(1) FG.

DEPARTMENT OF THE ARMY
UNITED STATES ARMY AVIATION TEST BOARD
Fort Rucker, Alabama 36360

STEBG-TD (6) JUN 15 1967

SUBJECT: Letter Report, Service/Logistical Test of the Foam and Vithane Kits on the UH-1C, RDT&E Project No. _____, (16) USATECOM Project No. 4-5-0101-09

TO: See Distribution (9) Letter rept.

(11) 15 Jun 67

(12) 33p.

1. References.

a. Message, AMC 28672, Commanding General, US Army Materiel Command, 24 August 1966, classified CONFIDENTIAL.

b. Iroquois Test Coordination Meeting, US Army Aviation Test Board, 30 August 1966.

c. Letter, AMSAV-EAA, Headquarters, US Army Aviation Materiel Command, 14 December 1966, subject: "Request for Test Directive to Conduct a Service/Logistical Test of the Foam and Vithane Kits on the UH-1C," with 1st Ind, AMSTE-BG, Headquarters, US Army Test and Evaluation Command, 9 January 1967.

d. Iroquois Test Coordination Meeting, US Army Aviation Test Board, 15 March 1967.

2. Background.

The US Army Test and Evaluation Command at the request of the US Army Aviation Materiel Command (reference 1c) established a high priority for this project because of an immediate operational requirement, and directed the US Army Aviation Test Board (USAAVNTBD) to conduct the test (reference 1c). The overall purpose of this project is classified CONFIDENTIAL, and the USAAVNTBD was directed to test the kit only from an installation standpoint.

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3. Description of Materiel.

The technical description and characteristics of the kit are classified. The system components supplied in the kit consist of formed, plastic-covered foam (figures 1 through 5, inclosure 1), designed and shaped to fit in specific aircraft areas.

4. Objectives.

a. Purpose. To determine whether the kit is suitable for installation in UH-1C Helicopters.

b. Test Objectives.

(1) To determine installation requirements of the test material.

(2) To develop and improve installation instructions.

(3) To determine the effects of the installed kit on ease of maintenance of the test helicopter.

(4) To determine durability of the test material for an extended operating period.

(5) To determine serviceability of the kit and susceptibility to corrosion, absorption of fuel, oil, dirt, and moisture.

5. Summary of Results.

The kit was installed in a UH-1C Helicopter, serial number 65-9467, and flight tested for 487 hours. The kit was periodically inspected for adverse effects.

a. The complete kit was installed in the helicopter by one Single-Rotor Aircraft Mechanic (MOS 67N20) in five man-hours. No special tools or skills were required. The installation time is not indicative of normal installation time, because the instructions were written by the manufacturer as the kit was being installed by USAAVNTBD personnel.

b. The installation instructions (inclosure 2) developed during the installation of the test item were satisfactory for installing and removing the kit. However, the 32 installation man-hours required by the manufacturer (section 1, inclosure 2) exceed those required during this installation, and should be changed to more closely reflect those man-hours required in paragraph 1b, reference 1a.

c. No difficulties were encountered in maintaining the helicopter with the kit installed.

d. Holes, caused by rubbing of the control tubes, were worn in the plastic covering of the kit in the "hell-hole" after 86 hours of test time. (Equipment Failure Report, KF-1, was submitted on 2 November 1966.) The "hell-hole" portion of the kit was removed, covered with a more durable plastic, and reinstalled. Removal and reinstallation time required one man-hour. No further problems were encountered with the serviceability or durability of the material during the remainder of the test.

e. After the plastic covering was punctured, the material absorbed hydraulic oil and water, which were easily removed by squeezing the material and then allowing it to dry. Covering the "hell-hole" portion of the kit with a more durable plastic alleviated this problem.

6. Conclusion.

The kit, when covered with the more durable plastic, will be suitable for installation in UH-1C Helicopters using the installation instructions developed.

7. Recommendations.

It is recommended that:

a. The installation instructions developed during the test be made a part of the kit after the man-hour requirement in the instructions has been amended.

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b. The kit, when covered with the more durable plastic, be considered suitable for installation in UH-1C Helicopters that are operating in areas which require this type protection.

Raymond E. Johnson

2 Incl
1. Photographs
2. Installation instructions

RAYMOND E. JOHNSON
Colonel, Artillery
President

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PHOTOGRAPHS


HELL HOLE

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INSTALLATION INSTRUCTIONS

UH-1C HELICOPTER
FIRE DETERRENT FOAM

PRELIMINARY COPY

THE GOODYEAR TIRE & RUBBER COMPANY
AKRON, OHIO 44316

OCTOBER 1966

SECTION 1

INTRODUCTION

This document provides installation instructions for the Fire Deterrent Foam System developed for the UH-1C Helicopter. The system was designed and manufactured by The Goodyear Tire & Rubber Company under Army Contract DA33-019-AMC-322 (X).

A prototype foam system was installed in a UH-1C Helicopter at Fort Rucker, Alabama, in mid-October 1966. These instructions were developed from the prototype installation. The photographs accompanying the instructions illustrate the prototype installation.

System components, supplied in a kit, consist of coated foam shapes designed to fit in specific aircraft areas to prevent ignition of fuel vapors.

The installation includes placing foam in the following areas of the UH-1C:

(1) Each sump

(2) Hell hole

(3) Battery compartment

(4) Electrical compartment

(5) Under the cargo floor

(6) Heater compartment

(7) Oil cooler compartment

The foam can be installed in the UH-1C without modification of the aircraft. Approximately 32 man-hours are required for a complete installation. No special tools or facilities are required for a foam installation.

Part numbers used to identify system components in the installation procedures were arbitrarily assigned to design drawings. The numbers are marked on one face of each part as shown in figure 1. Nomenclature of existing UH-1C components which are referred to in the installation procedures (doors, covers) are taken from TM55-1520-210-20P.

