

CHAPTER 16

AIRCRAFT WEAPONS SYSTEMS TEST EQUIPMENT

Aviation ordnancemen use test equipment in all phases of electrical testing of weapons systems. The testing procedures you use are required at specific maintenance levels, such as depot, intermediate, or organizational. Test equipment varies in complexity, from a small pocket tester to a very large and complex unit. No matter the size or complexity, the purpose of the test equipment is to make sure that the weapon and the launching platform (aircraft) function correctly.

TEST EQUIPMENT

LEARNING OBJECTIVE: *Identify the test equipment used with aircraft weapons systems. Recognize the purpose and use of each.*

All the test equipment you will use isn't described in this chapter. Also, the step-by-step procedures

required to operate the test equipment aren't listed. To do your job, you need to be able to identify the equipment, know what it is used for, and how it is used. The specific step-by-step procedures that you should follow when you use test equipment can be found in applicable publications.

MULTIMETERS

The AN/PSM-4 and 77/AN multimeters (figs. 16-1 and 16-2) are used to measure resistance (ohms) and voltage (ac or dc) in an electrical circuit. You use them to test aircraft circuits when no special test equipment is available, or when reasonably accurate measurements are required.

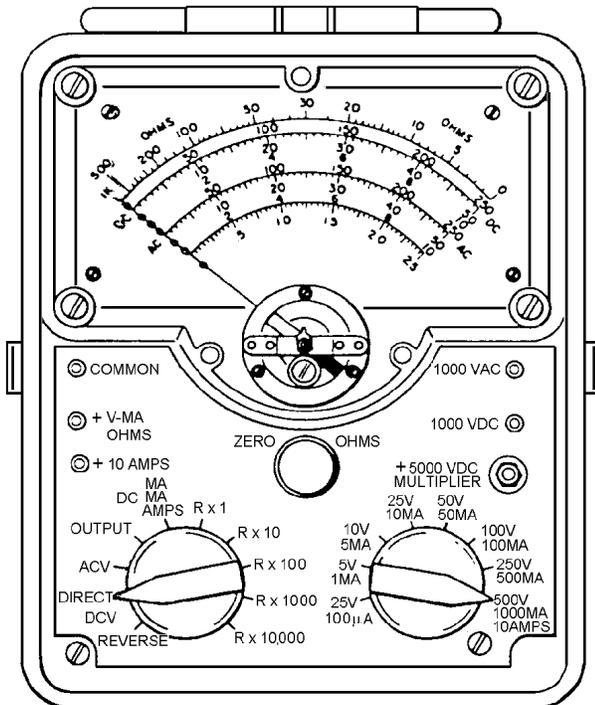


Figure 16-1.—AN/PSM-4 multimeter.

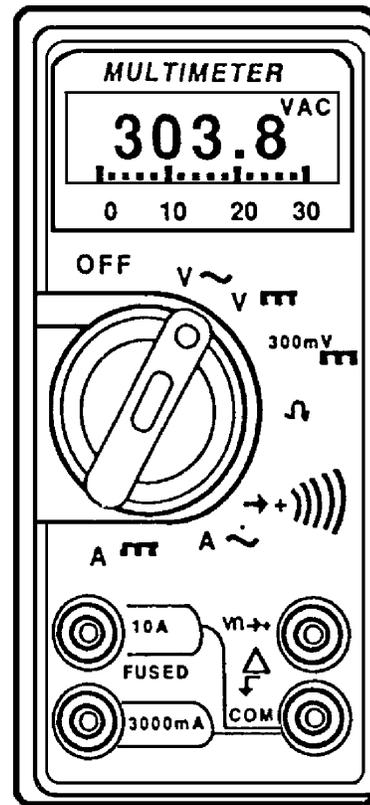


Figure 16-2.—77/AN multimeter.

AN/AWM-54 AIRCRAFT FIRING CIRCUIT TEST SET

The AN/AWM-54 aircraft firing circuit test set (fig. 16-3) is a portable, battery-operated, flight line test set used at duty stations ashore or afloat. You use this test set to check for stray voltages and various aircraft firing circuits, such as rocket firing, bomb release, and missile firing.

The complete AN/AWM-54 test set includes the following components:

- AWM-54 test set
- Transit case
- Spare battery pack
- Spare extension cable

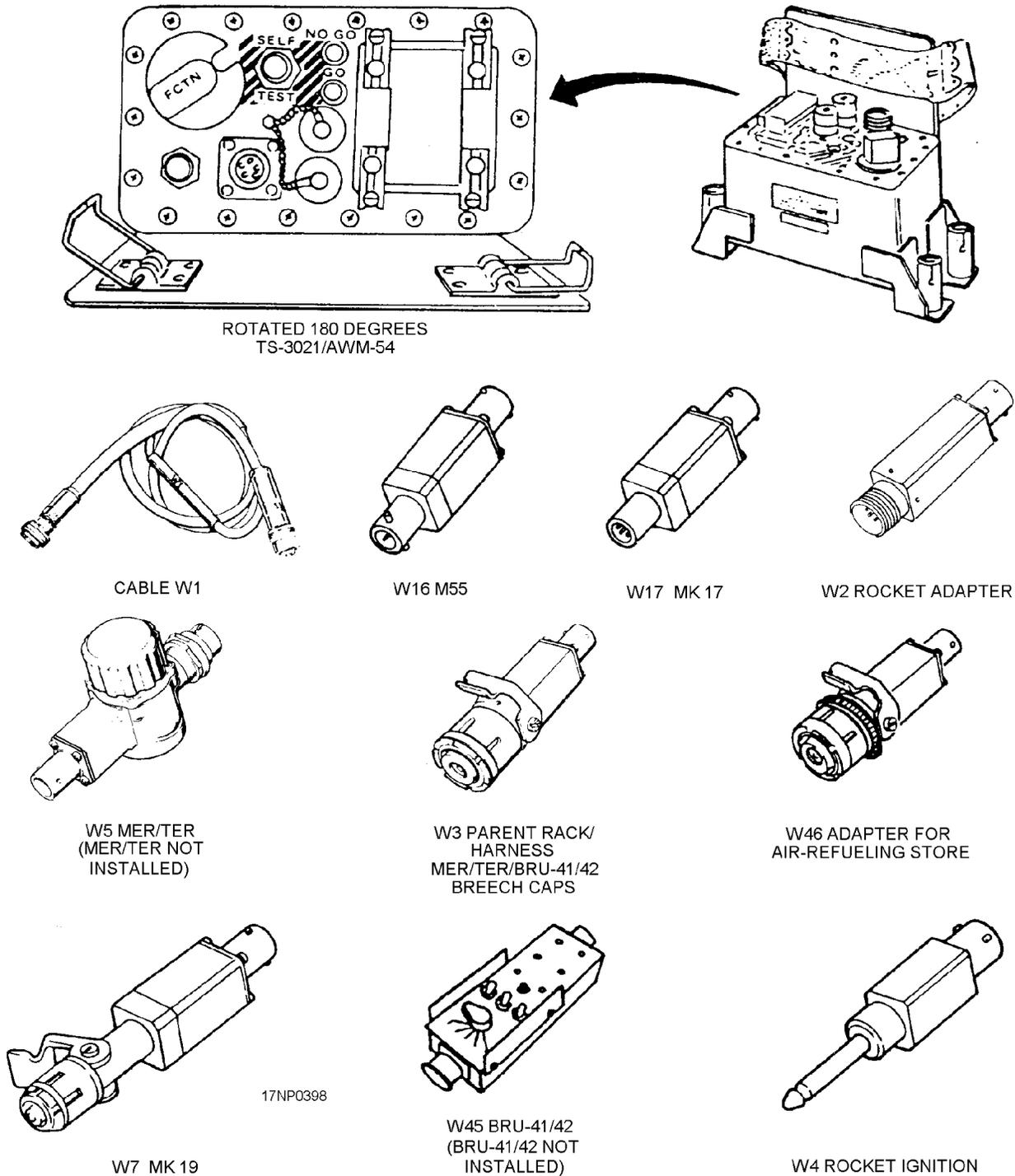


Figure 16-3.—AN/AWM-54 aircraft firing circuit test set.

