11. GENERAL. (CONT)

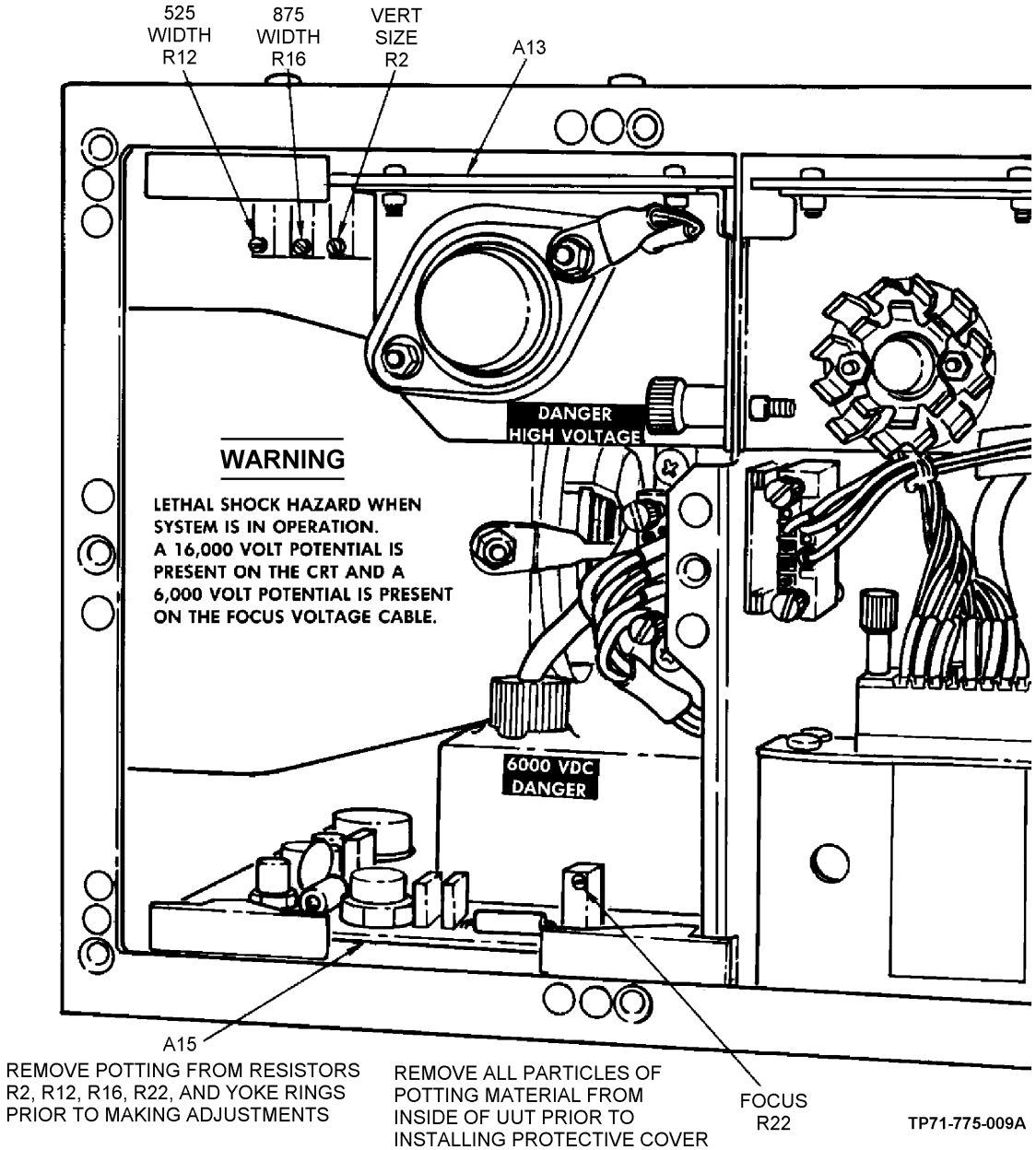


Figure 6-12. IVD Electronics Assembly Component Locations

6-11. GENERAL. (CONT)

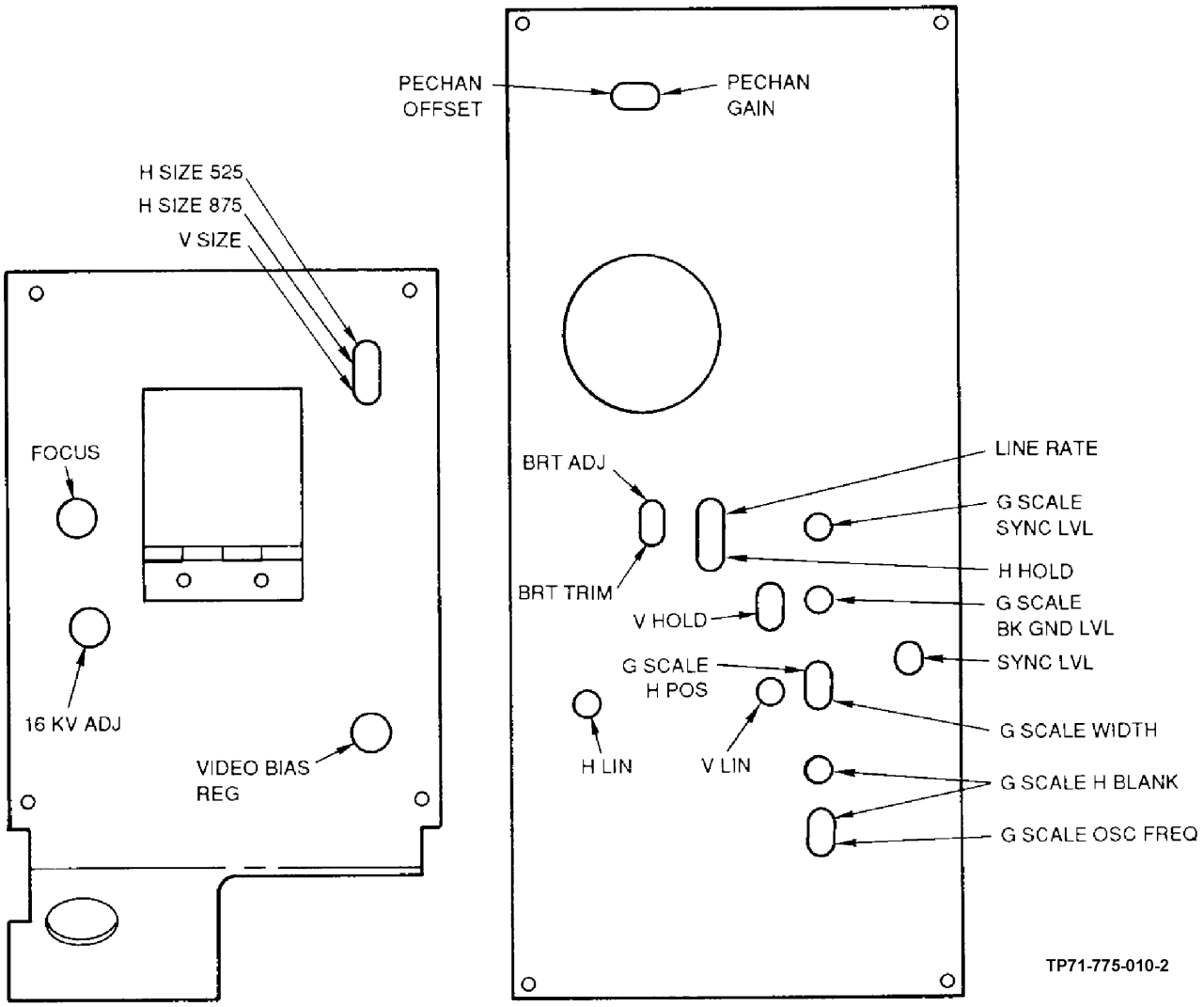


Figure 6-13. Upper and Lower IVD Protective Cover Assemblies

6-11. GENERAL. (CONT)

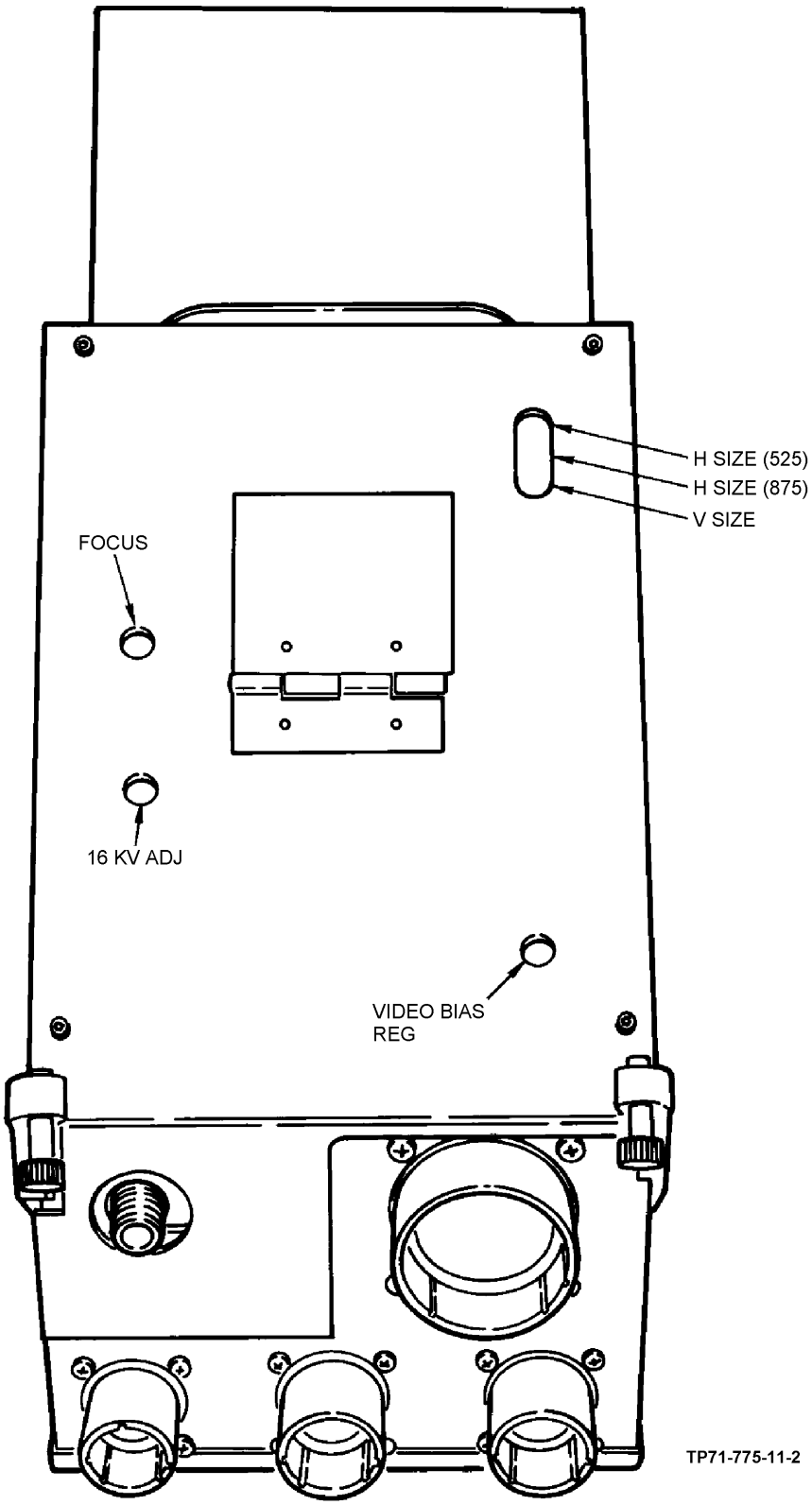


Figure 6-14. IVD Electronics Assembly With Upper IVD Protective Cover Assembly Installed

6-11. GENERAL. (CONT)

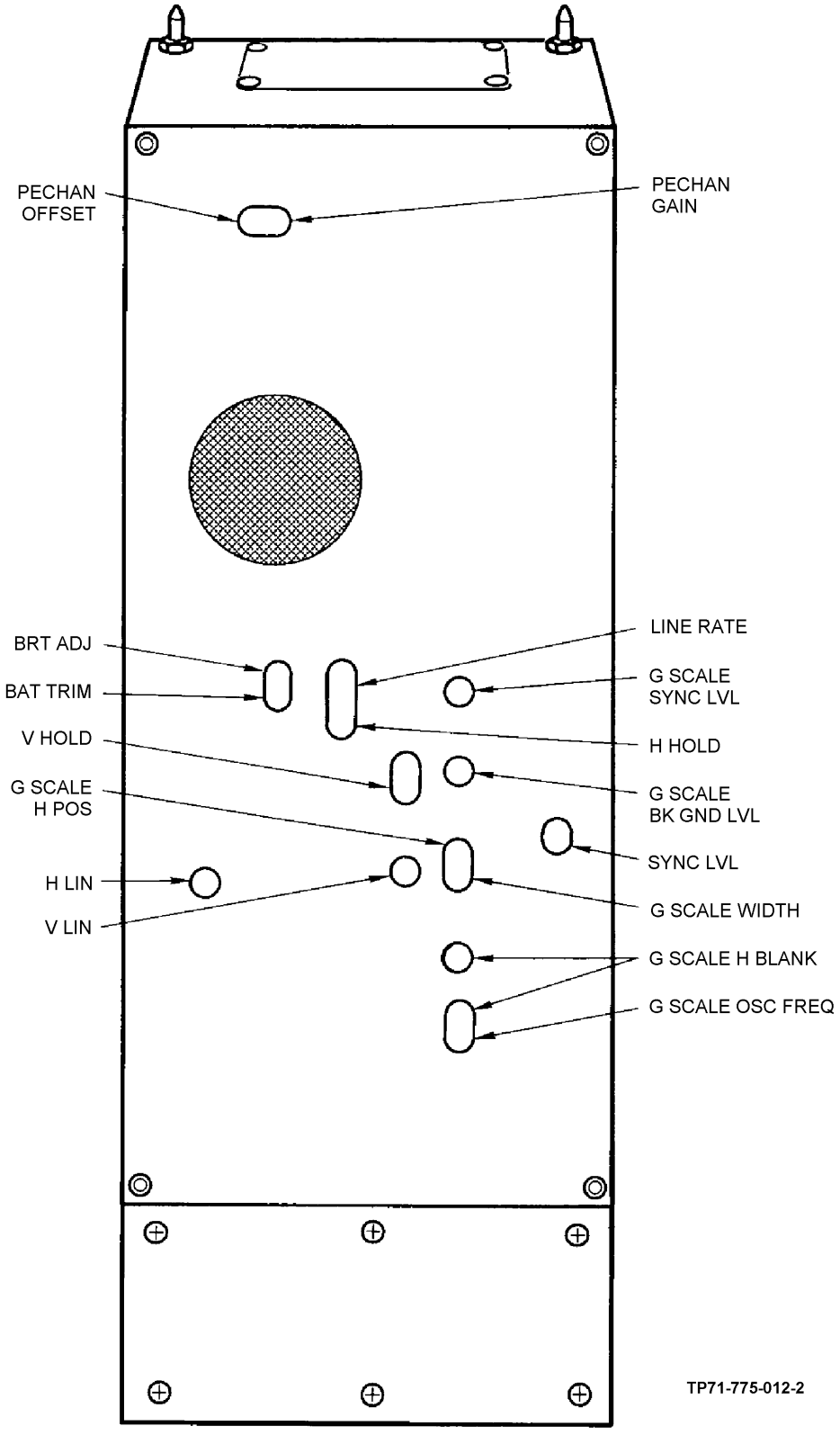


Figure 6-15. IVD Electronics Assembly With Lower IVD Protective Cover Assembly Installed

6-11. GENERAL. (CONT)

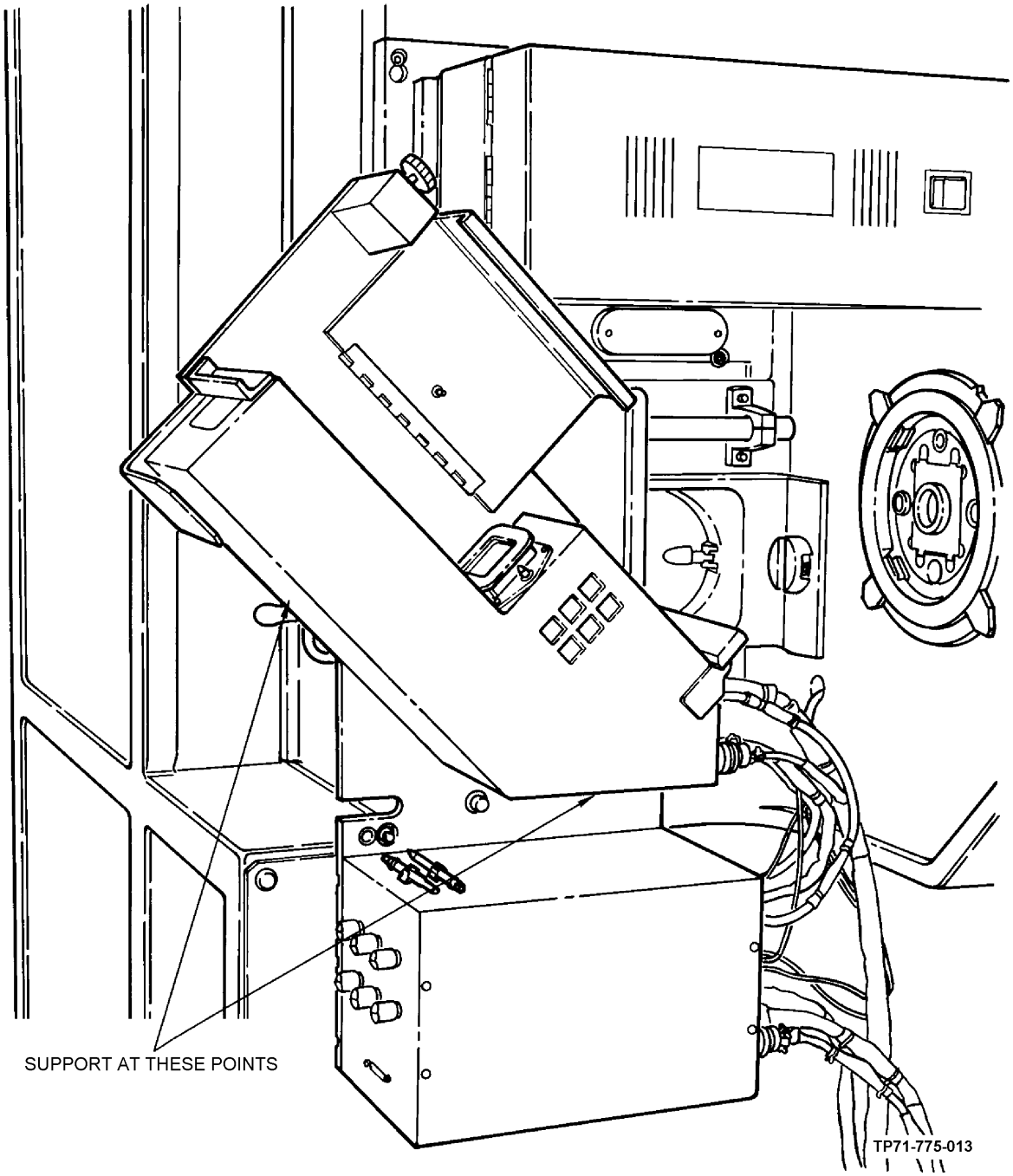


Figure 6-16. IVD Electronics Assembly Installation Support Points

6-11. GENERAL. (CONT)

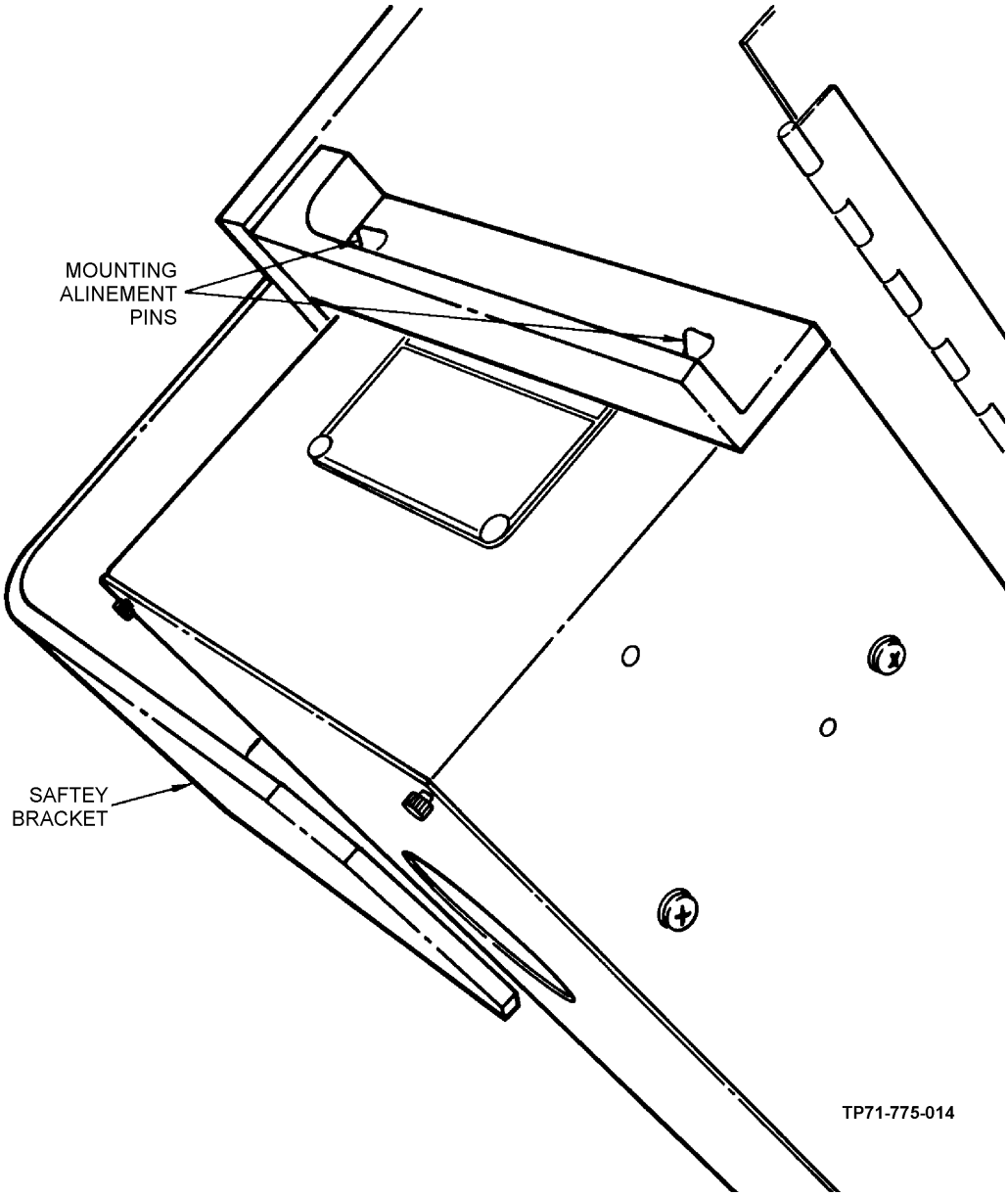


Figure 6-17. IVD Electronics Assembly Installation (Forward View)

6-11. GENERAL. (CONT)

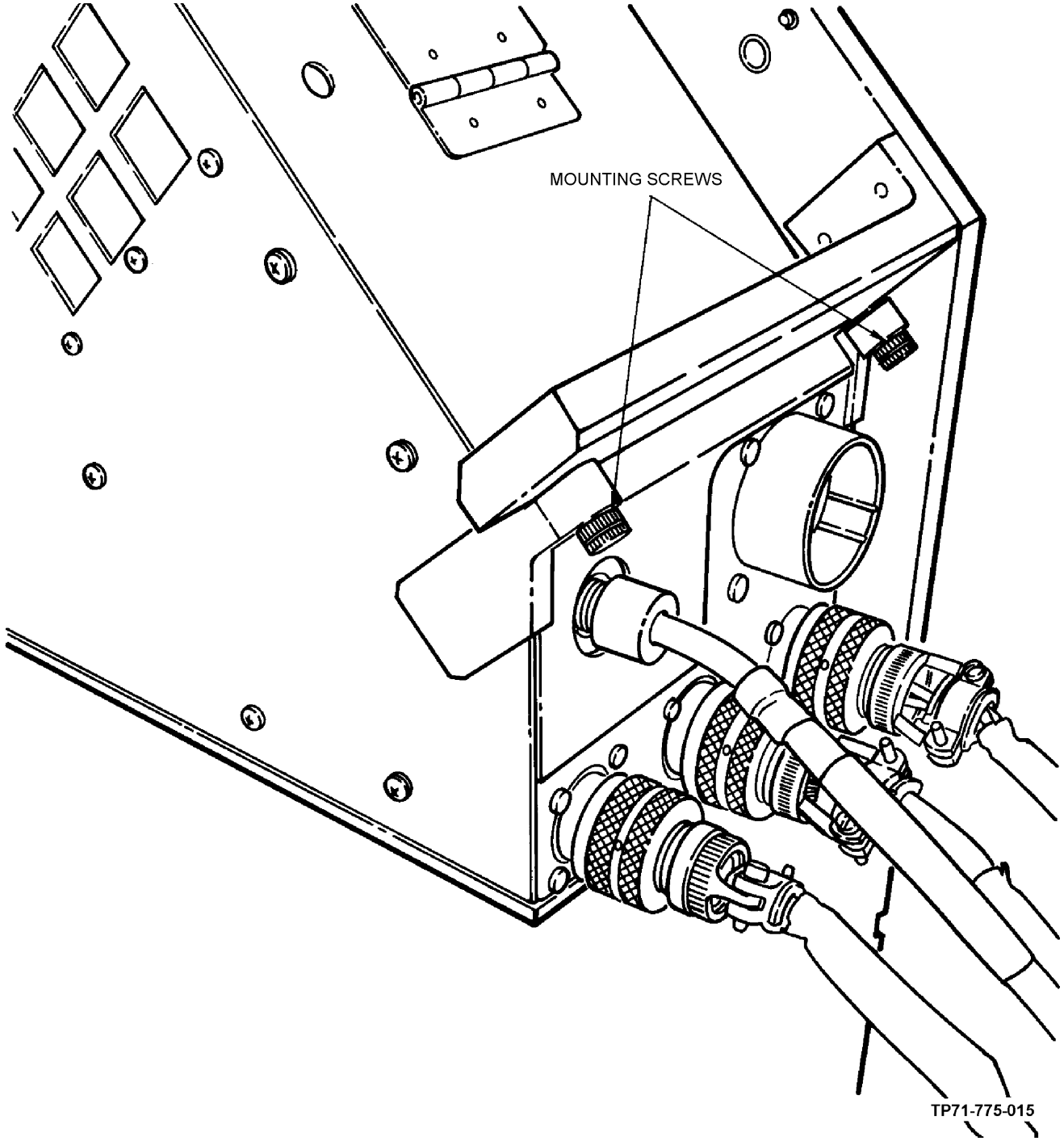


Figure 6-18. IVD Electronics Assembly Installation (Rear View)

6-11. GENERAL. (CONT)

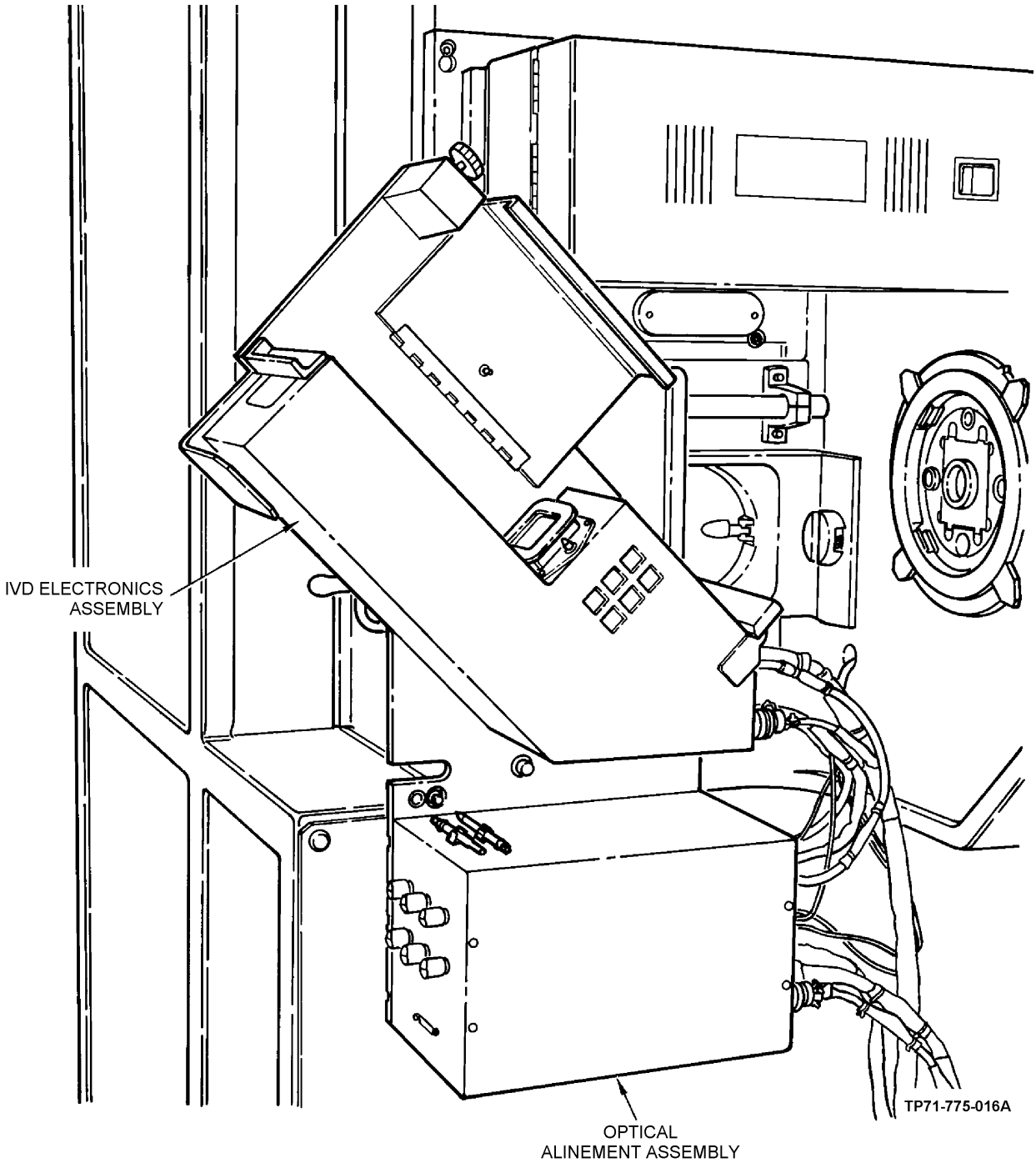


Figure 6-19. IVD Electronics Assembly Installed on Optical Alinement Assembly

6-11. GENERAL. (CONT)

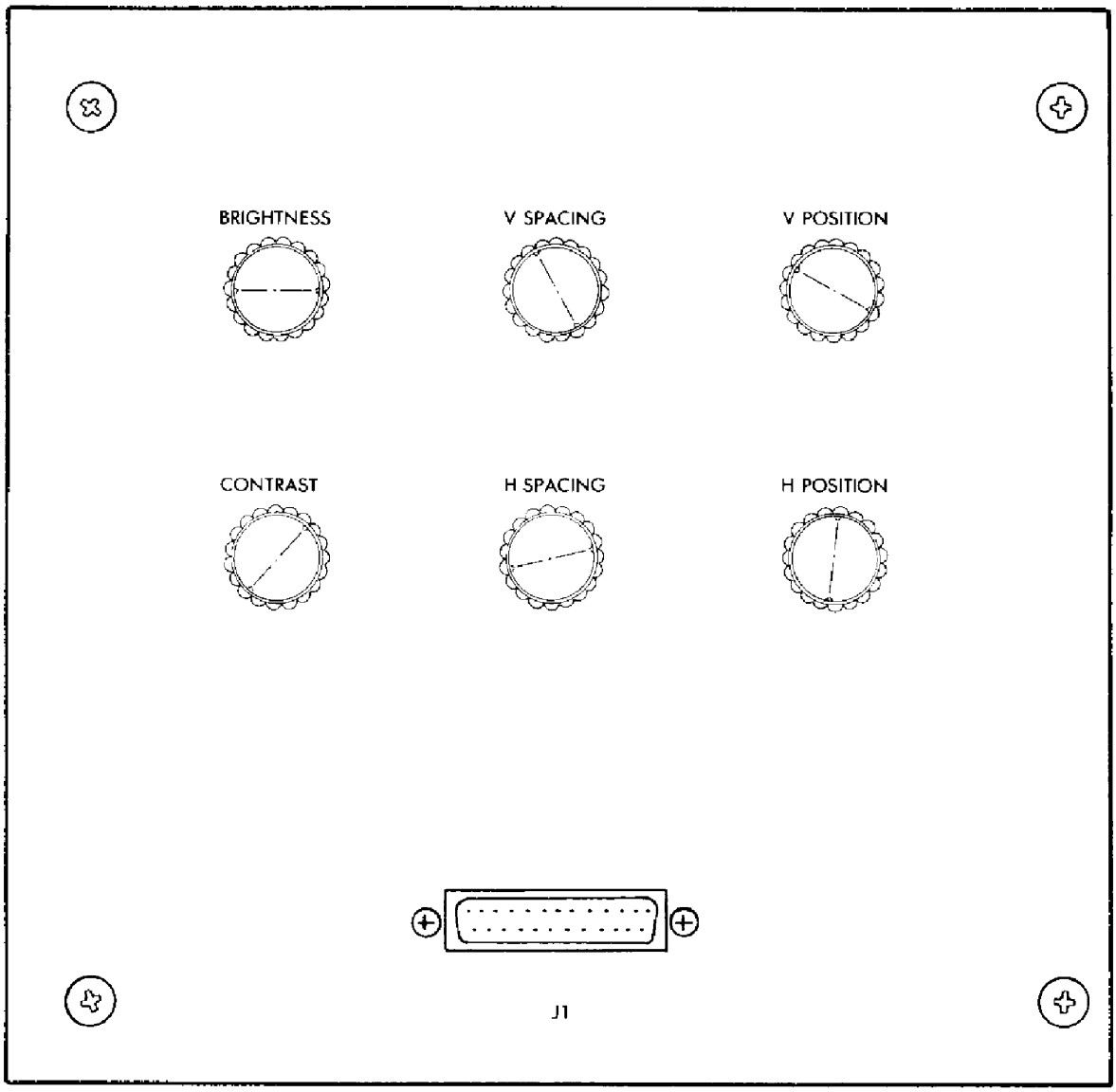


Figure 6-20. Optical Alinement Assembly CRT Controls

6-11. GENERAL. (CONT)

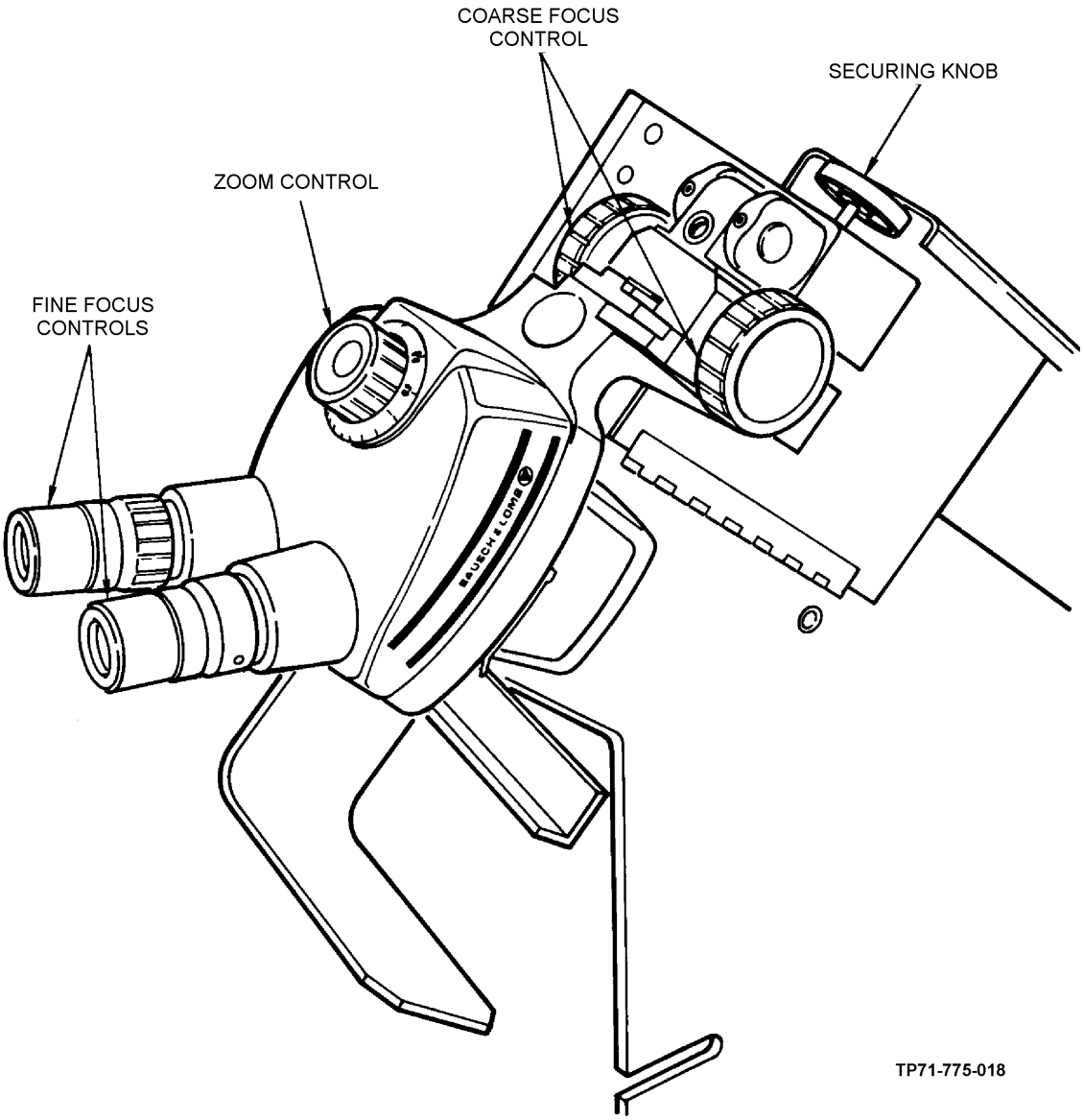


Figure 6-21. Power Pod Assembly (Microscope) Adjustment Locations

6-11. GENERAL. (CONT)

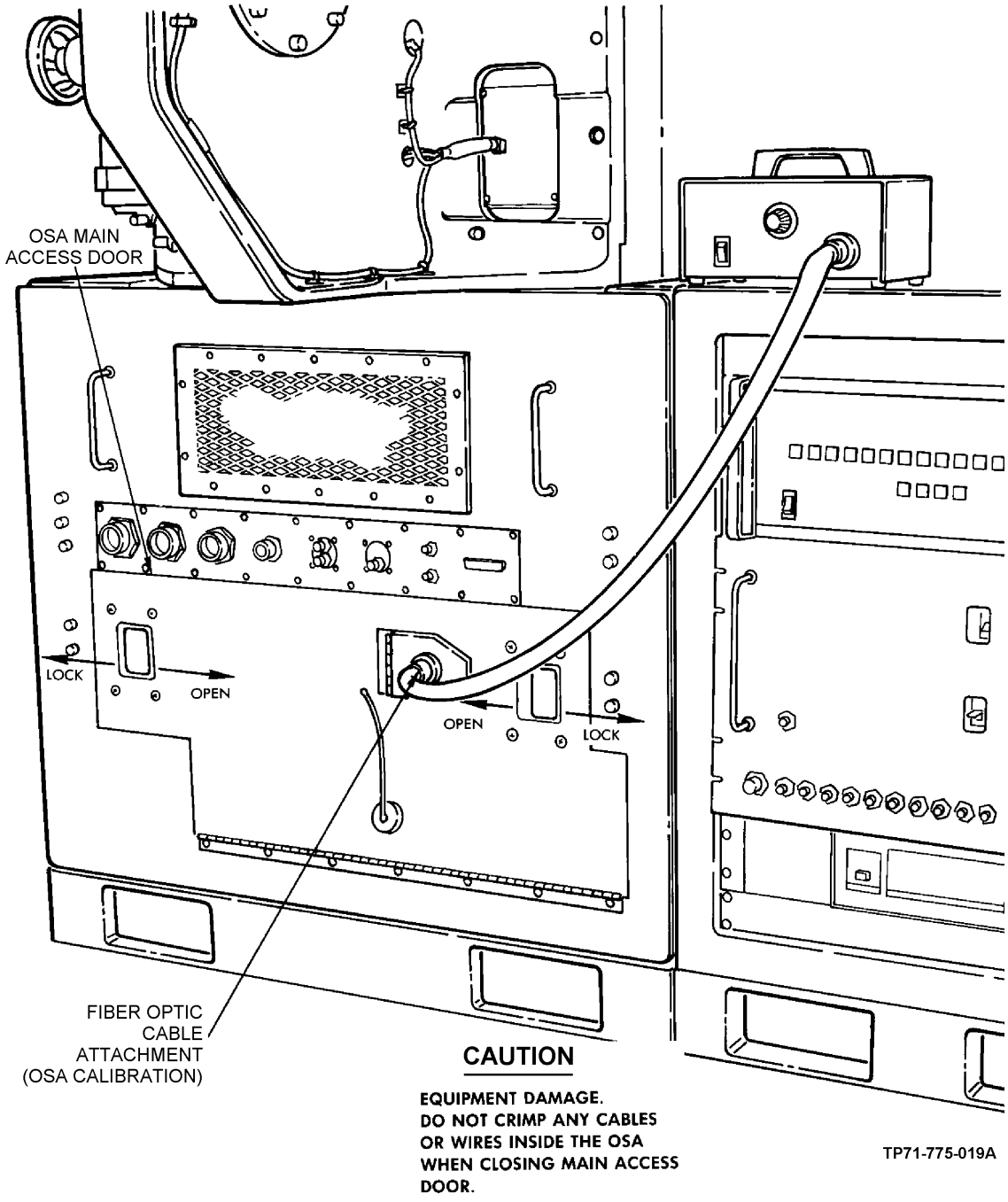


Figure 6-22. Optical Signal Analyzer Door Locations

6-11. GENERAL. (CONT)

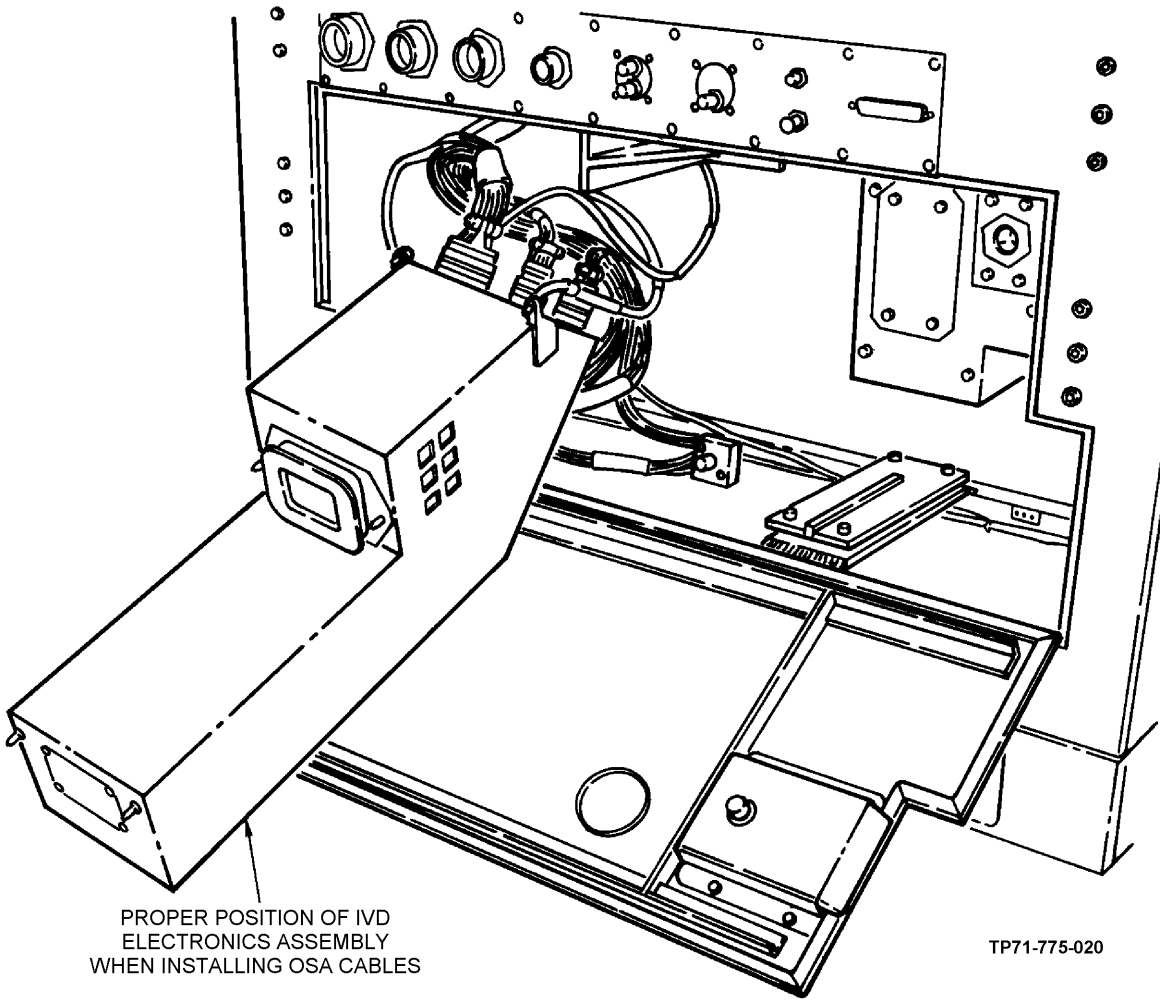


Figure 6-23. IVD Electronics Assembly OSA Connector View

6-11. GENERAL. (CONT)

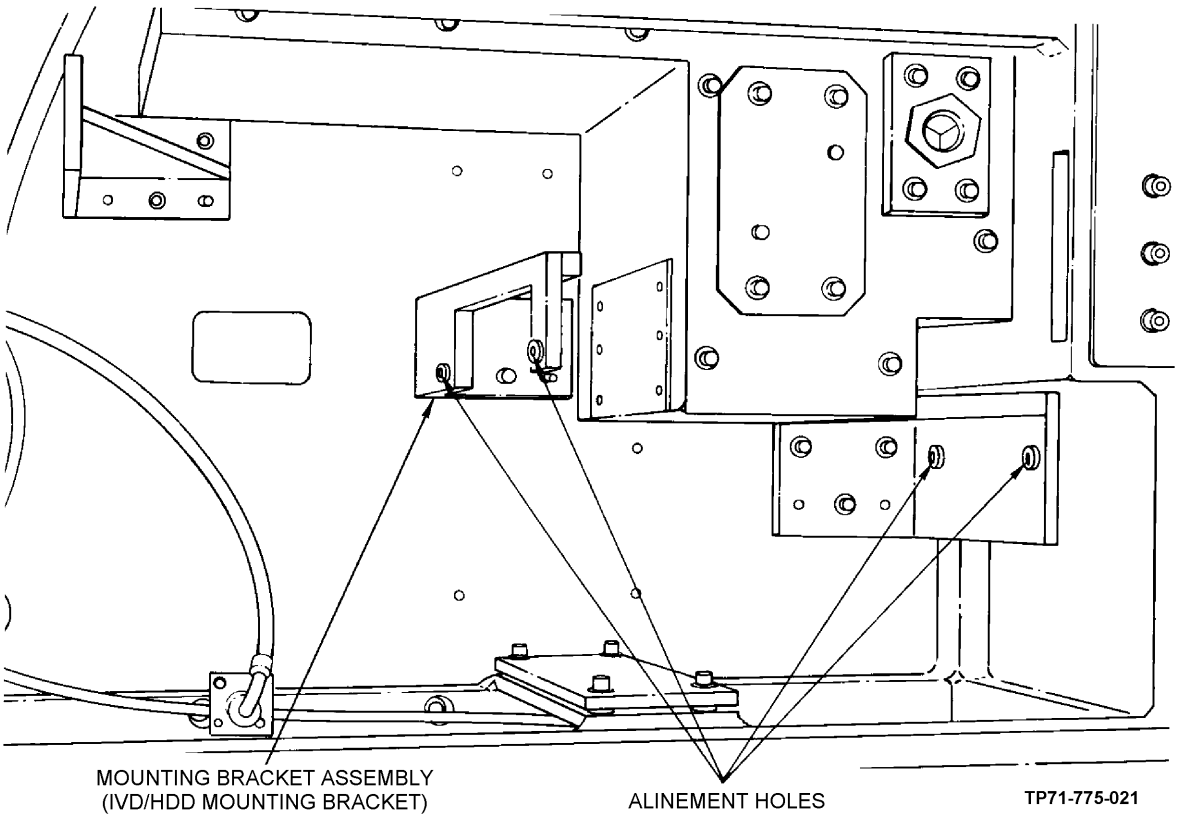


Figure 6-24. OSA IVD Electronics Assembly Mounting Bracket Positions

6-11. GENERAL. (CONT)

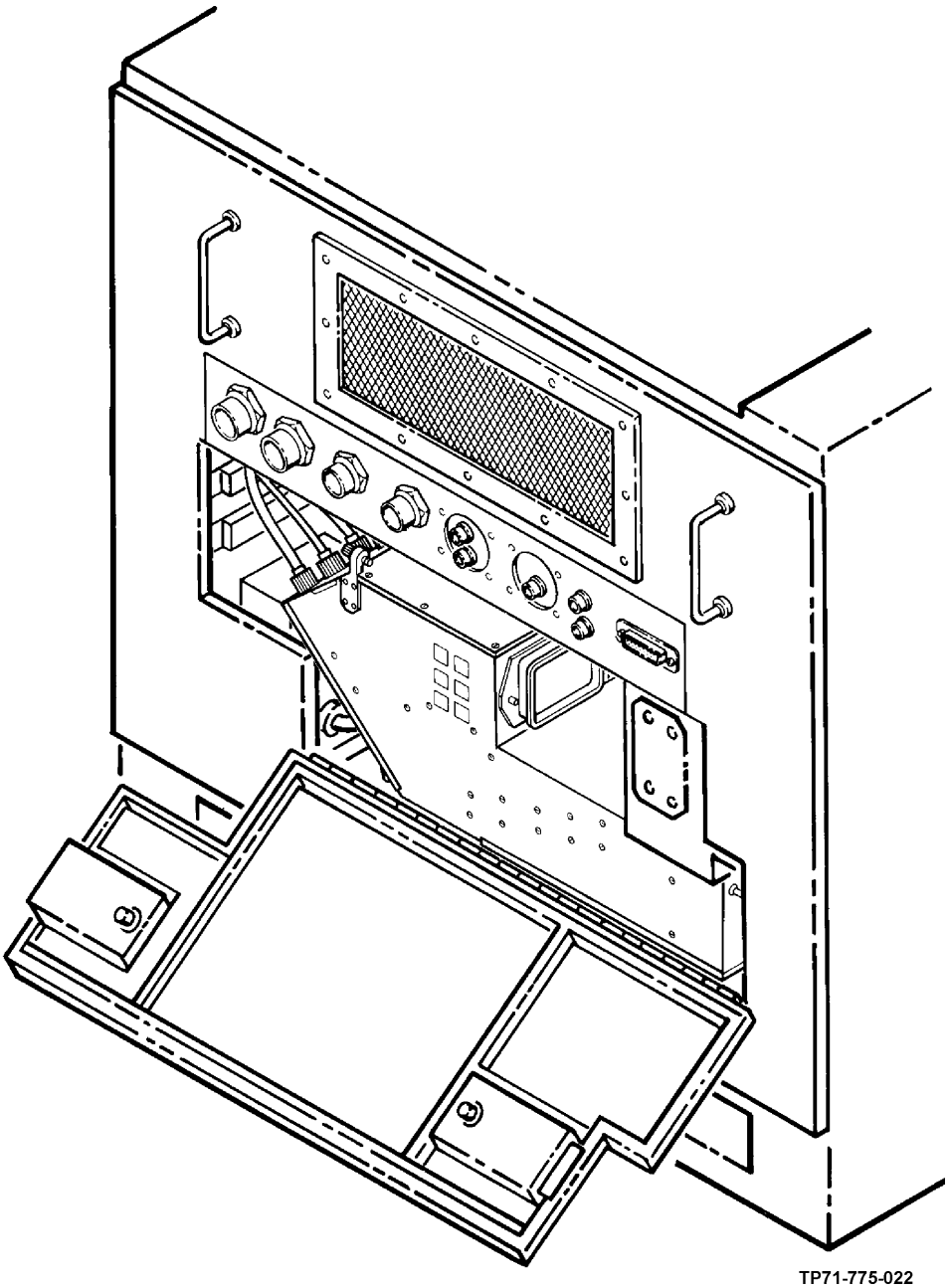


Figure 6-25. IVD Electronics Assembly Properly Installed

6-11. GENERAL. (CONT)

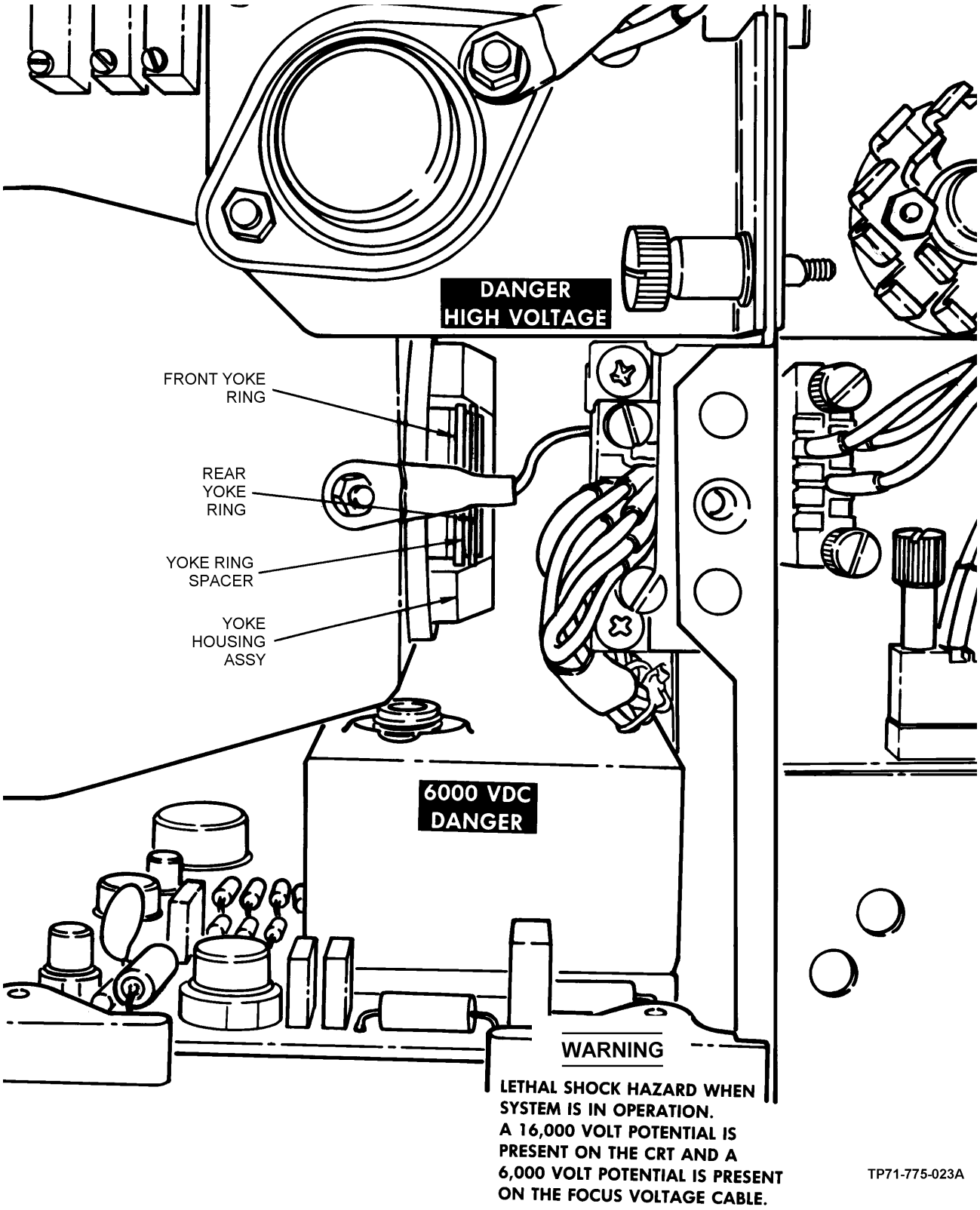


Figure 6-26. IVD Electronics Assembly Yoke Alinement Locations

6-11. GENERAL. (CONT)

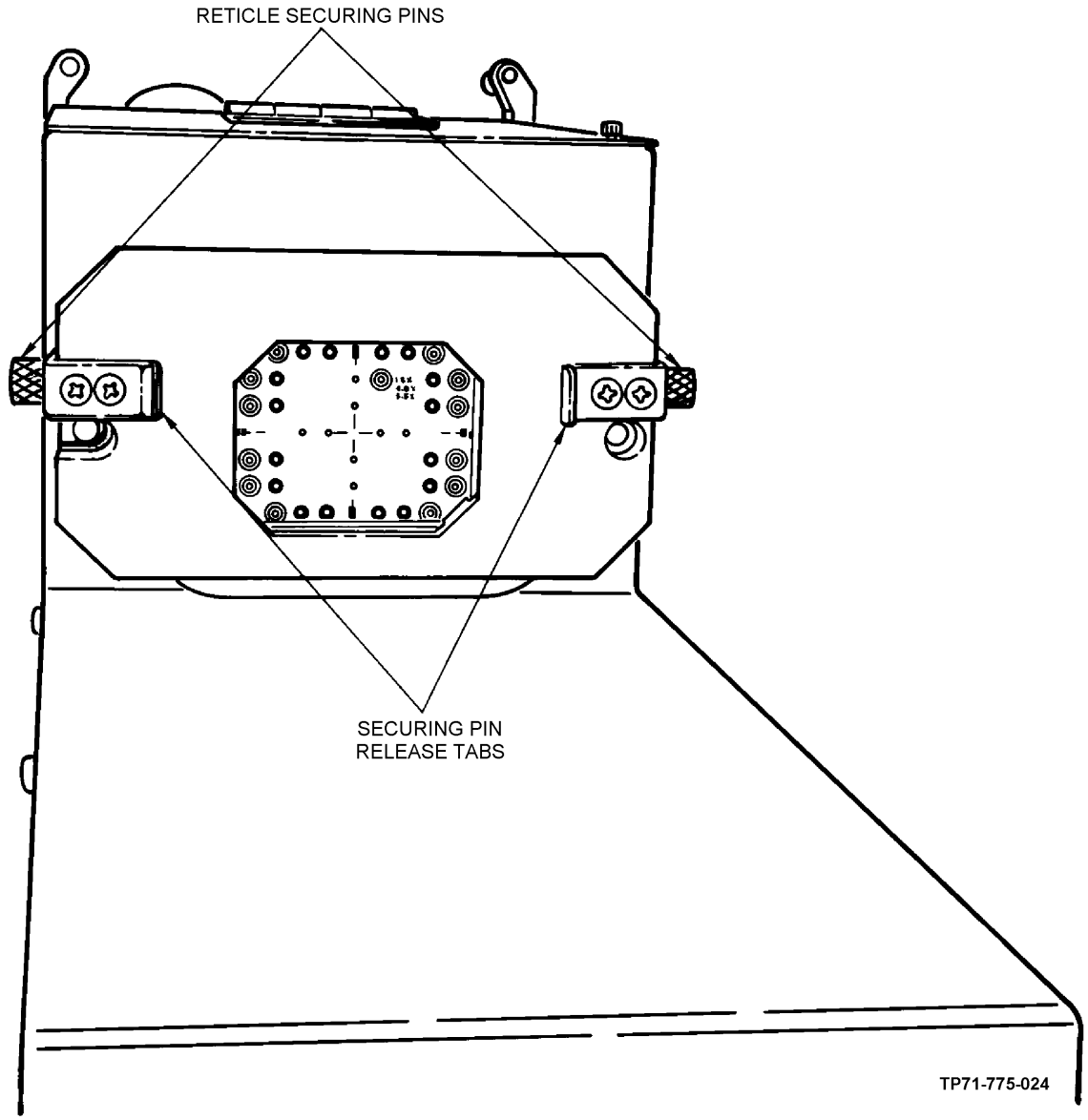


Figure 6-27. IVD Electronics Assembly Reticle Installation

6-11. GENERAL. (CONT)

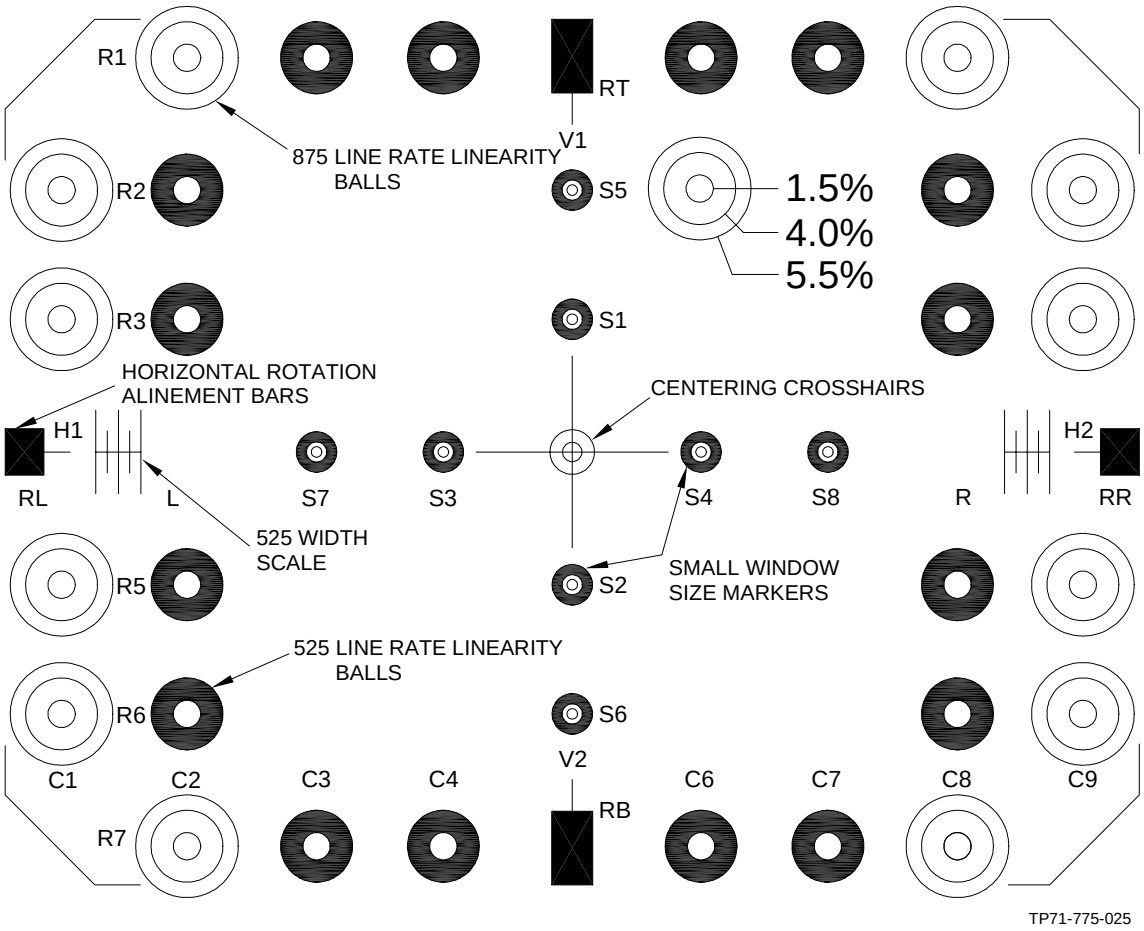


Figure 6-28. Reticle Pattern Descriptions

6-11. GENERAL. (CONT)