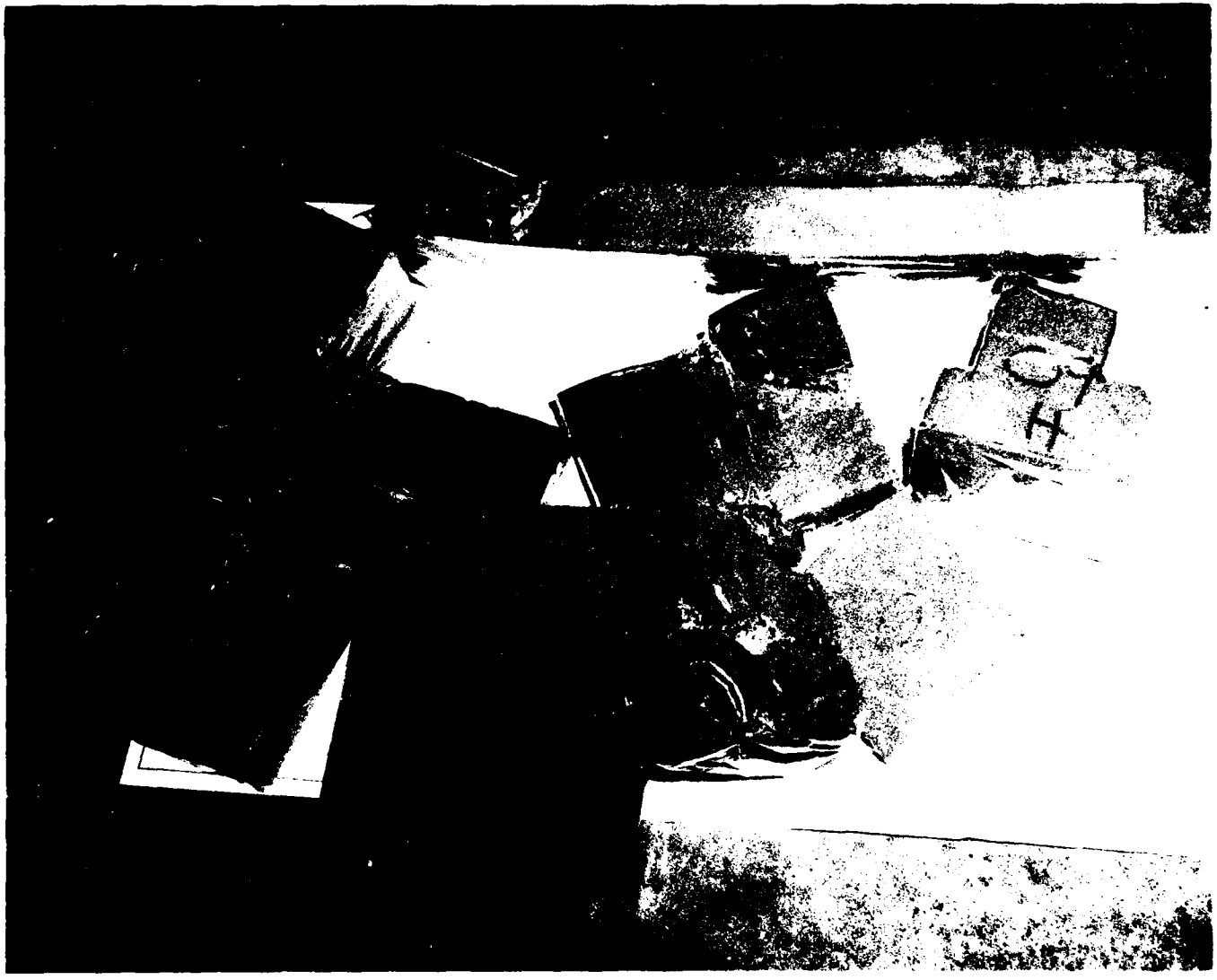


Figure 1. Prototype Foam Identification

SECTION 2

INSTALLATION PROCEDURES

NOTE

Refer to Organizational Maintenance Manual for UH-1C Helicopter when performing removal and installation procedures for existing helicopter components.

APPLYING FOAM TO BATTERY AND ELECTRICAL COMPARTMENTS

Install foam in the battery and electrical compartments by performing the following steps (see figures 2, 3, and 4):

1. Open Equipment Door Assembly, P/N 204-030-287-71.

2. Remove battery and battery shelf to gain access to area under battery as shown in figure 2.

3. Position foam shapes 12A, 12C and 12B in area as shown in figure 3.

4. Reinstall battery shelf which was removed in step 2.

5. Move connector in electrical compartment from forward hole to center hole; then position foam shape 13B against fuel cell as shown in figure 4 with cutout in foam down and inboard.

6. Position foam shape 13A against fuel cell as shown in figure 4; then reinstall battery.

7. Close Equipment Door Assembly.

APPLYING FOAM TO FORWARD FUEL TANK WALL

1. Remove cover, P/N 204-031-323-7, from floor on right side of pilot's compartment.

2. Position foam shape 56 against fuel tank wall and behind fuel line as shown in figure 5.

3. Position foam shape 55 inboard of shape 56 and behind fuel line as shown in figure 6.

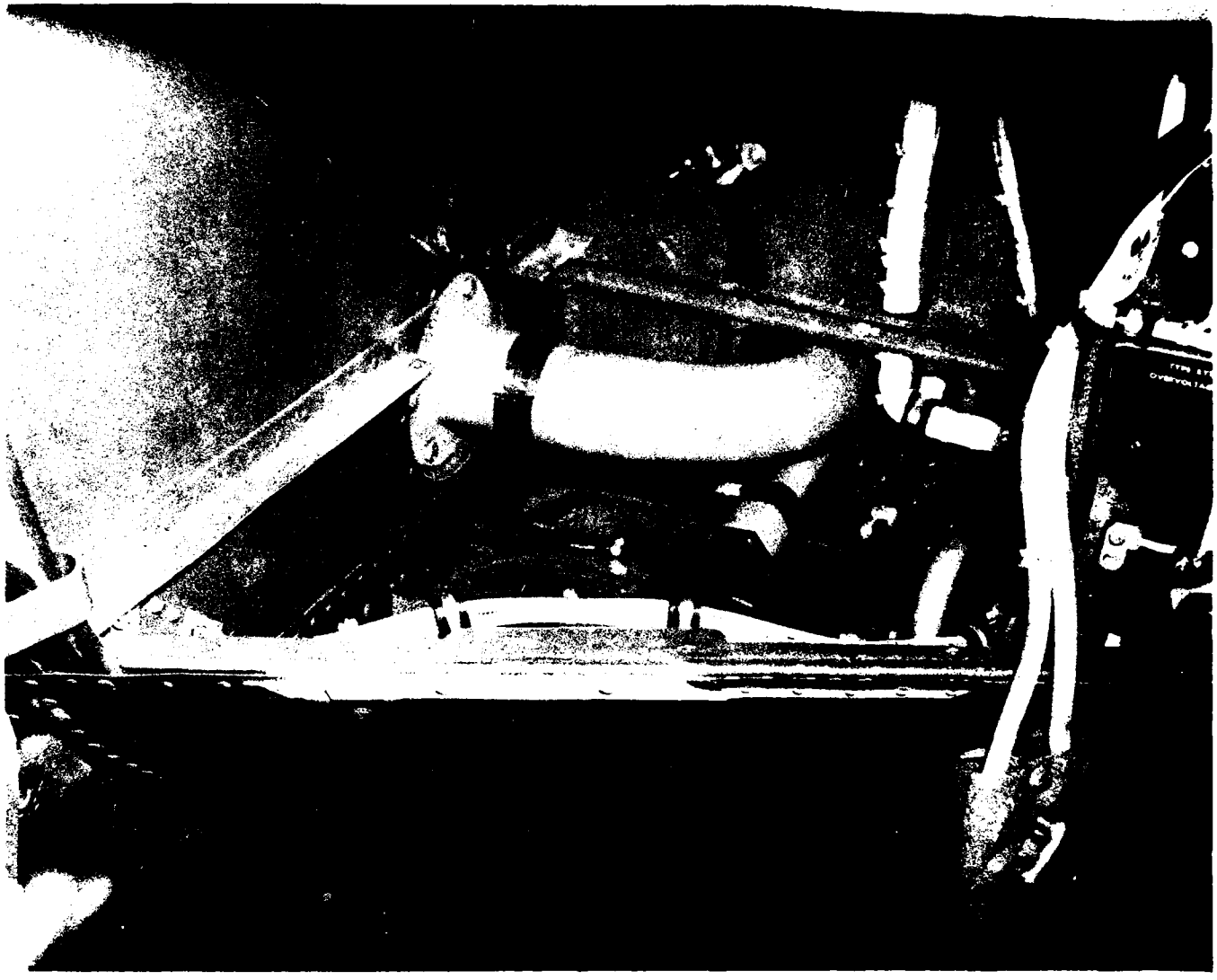


Figure 2. Area Under Battery (Without Foam)