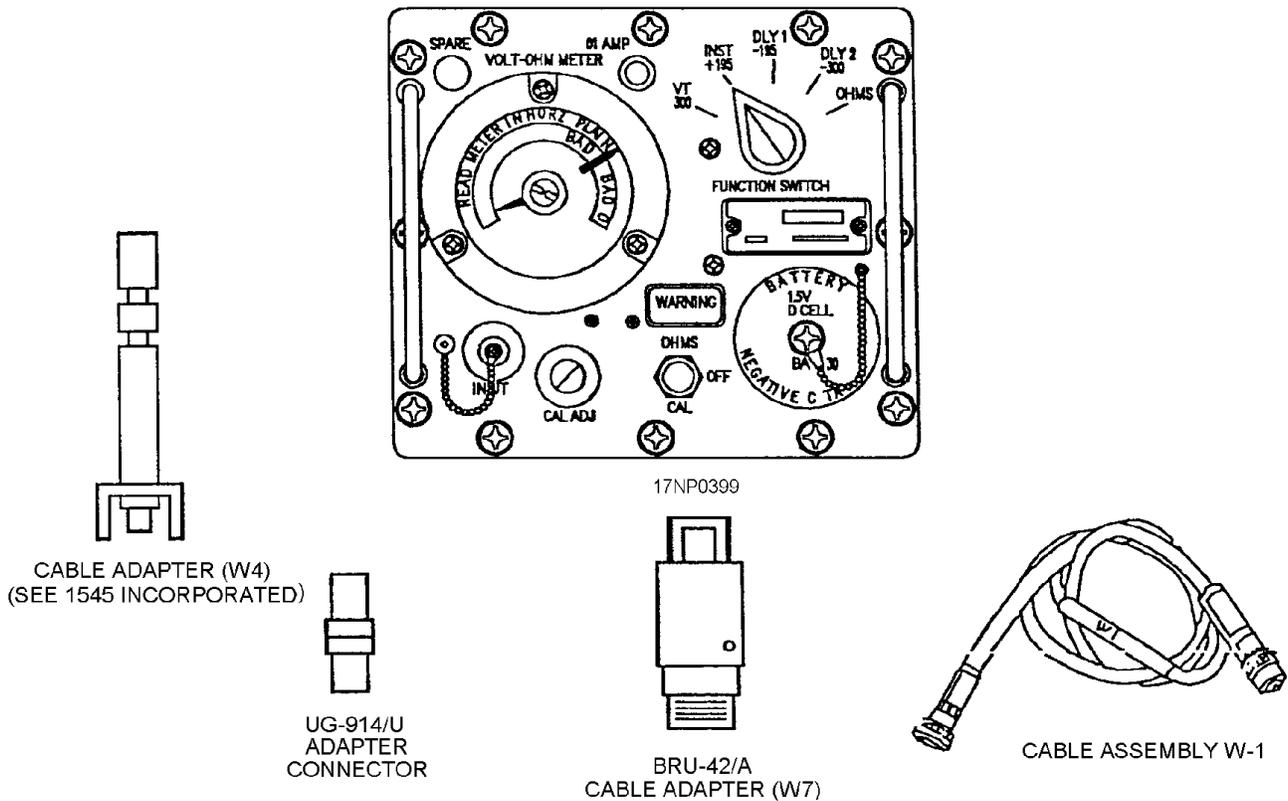


Figure 16-4.—AN/AWM-42A fuze function control test set.

- Adapter retainer assembly
- Technical manual

A battery charger (not shown) is also available, but you need to order it separately. The AWM-54 test set weighs about 7.5 pounds. It has a strap you can place around your waist for carrying the set.

Several accessory adapter assemblies are available for the test set. These adapters allow you to connect the test set to various armament configurations found on different aircraft. Some aircraft require only one or two adapter assemblies while others require five or six. These adapters are not furnished with the test set; they must be ordered separately.

AN/AWM-42A FUZE FUNCTION CONTROL TEST SET

The AN/AWM-42A fuze function control test set (fig. 16-4) is used to check the dc fuzing capabilities of fuze function control circuits. You use it to check for continuity and resistance in the electric fuzing. The test set has its own power source. The AN/AWM-42A fuze function control test set is used on all Navy and Marine Corps aircraft that have electric fuzing capabilities.

TTU-304/E GUIDED MISSILE TEST SET

The TTU-304/E guided missile test set (fig. 16-5) is used during prior-to-launch procedures for checking the tone and missile lock-on operability of the guidance control group of the Sidewinder missile. The TTU-304/E guided missile test set is used on all Navy aircraft that have Sidewinder missile capabilities.

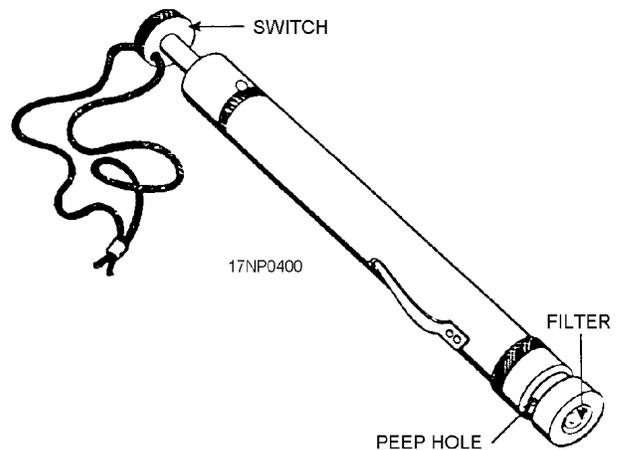


Figure 16-5.—TTU-304/E guided missile test set.

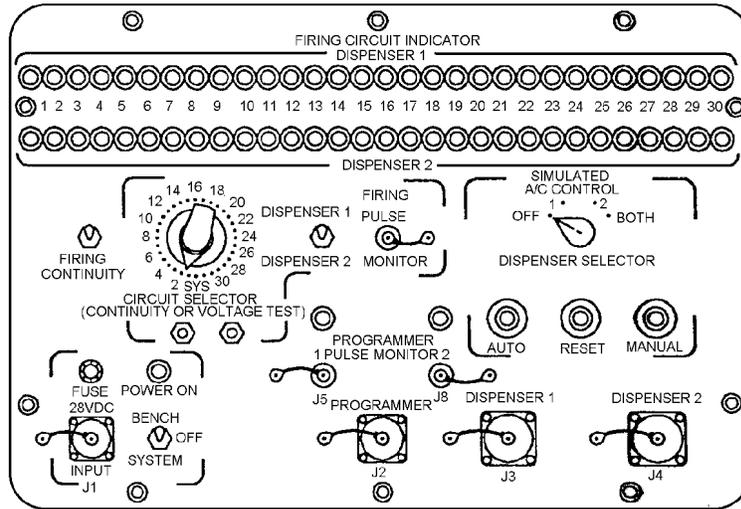
**AN/ALM-70A COUNTERMEASURE
DISPENSER TEST SET**

The AN/ALM-70A countermeasure dispenser test set (fig. 16-6) is used to check the AN/ALE-39 chaff and decoy dispensing system and the AN/ALE-37A dispenser. You connect the test set to the system being checked by test set cables or test set adapters. The test set uses aircraft power for its operation. The

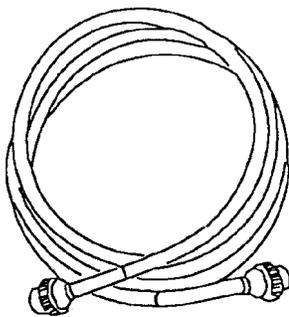
AN/ALM-70A test set is used on the F/A-18, S-3, and F-14 aircraft, and the H-60 helicopter.