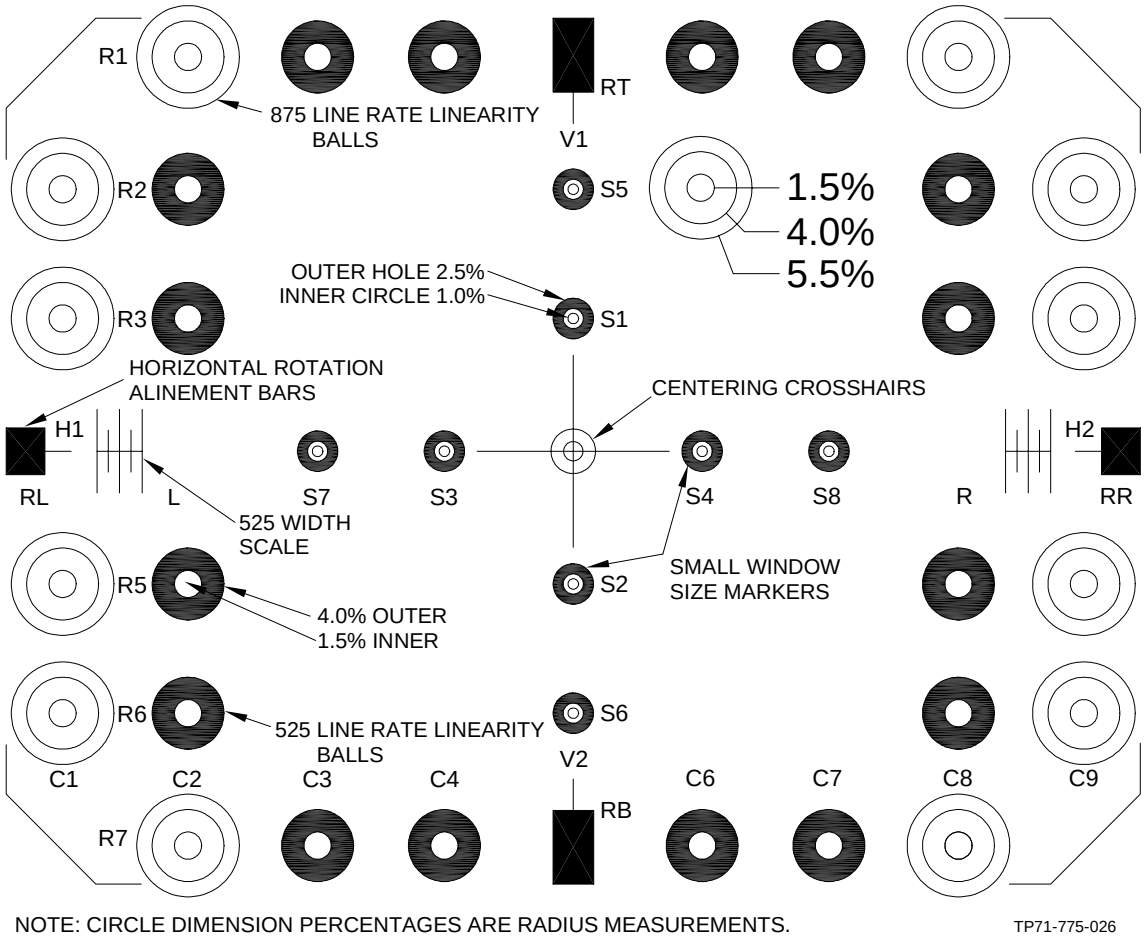


Figure 6-29. Reticle Pattern Dimensions

Figure 6-30. IVD Electronics Assembly CRT Display - Vertical Hold Problem

6-11. GENERAL. (CONT)

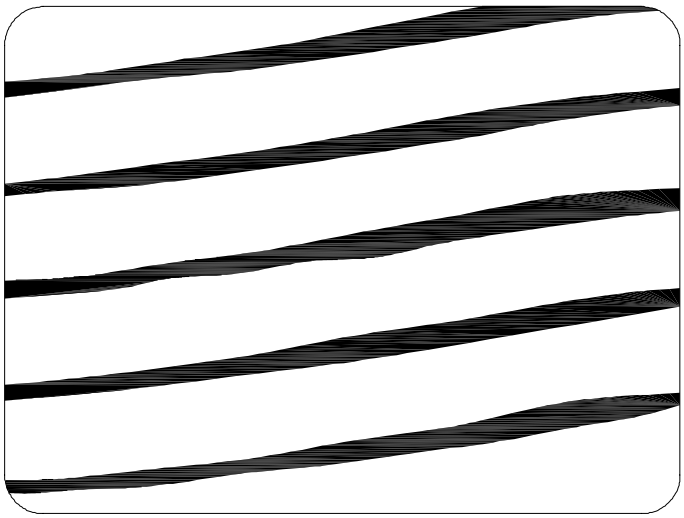


Figure 6-31. IVD Electronics Assembly CRT Display - Horizontal Hold Problem

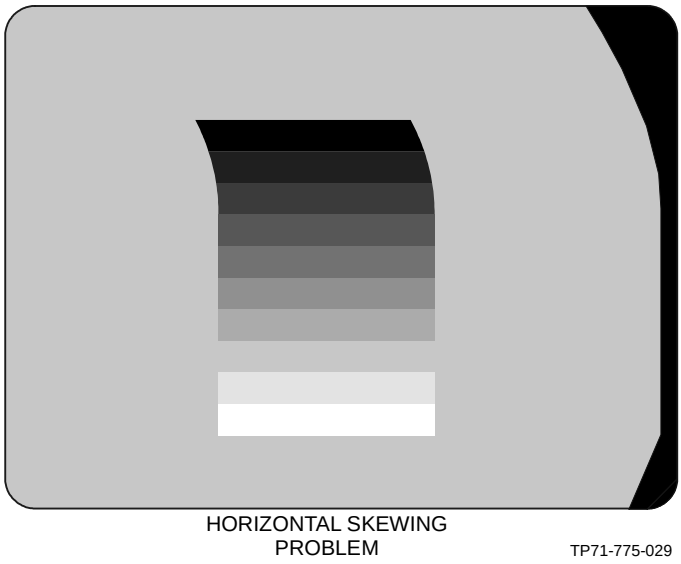
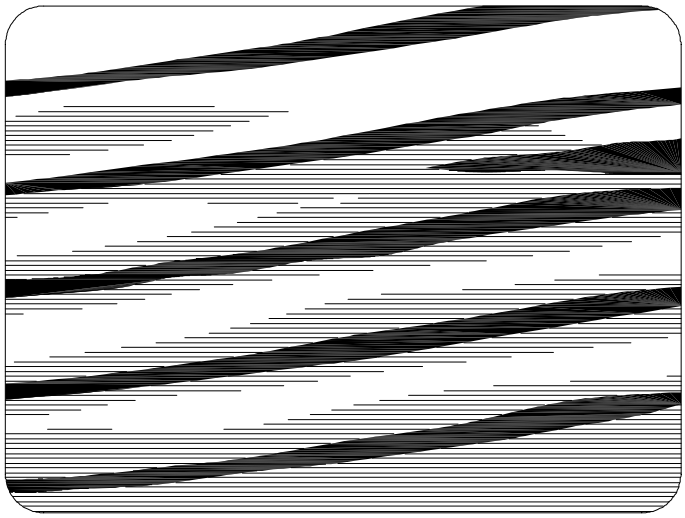


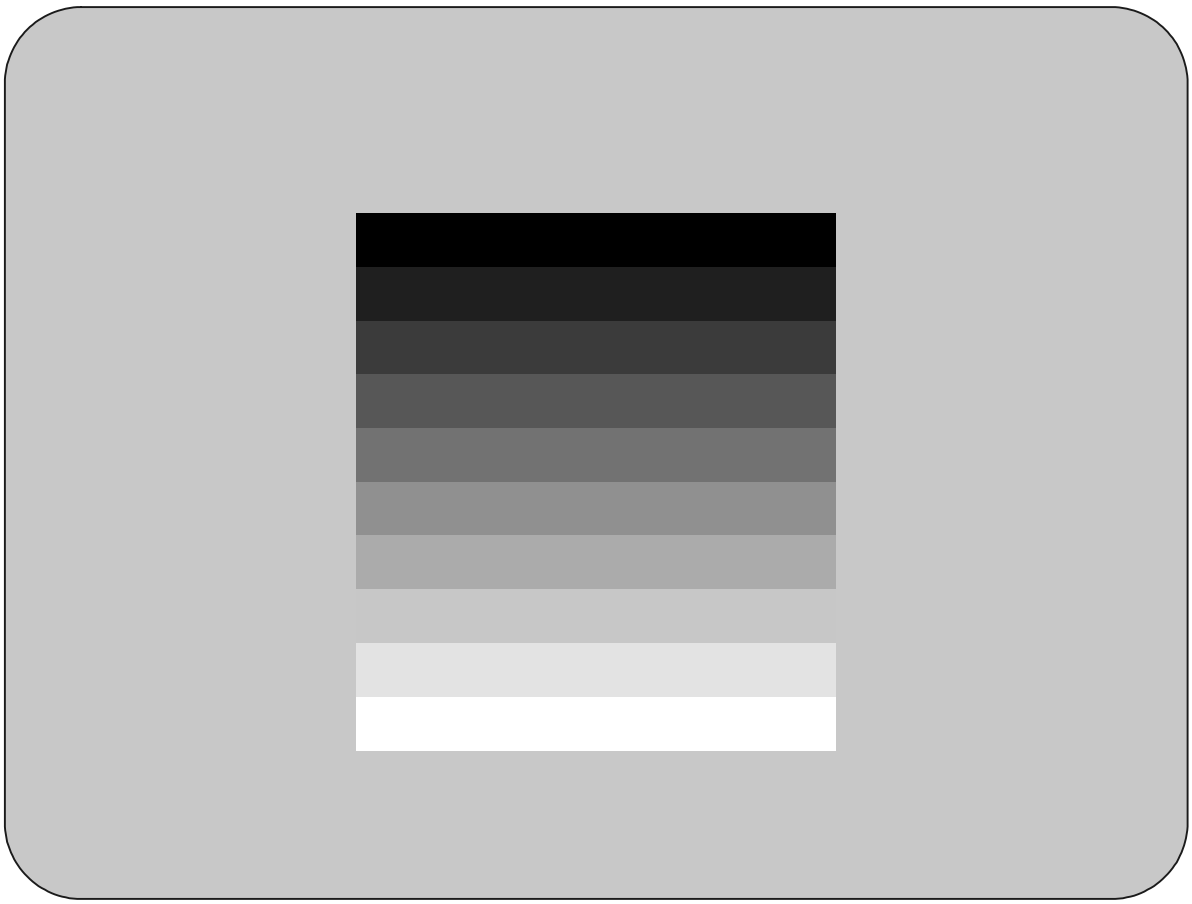
Figure 6-32. IVD Electronics Assembly CRT Display - Horizontal Skewing Problem

6-11. GENERAL. (CONT)



HORIZONTAL & VERTICAL
HOLD PROBLEM TP71-775-030

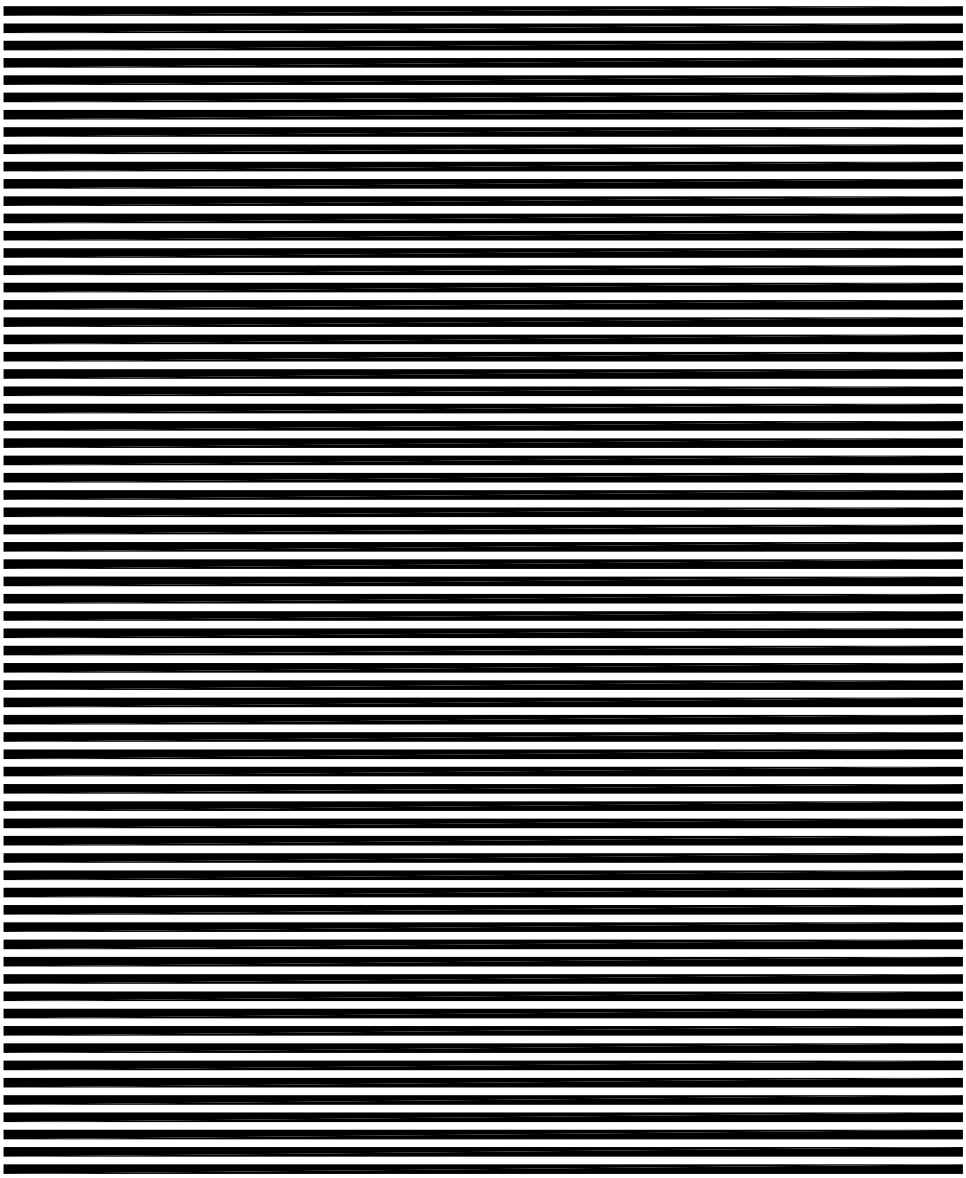
Figure 6-33. IVD Electronics Assembly CRT Display - Horizontal and Vertical Hold Problem



GRAY SCALE
(IN FOCUS) TP71-775-031

Figure 6-34. IVD Electronics Assembly CRT Display - Gray Scale

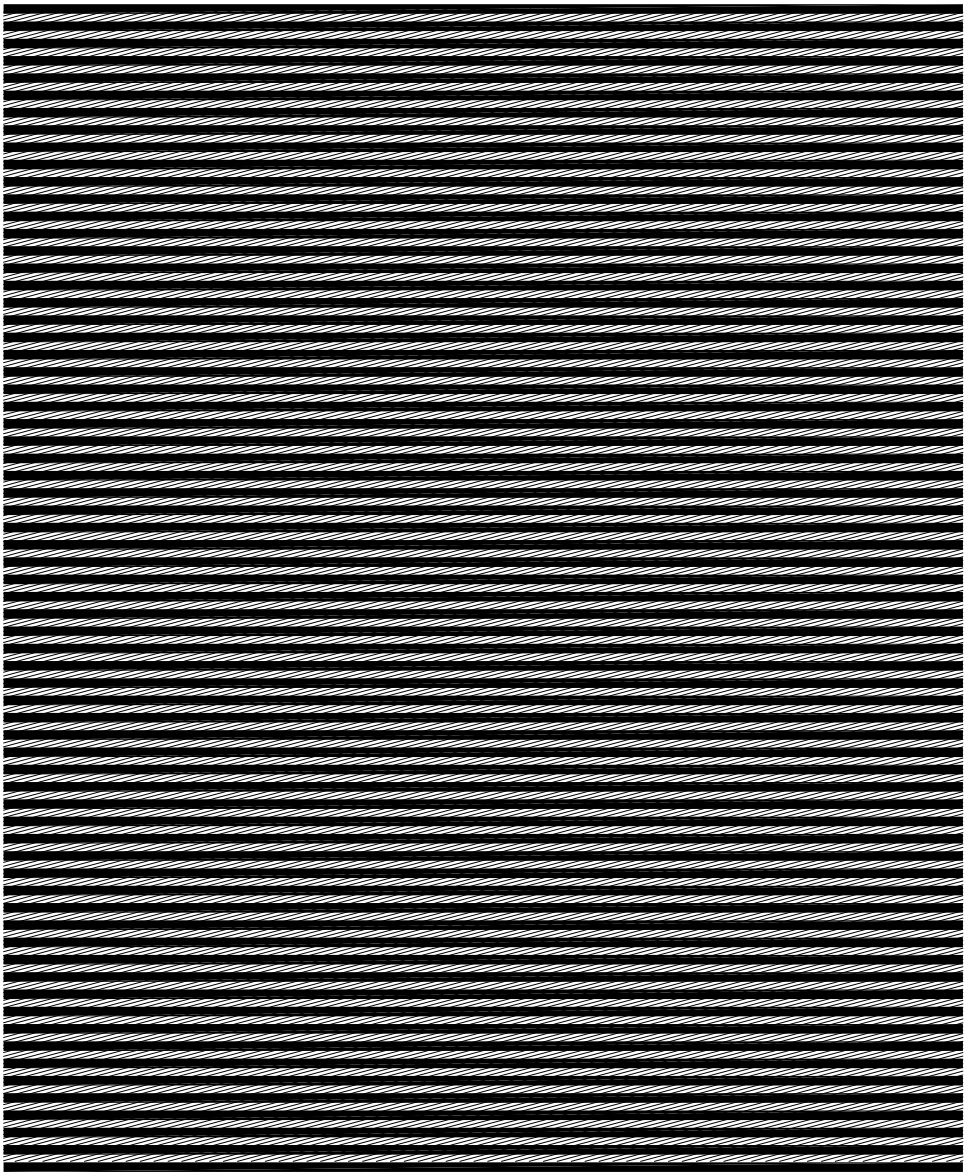
6-11. GENERAL. (CONT)



RASTER SCAN LINES (MAGNIFIED) - IN FOCUS TP71-775-032

Figure 6-35. IVD Electronics Assembly CRT Display - Magnified Raster Scan Lines - In Focus

6-11. GENERAL. (CONT)



RASTER SCAN LINES (MAGNIFIED) - OUT OF FOCUS TP71-775-033

Figure 6-36. IVD Electronics Assembly CRT Display - Magnified Raster Scan Lines - Out of Focus

6-11. GENERAL. (CONT)

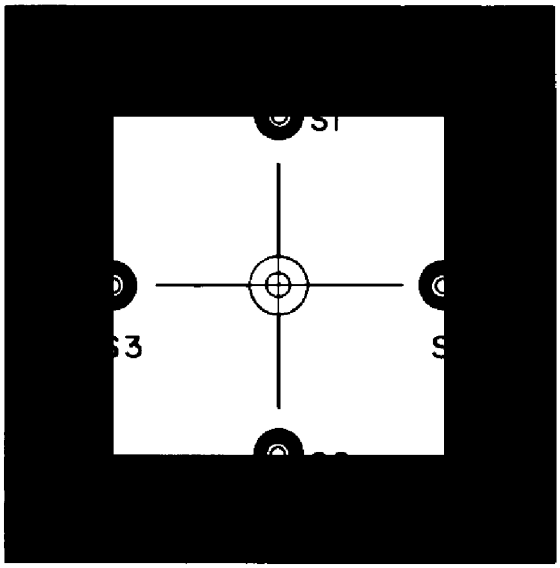


Figure 6-37. IVD Electronics Assembly CRT Display - Small Window With 0 Percent Error\

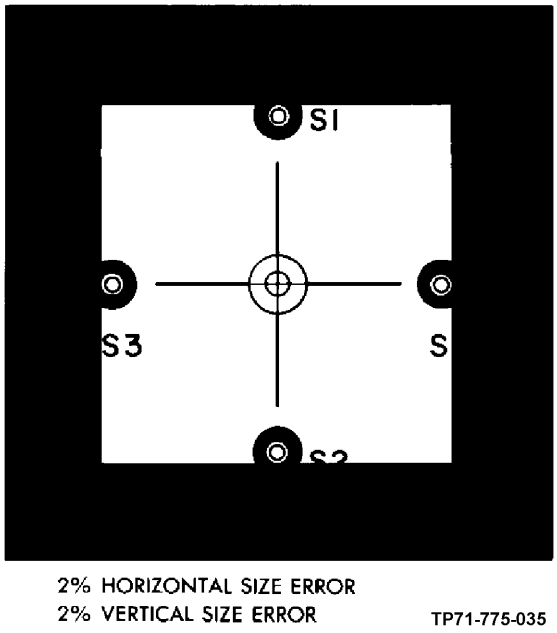
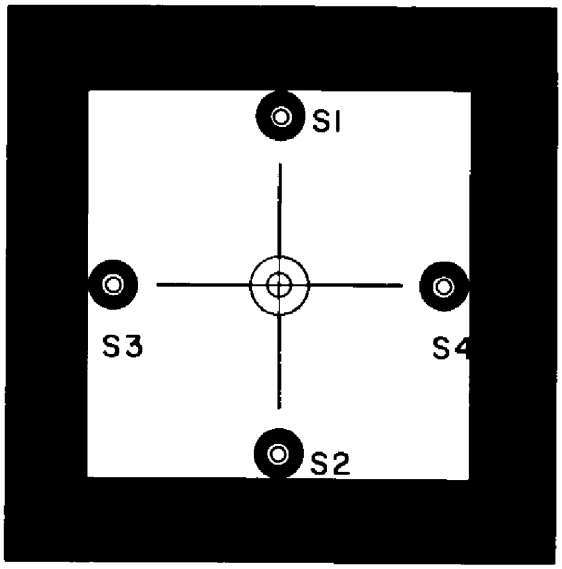


Figure 6-38. IVD Electronics Assembly CRT Display - Small Window With 2 Percent Size Error

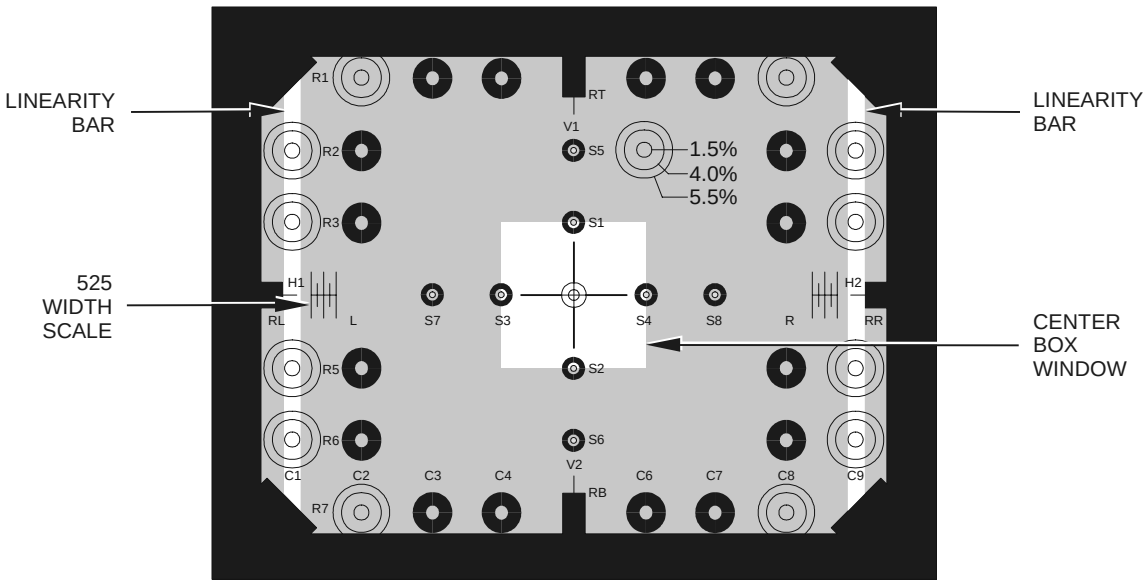
6-11. GENERAL. (CONT)



4% HORIZONTAL SIZE ERROR
4% VERTICAL SIZE ERROR

TP71-775-036

Figure 6-39. IVD Electronics Assembly CRT Display - Small Window With 4 Percent Size Error

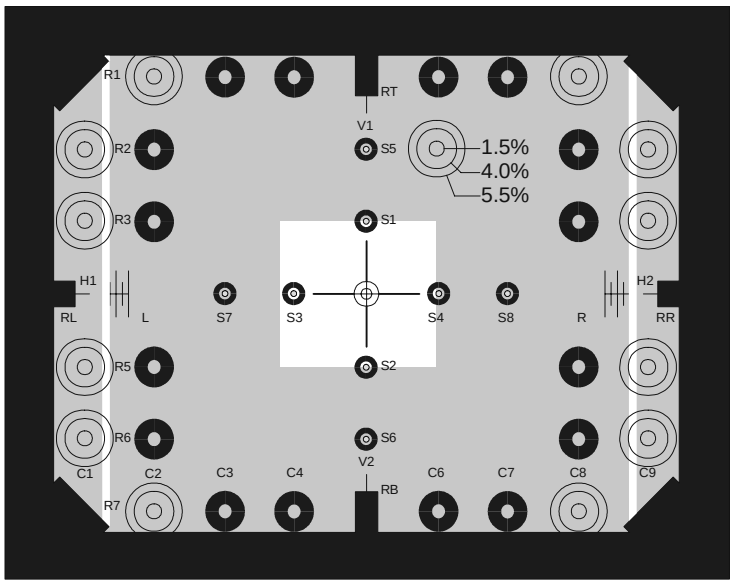


HORIZONTAL INTERACTIVE TEST PATTERN. FIGURE SHOWS NOMINAL HORIZONTAL ALINEMENT, BOX IS HORIZONTALLY CENTERED AND EDGES PASS THROUGH S3 AND S4 SIZE MARKERS, AND LINEARITY BARS PASS APPROXIMATELY THROUGH THE ZERO MARKER ON THE 525 WIDTH SCALE ON BOTH SIDES OF THE SCREEN.

TP71-775-037-1

Figure 6-40. IVD Electronics Assembly CRT Display - Nominal Alinement of Horizontal Interactive Alinement Pattern

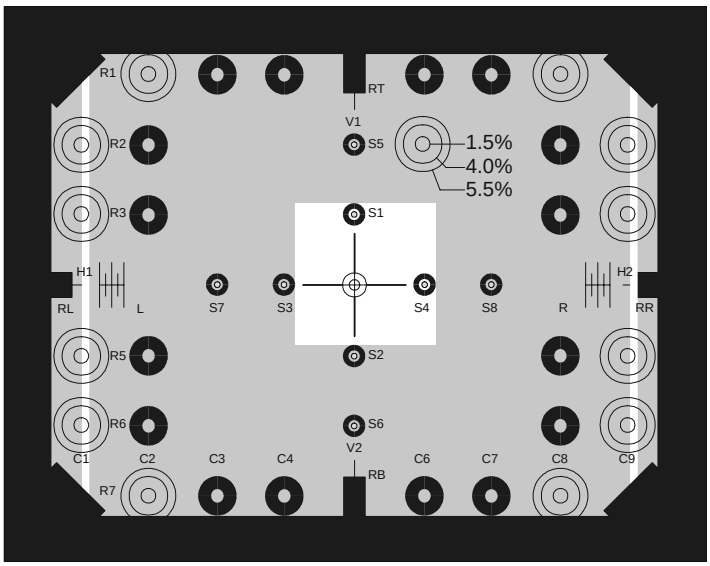
6-11. GENERAL. (CONT)



HORIZONTAL INTERACTIVE TEST PATTERN. FIGURE SHOWS A SLIGHT HORIZONTAL MISALINEMENT; CENTERING SHIFTED LEFT, SIZE APPROXIMATELY 1% WIDE, AND LINEARITY BARS HAVE APPROXIMATELY +1 MARKER OFFSET ON THE 525 WIDTH SCALE. (HORIZONTAL LINEARITY AND HORIZONTAL SIZE ADJUSTMENTS ARE REQUIRED).

TP71-775-038

Figure 6-41. IVD Electronics Assembly CRT Display - Slight Misalinement of Horizontal Interactive Alinement Pattern

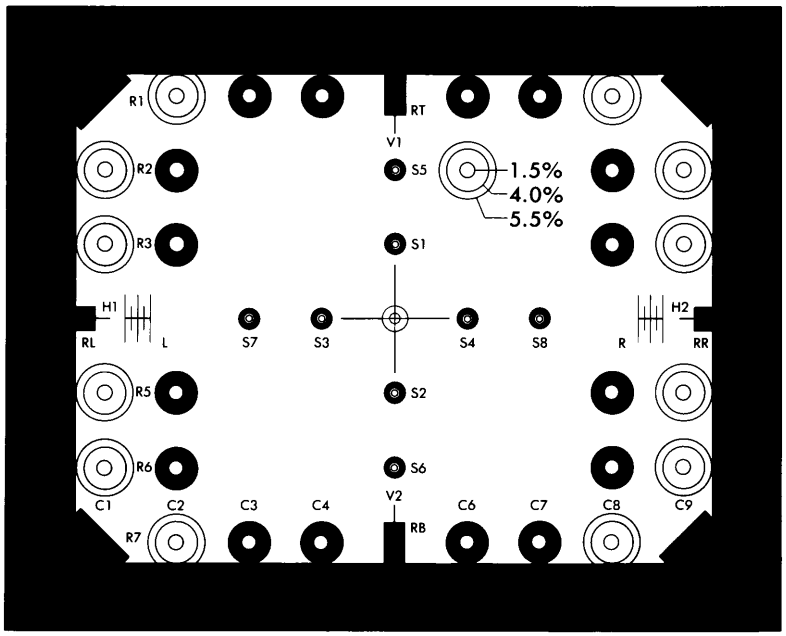


HORIZONTAL INTERACTIVE TEST PATTERN. FIGURE SHOWS A GROSS HORIZONTAL MISALINEMENT: CENTERING IS SHIFTED UP AND RIGHT, HORIZONTAL SIZE IS TOO LARGE, AND LINEARITY BARS ARE OUTSIDE OF THE 525 WIDTH SCALE MARKERS. (HORIZONTAL LINEARITY, HORIZONTAL SIZE AND CENTERING ADJUSTMENTS ARE REQUIRED).

TP71-775-039

Figure 6-42. IVD Electronics Assembly CRT Display - Gross Misalinement of Horizontal Interactive Alinement Pattern

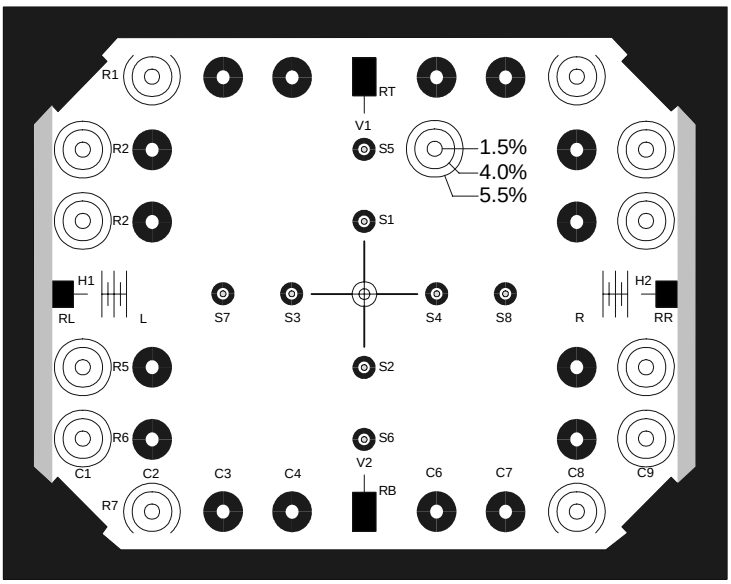
6-11. GENERAL. (CONT)



FULL SCREEN WIDTH AT 875 LINE RATE
SHOWING 0% WIDTH ERROR

NOTE: RASTER IS FLUSH WITH EDGE OF SCREEN TP71-775-040

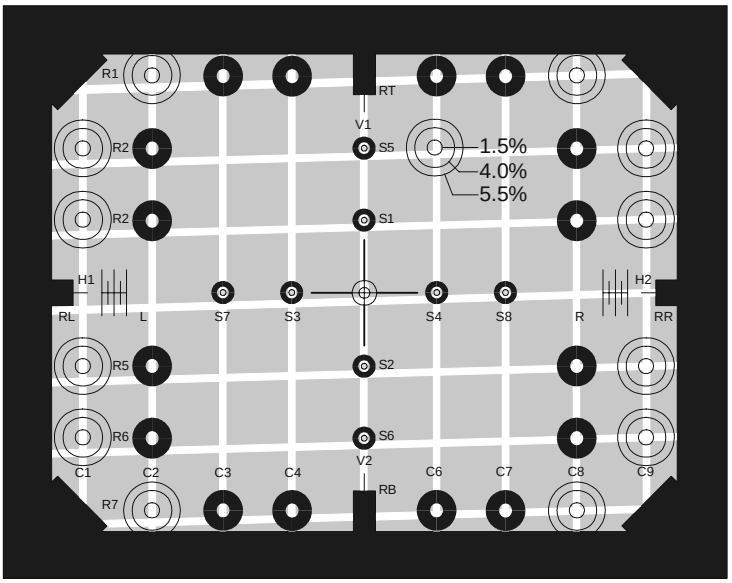
Figure 6-43. IVD Electronics Assembly CRT Display - 0 Percent Size Error - Fullscreen (875 Line Rate)



FULL SCREEN WIDTH SHOWING AN APPROXIMATE
-5% WIDTH ERROR TP71-775-041

Figure 6-44. IVD Electronics Assembly CRT Display - 5 Percent Error - Fullscreen (875 Line Rate)

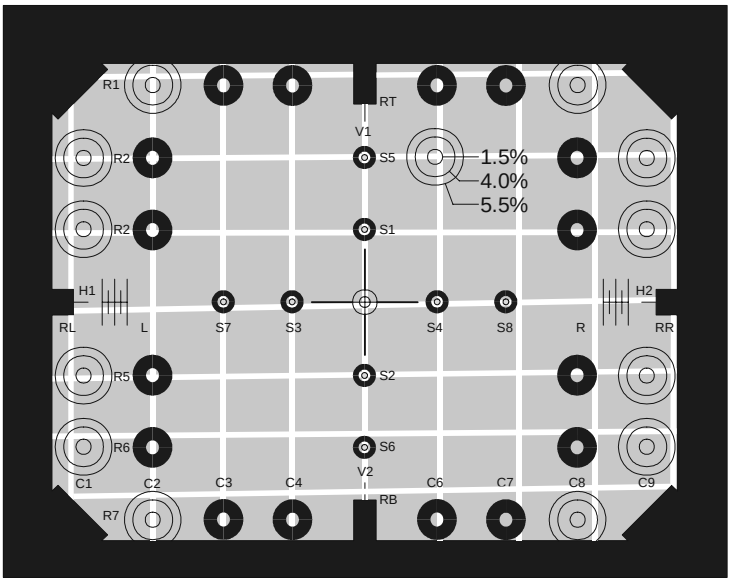
6-11. GENERAL. (CONT)



DISTORTION ADJUSTMENT GRID PATTERN
SHOWING A 0% VERTICAL ERROR
AND APPROXIMATELY 1.5% HORIZONTAL DISTORTION

TP71-775-042

Figure 6-45. IVD Electronics Assembly CRT Display - Nominal Distortion Alinement

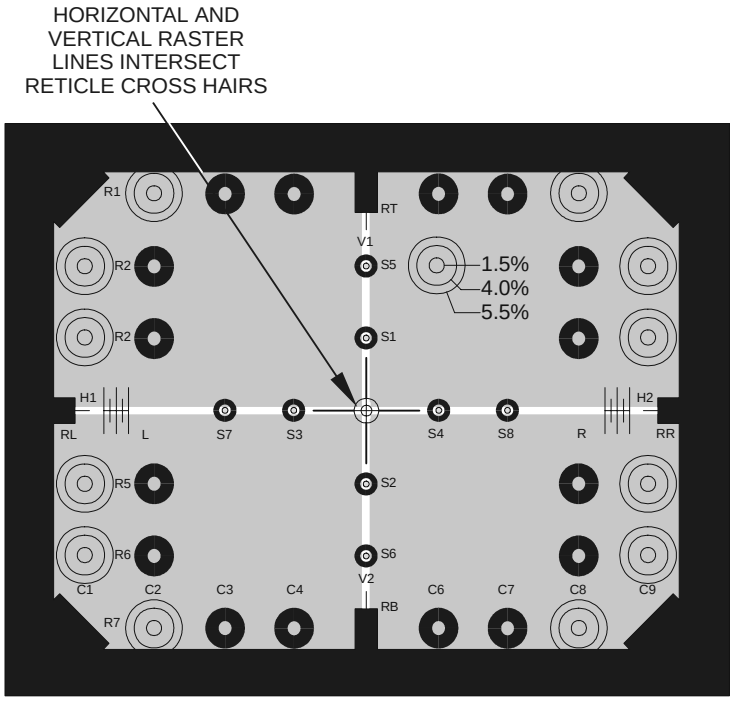


DISTORTION PATTERN SHOWING 5.5% HORIZONTAL
AND 5% VERTICAL DISTORTION ERROR
(OUT OF TOLERANCE)

TP71-775-043

Figure 6-46. IVD Electronics Assembly CRT Display - Out of Tolerance Distortion Alinement Example

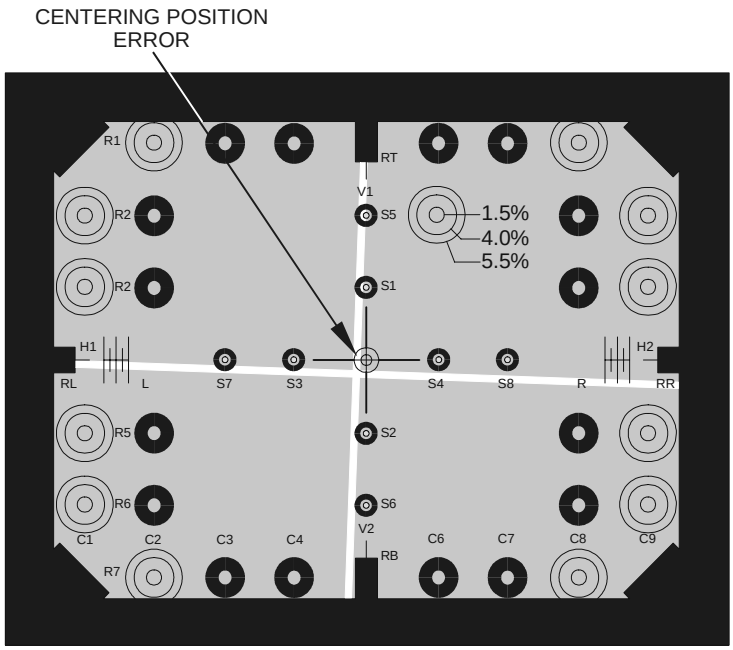
6-11. GENERAL. (CONT)



RASTER POSITIONING PATTERN SHOWING 0%
ERROR IN CENTERING POSITION

TP71-775-044

Figure 6-47. IVD Electronics Assembly CRT Display - Nominal Centering Alinement

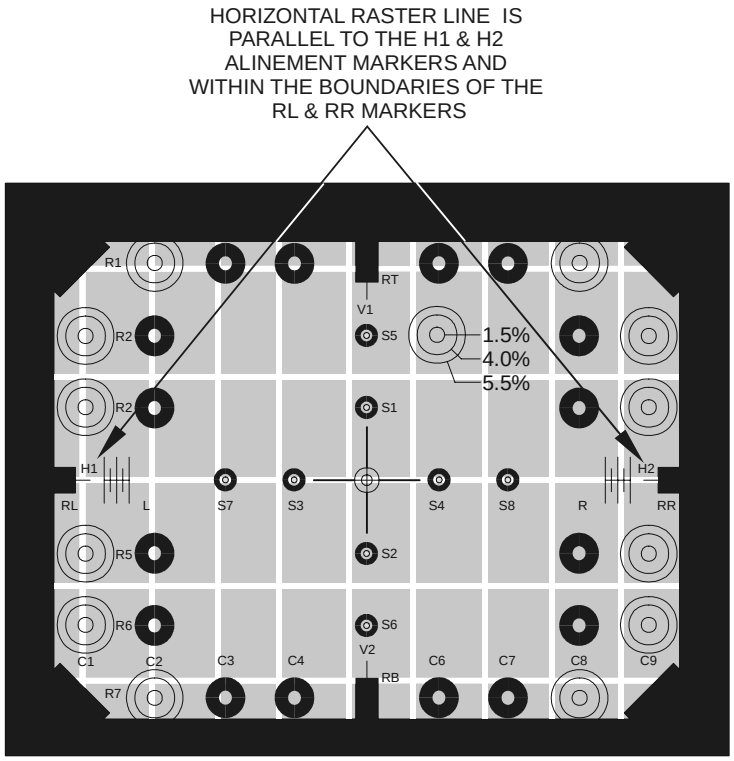


RASTER POSITION PATTERN SHOWING<2.5%
CENTERING ERROR (OUT OF POSITION)

TP71-775-045

Figure 6-48. IVD Electronics Assembly CRT Display - Centering Misalinement Example

6-11. GENERAL. (CONT)

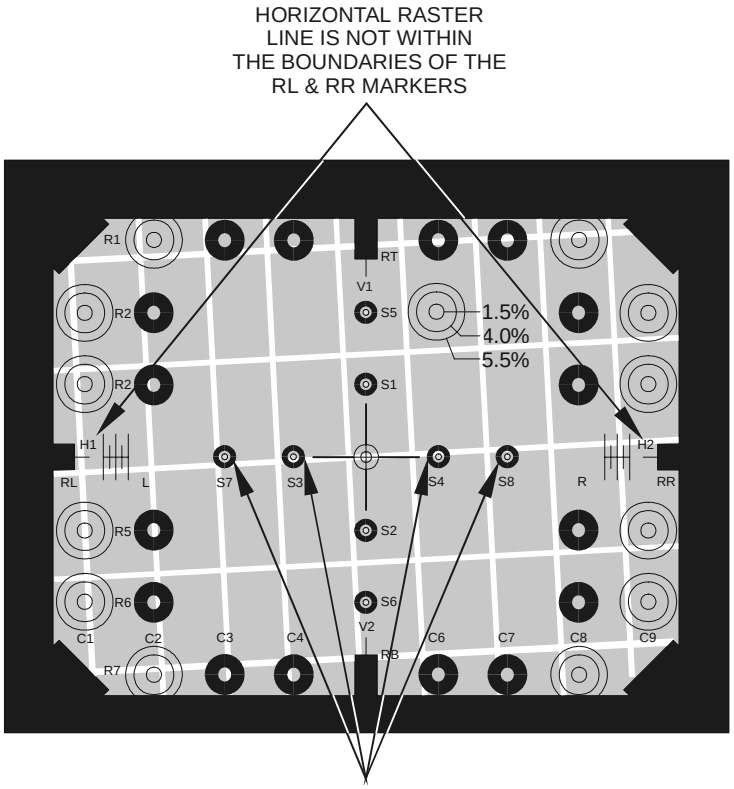


ROTATION POSITION PATTERN SHOWING
0.0 DEGREE ERROR IN ROTATION

TP71-775-046

Figure 6-49. IVD Electronics Assembly CRT Display - Nominal Rotation Alinement

6-11. GENERAL. (CONT)



ROTATION POSITION PATTERN SHOWING
APPROXIMATELY 2 DEGREE ROTATIONAL ERROR TP71-775-047

Figure 6-50. IVD Electronics Assembly CRT Display - Rotation Misalinement Example

6-11. GENERAL. (CONT)

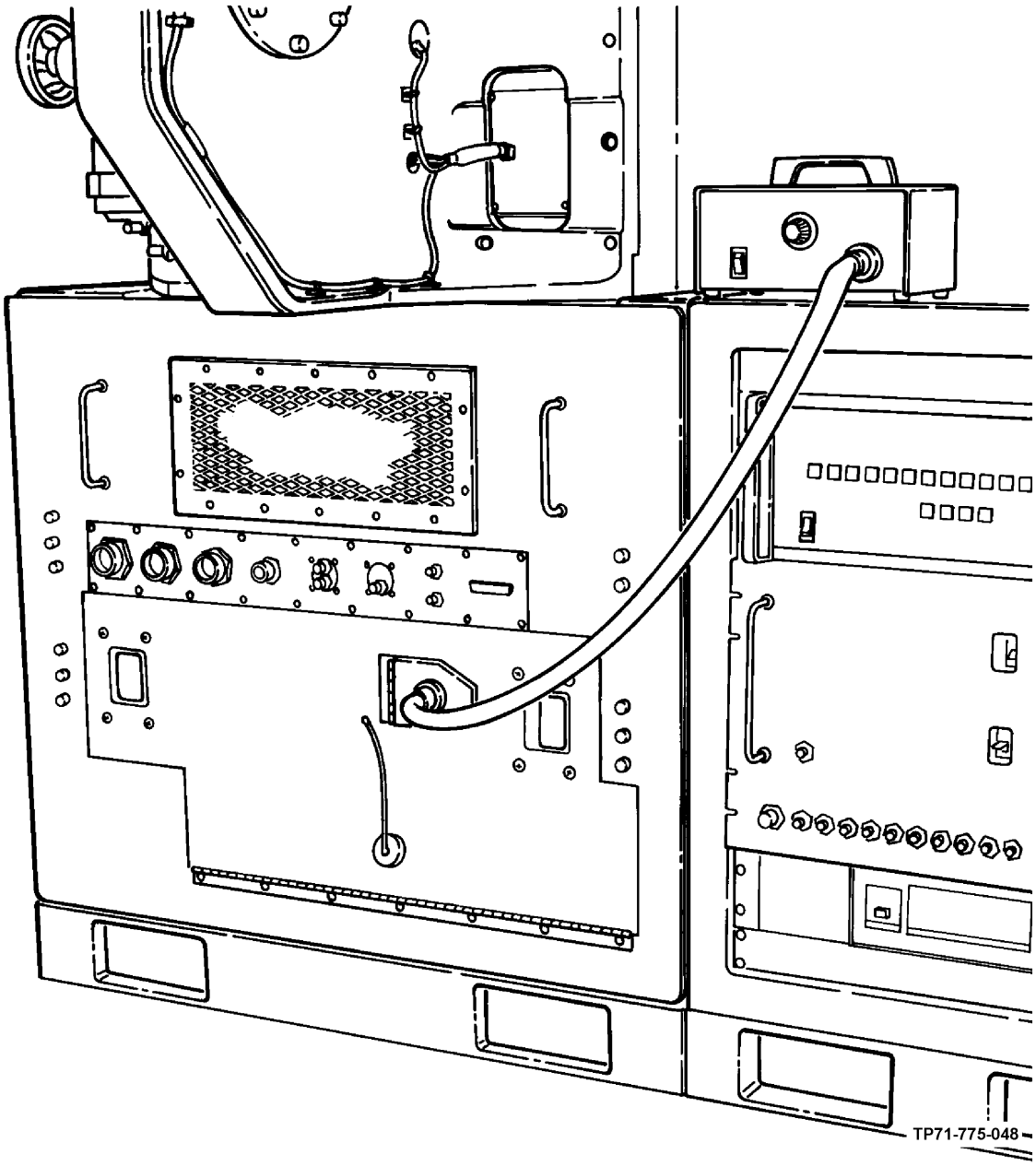


Figure 6-51. Illuminator Source I-250 Installed on OSA Door

6-11. GENERAL. (CONT)

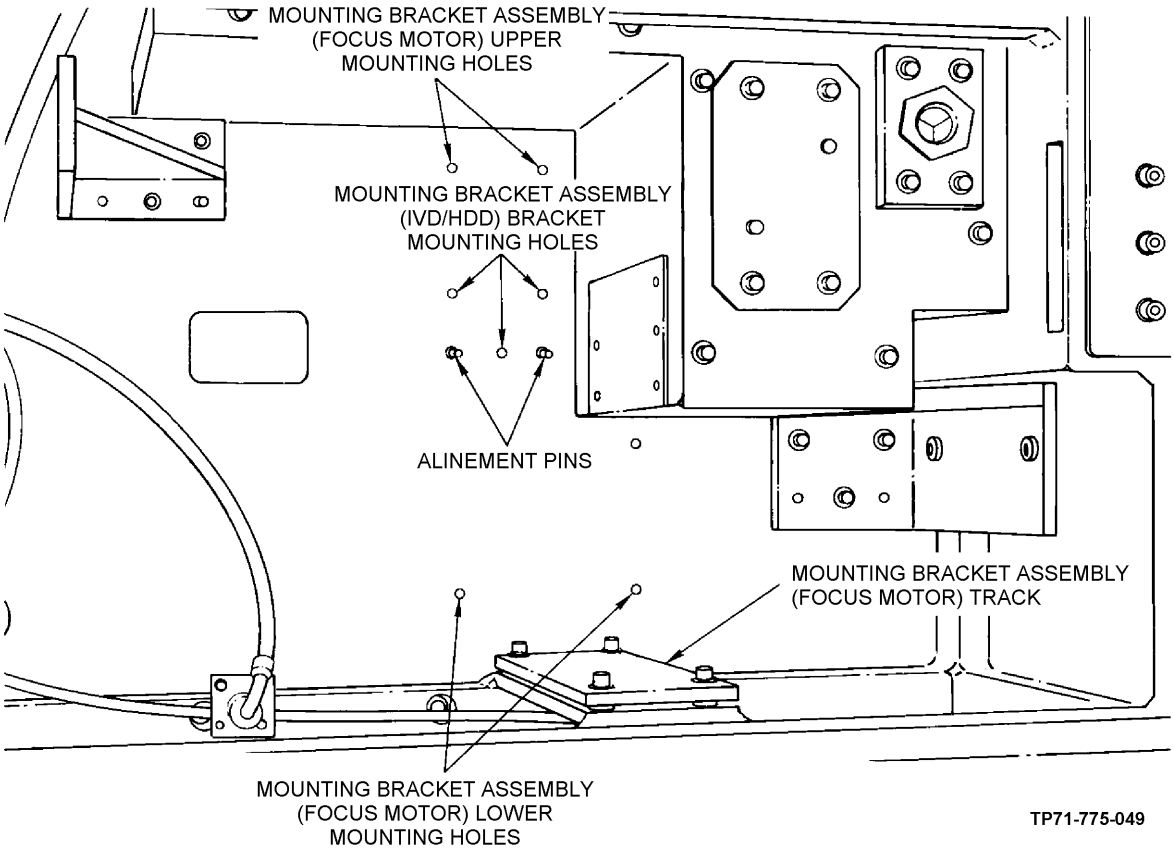


Figure 6-52. OSA Bracket Mounting Positions

6-11. GENERAL. (CONT)

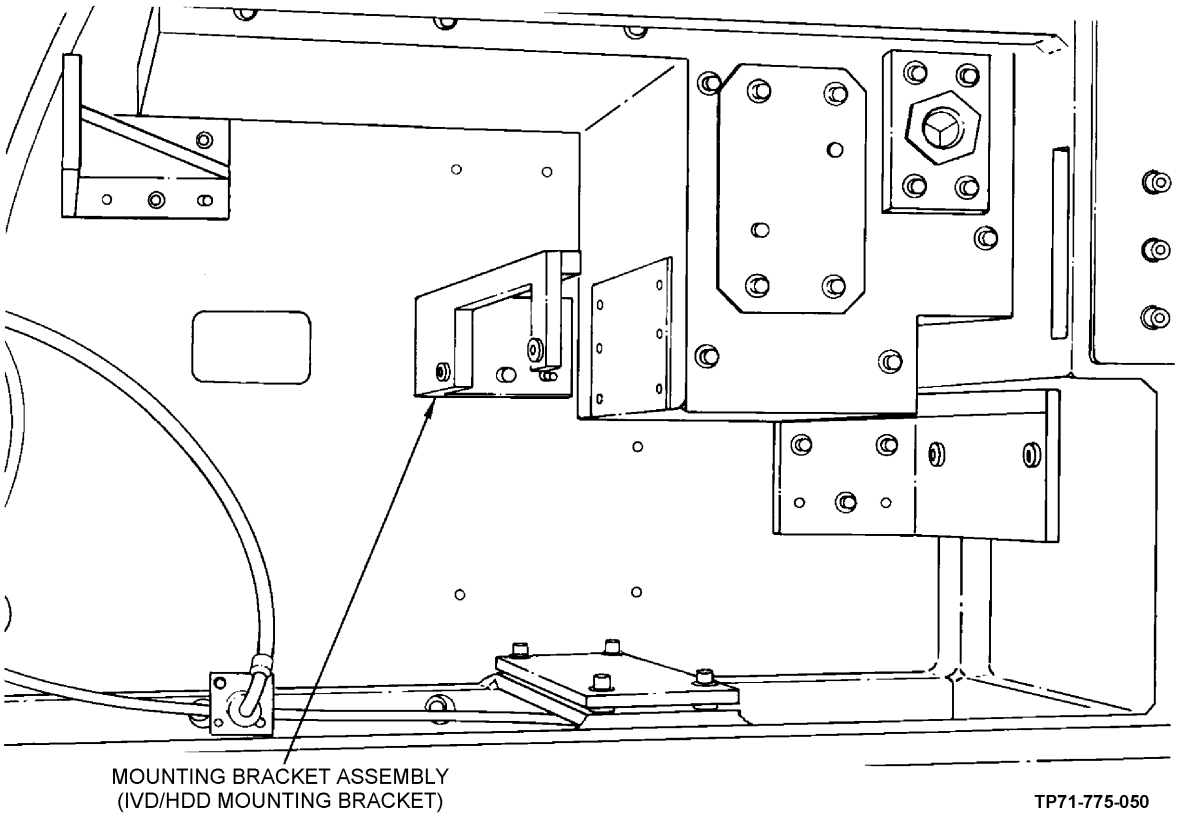


Figure 6-53. Mounting Bracket Assembly (IVD/HDD) Installed

6-11. GENERAL. (CONT)

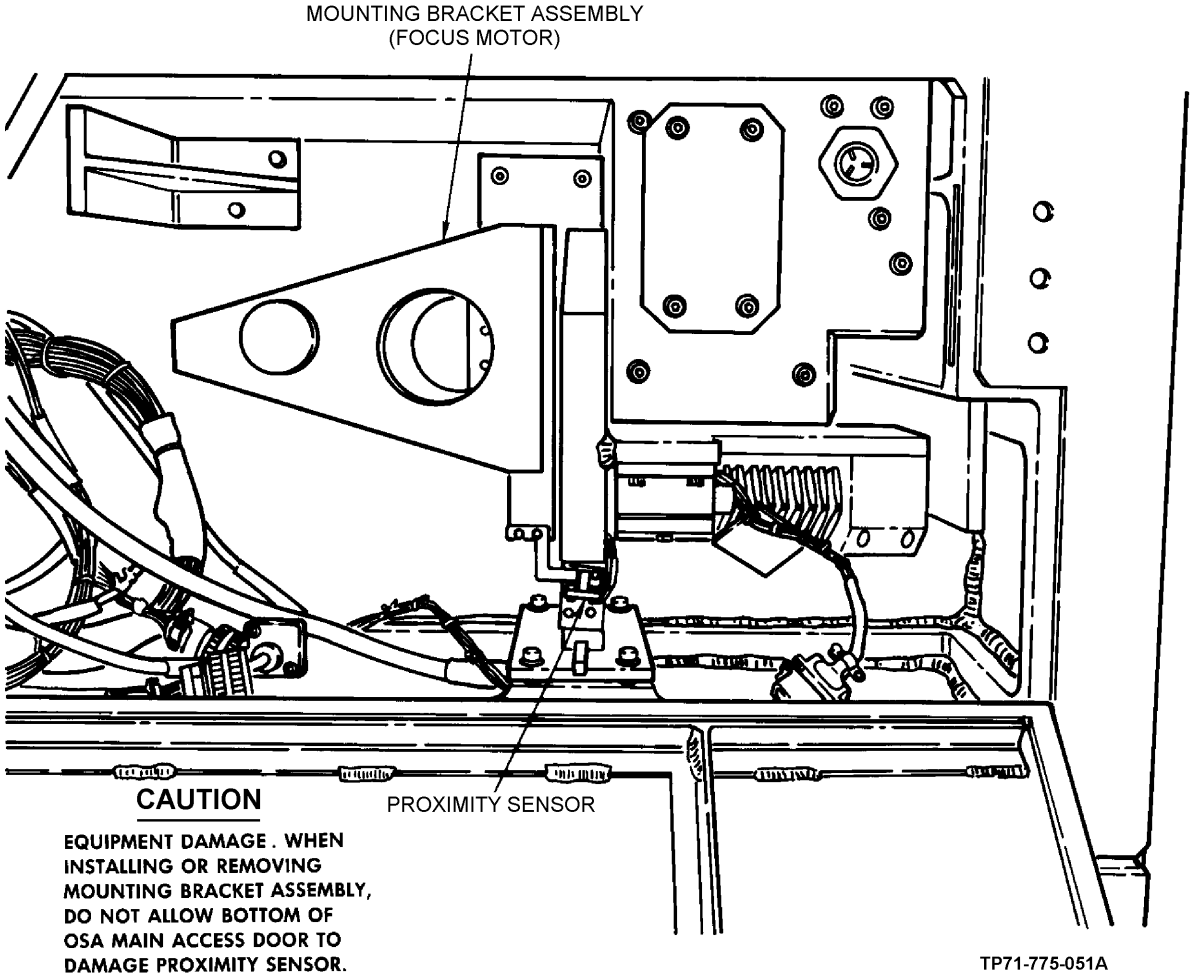


Figure 6-54. Mounting Bracket Assembly (Focus Motor) in Installed Position

6-11. GENERAL. (CONT)

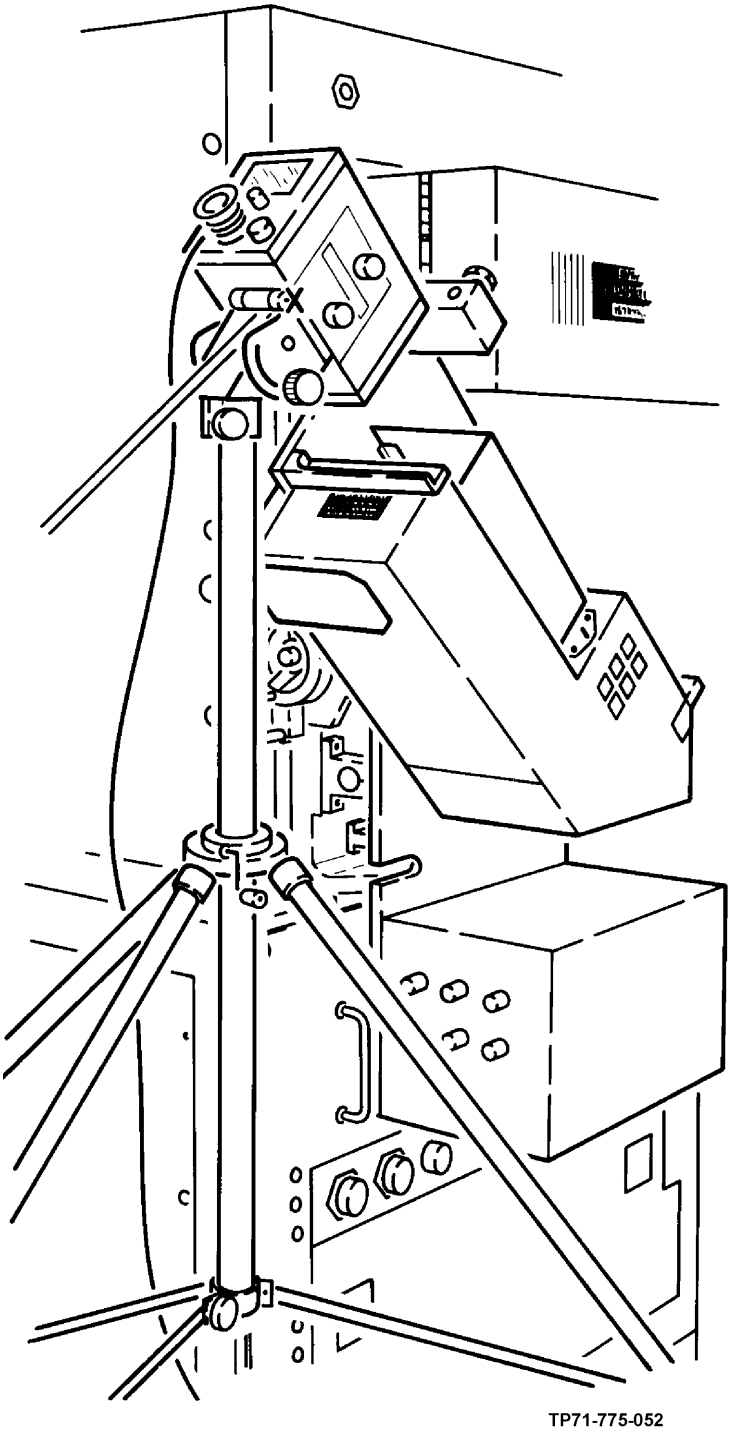


Figure 6-55. Spotmeter Installation (OSA Calibration)

6-11. GENERAL. (CONT)

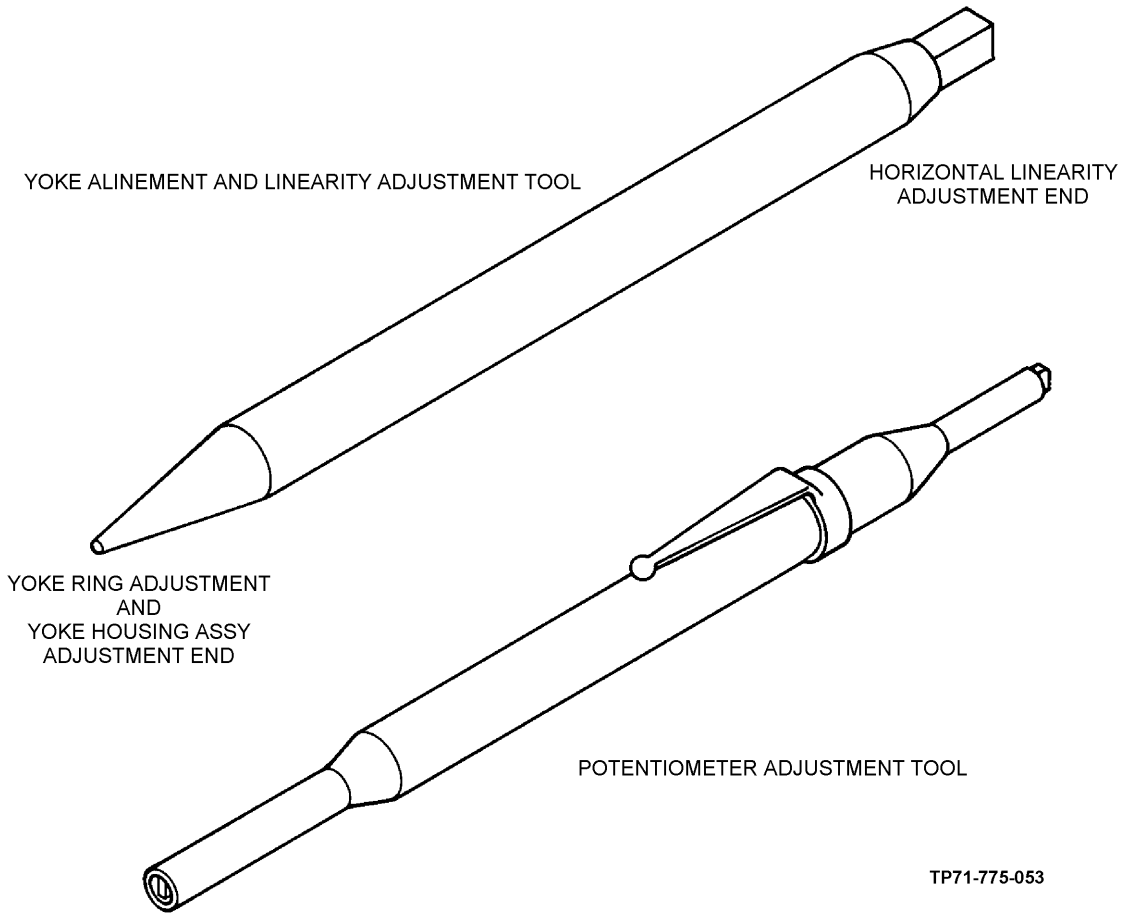


Figure 6-56. IVD Electronics Assembly Adjustment Tools

6-11. GENERAL. (CONT)

