

1 JULY 1963

SUPERSEDING
MIL-M-5794A
15 MAY 1954
MILITARY SPECIFICATION

**MICROPHONE UNIT M-6A/UR AND MICROPHONE,
 CARBON M-51/UR
 (CARBON NOISE CANCELLING)**

This specification has been approved by the Department of Defense and is mandatory for use by the Departments of the Army, the Navy, and the Air Force

1. SCOPE

1.1 This specification covers two types of noise cancelling, carbon microphone units designated Microphone Unit M-6A/UR and Microphone Carbon M-51 UR

2. APPLICABLE DOCUMENTS

2.1 The following documents of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein.

SPECIFICATIONS**FEDERAL**

QQ-P-416 — Plating, Cadmium (Electrodeposited)

QQ-S 571 — Solder Lead Alloy, Tin Lead Alloy, and Tin Alloy. Flux Coated Ribbon and Wire, and Solid Form.

QQ-Z-325 — Zinc Coating, Electrodeposited; Requirements for.

PPP-B-566 — Boxes, Folding, Paperboard.

PPP-B-576 — Box, Wood, Cleated, Veneer, Paper Overlaid

PPP-B-585 — Boxes, Wood, Wire-bound

PPP-B-591 — Boxes, Fiberboard, Wood-Cleated

PPP-B-601 — Boxes, Wood, Cleated-Plywood.

PPP-B-621 — Boxes, Wood, Nailed and Lock-Corner

PPP B-636 — Box, Fiberboard

PPP-B-640 — Boxes, Corrugated, Triple Wall, 350 Pound Maximum Weight.

PPP-B-665 — Boxes, Paperboard, Metal Staged (Including Stay Material).

PPP-B-676 — Boxes, Set-Up, Paperboard.

MIL-M-5794B

MILITARY

- MIL-P-116 — Preservation, Methods of.
- MIL-L-10547 — Liners, Case, and Sheet, Overwrap, Water - Vaporproof or Waterproof, Flexible.
- MIL-C-15328 — Coating, Pretreatment, Formula No 117 for Metals.
- MIL-D-70327 — Drawings Engineering and Associated Lists

STANDARDS

MILITARY

- MIL-STD-105 — Sampling Procedures and Tables for Inspection by Attributes
- MIL-STD-129 — Marking for Shipment and Storage
- MIL-STD-130 — Identification Marking of U.S. Military Property.
- MIL-STD-202 — Test Methods for Electronic and Electrical Component Parts

DRAWINGS

U.S. AIR FORCE

- 49 B-12537 — Microphone Unit M-6A, UR

U.S. ARMY

- SC-D-10598 — Microphone Test Equipment, ARL-174-A, Calibration and Test Set-Up.
- SC-C-77023 — Microphone Unit, Outline Dimensions.

(Copies of specifications, standards and drawings required by suppliers in connection with specific

procurement functions should be obtained from the procuring activity or as directed by the contracting officer. Both the title and number or symbol should be stipulated when requesting copies.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

AMERICAN STANDARDS ASSOCIATION

Z24.4/164 — Calibration of Standard Pressure Microphones.

(Copies of ASA publication may be obtained from the American Standards Association, 70 East Forty-fifth Street, New York 17, New York)

3 REQUIREMENTS

3.1 General. Unless otherwise stated herein, the term "microphone unit" is taken to mean either Microphone Unit M-6A/UR or Microphone Carbon M-51/UR

3.2 Preproduction samples. The contractor shall furnish preproduction samples for approval, if required by the invitation for bids and contract (see 4.3 and 6.2(c).)

3.2.1 Fabrication and assembly. Preproduction samples shall be fabricated by the contractor and shall meet all requirements specified for the equipment on contract. The preproduction samples shall be assembled using parts, materials, and processes that will be employed in production, and shall be fabricated and assembled in a manner similar to that to be used in production

3.2.2 Approval and use. Approval of preproduction samples shall not be construed as a waiver of any specified requirement. After being released to the contractor (see 3.2.3), preproduction samples to be offered as units on contract shall be refabricated by the contractor if necessary to meet specified requirements.

3.2.3 Reference standards. After preproduction samples have been approved, they shall be kept intact in custody of the Government inspector until released by him. They shall be used as reference standards to resolve any differences of opinion regarding interpretation of requirements.