**AN/ALM-225 COUNTERMEASURE
DISPENSER TEST SET**

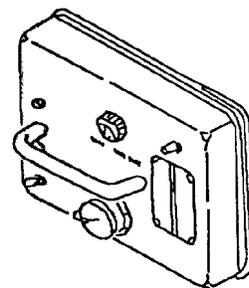
The AN/ALM-225 (fig. 16-7) is used for preflight testing of the AN/ALE-39 countermeasures dispenser system.



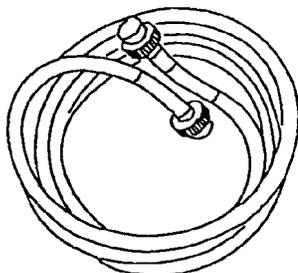
TS-2614/ALM-70 TEST SET



DISPENSER CABLE W-4

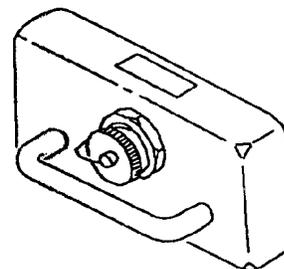


MX-7910/ALM-70 TEST ADAPTER



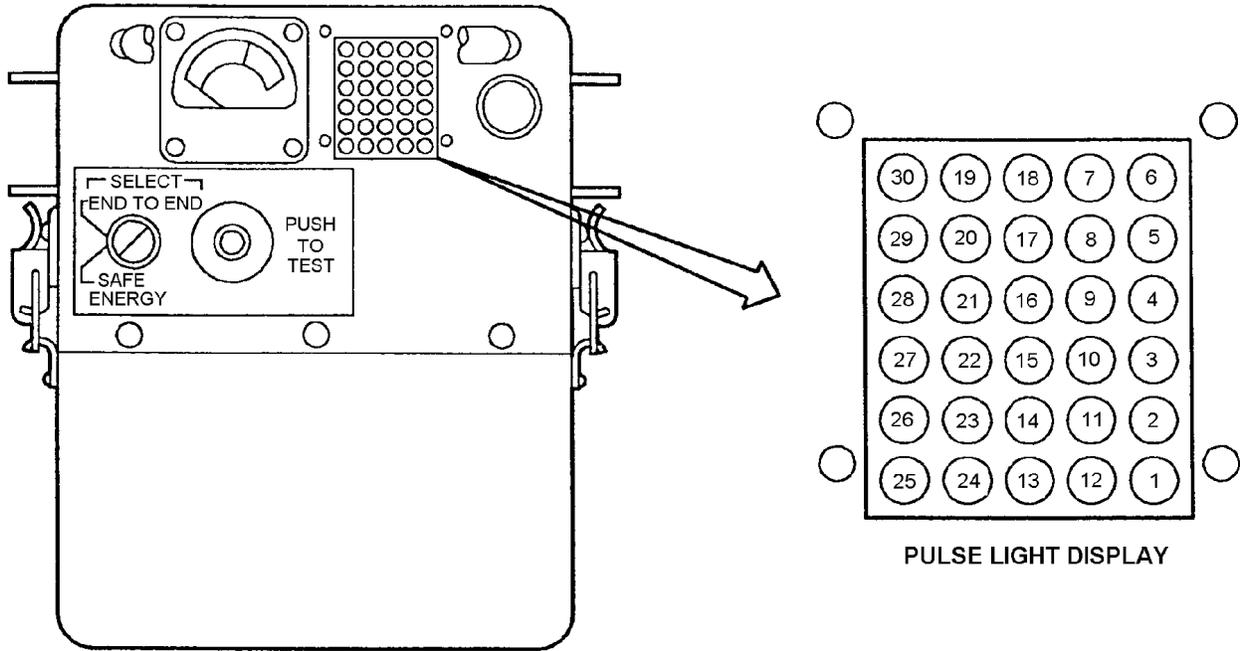
DISPENSER CABLE W-3

17NP0401



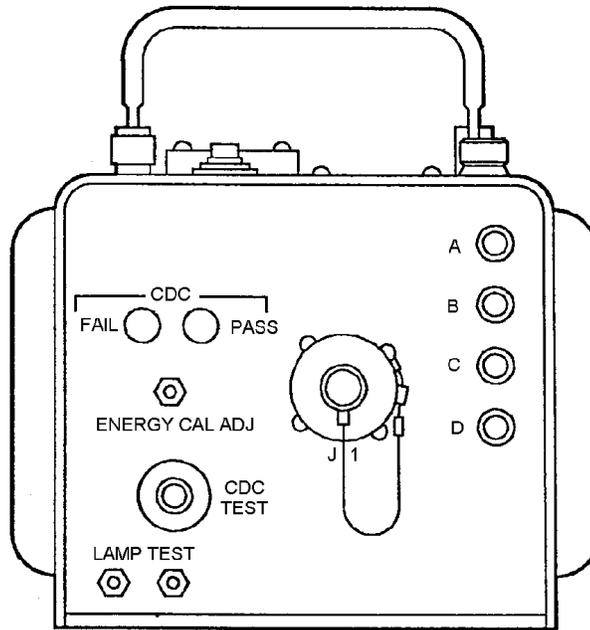
MX-8455/ALM-70A ADAPTER

Figure 16-6.—AN/ALM-70A countermeasure dispenser test set.



TOP VIEW

17NP0402



FRONT VIEW
(COVER REMOVED)

Figure 16-7.—AN/ALM-225 countermeasure dispenser test set.

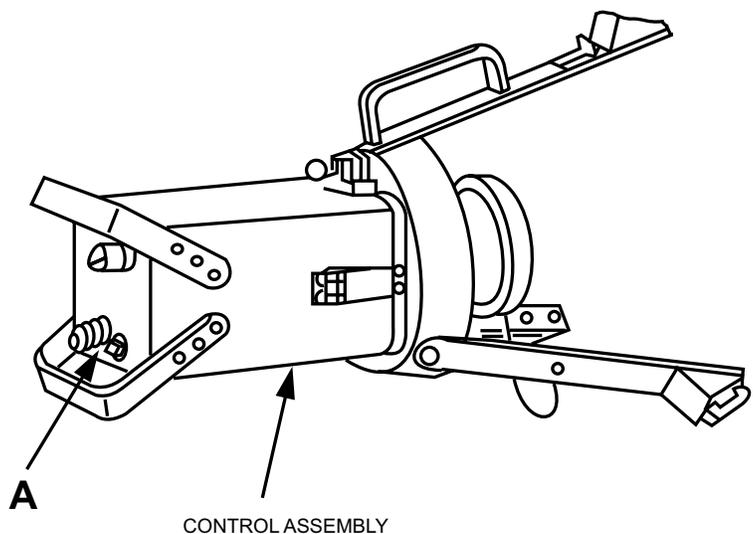
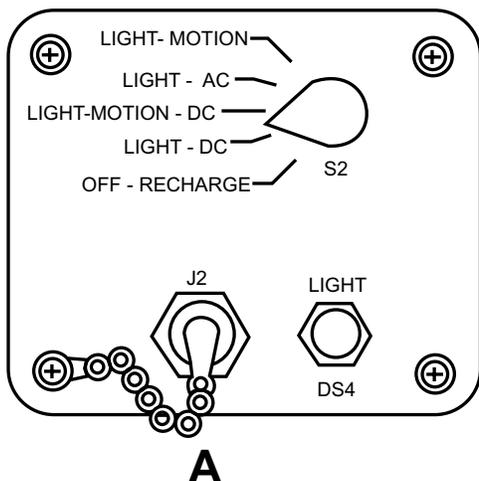
REVIEW NUMBER 1

TO ANSWER QUESTIONS 1 THROUGH 4, MATCH THE TEST SET WITH ITS DESCRIPTION.