Figure 3. Area Under Battery (With Foam)

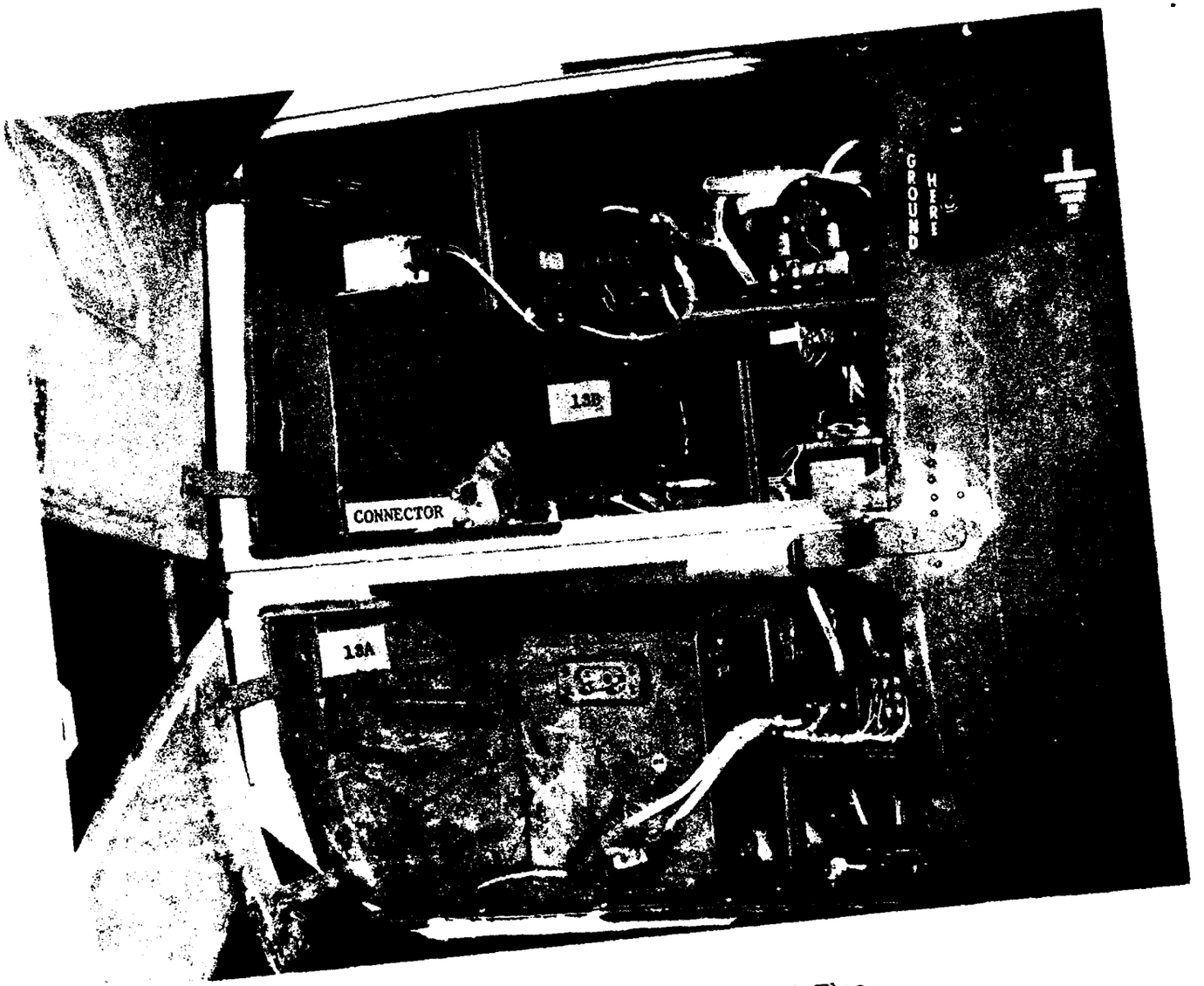


Figure 4. Completed Battery and Electrical Compartments.