3.3 Parts, materials, and processes; general. Parts, materials, and processes shall be such as to enable the microphone unit to meet its performance and other requirements as specified herein. Ratings and derated values of parts and materials shall not be exceeded when the microphone unit is subjected to specified service conditions (see 3.6)

3.3.1 Molded plastic material. All molded plastic parts shall be of the high temperature, high impact, resistant plastic material which shall meet the service requirements of the specification

3.3.2 Steel parts Steel parts shall be cadmium plated in accordance with class 1, type II of Specification QQ-P-416, with supplementary chromatic treatment, or zinc-plated in accordance with type II, class 2 in accordance with Specification QQ-Z-325

3.3.3 Exposed non-ferrous parts. Parts that are exposed after the microphone unit is assembled shall be thoroughly cleaned, followed by a preventive coating in accordance with Specification MIL-C-15328. This shall be followed by two coats of a high quality alkyd, semi-gloss, black enamel.

3.3.1 Cementing compound Any cementing compound used in the construction of the microphone unit, shall be of such a character and quality that it will withstand all service and test conditions specified herein without evidence of loosening or otherwise affecting the performance requirements of the microphone unit.

3.3.5 Soldering flux Only rosin or rosin-core solder may be used as a flux in the assembly of the microphone unit

3.3.5.1 Soft solder. Soft solder shall not be depended upon for the mechanical strength of any soldered joint. There shall be no evidence of "cold soldering" and the use of excessive amounts of solder will not be acceptable. Soft solder shall be solid or rosin flux-cored in accordance with composition Sn60 of Specification QQ-S-571.

3.4 Detail requirements.

3.4.1 Design. The microphone units shall be of the noise-cancelling carbon microphone type. In general, the design and assembly of the microphone units shall be such that they will be inherently stable in mechanical, electrical, and acoustical characteristics. It shall not be necessary to condition a microphone unit by any special procedure before it is ready for use.

3.4.2 Microphone cover. Microphone Unit M-6A/UR shall be equipped with a cover for protection against breath and air blasts and icing. The cover shall be a thin rugged membrane held in place over the front and rear grids of the microphone unit. The design shall be such as to permit easy removal and replacement of the cover. The frequency response and noise-cancelling characteristics of the microphone unit shall remain essentially unchanged with the cover in place on the microphone unit, or removed.

3.4.3 Contour and dimensions The shape and dimensions of Microphone Unit M-6A/UR shall be in accordance with AF Drawing 49B12537. The shape and dimensions of Microphone Carbon M-51/UR shall be in accordance with SC-C-77023

3.4.4 Weight The weight of a microphone unit shall not exceed one ounce

3.4.5 Carbon and carbon cavity

3.4.5.1 The carbon granules shall be of a grade, quality, size and shape equivalent to Western Electric type 13A122 and shall be suitable in every respect for the particular application.

MIL-M-5794B

3.4.5.2 The carbon granules shall be retained positively in the microphone unit in such a manner that it is impossible for them to leak from the carbon cavity during normal service use or under any of the conditions specified herein.

3.4.5.3 All contact surfaces within the carbon cavity shall be suitably plated with gold, and shall be free from porosity, and shall be thoroughly cleaned before assembly of the microphone.

3.5 Performance.

3.5.1 *Response characteristics* The response of the microphone unit measured as specified herein shall be expressed in decibels (db) relative to a zero reference level of 1.0 millivolt. The sound pressure applied to the face of the microphone unit shall be 115 db relative to 0.0002 dyne per square centimeter. The response shall be such as to meet the following requirements when measured with the grid of the microphone unit in a vertical plane

3.5.1.1 *Response limits — Microphone M-6A/UR.* The frequency response shall be not less than 45 db nor more than 53 db at any frequency between 300 and 4000 cycles per second inclusive. The arithmetical average of the test frequency response values over the 300 to 4000 cycles per second frequency range shall be between the limits of 47.0 and 51.0 db, inclusive. The difference between any two successive readings, 200 cycles apart, shall not exceed 2.5 db. Below 300 and above 4000 cps, the response shall fall off at a rate of not less than 3 db per octave

3.5.1.2 *Response limits — Microphone, Carbon M-51/UR.* The response shall be not less than 45 db above a zero reference level of 0.001 volt across 100 ohms at 1000 cps and shall meet the frequency requirements listed in table I and table II when the microphone unit is in the vertical position.