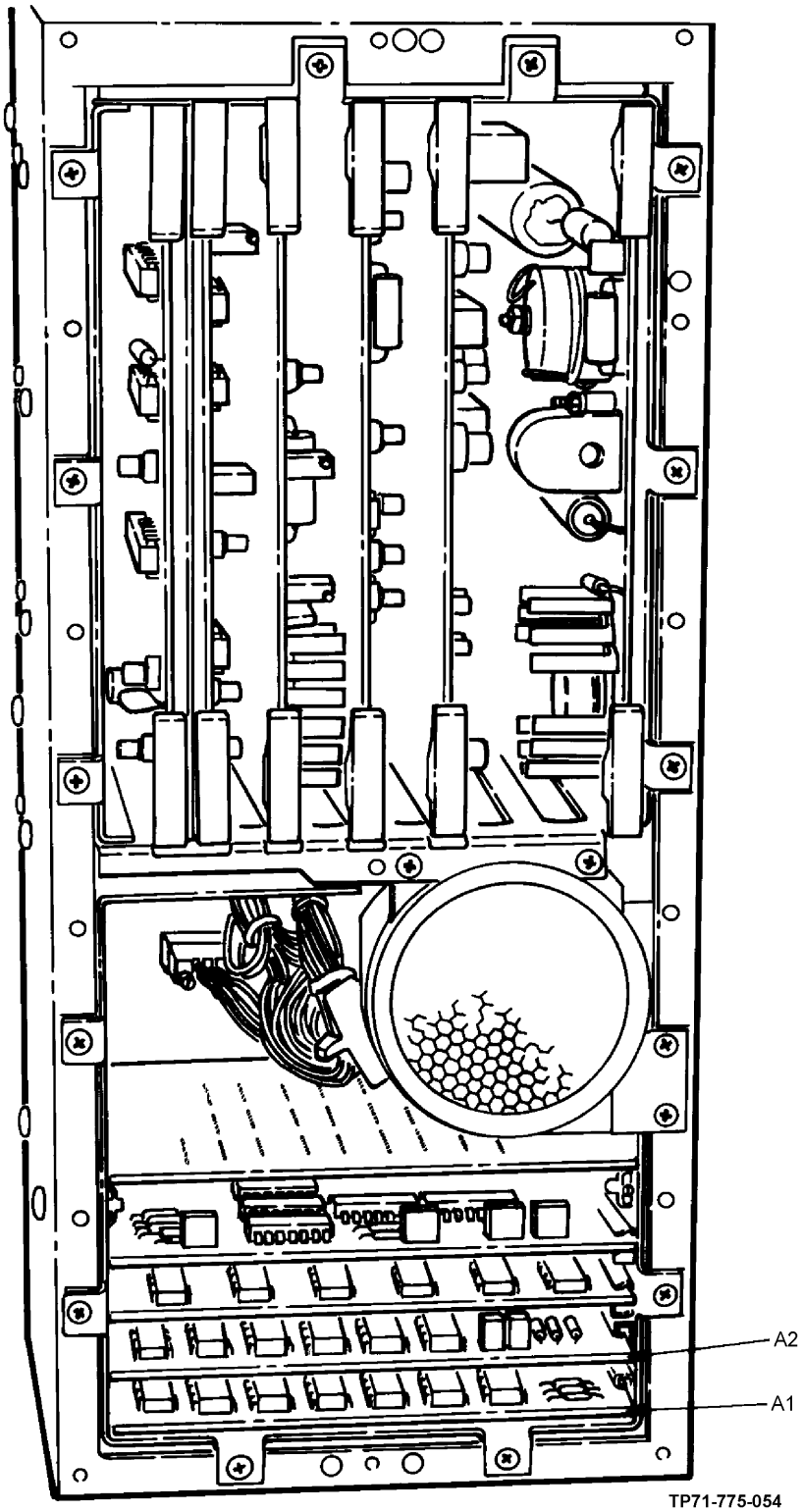


Figure 6-57. IVD Electronics Assembly CEM CCA Locations

6-11. GENERAL. (CONT)

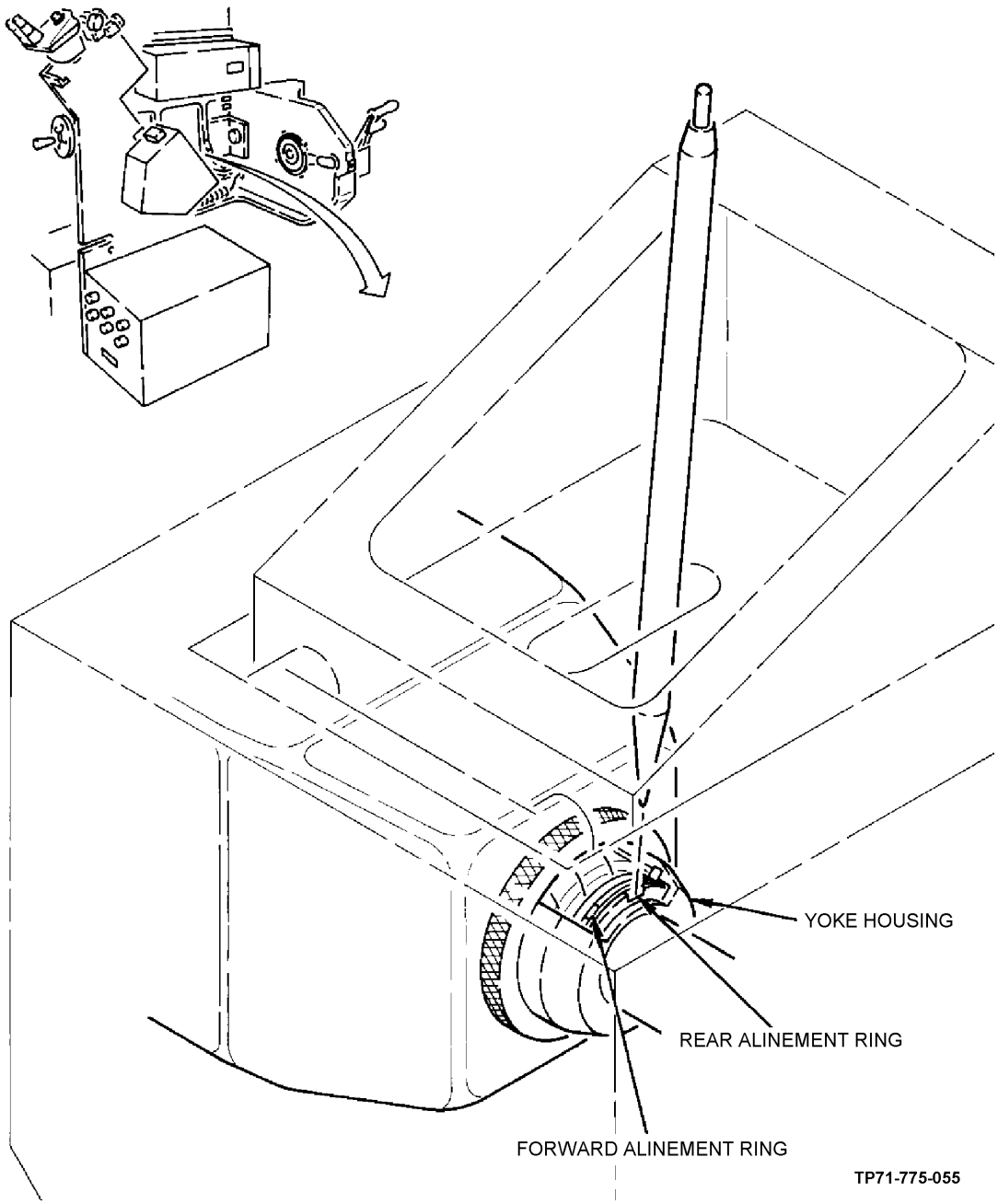


Figure 6-58. IVD Electronics Assembly Yoke Alinement Rings

6-11. GENERAL. (CONT)

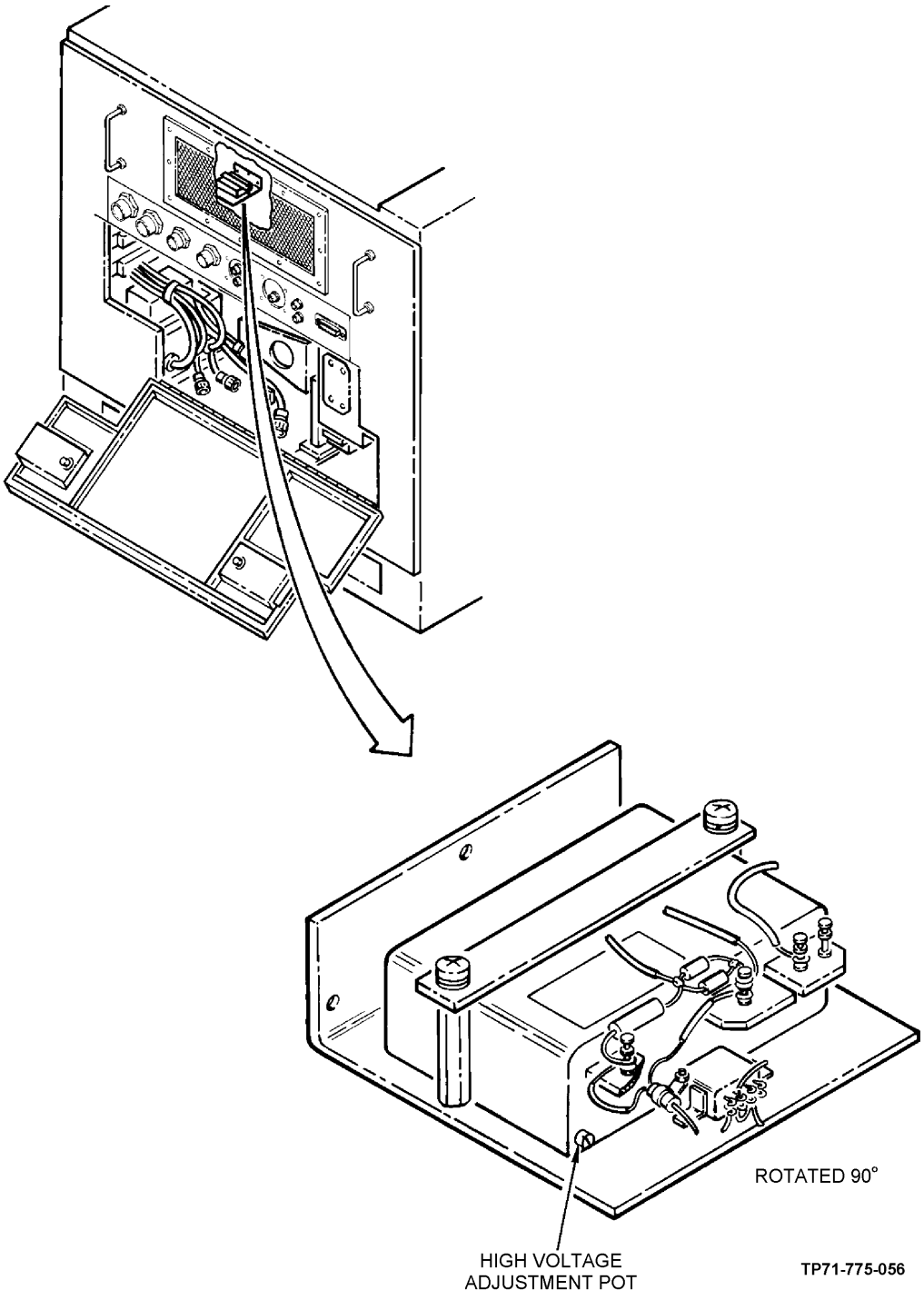


Figure 6-59. High Voltage Adjustment Pot Location (OSA Calibration)

6-11. GENERAL. (CONT)

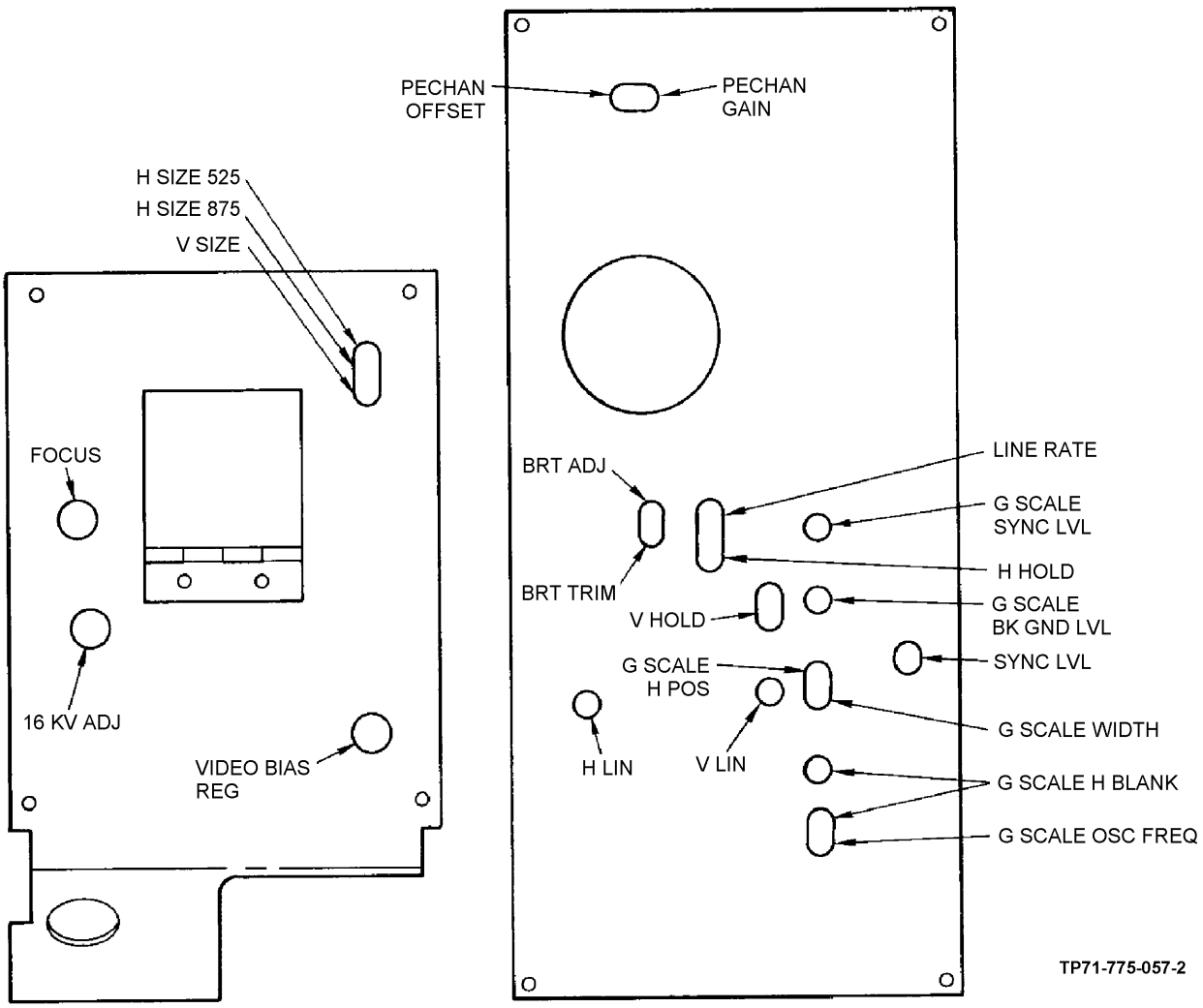


Figure 6-60. Top and Bottom Alinement Cover Assemblies (Internal HDD Calibration)

6-11. GENERAL. (CONT)

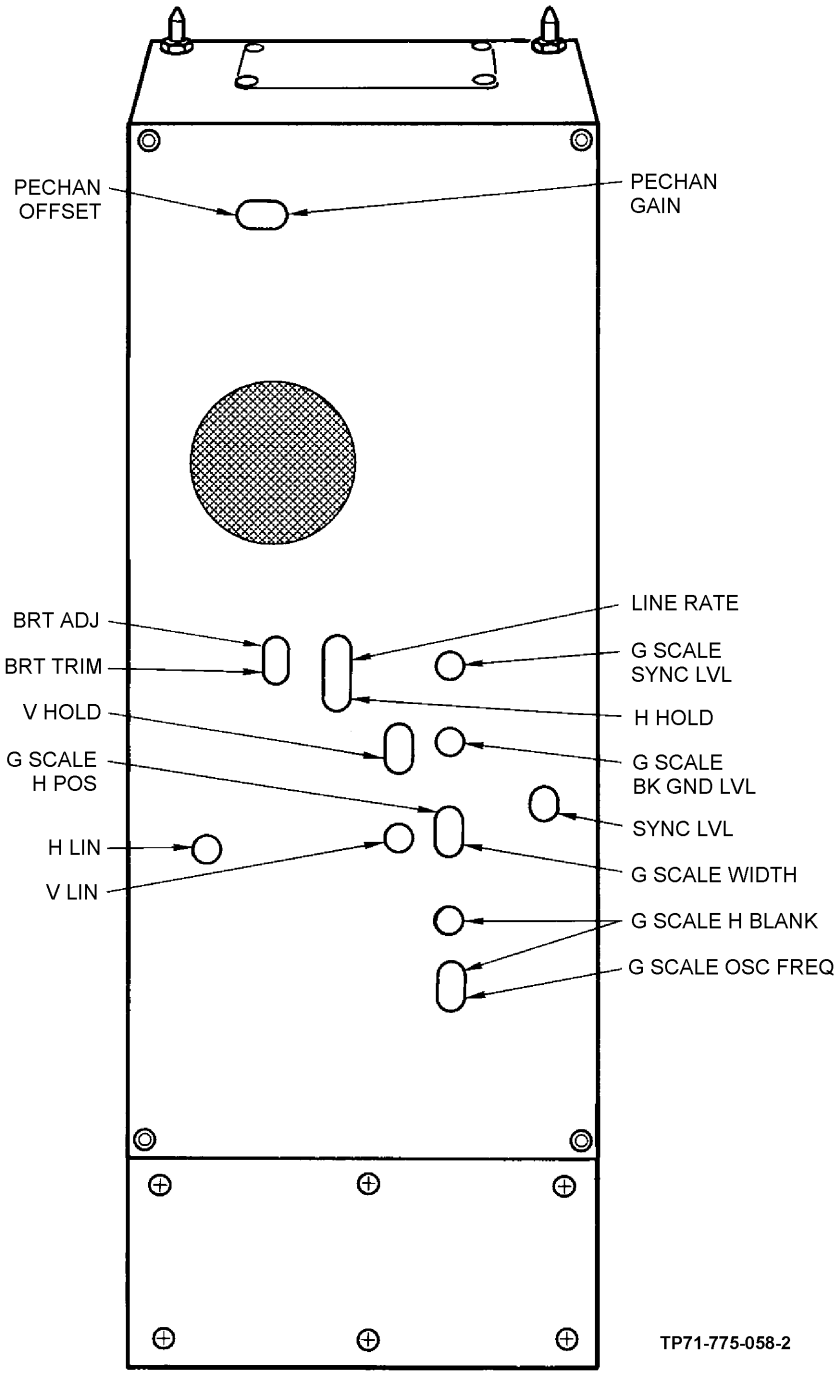


Figure 6-61. Bottom Alinement Cover Installed (Internal HDD Calibration)

6-11. GENERAL. (CONT)

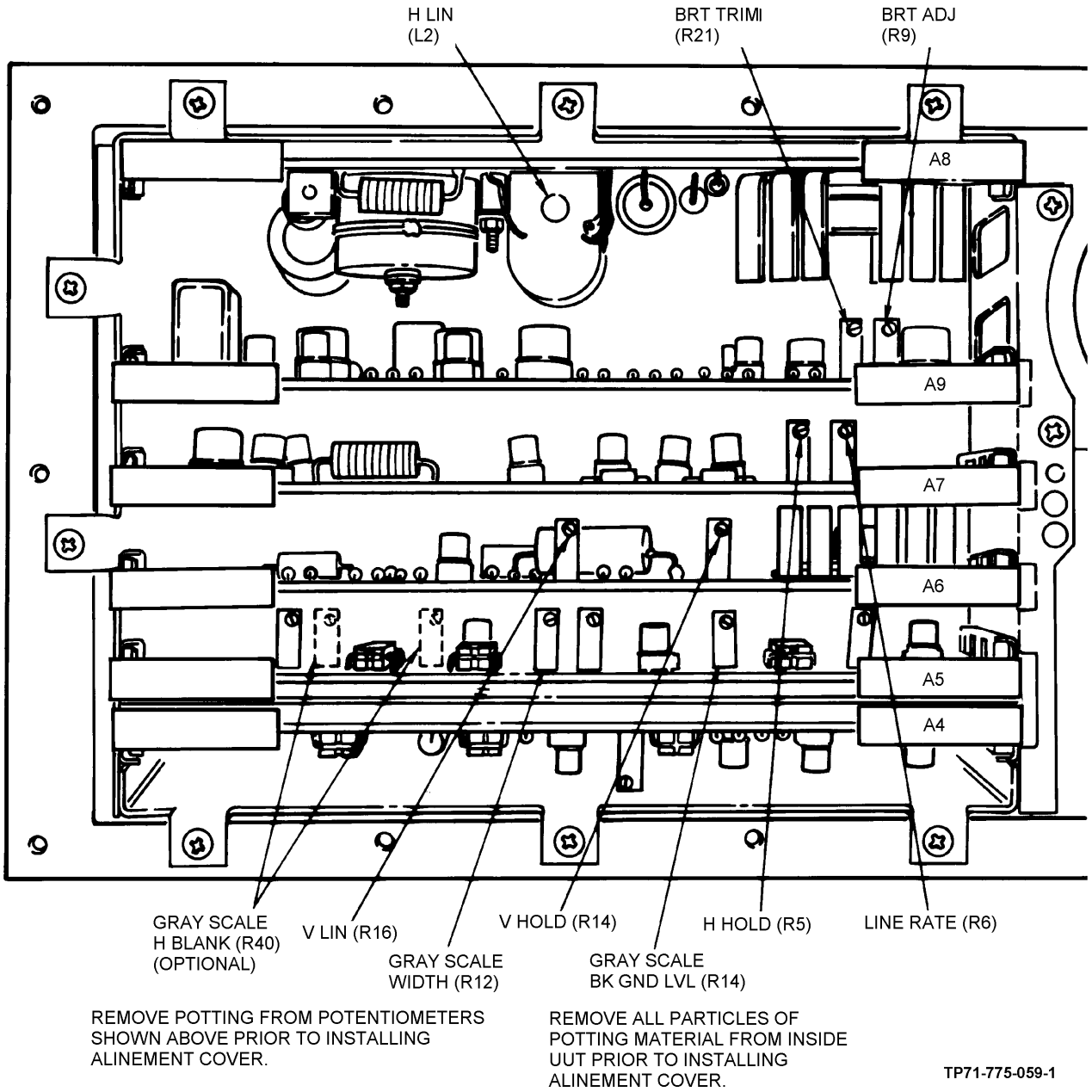


Figure 6-62. IVD Electronics Assembly Adjustment Component Locations (Bottom) (Internal HDD Calibration)

6-11. GENERAL. (CONT)

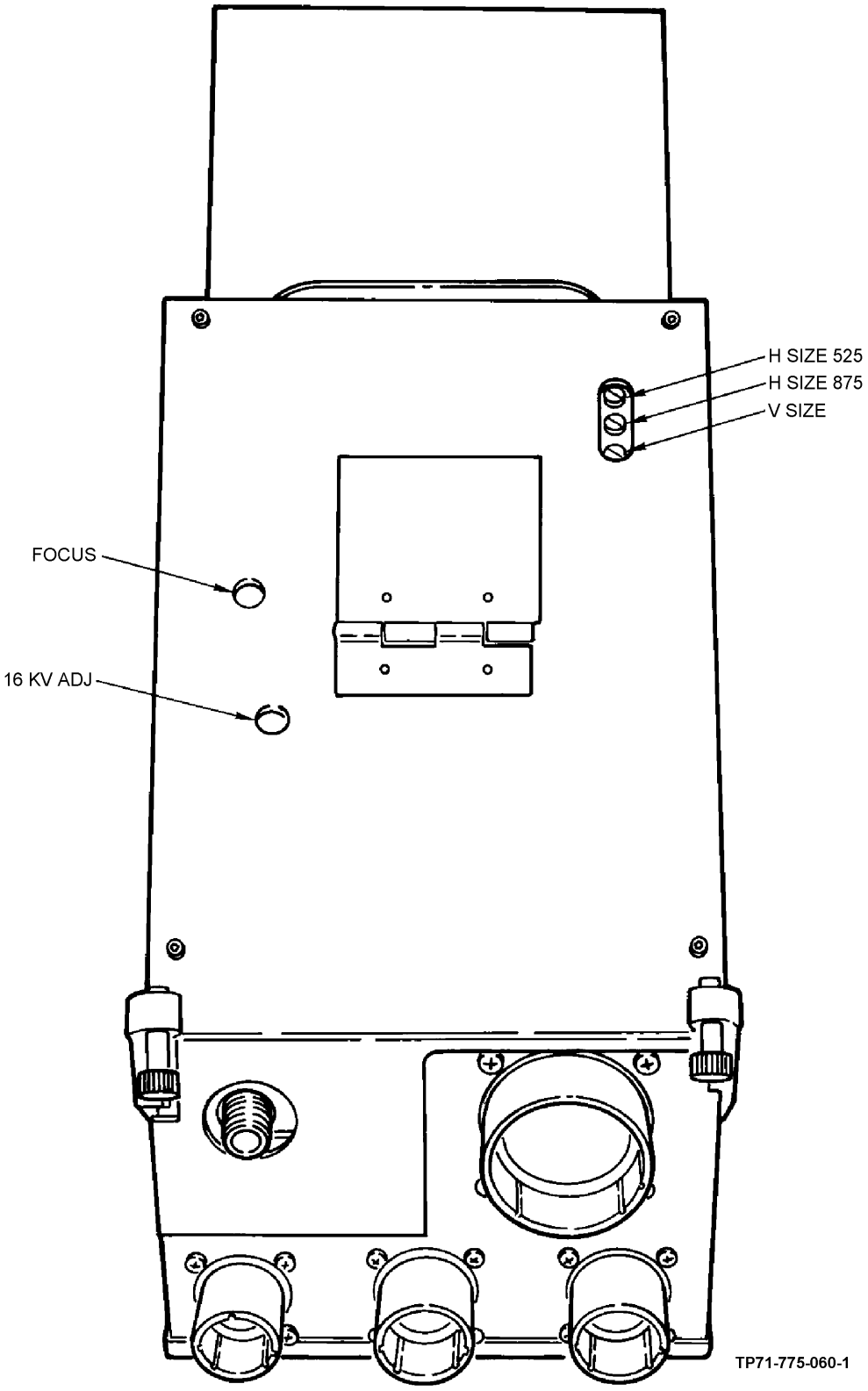


Figure 6-63. Top Alinement Cover Installed (Internal HDD Calibration)

6-11. GENERAL. (CONT)

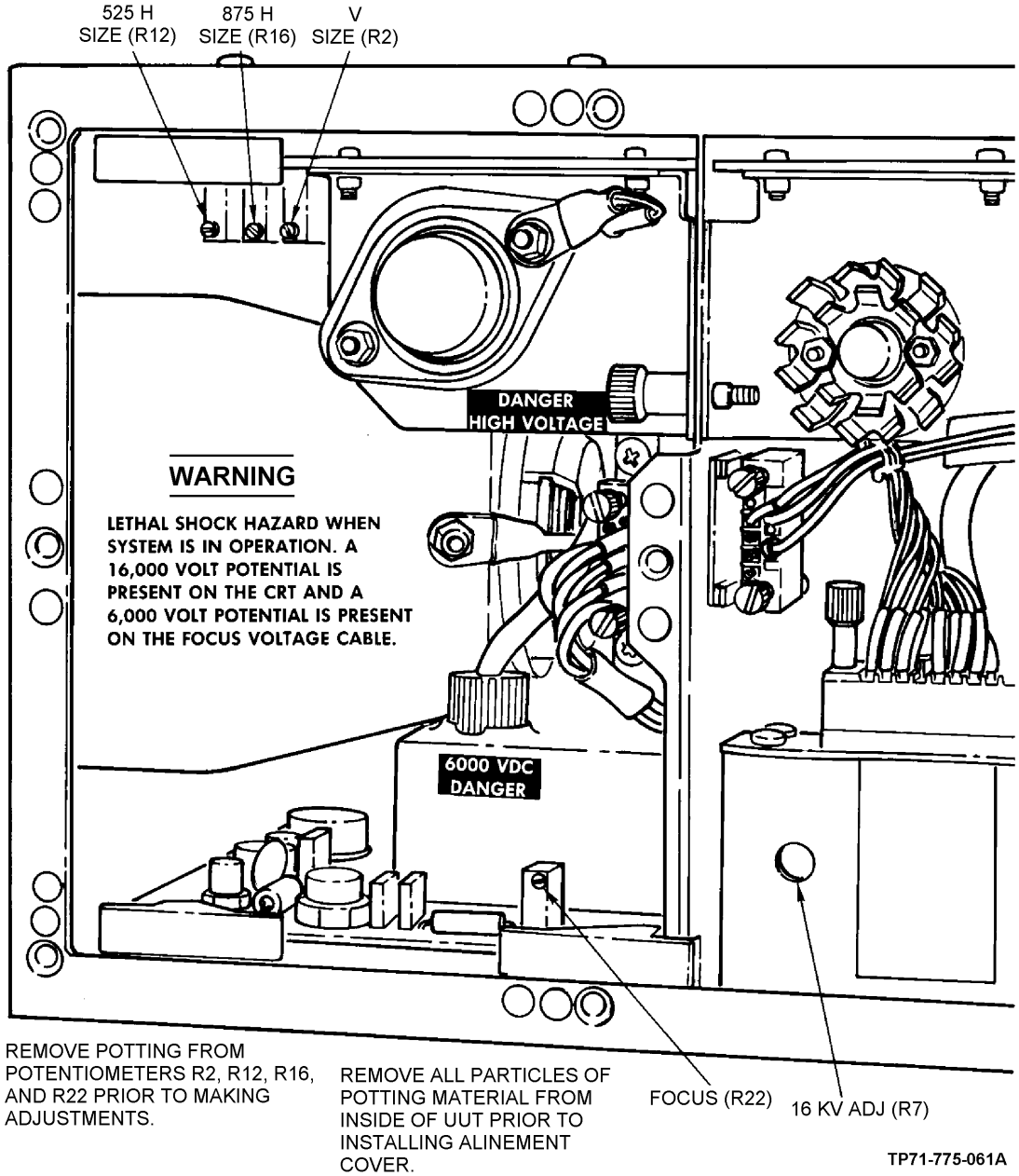


Figure 6-64. IVD Electronics Assembly Adjustment Component Locations (Top) (Internal HDD Calibration)

6-11. GENERAL. (CONT)

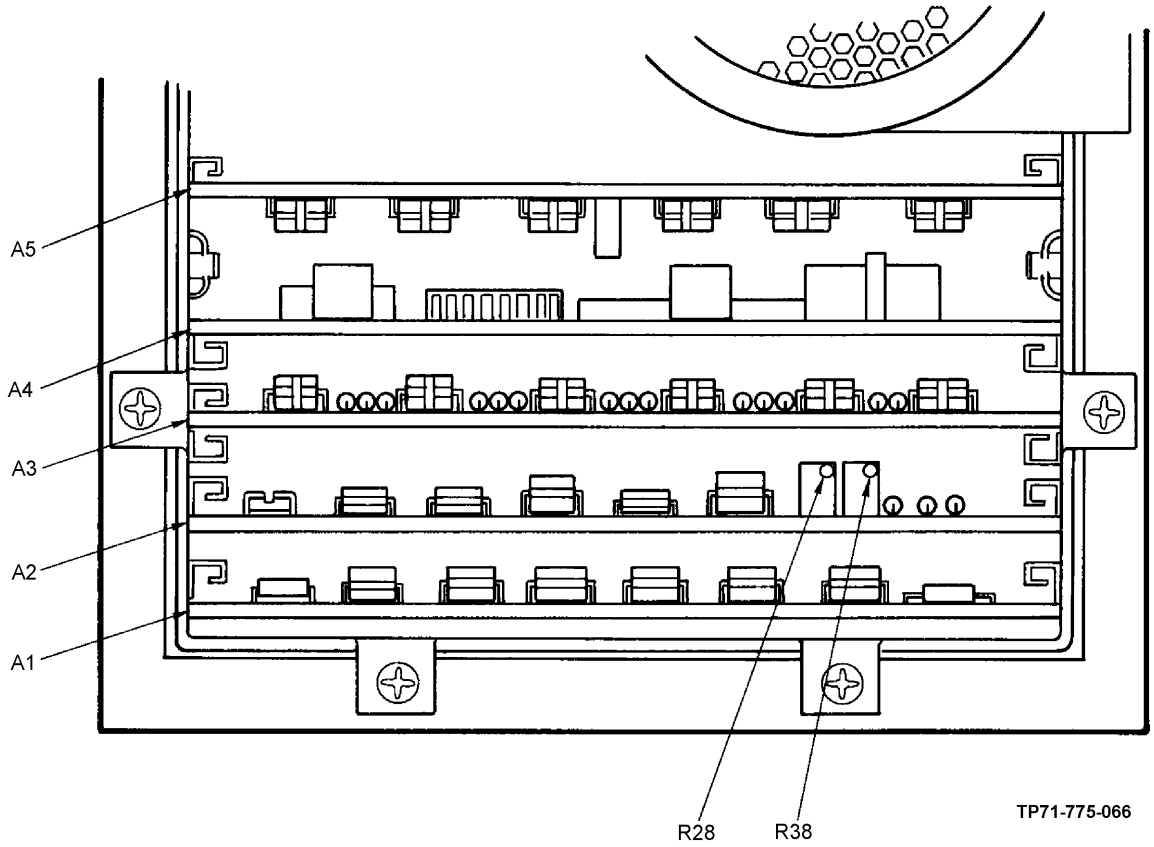


Figure 6-65. IVD Electronics Assembly CEM CCA Adjustment Locations

CHAPTER 7

TELEVISION SENSOR ASSEMBLY, VISUAL MULTIPLEXER ASSEMBLY, VISUAL RELAY/MULTIPLEXER ASSEMBLY AND SOLID STATE CAMERA ASSEMBLY (FOR DAY TV, PNVS, TADS FLIR)

Section I. PREPARATION FOR TEST

7-1. TEST PREPARATION.

No special procedures are required to prepare the television sensor assembly, the TADS visual multiplexer assembly, the PNVS visual relay/multiplexer assembly or solid state camera assemblies (for day TV, PNVS, or TADS FLIR) for test. Refer to the UUT test program for a list of cables, test equipment, and test accessories required to test a UUT.

7-2. UUT DESCRIPTION.

The items of equipment that are tested by the same UUT test program are described below.

a. Television Sensor Assembly. The television (TV) sensor assembly (figure 7-1) is an LRU of the TADS day sensor assembly. It is a small TV camera that creates TV images of target scenes and converts them into electrical signals used for target acquisition and tracking. Major assemblies of the TV sensor assembly are shown in the figure.

b. Visual Multiplexer Assembly. The visual multiplexer assembly (figure 7-1) is an LRU of the TADS night sensor assembly. It is a small TV camera with a special right-angle lens. It converts an optical image created by an LED array into a video image that is converted into a TV signal by other equipment. Major assemblies of the visual multiplexer assembly are shown in the figure.

c. Visual Relay/Multiplexer Assembly. The visual relay/multiplexer assembly (figure 7-1) is an LRU of the PNVS turret. It is identical to the TADS visual multiplexer assembly, except that the special lens is not a right-angle lens. It serves the same purpose to the PNVS equipment as the visual multiplexer assembly does to the TADS equipment.

7-2. UUT DESCRIPTION. (CONT)

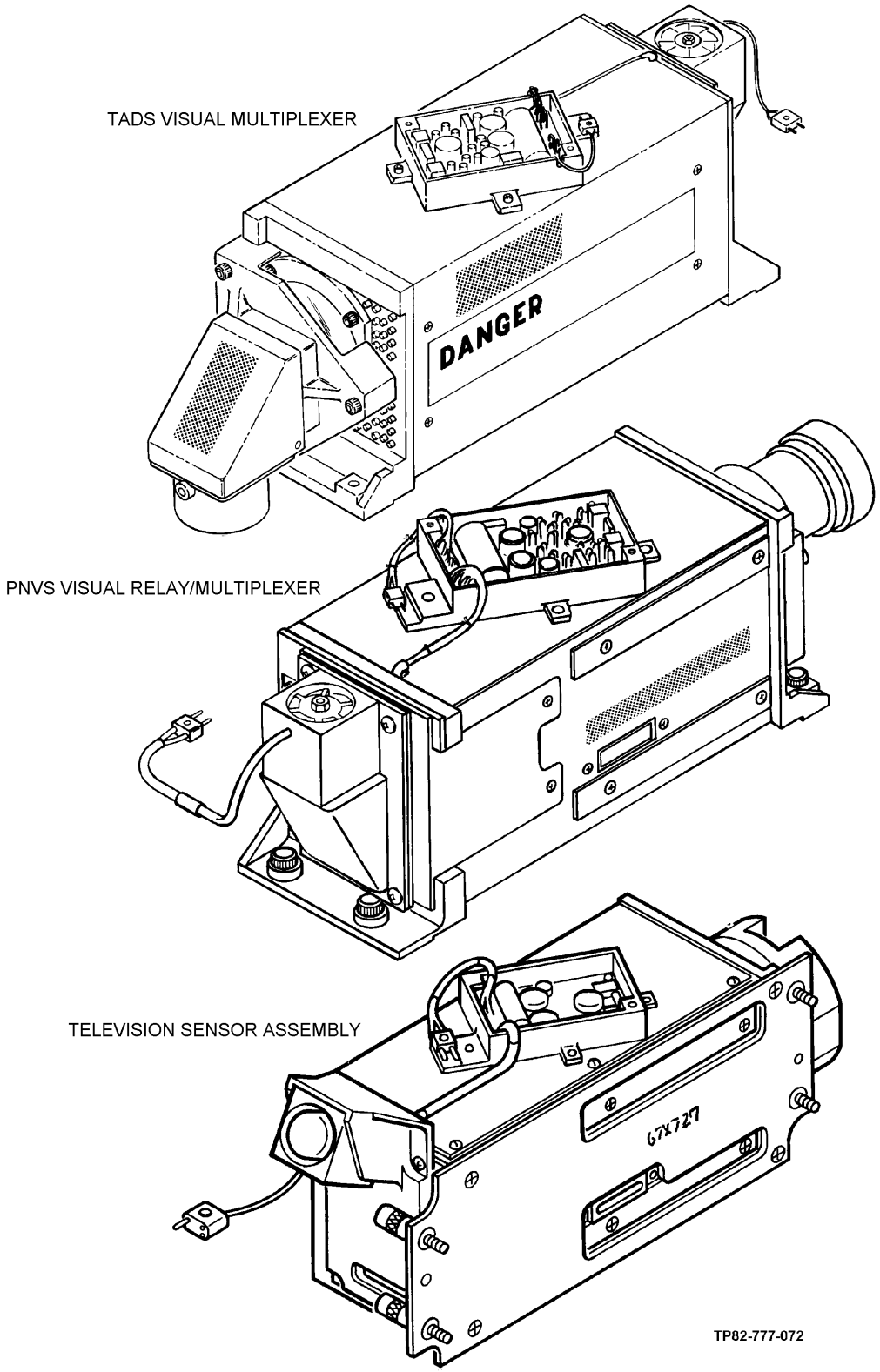


Figure 7-1. Television Sensor Assembly, Visual Multiplexer Assembly, and Visual Relay/Multiplexer Assembly

7-2. UUT DESCRIPTION. (CONT)

d. Solid State Camera Assembly. The three solid state camera assemblies (figure 7-2) are interchangeable with the television (TV) sensor assembly, visual multiplexer assembly and visual relay/ multiplexer assembly located in the PNUS turret, TADS FLIR and day sensor. Each solid state camera assembly contains a charge coupled device (CCD) camera. The only external visual difference of the solid state camera assemblies is the attaching lens assemblies and the filter/cabling assemblies mounted on top.

7-3. PRECAUTION FOR VIDICON TELEVISION TUBES.

The vidicon television tube, a component of LRUs identified in para a, b & c, is delicate and easily damaged. For this reason, always handle the UUT with care and do not jar it or allow any object to strike it. Do not touch the face plate of the vidicon and the optical surfaces of the lenses to avoid contamination.

7-3. PRECAUTION FOR VIDICON TELEVISION TUBES. (CONT)

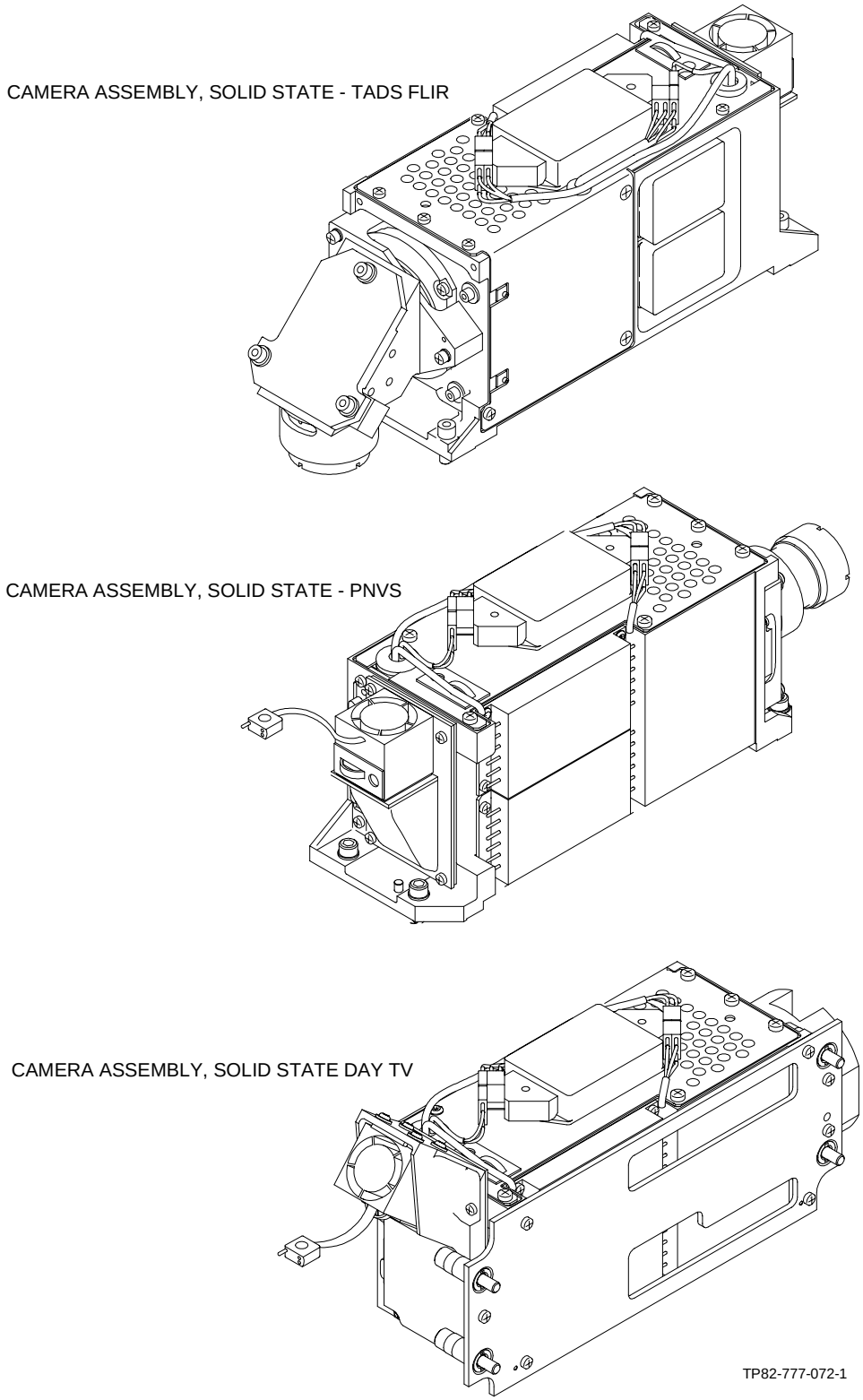


Figure 7-2. Camera Assemblies, Solid State - (TADS FLIR, PNVS, DAY TV)

Section II. DESCRIPTION OF TEST

7-4. GENERAL.

This section describes the UUT test for the TV sensor, visual multiplexer, visual relay/multiplexer, and solid state camera assemblies. It contains an explanation of the way testing is accomplished and a description of the test.

7-5. TEST CONCEPT.

The UUT test is supplemented by procedures in section III of this chapter, and by illustrations in section IV. While you are performing the UUT test, message prompts on the VDT will direct you to perform one of the procedures in section III, or to refer to an illustration in section IV.

a. Procedures.Section III contains procedures to remove the TV sensor assembly and solid state camera assembly from the shipping and storage container and to replace it in the container. These procedures do not apply to the UUT test until called for by the test program. At the appropriate time during the test, a message prompt on the VDT will direct you to perform a set of procedures in this section. At that time, turn to the referenced paragraph and perform those procedures, as the program cannot continue until they have been performed.

b. Illustrations. Section IV contains illustrations that supplement the UUT test procedures on the VDT. The procedures cannot be successfully accomplished unless you refer to the appropriate illustrations when directed by message prompts. In addition to showing you how to make an adjustment or locate a component, many of the illustrations contain explanatory data, cautions relating to equipment damage, and warnings relating to shock hazards. At the appropriate time during the UUT test, a message prompt will refer to an illustration in section IV. Turn to the referenced illustration for assistance while performing the following instructions on the VDT.

7-6. TEST DESCRIPTION.

When the UUT test program has run the selected self-tests and is ready to test the UUT, either the vidicon tube or solid state camera test menu will be displayed on the VDT as shown below:

7-6. TEST DESCRIPTION. (CONT)

TEST MENU (VIDICON TUBE)

ELECTRICAL TESTS
10. ALL ELECTRICAL TESTS

PRE-ALIGNMENT TESTS
20. ALL PRE-ALIGNMENT TESTS

VIDEO TESTS
30. ALL VIDEO TESTS
31. VIDEO PEAKING TEST
32. VIDEO AMPLITUDE TEST
33. VIDEO SNR TEST
34. CTF TEST

99. EXIT

RASTER GEOMETRY TESTS
40. ALL RASTER GEOMETRY TESTS
41. RASTER ROTATION TEST
42. TEMPERATURE CONTROL TEST
43. HORIZONTAL SIZE TEST
44. VERTICAL SIZE TEST
45. BORESIGHT AND SCALING TEST
46. GEOMETRIC DISTORTATION TEST

SIGNAL UNIFORMITY TESTS
50. ALL SIGNAL UNFORMITY TESTS
51. SHADING TEST
52. BLEMISH TEST
53. AFTER IMAGE TEST

ENTER NUMBER OF THE TEST TO BE PERFORMED AND PRESS <RETURN>:

Paragraphs a through e below explain the vidicon tube test options.

a. **ELECTRICAL TESTS**. This test monitors certain critical camera voltages for proper amplitude. No adjustment is provided.

b. **PRE-ALIGNMENT TESTS**. The prealinement tests allow you to make coarse adjustments of the raster geometry and signal uniformity tests before those tests are performed so that the parameters are measurable during those tests.

(1) **RESOLUTION**. Check and adjust focus and astigmatism.

(2) **UNIFORMITY**. Check for uniform shading of the target and adjust shading potentiometers if necessary.

(3) **PREROTATION**. Check mechanical alinement of the vidicon. Check size and centering of the target.

(4) **BEAM SATURATION TEST**. Check the vidicon beam current for proper saturation. Adjustment may be necessary if the target is too dim, too bright, or indistinct.

c. **VIDEO TESTS**. These tests check the vidicon output for proper video.

(1) **VIDEO PEAKING TEST**. Adjust for proper black-to-white transition in the video output to eliminate smears and bleeding.

7-6. TEST DESCRIPTION. (CONT)

(2) **VIDEO AMPLITUDE TEST**. Measure the peak-to-peak amplitude of the target video for minimum value.

(3) **VIDEO SNR TEST**. Measure the target signal-to-noise ratio.

(4) **CTF TEST**. Contrast transfer function test. Measure the black-to-white response (contrast) at certain frequencies and adjust as necessary.

d. **RASTER GEOMETRY TESTS**. These tests check the vidicon output for proper reproduction of target video and check the boresight offset circuits.

(1) **RASTER ROTATION TEST**. Measure the mechanical rotation of the vidicon and adjust if necessary.

(2) **TEMPERATURE CONTROL TEST**. Check the temperature control circuits on top of the camera for proper operation and adjust if necessary.

(3) **HORIZONTAL SIZE TEST**. Check the horizontal size potentiometers (full scan and underscan) for proper adjustment to allow size markers generated by the camera to match markers generated by the automatic test equipment.

(4) **VERTICAL SIZE TEST**. Check the vertical size potentiometers (full scan and underscan) for proper adjustment to allow size markers generated by the camera to match markers generated by the automatic test equipment.

(5) **BORESIGHT AND SCALING TEST**. Check the horizontal and vertical centering controls for proper adjustment. Apply horizontal and vertical scaling voltages to the offset circuits of the camera to allow measurement of camera offset.,

(6) **GEOMETRIC DISTORTION TEST**. The crosshatch generator in the automatic test equipment generates a test pattern that is superimposed over the target to allow measurement of distortion.

e. **SIGNAL UNIFORMITY TESTS**. Check the output video for absence of shading or blemishes.

(1) **SHADING TEST**. Measure any shading in the output video produced by electronic circuits and adjust it out.

(2) **BLEMISH TEST**. Check certain zones on the face of the vidicon for blemishes of certain size, amplitude, and color.

(3) **AFTER IMAGE TEST**. Verify that no test pattern images are produced by the vidicon after test pattern signals are removed. If any exist, an intense light will be generated over the entire vidicon screen and gradually removed to cause any after-images to disappear.

7-6. TEST DESCRIPTION. (CONT)

TEST MENU (SOLID STATE CAMERA)

ELECTRICAL TESTS
10. ALL ELECTICAL TESTS
    11. POWER SUPPLY TEST
    12. ALC/AGC TEST
    13. FDLS TEST

VIDEO TESTS
20. ALL VIDEO TESTS
    21. VIDEO AMPLITUDE/SNR TEST
    22. CTF TEST

IMAGE GEOMETRY TESTS
30. ALL IMAGE GEOMETRY TESTS
31. IMAGE ROTATION TEST
32. BORESIGHT AND SCALING TEST

SIGNAL UNIFORMITY TESTS
40. ALL SIGNAL UNIFORMITY TESTS
    41. SHADING TEST
    42. BLEMISH TEST

99. EXIT

ENTER NUMBER OF THE TEST TO BE PERFORMED AND PRESS <RETURN>:

Paragraphs f through i below explain the solid state camera test options.

f. **ELECTRICAL TESTS**. This section tests the critical voltages on the power supplies and CCAs inside the camera.

(1) **POWER SUPPLY TEST**. Checks the voltages, noise and inhibit characteristics of the five camera power supplies.

(2) **ALC/AGC TEST**. Checks the ALC and AGC function on the analog CCA.

(3) **FDLS TEST**. Checks the voltage and timing parameters of the seven signals accessible via the FDLS function in the camera.

g. **VIDEO TESTS**. These tests check the camera output for proper video.

(1) **VIDEO AMPLITUDE SNR TEST**. Measure the video amplitude and signal to noise ratios with the video amplitude adjusted so that the ALC output is set to 2.40 and 1.00 volts.

(2) **CTF**. Contrast transfer function test. Measure the black-to-white response (contrast) at certain frequencies and directs the operator to focus the camera (if required) to achieve the optimum resolution.

h. **IMAGE GEOMETRY TEST**. These tests check the rotation and boresight of the camera and directs the operator to adjust, if the parameters are out of tolerance.

(1) **IMAGE ROTATION TEST**. Measures the image rotation and adjusts the rotation and boresight, if the parameters are out of tolerance.

7-6. TEST DESCRIPTION. (CONT)

(2) **BORESIGHT AND SCALING TEST**. Measures the image boresight and adjusts the rotation and boresight, if the parameters are out of tolerance. Apply horizontal and vertical scaling voltages to the offset circuits of the camera to allow the measurement of camera offset.

i. **SIGNAL UNIFORMITY TESTS**. Check the output video for absence of shading, blemishes, and after-images.

(1) **SHADING TEST**. Measure any shading in the output video produced by electronic circuits.

(2) **BLEMISH TEST**. Check certain zones on the face of the vidicon for blemishes of certain size, amplitude, and color.

7-7. PRETESTING DATA.

Awareness of the following information will help you to successfully test the UUT, and may prevent unnecessary termination of the test.

CAUTION

To prevent possible burning of UUT vidicon tube, perform all image evaluations and UUT adjustments quickly.

a. Possible Vidicon Burns. The image of the optical signal generator test chart may become permanently burned into the UUT vidicon tube if viewed for long periods of time.

CAUTION

Operation of visual multiplexer or visual relay/multiplexer assemblies in the underscan mode beyond 2 minutes may produce permanent underscan raster burn on the vidicon tube.

b. Automatic Return to Full Scan Mode. Prolonged operation of the visual multiplexer assembly and the visual relay/multiplexer assembly in the underscan mode may produce a permanent underscan raster burn on the vidicon tube. Therefore, the program will automatically return to full scan operation for 2 minutes if operation in the underscan mode exceeds 2 minutes.

c. UUT Warmup. Since some UUT parameters are temperature dependent, accurate evaluation requires that a sufficient warmup period be allowed prior to measurement. The UUT test program automatically provides the required warmup period in the ALL TEST and MENU SELECTION modes. A message on the VDT will inform you that a warmup period is in progress.

7-8. FINAL ACCEPTANCE.

When the UUT has been repaired, repeat the UUT test. If an ALL TESTS GO prompt is received at the end of the test, the UUT is considered to be fully operational.

Section III. TEST PROMPTED PROCEDURES

7-9. TELEVISION SENSOR ASSY/SOLID STATE CAMERA ASSY REMOVAL FROM SHIPPING AND STORAGE CONTAINER.

WARNING

HEAVY OBJECT

- Excessive strain can cause serious injury.
- Don't: Attempt to lift or carry heavy objects alone.
- Do: Get help for lifting or carrying heavy objects.
- If you experience a sudden pain while lifting or discomfort after lifting, get medical help at once.

NOTE

Two people are required when performing this task.

a. Press container pressure relief valve (1, figure 7-3).

b. Open container latches (2).

c. Remove container lid (3) and set aside in a clean dry area.

d. Carefully remove camera assembly (4) from container.

CAUTION

EQUIPMENT DAMAGE

The black foam in the shipping container may dry rot over time creating a dust/powder/grit residue. A potential exists for abrasive damage to optics and mechanical assemblies and degradation of optical performance. Inspect and clean assemblies as required.

e. Inspect and remove any dust, black powder, or grit from camera assembly before testing.

f. Replace container lid on container and secure latches.

7-9. TELEVISION SENSOR ASSY/SOLID STATE CAMERA ASSY REMOVAL FROM SHIPPING AND STORAGE CONTAINER. (CONT)

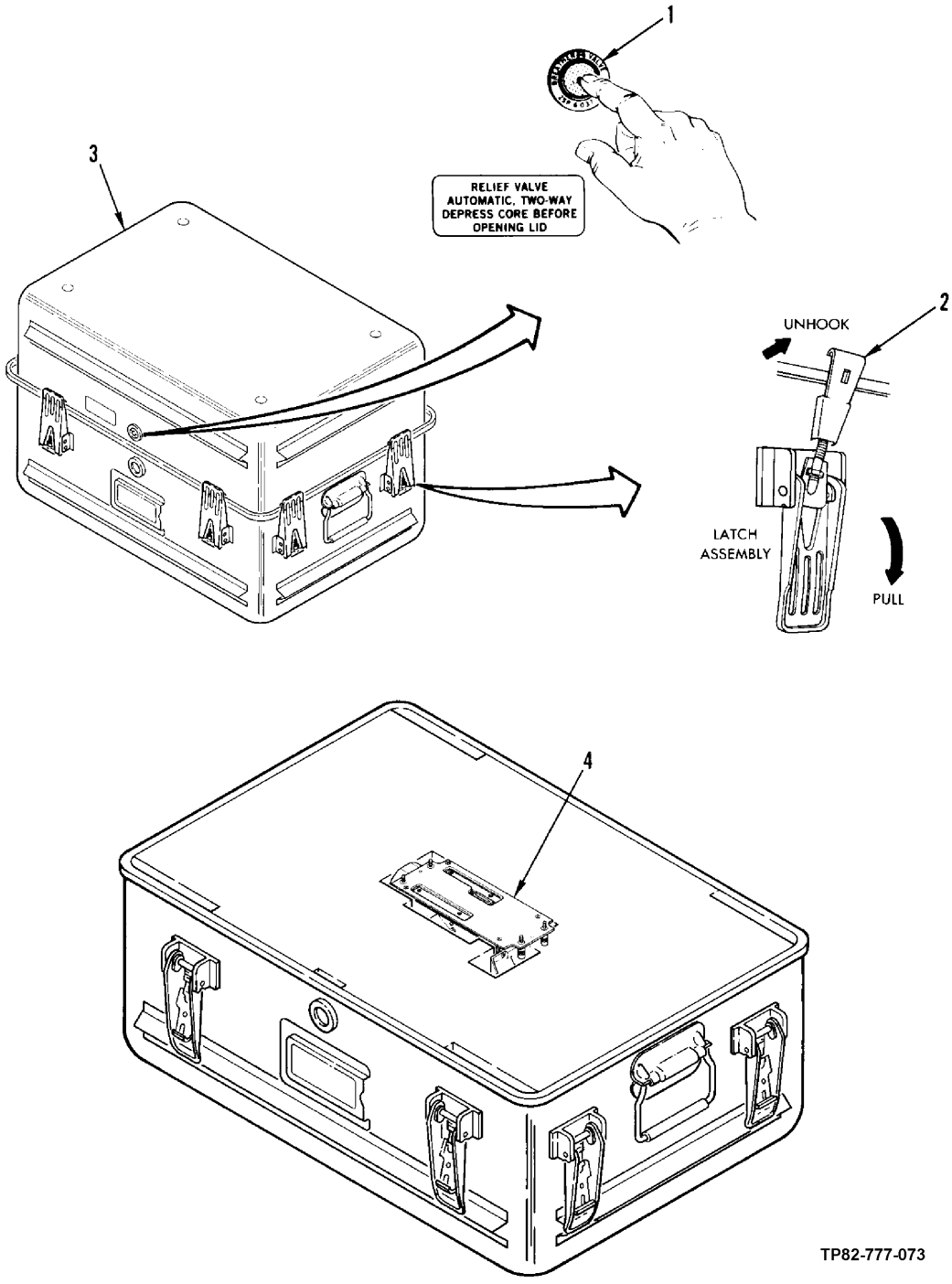


Figure 7-3. Television Sensor Assembly or Solid State Camera Removal from Shipping and Storage Container

7-10. INSTALLATION OF TELEVISION SENSOR ASSY/SOLID STATE CAMERA ASSY IN SHIPPING AND STORAGE CONTAINER.

WARNING

HEAVY OBJECT

- Excessive strain can cause serious injury.
- Don't: Attempt to lift or carry heavy objects alone.
- Do: Get help for lifting or carrying heavy objects.
- If you experience a sudden pain while lifting or discomfort after lifting, get medical help at once.

NOTE

Two people are required when performing this task.

a. Open container latches (1, figure 7-3).

b. Remove container lid (2) and set aside in a clean dry area.

c. Carefully lower camera assembly (3) into container.

CAUTION

EQUIPMENT DAMAGE

The black foam in the shipping container may dry rot over time creating a dust/powder/grit residue. A potential exists for abrasive damage to optics and mechanical assemblies and degradation of optical performance. Inspect and clean assemblies as required.

d. Inspect and remove any dust, black powder, or grit from camera assembly before testing.

e. Replace container lid on container and secure latches.

7-10. INSTALLATION OF TELEVISION SENSOR ASSY/SOLID STATE CAMERA ASSY IN SHIPPING AND STORAGE CONTAINER. (CONT)

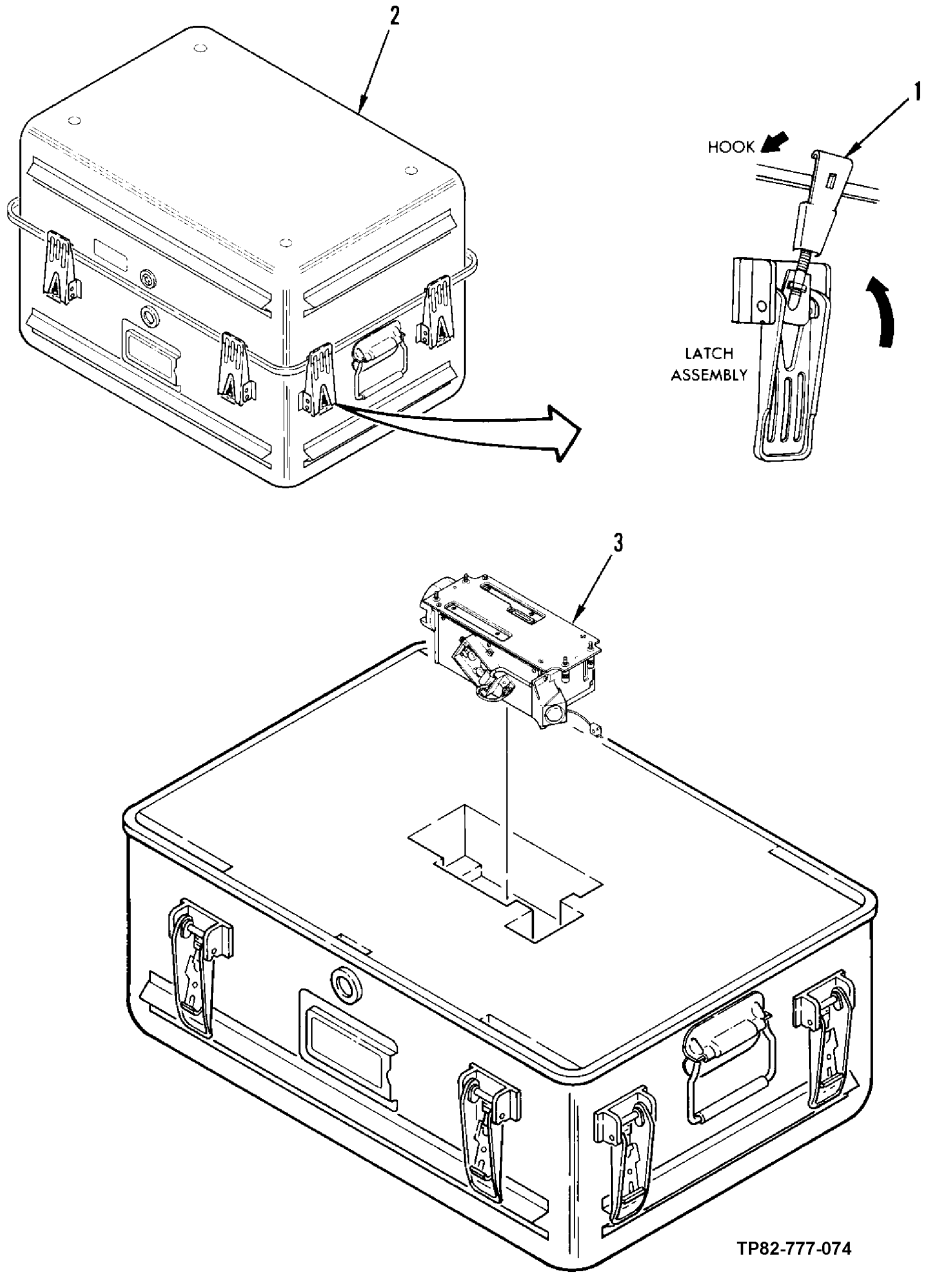


Figure 7-4. Television Sensor Assembly or Solid State Camera Installation into Shipping and Storage Container

Section IV. TEST PROMPTED REFERENCES

7-11. GENERAL.

This section contains illustrations to be referred to while you are performing the UUT test. When the UUT test program directs you to refer to an illustration in this manual, locate the illustration and refer to it for assistance while you perform the following instructions on the VDT.

