AD-A031 574 ARMY AVIATION TEST BOARD FORT RUCKER ALA F/G 17/2.1

MILITARY POTENTIAL TEST (COMPARATIVE EVALUATION) OF LIGHTWEIGHT--ETC(U)

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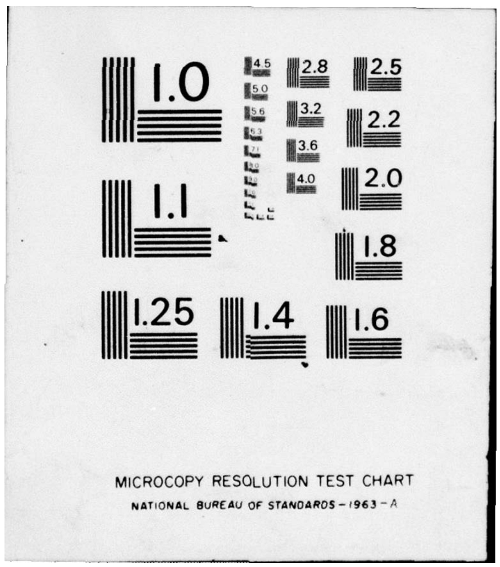
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MICROCOPY RESOLUTION TEST CHART
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(1) B.S.

DEPARTMENT OF THE ARMY
UNITED STATES ARMY AVIATION TEST BOARD
Fort Rucker, Alabama 36362

STEBG-TD

30 JUL 1965

SUBJECT: Letter Report, "Military Potential Test (Comparative Evaluation) of Lightweight VHF Aircraft Radios," DA Project No. Unknown, USATECOM Project No. 4-5-3660-01 (For Official Use Only)

(6) (11) 30 Jul 65 (12) 14p.

TO: Commanding General
US Army Electronics Command
ATTN: AMSEL-AV-C
Fort Monmouth, New Jersey

(9) Letter rept.

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1. References.

a. VHF Planning Conference, US Army Test and Evaluation Command, 4 March 1965, attended by representatives of the US Army Test and Evaluation Command (USATECOM), US Army Electronics Command (USAECOM), and the US Army Aviation Test Board (USAAVNTBD).

b. Letter, STEBG-TP-V, US Army Aviation Test Board, 13 May 1965, subject: "Plan of Test, Military Potential Test (Comparative Evaluation) of Lightweight VHF Aircraft Radios, USATECOM Project No. 4-5-3660-( )."

c. Message, BAAR-I 6-57, US Army Board for Aviation Accident Research, 28 June 1965, subject: "Installation of Replacement Radios."

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2. Authority.

a. Directive. Letter, AMSTE-BG, Headquarters, US Army Test and Evaluation Command, 6 May 1965, subject: "Test Directive, Military Potential (Comparative Evaluation) of Commercial VHF Radios, USATECOM Project No. 4-5-3660-( )."

The of this report is

b. Purpose. To obtain data which will enable the US Army Electronics Command (USAECOM) to select the most suitable off-the-shelf VHF radio set for use in O-1 and OH-13 aircraft in US Army Europe (USAREUR).

3. Background.

a. On 8 February 1965, the US Army Aviation Test Board (USAAVNTBD) was informally notified by the US Army Materiel Command (USAMC) and USAECOM that a comparative evaluation of several off-the-shelf VHF transmitter-receivers was to be conducted in an expedited timeframe. On 4 March 1965, a VHF planning conference was held at Headquarters, US Army Test and Evaluation Command (USATECOM) to discuss the number of sets to be tested, timeframe, and test objectives.

b. During the period 16 March 1965 through 28 May 1965, five VHF transmitter-receivers each from a different manufacturer were tested by the USAAVNTBD.

4. Findings.

a. Installation Tests.

(1) Physical Characteristics.

(a) Each test system consisted of two major components, receiver-transmitter (R/T) unit, which included the control panel, and a power-supply unit.

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(b) In addition to the two major components, System 1 (figure 1, inclosure 1) also had a ram-air cooling unit. The system was tested with both the Army standard antenna and the manufacturer's antenna.

(c) Antennas were not furnished by the manufacturers of test Systems 2, 3, 4, and 5 (figures 2, 3, 4, and 5, inclosure 1); therefore, the systems were tested using only the Army standard VHF antenna.

(d) The size and weight of each system are listed in inclosure 2.

(2) Installation in OH-13 Helicopters. All the test systems were installed in the space made available by the removal of the ARC Type-12 equipment and by minor modifications to the aircraft control panel console. Aircraft gross weight was reduced at least 20 pounds when the ARC Type-12 equipment was replaced with any of the test systems.