TABLE I

Frequency in cps	Allowable variation in response from 1000-cps value in db	
300	-5	+1
400	-4	+1
500	-3	+1
600	-2	+1
800	-1	+1
1000	0	0
1250	-1	+1
1500	-1	+1
1750	-2	+1
2000	-3	+1
2250	-4	+1
2500	-5	+1
2750	-6	+1
3000	-6	+1
3250	-6	+1
3500	-6	+1
3750	-7	+1
4000	-8	+1

TABLE II

Frequency band	Band width	Rate of change	
<i>cps</i>	<i>cps</i>	<i>db</i>	
300-1000	400	+3	-1
1000-2000	500	+1	-3
2000-3000	1000	+1	-4
3000-4000	1000	+3	-5

3.5.2 Positional characteristics.

3.5.2.1 *Microphone Unit M-6A/UR.* The frequency response shall be not less than 4 db at any frequency between 300 and 4000 cps when a sound pressure of 115 db relative to 0.0002 dyne per square centimeter is established at the face of the microphone unit with the microphone unit mounted in positions of plus or minus 90 degrees with reference to the vertical. In each position the response at any frequency within the range of 300 to 3000 cps shall be within plus or minus 5 db of the response at 1000 cps and the difference between any two successive readings 200 cps apart shall not exceed 3 db. From 3000 to 4000 cps the change shall be no more than plus or minus 8 db from the response at 1000 cps.

3.5.2.2 Microphone, Carbon M-51/UR. The response of the microphone when mounted at an angle of plus 90 degrees (face up) or — 90 degrees (face down) shall not be more than 5 db below the response of the microphone in the vertical position at any of the test frequencies, and the shape of the curve shall be similar to the shape of the curve obtained in the vertical position.

3.5.3 Microphone unit resistance The dc resistance of the microphone unit shall be between 40 and 100 ohms.

3.5.4 Noise cancellation. The signal-to-noise ratio of the microphone unit shall be at least 17 db in favor of the signal, for noises of the types encountered in aircraft, boats, tanks, and other vehicles

3.5.5 Burning noise. The output of the microphone unit due to burning noise shall be kept to the lowest practicable minimum and in no case shall it exceed 1 0 millivolt

3.5.6 Aging characteristics. The design and construction of, and the materials used in, the microphone unit shall be such that the microphone unit shall maintain its original performance characteristics in use or in storage. The microphone unit shall comply with the following requirements when artificially aged as a result of the vibration tests.

3.5.6.1 Change in resistance due to aging. The resistance of the microphone unit shall not increase by more than 75 percent of its original resistance as a result of the prescribed vibration tests.

3.5.6.2 Change in response due to aging. The average response of the microphone unit over the 300 to 4000 cps frequency range shall not change by more than 3 db as a result of the vibration tests.

3.5.7 Anti-packing.

3.5.7.1 Surges. The microphone unit shall retain its response characteristics within 4 db

after 10 interruptions of the current in the test circuit of fig. 1 with a 50 millihenry inductance and a make-break switch added in series with the microphone unit and the microphone current adjusted for 50 milliamperes.

3.5.7.2 Overload current. The microphone unit shall be capable of retaining its response characteristics within 8 db immediately after being subjected to a direct current excitation of 80 milliamperes for one hour in a constant current circuit.

3.5.7.3 Extended operation. The microphone unit shall be capable of retaining its response characteristics within 4 db immediately after being subjected to an excitation current of 50 milliamperes for 8 hours in a constant current circuit.

3.5.8 Immersion — (Microphone, Carbon M-51/UR). The response of the microphone shall not decrease by more than 3 db from its initial response, at any frequency between 300 and 4000 cps after immersion in tap water, at a covering depth of 3 feet and at room temperature, for a period of 2 hours.

3.5.9 Gun blast — (Microphone, Carbon M-51/UR). The microphone shall transmit intelligible speech after subjection to the gun blast test (see 4.6.14). The degradation in response shall not exceed 4 db at any frequency.

3.6 Service conditions (Environmental).

3.6.1 Altitude.

3.6.1.1 Microphone Unit M 6A/UR

3.6.1.1.1 Operating range. The response of the microphone unit shall not vary by more than 3 db from its initial response at any frequency between 300 and 4000 cps when subjected to any pressure in the range of 30 to 16.7 inches of mercury (ground level to approximately an altitude of 15000 feet) inclusive with the pressure constant or varying.

MIL-M-5794B

3.6.1.1.2 Pressure extremes. The response of the microphone unit shall not vary by more than 4 db from its initial response at any frequency between 300 and 4000 cps and the signal-to-noise ratio shall not be reduced by more than 2 db as a result of subjection to pressures ranging from 30 to 3.4 inches of mercury (ground level to approximately an altitude of 50,000 feet).

3.6.1.1.3 Response during rapid pressure changes. The response of the microphone unit shall not vary by more than 5 db at any frequency in the range of 300 to 4000 cps during rapid pressure changes corresponding to a rate of 5,000 feet per minute in the range of 30 to 16 7 inches of mercury (ground level to approximately 15,000 feet).

3.6.1.2 Microphone, Carbon M-51/UR. The response of the microphone unit at any frequency in the range of 300 to 4000 cps shall not decrease by more than 5 db from the response at ground level when operated at a pressure of 20.4 inches of mercury (corresponding to an altitude of 10,000 feet).