<u>DESCRIPTION</u>	<u>TEST SET</u>
Q1. Used to make stray voltage checks on Navy aircraft	A. TTU-304/E
Q2. Used to check the dc fuzing capabilities of fuze function control circuits	B. AN/ALM-70A countermeasures dispenser test set
Q3. Used to check the tone operability of the Sidewinder missile during prior-to-launch procedures	C. AN/AWM-54
Q4. Used to check the AN/ALE-39A and AN/ALE-37 chaff/decoy dispensing systems	D. AN/AWM-42A

AN/DSM-77 TEST SET

The AN/DSM-77 test set (fig. 16-8) is used to evaluate the operational readiness of the Walleye weapon guidance section and aircraft cockpit television display. You use the test set to check the television camera and guidance section in the weapon, the lock-on control in the aircraft, and the video display.



AOF1608

Figure 16-8.—AN/DSM-77 series test set.

AN/ASM-464 GUIDED MISSILE LAUNCHER TEST SET

The AN/ASM-464 guided missile launcher test set (fig. 16-9) is a portable flight line test device. It is used to perform the operational checks of AIM-9 missile launching, visual target acquisition system (VTAS), and Sidewinder expanded acquisition mode (SEAM) circuits associated with the guided missile launcher LAU-7 (series). The AN/ASM-464 test set is used with the F/A-18 and F-14 aircraft and the H-1 and H-60 helicopters.

TS-3279/ASM GUIDED MISSILE AVIONICS TEST SET

The TS-3279/ASM guided missile avionics test set (fig. 16-10) is used to test the Visual Target Acquisition System/Sidewinder Expanded Acquisition Mode (VTAS/SEAM) aircraft system applicable to AIM-9 missiles.

TS-4142/AWM-23 MISSILE INTERFACE TEST SET

The TS-4142/AWM-23 missile interface test set (MITS) (fig. 16-11) is used to perform the AIM-54 missile station (LAU-93) checks. The TS-4142/AWM-23 test set is used with the F-14 aircraft.

REVIEW NUMBER 1 ANSWERS

DESCRIPTION

TEST SET

- A1. Used to make stray voltage checks on Navy aircraft
 A2. Used to check the dc fuzing capabilities of fuze function control circuits

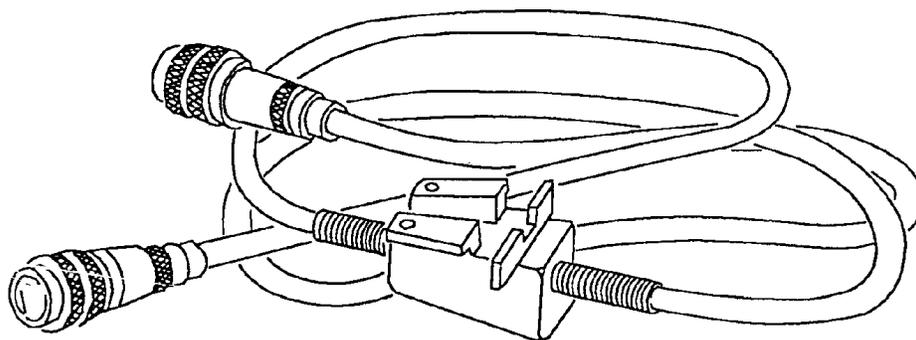
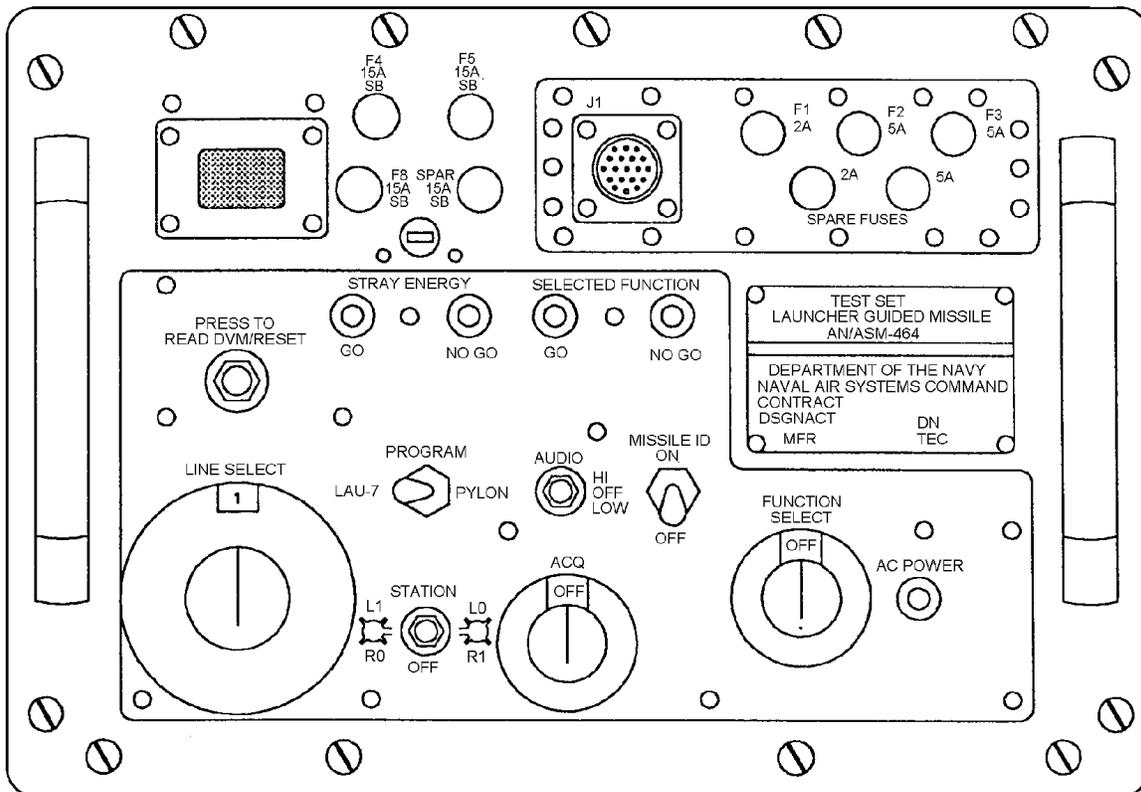
- C. AN/AWM-54
 D. AN/AWM-42A

A3. Used to check the tone operability of the Side-winder missile during prior-to-launch procedures

A4. Used to check the AN/ALE-39A and AN/ALE-37 chaff/decoy dispensing systems

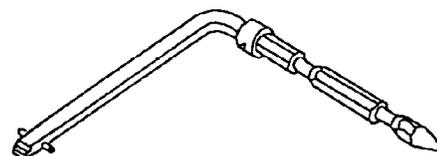
A. TTU-304/E

B. AN/ALM-70A countermeasures dispenser test set



CABLE ASSEMBLY-W1

17NP0407



DETENT WRENCH

Figure 16-9.—AN/ASM-464 guided missile launcher test set.