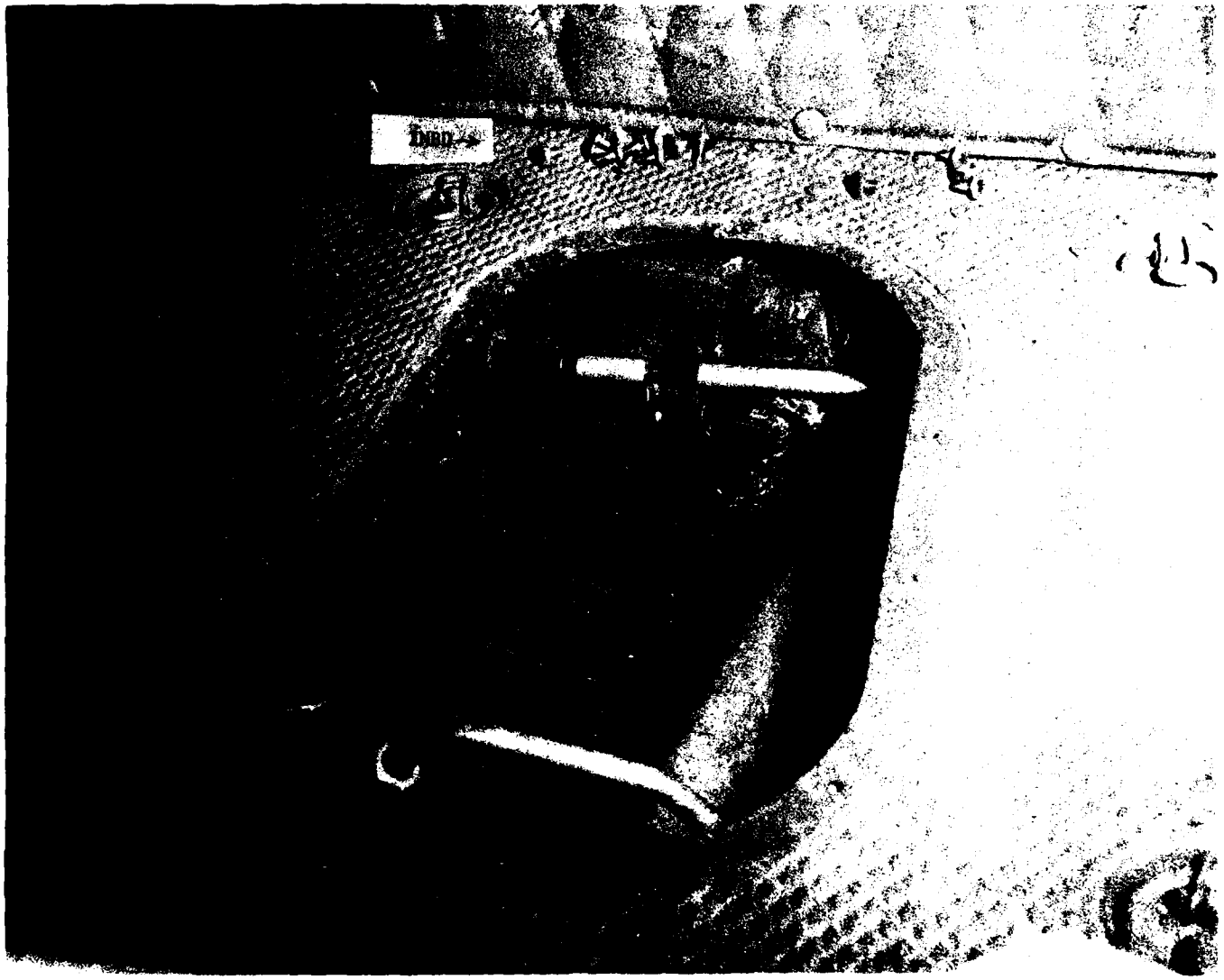


Figure 5. Installing Foam Shape 56

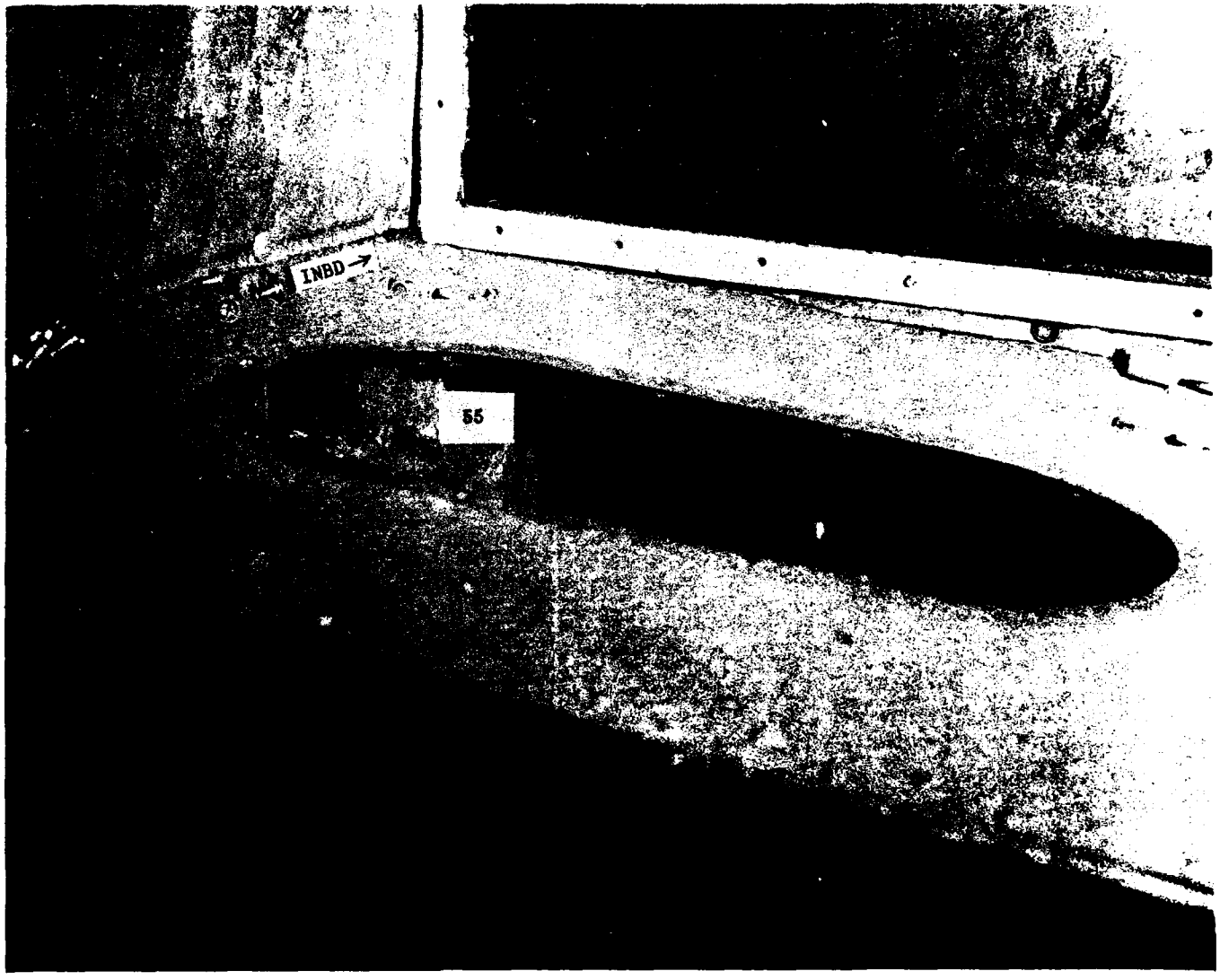


Figure 6. Installing Foam Shape 55

4. Reinstall cover removed in step 1.

APPLYING FOAM TO HEATER AREA

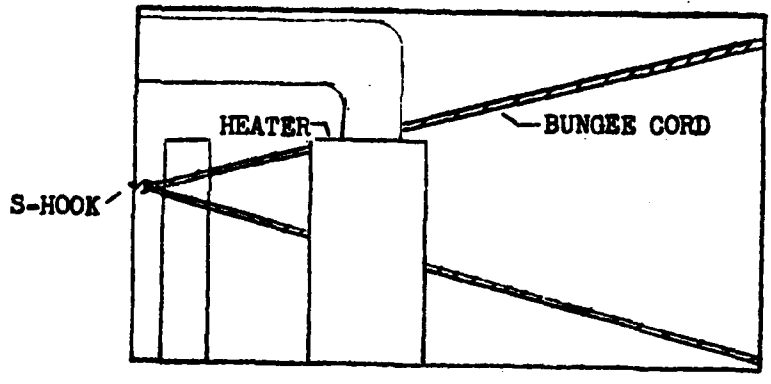
Install foam behind heater against fuel cell wall by performing the following steps (see figure 7):

1. Open heater access door on right side.

2. Remove screws which secure heater clamps.

3. Position foam shape 52 behind heater.

4. Hold foam in position by installing bungee cord (with S-hooks) from upper outboard corner, through S-hook at center inboard, and then to lower outboard corner as shown in sketch.



5. Reinstall heater clamps.

6. Close heater access door.

APPLYING FOAM TO RIGHT SUMP

Install foam in right sump by performing the following steps:

NOTE

No photograph of the installation is available.