3.6.2 Salt spray The response of the microphone unit shall not vary by more than 4 db from its initial response between 300 and 4000 cps after having been subjected to the salt spray test specified in 4.6.11. There shall be no evidence of destructive corrosion.

3.6.3 Temperature cycling. The response of the microphone unit shall not vary by more than 3 db from its initial response at any frequency between 300 and 1000 cps after being subjected to the temperature cycling test specified herein and the resultant signal-to-noise ratio shall not be reduced by more than 2 db.

3.6.4 Temperature extremes. The response of the microphone unit shall not vary by more than 4 db from its initial response at any frequency between 300 and 4000 cps after being subjected to the temperature extremes test specified in 4.6.10.

3.6.5 Moisture resistance. The response of the microphone unit shall not vary by more than 3 db from its initial response at any frequency between 300 and 4000 cps immediately after being subjected to the humidity cycling test specified in 4.6.7.

3.6.6 Impact. The microphone unit shall withstand the impact test specified herein with no resultant structural failure or other defects. In order to meet this requirement it will be necessary to fasten the grill to the microphone case by means other than cementing alone. The frequency response shall not show a change greater than 3 db from its original response at any frequency between 300 and 4000 cps and the resultant signal-to-noise ratio shall not decrease by more than 2 db.

3.6.7 Vibration. The microphone unit shall have no structural failure or defects and its frequency response shall be within 3 db of its initial response at any frequency between 300 and 4000 cps after being subjected to the vibration test of 4 6 13

3.7 Marking. The microphone unit shall be marked for identification in accordance with Standard MIL-STD-130. The identification shall include the type designation and the manufacturer's part number and shall be located as shown on Drawing SC-C-77023.

3.8 Interchangeability. All parts having the same manufacturer's part number shall be functionally and dimensionally interchangeable. The drawing number requirements of Specification MIL-D-70327 shall govern changes in the manufacturer's part numbers

3.9 Workmanship. Workmanship shall be such that the finished product shall meet all the requirements of this specification.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or pur-

chase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure that supplies and services conform to prescribed requirements.

4.2 Classification of inspection. Inspection shall be classified as follows:

- (a) Preproduction inspection (does not include preparation for delivery) (see 4.3).
- (b) Acceptance inspection Acceptance inspection of equipment before preparation for delivery (see 4.4).

4.3 Preproduction inspection. This inspection will be performed by the Government unless otherwise specified in the contract. It shall consist of the preproduction inspection specified in table III, and the inspection specified for group A, group B, and group C (see tables IV, V, and VI, respectively)

TABLE III. Preproduction inspection

Inspection	Requirement paragraph	Inspection paragraph
Moisture resistance	3.6.5	4.6.7
Altitude	3.6.1	4.6.8
Temperature extremes .	3.6.4	4.6.10
Vibration	3.6.7	4.6.13
Salt spray	3.6.2	4.6.11
Anti-Packing .. .	3.5.7	4.6.16
Gun blast	3.5.9	4.6.14

4.4 Acceptance inspection of equipment before preparation for delivery. The contractor, to demonstrate compliance with specified requirements, shall perform the inspection specified in 4.4.1 through 4.4.3.3. This does not relieve the contractor of his responsibility for performing any additional inspection which is necessary to control the quality of

the product and to assure compliance with all specification requirements. The Government will review and evaluate the contractor's inspection procedures and examine the contractor's inspection records. In addition the Government — at its discretion — may perform all or any part of the specified inspection, to verify the contractor's compliance with specified requirements. Test equipment for Government verification inspection shall be made available by the contractor.

4.4.1 Group A inspection. This inspection including sampling shall conform to table IV and the ordinary inspection procedures of Standard MIL-STD-105, level II. Group A inspection shall be performed in any order which is satisfactory to the Government

TABLE IV. Group A inspection

Inspection	Requirement paragraph	Inspection paragraph	AQL	
			Major	Minor
Visual and mechanical.	3.8	4.6.1	1%	4%
Response measurements (spot check).	3.5.1	4.6.2.6	1% for the group	(*)
Microphone Unit Resistance.	3.5.3	4.6.3		

* All electrical defects considered major.

4.4.2 Group B inspection. This inspection, including sampling, shall conform to table V and to the special procedures for small-sample inspection of Standard MIL-STD-105. The AQL shall be 6.5 percent defective and the inspection level shall be L-8 for normal and tightened inspection and L-6 for reduced inspection. The reduced inspection procedure shall be R-1. Group B inspection shall normally be performed on inspection lots that have passed group A inspection and on samples selected from units that have been subjected to and met the group A inspection

4.4.2.1 Order of inspection within group B. Group B inspection shall be performed in any order which is satisfactory to the Government.