(3) Installation in O-1 Airplanes. Complete installation was not required by the directive and therefore was not accomplished in the O-1. Components were positioned and measurements taken to ascertain suitability of respective configurations.

(a) All R/T-control units of the test systems could be installed on the left side of the pilot's compartment; however, these installations restricted the pilot's leg room (see figure 6, inclosure 1).

(b) The R/T-control units of Systems 1 and 2 could be installed under the right side of the instrument panel which is the optimum location from an operational standpoint (figure 7, inclosure 1). The depth of R/T-control units of Systems 3, 4, and 5 prevented their installation in this location.

(c) All the test system modulator/power supplies could be installed in the space made available by the removal of the ARC Type-12 equipment.

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(d) Only System 2 could be installed in the wing root, which had been determined by US Army Board for Aviation Accident Research (USABAAR) to be the optimum position for installation (reference c).

b. Transmission Range and Voice-Intelligibility Tests.

(1) All the test systems transmitted reliably from zero through 25 miles at an altitude of 1,000 feet absolute. The intelligibility of the received signal varied with each test system, operating frequency, and distance from the ground station. The voice intelligibility of each system was adequate. The order of adequacy of the test system's receivers from a voice intelligibility standpoint was as follows:

No. 1 - System 3

No. 2 - System 1

No. 3 - System 4

No. 4 - System 5

No. 5 - System 2

(2) The transmitter power output of the test systems deteriorated during 1.5 hours' flight time as follows:

	System 1 (watts)		System 2 (watts)		System 3 (watts)		System 4 (watts)		System 5 (watts)	
	From	To	From	To	From	To	From	To	From	To
119.50 mc.	11.0	7.0	8.5	7.5	10.0	4.5	11.0	10.0	6.5	6.0
123.80 mc.	11.5	8.5	8.0	7.5	8.0	5.0	11.0	9.0	6.0	5.0
133.75 mc.	11.0	7.0	8.0	6.0	8.0	4.5	10.5	6.0	7.0	5.0

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c. Aircraft-Orientation Tests. All the test systems provided satisfactory communication with the ground station during a 360-degree turn at a range of 25 nautical miles and an altitude of 1,000 feet absolute.

d. Ground Tests. Ground tests were not conducted because of the short time allotted for the test.

e. Receiver Overload Test. None of the test systems were adversely affected when flying within 1,000 feet of the ground station.

f. Radio Interference Tests. No adverse effects were noted as a result of radio interference between the test systems and other communication equipment installed in the OH-13.

g. Human Engineering.

(1) No problems were encountered in operating the controls of any of the test systems in the OH-13 Helicopter.

(2) All the test systems used similar methods for frequency readout. The numerals used on Systems 4 and 5 were too small to be read at a normal viewing distance, and were recessed into the panel which caused masking when viewed from a side angle.

(3) Of the systems tested, only System 2 had satisfactory lighting which consisted of a standard edge-lighted panel. Only the frequency readout of the other systems was lighted.

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h. Maintenance.

(1) A transistor in the modulator/power supply unit of System 1 failed after 2.5 hours of operation. The cause of this transistor failure was undetermined.

(2) The tuning shaft in System 4 failed during the initial installation ground check of the equipment. The tuning shaft consisted of a metal section swaged to a fiber glass section. This swaged connection failed, allowing the tuning control to turn independent of the frequency-select switch.

(3) A transistor in the power supply of System 5 failed after two hours of operation. Examination revealed that the unit was designed for 12-volt-d.c. operation but had been converted to 28-volt-d.c. operation. During the conversion by the manufacturer, the wrong value resistors were installed, and these resistors caused the transistor to fail.

(4) No failures occurred on Systems 2 and 3.

5. Conclusions.

a. All the test systems operated satisfactorily during flight.

b. All the test systems can be readily installed in the OH-13 Helicopter.

c. From an operational standpoint, only Systems 1 and 2 can be readily installed in the optimum location in the O-1 Aircraft.