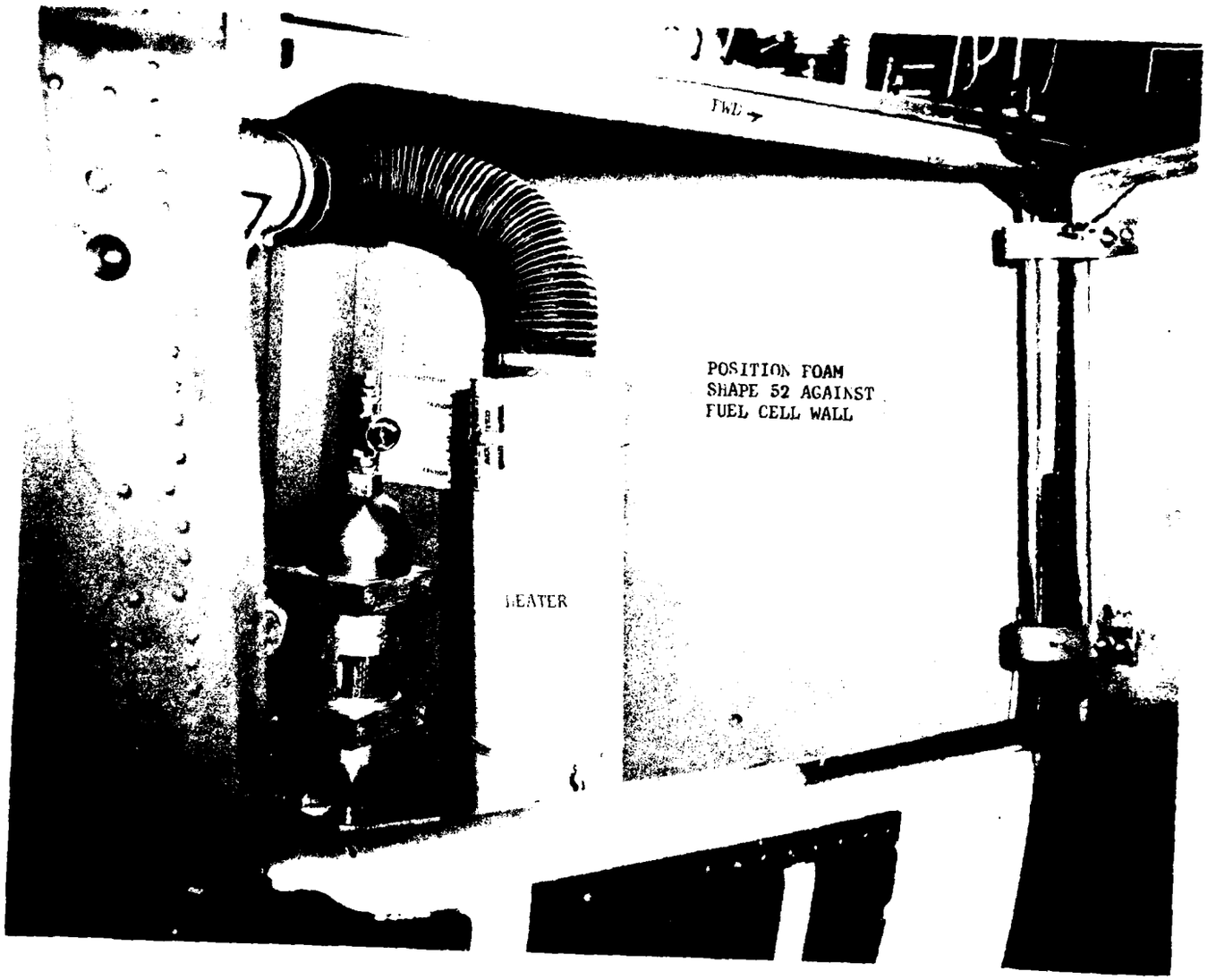


Figure 7. Installing Foam in Heater Area

1. Remove sump access door assembly P/N 204-031-007-53 by removing machine screws.

2. Position foam shape 09A inboard of control rod.

3. Position foam shape 09E in the aft outboard corner.

NOTE

Place foam behind cable which runs diagonally from aft center to aft corner of access.

4. Position foam shape 09F in top aft center of sump.

5. Position foam shape 09B in bottom aft center of sump.

6. Position foam shape 09D on top forward area of sump.

7. Position foam shape 09C on bottom forward area of sump.

8. Position foam shape 09G on outboard center of sump drain; then position foam shape 09J on the opposite side of sump drain adjacent to 09G.

9. Position foam shape 09H at top center of sump.

10. Reinstall sump access door assembly.

APPLYING FOAM TO LEFT SUMP

Install foam in left sump by performing the following steps (see figure 8):

1. Remove sump access door assembly P/N 204-031-007-85 by removing machine screws.

2. Position foam shape 15F in aft inboard corner.

3. Position foam shape 15D in fwd inboard corner.

4. Position foam shape 15E in fwd outboard corner.

5. Position foam shape 15A in inboard center (between 15F and 15D).

Figure 8. Relative Position of Left Sump Foam Shapes

6. Position foam shape 15B in fwd center (adjacent to 15E).

7. Position foam shape 15H in center aft (adjacent to 15F).

8. Position foam shape 15G in aft outboard corner.

9. Position foam shape 15C forward of and adjacent to 15G.

10. Position foam shape 15J in center forward area.

11. Position foam shape 15K in center aft area.

12. Reinstall sump access door assembly.

APPLYING FOAM TO HELL HOLE

Install foam in the hell hole by performing the following steps:

NOTE

Looking aft from the pilot's compartment, foam is installed on three sides of the hell hole, the right, the left, and rear sides.

1. Remove troop seats, if installed against aft bulkhead of pilot's compartment.

2. Remove trim panel from center of bulkhead.

3. Remove door assemblies P/N 204-030-87-1 and 204-031-953-1.

4. Enter hell hole from opening in bottom of aircraft.

5. Position foam on left side of hell hole as follows (see figure 9):

a. Position foam shapes 10, 54, 57, and 53 as shown in figure 10.

b. Hold shapes in place with bungee cord (20 inches long, unstretched with S-hooks) installed from hole drilled in aft bulkhead to hole drilled in door assembly support structure as shown in figure 10.