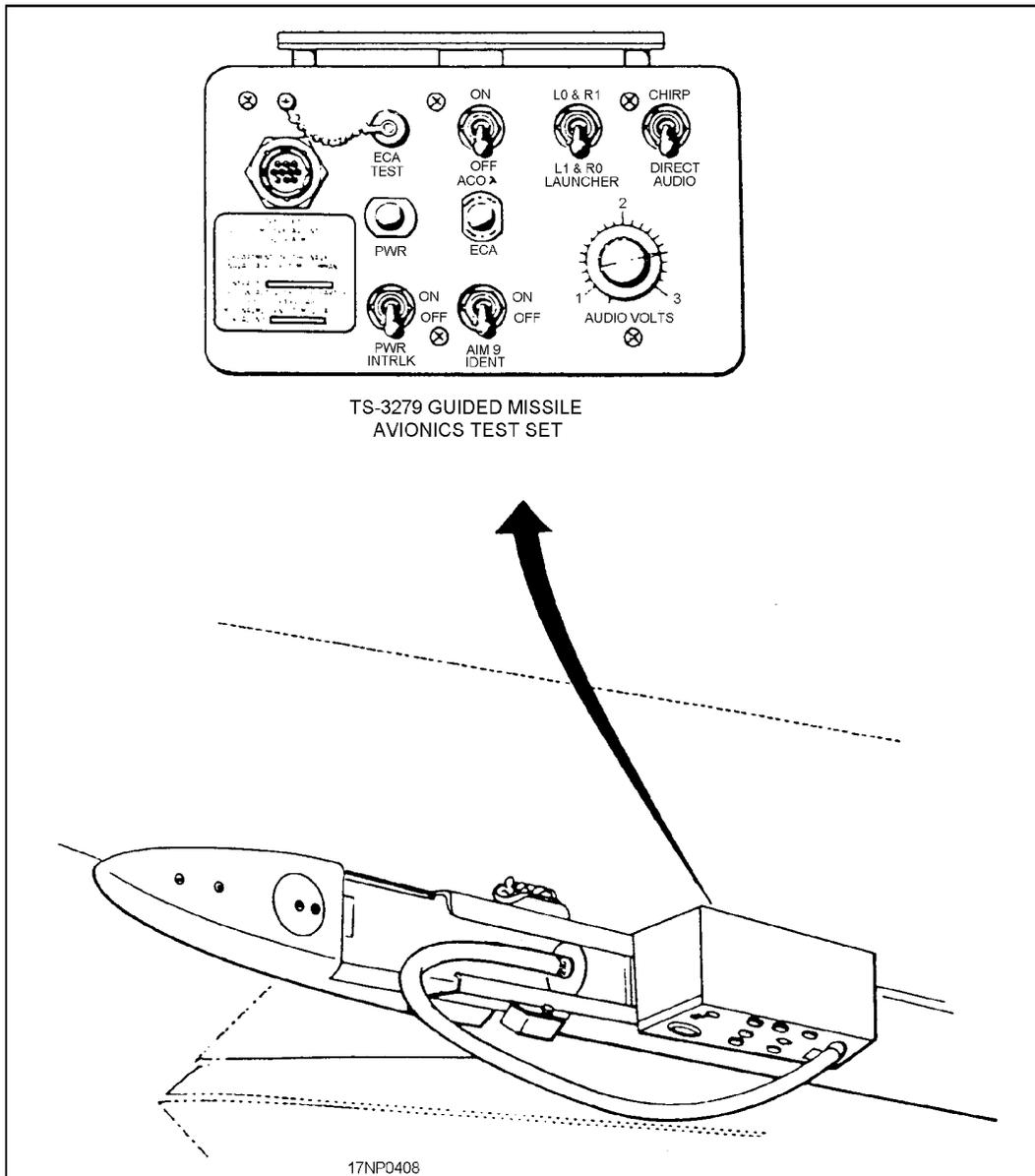


Figure 16-10.—AIM-9 SEAM system check.

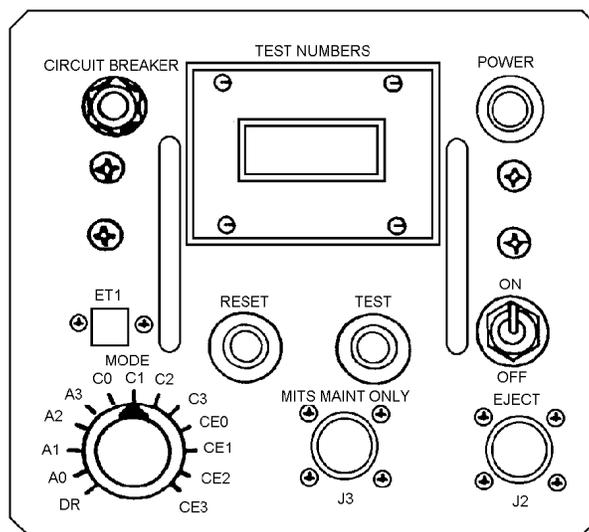
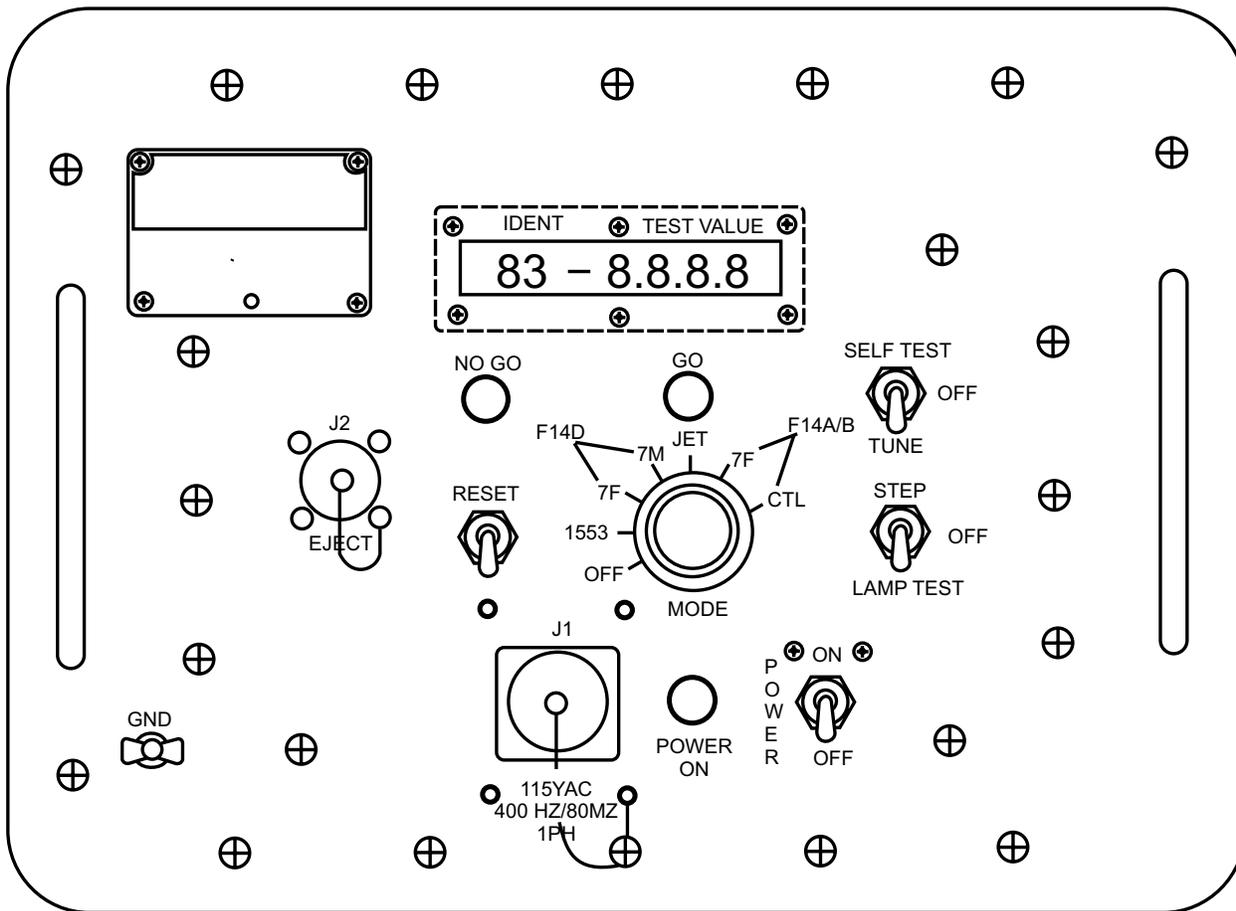


Figure 16-11.—TS-4142/AWM-23 missile interface test set.



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Figure 16-12.—Sparrow missile test set.