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6. Recommendations. It is recommended that priority be given to the systems in the following order:

System 2

System 1

System 3

System 4

System 5

Raymond E. Johnson

RAYMOND E. JOHNSON
Colonel, Artillery
President

3 Incl
1. Photographs
2. Size and Weight
3. Code Sheet

Copies furnished:
CG, USATECOM
ATTN: AMSTE-BG
Aberdeen P.G., Md. 21005

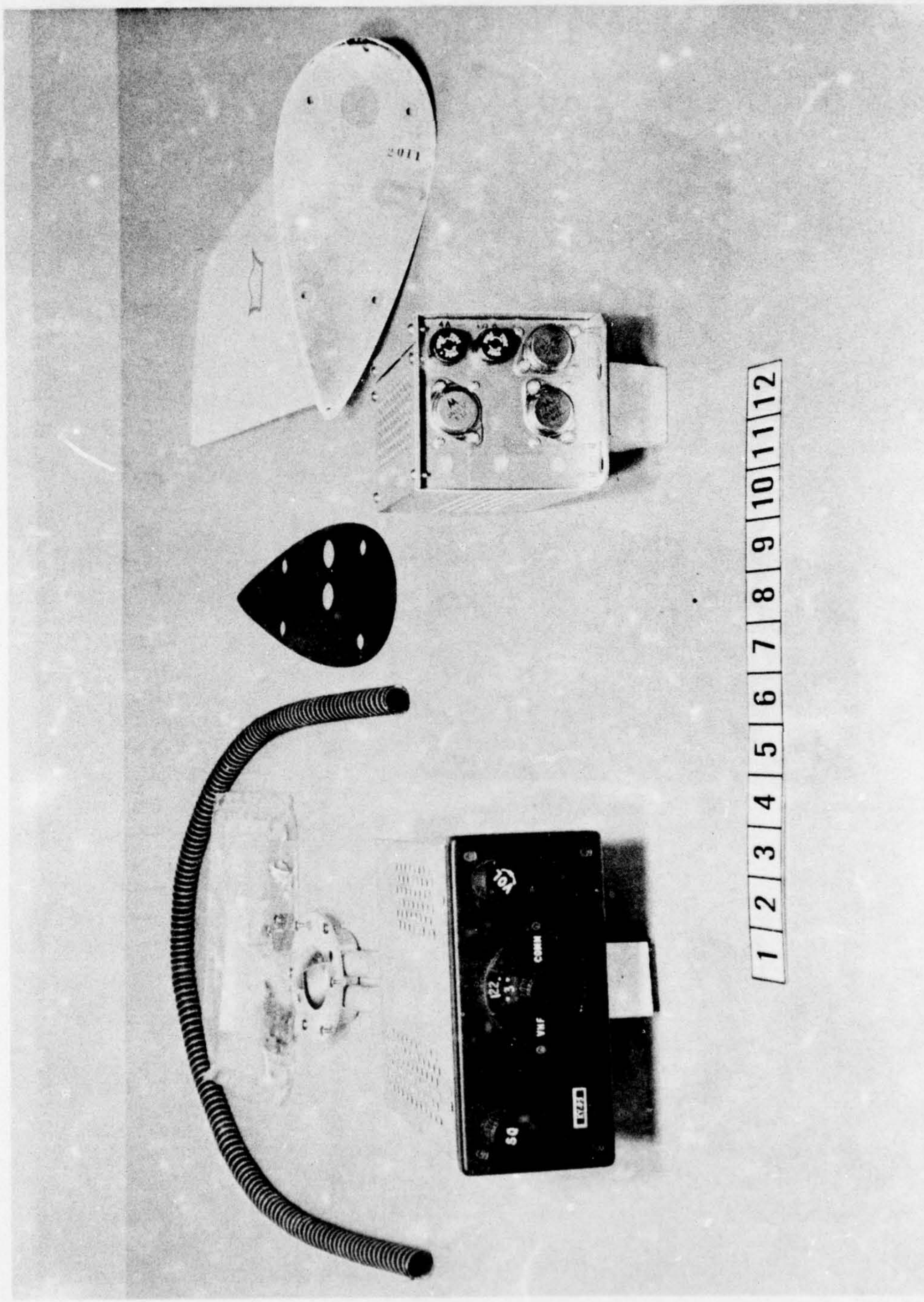

Figure 1. System 1

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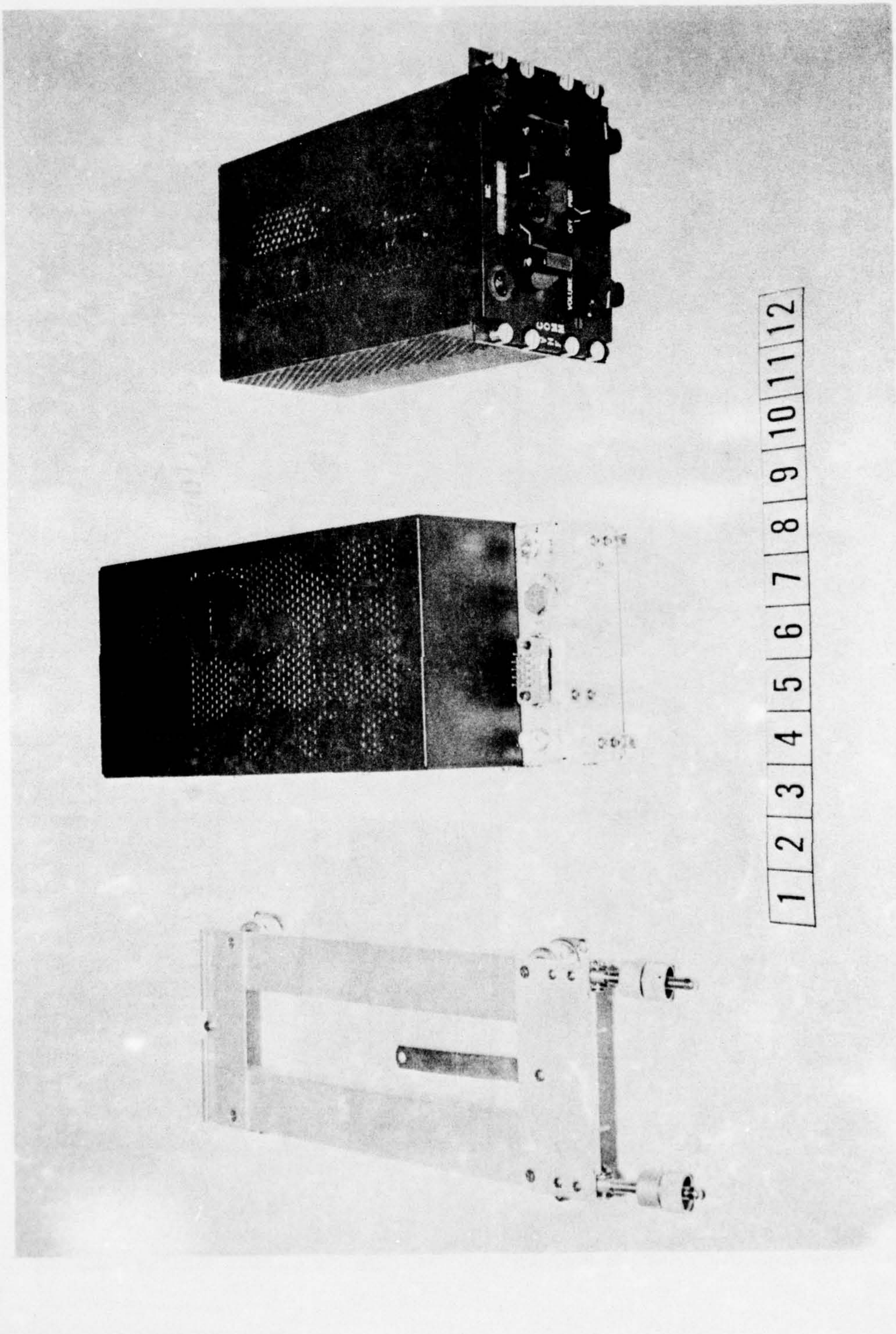