7-11. GENERAL. (CONT)

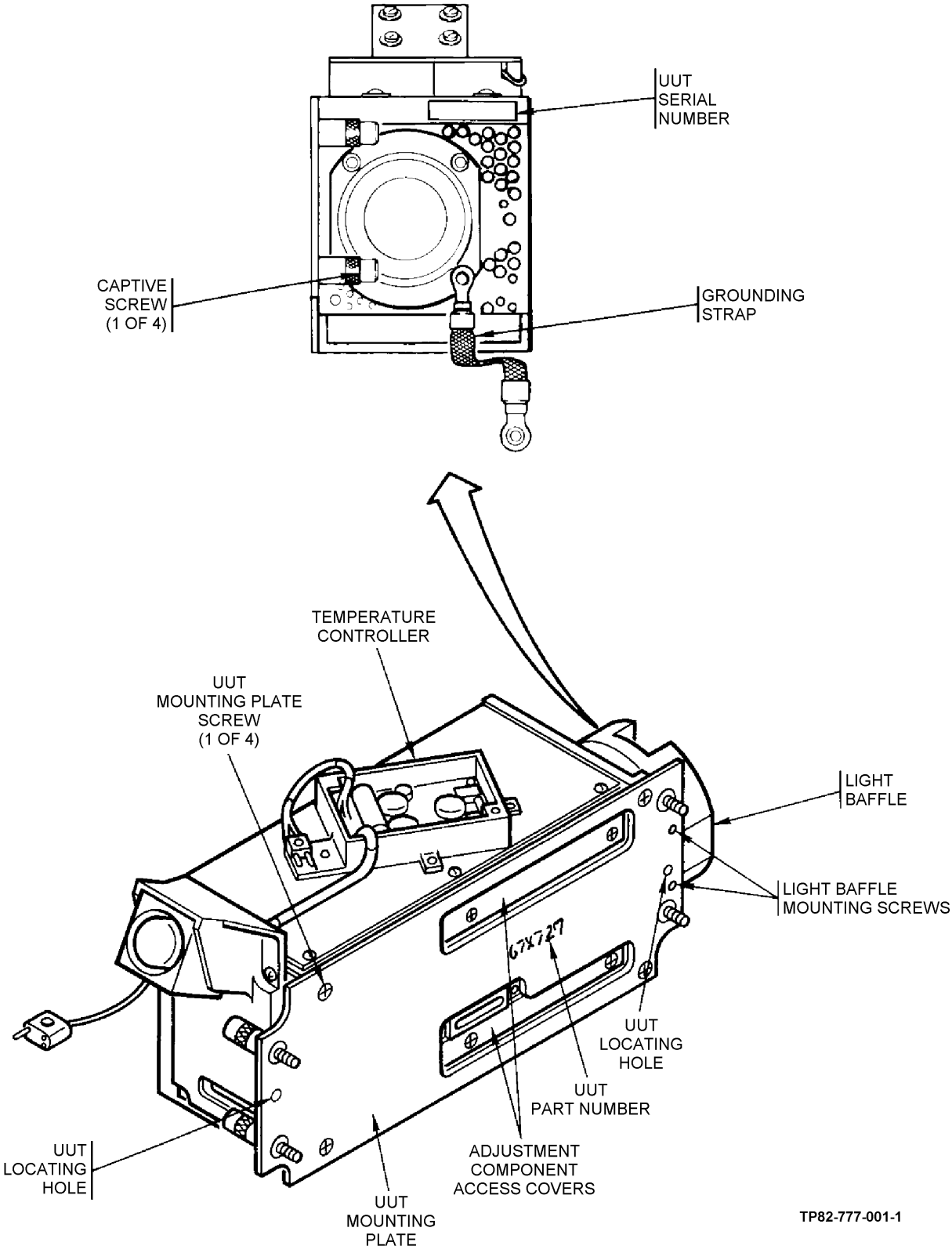


Figure 7-5. Television Sensor Assembly Physical Configuration

7-11. GENERAL. (CONT)

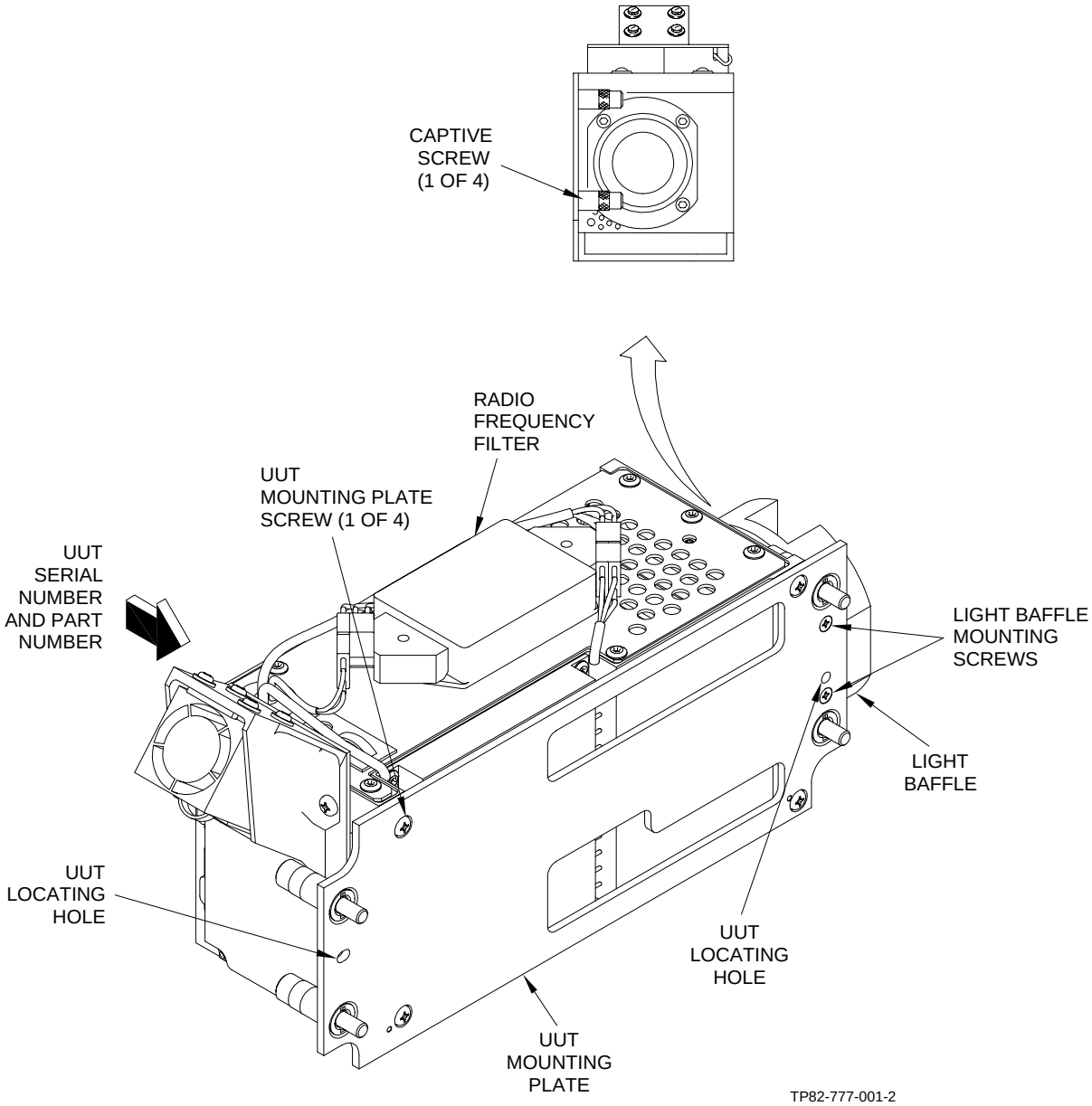


Figure 7-6. Solid State Camera Assembly - DAY TV Physical Configuration

7-11. GENERAL. (CONT)

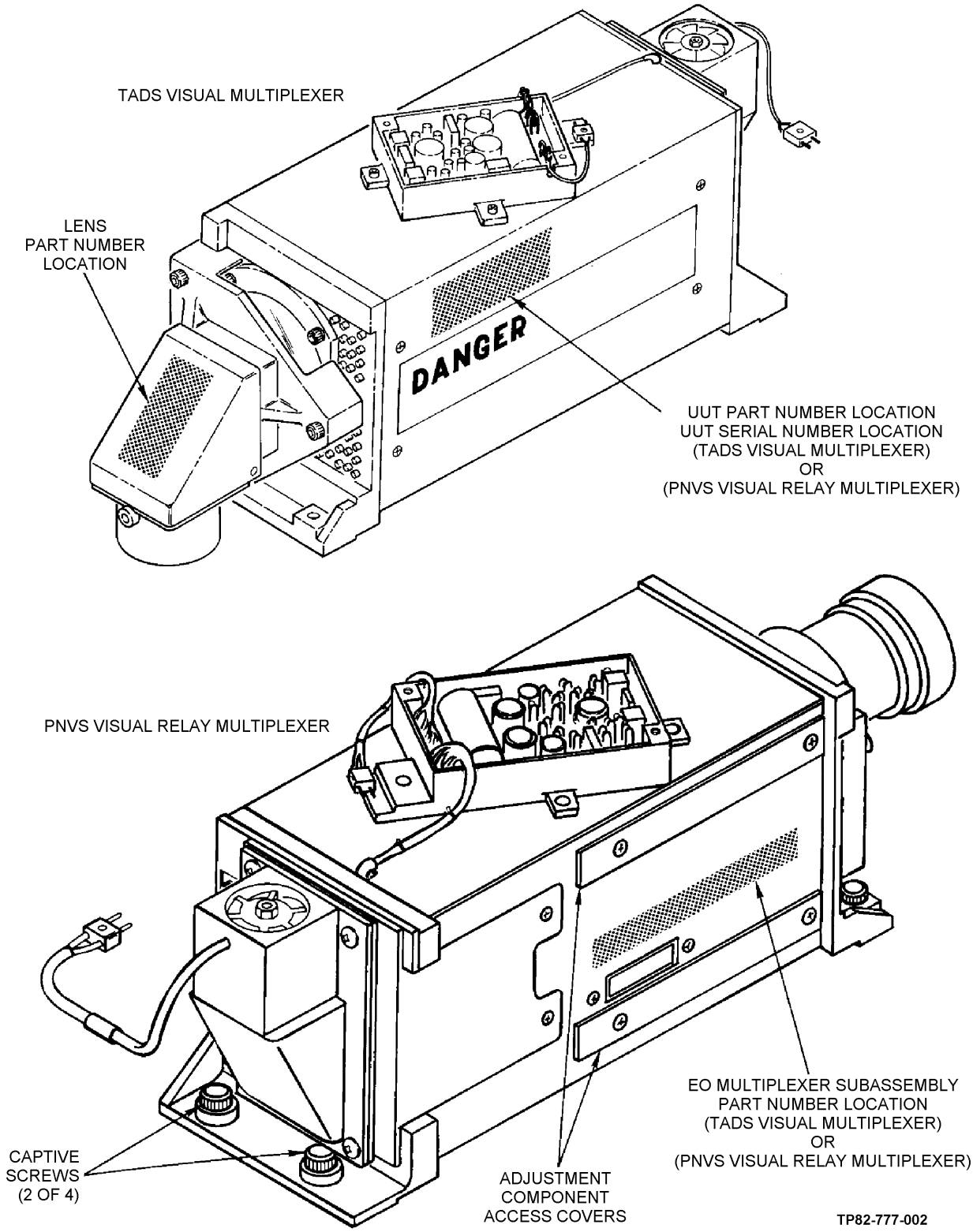


Figure 7-7. TADS Visual Multiplexer and PNVS Relay/Multiplexer Assemblies Physical Configuration

7-11. GENERAL. (CONT)

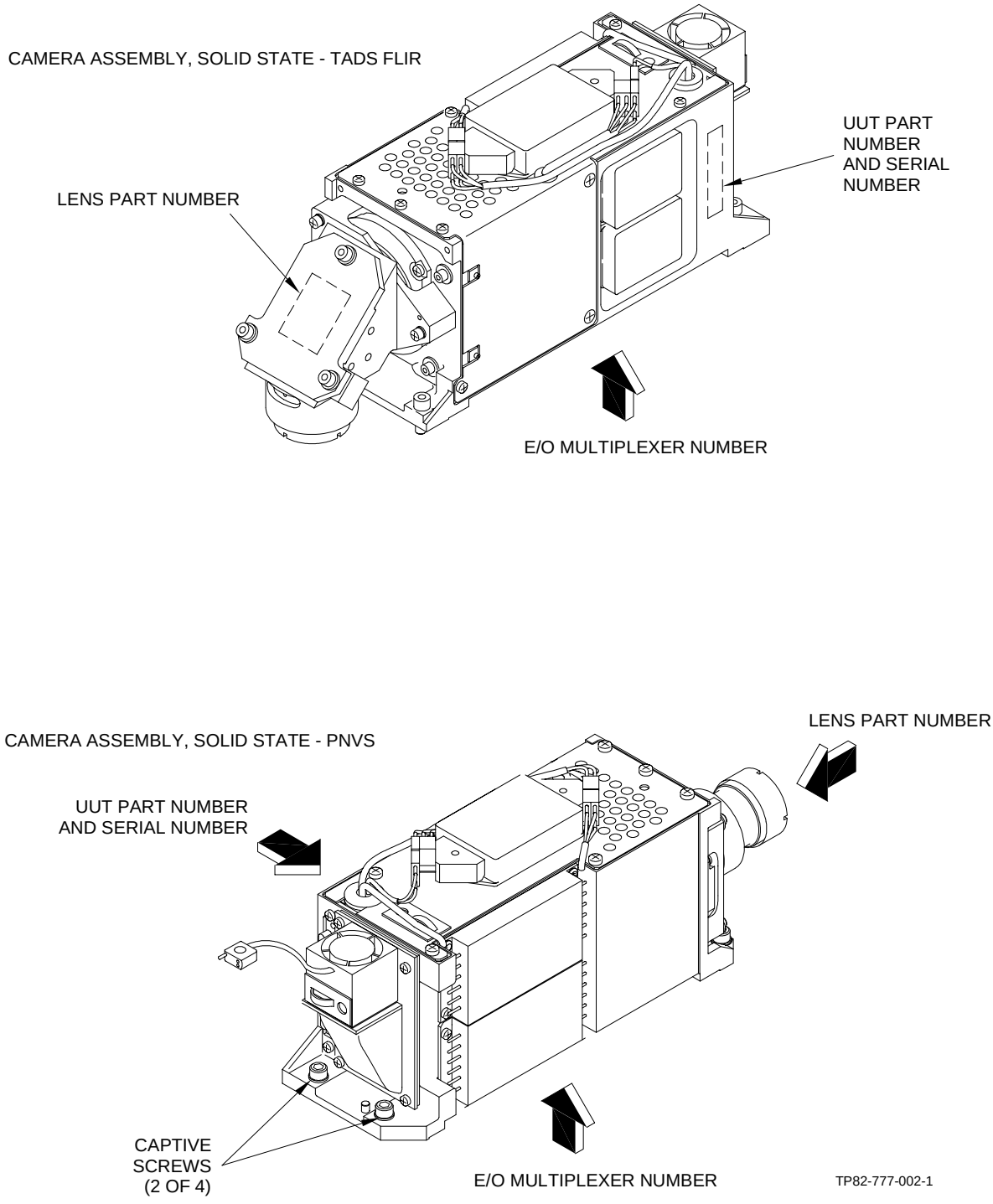


Figure 7-8. Solid State Camera Assemblies (TADS FLIR and PNVS) - Physical Configuration

7-11. GENERAL. (CONT)

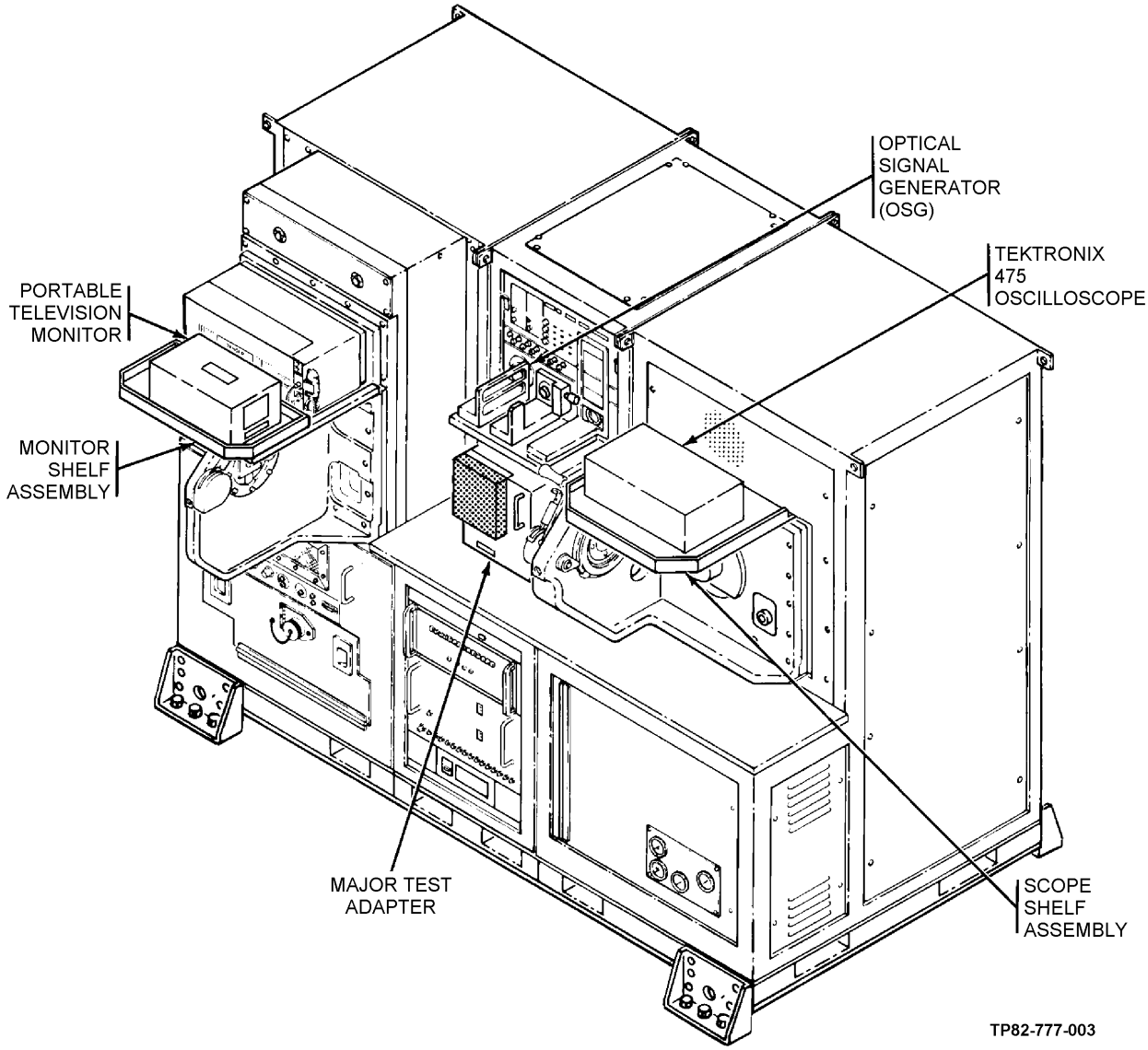


Figure 7-9. Electro-Optical Bench Configuration for Testing

7-11. GENERAL. (CONT)

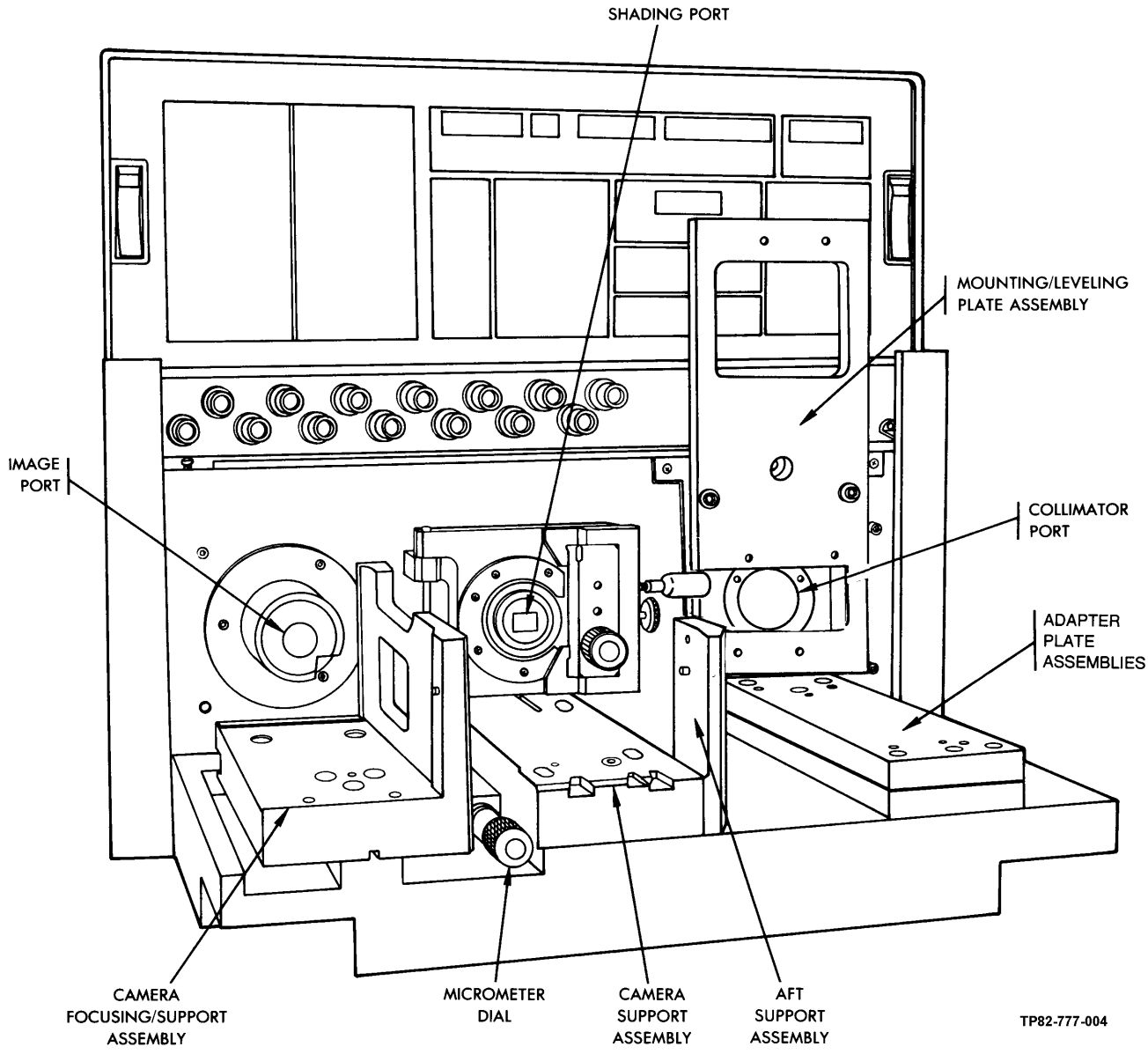


Figure 7-10. Optical Signal Generator Assembly

7-11. GENERAL. (CONT)

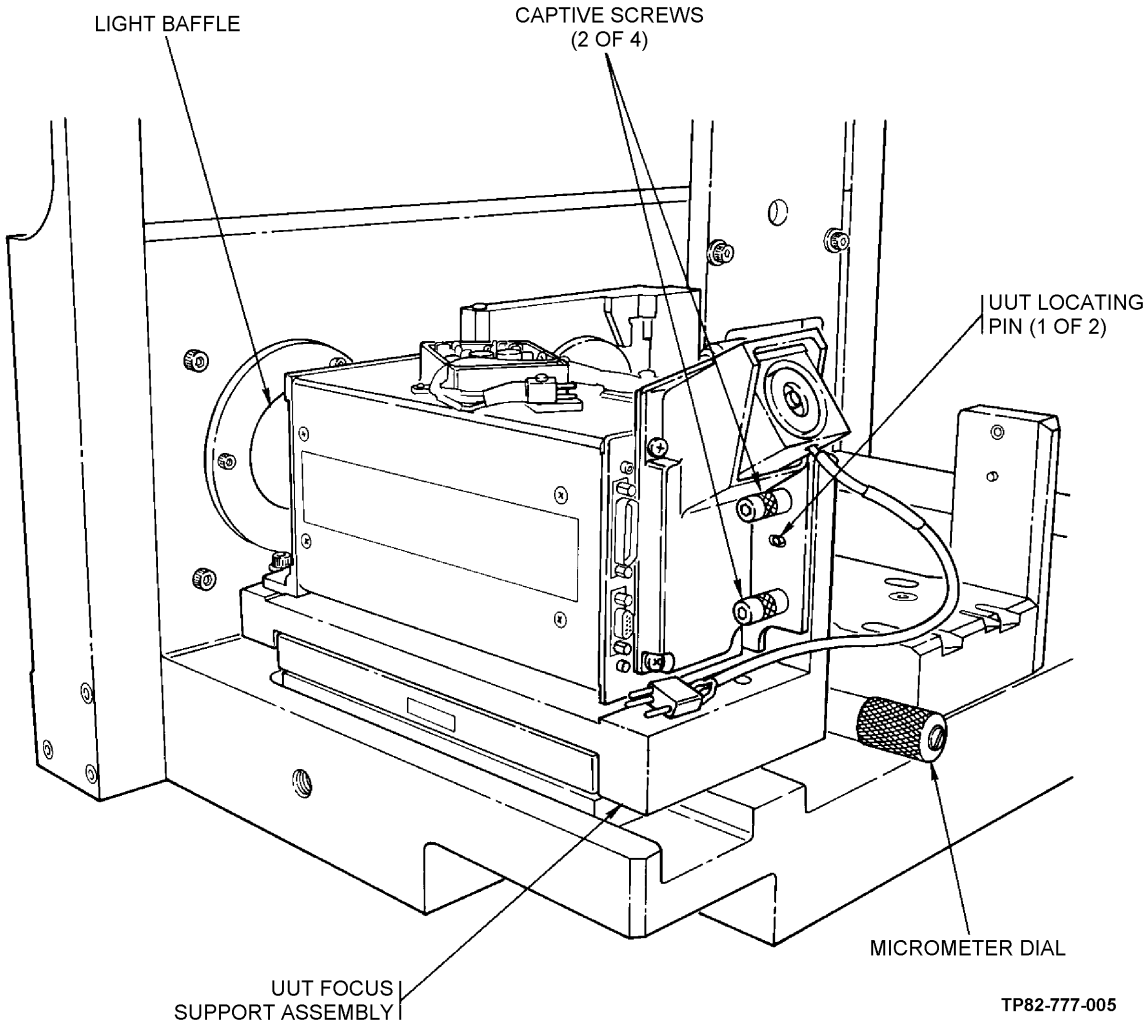


Figure 7-11. Television Sensor Assy or Solid State Camera Assy - DAY TV (not shown) Mounted to Optical Signal Generator Image Port

7-11. GENERAL. (CONT)

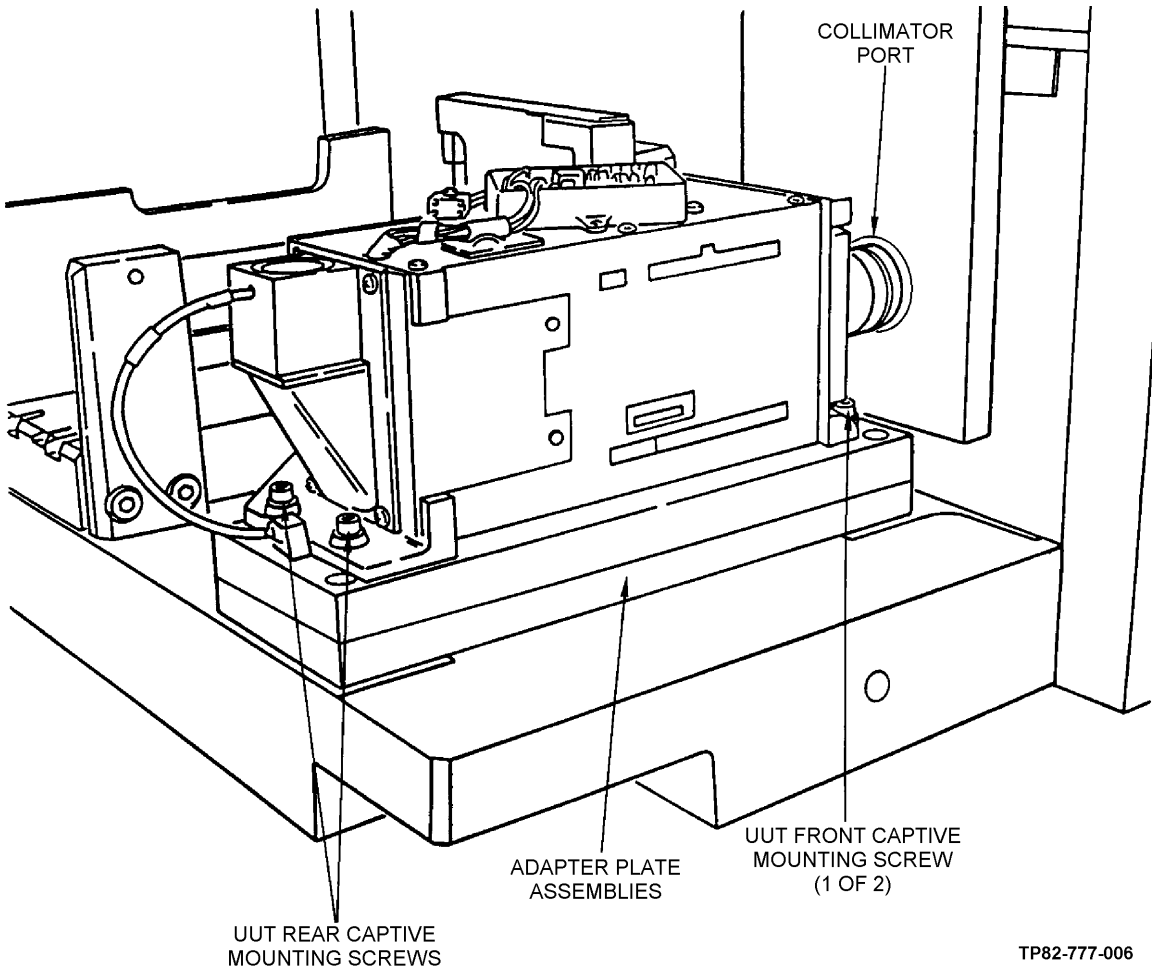


Figure 7-12. PNVS Visual Relay/Multiplexer or Solid State Camera Assy-PNVS (not shown) Mounted to Optical Signal Generator Collimator Port

7-11. GENERAL. (CONT)

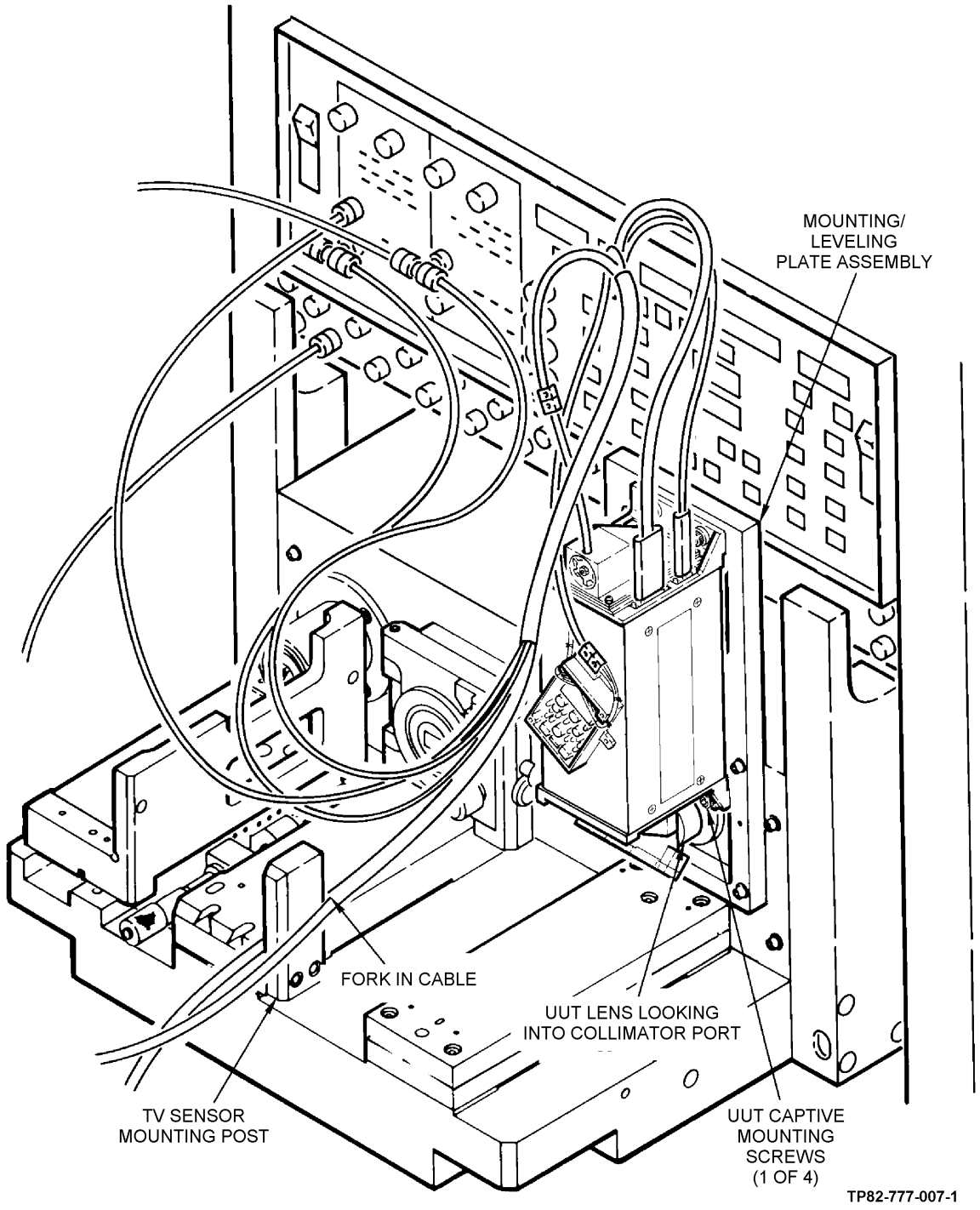


Figure 7-13. TADS Visual Multiplexer or Solid State Camera Assy - TADS FLIR (not shown) Mounted to Optical Signal Generator Collimator Port

7-11. GENERAL. (CONT)

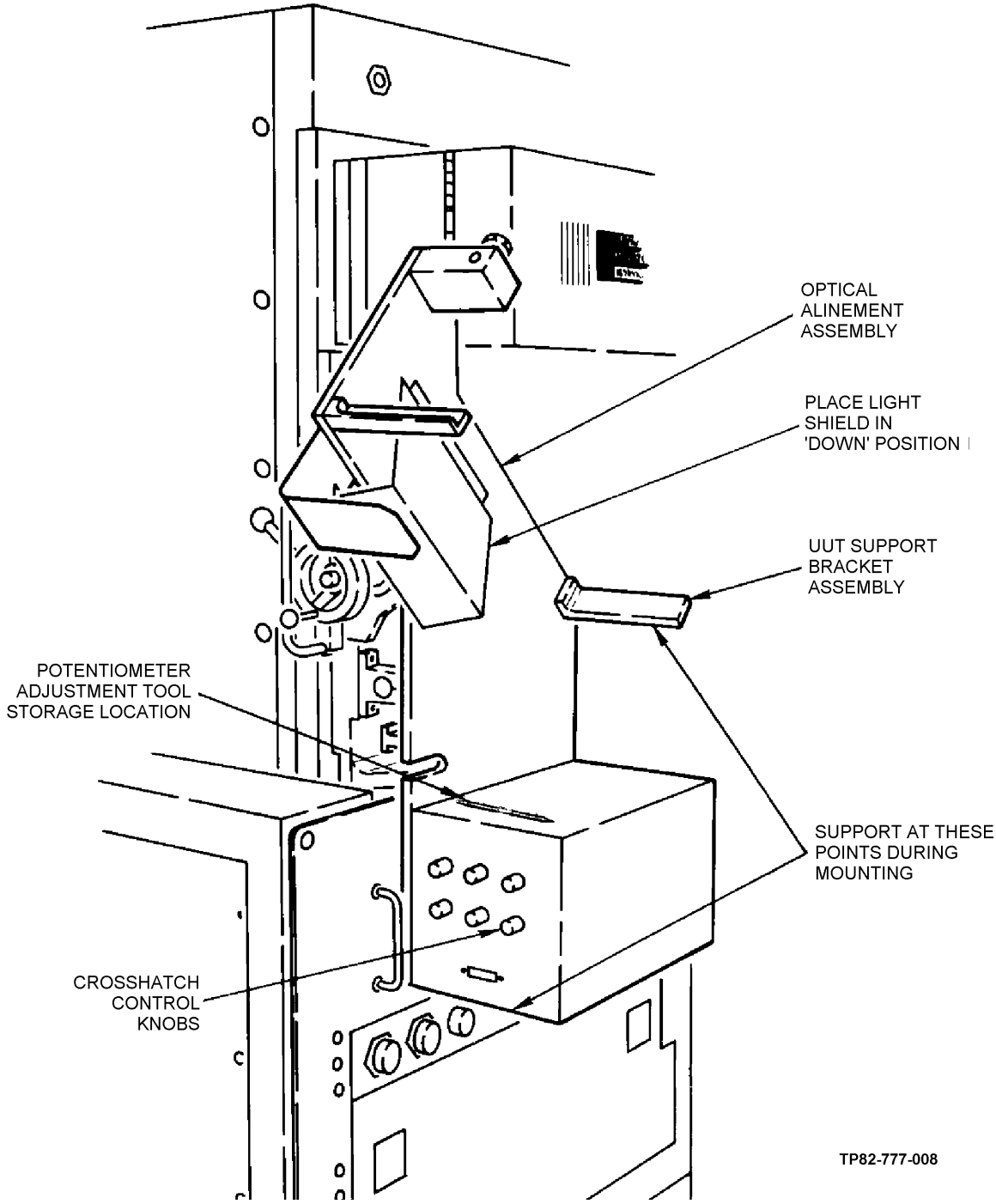


Figure 7-14. Optical Alinement Assembly Mounting Location

7-11. GENERAL. (CONT)

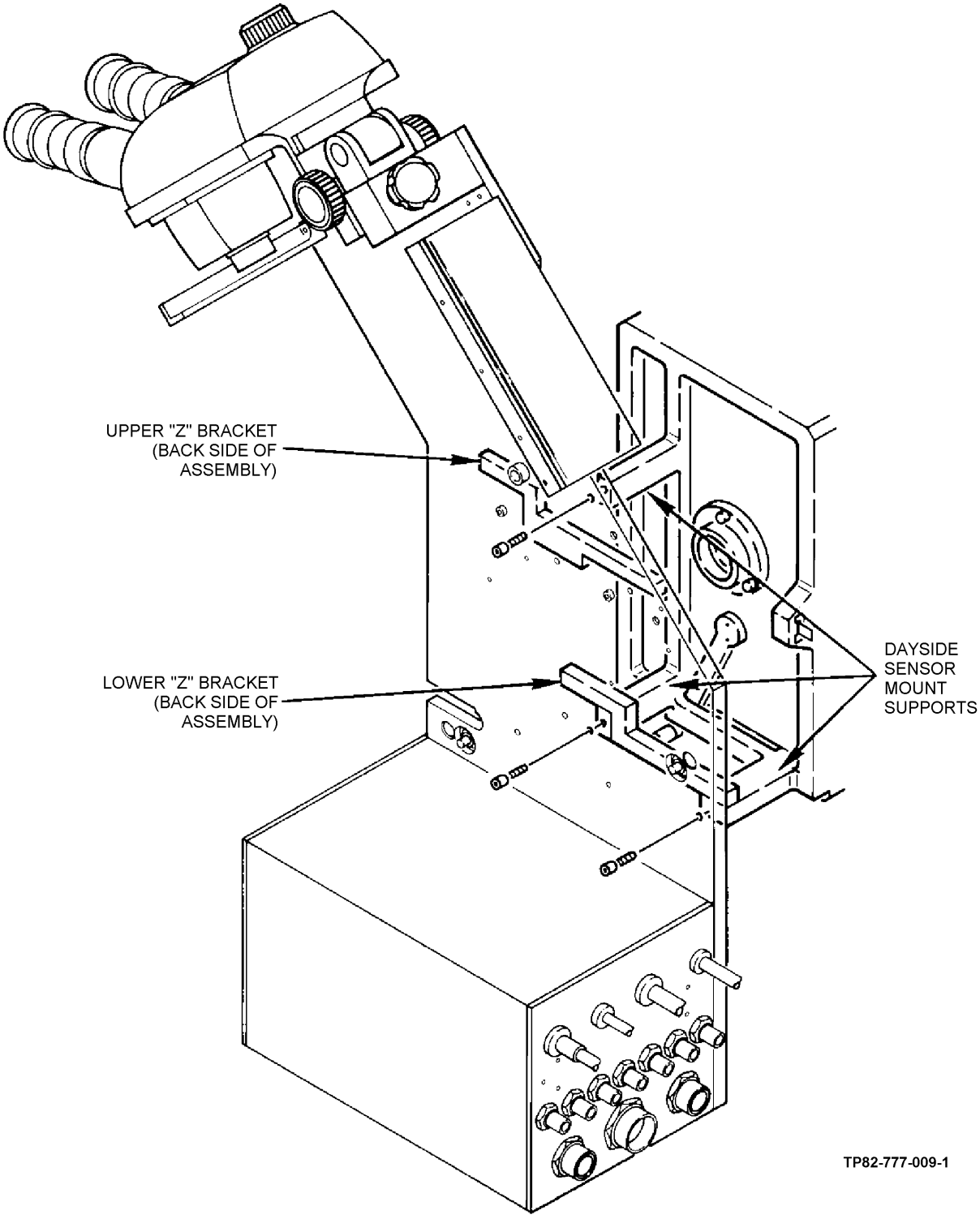


Figure 7-15. Optical Alinement Assembly Installation

7-11. GENERAL. (CONT)

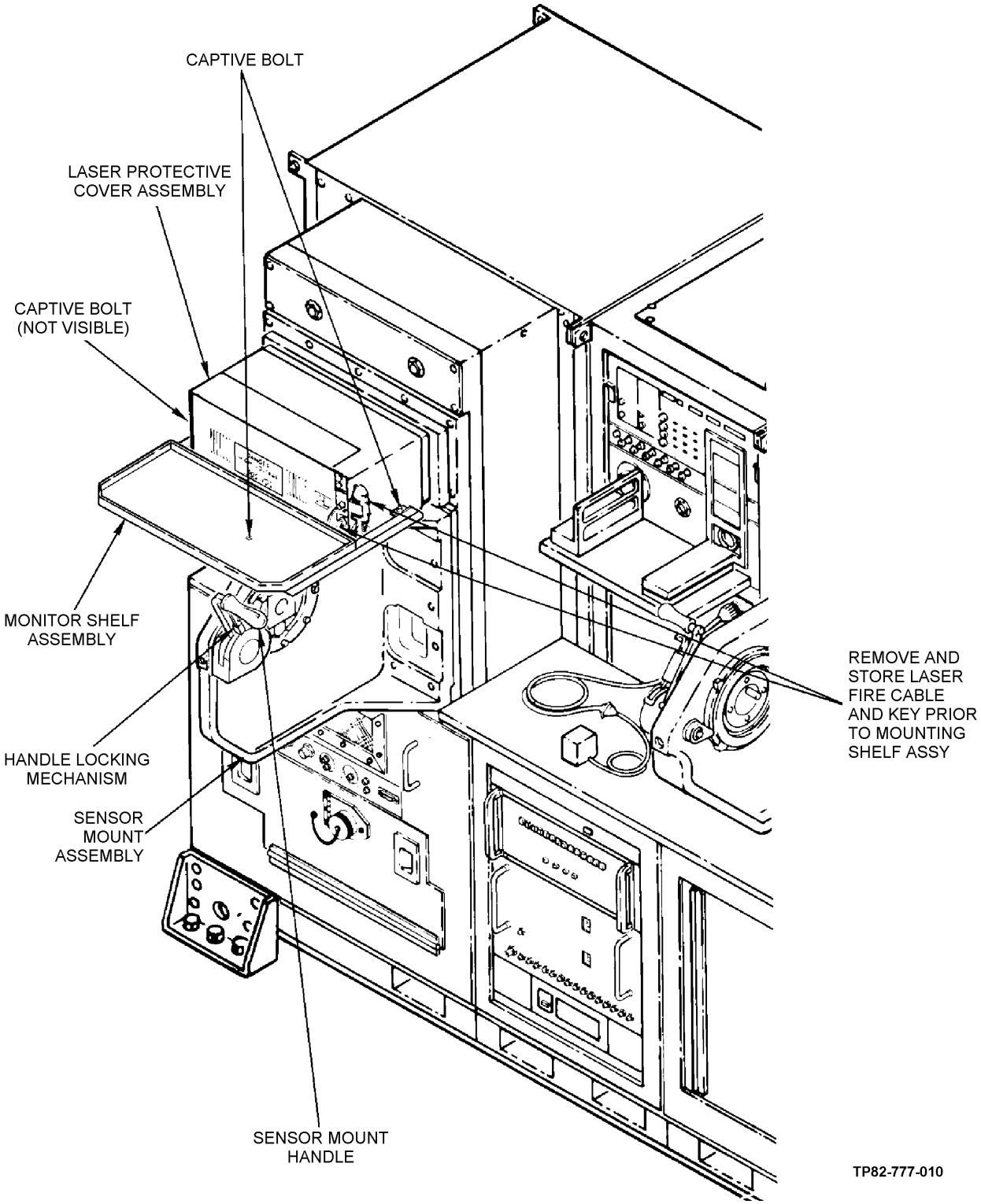


Figure 7-16. Monitor Shelf Assembly Mounting

7-11. GENERAL. (CONT)

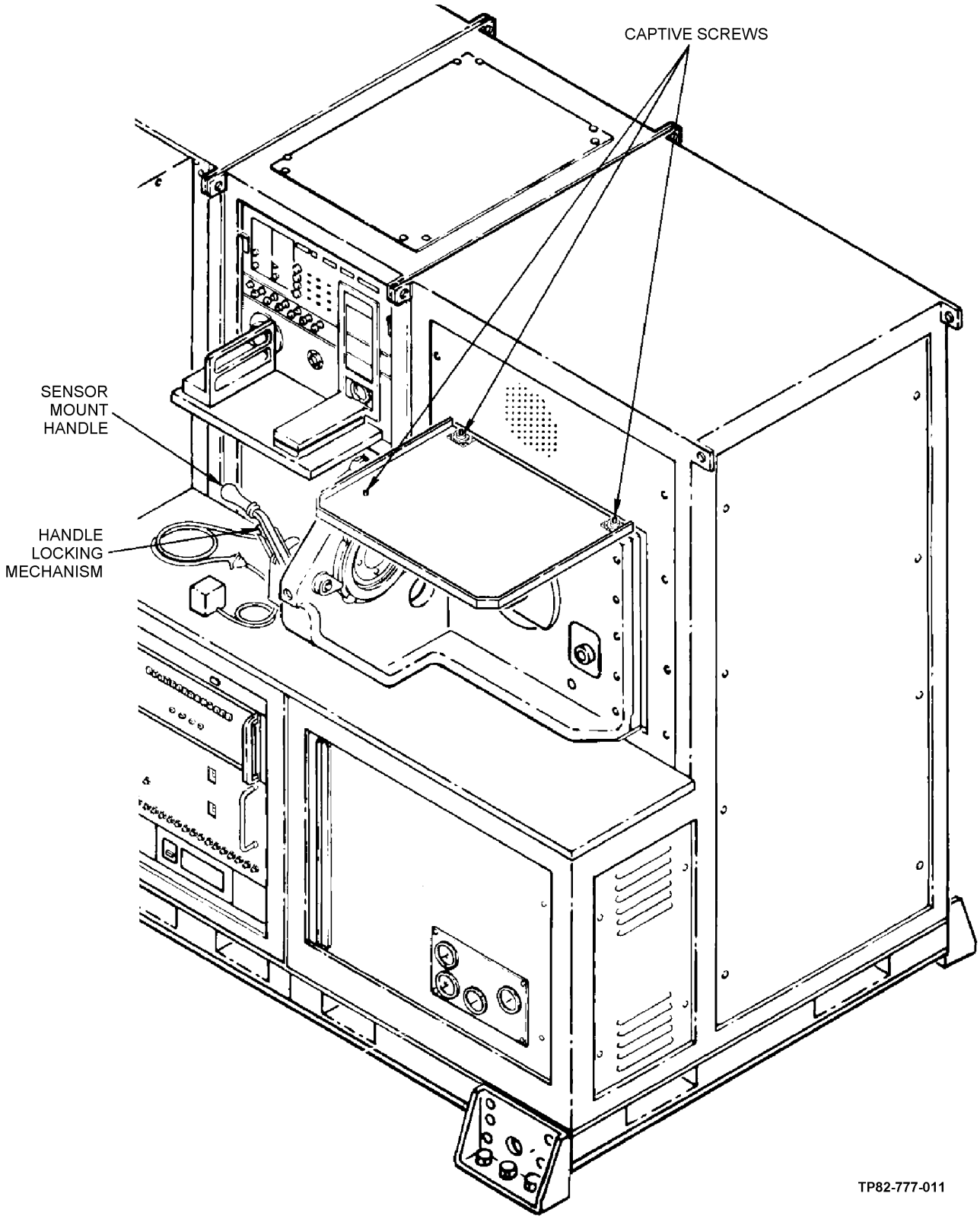


Figure 7-17. Oscilloscope Shelf Assembly Mounting

7-11. GENERAL. (CONT)

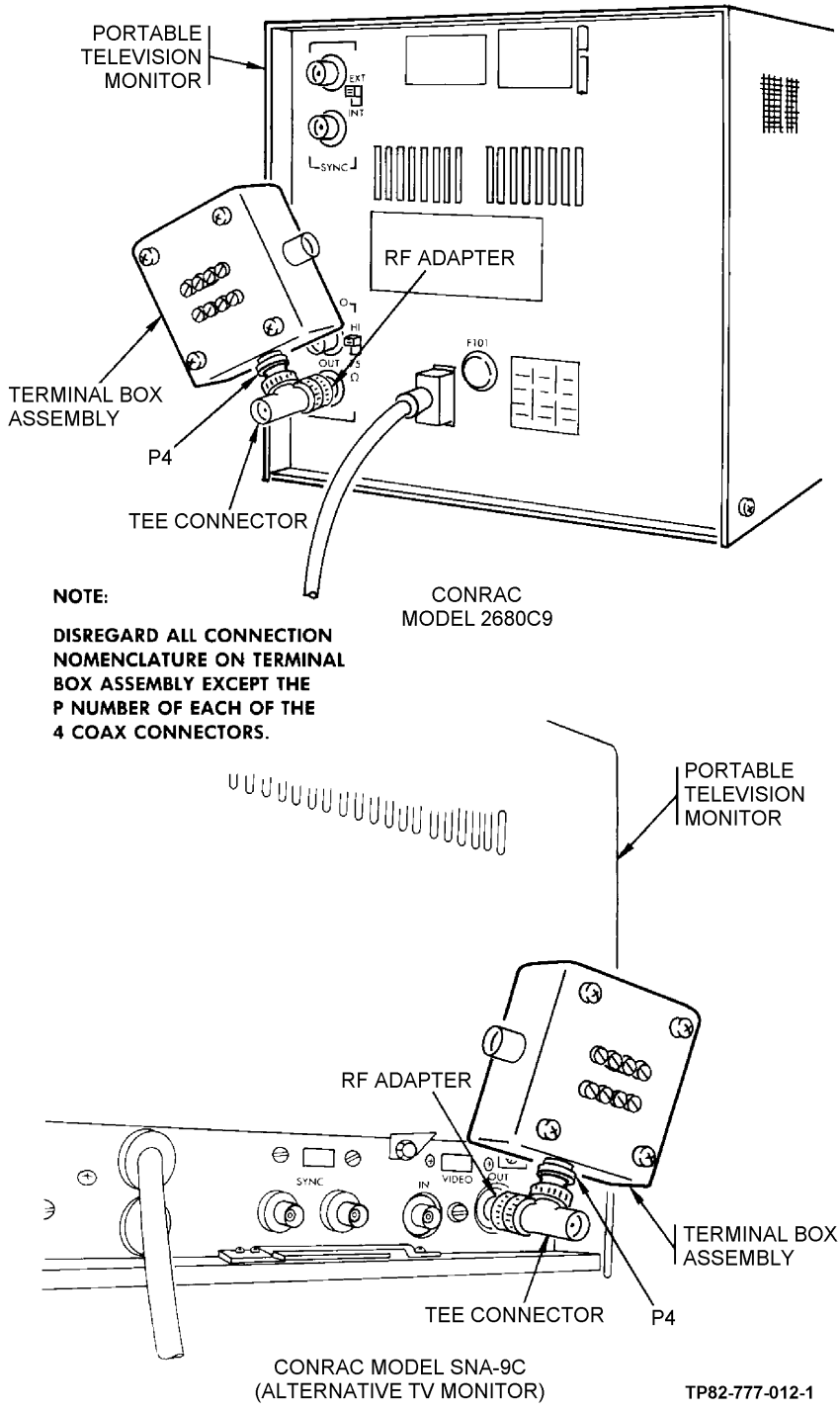


Figure 7-18. Terminal Box/Television Monitor Interface

7-11. GENERAL. (CONT)

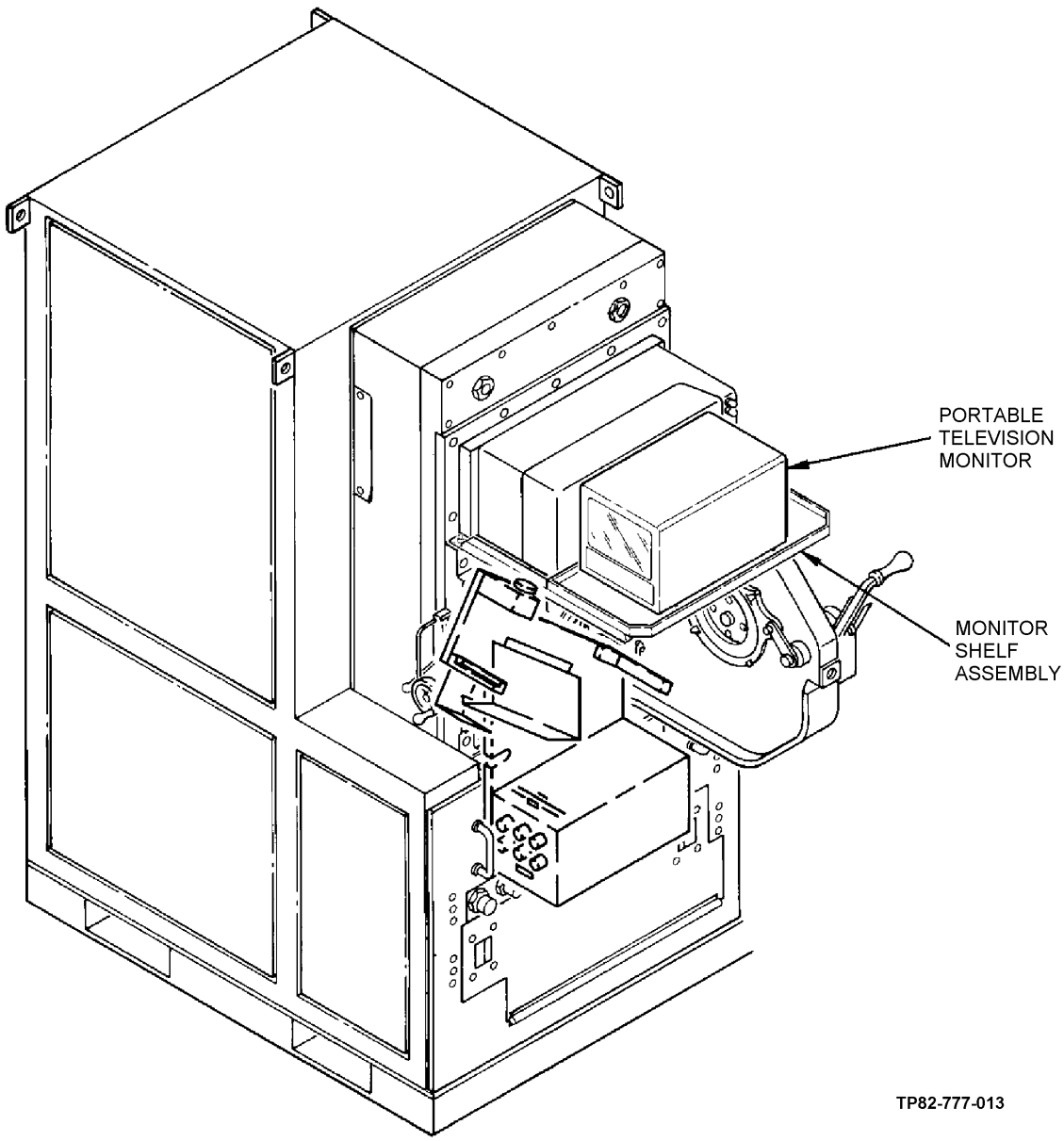


Figure 7-19. Portable Monitor Location for Geometric Distortion Test

7-11. GENERAL. (CONT)

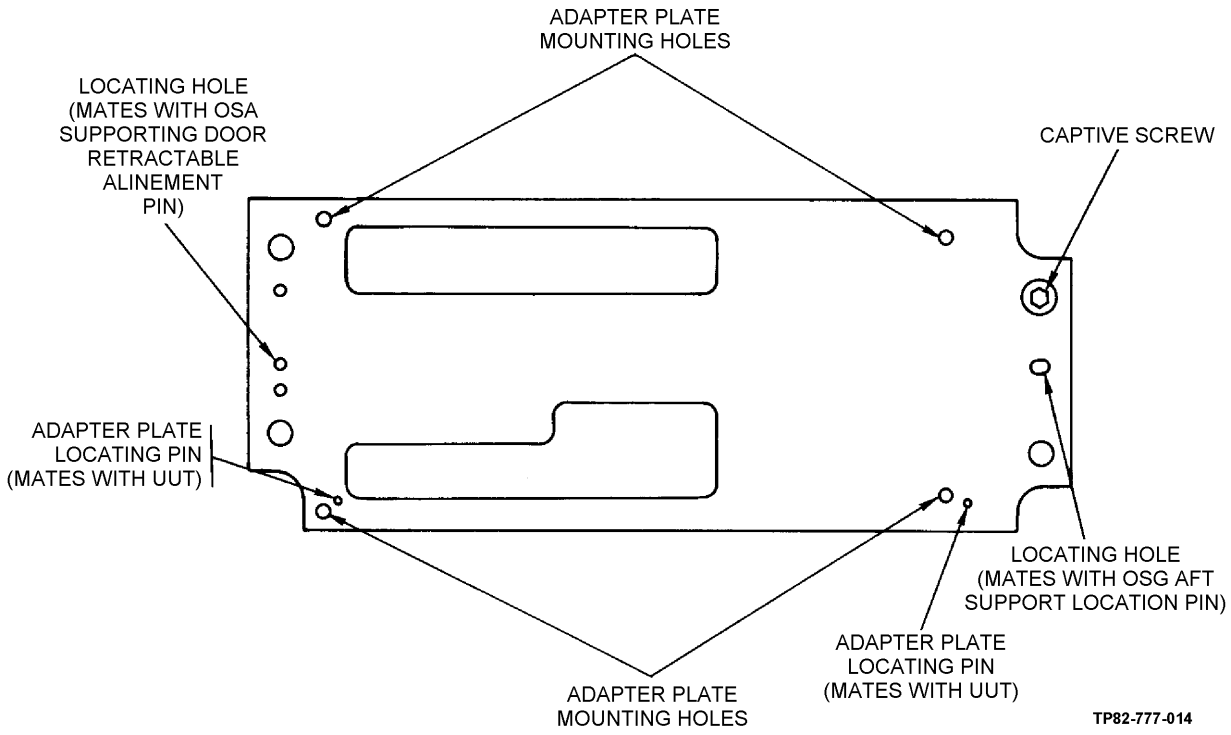


Figure 7-20. Television Sensor Assy or Solid State Camera Assy - DAY TV Adapter Plate Assembly

7-11. GENERAL. (CONT)

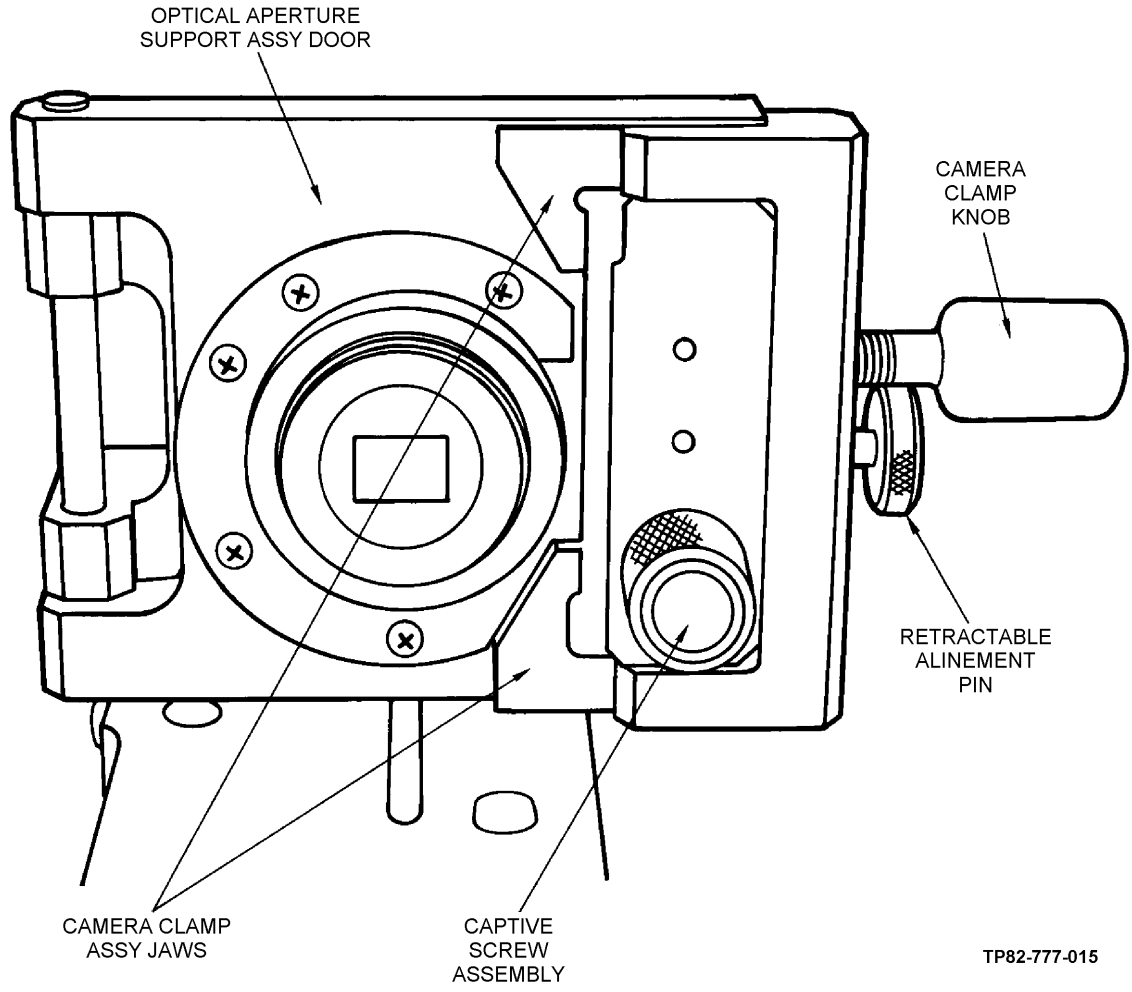


Figure 7-21. Optical Signal Generator Shading Port

7-11. GENERAL. (CONT)