MIL-M-5794B

TABLE V. Group B inspection

Inspection	Requirement paragraph	Inspection paragraph	AQL
Response Measurements (Continuous check).	3.5.1	4.6.2.4	6.5% for the group
Signal to noise ratio.....	3.5.4	4.6.4	
Burning noise	3.5.5	4.6.5	

4.4.3 Group C inspection This inspection shall be as listed in table VI and shall normally be performed on sample units that have been subjected to and met group A and group B inspection

TABLE VI. Group C inspection

Inspection	Requirement paragraph	Inspection paragraph
Position characteristics	3 5 2	4 6 6
Temperature cycling	3 6 3	4 6 9
Immersion	3 5 8	4.6.12
Impact	3 6 6	4 6 15

4.4.3.1 Sampling for group C inspection Samples for group C inspection shall be selected in accordance with the following from which no failures are permitted:

Sampling for group C tests

Purchase quantity	No to be tested
up to 300	1
301 to 700	2
701 to 1500	3
1501 to 3000	5
Over 3000	5 per thousand

4.4.3.2 Noncompliance If a sample unit fails group C inspection, the contractor shall immediately investigate the cause of failure and shall report to the Government inspector the results thereof and details of the corrective action on the process and all units of product which were manufactured with the same conditions, materials, processes, etc If the Government inspector does not consider that the corrective action will enable the product to meet specified requirements, or if the con-

tractor cannot determine the cause of failure, the matter shall be referred to the contracting officer.

4.4.3.3 Disposition of sample units. Sample units which have been subjected to "group C inspection" shall not be delivered on the contract or order.

4.5 Test conditions. Unless otherwise specified or indicated, the microphone unit shall be tested under the following conditions:

- (a) *Temperature.* 20 to 35° C.
- (b) *Pressure.* Normal atmospheric
- (c) *Humidity.* 25 to 90 percent relative
- (d) *Position* The face of the microphone shall be in a vertical plane

4.6 Test procedures.

4.6.1 Visual and mechanical inspection The microphone unit shall be given a thorough mechanical inspection for size, loose or defective parts, workmanship, visible defects, marking, weight and dimensions

4.6.2 Response tests

4.6.2.1 Sound pressure meter The sound pressure meter specified in fig. 2, or equal, shall be used in setting up sound levels for performing the response measurements specified herein. The microphone of this sound level meter shall be a Western Electric 640-A or 640-AA condenser microphone or a demonstrated equivalent The sound pressure meter microphone shall be calibrated by the reciprocity method in accordance with ASA Standard Z24 1, 164 at a recognized laboratory.

4.6.2.2 Sound source calibration The equipment and test setup shown in fig 3, or its specifically approved equivalent, shall be used to provide the sound input to the microphone under test for all response measurements. The test fixture (see Drawing SC-D-10598) employed to hold the microphone unit under

test shall be so constructed as to permit rotation of the microphone unit when mounted in the fixture (for conditioning purposes), and shall support the microphone unit in such a fashion that the grid area of the microphone unit (with no surrounding baffle) is exposed to the sound source. The grid of the microphone unit under test shall be spaced $\frac{1}{4}$ inch from the mouth of the sound source. The geometric centerline of the grid shall coincide with the centerline of the mouth of the sound source. The input to the drive unit required to produce a sound pressure of 115 db above a reference level of 0.00020 dyne per square centimeter at the grid of the microphone unit under test shall be determined for each 100 cps increment from 200 to 1000 cps inclusive, each 200 cps increment from 1000 to 4000 cps inclusive, and each 500 cps increment from 4000 to 5000 cps inclusive. The grid of the 640-A condenser microphone shall be spaced $\frac{1}{4}$ inch from the mouth of the sound source during calibration, and the centerline of the sound source mouth and the 640-A condenser microphone shall coincide. No baffle shall be used with the 640-A condenser microphone. At each frequency the distortion in the output of the sound source shall be such that the level of the second harmonic is at least 35 db below the fundamental and the levels of the third and higher harmonics are each at least 40 db below the fundamental.

4.6.2.3 Conditioning of microphone unit
Immediately prior to response measurements, each microphone unit shall be conditioned using the test circuit of fig 1 according to the following procedure:

4.6.2.3.1 The microphone unit shall be secured to the test fixture, and electrically connected to Jack J-1 of the test circuit. (It is desirable to shake the microphone vigorously in all directions before mounting it in the test fixture).

4.6.2.3.2 Switch S-1 of the test circuit shall be closed (no microphone current) and re-

sistor R-1 shall be adjusted to produce a reading of 60 milliamperes for M-6A/UR, and 85 milliamperes for M-51/UR, on Meter M-1.