Figure 2. System 2

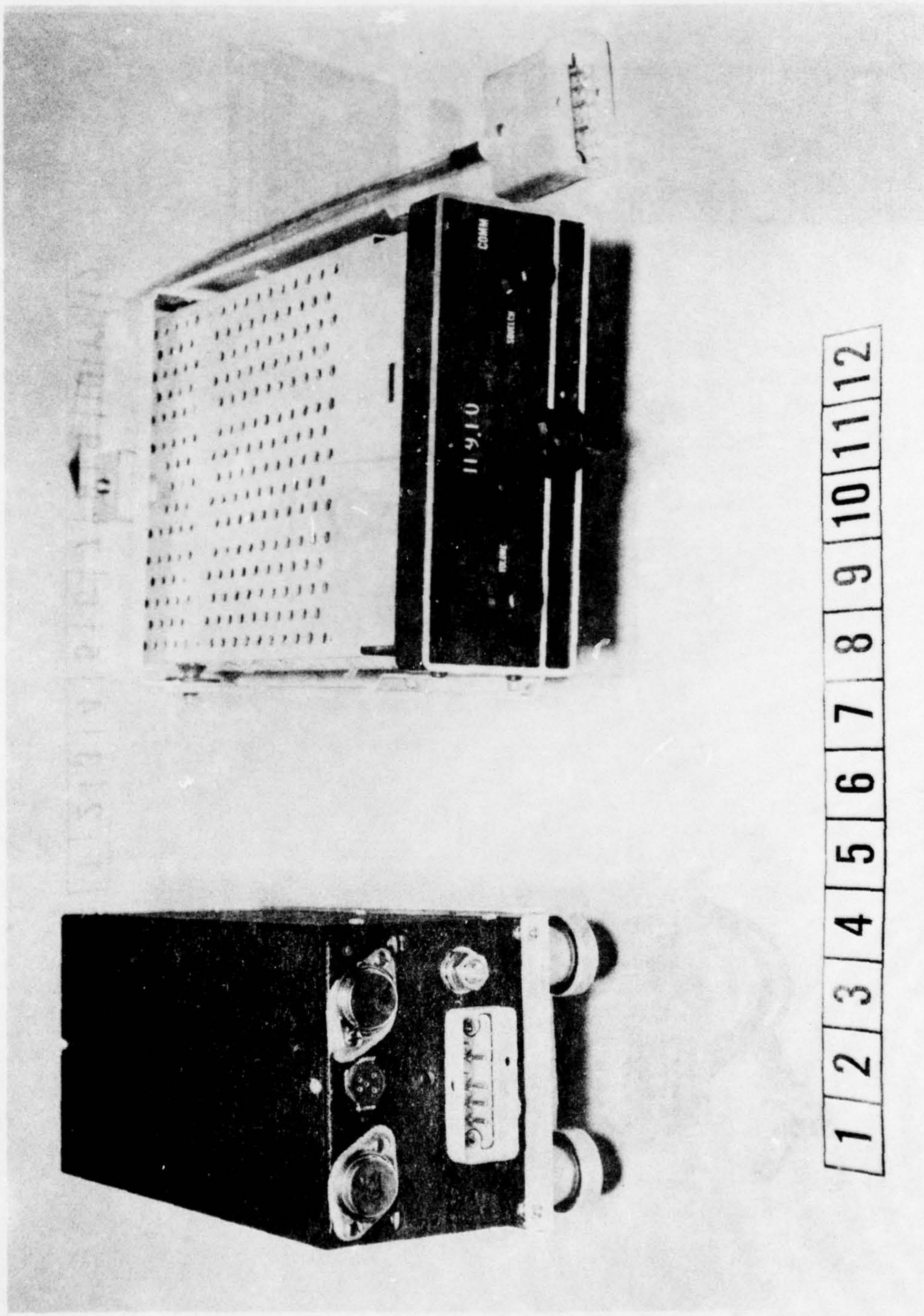

Figure 3. System 3

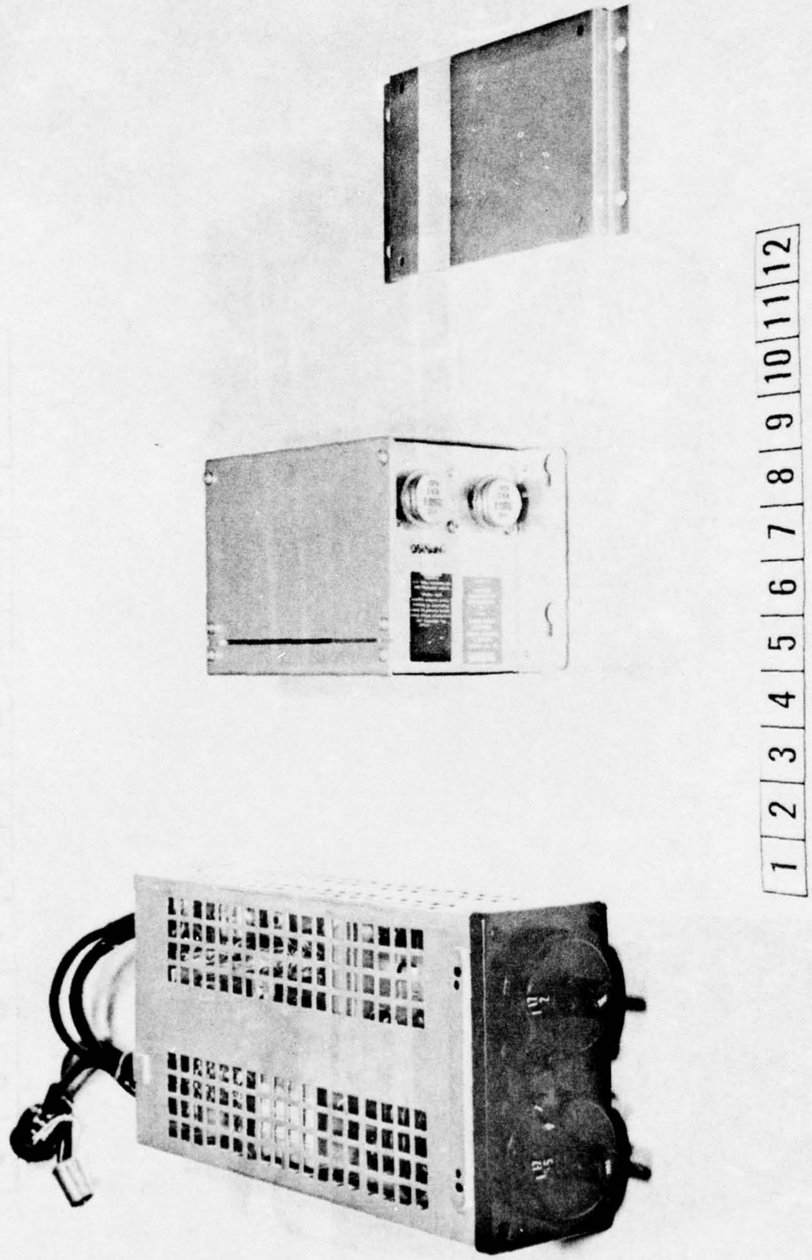

Figure 4. System 4

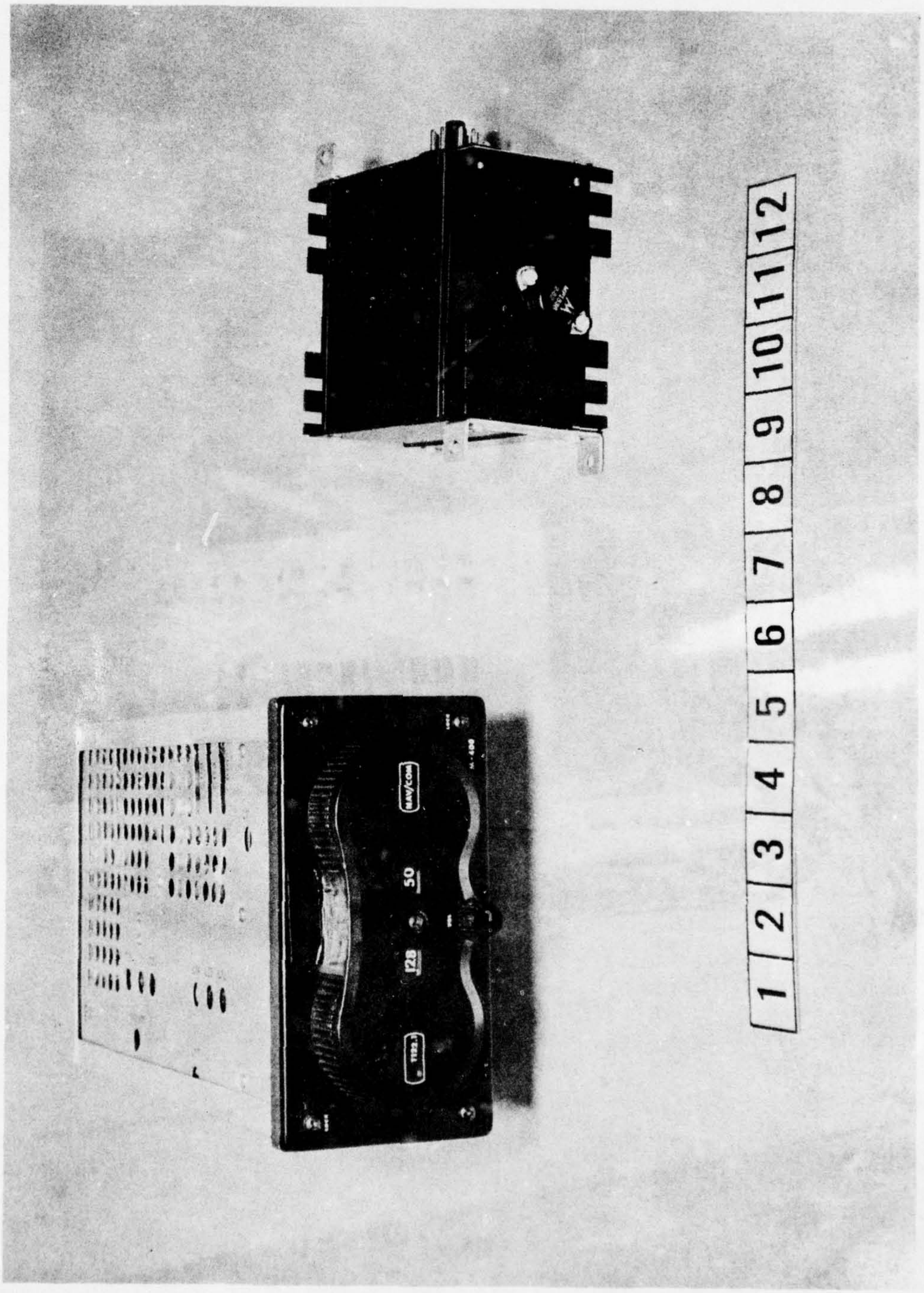

Figure 5. System 5

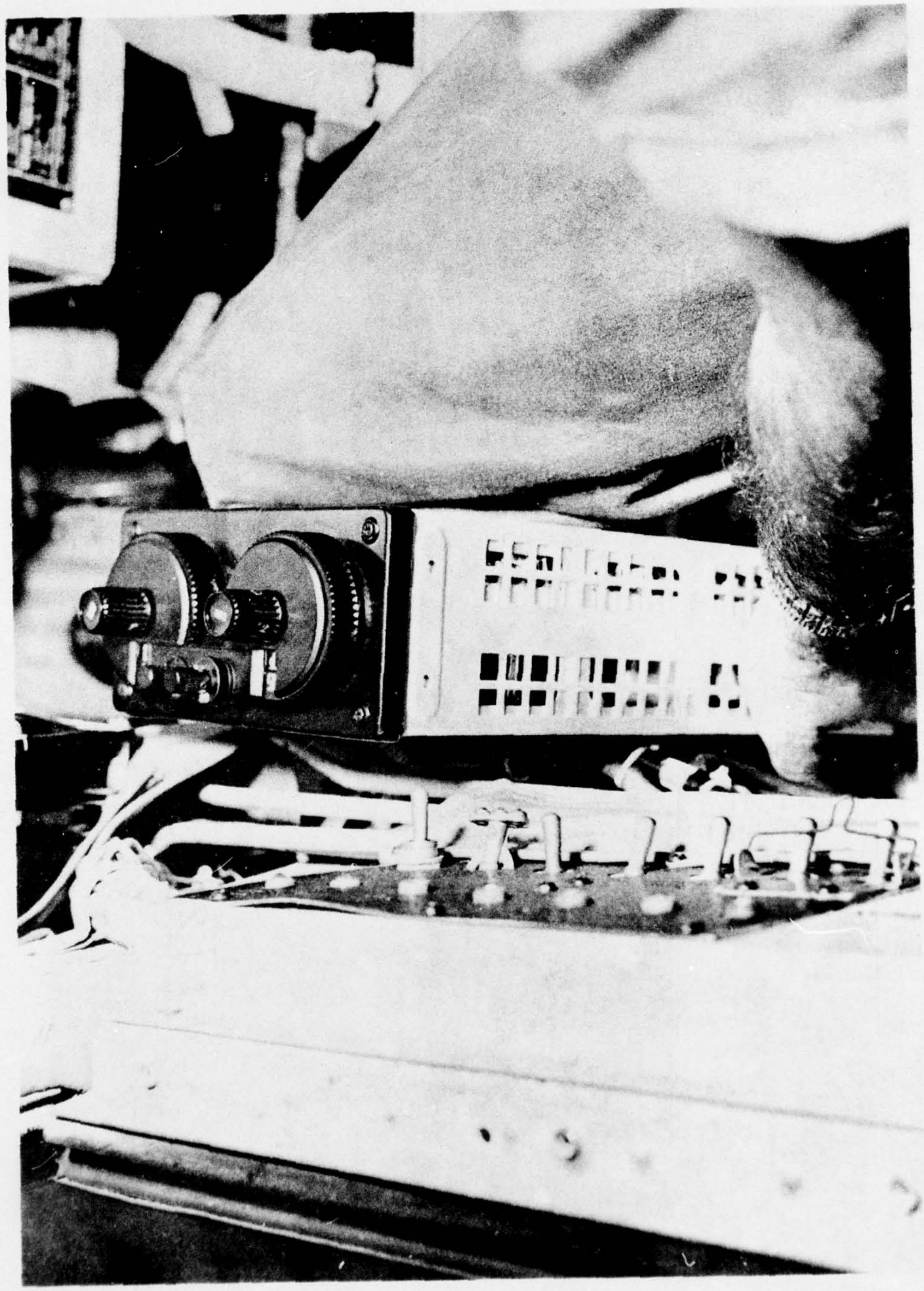

Figure 6. Location for test systems installed in O-1 Aircraft