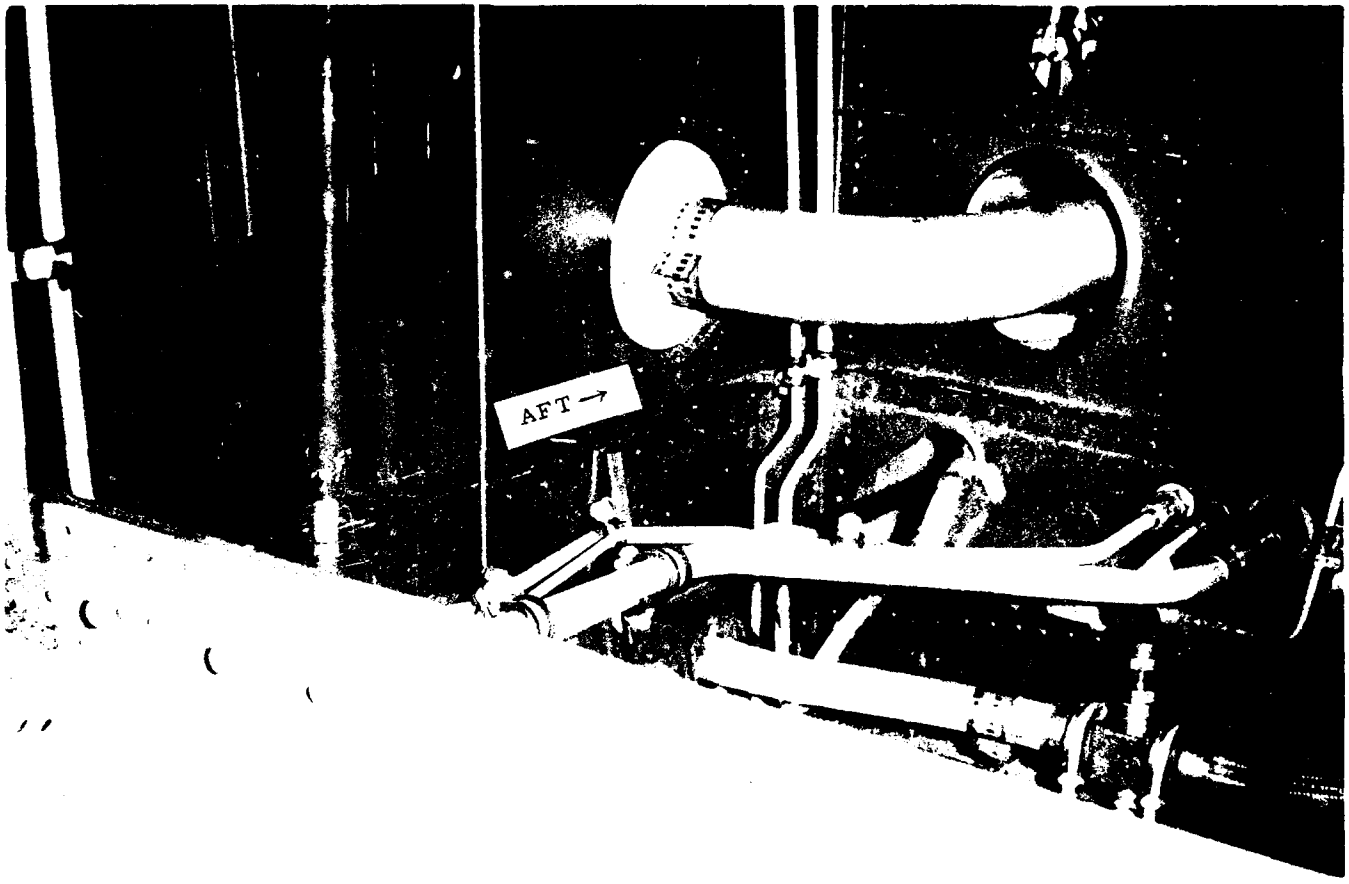


Figure 9. Hell Hole Left Side (Without Foam)

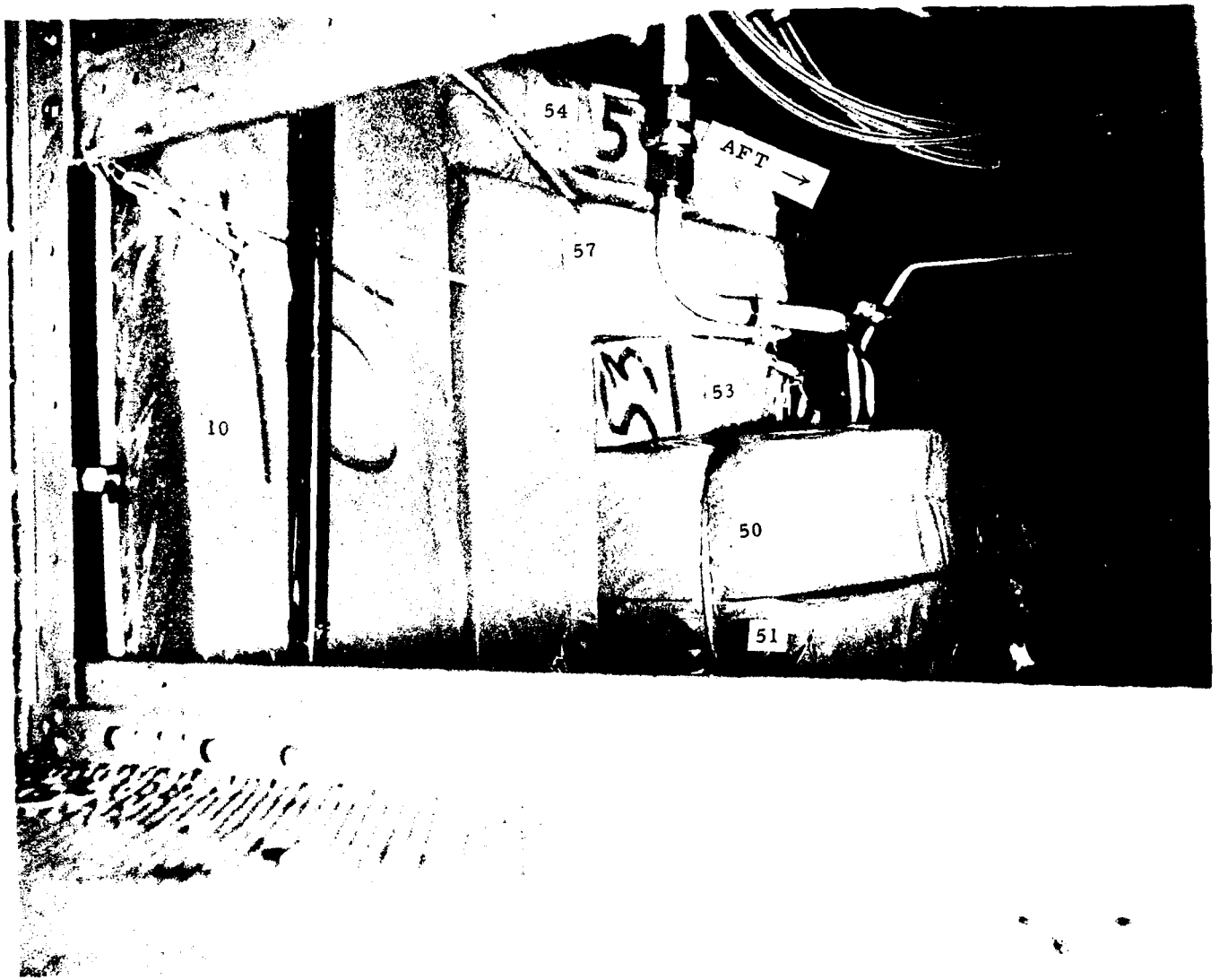


Figure 10. Foam Installed on Left Side of Hell Hole

c. Position foam shapes 50 and 51 around fuel cross-over tube as shown in figure 10.

d. Wrap shapes 50 and 51 with bungee cord as shown and hook into holes drilled in flanges on rear bulkhead.

NOTE

Unstretched length of cord is approximately 20 inches including hooks.

e. Install foam shape 58A as shown in figure 11.

6. Position foam on aft side of hell hole as follows:

a. Position foam shape 58C around fuel line as shown in figure 11.

b. Wrap 58C with bungee cord and secure to holes drilled in lighting hole flange.

NOTE

Unstretched length of cord is approximately 13 inches including hooks.

c. Position foam shape 58B on fuel line as shown in figure 11.

7. Position foam on right side of hell hole as follows:

a. Position foam shape 11 against bulkhead, behind control arms, as shown in figure 12.

b. Hold shape 11 in position with bungee cord stretched as shown in figure 12.

8. Reinstall door assemblies, panel trim, and seats (if removed).

APPLYING FOAM TO FUEL CROSS-OVER LINE IN OIL COOLER COMPARTMENT.

Install foam over fuel cross-over line in oil cooler compartment as follows (see figure 13):