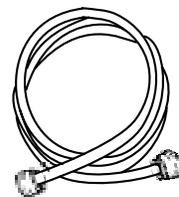
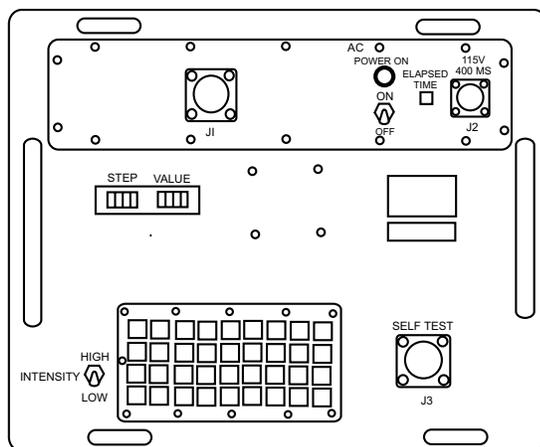
SPARROW MISSILE STATION TEST SET

The Sparrow missile station test set (SMTS) (fig. 16-12) is used to verify the operational status and functions of the AIM-7 Sparrow missile control system. When connected to the aircraft, the SMTS simulates the missile and provides visual indications of

received inputs. The test set is used with the F-14 aircraft.

AN/AWM-92 AIRCRAFT WEAPONS CONTROL TEST SET

The AN/AWM-92 test set (fig. 16-13) is used to perform operational checks of the HARM, Maverick,



CABLE ASSEMBLY W-4



CABLE ASSEMBLY W-1

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Figure 16-13.—AN/AWM-92 aircraft weapons control test set.

Walleye, and missile launch and control systems. This test set is used with the F/A-18 aircraft.

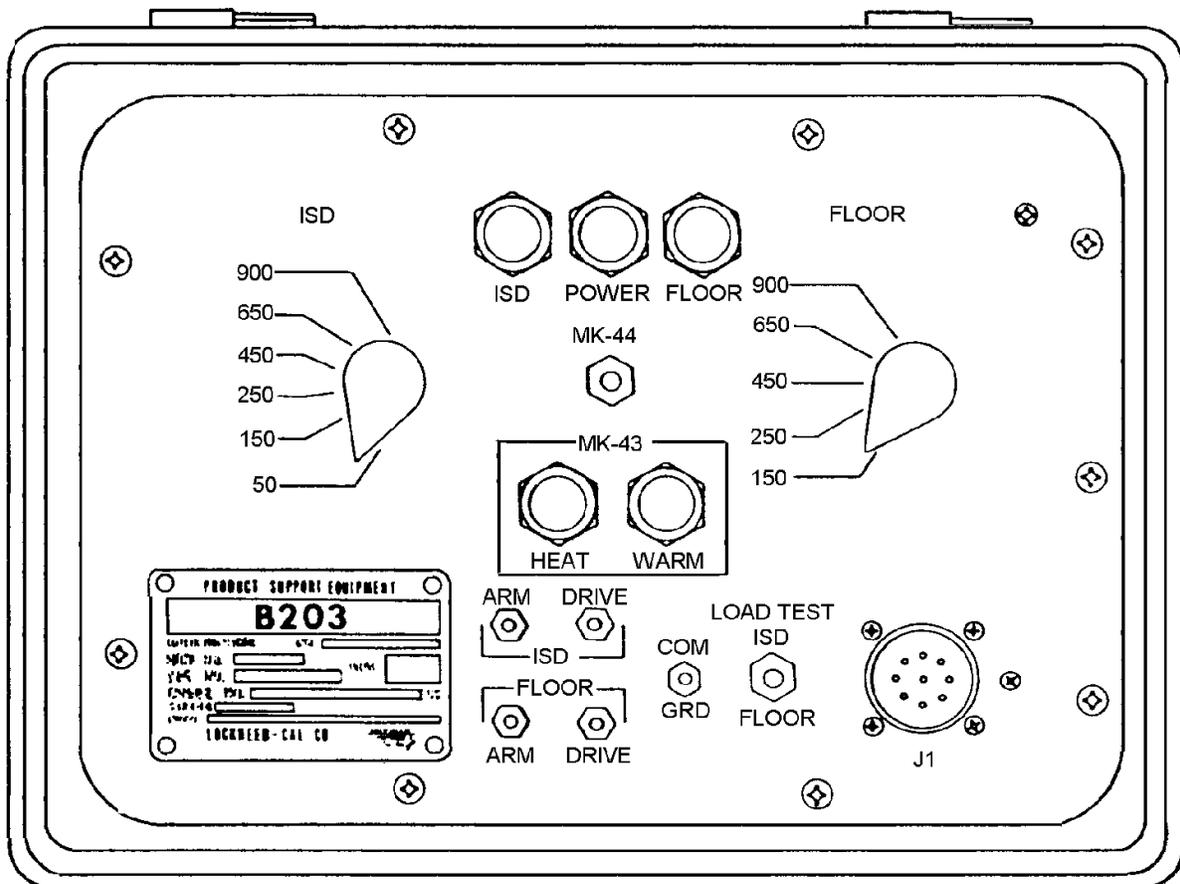
B203 TORPEDO HEAT AND CONTROL SYSTEM TEST SET/B473 TEST SET OVERLAY

The B203 torpedo heat and control system test set (fig. 16-14) is used to perform circuit continuity tests on Mk 46 torpedo preset circuits. The B473 test set (fig. 16-15) consists of an overlay and an adapter cable. It is

used with the B203 torpedo heat and control test set to perform circuit continuity tests on Mk 46 torpedo preset circuits. Both the B203 and B473 test sets are used with the P-3 aircraft.

TS-3519D/DSM TEST SET SIMULATOR

The TS-3519D/DSM (P-3 aircraft) test set simulator (fig. 16-16) is a manually programmable digital test set used with the P-3 aircraft. It is used to functionally check the AGM-84 system prior to loading.



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Figure 16-14.—B203 torpedo heat and control system test set.

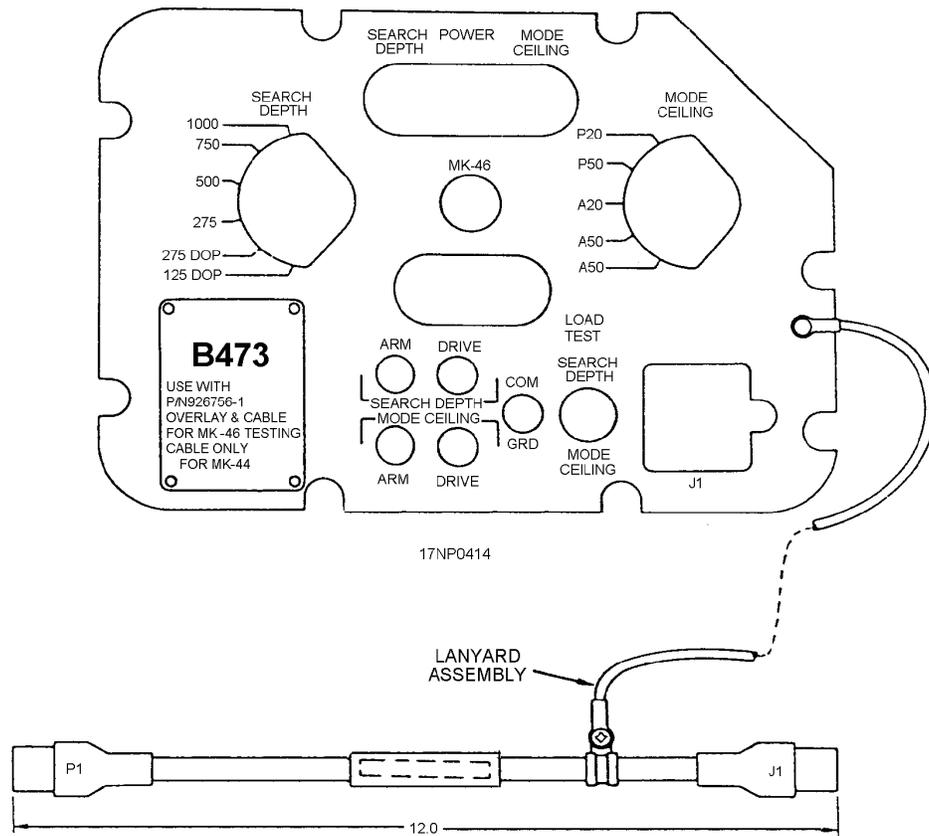


Figure 16-15.—B473 test set overlay.