4.6.2.3.3 The microphone unit shall be rotated about its axis 3 times, through an arc of approximately 270 degrees and back in 2 seconds. The microphone unit shall be in the position at which it is to be tested at the completion of this rotation procedure.

4.6.2.3.4 Switch S-1 shall be opened, approximately 3 seconds shall be allowed for current stabilization, then the conditioning sweep tone described in 4.6.2.3.5 and 4.6.2.3.6 shall be applied. The voltage of the conditioning sweep tone shall have been previously determined as follows:

4.6.2.3.4.1 The oscillator shall be set at that frequency between 1000 and 3000 cps at which the response of the driver is maximum

4.6.2.3.4.2 The driver input voltage shall be adjusted at that frequency, to 127 db sound level (the maximum sound pressure level develop during conditioning shall, therefore, not exceed 127 db).

4.6.2.3.4.3 The oscillator frequency shall be changed to 1000 cps without disturbing the output control of the oscillator. The voltage read on Output Meter 2 on fig. 3, shall then be taken as the 1000 cps reference conditioning voltage.

4.6.2.3.5 The driver input voltage shall be adjusted at 1000 cps to the value required for conditioning (see 4.6.2.3.4.3)

4.6.2.3.6 The oscillator frequency shall be continuously varied through the 1000 to 3000 to 1000 cps audio frequency range 3 times at a rate of approximately one complete sweep in 2 seconds.

4.6.2.3.7 At the conclusion of the third sweep cycle the oscillator output voltage shall be gradually reduced to zero.

MIL-M-5794B

4.6.2.3.8 Approximately 2 seconds shall elapse before starting response measurements in a specific test run.

Caution: The microphone unit shall not be disturbed by loud clicks from the driver unit, noises, vibrations, or accidental bumps during "conditioning" or measurements of response, resistance or thermal noise.

4.6.2.4 *Response measurement.* After the microphone unit under test has been conditioned in accordance with the above procedure, the sound level, determined as specified under 4.6.2.2 shall be applied. The response (output level) of the microphone unit shall be determined for each test frequency. Measurements shall start at 200 cps and progress through each successively higher test frequency up to 4000 cps. The sound output from the driver shall be left on in changing the oscillator from one test frequency to the next, but the sound input to the microphone unit shall not exceed 115 db in effecting the changes in frequency. This shall not be construed as prohibiting the use of push-button frequency control in production testing, provided that substantially equivalent results are obtained.

4.6.2.5 *Response curves.* The response curves of the microphone units, based on the contractor's test data, shall be plotted on 20 divisions per inch (total 120 division) by two 4½-inch cycles, semi-logarithmic graph paper. The axis of ordinates shall cover the range of from plus 10 to plus 70 db, each vertical division shall be 0.5 db. Resistance, thermal noise and signal-to-noise ratio values for the microphone units shall also be shown on the curve sheets. It is necessary that the total time for taking the response curve does not exceed 3 minutes in order that the carbon button may not completely lose its conditioning.

4.6.2.6 *Response measurements (individual tests).* Prior to making response measurements, the microphone unit shall be conditioned as specified herein or according to

some other specifically approved method which will produce equivalent results. Each microphone units shall be subjected to response tests at not less than 6 approved frequencies, such as 400, 1000, 2000, 3000, and 4000 cps. The specified frequencies to be used will be determined by the procuring agency on the basis of tests made on the preproduction samples and information gained in the initial stages of production. Sweep or band frequency tests may be employed provided the contractor demonstrates the suitability of such tests to the procuring agency. The method of testing and the selection of frequencies shall be such that they will truly indicate the overall response characteristics and output level of the microphone.

4.6.3 *Microphone unit resistance.* The microphone unit resistance shall be measured at the time the 1000-cps response is being determined in accordance with 4.6.2.4 by the voltmeter-ammeter method (meters M-1 and M-3 read simultaneously utilizing the circuit shown in fig 1

4.6.4 *Signal-to-noise ratio test*

4.6.4.1 By means of suitable apparatus similar to that detailed in fig. 4, or equal, and the test circuit of fig. 5, or equal, provision shall be made for the production of the noise spectrum, table VII at an rms sound pressure of 115 db above a reference level of 0.00020 dyne per square centimeter as measured at the microphone diaphragm. The "noise" source shall be a loud speaker capable of producing a sound pressure of 115 db above a reference level of 0.00020 dyne per square centimeter at the rear as well as the front of the microphone and the loudspeaker shall be located as far away from the microphone as practicable. The calibrating microphone shall be mounted in the test rig, in the box, ¼ inch from the mouth of the signal speaker which shall be short-circuited during adjustments of the noise spectrum.