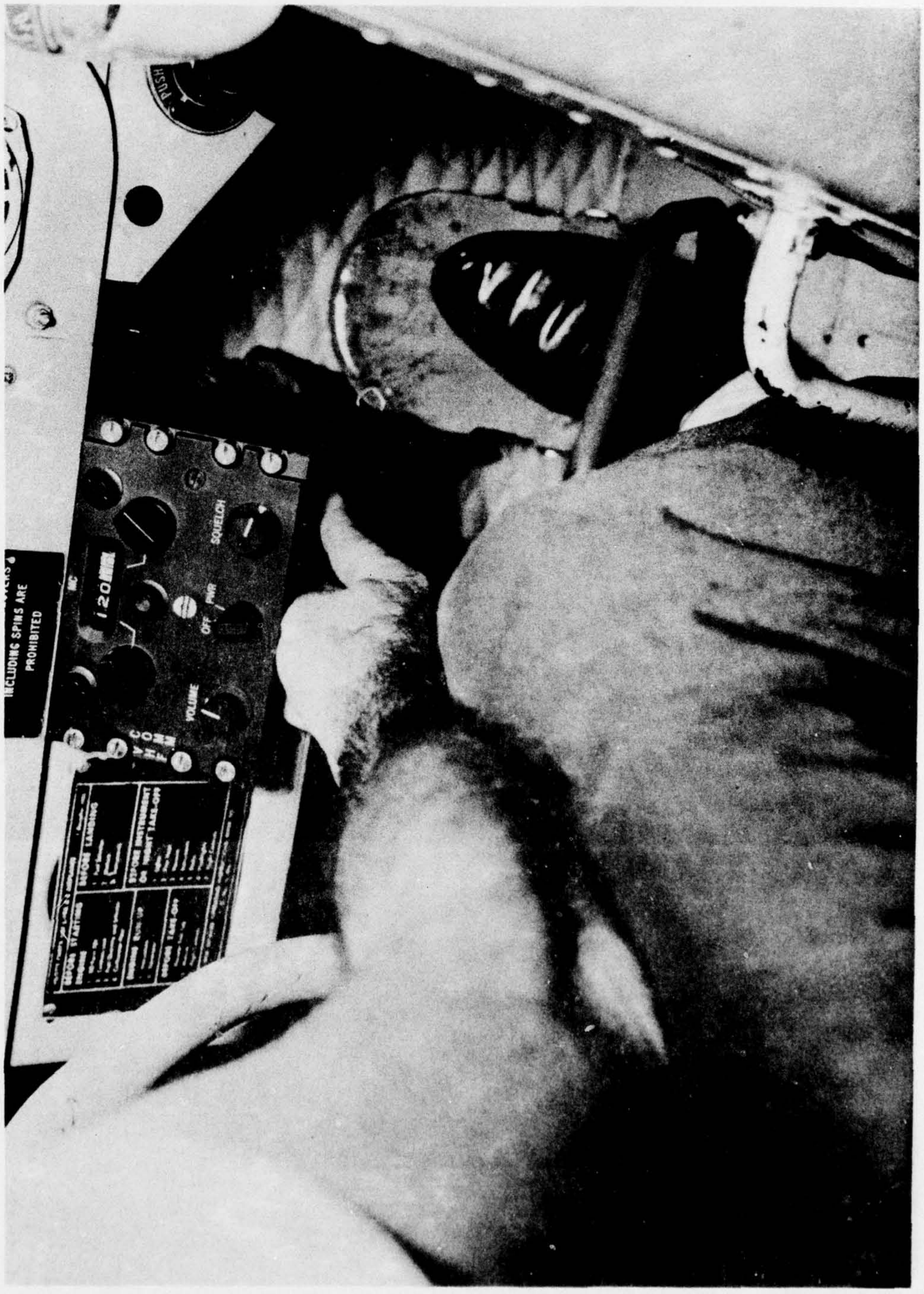

Figure 7. Location for Systems 1 and 2 when installed in O-1 Aircraft

SIZE AND WEIGHT

	Length (in.)	Width (in.)	Height (in.)	Volume (cu. in.)	Weight (lb.)
System No. 1					
Control Panel	10.5	6.5	3.0	204.75	4.25
Power Supply	7.7	3.3	3.7	94.02	3.12
Total				298.77	7.37
System No. 2					
Control Panel	9.5	5.7	3.7	201.46	5.12
Power Supply	12.1	4.9	5.5	326.09	7.12
Total				527.55	12.24
System No. 3					
Control Panel	14.7	7.2	3.7	391.60	6.50
Power Supply	10.0	4.7	4.7	220.90	4.50
Total				612.50	11.00
System No. 4					
Control Panel	14.7	6.2	3.2	291.64	5.87
Power Supply	7.7	4.5	4.2	145.53	3.62
Total				437.17	9.49
System No. 5					
Control Panel	12.5	6.4	3.2	256.00	7.06
Power Supply	4.7	5.6	2.7	71.06	2.31
Total				337.06	9.37

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