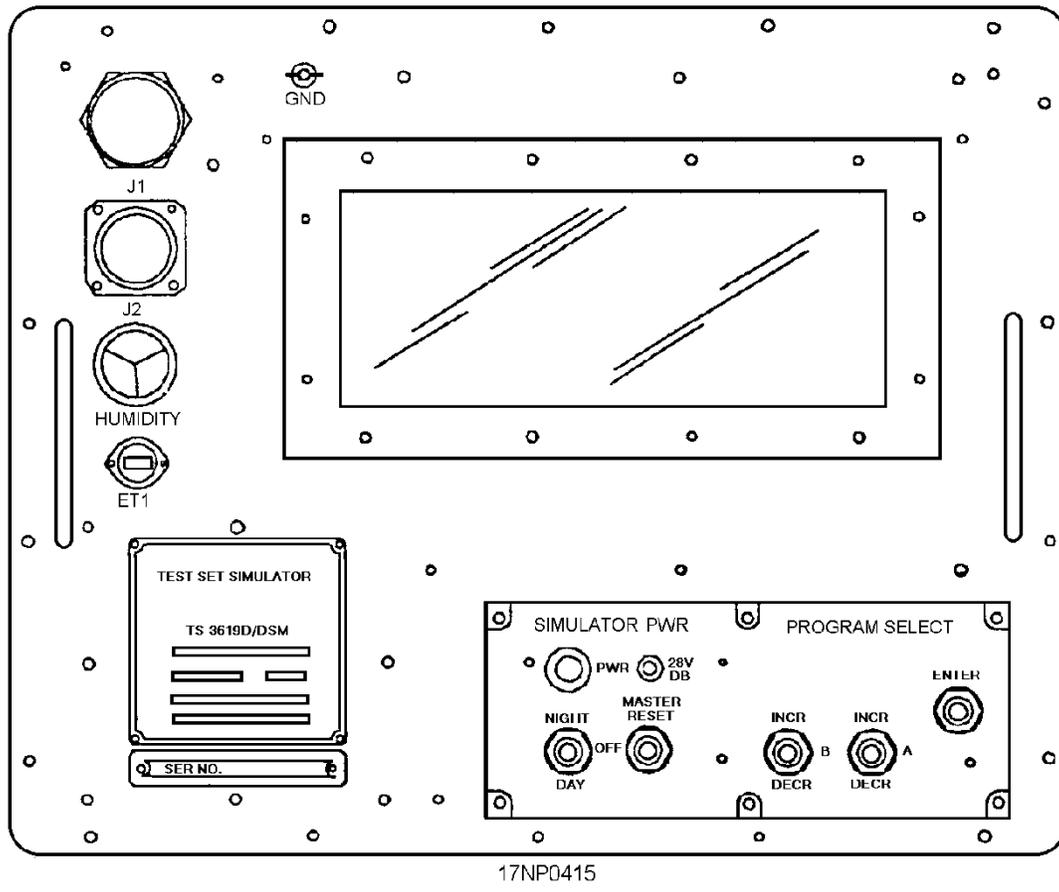


Figure 16-16.—TS-3519D/DSM test set simulator (P-3 aircraft).

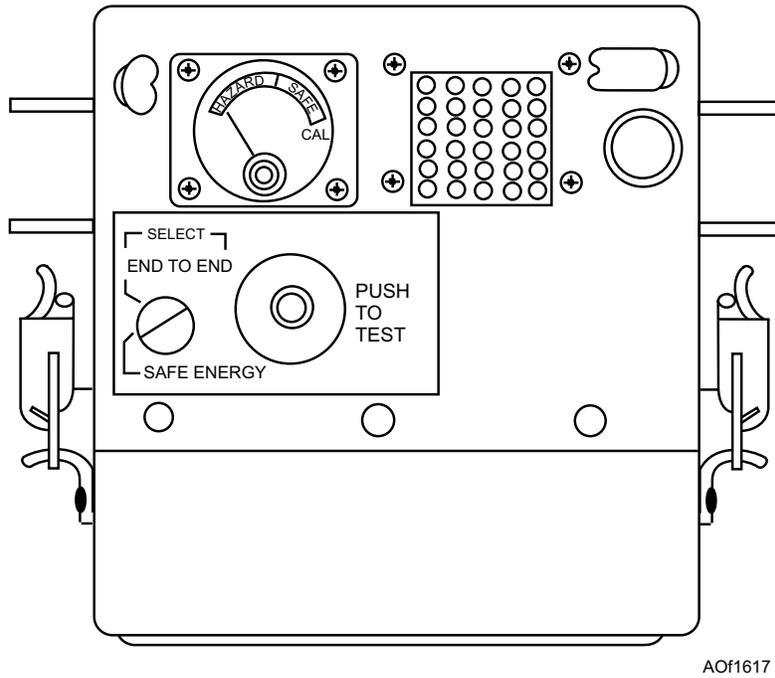


Figure 16-17.—TS-3519D/DSM test set simulator (S-3 aircraft).

TS-3519D/DSM TEST SET SIMULATOR

The TS-3519D/DSM (S-3 aircraft) test set simulator (fig. 16-17) is a portable test set. It is used to

simulate a Harpoon missile for wing station checkout, power-on functional testing, and fault isolation. The TS-3519D/DSM is used with the S-3 aircraft.

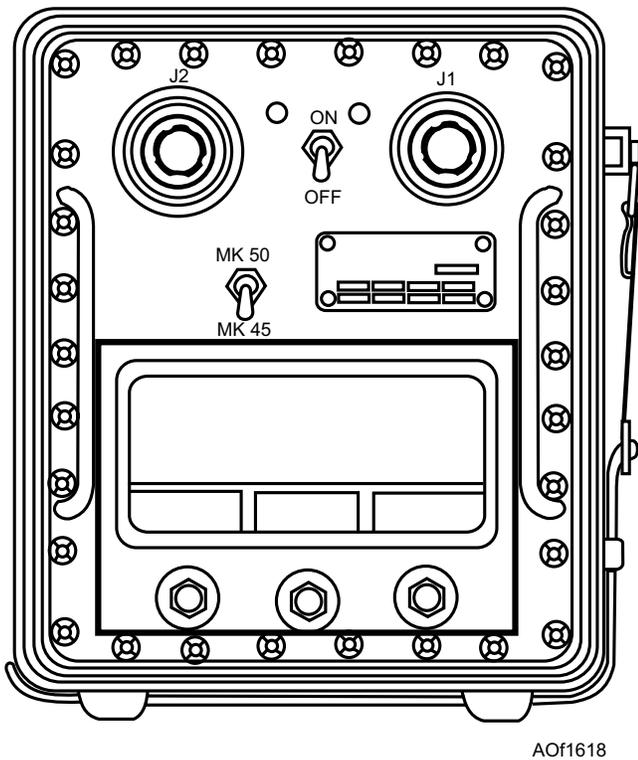


Figure 16-18.—MK 432 Mod 4 airborne torpedo presetter test set.