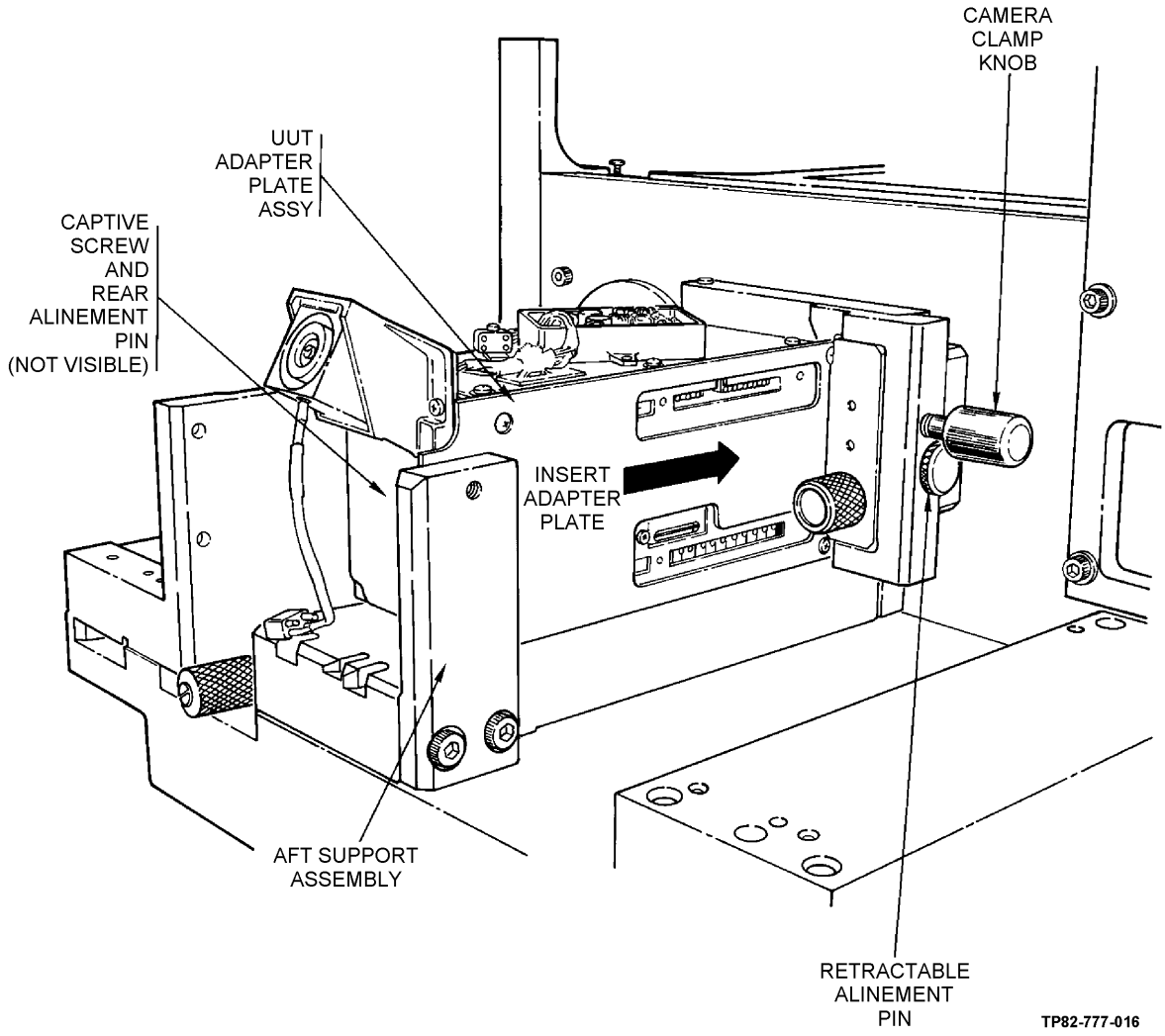


Figure 7-22. Television Sensor Assy or Solid State Camera Assy - DAY TV (not shown) Mounted to Shading Port

7-11. GENERAL. (CONT)

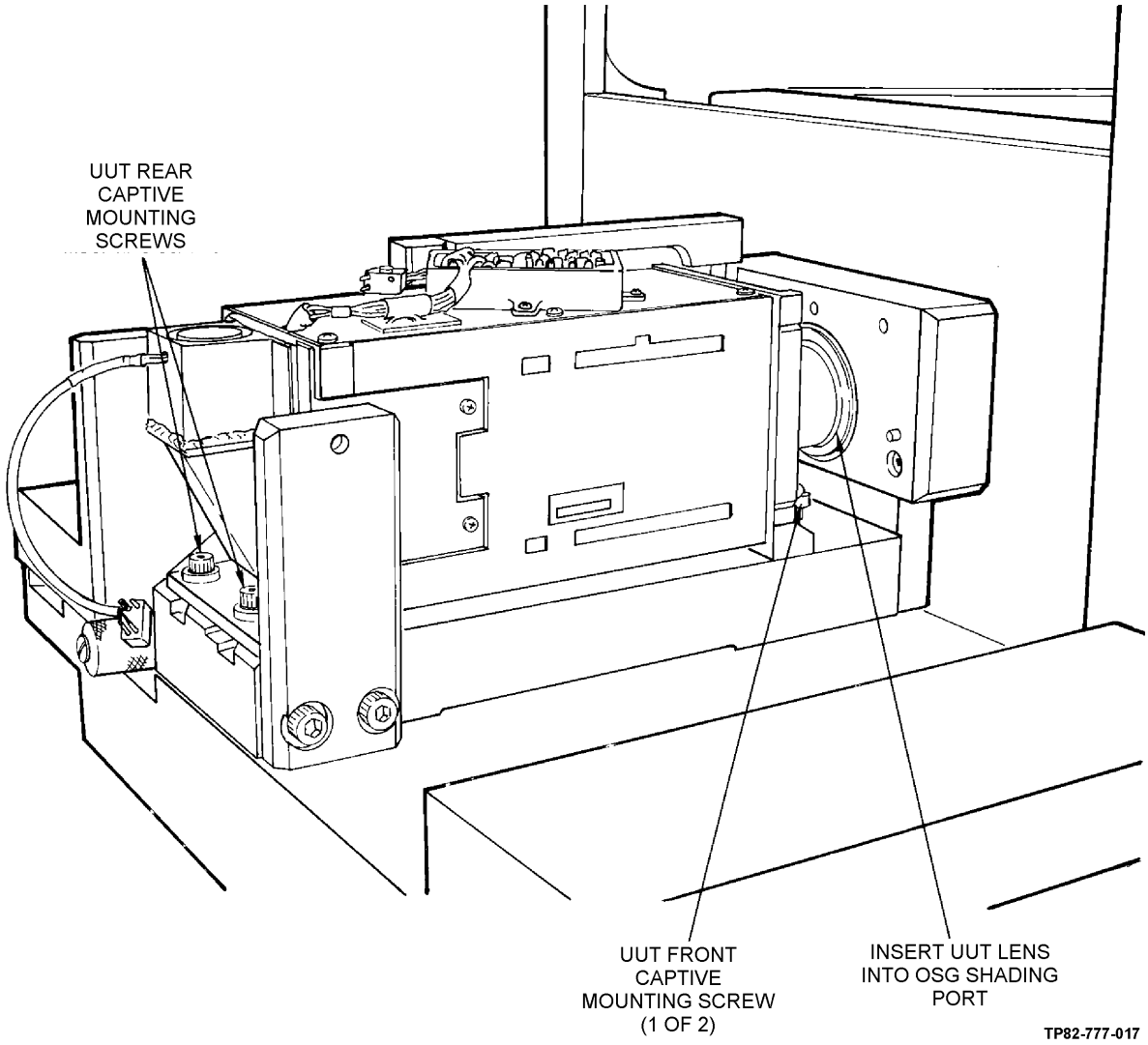


Figure 7-23. PNVS Visual Relay/Multiplexer or Solid State Camera Assy - PNVS (not shown) Mounted to Optical Signal Generator Shading Port

7-11. GENERAL. (CONT)

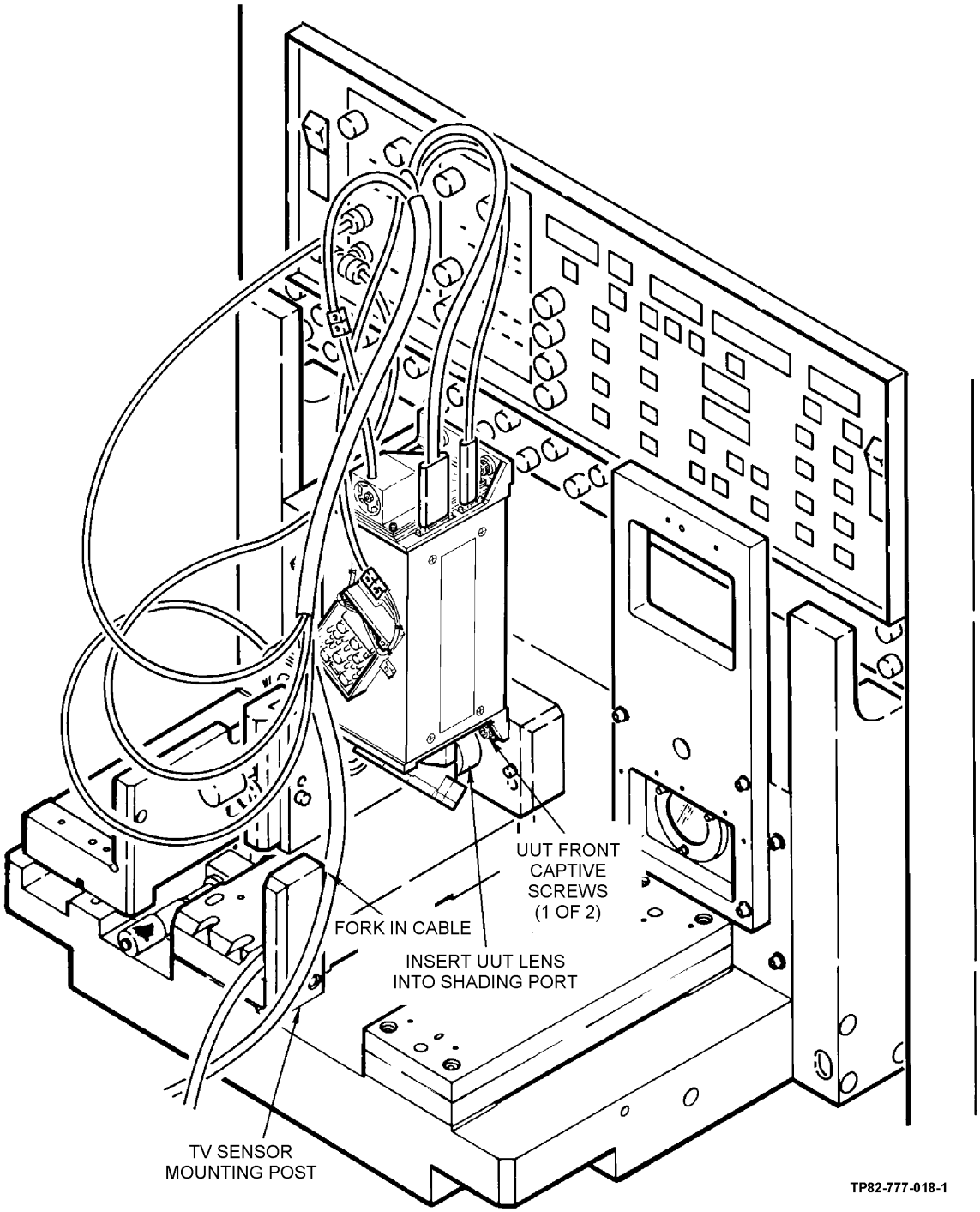


Figure 7-24. TADS Visual Multiplexer or Solid State Camera Assy - TADS FLIR (not shown) Mounted to Optical Signal Generator Shading Port

7-11. GENERAL. (CONT)

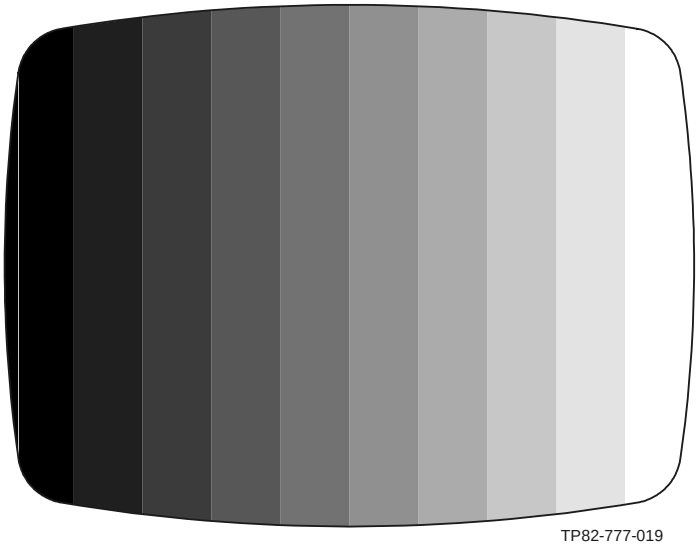


Figure 7-25. Displayed 10 Shades of Gray

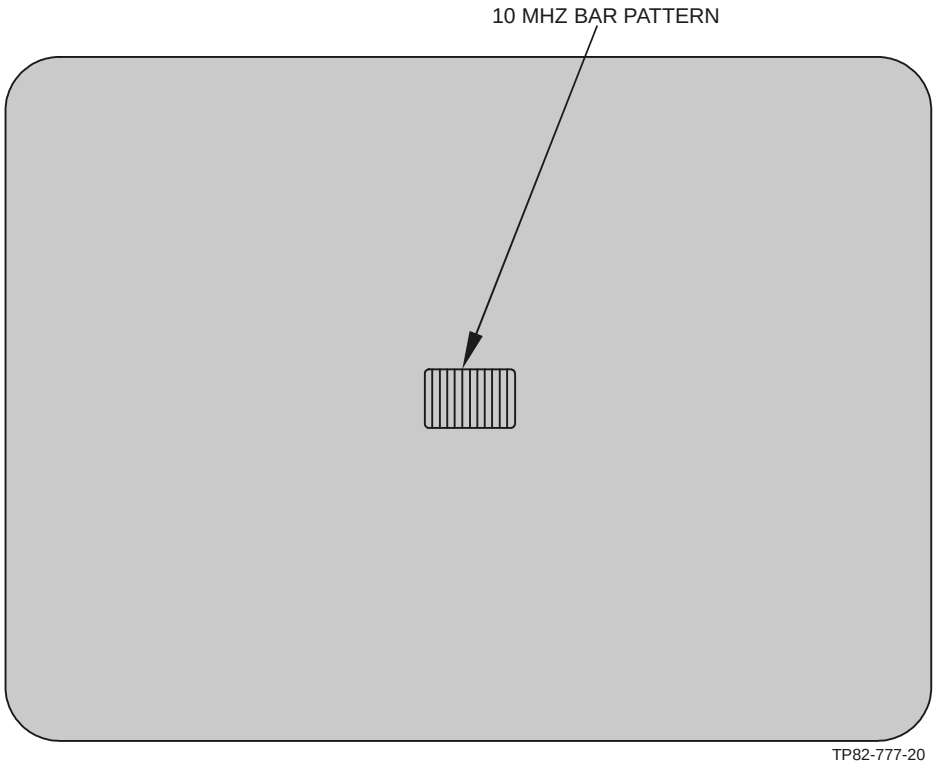


Figure 7-26. Displayed 10 MHz Burst Pattern

7-11. GENERAL. (CONT)

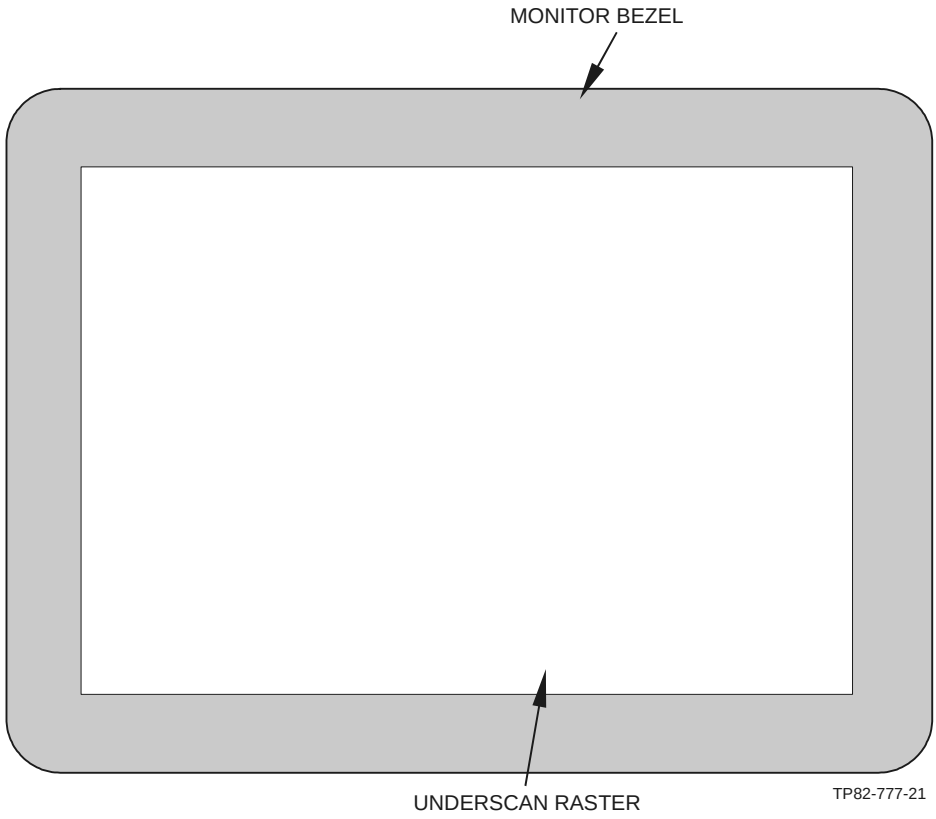


Figure 7-27. Monitor Underscan Raster

7-11. GENERAL. (CONT)

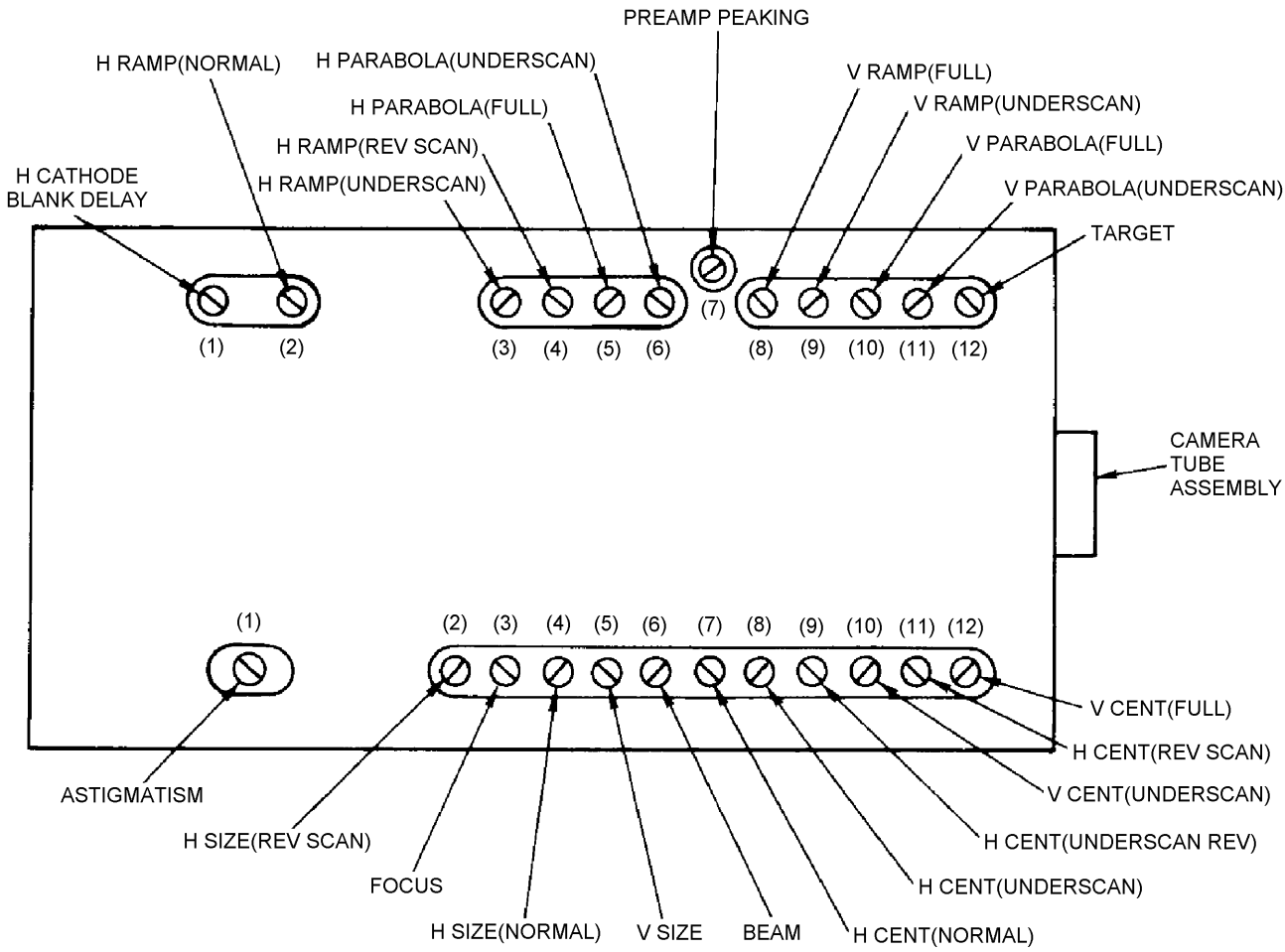
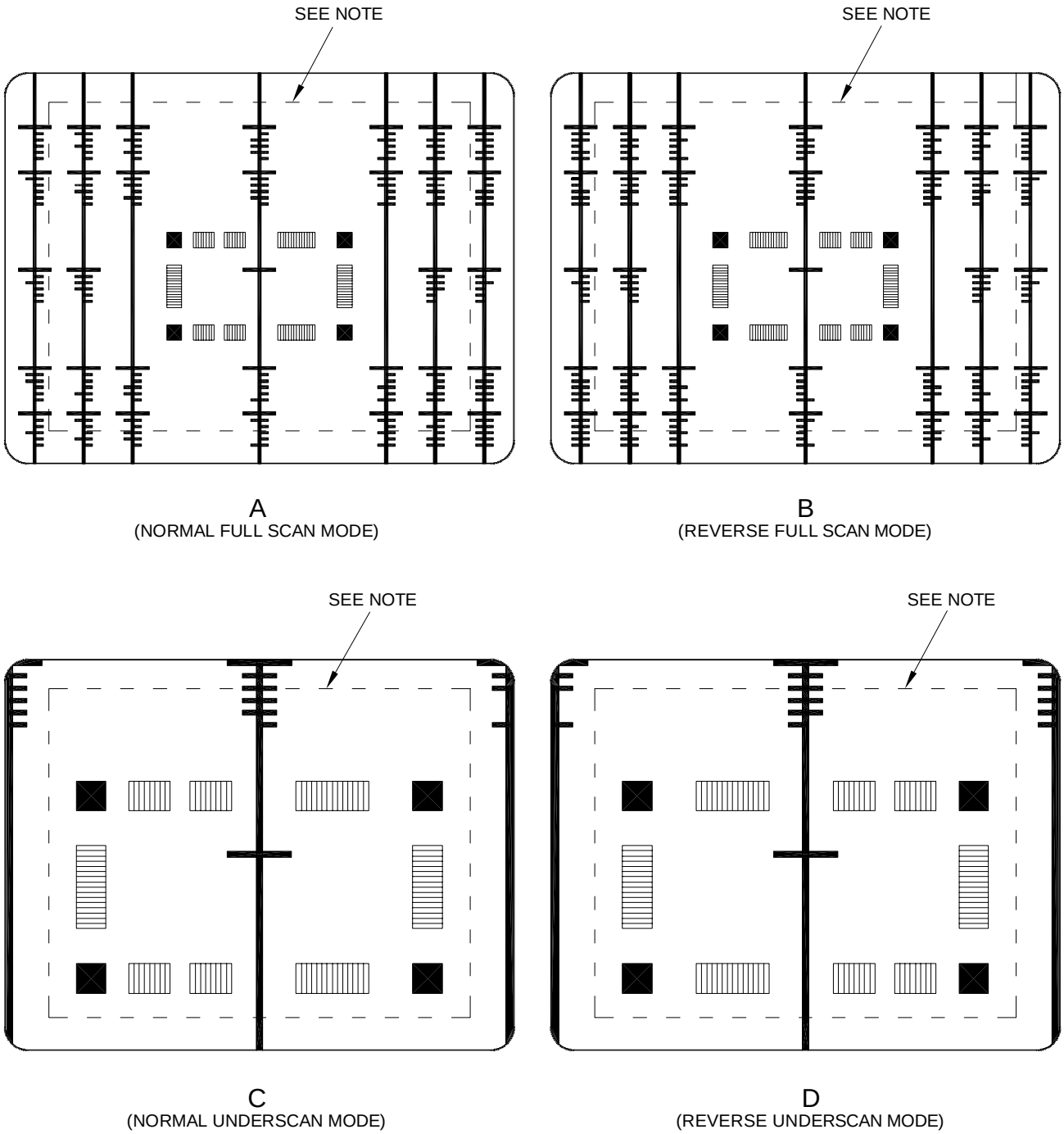


Figure 7-28. UUT Pot Locations

7-11. GENERAL. (CONT)



NOTE: AREA WITHIN DOTTED LINES IS AREA OF TEST CHART VISIBLE WHEN A TADS VISUAL MULTIPLEXER WITH A 13076003-009 LENS IS BEING TESTED. THE ENTIRE AREA OF TEST CHART IS VISIBLE WHEN A TV SENSOR, PNVS VISUAL RELAY/MULTIPLEXER, OR TADS VISUAL MULTIPLEXER WITH A 13074146 LENS IS BEING TESTED.

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Figure 7-29. Displayed Test Chart (Four Scan Modes)

7-11. GENERAL. (CONT)

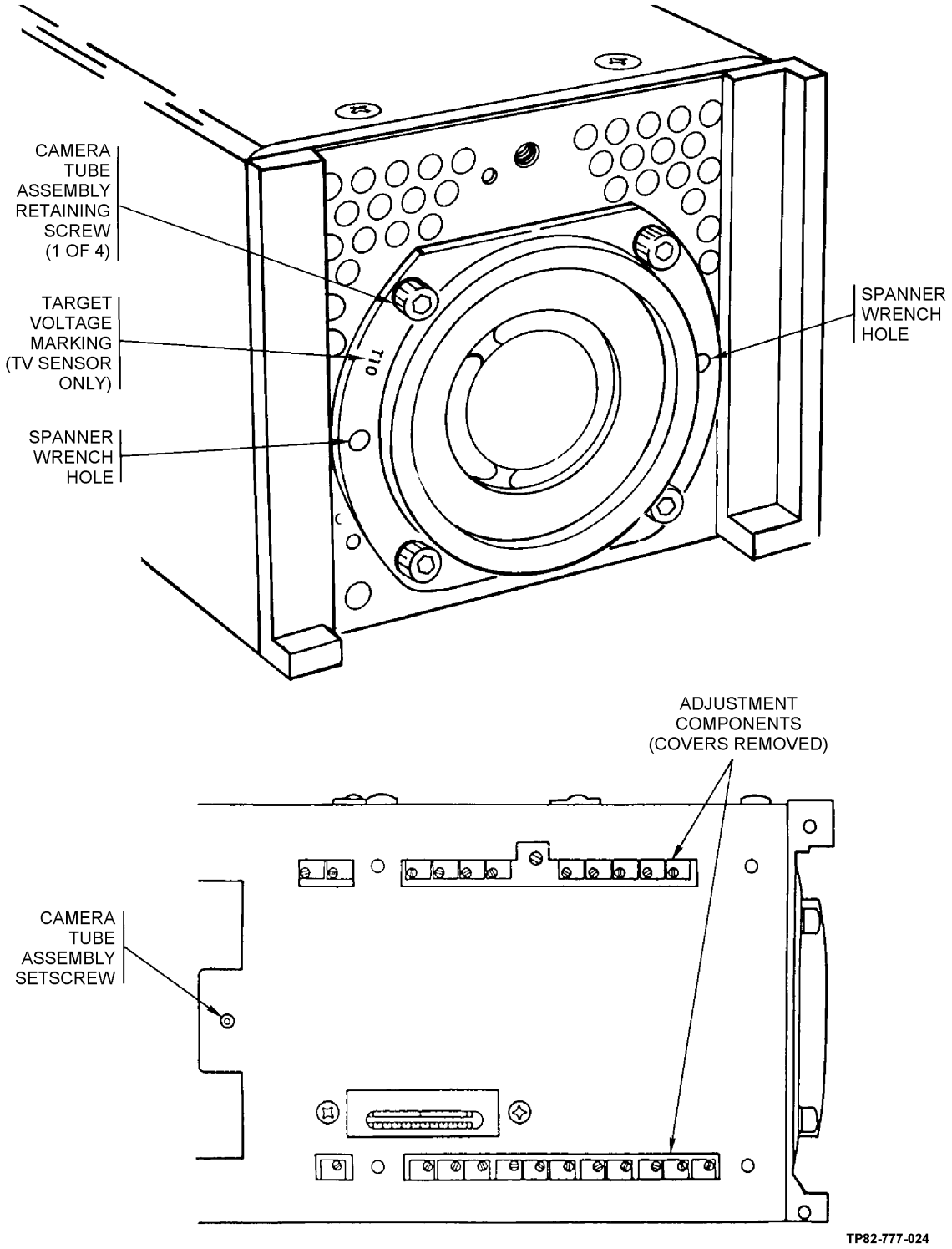


Figure 7-30. Television Sensor, Visual Multiplexer, and Visual Relay/Multiplexer Assemblies Alinement Factors

7-11. GENERAL. (CONT)

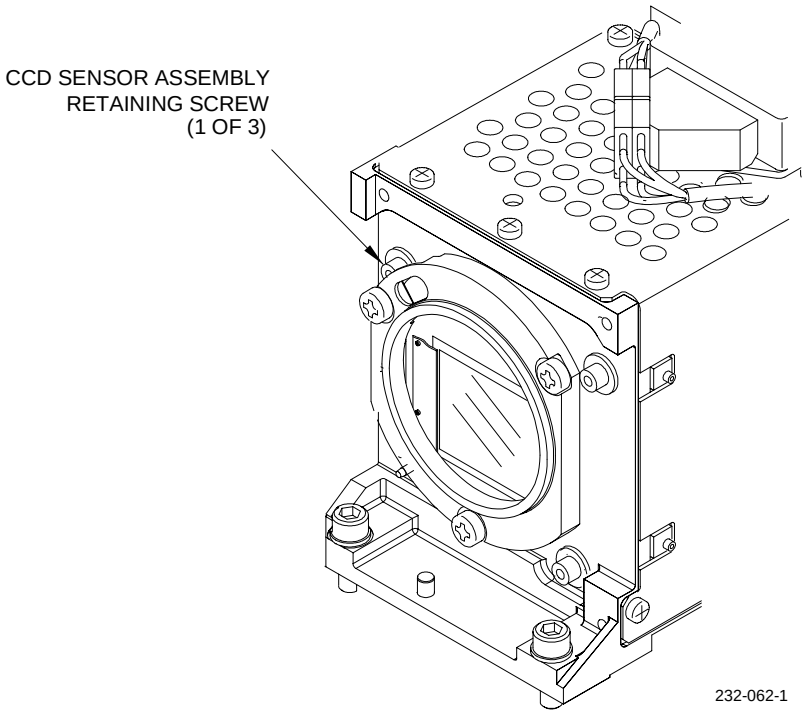


Figure 7-31. UUT Assembly/Solid State Camera

7-11. GENERAL. (CONT)

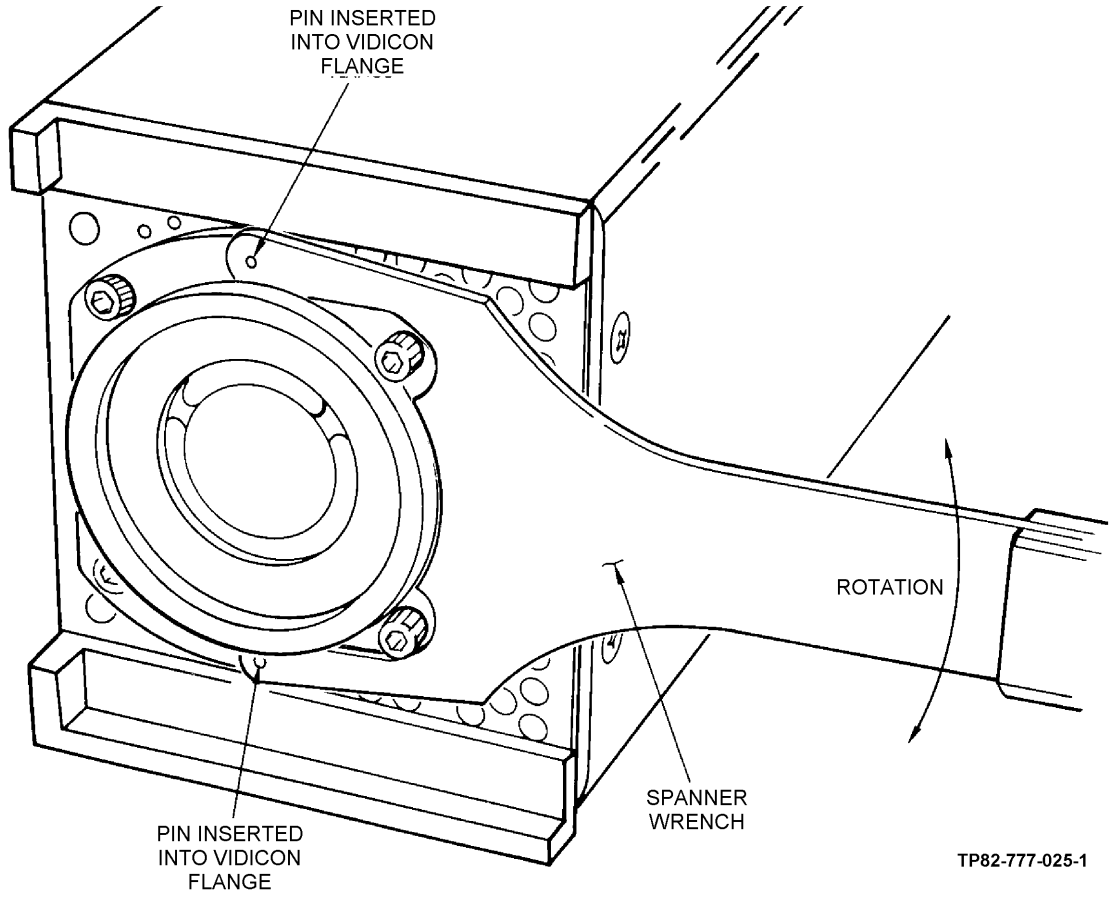


Figure 7-32. Camera Tube Rotation With Spanner Wrench

7-11. GENERAL. (CONT)

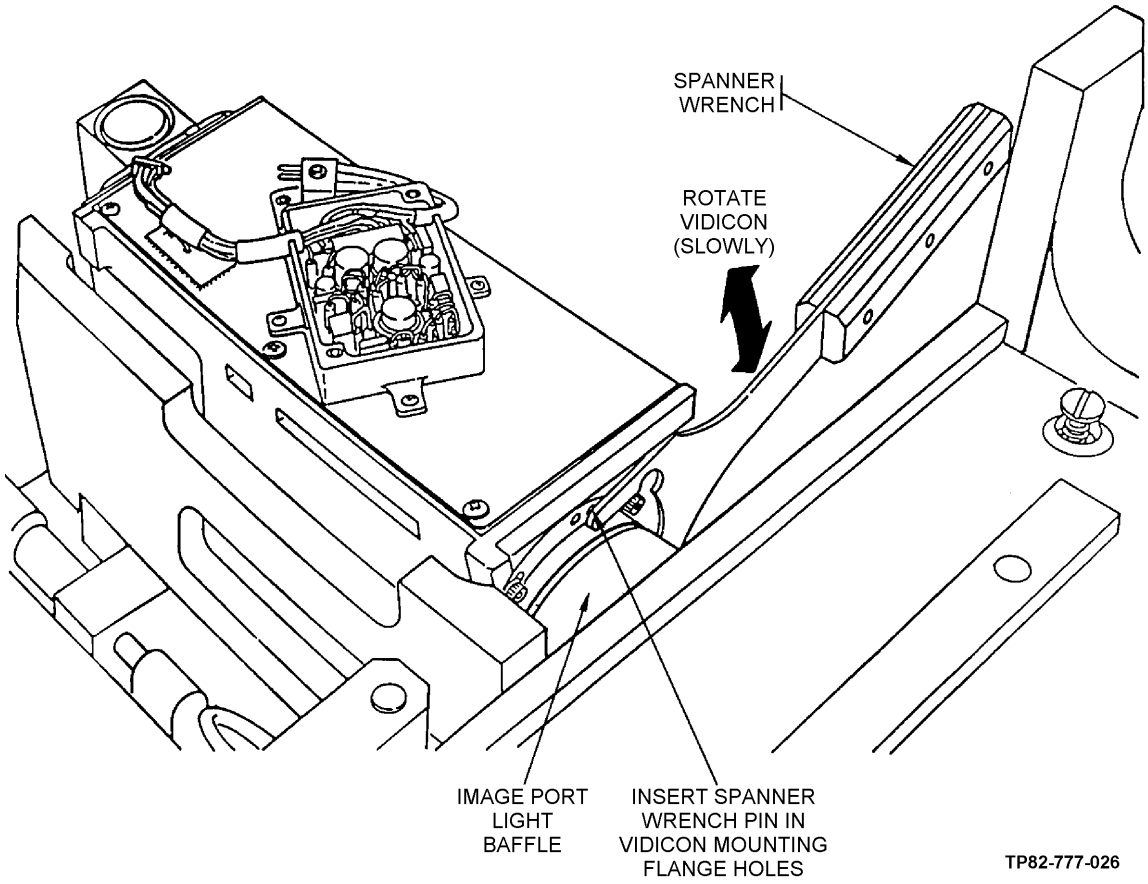


Figure 7-33. Vidicon Rotation Adjustment

7-11. GENERAL. (CONT)

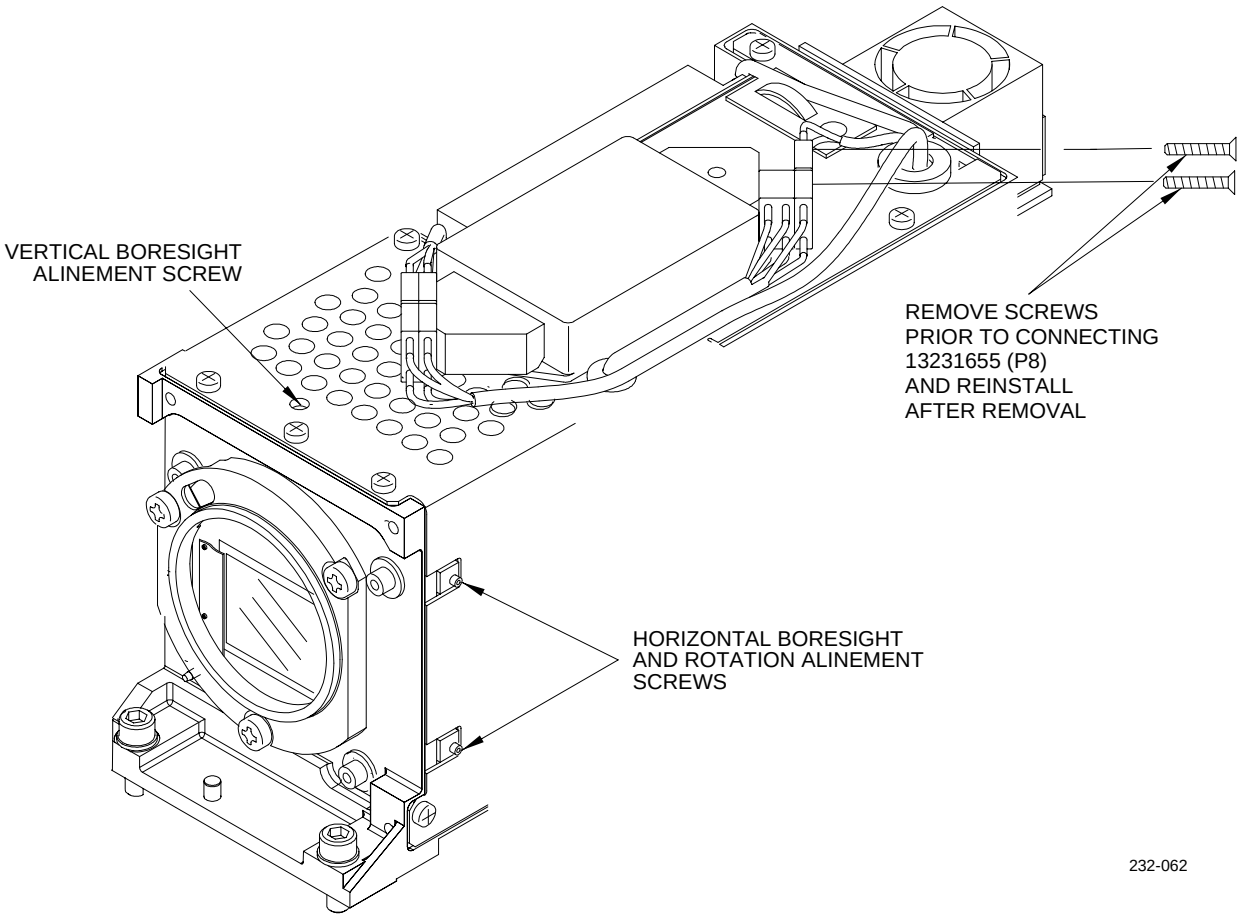
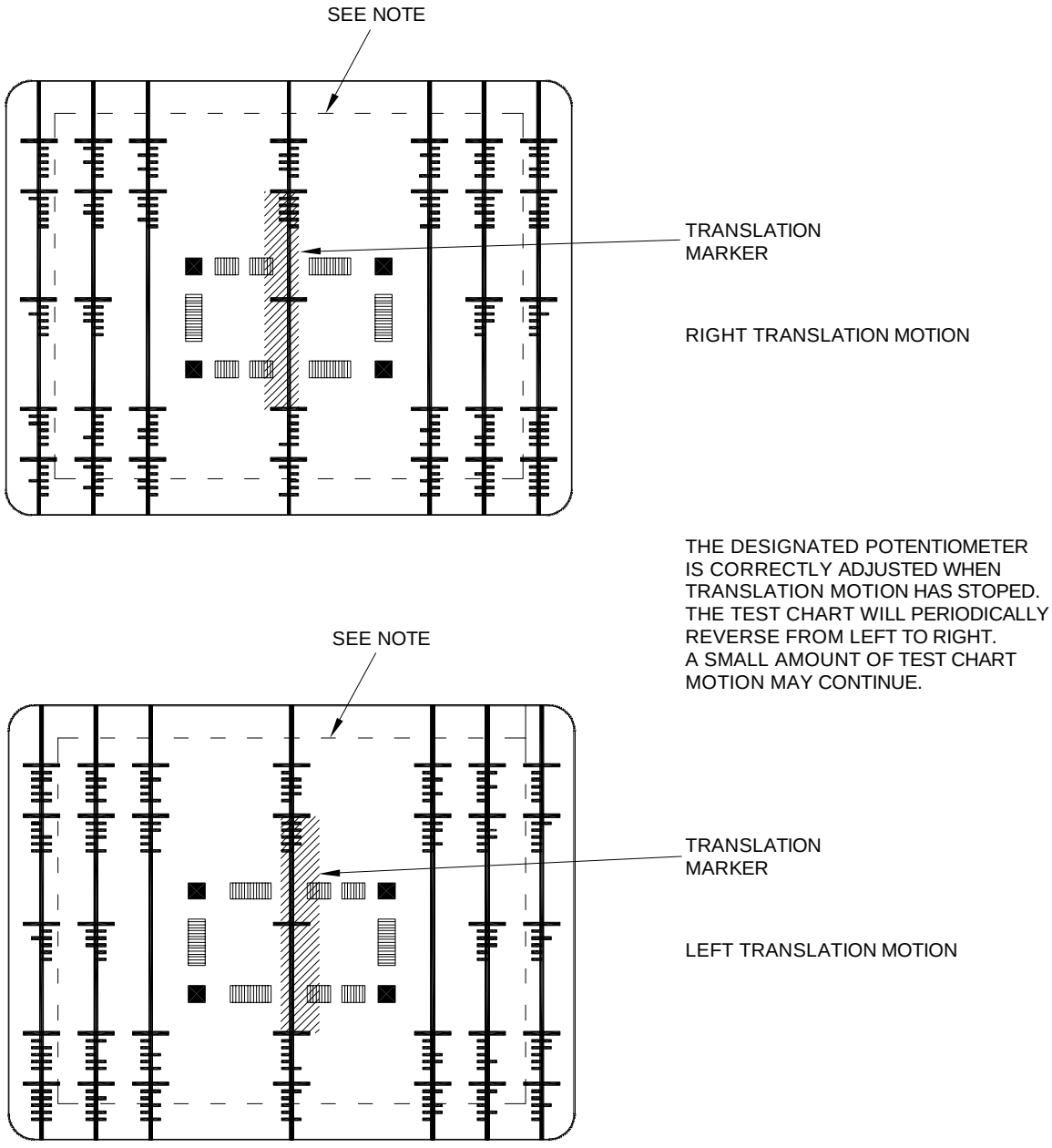


Figure 7-34. Solid State Camera Boresight Rotation Alinement

7-11. GENERAL. (CONT)



NOTE: AREA WITHIN DOTTED LINES IS AREA OF TEST CHART VISIBLE WHEN A TADS VISUAL MULTIPLEXER WITH A 13076003-009 LENS IS BEING TESTED. THE ENTIRE AREA OF TEST CHART IS VISIBLE WHEN A TV SENSOR, PNVS VISUAL RELAY/MULTIPLEXER, OR TADS VISUAL MULTIPLEXER WITH A 13074146 LENS IS BEING TESTED.

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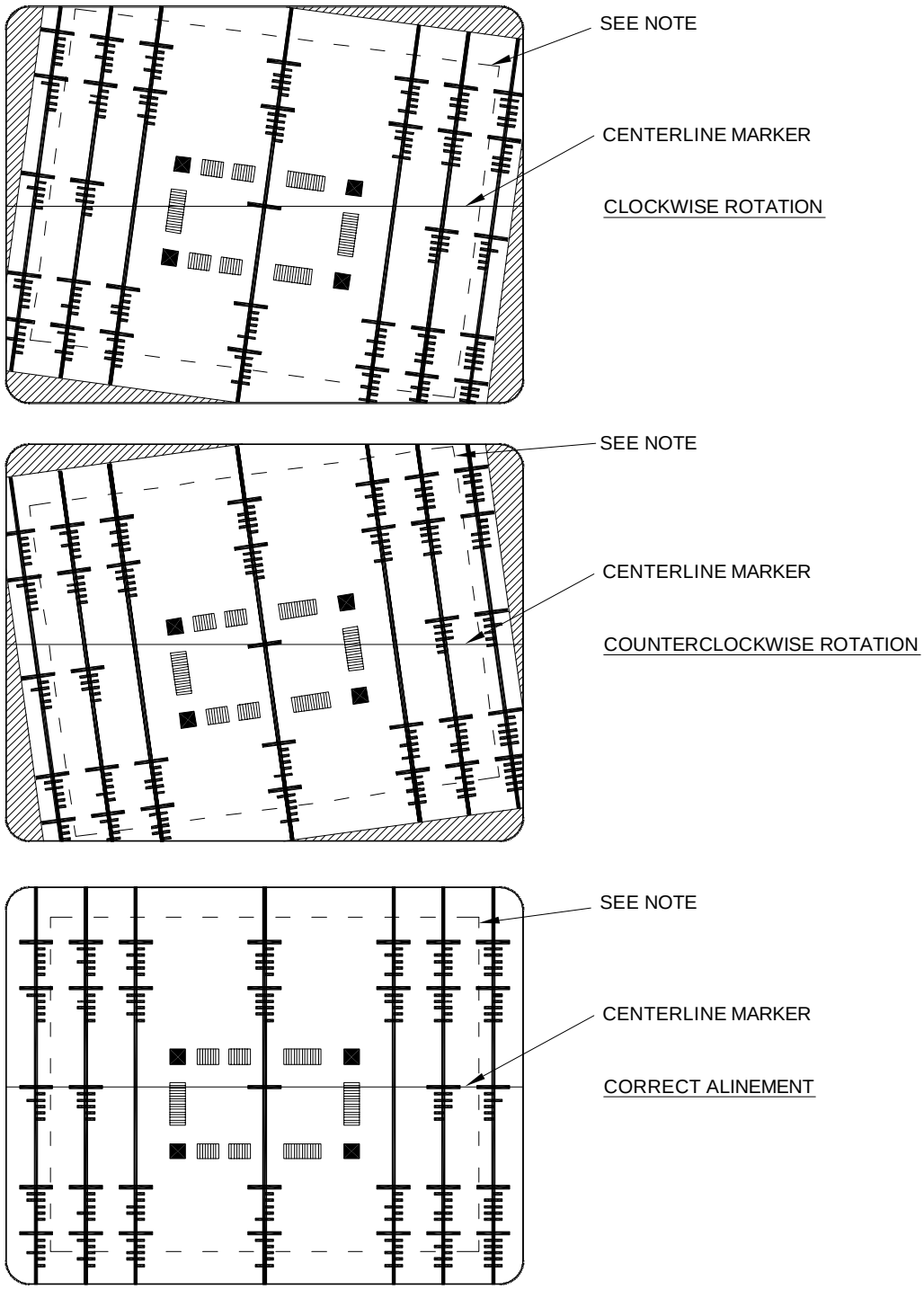
Figure 7-35. Raster Translation Alinement

7-11. GENERAL. (CONT)



NOTE: AREA WITHIN DOTTED LINES IS AREA OF TEST CHART VISIBLE WHEN A TADS VISUAL MULTIPLEXER WITH A 13076003-009 LENS IS BEING TESTED. THE ENTIRE AREA OF TEST CHART IS VISIBLE WHEN A TV SENSOR, PNVS VISUAL RELAY/MULTIPLEXER, OR TADS VISUAL MULTIPLEXER WITH A 13074146 LENS IS BEING TESTED.

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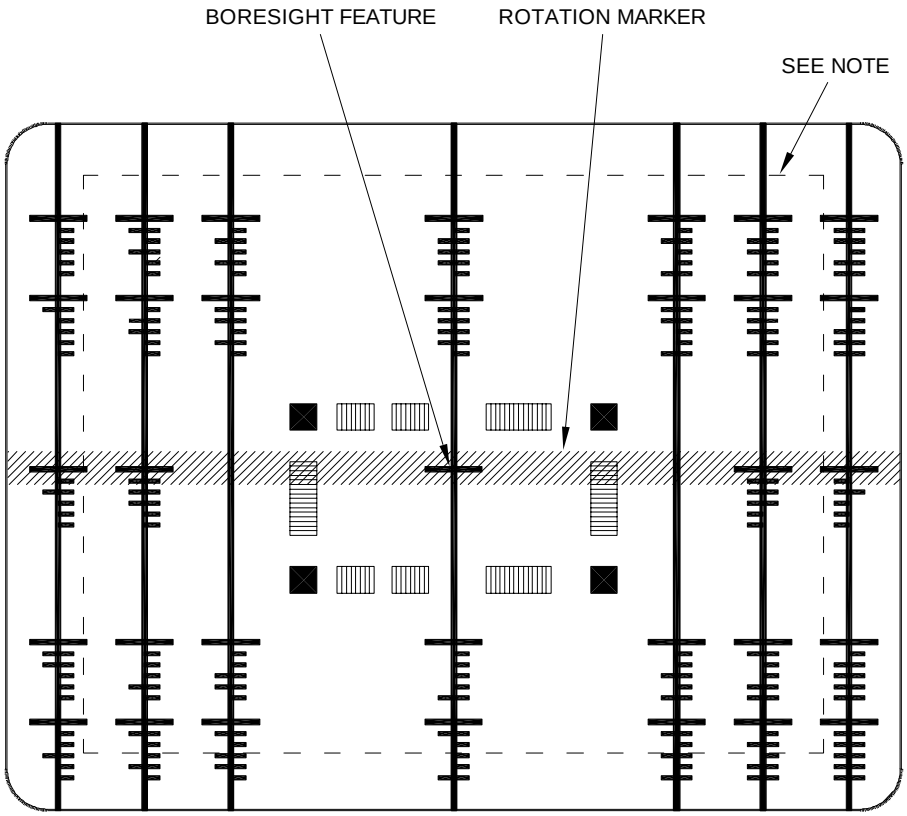
Figure 7-36. Raster Rotation Alinement

7-11. GENERAL. (CONT)



NOTE: AREA WITHIN DOTTED LINES IS AREA OF TEST CHART VISIBLE WHEN A TADS VISUAL MULTIPLEXER WITH A 13076003-009 LENS IS BEING TESTED. THE ENTIRE AREA OF TEST CHART IS VISIBLE WHEN A TV SENSOR, PNVS VISUAL RELAY/MULTIPLEXER, OR TADS VISUAL MULTIPLEXER WITH A 13074146 LENS IS BEING TESTED.

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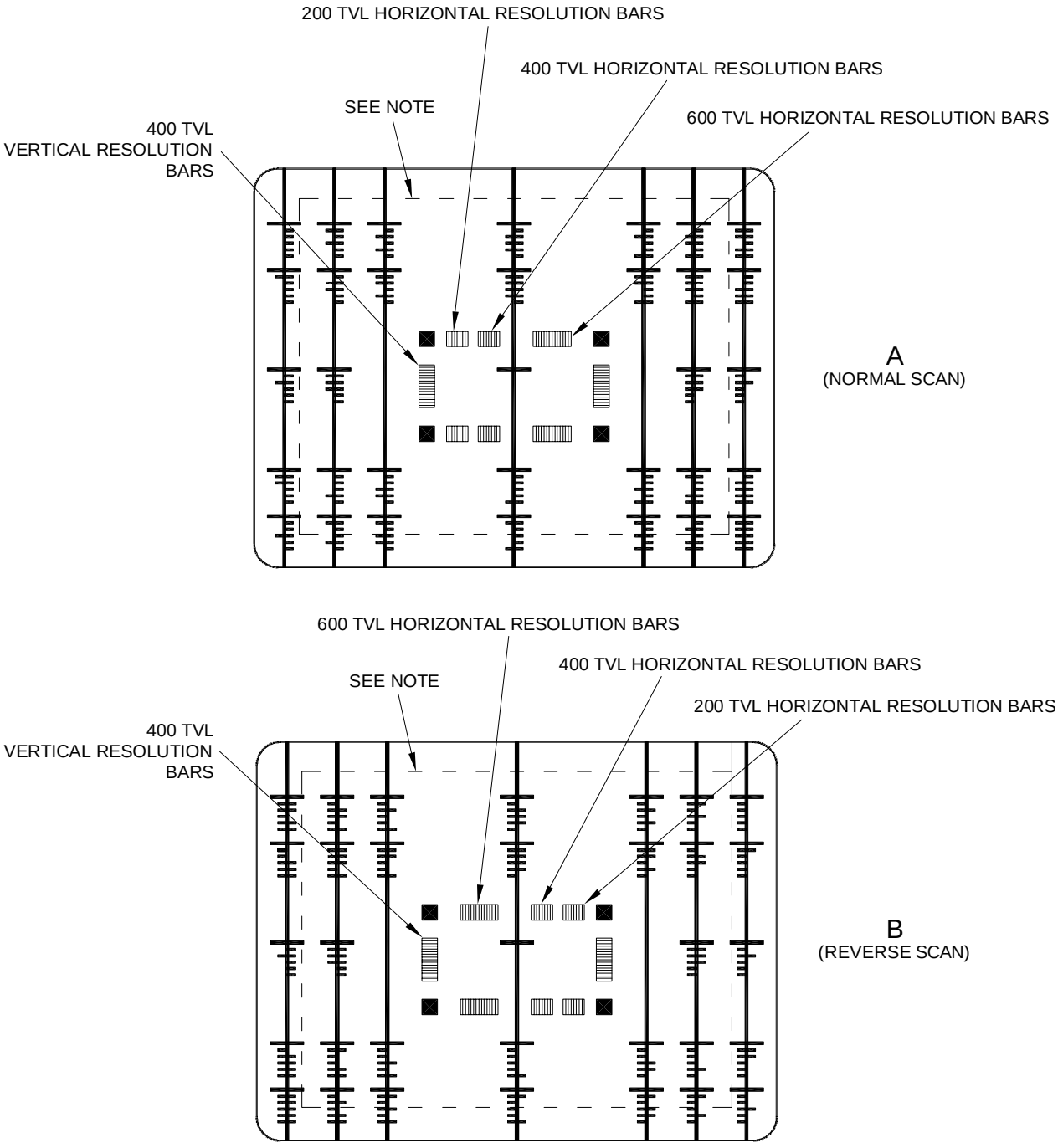
Figure 7-37. Raster Rotation Marker Alinement

7-11. GENERAL. (CONT)



NOTE: AREA WITHIN DOTTED LINES IS AREA OF TEST CHART VISIBLE WHEN A TADS VISUAL MULTIPLEXER WITH A 13076003-009 LENS IS BEING TESTED. THE ENTIRE AREA OF TEST CHART IS VISIBLE WHEN A TV SENSOR, PNVS VISUAL RELAY/MULTIPLEXER, OR TADS VISUAL MULTIPLEXER WITH A 13074146 LENS IS BEING TESTED.

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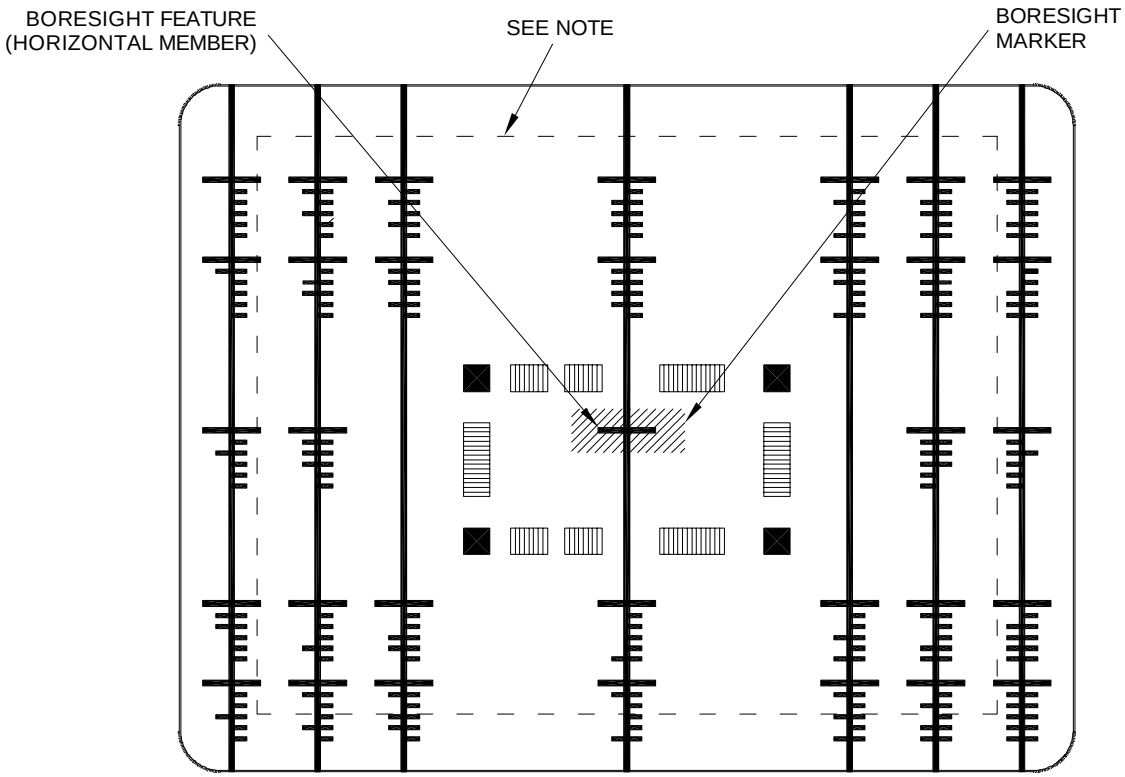
Figure 7-38. Displayed Resolution Bar Location

7-11. GENERAL. (CONT)

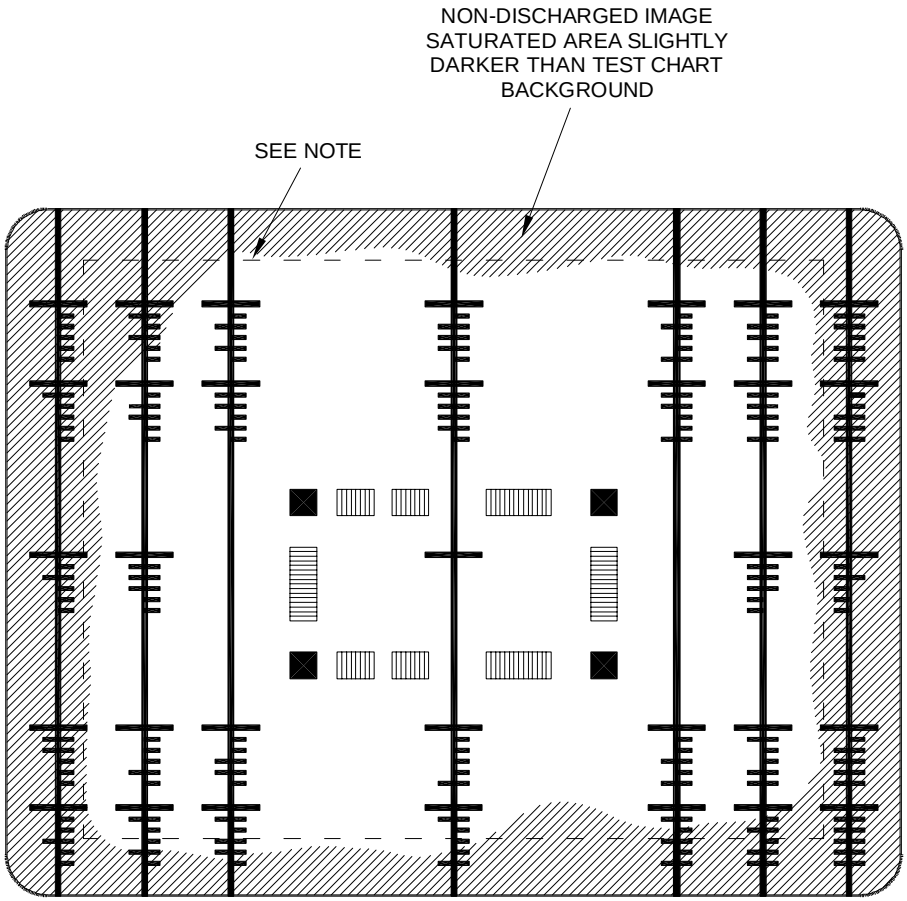


NOTE: AREA WITHIN DOTTED LINES IS AREA OF TEST CHART VISIBLE WHEN A TADS VISUAL MULTIPLEXER WITH A 13076003-009 LENS IS BEING TESTED. THE ENTIRE AREA OF TEST CHART IS VISIBLE WHEN A TV SENSOR, PNVS VISUAL RELAY/MULTIPLEXER, OR TADS VISUAL MULTIPLEXER WITH A 13074146 LENS IS BEING TESTED.