4.6.4.2 By means of the apparatus as set up previously, provision shall also be made

for the production of the following signal spectrum table VIII at a rms sound pressure of 115 db above a reference level of 0.00020 dyne per square centimeter. The "signal" source shall be the driver unit. The calibrating microphone shall be positioned $\frac{1}{4}$ inch directly in front of the driver unit.

TABLE VII. *Noise spectrum*

Frequency cps	Sound pressure in db relative to sound pressure at 100 cps
40	0
70	0
130	0
300	-5
600	-9
1000	-13
2000	-17
3000	-19
4000	-21

TABLE VIII. *Signal spectrum*

Frequency cps	Sound pressure in db relative to sound pressure at 100 cps
130	0
300	+7
600	+8
1000	+5
2000	-3
3000	-7
4000	-9

4.6.4.3 Measurement of the signal-to-noise ratio.

4.6.4.3.1 The microphone under test shall be mounted in its test rig with its front grid $\frac{1}{4}$ inch from the mouth of the signal speaker. The microphone shall be connected to the test circuit.

4.6.4.3.2 The short-circuit current shall be in accordance with 4.6.2.3.2. The short-circuit switch shall be opened and the noise spectrum applied for 3 seconds. The noise spectrum shall be removed and the signal spectrum applied for 3 seconds and the output of the microphone shall be measured. The

signal spectrum shall be removed and the noise spectrum applied for 3 seconds and the output of the microphone measured. The signal-to-noise ratio shall be the quotient of these values.

4.6.5 *Burning noise.* The output of the microphone unit due to burning noise shall be measured in the circuit shown in fig. 1. After the microphone unit has been conditioned according to the procedure given, it shall remain still and without signal input for 30 seconds. The maximum output, as indicated on Meter M-2 of the test circuit during the 10-second interval immediately following the 30-second period, shall be the measure of the burning noise.

4.6.6 *Positional characteristics.* Response measurements shall be made with the microphone mounted at angles of plus 90 degrees (face up) and minus 90 degrees (face down). The angles shall be measured in vertical plane between the sound source-microphone axis and the horizontal

4.6.7 *Moisture resistance.* The microphone shall be subjected to the humidity resistance test of method 106A of MIL-STD-202, except that step 7 shall not apply.

4.6.8 Altitude.

4.6.8.1 *Pressure cycling.* The microphone unit shall be subjected to 5 varying pressure cycles. Each pressure cycle shall consist of 30 minutes at 3.4 inches of mercury (approximately 50,000 feet) and 30 minutes at 30 inches of mercury (approximately sea level). The pressure transition shall be approximately 5000 feet per minute. The response characteristic of the microphone unit shall then be measured and shall not show a decrease in output in excess of 4 db.

4.6.8.2 *Response at simulated altitude of 15,000 feet (M-6A/UR only).* The microphone unit shall be placed in an altitude chamber and the pressure inside the chamber reduced

MIL-M-5794B

to that corresponding to an altitude of 15,000 feet (approximately 16.7 inches of mercury). The response of the microphone unit shall be measured at that altitude. The response of the microphone unit shall also be measured at a frequency of 1000 cps while the pressure is being varied at a rate of 5000 feet per minute (up or down).

4.6.8.3 Response at simulated altitude of 10,000 feet (M-51/UR only). The microphone unit shall be placed in an altitude chamber. The response of the microphone unit at ground level shall be obtained at 300, 500, 1000, 2000, 3000 and 4000 cps. Pressure inside the chamber shall then be reduced to that corresponding to an altitude of 10,000 feet. The response of the microphone unit shall be taken again at the same frequencies as mentioned above

4.6.9 Temperature cycling The microphone shall be subjected to the thermal shock test of method 107A, condition A of MIL-STD-202.

4.6.10 Temperature extremes.

4.6.10.1 Low temperature. Expose the microphone unit to an ambient temperature of -62°C for 2 hours. Remove the microphone from the cold chamber and immediately measure the response under normal room temperature conditions.

4.6.10.2 High temperature Expose the microphone unit to an ambient temperature of $\pm 71^{\circ}\text{C}$ for 2 hours. Remove the microphone unit from the hot chamber and immediately measure its response under normal room temperature conditions.

4.6.11 Salt spray. The microphone unit shall be subjected to the salt spray test in accordance with MIL-STD-202 for a period of 50 hours. The microphone unit shall be washed in tap water to remove excess salt deposits and then excess moisture removed. The response characteristics shall be measured immedi-

ately after removal from the salt spray chamber.

4.6.12 Immersion. The microphone unit shall be immersed in tap water, at room temperature to a covering depth of 3 feet for a period of 2 hours. The response characteristics of the microphone unit shall be measured immediately after removal from the water.