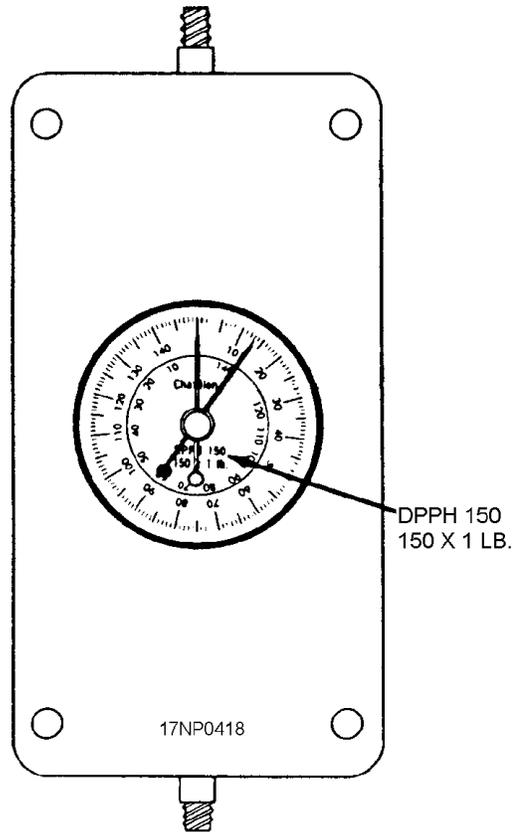


Figure 16-19.—Force retention gauge (typical).

MK 432 MOD 4 AIRBORNE TORPEDO PRESETTER TEST SET

The MK 432 MOD 4 airborne torpedo presetter test set (fig. 16-18) has capabilities for functionally testing the presetter portion of the armament control panel subassembly in the aircraft. It can also be used to check aircraft wiring and the torpedo umbilical connector. The MK 432 MOD 4 test set is used with the P-3 and S-3 aircraft.

FORCE RETENTION GAUGE

The force retention gauge (fig. 16-19) is used to functionally check the bomb rack nose and tail arming solenoids. You should refer to the applicable maintenance instruction manual for the proper retention readings.

REVIEW NUMBER 2

IN ANSWERING QUESTIONS 1 THROUGH 5,
MATCH THE DESCRIPTION WITH THE TEST
SET.

<u>DESCRIPTION</u>	<u>TEST SET</u>
Q1. Used to evaluate the operational readiness of the Walleye weapon guidance section cockpit television display	A. TS-3279
Q2. Used to perform the operational checks of the AIM-9 missile launching, visual target acquisition system (VTAS), and Sidewinder expanded acquisition mode (SEAM)	B. B203 torpedo heat and control system test set
Q3. Used to check the VTAS/SEAM system on AIM-9 missiles	C. AN/DSM-77
Q4. Used to verify the operational status and function of the AIM-7 Sparrow missile on the F-14 aircraft	D. Sparrow missile test set
Q5. Used to perform circuit continuity tests on Mk 46 torpedo preset circuits	E. AN/ASM-464

TEST EQUIPMENT SAFETY SUMMARY

LEARNING OBJECTIVE: *Recognize the safety precautions to follow when working with aircraft weapons systems test equipment.*

The test equipment discussed in this chapter is designed to perform various functions. Two of the most important functions are—

1. to ensure the correct firing voltage is available at the appropriate station when the cockpit switches are properly set, and
2. to ensure that voltage or stray voltage is not present before electrical connection of certain launchers, such as rocket launchers, is made.

These two functions are called *aircraft release and system control checks*. Normally, you perform aircraft release and system control checks before the weapons are installed on the aircraft. However, some checks require the weapons to be loaded on the aircraft. As part of the loading process, the Sparrow, Phoenix, Walleye, and Sidewinder (on some aircraft) weapons are electrically mated to the aircraft. Then, the external power is applied to the aircraft, and a missile-on-aircraft test (MOAT) is performed. This test is normally performed during the prior-to-launch sequence.

You conduct the Sparrow and Phoenix MOAT by activating the circuits within the aircraft. Then, you observe the indications as they are received in the cockpit. No test equipment is required to perform this test.

At least two team members and a team leader using an audio headset and a TTU-304/E tester perform the Sidewinder MOAT. The TTU-304/E tester is basically a pencil flashlight with an infrared filter lens.

The person in the cockpit plugs the headset into the audio connection and turns on the switches indicated in the checklist. These switches are Sidewinder COOL, STATION SELECT, and AUDIO CONTROL. The person at the missile station removes the missile protective dome cover. Then, with the tester turned ON, the beam of the tester is moved across the nose of the missile from a distance of 4 to 6 feet. As the missile senses radiation from the tester through the launcher's audio amplifier, a tone is heard in the headset. If more than one missile is loaded, each missile should be tested and the dome covers replaced. Sidewinder MOAT may also be performed during pretaxi arming signals with the pilot as the person in the cockpit.

REVIEW NUMBER 2 ANSWERS

<u>DESCRIPTION</u>	<u>TEST SET</u>
A1. Used to evaluate the operational readiness of the Walleye weapon guidance section cockpit television display	C. AN/DSM-77
A2. Used to perform the operational checks of the AIM-9 missile launching, visual target acquisition system (VTAS), and Sidewinder expanded acquisition mode (SEAM)	E. AN/ASM-464
A3. Used to check the VTAS/SEAM system on AIM-9 missiles	A. TS-3279
A4. Used to verify the operational status and function of the AIM-7 Sparrow missile on the F-14 aircraft	D. Sparrow missile test set
A5. Used to perform circuit continuity tests on Mk 46 torpedo preset circuits	B. B203 torpedo heat and control system test set

The Walleye MOAT also requires at least three persons and a DSM-77 test set. The DSM-77 test set projects a test image to be received by the Walleye.

With the cockpit switches ON, as listed in the checklist, the Walleye dome cover removed, and the tester mounted on the weapon and switched to LIGHT, a display appears on the aircraft monitor. When the tester is switched to LIGHT-MOTION, the image moves from side to side, diagonally, or up and down, depending upon the position of the tester. The tester control assembly is rotated around the foundation assembly during the testing process. During each position test, the person in the cockpit pulls the trigger switch and the weapon's television camera will lock on to one of the target dots and follow it as it moves. As each test is completed for each weapon loaded, the dome cover should be replaced.

WARNING

During MOAT, or any other test being performed after weapons have been loaded on the aircraft, the MASTER ARMAMENT

switch must NEVER be placed in the ON position.

When performing aircraft release and system control checks, you should always use the step-by-step procedures (checklist) provided in the aircraft loading manual. A few safety precautions must be observed when performing aircraft release and system control checks. These precautions are listed below.

1. Before you begin an aircraft release and system control check, make sure the aircraft is parked in a designated area, secured, and electrically grounded.
2. Before you apply external electrical power to the aircraft, make sure all cockpit switches have been positioned to OFF, NORMAL, or HOLD. If required, apply external air conditioning.
3. Release and control system checks will not be performed with weapons loaded on the aircraft. Checks may be performed with airborne stores (fuel tanks, empty MERs/VERs, pods, etc.) installed on the aircraft stations, provided cartridge retainers, breech caps, and ejector cartridges are removed.
4. Test equipment should only be used by personnel who have become qualified through an established qualification and certification program.

Stray voltage checks are normally performed with the weapon loaded on the aircraft, but they are made before making an electrical connection between the weapon and the aircraft. Additionally, this check is normally performed after the aircraft's engines have been started and all aircraft preflight checks have been completed. The stray voltage check is performed at the last possible moment before the aircraft takes off. This is to ensure that no voltage has been induced in the aircraft firing circuitry from external sources, such as the ship's radar. The launcher electrical safety pin must not be removed until the aircraft is positioned on the catapult for takeoff.

REVIEW NUMBER 3

- Q1. How many persons are required to perform a MOAT on a Sidewinder missile?
- Q2. In what position should the MASTER ARM switch be set when a MOAT is being conducted on a naval aircraft?

REVIEW NUMBER 3 ANSWERS

A1. *At least three persons are required to perform a MOAT on a Sidewinder missile.*

A2. *The MASTER ARM switch should be set in the OFF or SAFE position when a MOAT is being conducted on a naval aircraft.*