TP82-777-031-1

Figure 7-39. Prealinement Coarse Boresight Marker Alinement

7-11. GENERAL. (CONT)

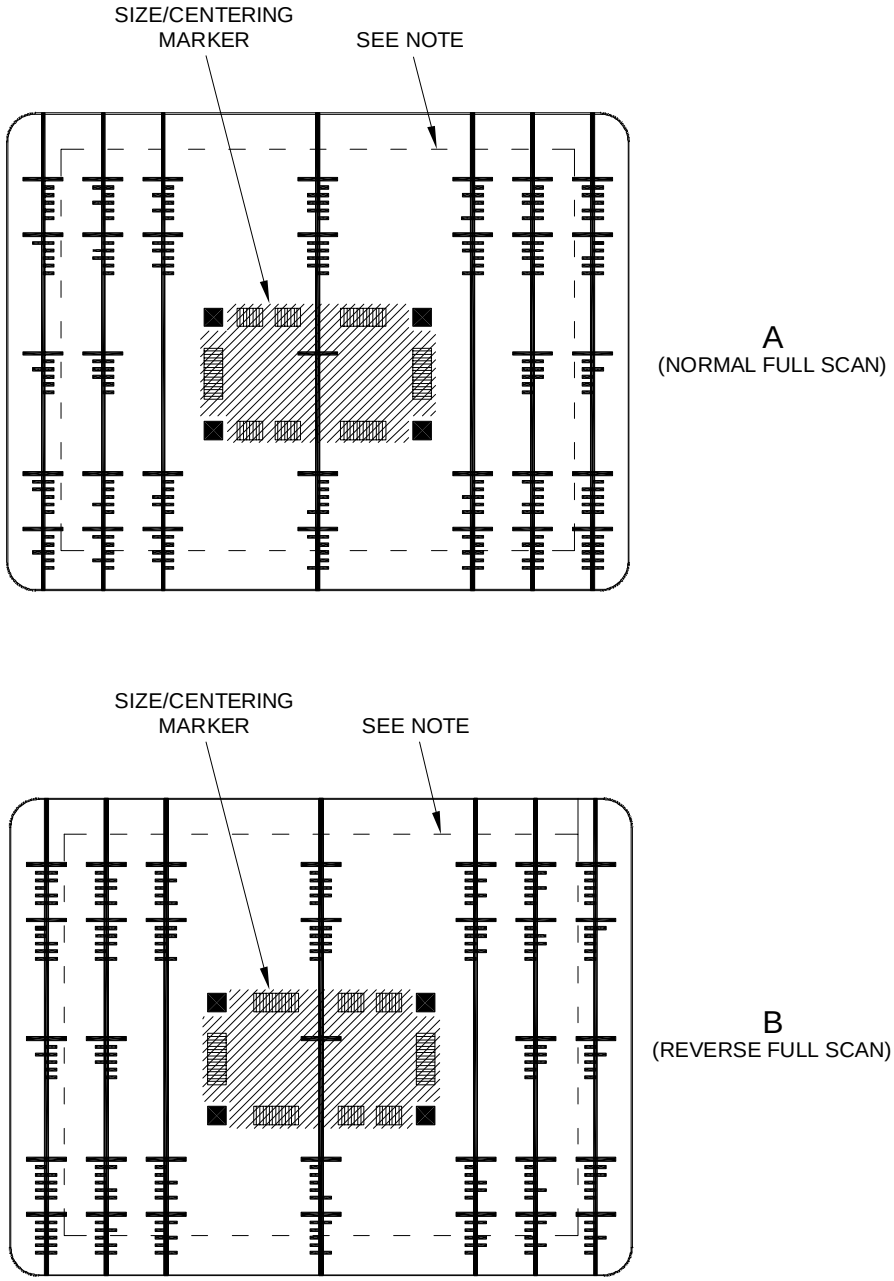


NOTE: AREA WITHIN DOTTED LINES IS AREA OF TEST CHART VISIBLE WHEN A TADS VISUAL MULTIPLEXER WITH A 13076003-009 LENS IS BEING TESTED. THE ENTIRE AREA OF TEST CHART IS VISIBLE WHEN A TV SENSOR, PNVS VISUAL RELAY/MULTIPLEXER, OR TADS VISUAL MULTIPLEXER WITH A 13074146 LENS IS BEING TESTED.

TP82-777-032-1

Figure 7-40. Discharge Non-Uniformity Illustration

7-11. GENERAL. (CONT)

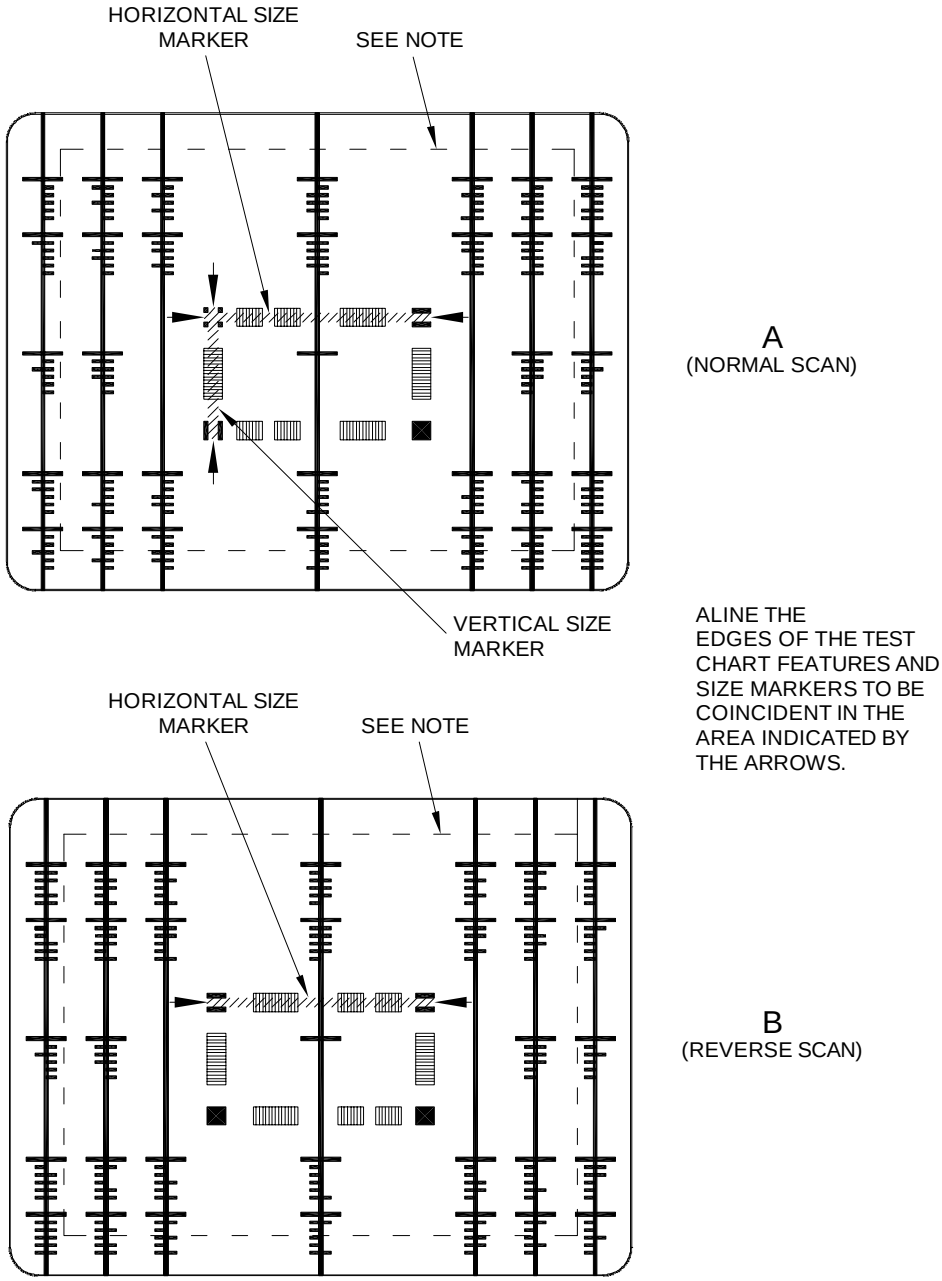


NOTE: AREA WITHIN DOTTED LINES IS AREA OF TEST CHART VISIBLE WHEN A TADS VISUAL MULTIPLEXER WITH A 13076003-009 LENS IS BEING TESTED. THE ENTIRE AREA OF TEST CHART IS VISIBLE WHEN A TV SENSOR, PNVS VISUAL RELAY/MULTIPLEXER, OR TADS VISUAL MULTIPLEXER WITH A 13074146 LENS IS BEING TESTED.

TP82-777-033-1

Figure 7-41. Prealinement Raster Size/Centering Marker Alinement

7-11. GENERAL. (CONT)

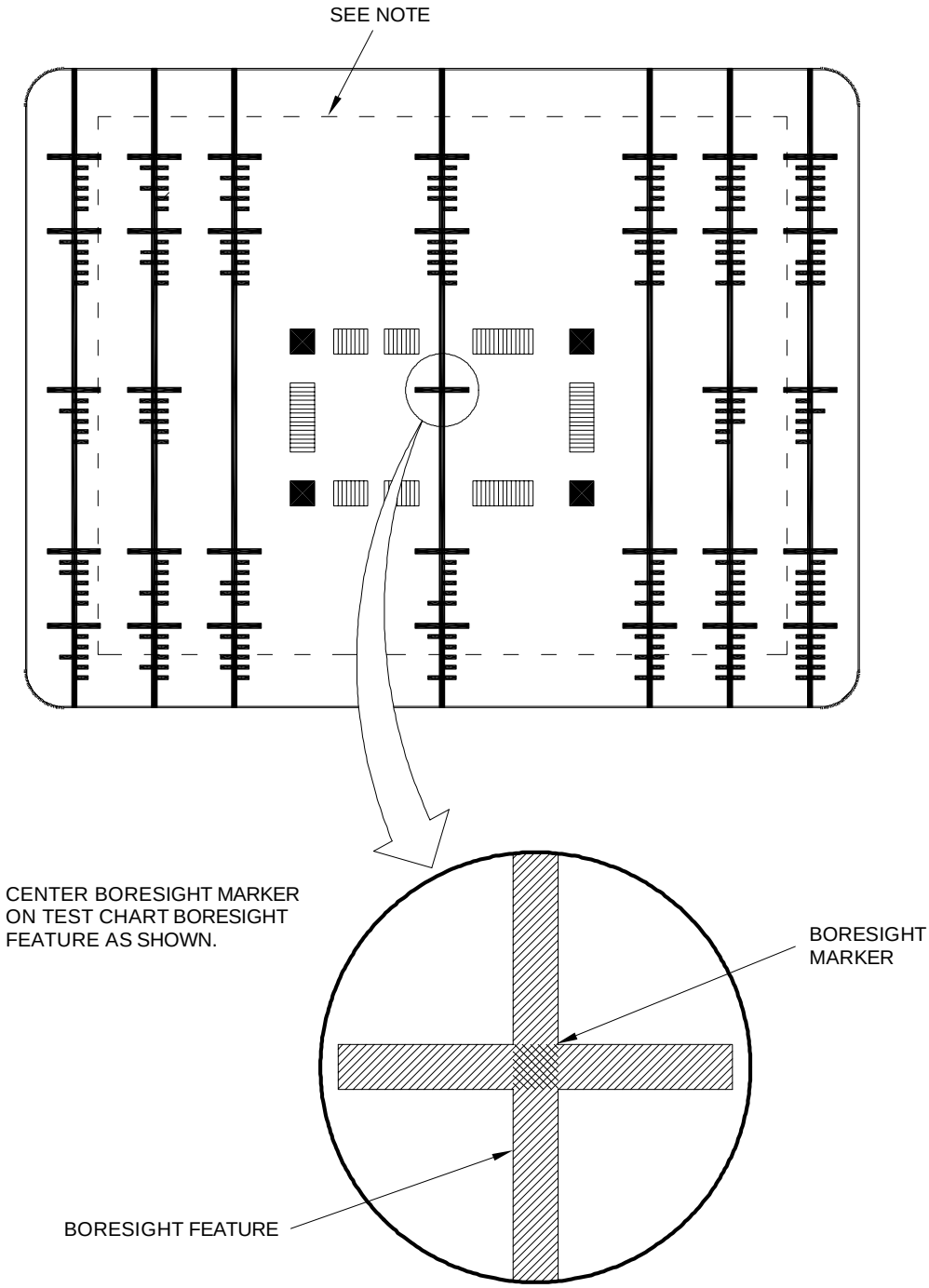


NOTE: AREA WITHIN DOTTED LINES IS AREA OF TEST CHART VISIBLE WHEN A TADS VISUAL MULTIPLEXER WITH A 13076003-009 LENS IS BEING TESTED. THE ENTIRE AREA OF TEST CHART IS VISIBLE WHEN A TV SENSOR, PNVS VISUAL RELAY/MULTIPLEXER, OR TADS VISUAL MULTIPLEXER WITH A 13074146 LENS IS BEING TESTED.

TP82-777-034-1

Figure 7-42. Prealinement Full Scan Horizontal Size Marker Alinement

7-11. GENERAL. (CONT)

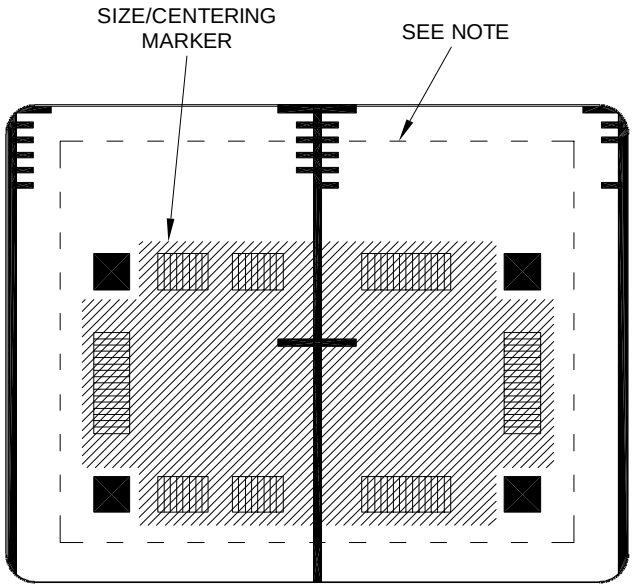


NOTE: AREA WITHIN DOTTED LINES IS AREA OF TEST CHART VISIBLE WHEN A TADS VISUAL MULTIPLEXER WITH A 13076003-009 LENS IS BEING TESTED. THE ENTIRE AREA OF TEST CHART IS VISIBLE WHEN A TV SENSOR, PNVS VISUAL RELAY/MULTIPLEXER, OR TADS VISUAL MULTIPLEXER WITH A 13074146 LENS IS BEING TESTED.

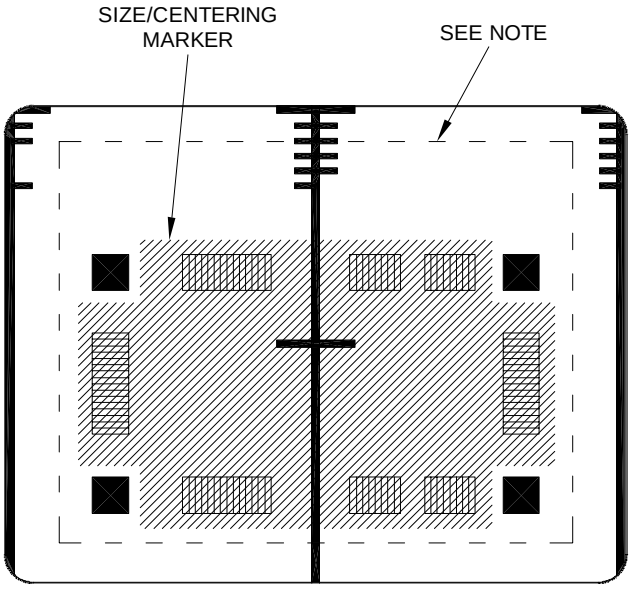
TP82-777-035-1

Figure 7-43. Prealinement Boresight Marker Alinement

7-11. GENERAL. (CONT)



A
(NORMAL UNDERSCAN)



B
(REVERSE UNDERSCAN)

NOTE: AREA WITHIN DOTTED LINES IS AREA OF TEST CHART VISIBLE WHEN A TADS VISUAL MULTIPLEXER WITH A 13076003-009 LENS IS BEING TESTED. THE ENTIRE AREA OF TEST CHART IS VISIBLE WHEN A TV SENSOR, PNVS VISUAL RELAY/MULTIPLEXER, OR TADS VISUAL MULTIPLEXER WITH A 13074146 LENS IS BEING TESTED.

TP82-777-036-1

Figure 7-44. Prealinement Underscan Size/Centering Marker Alinement

7-11. GENERAL. (CONT)

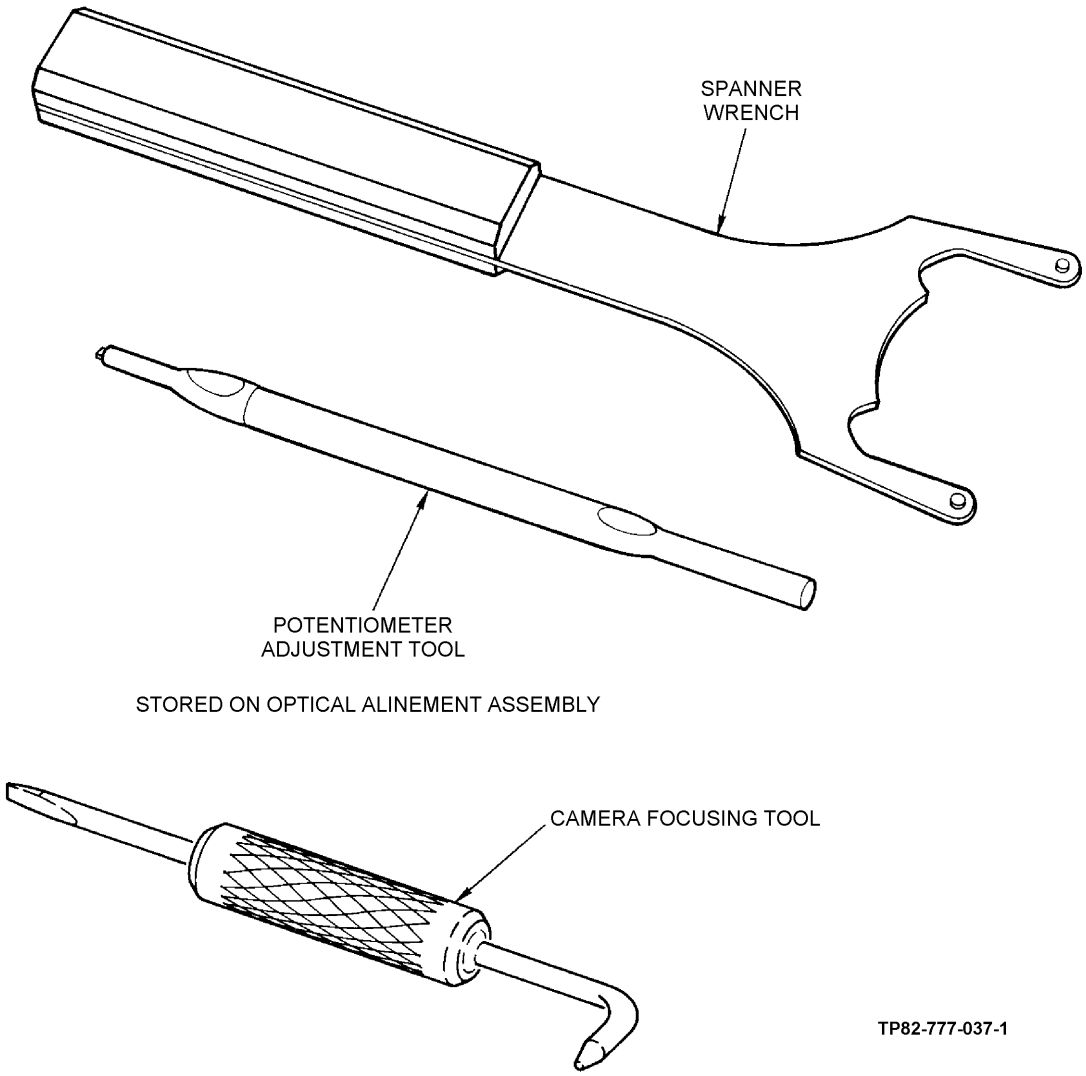


Figure 7-45. UUT Alinement Tools

7-11. GENERAL. (CONT)

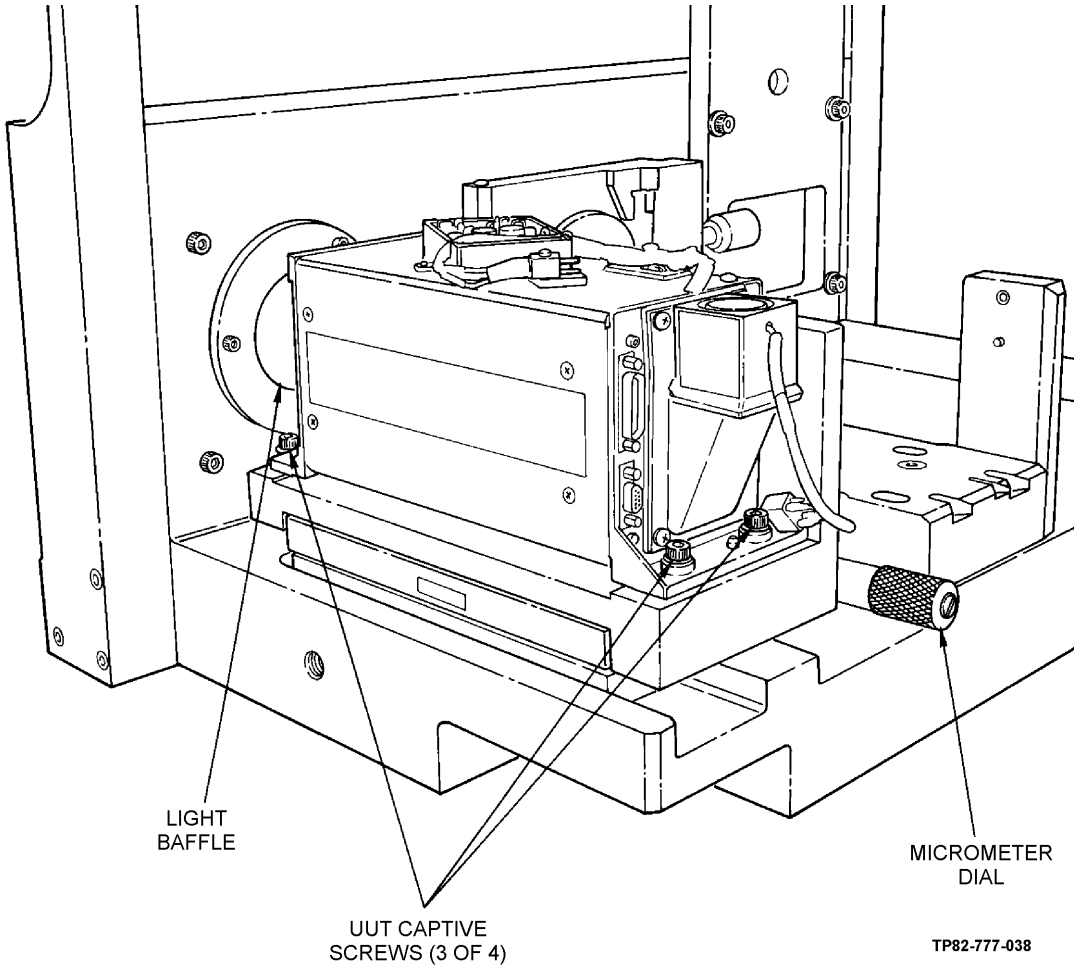
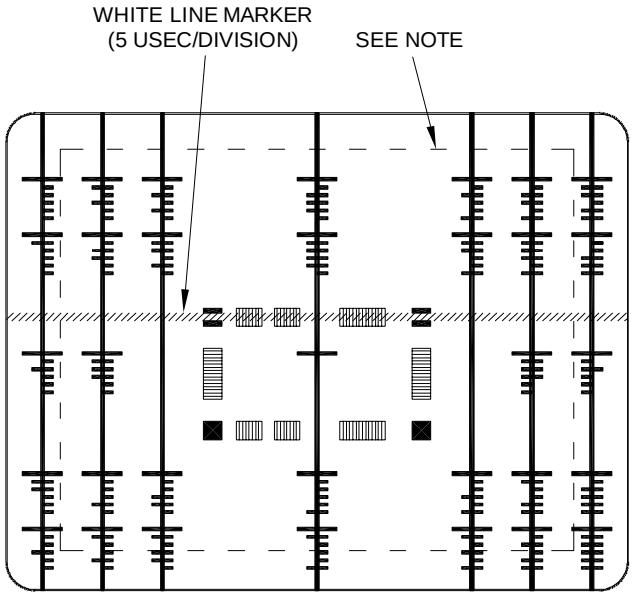
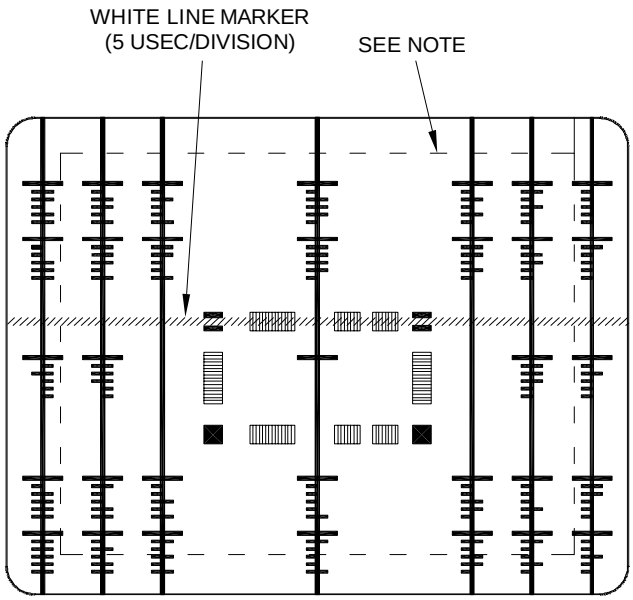


Figure 7-46. Multiplexer (Without Lens) Mounted to Optical Signal Generator Image Port

7-11. GENERAL. (CONT)



A
(NORMAL SCAN)
5 USEC/DIVISION



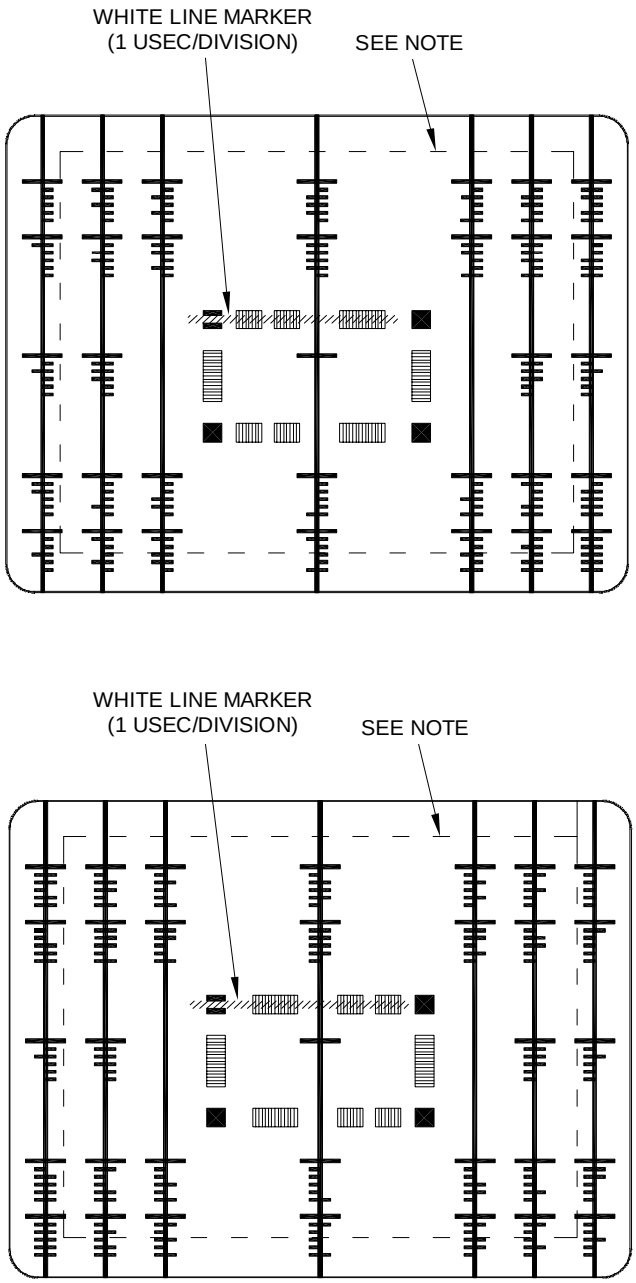
B
(REVERSE SCAN)
5 USEC/DIVISION

NOTE: AREA WITHIN DOTTED LINES IS AREA OF TEST CHART VISIBLE WHEN A TADS VISUAL MULTIPLEXER WITH A 13076003-009 LENS IS BEING TESTED. THE ENTIRE AREA OF TEST CHART IS VISIBLE WHEN A TV SENSOR, PNVS VISUAL RELAY/MULTIPLEXER, OR TADS VISUAL MULTIPLEXER WITH A 13074146 LENS IS BEING TESTED.

TP82-777-039-1

Figure 7-47. Line Select Marker Location (Signal Amplifier/SNR Test)

7-11. GENERAL. (CONT)

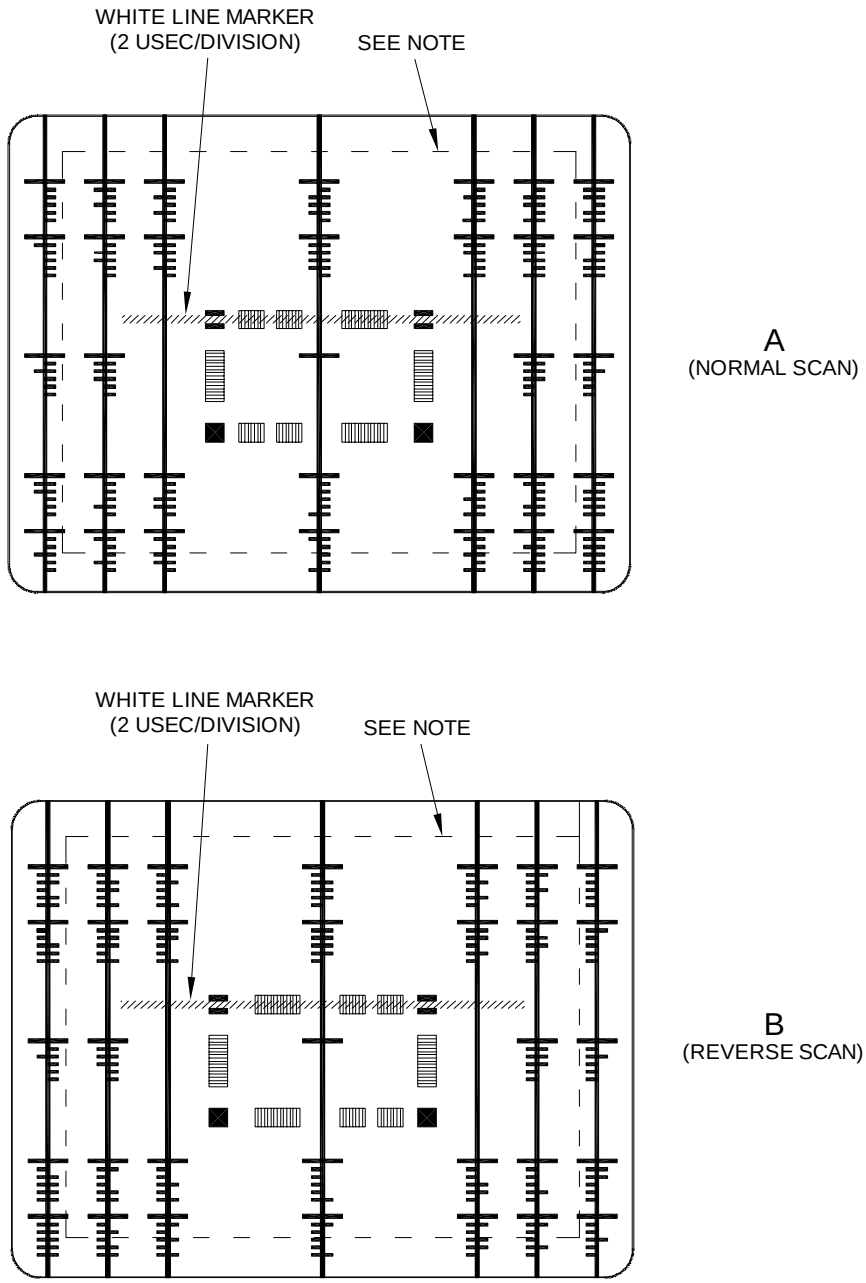


NOTE: AREA WITHIN DOTTED LINES IS AREA OF TEST CHART VISIBLE WHEN A TADS VISUAL MULTIPLEXER WITH A 13076003-009 LENS IS BEING TESTED. THE ENTIRE AREA OF TEST CHART IS VISIBLE WHEN A TV SENSOR, PNVS VISUAL RELAY/MULTIPLEXER, OR TADS VISUAL MULTIPLEXER WITH A 13074146 LENS IS BEING TESTED.

TP82-777-040-1

Figure 7-48. Line Select Marker Location (CTF Test)

7-11. GENERAL. (CONT)

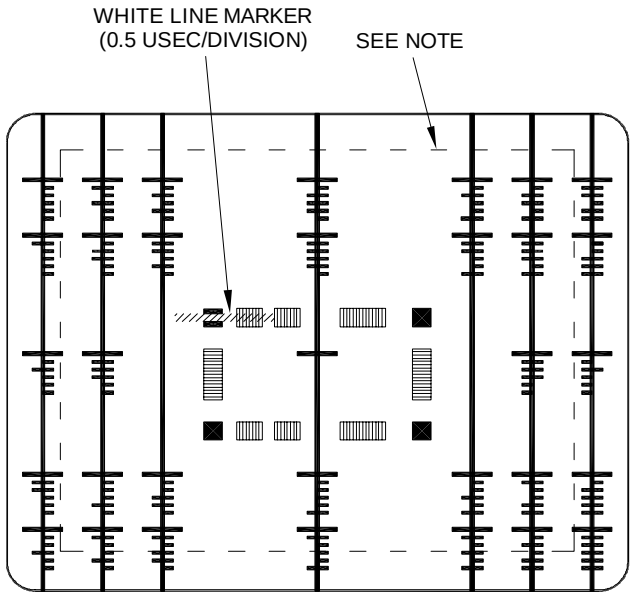


NOTE: AREA WITHIN DOTTED LINES IS AREA OF TEST CHART VISIBLE WHEN A TADS VISUAL MULTIPLEXER WITH A 13076003-009 LENS IS BEING TESTED. THE ENTIRE AREA OF TEST CHART IS VISIBLE WHEN A TV SENSOR, PNVS VISUAL RELAY/MULTIPLEXER, OR TADS VISUAL MULTIPLEXER WITH A 13074146 LENS IS BEING TESTED.

TP82-777-041-1

Figure 7-49. Line Select Marker Location (CTF Signal Uniformity Test)

7-11. GENERAL. (CONT)



NOTE: AREA WITHIN DOTTED LINES IS AREA OF TEST CHART VISIBLE WHEN A TADS VISUAL MULTIPLEXER WITH A 13076003-009 LENS IS BEING TESTED. THE ENTIRE AREA OF TEST CHART IS VISIBLE WHEN A TV SENSOR, PNVS VISUAL RELAY/MULTIPLEXER, OR TADS VISUAL MULTIPLEXER WITH A 13074146 LENS IS BEING TESTED.

TP82-777-042-1

Figure 7-50. Line Select Marker Location (Peaking Test)

7-11. GENERAL. (CONT)

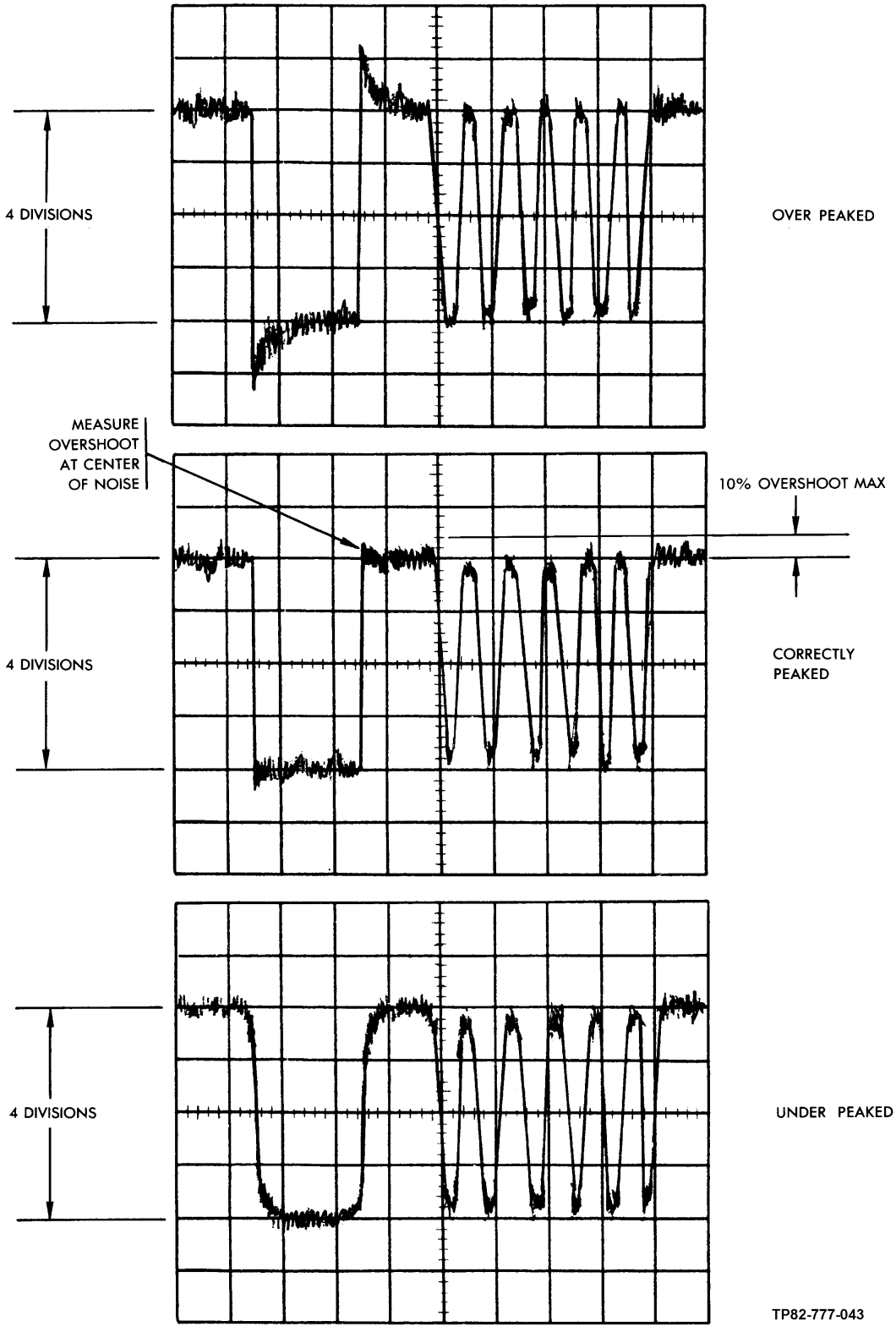


Figure 7-51. Video Peaking Waveforms

7-11. GENERAL. (CONT)

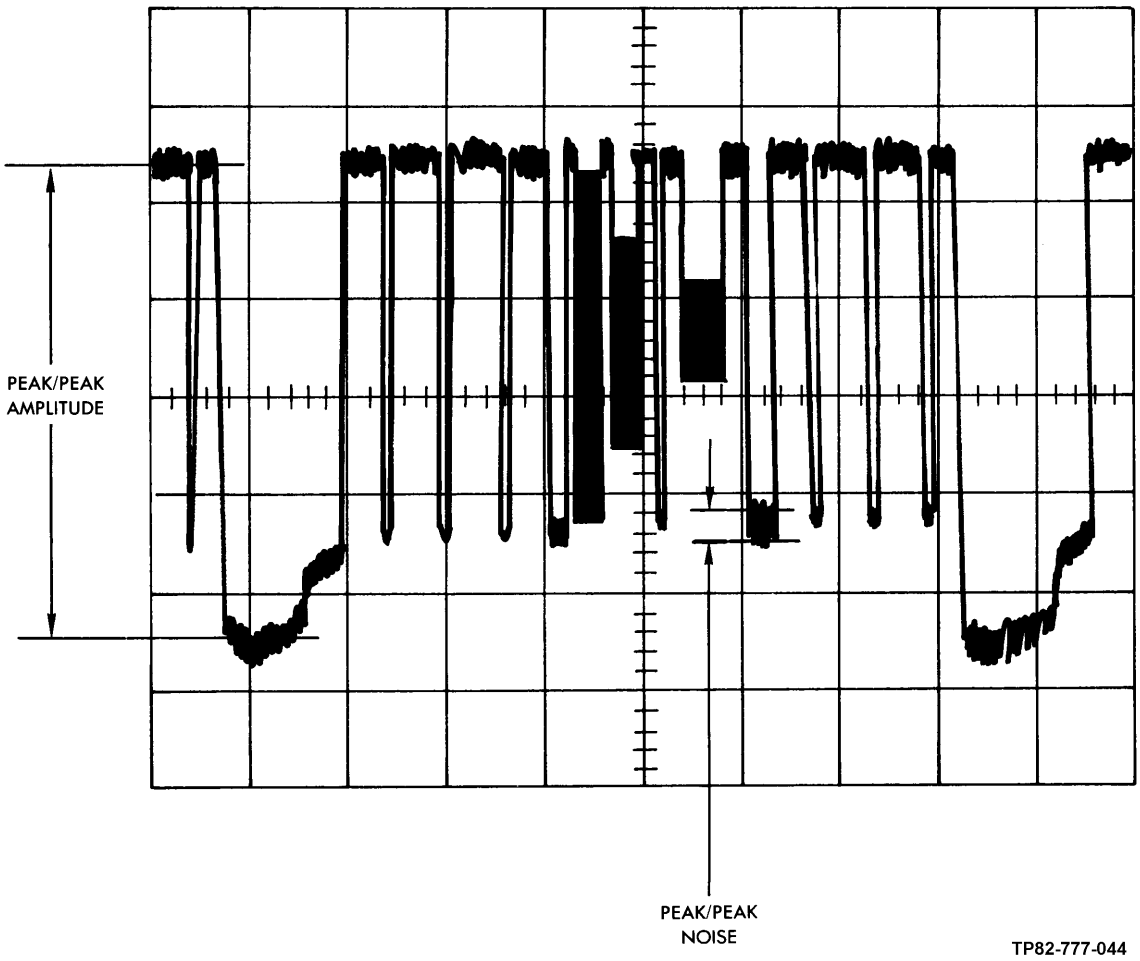


Figure 7-52. Video Waveform (Video Amplitude/SNR Test)

7-11. GENERAL. (CONT)

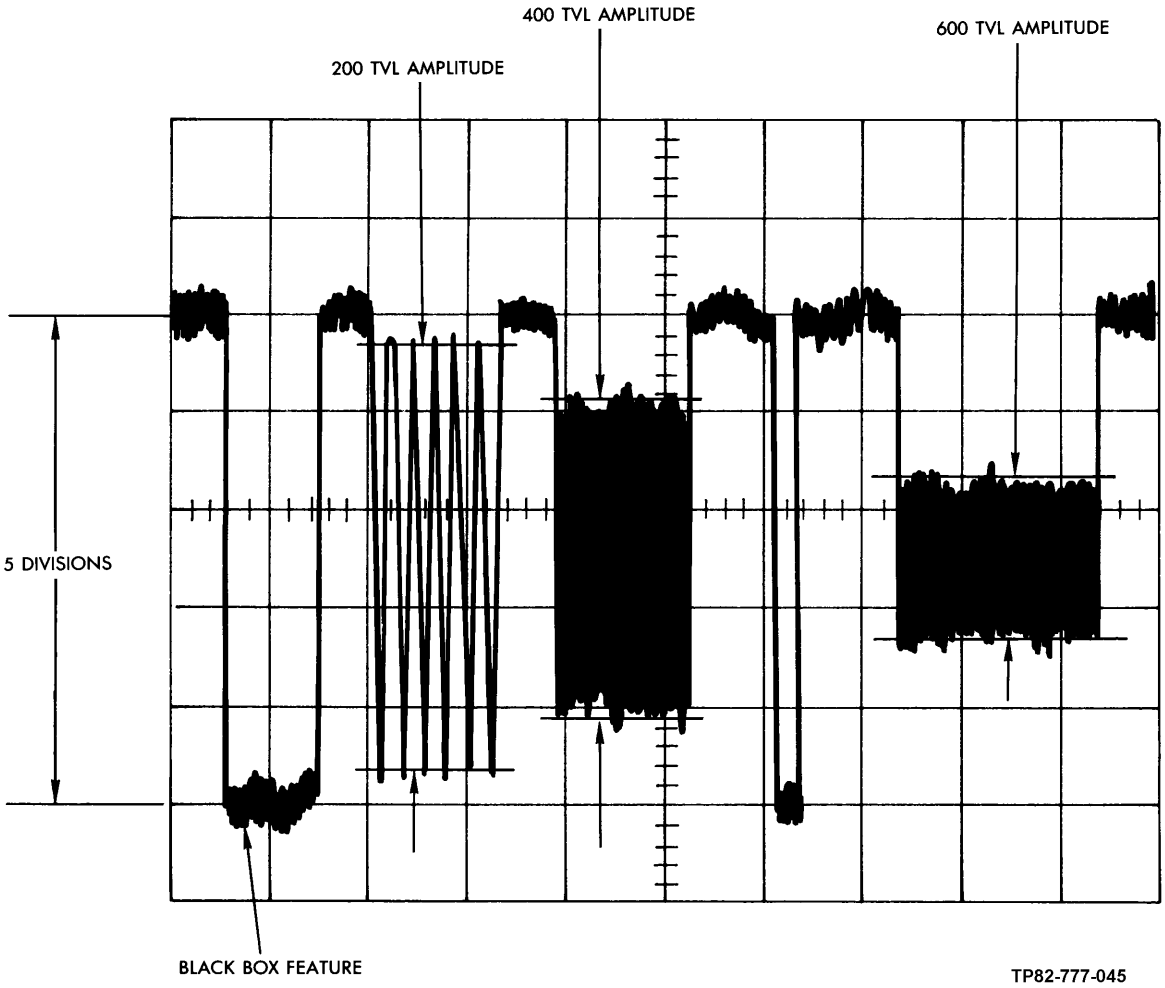


Figure 7-53. Video Waveform (Normal Scan CTF Test)

7-11. GENERAL. (CONT)

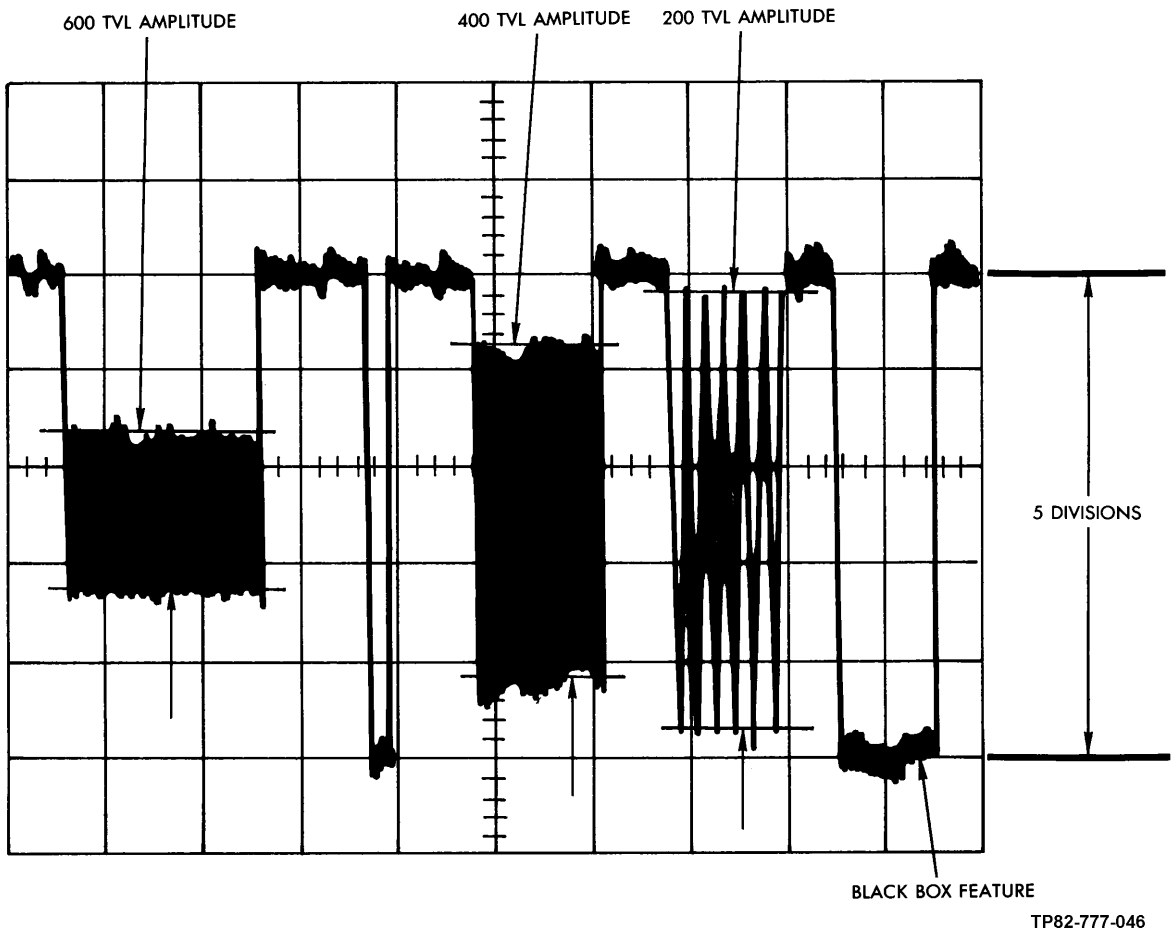
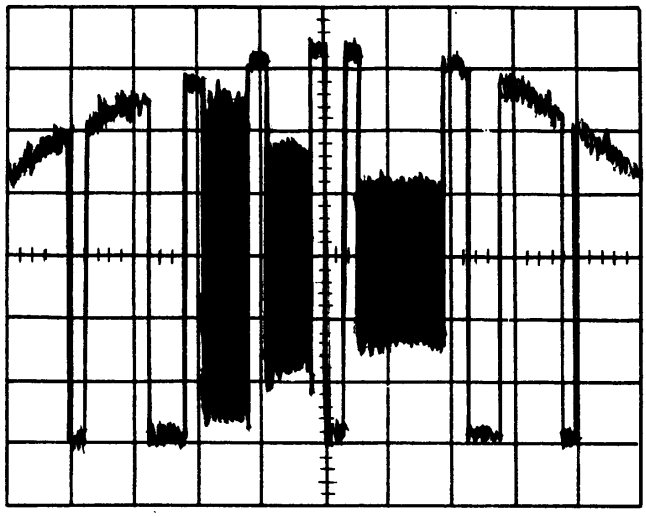
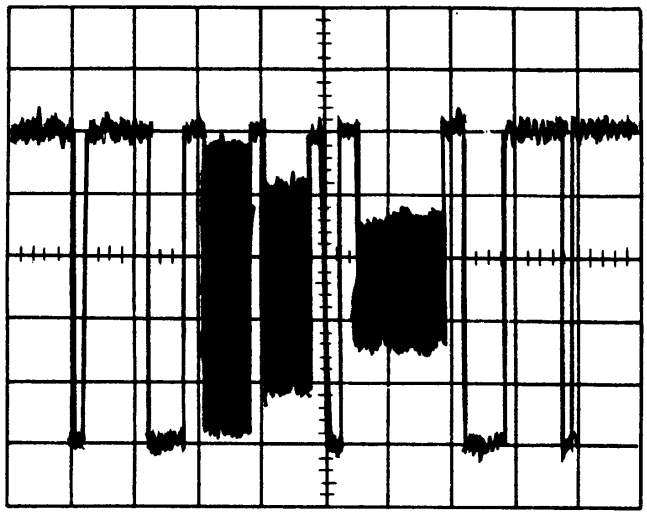


Figure 7-54. Video Waveform (Reverse Scan CTF Test)

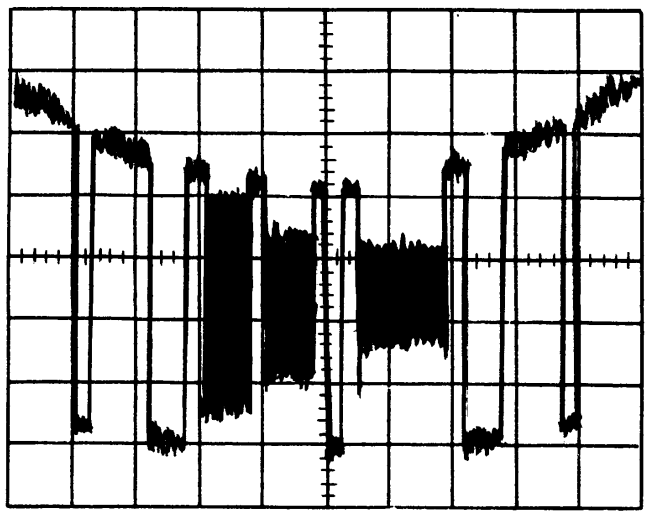
7-11. GENERAL. (CONT)



HORIZONTAL PARABOLA (FULL) POTENTIOMETER INCORRECTLY ADJUSTED.
- ADJUST DESIGNATED POTENTIOMETER COUNTER-CLOCKWISE UNTIL WAVEFORM AMPLITUDE IS UNIFORM AS SHOWN BELOW.



CORRECTLY ADJUSTED (UNIFORM SIGNAL)

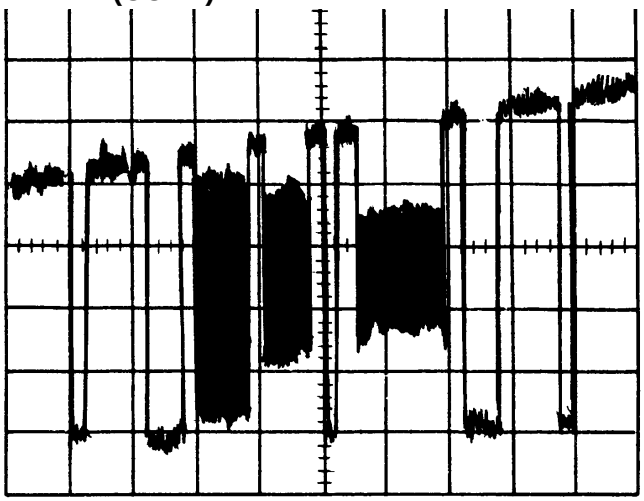


HORIZONTAL PARABOLA (FULL) POTENTIOMETER INCORRECTLY ADJUSTED.
- ADJUST DESIGNATED POTENTIOMETER CLOCKWISE UNTIL WAVEFORM AMPLITUDE IS UNIFORM AS SHOWN ABOVE.

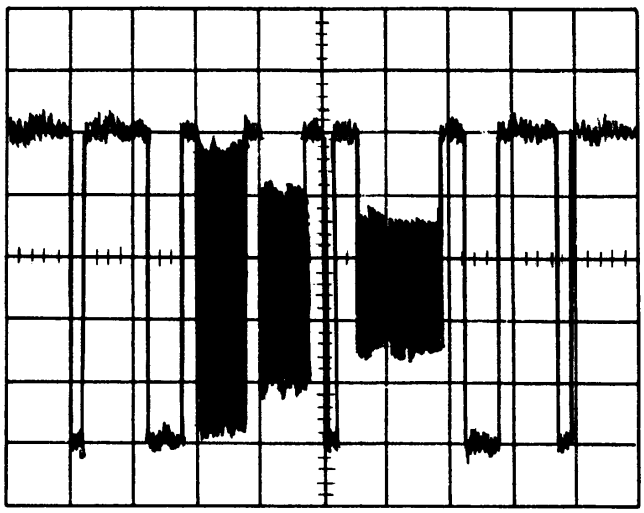
TP87-777-047

Figure 7-55. Parabolic Shading Adjustment for CTF Measurement

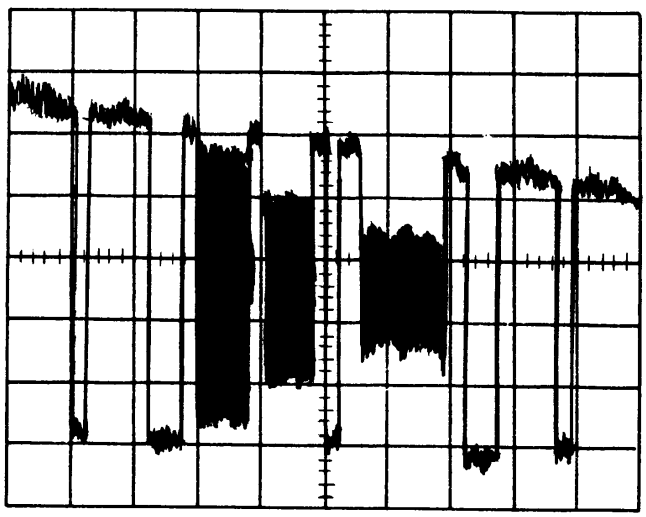
7-11. GENERAL. (CONT)



HORIZONTAL RAMP POTENTIOMETER INCORRECTLY ADJUSTED.
- ADJUST POTENTIOMETER CLOCKWISE UNTIL WAVEFORM AMPLITUDE IS UNIFORM AS SHOWN BELOW.



CORRECTLY ADJUSTED (UNIFORM SIGNAL)

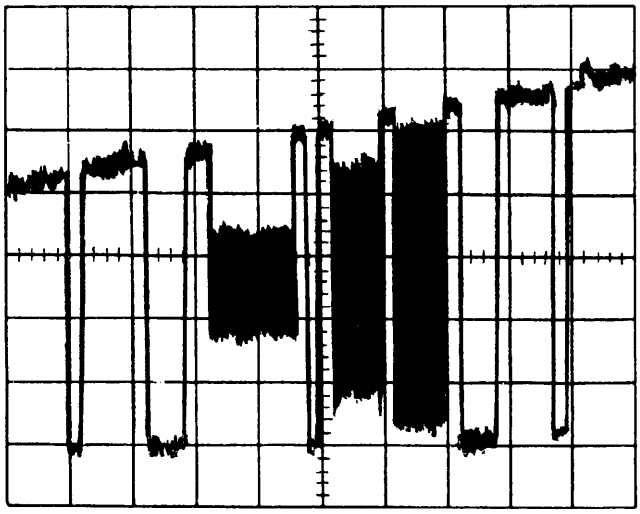


HORIZONTAL RAMP POTENTIOMETER INCORRECTLY ADJUSTED.
- ADJUST POTENTIOMETER COUNTER-CLOCKWISE UNTIL WAVEFORM AMPLITUDE IS UNIFORM AS SHOWN ABOVE.

TP82-777-048

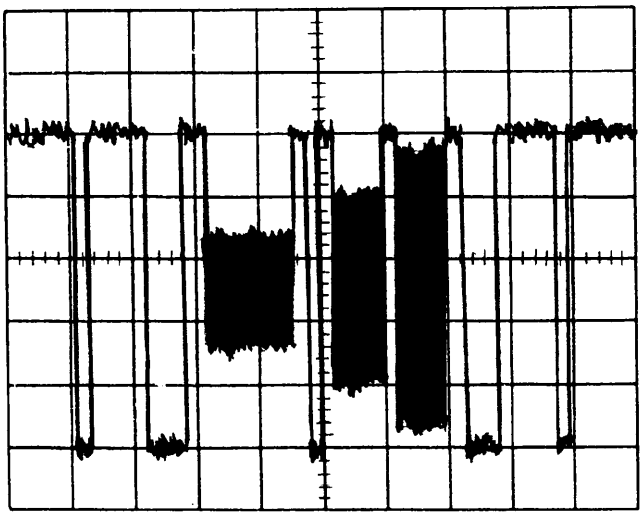
Figure 7-56. Ramp Shading Adjustment For CTF Measurement (Normal Scan)

7-11. GENERAL. (CONT)

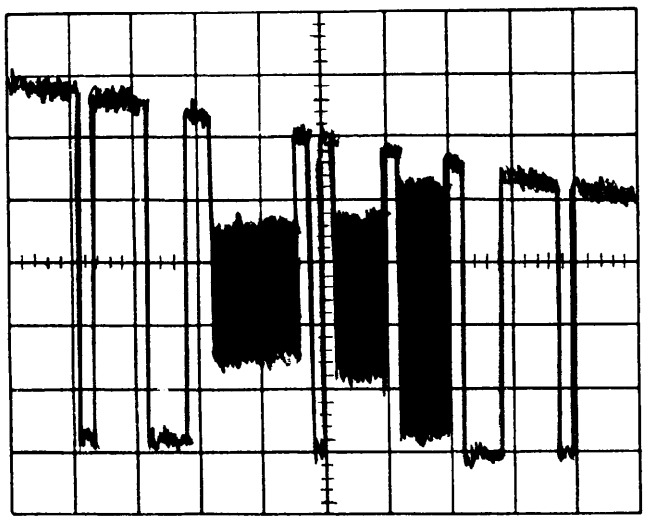


HORIZONTAL RAMP (REV SCAN) POTENETIOMETER INCORRECTLY ADJUSTED

- ADJUST POTENTIOMETER COUNTERCLOCKWISE UNTIL WAVEFORM AMPLITUDE IS UNIFORM AS SHOWN BELOW.



CORRECTLY ADJUSTED
(UNIFORM SIGNAL)



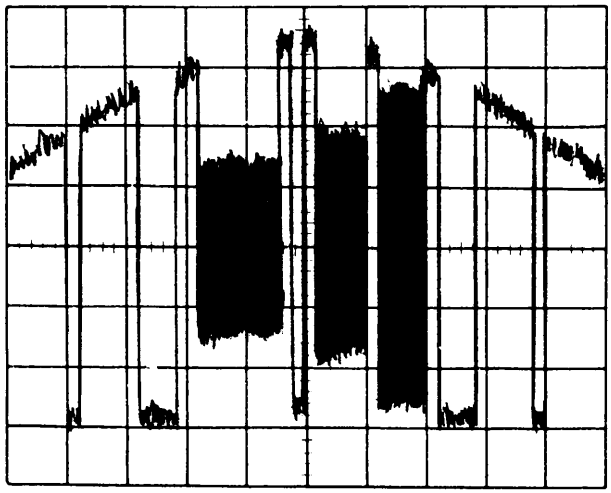
HORIZONTAL RAMP (REV SCAN) POTENETIOMETER INCORRECTLY ADJUSTED

- ADJUST POTENTIOMETER CLOCKWISE UNTIL WAVEFORM AMPLITUDE IS UNIFORM AS SHOWN ABOVE.

TP82-777-049

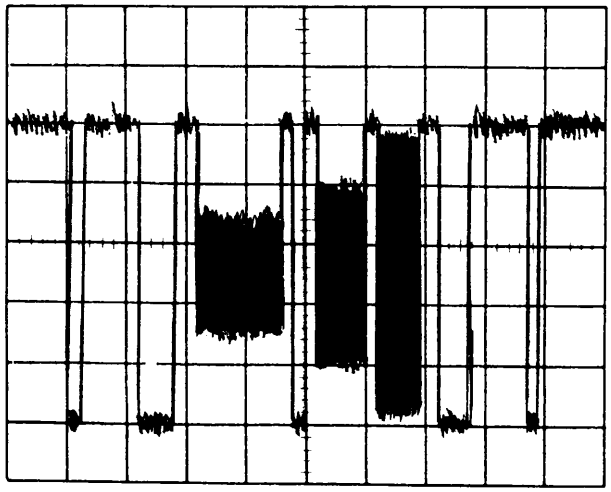
Figure 7-57. Ramp Shading Adjustment For CTF Measurement (Reverse Scan)

7-11. GENERAL. (CONT)

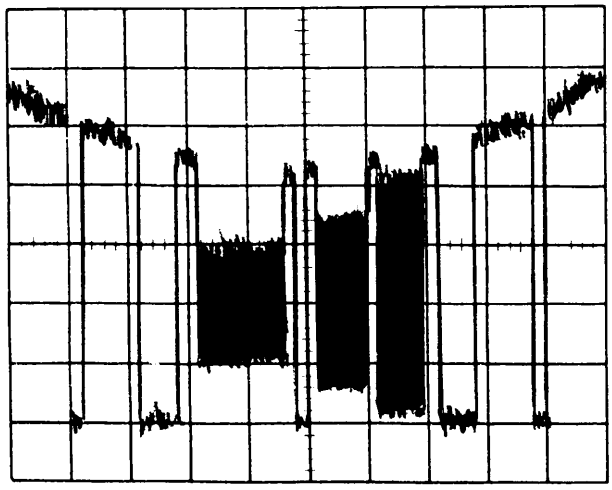


HORIZONTAL PARABOLA (FULL) POTENETIOMETER INCORRECTLY ADJUSTED

- ADJUST POTENTIOMETER COUNTERCLOCKWISE UNTIL WAVEFORM AMPLITUDE IS UNIFORM AS SHOWN BELOW.



CORRECTLY ADJUSTED
(UNIFORM SIGNAL)



HORIZONTAL PARABOLA (FULL) POTENETIOMETER INCORRECTLY ADJUSTED

- ADJUST POTENTIOMETER CLOCKWISE UNTIL WAVEFORM AMPLITUDE IS UNIFORM AS SHOWN ABOVE.