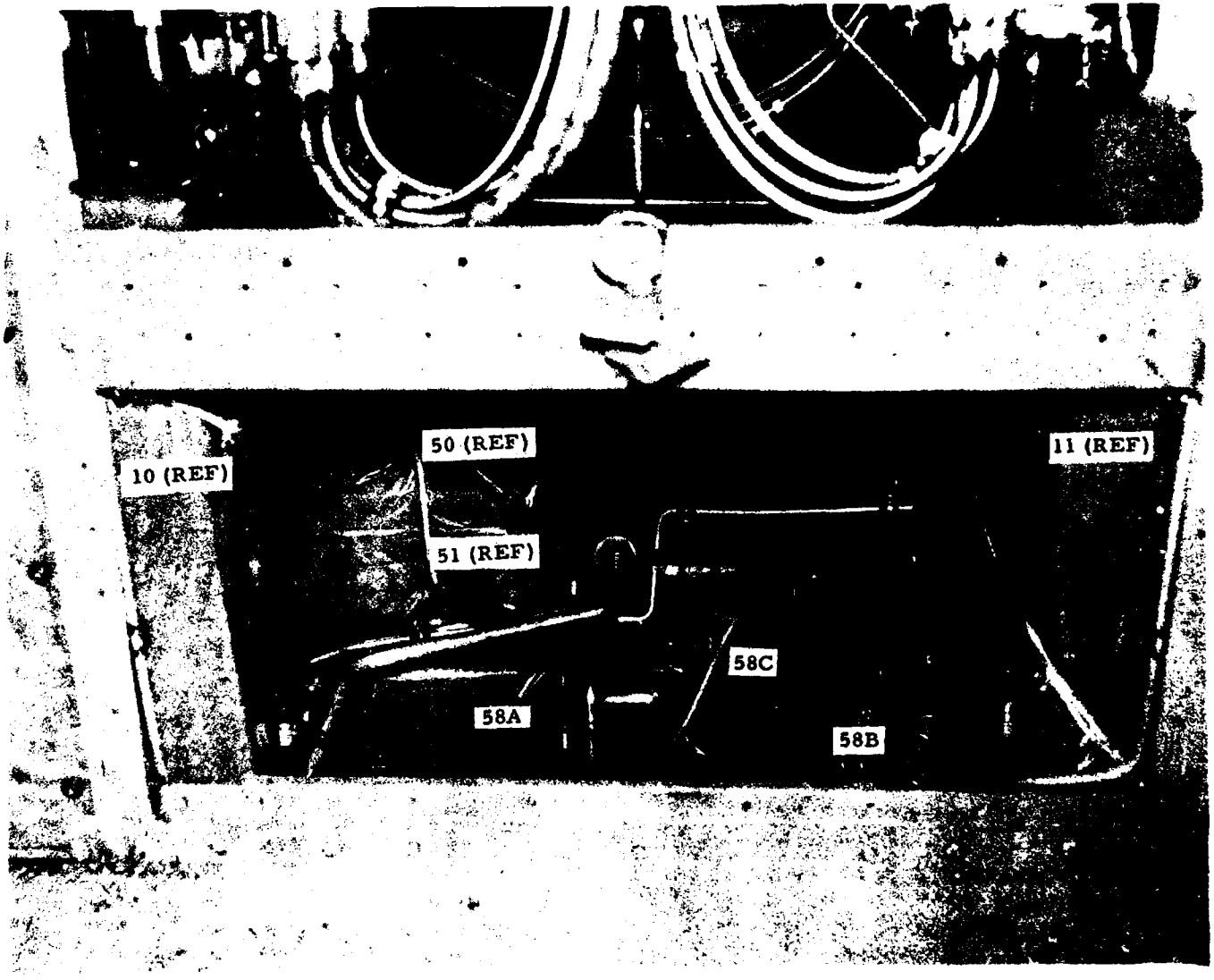


Figure 11. Foam Installed in Hell Hole (Looking Aft).

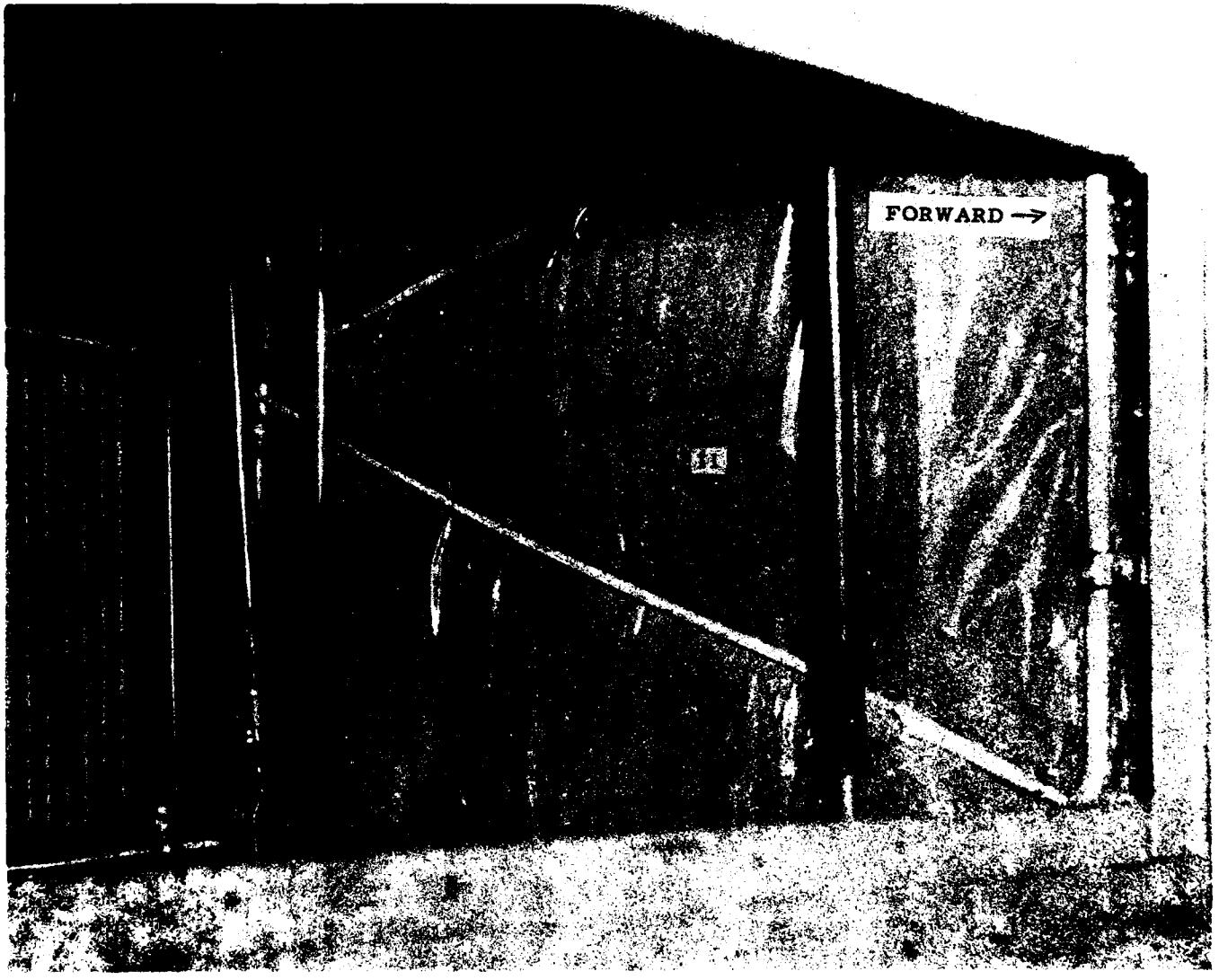


Figure 12. Foam Installed on Right Side of Hell Hole.