TP82-777-050

Figure 7-58. Parabolic Shading Adjustment for CTF Measurement (Reverse Scan)

7-11. GENERAL. (CONT)

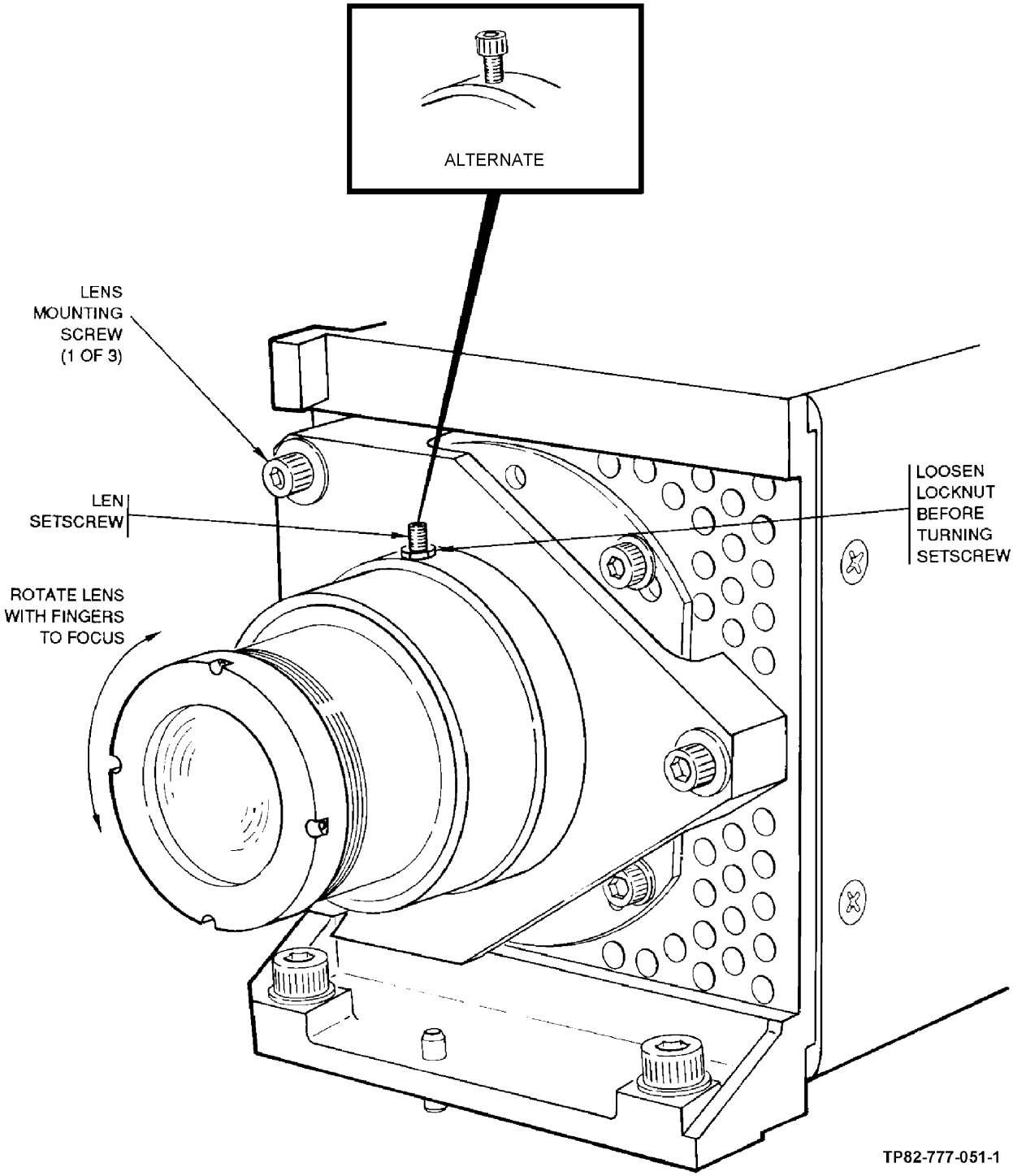


Figure 7-59. PNVS Visual Relay/Multiplexer (Vidicon) Optical Focus

7-11. GENERAL. (CONT)

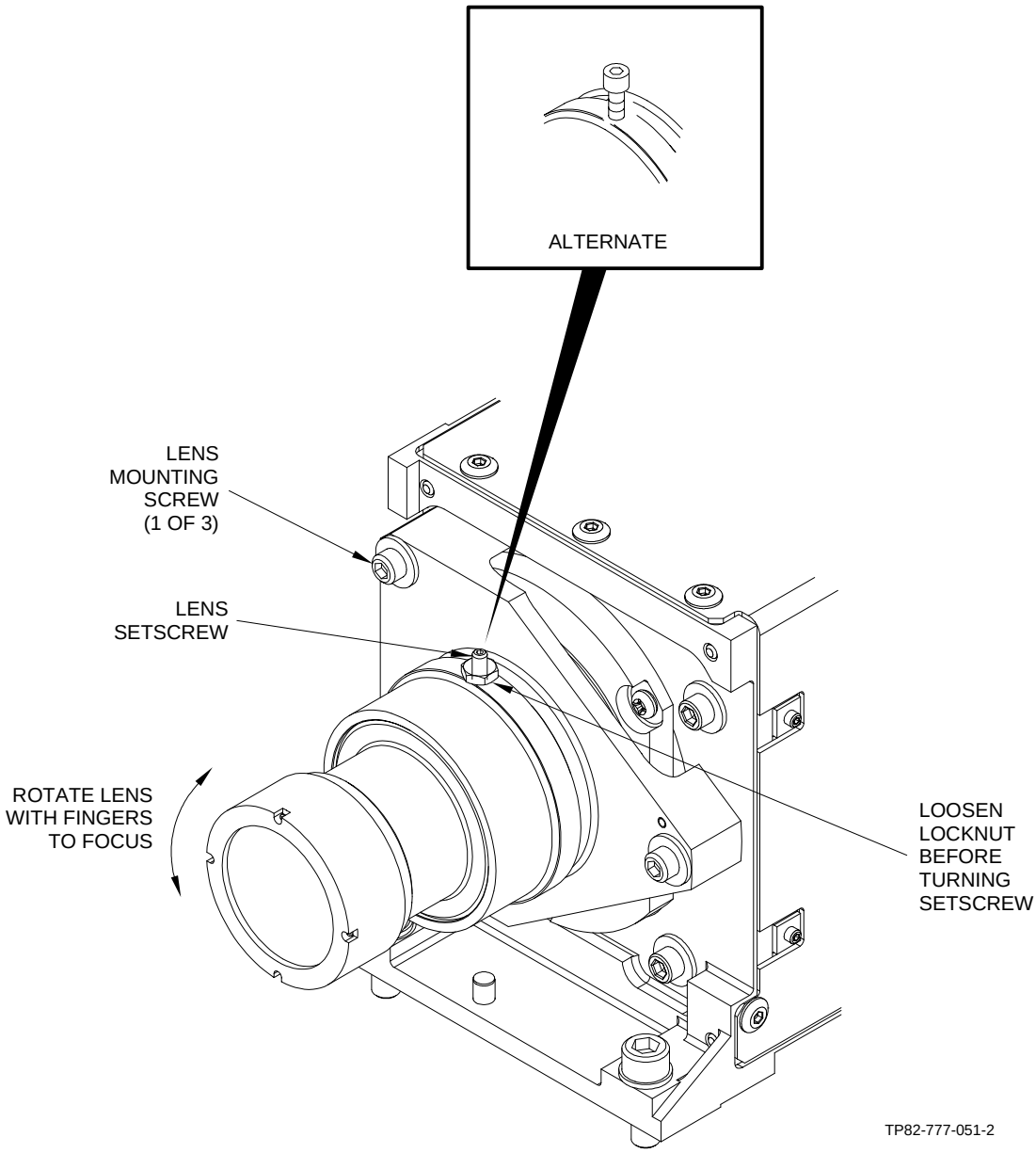


Figure 7-60. PNVS Visual Relay/Multiplexer (Solid State Camera) Optical Focus

7-11. GENERAL. (CONT)

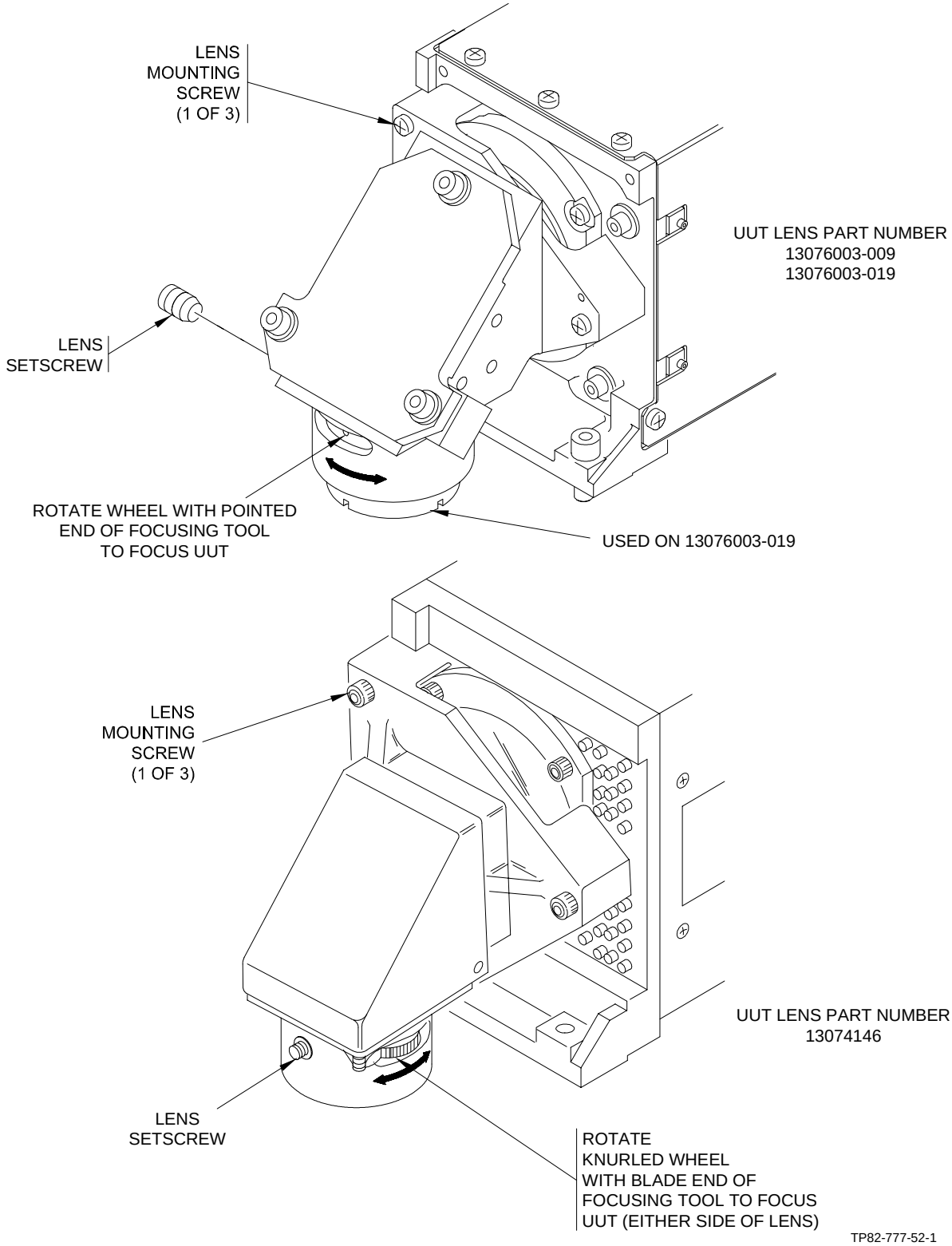


Figure 7-61. TADS Visual Multiplexer Optical Focus

7-11. GENERAL. (CONT)

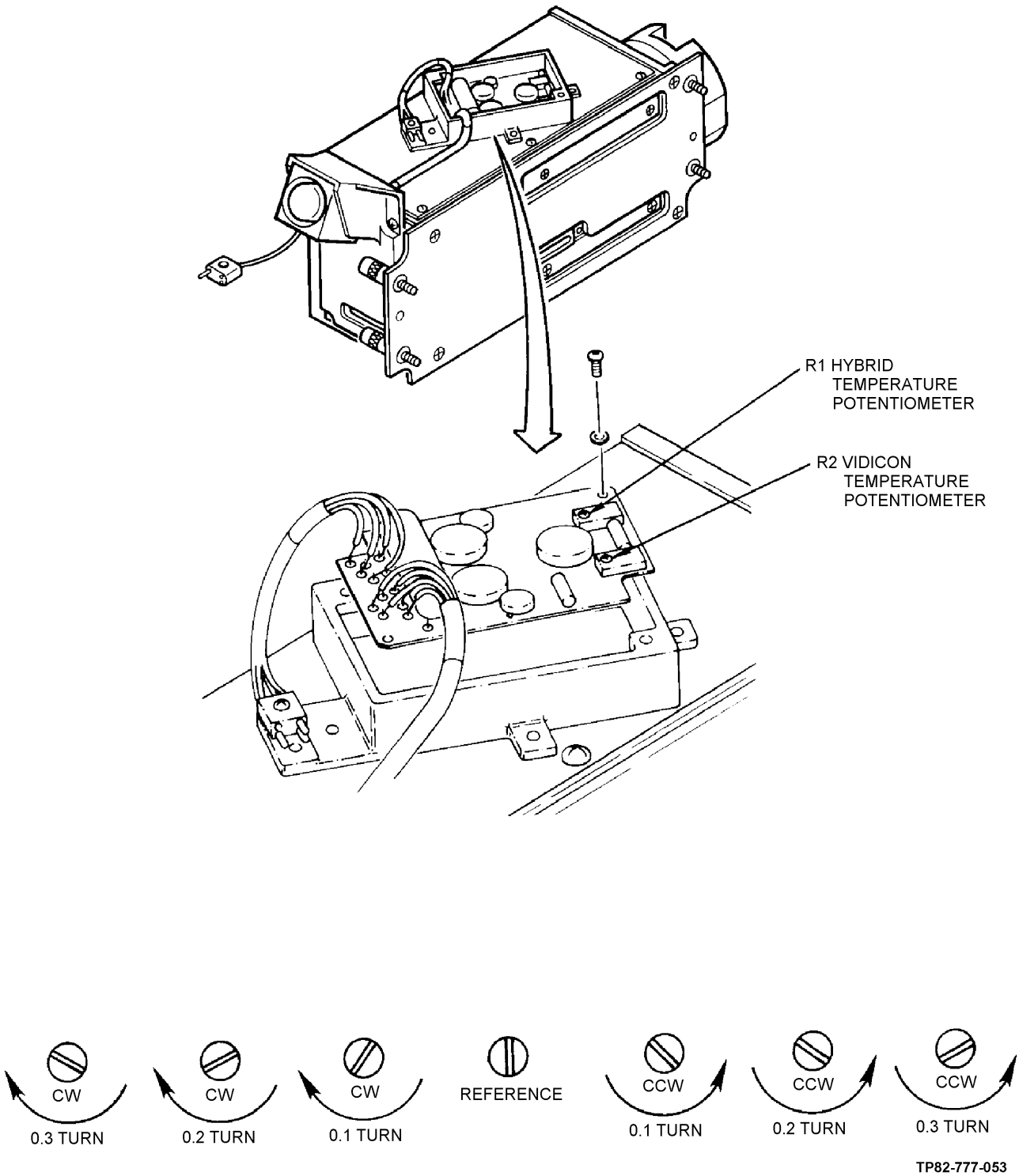
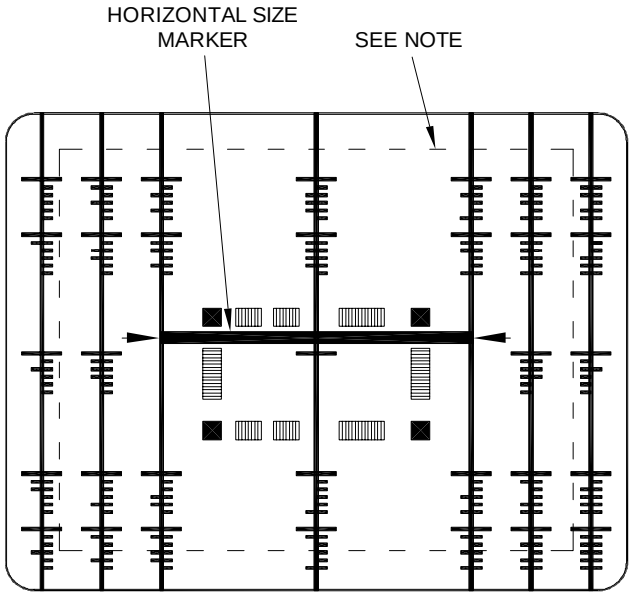


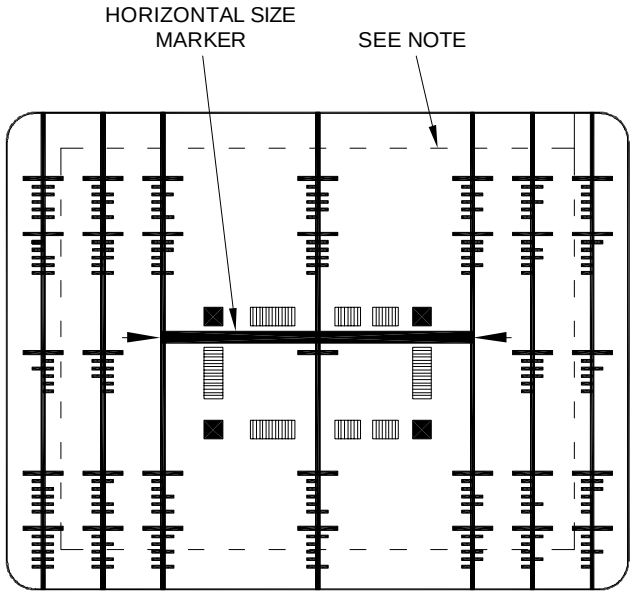
Figure 7-62. Temperature Controller Potentiometer Location

7-11. GENERAL. (CONT)



A
(NORMAL FULL SCAN)

ALINE THE EDGES OF THE TEST CHART FEATURES AND SIZE MARKERS TO BE COINCIDENT IN THE AREA INDICATED BY THE ARROWS.



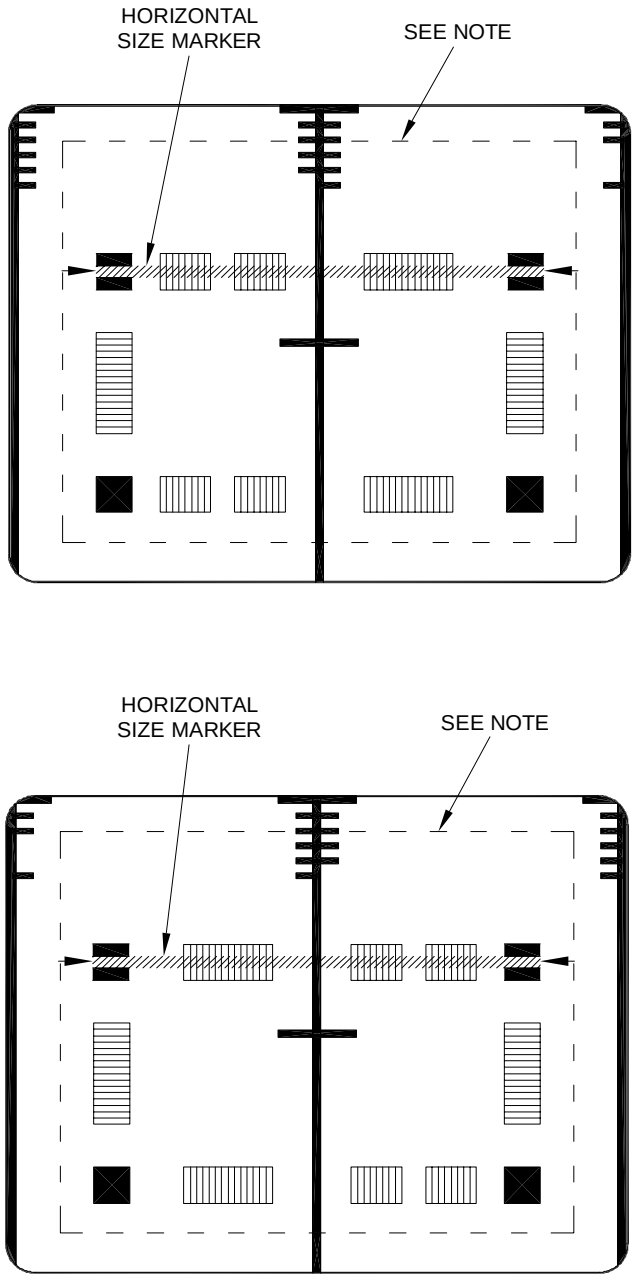
B
(REVERSE FULL SCAN)

NOTE: AREA WITHIN DOTTED LINES IS AREA OF TEST CHART VISIBLE WHEN A TADS VISUAL MULTIPLEXER WITH A 13076003-009 LENS IS BEING TESTED. THE ENTIRE AREA OF TEST CHART IS VISIBLE WHEN A TV SENSOR, PNVS VISUAL RELAY/MULTIPLEXER, OR TADS VISUAL MULTIPLEXER WITH A 13074146 LENS IS BEING TESTED.

TP82-777-054-1

Figure 7-63. Full Scan Horizontal Size Marker Alinement

7-11. GENERAL. (CONT)

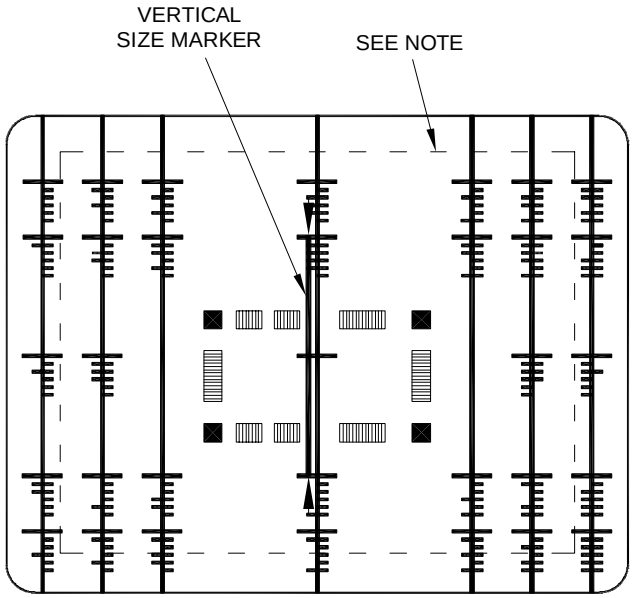


NOTE: AREA WITHIN DOTTED LINES IS AREA OF TEST CHART VISIBLE WHEN A TADS VISUAL MULTIPLEXER WITH A 13076003-009 LENS IS BEING TESTED. THE ENTIRE AREA OF TEST CHART IS VISIBLE WHEN A TV SENSOR, PNVS VISUAL RELAY/MULTIPLEXER, OR TADS VISUAL MULTIPLEXER WITH A 13074146 LENS IS BEING TESTED.

TP82-777-055-1

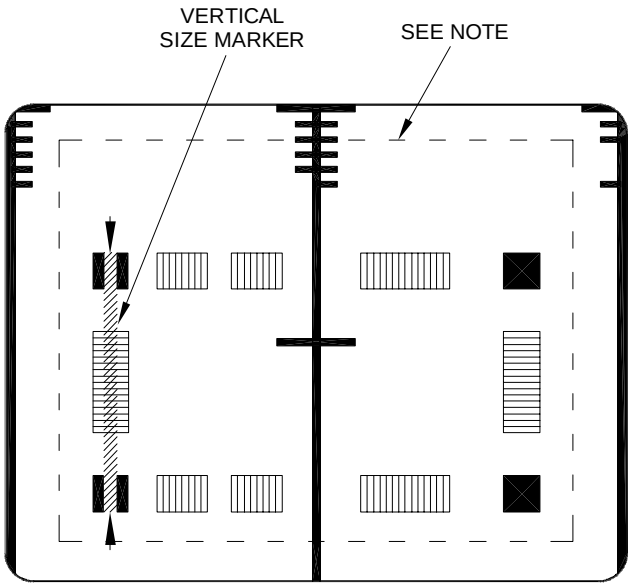
Figure 7-64. Underscan Horizontal Size Marker Alinement

7-11. GENERAL. (CONT)



A
(FULL SCAN)

ALINE THE EDGES OF THE TEST CHART FEATURES AND SIZE MARKERS TO BE COINCIDENT IN THE AREA INDICATED BY THE ARROWS.



B
(UNDERSCAN)

NOTE: AREA WITHIN DOTTED LINES IS AREA OF TEST CHART VISIBLE WHEN A TADS VISUAL MULTIPLEXER WITH A 13076003-009 LENS IS BEING TESTED. THE ENTIRE AREA OF TEST CHART IS VISIBLE WHEN A TV SENSOR, PNVS VISUAL RELAY/MULTIPLEXER, OR TADS VISUAL MULTIPLEXER WITH A 13074146 LENS IS BEING TESTED.

TP82-777-056-1

Figure 7-65. Vertical Size Marker Alinement

7-11. GENERAL. (CONT)

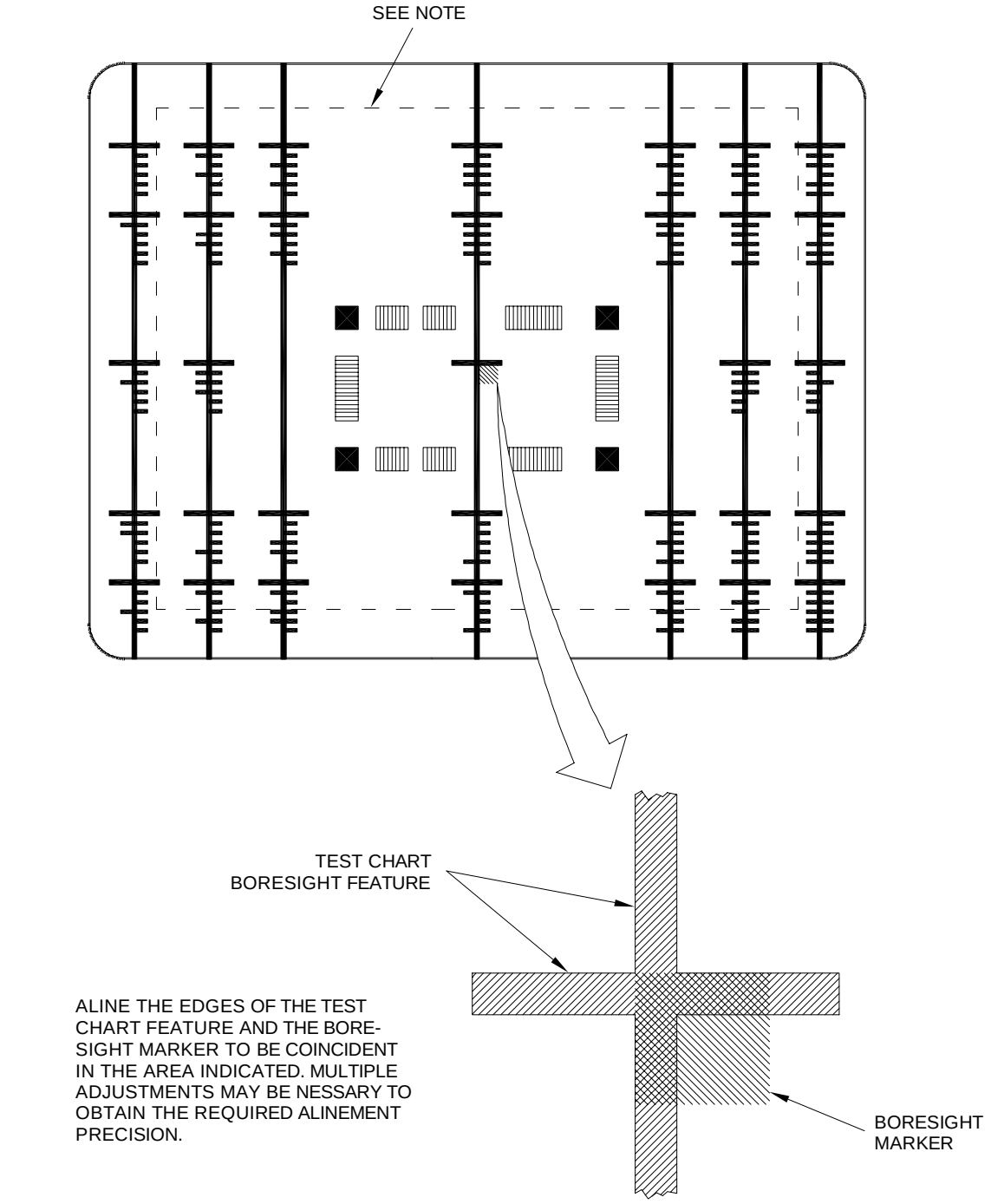


Figure 7-66. Boresight Marker Alinement (Normal Full Scan)

7-11. GENERAL. (CONT)

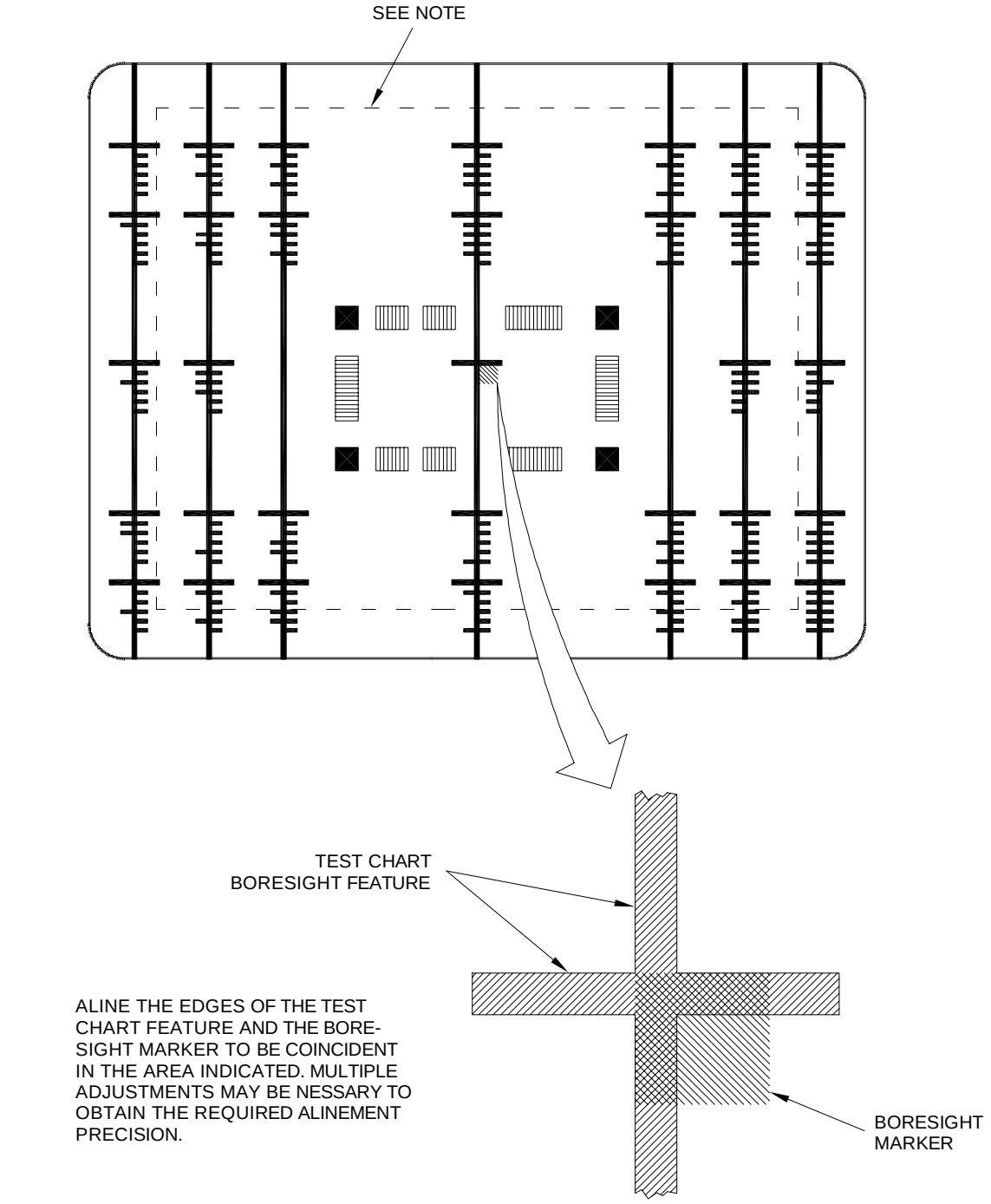
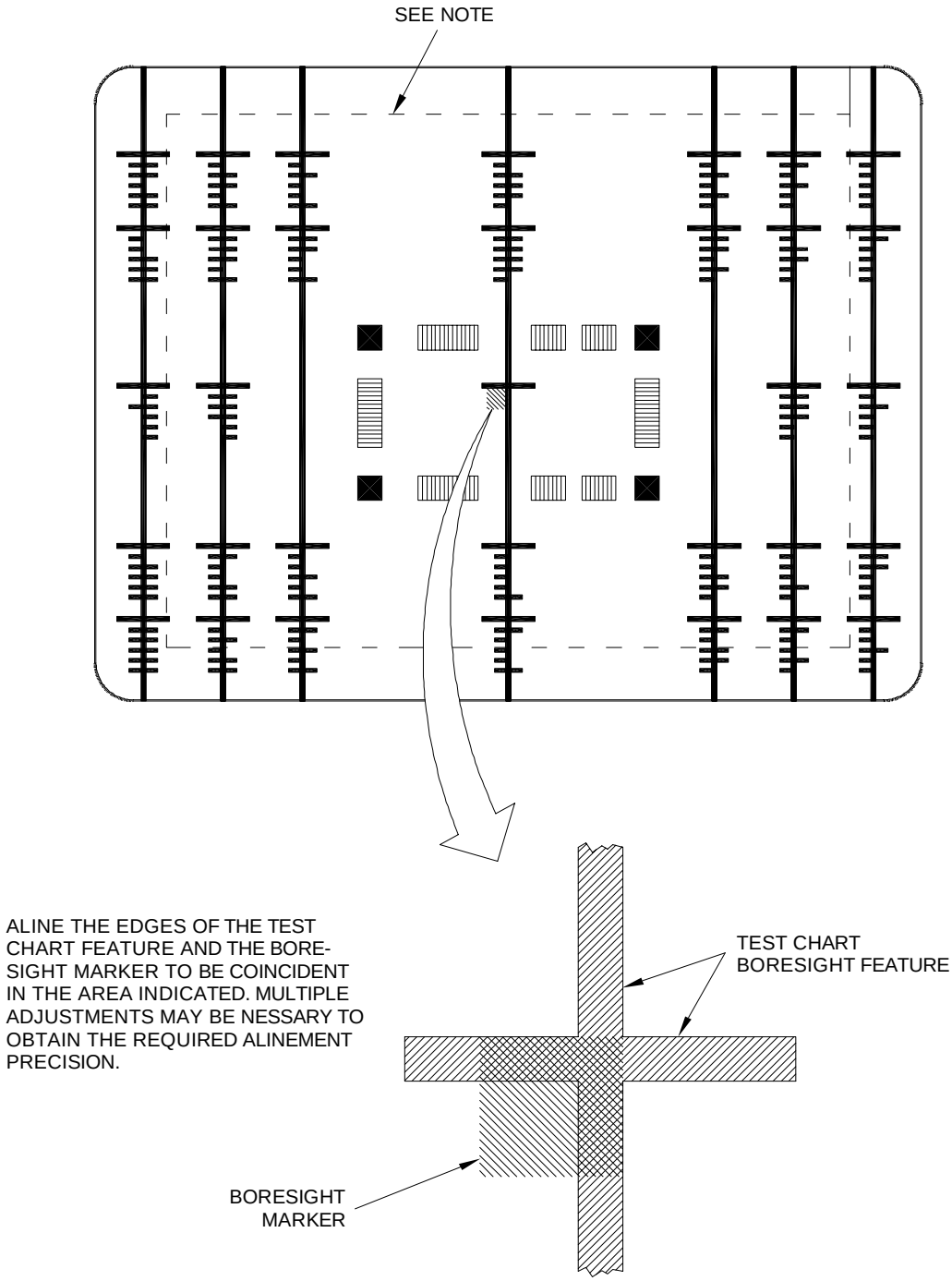


Figure 7-66. Boresight Marker Alinement (Normal Full Scan)

7-11. GENERAL. (CONT)

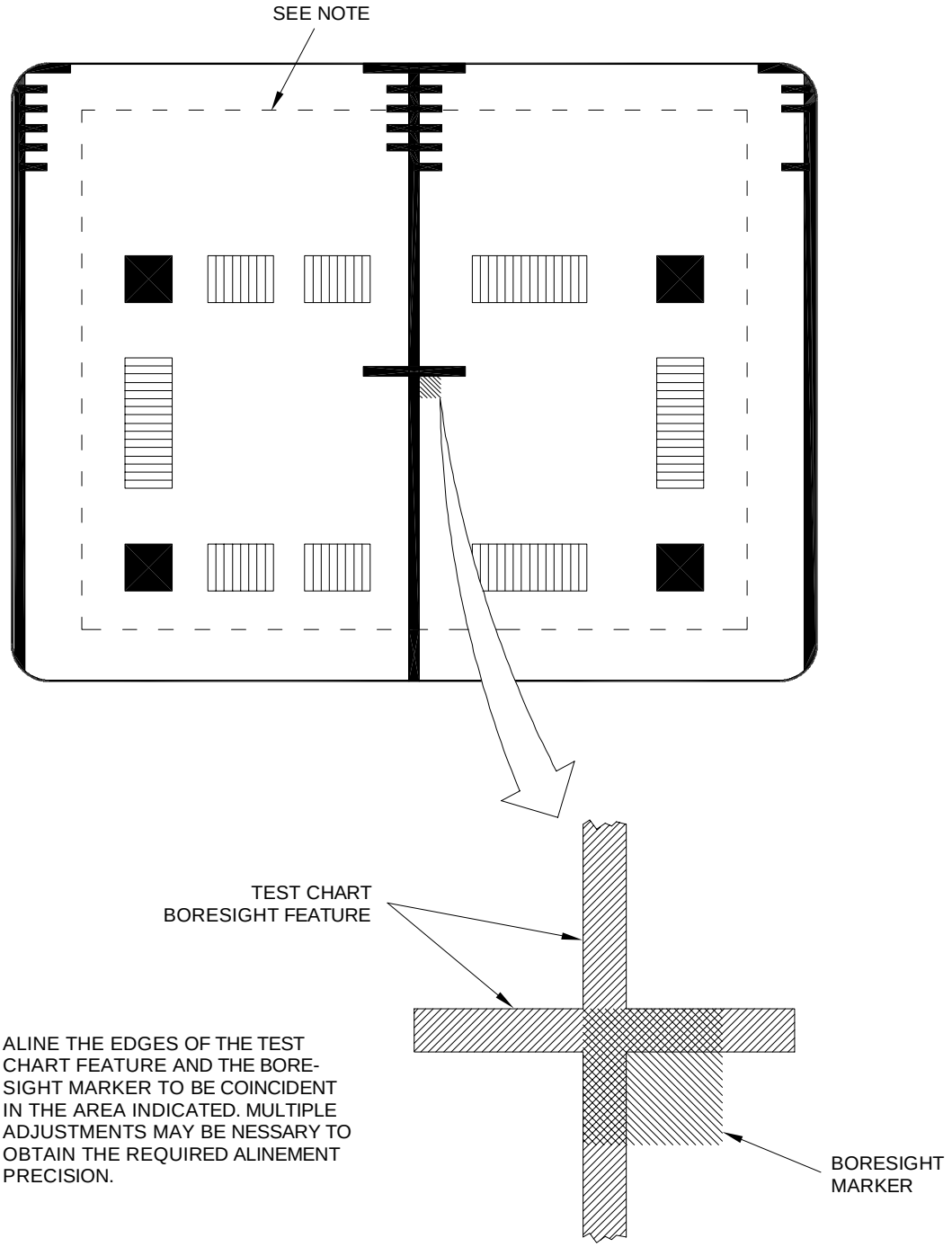


NOTE: AREA WITHIN DOTTED LINES IS AREA OF TEST CHART VISIBLE WHEN A TADS VISUAL MULTIPLEXER WITH A 13076003-009 LENS IS BEING TESTED. THE ENTIRE AREA OF TEST CHART IS VISIBLE WHEN A TV SENSOR, PNVS VISUAL RELAY/MULTIPLEXER, OR TADS VISUAL MULTIPLEXER WITH A 13074146 LENS IS BEING TESTED.

TP82-777-058-1

Figure 7-67. Boresight Marker Alinement (Reverse Full Scan)

7-11. GENERAL. (CONT)

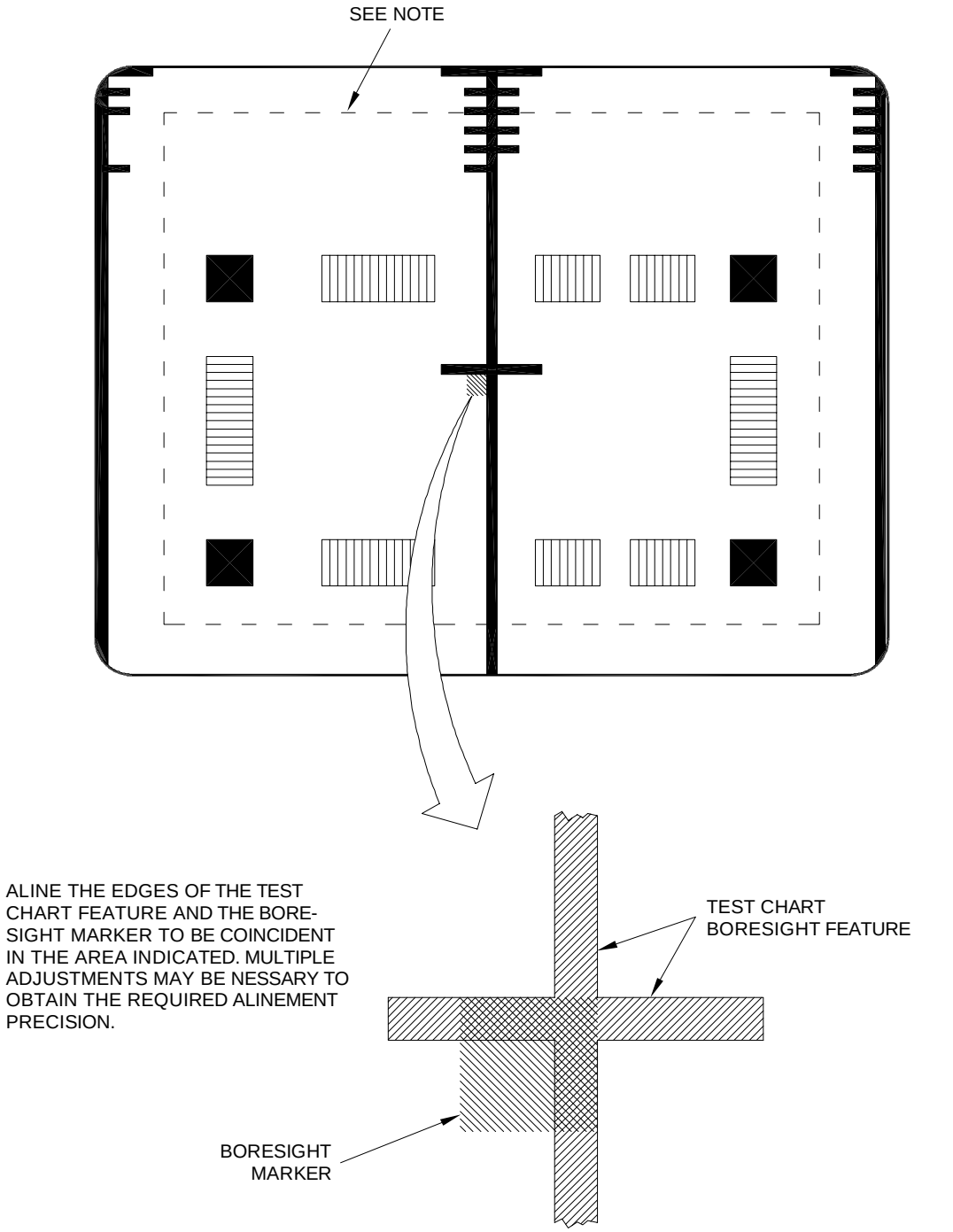


NOTE: AREA WITHIN DOTTED LINES IS AREA OF TEST CHART VISIBLE WHEN A TADS VISUAL MULTIPLEXER WITH A 13076003-009 LENS IS BEING TESTED. THE ENTIRE AREA OF TEST CHART IS VISIBLE WHEN A TV SENSOR, PNVS VISUAL RELAY/MULTIPLEXER, OR TADS VISUAL MULTIPLEXER WITH A 13074146 LENS IS BEING TESTED.

TP82-777-059-1

Figure 7-68. Boresight Marker Alinement (Normal Underscan)

7-11. GENERAL. (CONT)

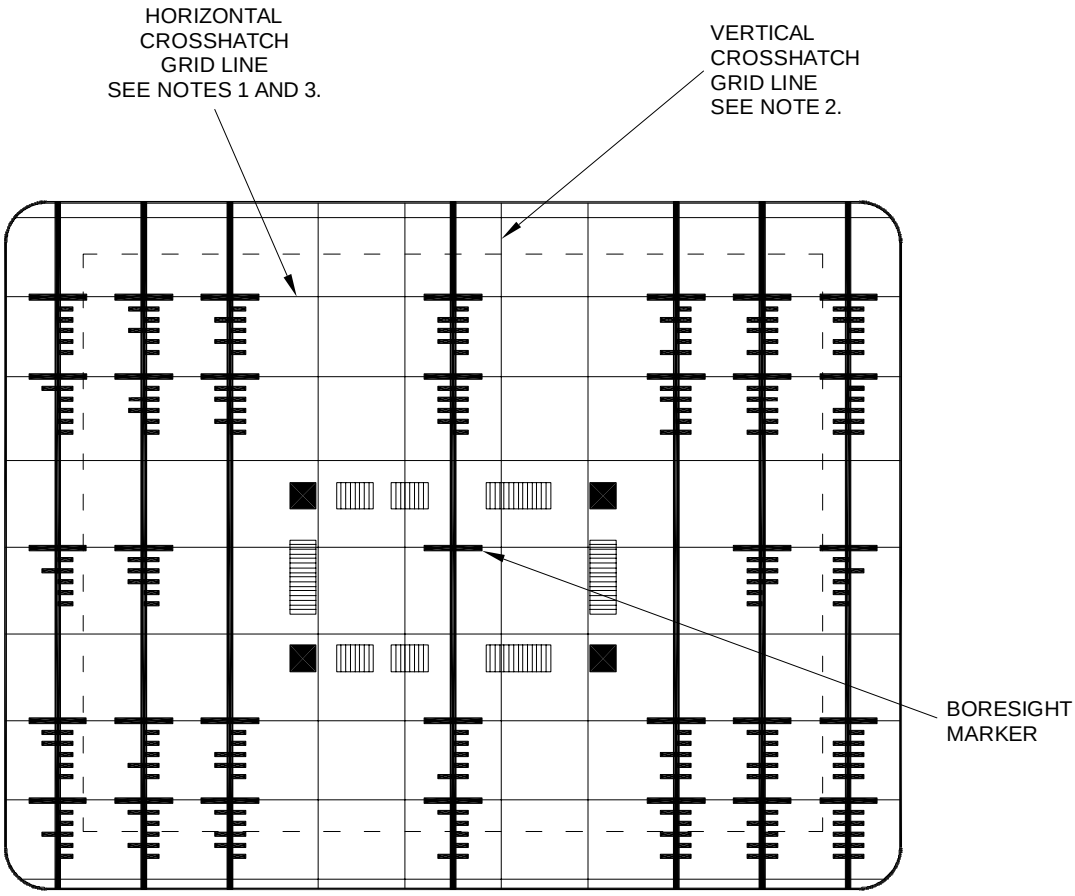


NOTE: AREA WITHIN DOTTED LINES IS AREA OF TEST CHART VISIBLE WHEN A TADS VISUAL MULTIPLEXER WITH A 13076003-009 LENS IS BEING TESTED. THE ENTIRE AREA OF TEST CHART IS VISIBLE WHEN A TV SENSOR, PNVS VISUAL RELAY/MULTIPLEXER, OR TADS VISUAL MULTIPLEXER WITH A 13074146 LENS IS BEING TESTED.

TP82-777-060-1

Figure 7-69. Boresight Marker Alinement (Reverse Underscan)

7-11. GENERAL. (CONT)

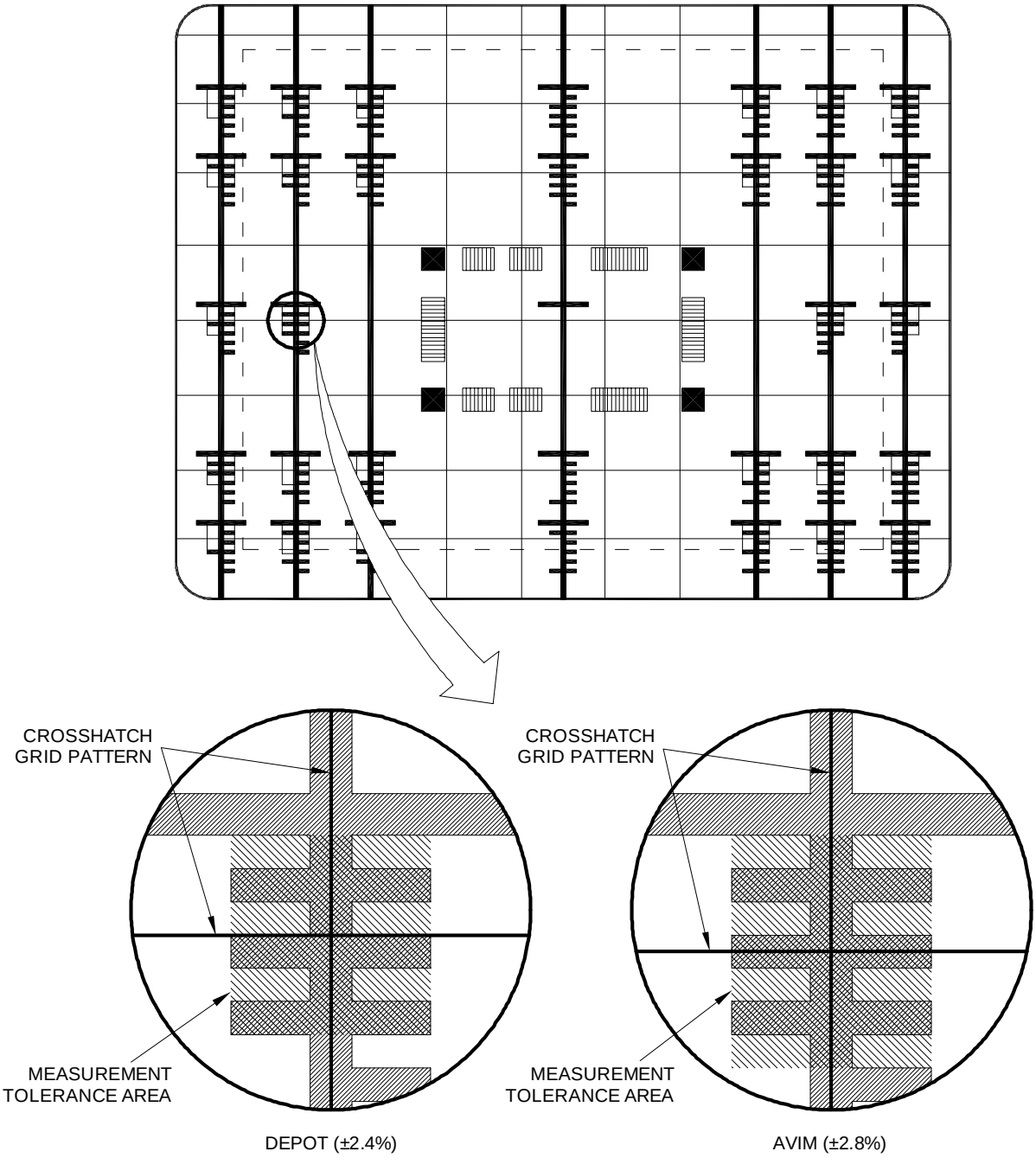


NOTES:
1. 1 OF 9 FOR 13076139, 13080390 AND 13075911 WITH 13074146 RELAY LENS.
   1 OF 7 FOR 13075911 WITH 13076003-009 LENS.
2. 1 OF 10 FOR 13076139, 13080390 AND 13075911 WITH 13074146 RELAY LENS.
   1 OF 8 FOR 13075911 WITH 13076003-009 LENS.
3. THE TOP AND BOTTOM HORIZONTAL CROSS HATCH GRID LINES ARE LOCATED VERY CLOSE TO THE TOP AND BOTTOM OF THE RASTER AND MAY BE DIFFICULT TO SEE.

TP82-777-061-1

Figure 7-70. Crosshatch Pattern Setup

7-11. GENERAL. (CONT)

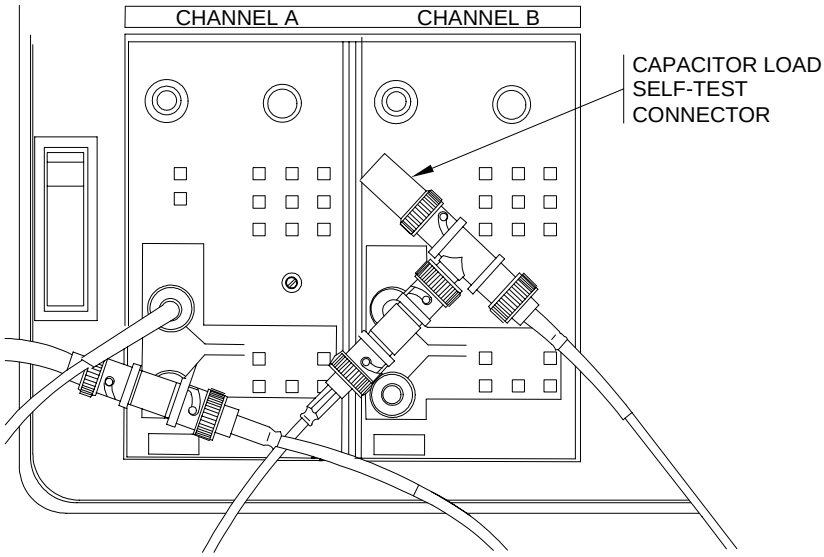


NOTES:
1. 28 MEASUREMENT AREAS ARE EVALUATED FOR 13076139, 13080390 AND 13075911 WITH 13074146 RELAY LENS.
2. 14 MEASUREMENT AREAS ARE EVALUATED FOR13075911 WITH 13076003-009 RELAY LENS. THE 7 MEASURMENT AREAS AT THE BOTTOM OF THE DISPLAY ARE NOT USED.

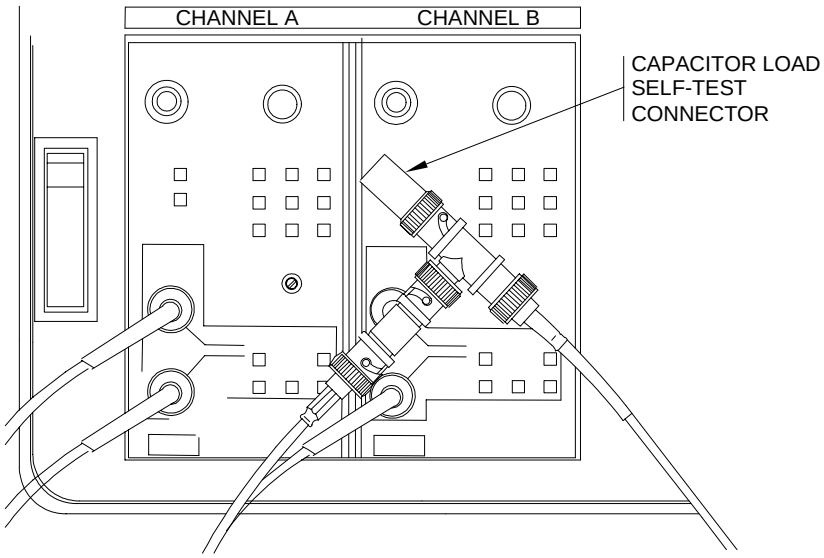
TP82-777-062-1

Figure 7-71. Geometric Distortion Measurement

7-11. GENERAL. (CONT)



VIDICON SETUP

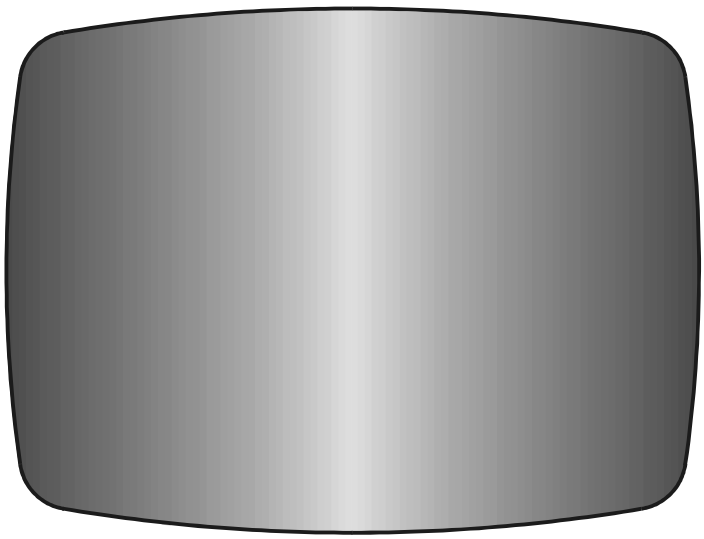


SOLID STATE CAMERA SETUP

TP82-777-63-1

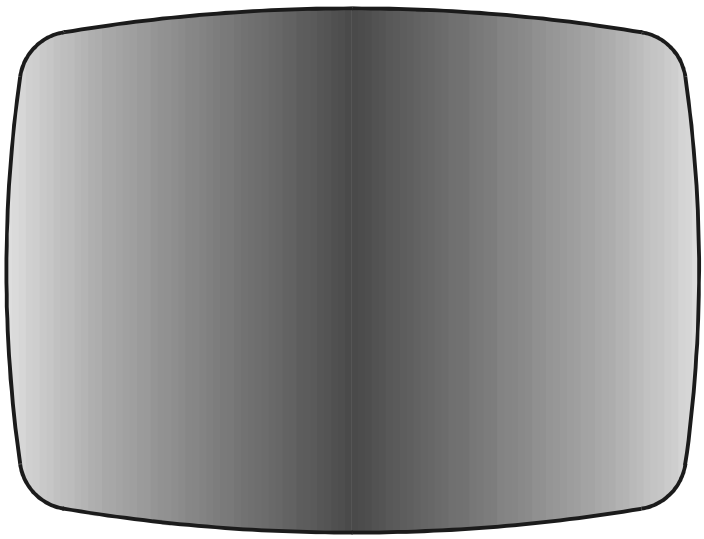
Figure 7-72. Capacitor Load Self-Test Connector

7-11. GENERAL. (CONT)



HORIZONTAL PARABOLA POTENTIOMETER MISADJUSTED
•ADJUST POTENTIOMETER COUNTERCLOCKWISE FOR MOST UNIFORM DISPLAY BRIGHTNESS.

NOTE: THE ADJUSTMENT PROCEDURES ARE FOR VIDICON CAMERA ONLY



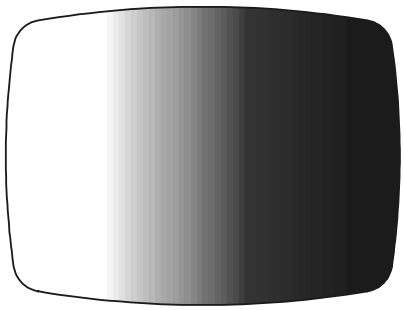
HORIZONTAL PARABOLA POTENTIOMETER MISADJUSTED
•ADJUST POTENTIOMETER CLOCKWISE FOR MOST UNIFORM DISPLAY BRIGHTNESS.

TP82-777-64

Figure 7-73. Horizontal Parabola Shading Adjustment

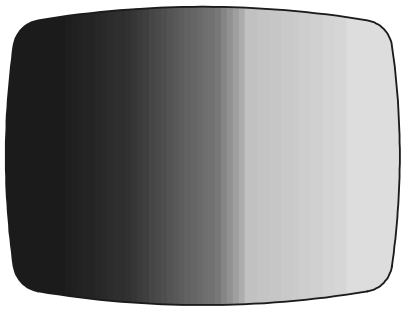
7-11. GENERAL. (CONT)

NOTE: THE ADJUSTMENT PROCEDURES ARE FOR VIDICON CAMERA ONLY



HORIZONTAL RAMP (NORMAL) OR HORIZONTAL RAMP (UNDERSCAN) POTENTIOMETER MISADJUSTED

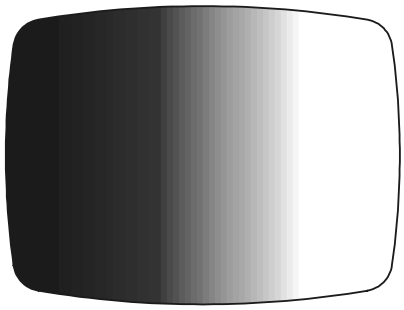
- ADJUST DESIGNATED POTENTIOMETER COUNTER-CLOCKWISE FOR MOST UNIFORM DISPLAY BRIGHTNESS.



HORIZONTAL RAMP (NORMAL) OR HORIZONTAL RAMP (UNDERSCAN) POTENTIOMETER MISADJUSTED

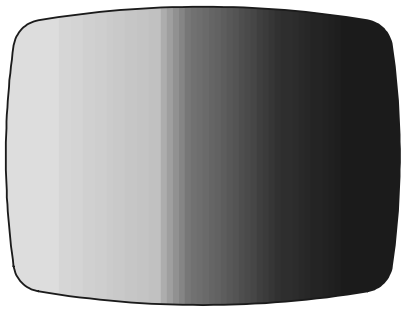
- ADJUST DESIGNATED POTENTIOMETER CLOCKWISE FOR MOST UNIFORM DISPLAY BRIGHTNESS.

A-NORMAL SCAN



HORIZONTAL RAMP (REV SCAN) POTENTIOMETER MISADJUSTED

- ADJUST POTENTIOMETER COUNTERCLOCKWISE FOR MOST UNIFORM DISPLAY BRIGHTNESS.



HORIZONTAL RAMP (REV SCAN) POTENTIOMETER MISADJUSTED

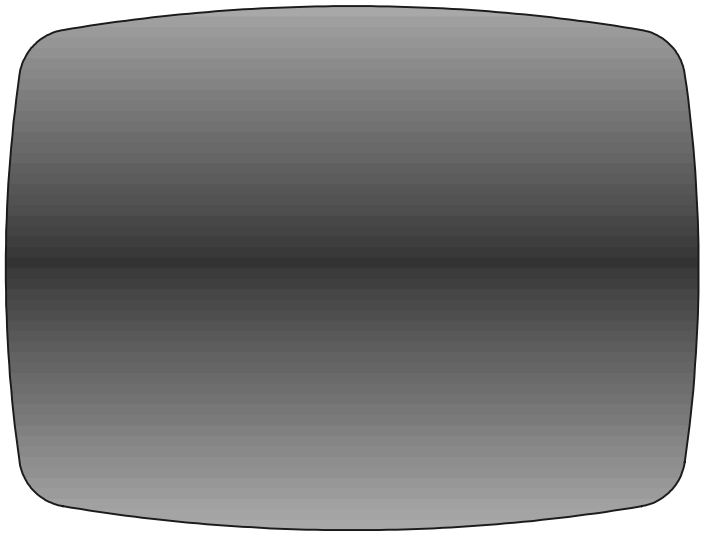
- ADJUST POTENTIOMETER CLOCKWISE FOR MOST UNIFORM DISPLAY BRIGHTNESS.

B-REVERSE SCAN

TP82-777-65

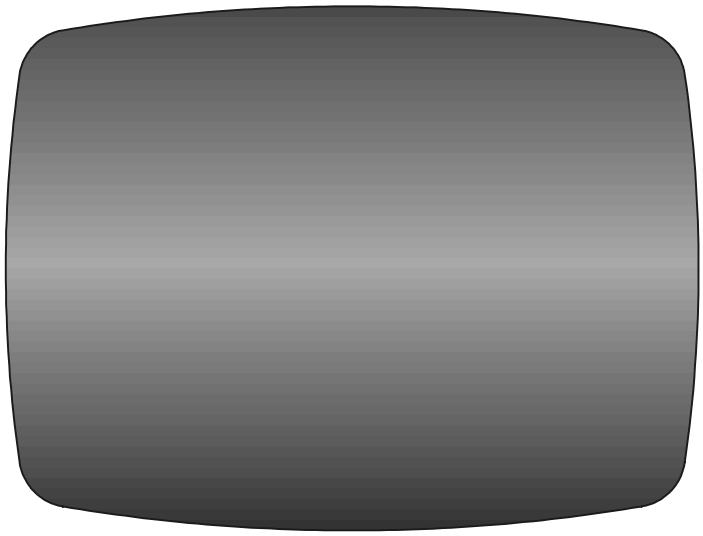
Figure 7-74. Horizontal Ramp Shading Adjustment

7-11. GENERAL. (CONT)



VERTICAL PARABOLA POTENTIOMETER MISADJUSTED
- ADJUST POTENTIOMETER COUNTERCLOCKWISE FOR MOST UNIFORM DISPLAY BRIGHTNESS.

NOTE: THE ADJUSTMENT PROCEDURES ARE FOR VIDICON CAMERA ONLY



VERTICAL PARABOLA POTENTIOMETER MISADJUSTED
- ADJUST POTENTIOMETER CLOCKWISE FOR MOST UNIFORM DISPLAY BRIGHTNESS.

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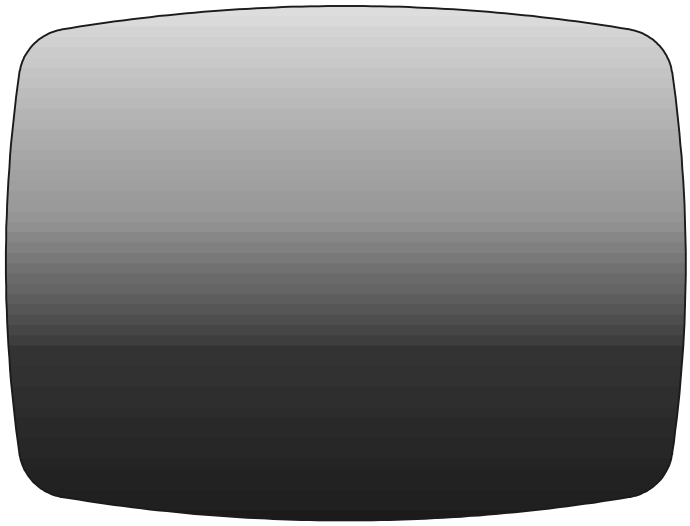
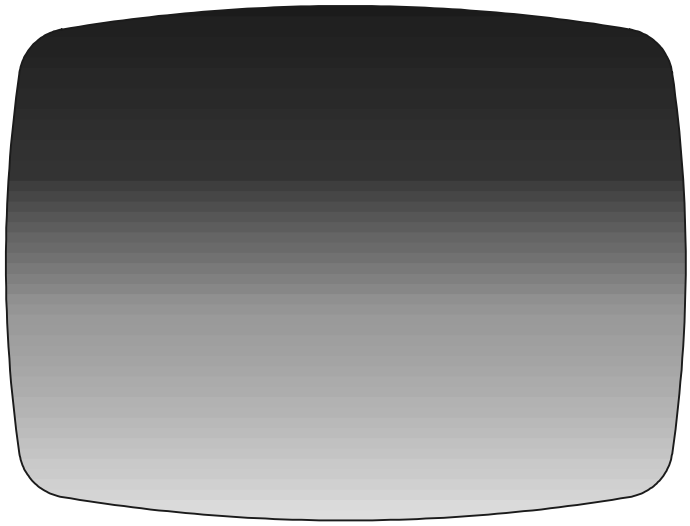
Figure 7-75. Vertical Parabola Shading Adjustment

7-11. GENERAL. (CONT)



VERTICAL RAMP
POTENTIOMETER MISADJUSTED
- ADJUST POTENTIOMETER CLOCKWISE FOR MOST UNIFORM DISPLAY BRIGHTNESS.

NOTE: THE ADJUSTMENT PROCEDURES ARE FOR VIDICON CAMERA ONLY



VERTICAL RAMP
POTENTIOMETER MISADJUSTED
- ADJUST POTENTIOMETER COUNTERCLOCKWISE FOR MOST UNIFORM DISPLAY BRIGHTNESS.

TP82-777-67

Figure 7-76. Vertical Ramp Shading Adjustment

7-11. GENERAL. (CONT)

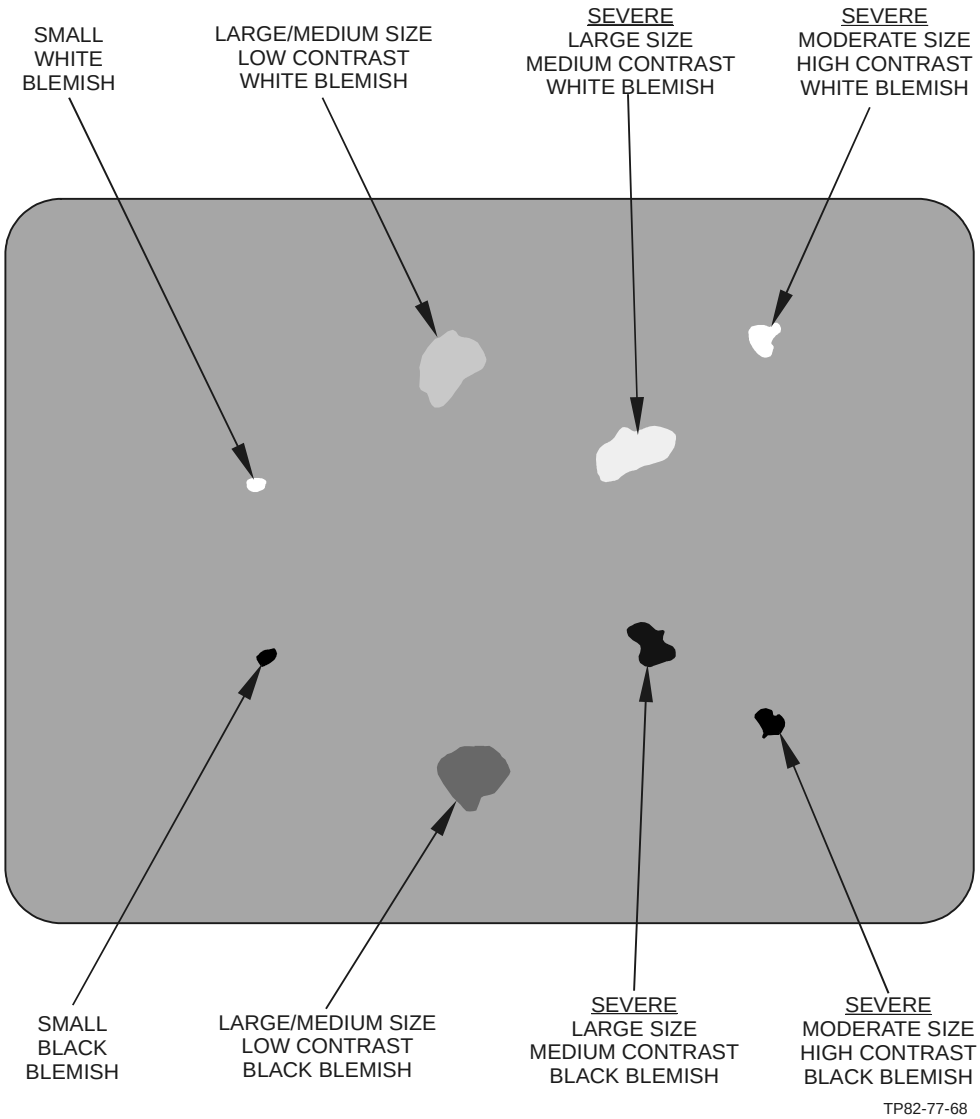
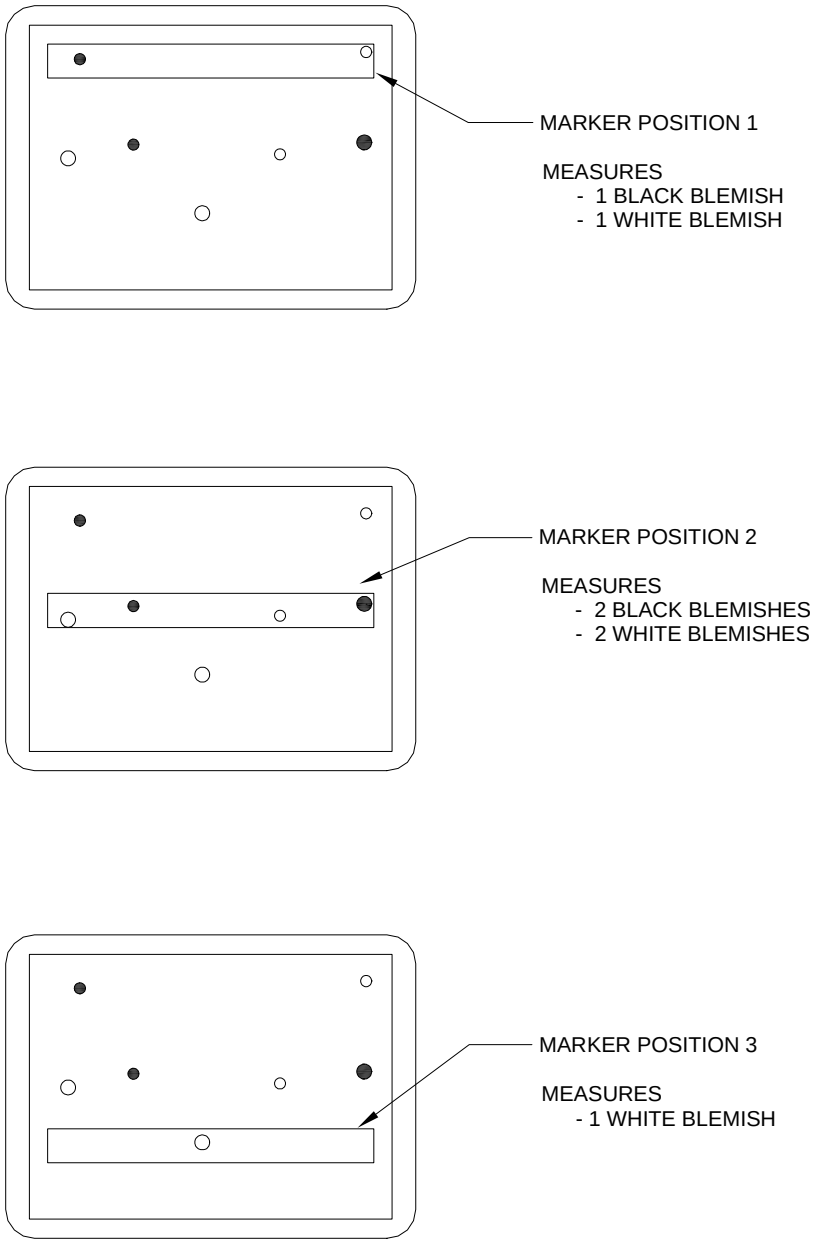


Figure 7-77. Blemish Definition

7-11. GENERAL. (CONT)



NOTE: THE MARKER SHOULD BE POSITIONED OVER EACH BLEMISH AT LEAST ONCE WITH EACH POSITION ADJUSTED TO COVER AS MANY BLEMISHES AS POSSIBLE.
EACH TIME THE DESIRED MARKER POSITION IS ESTABLISHED ENTER 7 TO MEASURE DATA IN THE MARKED REGION.
IF A BLEMISH IS MEASURED IN MULTIPLE MARKER POSITIONS, IT IS MEASURED IN EACH POSITION BUT ONLY COUNTED ONCE FOR THE ENTIRE RASTER.

TP82-777-028-2

Figure 7-78. Marker Positioning Procedure

7-11. GENERAL. (CONT)

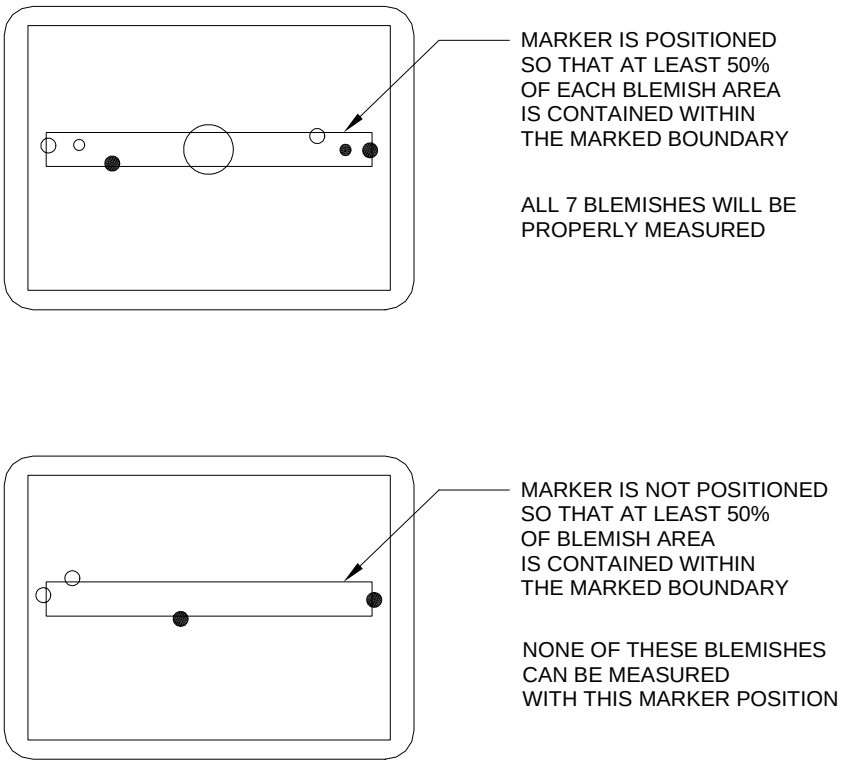


Figure 7-79. Marker Positioning Criteria

7-11. GENERAL. (CONT)

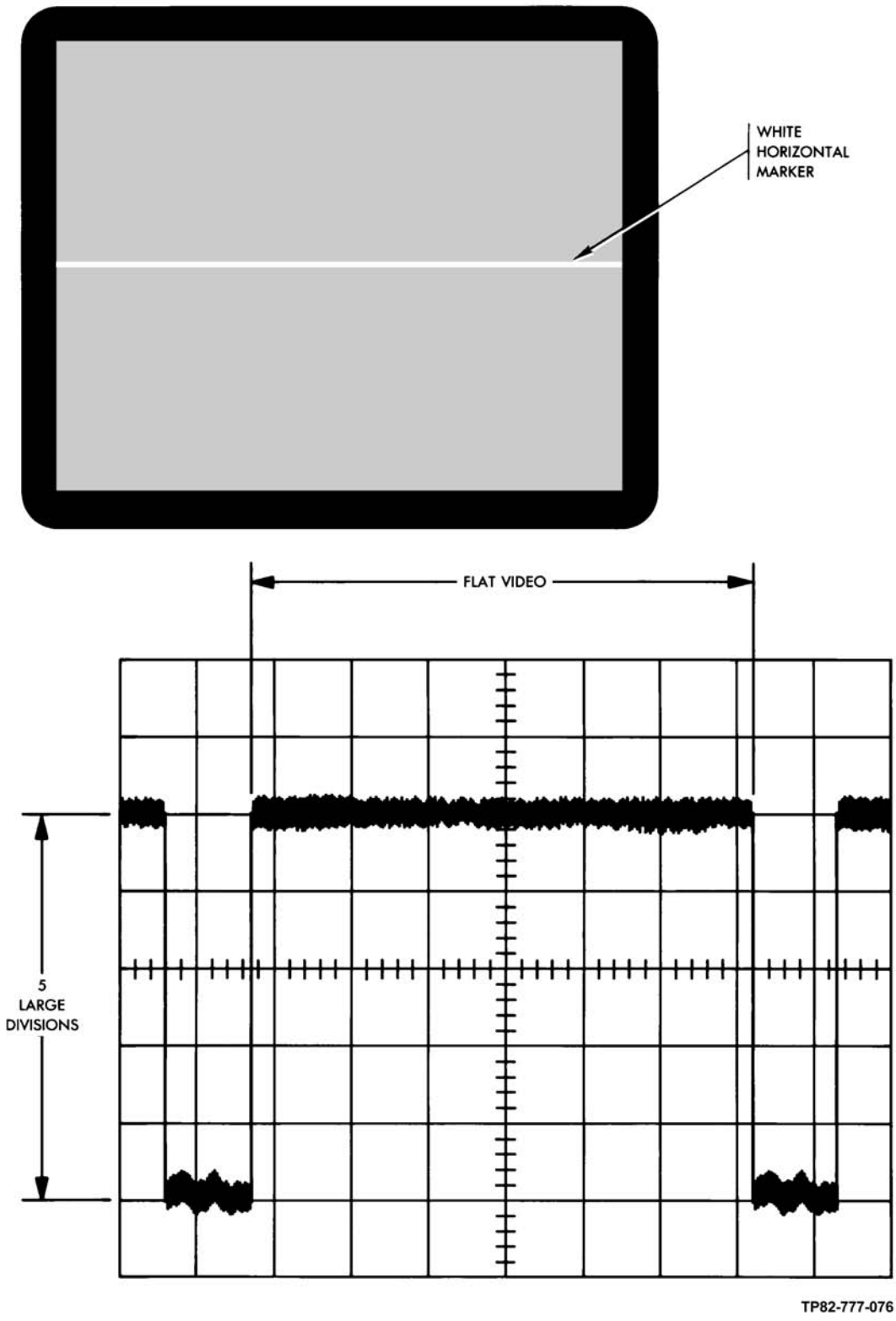


Figure 7-80. Flat Video Waveform

7-11. GENERAL. (CONT)

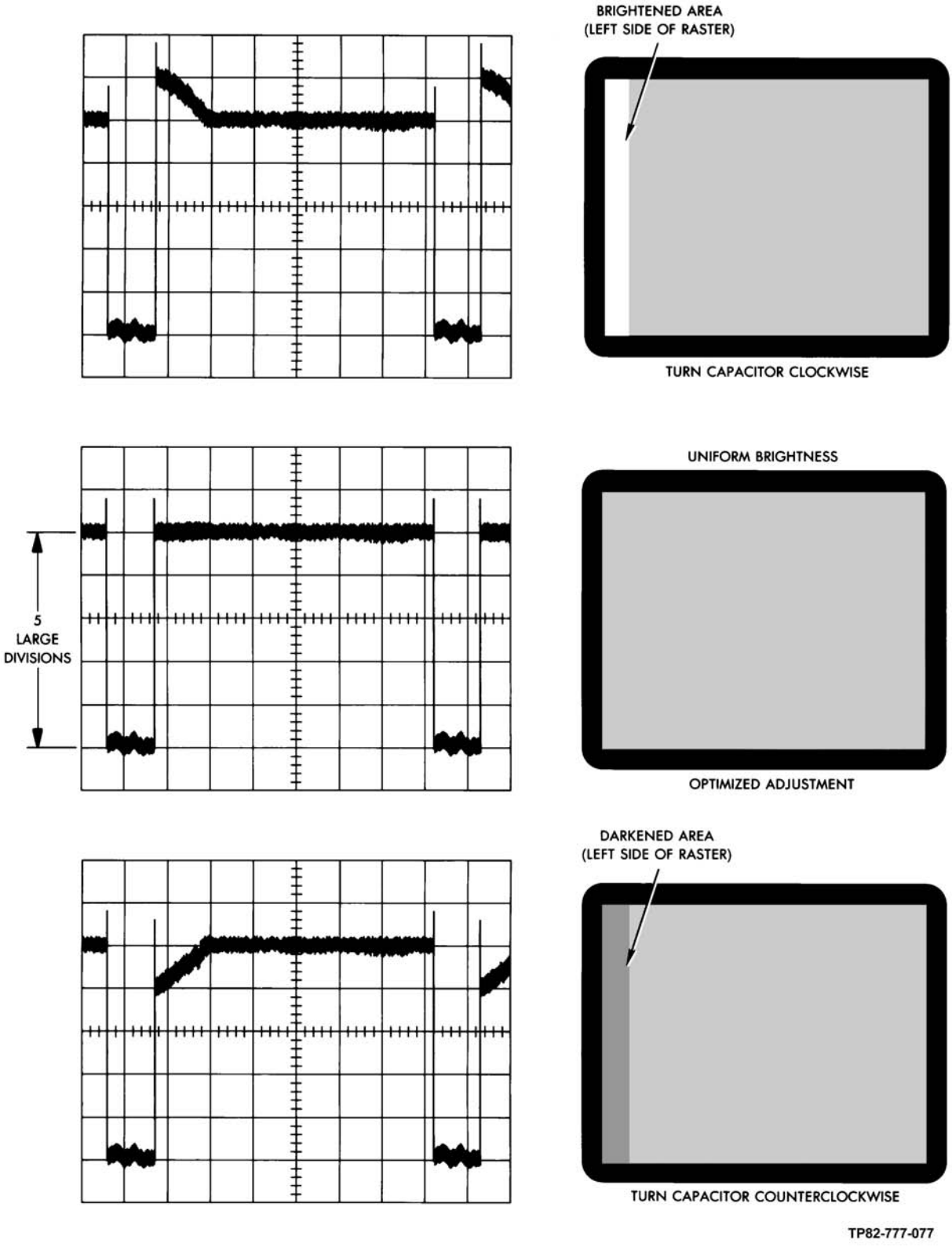


Figure 7-81. Trim Capacitor Adjustment (Coarse)

7-11. GENERAL. (CONT)

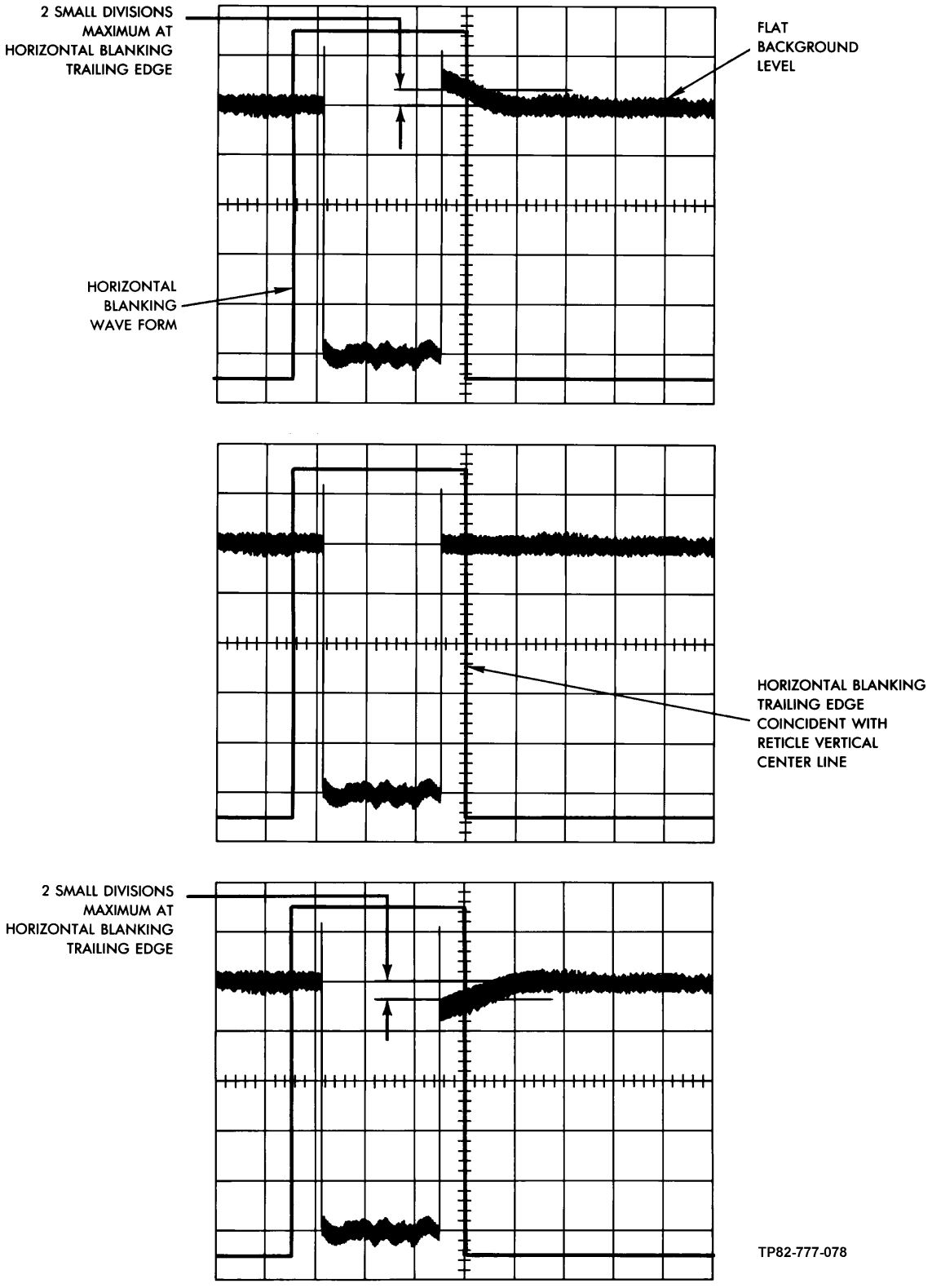


Figure 7-82. Trim Capacitor Adjustment (Fine)

7-11. GENERAL. (CONT)

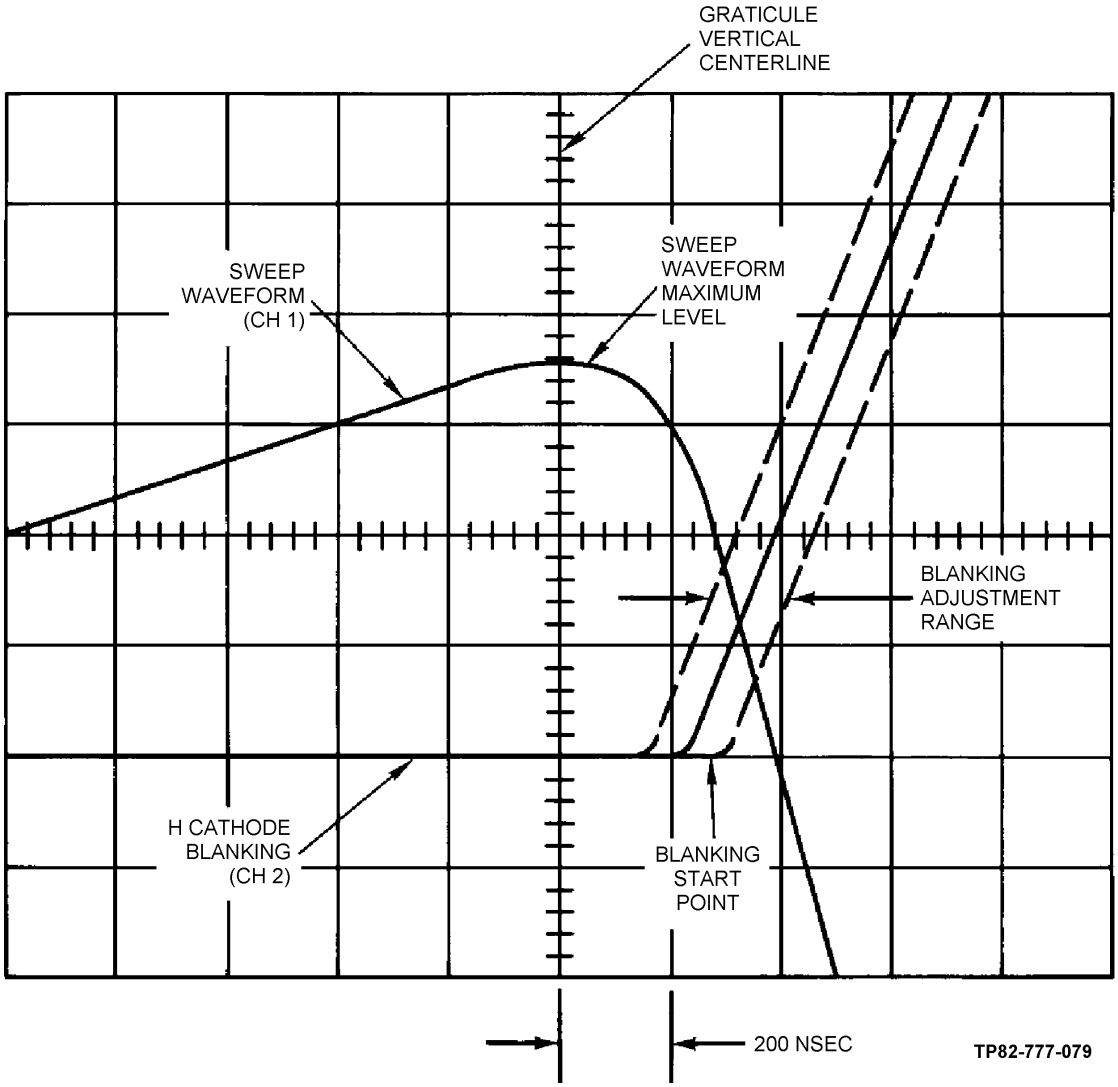
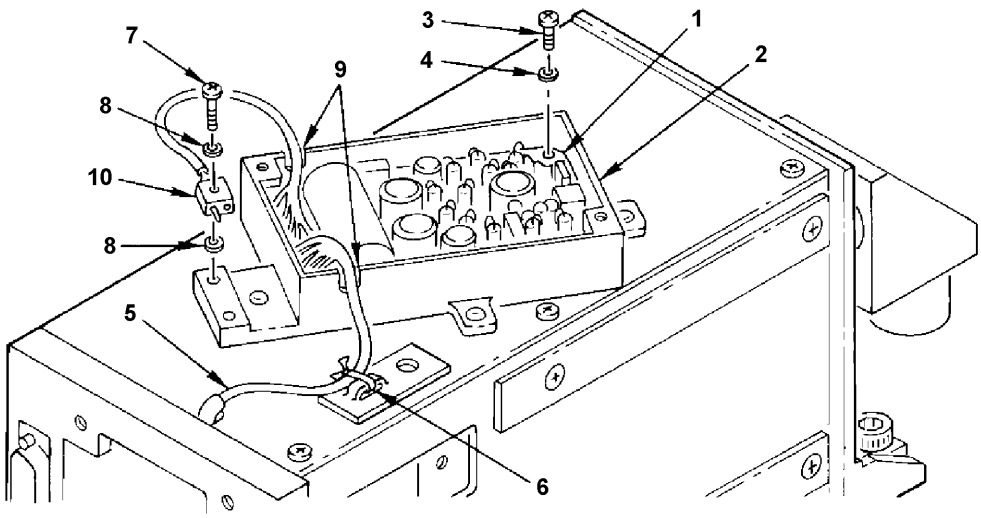


Figure 7-83. H Cathode Blanking Delay Adjustment

7-11. GENERAL. (CONT)



1. CONTROLLER CCA
2. CONTROLLER MOUNTING BASE
3. SCREW (2)
4. WASHER (2)
5. CONTROLLER CCA WIRE BUNDLE
6. TIE CLIP
7. SCREW
8. WASHER (2)
9. CONTROLLER MOUNTING BASE CUTOUTS (2)
10. CONTROLLER CCA CONNECTOR J1

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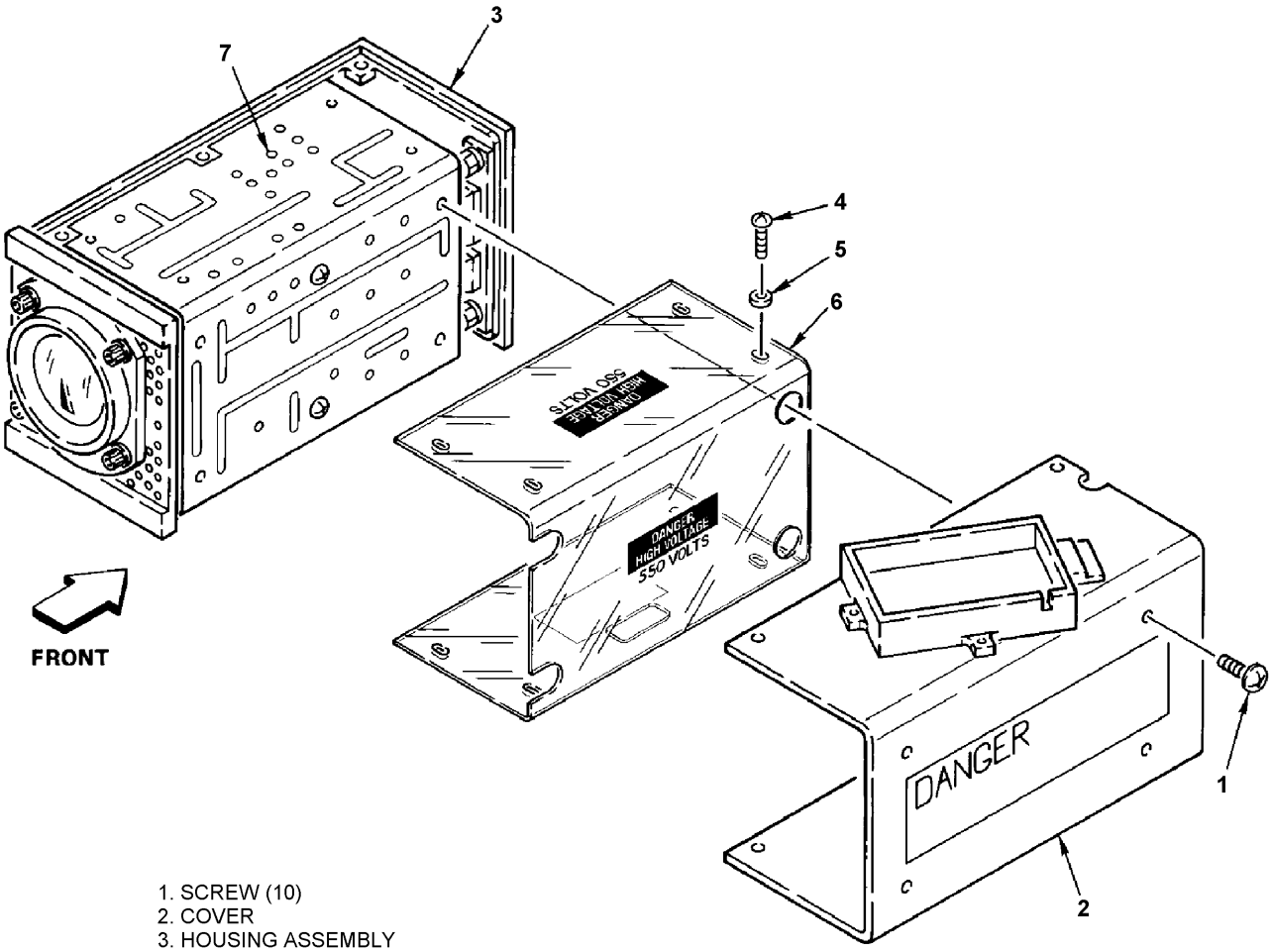
Figure 7-84. Temperature Controller Disassembly/Reassembly

7-11. GENERAL. (CONT)



1. SCREW (10)
2. COVER
3. HOUSING ASSEMBLY
4. SCREW (8)
5. WASHER (8)
6. INSULATOR ASSEMBLY
7. CCA A1

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Figure 7-85. UUT Cover Removal/Reassembly

7-11. GENERAL. (CONT)

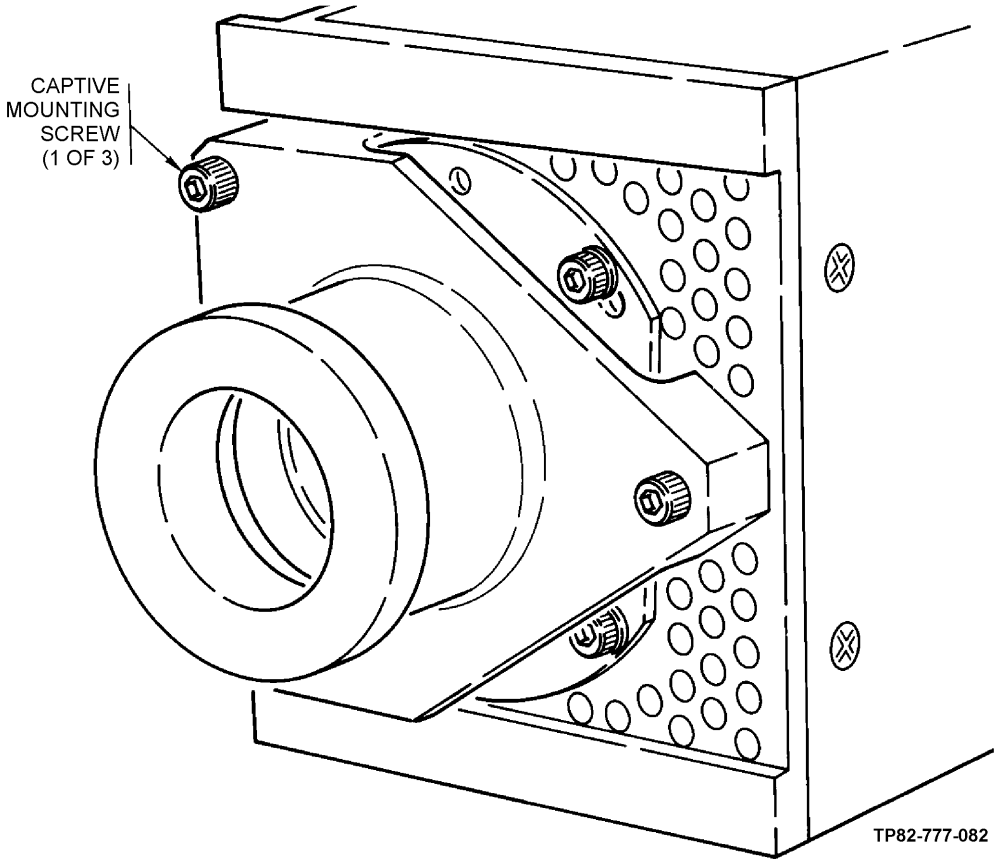


Figure 7-86. Optical Coupler Mounting

7-11. GENERAL. (CONT)

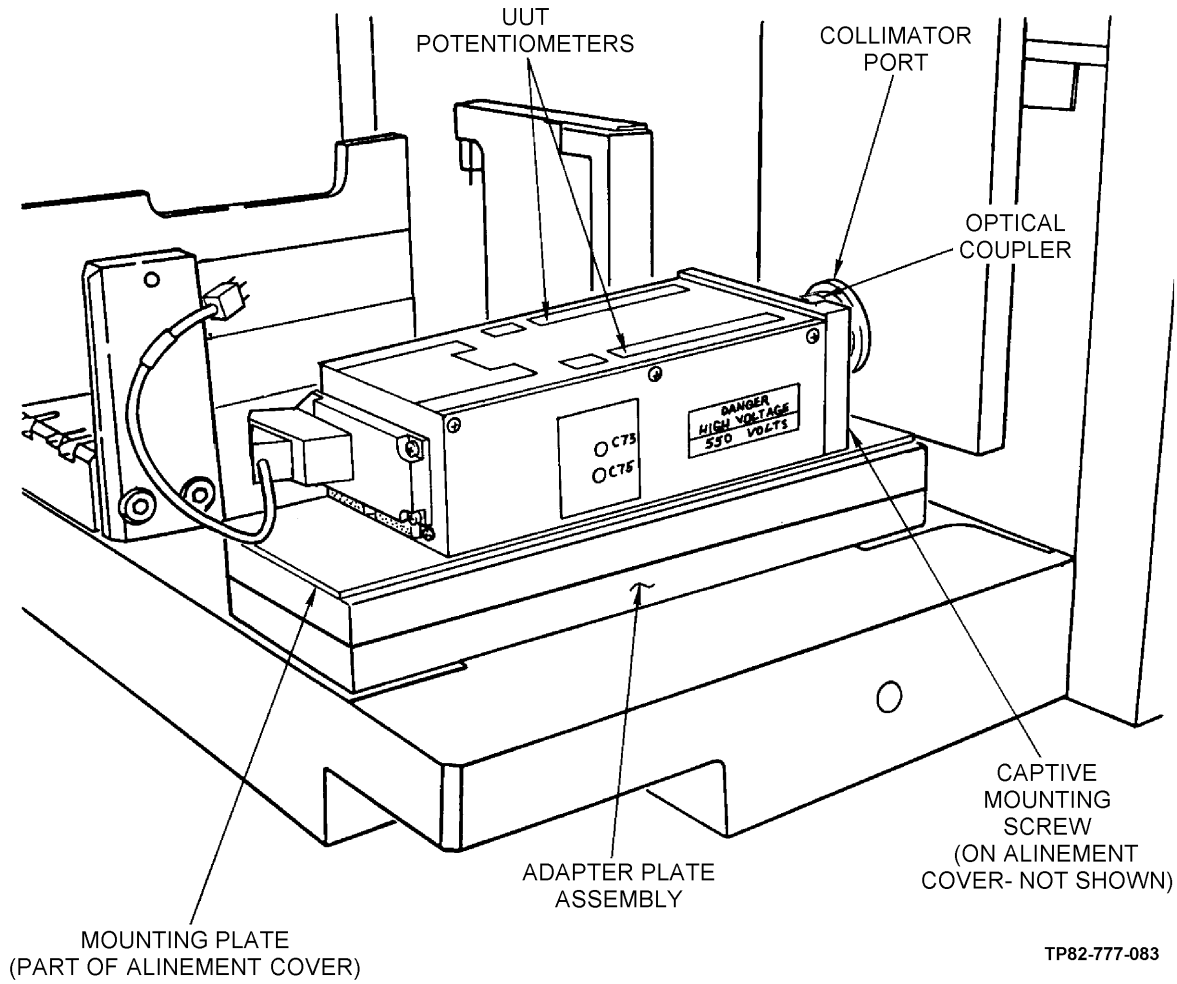
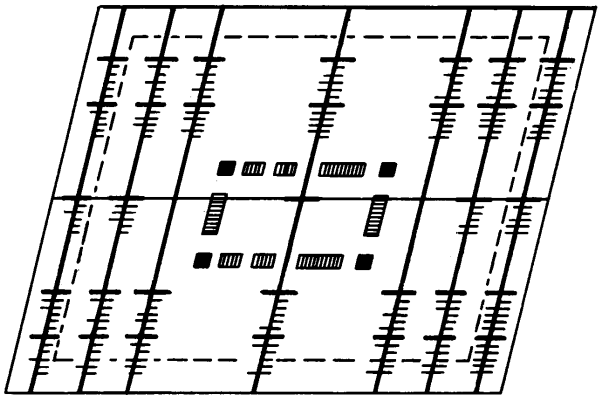


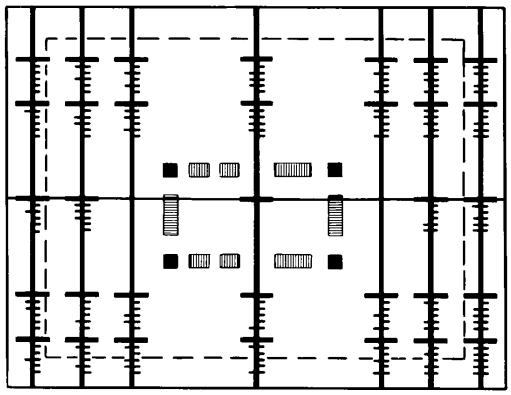
Figure 7-87. TV Sensor Mounting and CCA Adjustment

7-11. GENERAL. (CONT)

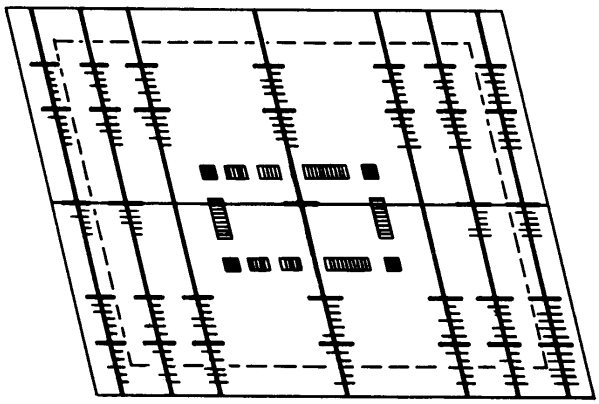


ADJUST ASTIGMATISM POTENTIOMETER TO CORRECT ALINEMENT AS SHOWN BELOW.

ORTHOGONALITY MISALINEMENT



CORRECT ORTHOGONALITY ADJUSTMENT



ADJUST ASTIGMATISM POTENTIOMETER TO CORRECT ALINEMENT AS SHOWN BELOW.

ORTHOGONALITY MISALINEMENT

TP82-777-084

Figure 7-88. Raster Orthogonality Adjustment

7-11. GENERAL. (CONT)

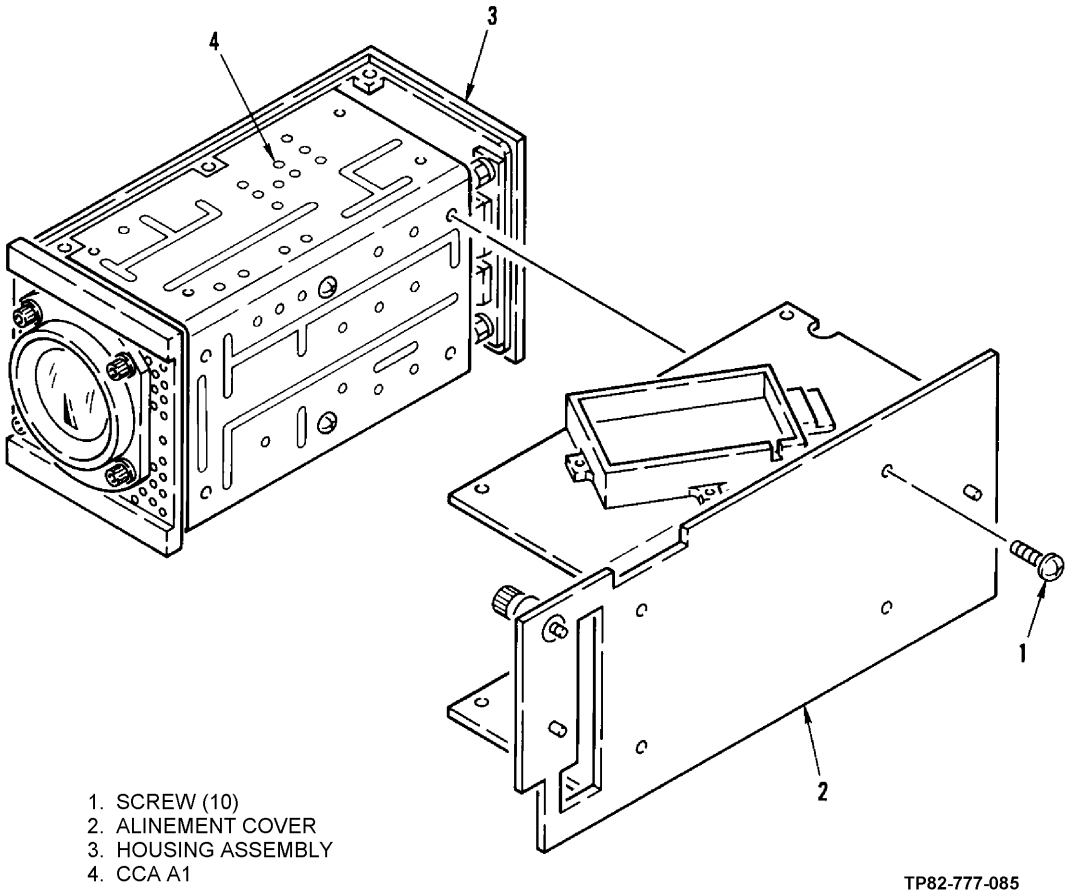


Figure 7-89. Alinement Cover Mounting/Removal

7-11. GENERAL. (CONT)

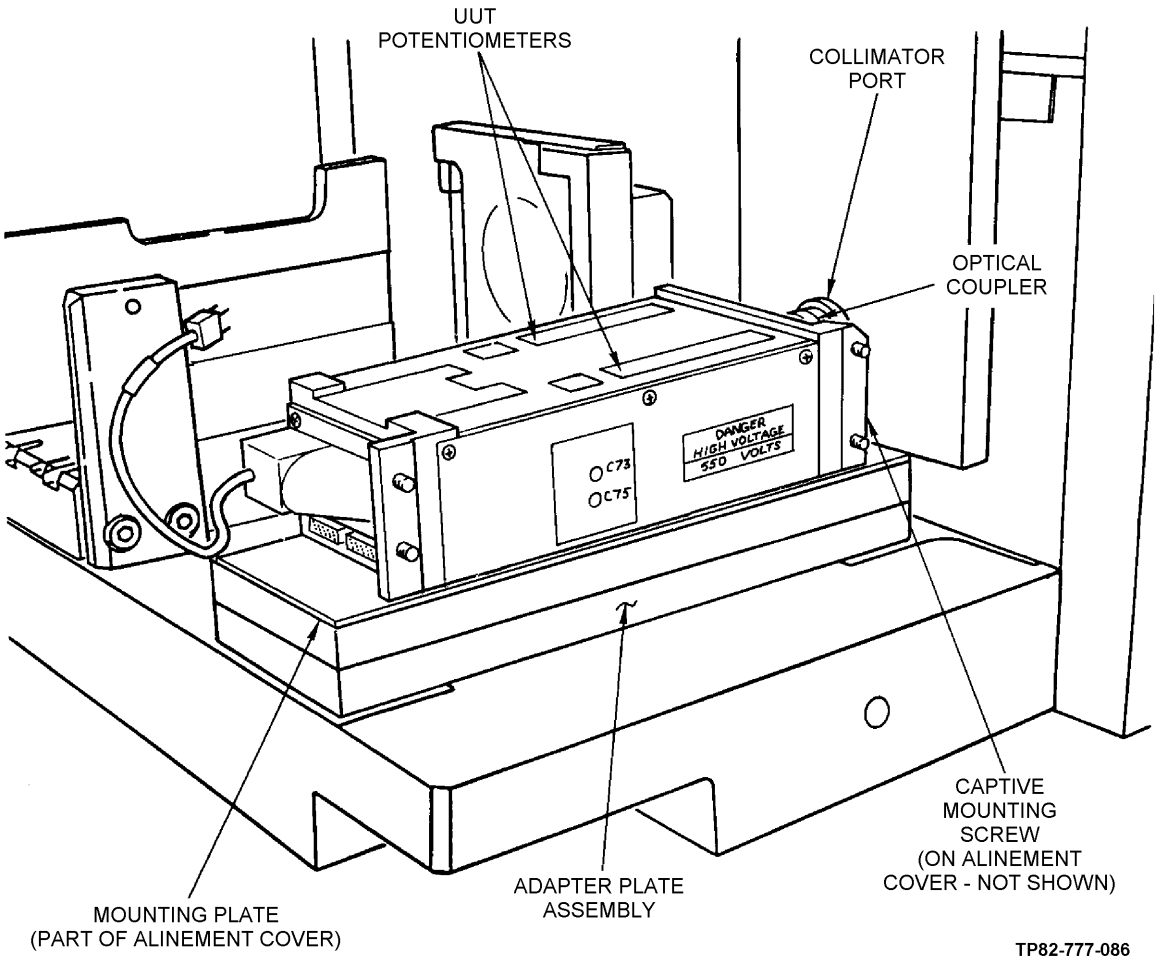


Figure 7-90. Multiplexer Mounting (Coarse Alinement)

APPENDIX A

REFERENCES

A-1. SCOPE

Table A-1 lists all technical data referenced or used in conjunction with this manual.

Table A-1. References

Title	Number
Technical Manuals	
Aviation Unit Maintenance Manual, Target Acquisition Designation Sight (TADS) Assembly AN/ASQ-170	TM 1-1270-476-20
Aviation Unit Troubleshooting Manual, Target Acquisition Designation Sight (TADS) Assembly AN/ASQ-170	TM 1-1270-476-T
Aviation Unit and Intermediate Maintenance Repair Parts and Special Tools List, Target Acquisition Designation Sight (TADS) Assembly AN/ASQ-170	TM 1-1270-476-23P
Aviation Intermediate Maintenance Manual, Target Acquisition Designation Sight (TADS) Assembly AN/ASQ-170	TM 1-1270-476-30
Aviation Unit Maintenance Manual, Pilot Night Vision Sensor (PNVS) Assembly AN/AAQ-11	TM 1-5855-265-20
Aviation Unit Troubleshooting Manual, Pilot Night Vision Sensor (PNVS) Assembly AN/AAQ-11	TM 1-5855-265-T
Aviation Unit and Intermediate Maintenance Repair Parts and Special Tools List, Pilot Night Vision Sensor (PNVS) Assembly AN/AAQ-11	TM 1-5855-265-23P
Aviation Intermediate Maintenance Manual, Pilot Night Vision Sensor (PNVS) Assembly AN/AAQ-11	TM 1-5855-265-30
Operator and Organizational Maintenance Manual, Test Station Electronic Equipment	TM 11-6625-2773-12
Organizational and Direct Support Maintenance Repair Parts and Special Tools List for Electronic Equipment Test Facility (EETF) TADS/ PNVS Augmentation Equipment	TM 1-6625-3081-30P
Operator and Aviation Unit Maintenance (AVUM) Setup, Operation and Teardown Procedures AH-64A Electronic Equipment Test Facility (EETF) OQ-290(V)2/MSM	TM 11-6625-3085-12

Table A-1. References - Continued

Title	Number
Technical Manuals	
Operator and Aviation Unit Maintenance (AVUM) Setup, Operation and Teardown Procedures AH-64A Electronic Equipment Test Facility (EETF) OQ-290(V)2/MSM	TM 11-6625-3085-12
Aviation Intermediate Maintenance (AVIM) Procedures Peculiar Sub-system and Interface Devices (IDs)	TM 11-6625-3085-30
Supply Catalogs	
Tool Kit, Electronic Equipment TK-100/G	SC 5180-91-CL-S21
Tool Kit, Electronic Equipment TK-105/G	SC 5180-91-CL-R07
Miscellaneous Publications	
Electrostatic Discharge Control Handbook for Protection of Electrical and Electronic Parts, Assemblies and Equipment (Excluding Electrically Initiated Explosive Devices)	DOD-HDBK-263
Electrostatic Discharge Control Program for Protection of Electrical and Electronic Parts, Assemblies and Equipment (Excluding Electrically Initiated Explosive Devices)	DOD-STD-1686

APPENDIX B

UUT/TPS/INTERFACE DEVICE MATRIX

B-1. GENERAL.

This appendix provides two listings. The listing in table B-1 cross-references the UUT to the test program software (tape and TPS control number). The listing in table B-2, in TPS control number sequence, includes all interface devices required to perform the test. This appendix is provided as a supplementary listing and should be used in that manner. The operator should follow the data displayed on the VDT.

Table B-1. UUT/Test Program Software/Control Number

UUT Part No	Test Program Software Part No.	Control No.
13074291	13082607-605	4
13074291-19	13082607-605	4
13074292	13082957-613	71
13074292-19	13082957-613	71
13074292-29	13082957-613	71
13075600	13081500-607	82
13075911	13081500-607	82
13075988	13082607-605	4
13075988-19	13082607-605	4
13075988-29	13082607-605	4
13075988-529	13082607-605	4
13076056-29	13082604-616	1
13076056-39	13082604-616	1
13076056-49	13082604-616	1
13076056-539	13082604-616	1
13076056-549	13082604-616	1
13076130-39	13082606-604	3
13076139	13081500-607	82
13076144	13082606-604	3
13076144-19	13082606-604	3

Table B-1. UUT/Test Program Software/Control Number - Continued

UUT Part No	Test Program Software Part No.	Control No.
13076144-519	13082606-604	3
13076149	13081500-607	82
13076149-19	13081500-607	82
13076745-009	13081500-607	82
13076747-009	13081500-607	82
13076749-009	13081500-607	82
13080390	13081500-607	82
13080451-19	13082605-618	2
13080451-29	13082605-618	2

Table B-2. Interface Device Items Required For Testing

Con-trol No.	TPS Number	Major Test Adapter	Circuit Card Assembly	Cable Set	Self Test Connectors	Test Fixtures
1	13082107-639	13083633-19	13082310 13082316 13231525-509	13081706(5) 13081706-29 13082730 13083092 13083093 13231031-509 13231435	13081998 13083091 13083091-19 13083963-349 13231027-509 13231028-509	13082064-39 13082747 13083098 13083129 13083157 13083603-19 13231204-509 13231262-509 13231666 31-008 I-250
2	13082106-649	13083633-19	13082050 13082310 13082316 13083641 13231525-19	13081706(5) 13082730 13083092 13083093 13083693-19 13231435	13081998-79 13083091 13083091-19 13083963-349 13083963-359	13082064-39 13082747 13083098 13083129 13083138 13083880-19 13231666 31-008 I-250

Table B-2. Interface Device Items Required For Testing - Continued

Con-trol No.	TPS Number	Major Test Adapter	Circuit Card Assembly	Cable Set	Self Test Connectors	Test Fixtures
3	13082108-609	13083633-19	13082315	13082730	13081998	13081927
			13082318	13231735	13083679-29	13082064-39
					13083679-39	13083098
					13231730(3)	13083956
					13231731	13083956
					13231732(2)	326PZ
					13231739	874A
						I-250
4	13082099-639	13083633-19	13082365	13081706(3)	13083962-419	13083078-39
			13082411	13081706-29	13083962-429	13083082
			13083641	13081706-69(2)	13083962-439	13083098
				13082730	13083962-449	13083111(2)
				13083226	13083962-459	13083117
				13083701	13083962-519	13083119
				13083702	13083962-529	13083489-19
				13230911	13083962-539	13083557(2)
				13231435	13083963-549	13230921-5
					13083963-559	13231666
					13083963-569	2-830126-5
					13083963-59	31-008
						I-250

Table B-2. Interface Device Items Required For Testing - Continued

Con-trol No.	TPS Number	Major Test Adapter	Circuit Card Assembly	Cable Set	Self Test Connectors	Test Fixtures
71	13081533-629	13083633-19	13082365	13081706(3)	13083962-109	13083078-39
			13082411	13081706-29	13083962-419	13083098
			13083641	13081706-69(2)	13083962-429	13083110
				13082730	13083962-439	13083114
				13083702	13083962-449	13083115
					13083962-459	31-008
					13083962-469	1-250
					13083962-479	
82	13082433-629	13083633-19	13082310	13081706(5)	13082458	13082747
			13231581	13081706-69(2)	13083091	13083078-39
				13081706-79(3)	13083091-19	13230910
				13081706-89(3)	13083679-29	13231558
				13082730	13083679-49	13231653
				13083092	13083962-459	13231654
				13083093	13083962-549	13231659
				13231598	13083962-579	13231666
				13231655	13083966	31-008(6)
					13231756	M55339/15-00491

GLOSSARY

Section I. ABBREVIATIONS

ACM	Automatic control module
AVIM	Aviation intermediate maintenance
CCA	Circuit card assembly
CCD	Charged Coupled Device
CCW	Counterclockwise
CEM	Control electronics module
CID	Charge induced device
CRT	Cathode ray tube
CFT	Contrast transfer function
CW	Clockwise
DIU	Dedicated interface unit
DTV	Day television
DVO	Direct view optics
E/O	Electro-optical
EETF	Electronic equipment test facility
EIR	Equipment improvement recommendations
EON	Electro-optic noise
F	Fahrenheit
FLIR	Forward looking infrared
FOV	Field-of-view
FT-LB	Foot-pound
FWD	Forward
HDD	Heads down display
HOR	Horizontal
IN-LB	Inch-pound
IVD	Indirect view display
LRU	Line replaceable unit
MAX	Maximum
MHZ	Megahertz
MIN	Minimum
MRT	Minimum resolvable temperature
MTF	Modulation transfer function
NETD	Noise equivalent temperature differential
NFOV	Narrow field-of-view
NSA	Night sensor assembly
OIA	Optical imager assembly
OIP	Optical improvement program
OSA	Optical signal analyzer
OSG	Optical signal generator
PIU	Programmable interface unit
PNVS	Pilot night vision sensor
PSI	Pounds per square inch
SITF	System intensity transfer function
SITM	System intensity transfer function medium field-of-view
SITN	System intensity transfer function narrow field-of-view
SITW	System intensity transfer function wide field-of-view
SNR	Signal-to-noise ratio
TADS	Target acquisition designation sight
TAMMS	The army maintenance management system

TPS	Test program set
TVL	Television lines
USEC	Microsecond
UUT	Unit under.test
VDT	Video display terminal
WFOV	Wide field-of-view

Section II. DEFINITION OF UNUSUAL TERMS

Athermalization - The compensation in the optical path that corresponds to temperature changes.

Backlash - The mechanical resistance to the movement of one object by another.

Boresight - The alinement of the optical system by use of a fixed target.

Breakaway torque - The amount of force required to produce movement of an object.

Channelbalance - The procedure used to produce uniform sensitivity of the selected target scene which consists of 180 channels.

Collimator lens - An optical device that creates a beam made of parallel rays of light.

Interface device - The equipment connected between the item being tested and the AH-64A test set.

Raster - The electronically produced area on a television picture tube where an image is produced.

Reticle - A system of lines or crosshairs in the focus of the eyepiece of an optical instrument.

Vidicon - Television camera tube that scans a target scene.

Zoom - Continuously variable magnification.

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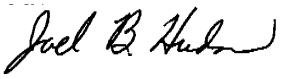
By Order of the Secretary of the Army:

Official:

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



JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army
0119108

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To: 2028@redstone.army.mil
Subject DA Form 2028

1. ***From:*** Joe Smith
2. *Unit:* home
3. ***Address:*** 4300 Park
4. ***City:*** Hometown
5. ***St:*** MO
6. ***Zip:*** 77777
7. ***Date Sent:*** 19-OCT-93
8. ***Pub no:*** 55-2840-229-23
9. ***Pub Title:*** TM
10. ***Publication Date:*** 04-JUL-85
11. *Change Number:* 7
12. *Submitter Rank:* MSG
13. ***Submitter FName:*** Joe
14. *Submitter MName:* T
15. ***Submitter LName:*** Smith
16. ***Submitter Phone:*** 123-123-1234
17. ***Problem:*** **1**
18. *Page:* 2
19. *Paragraph:* 3
20. *Line:* 4
21. *NSN:* 5
22. *Reference:* 6
23. *Figure:* 7
24. *Table:* 8
25. *Item:* 9
26. *Total:* 123
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DATE SENT
31 DEC 91

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 1-1270-476-20	31 AUGUST 91	AVIATION UNIT MAINTENANCE MANUAL TARGET ACQUISITION DESIGNATION SIGHT (TADS) ASSEMBLY AN/ASQ-170

BE EXACT . . . PIN-POINT WHERE IT IS

PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.
2-14			Com

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

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Should be changed to (Stauffer SWS-1001 Insulating primer)

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Redstone Arsenal, AL 35898-5230

The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = 0.39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hect.ometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = 0.15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigram = 0.035 ounce
1 dekagram = 10 grams = 0.35 ounce
1 hectogram = 10 dekagrams 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Temperature

5/9 (°F-32) = °C
212° Fahrenheit = 100° Celsius
90° Fahrenheit = 32.2° Celsius
32° Fahrenheit = 0° Celsius
9/5 C° +32 = F°

Liquid Measure

1 centiliter = 10 milliliters = 0.34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = 0.155 sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = 0.386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = 0.06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	To	Multiply by
inches	centimeters	2.540
feet	meters	0.305
yards	meters	0.914
miles	kilometers	1.609
square inches	square centimeters	6.451
square feet	square meters	0.093
square yards	square meters	0.836
square miles	square kilometers	2.590
acres	square hectometers	0.405
cubic feet	cubic meters	0.028
cubic yards	cubic meters	0.765
fluid ounces	milliliters	29,573
pints	liters	0.473
quarts	liters	0.946
gallons	liters	3.785
ounces	grams	28.349
pounds	kilograms	0.454
short tons	metric tons	0.907
pound-feet	newton-meters	1.356
pound-inches	newton-meters	0.11296

To change	To	Multiply by
ounce-inches	newton-meters	0.007062
centimeters	inches	0.394
meters	feet	3.280
meters	yards	1.094
kilometers	miles	0.621
square centimeters	square inches	0.155
square meters	square feet	10.764
square meters	square yards	1.196
square kilometers	square miles	0.386
square hectometers	acres	2.471
cubic meters	cubic feet	35.315
cubic meters	cubic yards	1.308
milliliters	fluid ounces	0.034
liters	pints	2.113
liters	pints	1.057
liters	quarts	0.264
grams	ounces	0.035
kilograms	pounds	2.205
metric tons	short tons	1.102
Newton-meters	pound-feet	0.738
Kilo pascals	pounds per square inch	0.145

PIN: 079133-000