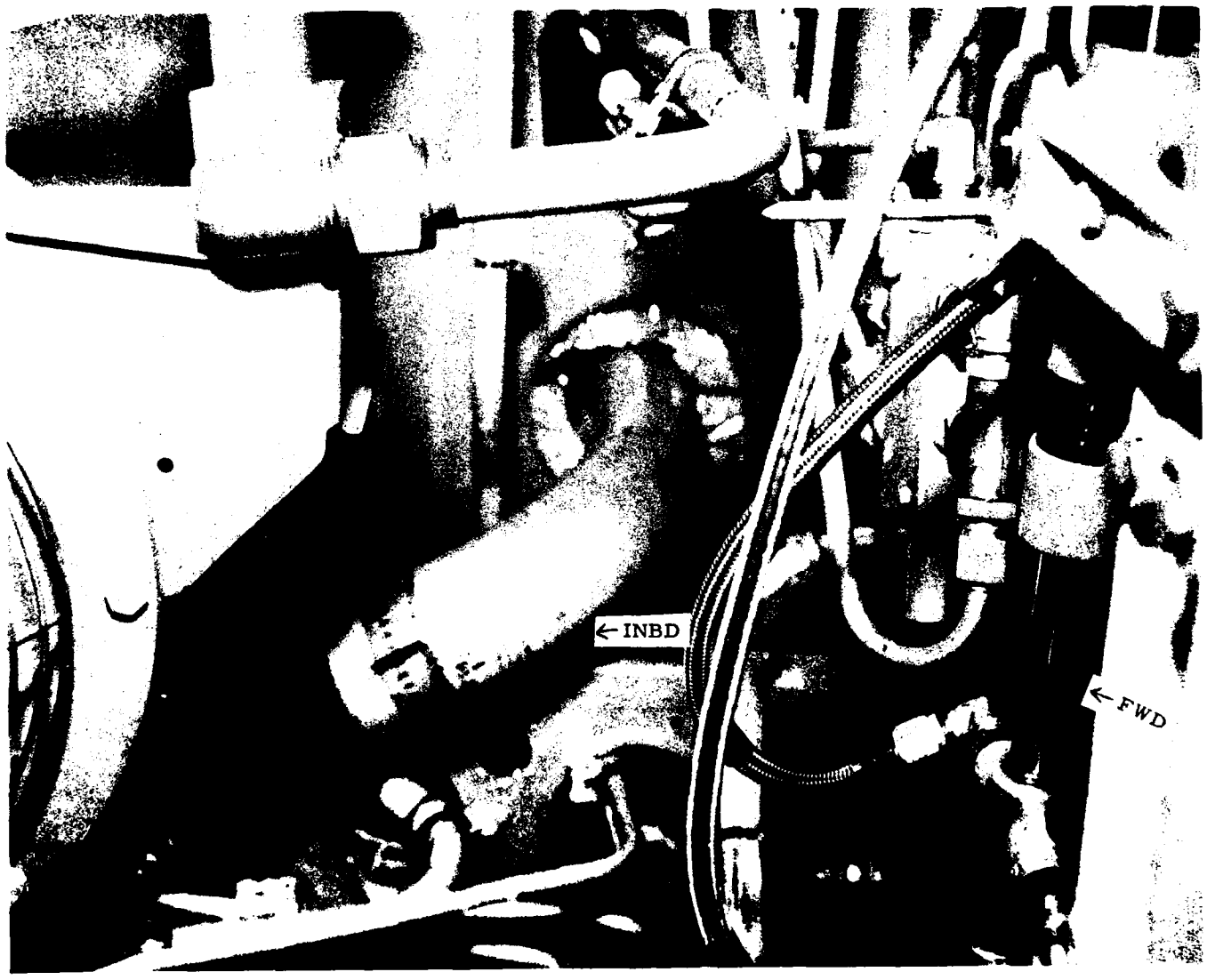


Figure 13. Fuel Cross-over Line (Without Foam)

1. Open oil cooler access door.

2. Position foam shape 14B around fuel line as shown in figure 14.

3. Secure shape with bungee hooked end to end.

4. Position foam shape 14A around fuel line outboard of fan shown in figure 14.

NOTE

No bungee cord is required around 14A

5. Reinstall oil cooler access door.

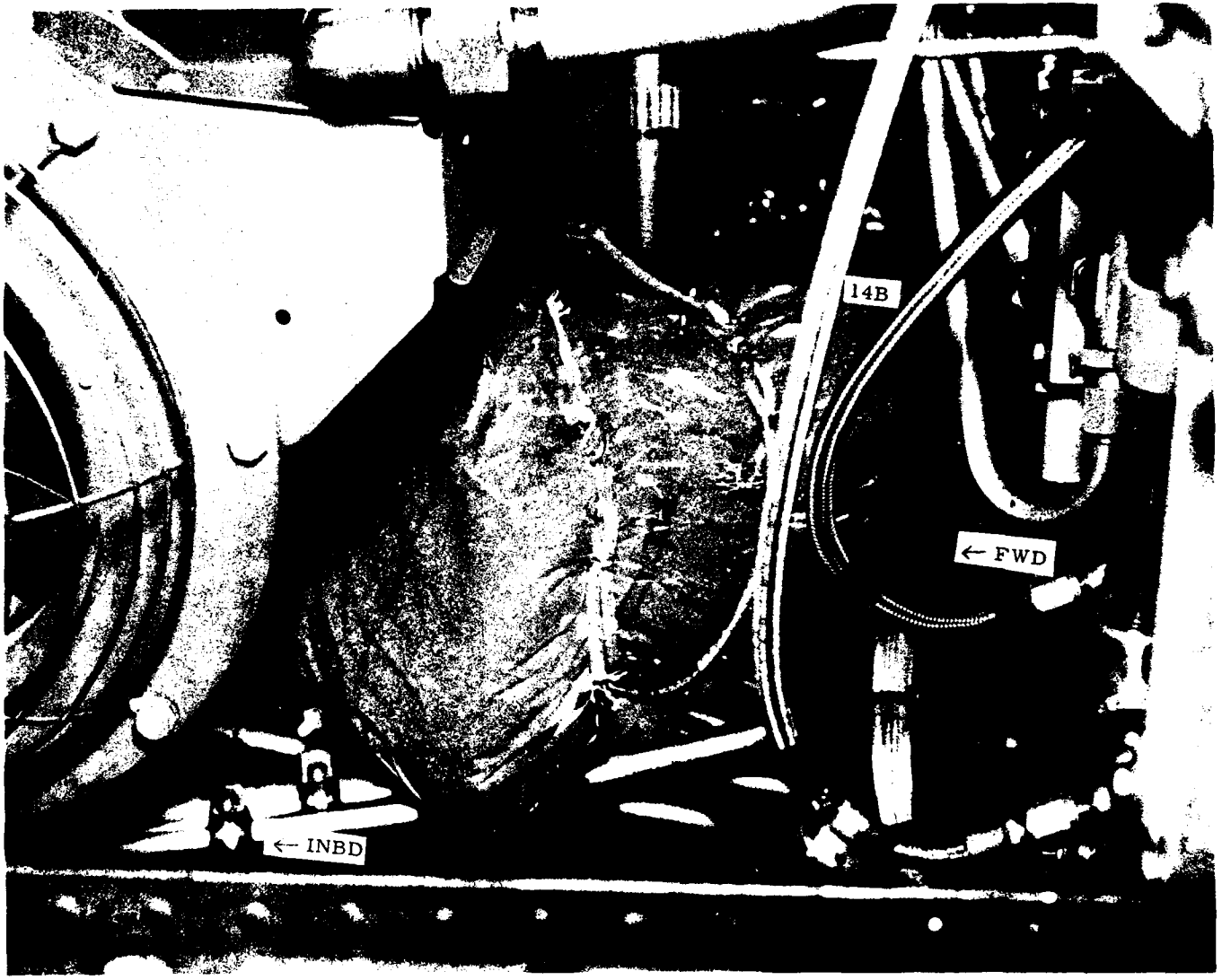


Figure 14. Fuel Cross-over Line in Oil Cooler Compartment (With Foam)