4.6.13 Vibration. The microphone unit shall be placed in a vertical position on a vibration machine giving motion in 3 planes; vertical, horizontal and 45 degrees to the horizontal, of 0.03 inch amplitude (0.06 inch total excursion), and the frequency of vibration varying from 10 to 50 to 10 cps approximately every 3 minutes. The microphone shall be connected in a test circuit providing for a carbon current of 50 milliamperes. The test shall be conducted for a period of one hour. The current shall be turned on for 2 minutes and off for 2 minutes alternately for the duration of the test.

4.6.14 Blast test (Microphone Unit M-51/UR) The microphone unit shall be elevated at least 6 feet above the ground and located at least 12 feet for a 25 caliber gun, or 14 feet for a 38 caliber gun, from the gun muzzle in the plane through the muzzle perpendicular to the gun axis. The front edge of the microphone unit shall be positioned so that its axis will be coincident with that of the gun muzzle. The microphone unit shall be subjected to 30 service charge blasts of a 5-inch, 25 or 38 caliber gun at a peak pressure of 9.5 pounds per square inch.

4.6.15 Impact test (Microphone Unit M-6A/UR) The microphone unit shall be subjected to the following combination of tests. The cycle shall be repeated three times:

- (a) Five cycles of exposure to moisture resistance tests as specified in 4.6.7.
- (b) Exposure to the temperature cycling test as specified herein, except that the temperatures shall be maintained for 2-hour periods.
- (c) Impact test for 10 random drops.

The drops shall be from a 6-foot height to a concrete floor, covered with 1/8 or 3/16-inch thick asphalt tile thoroughly cemented to the concrete floor, and using a minimum thickness of cement.

4.6.15.1 *Microphone, Carbon M-51/UR.* The microphone shall be subjected to 20 random drops, from a 6-foot height to a covered concrete floor. The covering shall consist of 1/8 or 3/16 inch thick asphalt tile thoroughly cemented to the concrete floor using a minimum thickness of cement.

4.6.16 *Anti-packing.* The microphone unit shall be tested for surges, overload current, and extended operation using the circuit of fig. 1 The microphone unit shall not be conditioned prior to making the response measurements required to determine degradation in performance

5. PREPARATION FOR DELIVERY

5.1 *Preservation and packaging.* Preservation and packaging shall be Level A or C as specified (see 6.2).

5.1.1 *Level A.* Unless otherwise specified (see 6.2), the microphone shall be individually protected and unit packaged in accordance with method 1C-3 of MIL-P-116, without the use of contact preservatives.

5.1.1.1 *Unit containers.* Unit containers, except those specified in MIL-P-116 for the applicable method of preservation shall conform to any of the following containers at the option of the contractor:

Specification	Box or can
PPP-B-566	Folding, paperboard
PPP-B-636	Fiberboard
PPP-B-665	Paperboard, metal stayed
PPP-B-676	Set-up, paperboard

Container closure and sealing shall be in accordance with the applicable container specification or appendix thereto.

5.1.1.2 *Intermediate packaging.* Unit quantities in an intermediate container shall be as specified (see 6.2). Intermediate containers shall conform to any of the following specifications at the option of the contractor:

Specification	Box
PPP-B-566	Folding, paperboard
PPP-B-636	Fiberboard
PPP-B-665	Paperboard, metal stayed
PPP-B-676	Set-up, paperboard

Container closure and sealing shall be in accordance with the applicable container specification or appendix thereto The gross weight of paperboard boxes shall not exceed 10 pounds; fiberboard containers shall not exceed 20 pounds.

5.1.2 *Level C.* Preservation and packaging shall be sufficient to afford adequate protection against corrosion, deterioration and physical damage during shipment from the supply source to the first receiving activity for immediate use This level may conform to the supplier's commercial practice when such meets the requirements of this level

5.2 *Packing.* Packing shall be Level A, B or C as specified (see 6.2).

5.2.1 *Level A.* Microphones packaged as specified (see 6.2), shall be packed in containers conforming to any one of the following specifications at the option of the contractor:

Specification	Box	Classification
PPP-B-576	Box, wood cleated, veneer paper overlaid.	Overseas
PPP-B-585	Box, wirebound, wood	Class 2
PPP-B-591	Box, wood cleated, fiberboard.	Overseas
PPP-B-601	Box, wood cleated, plywood	Overseas
PPP-B-621	Box, nailed wood	Class 2
PPP-B-636	Fiberboard	Class 2
PPP-B-640	Fiberboard-corrugated triple wall.	Class 2

When required, shipping containers shall have caseliners conforming to MIL-L-10547. Caseliners shall be closed and sealed in ac-

MIL-M-5794B

cordance with the appendix to MIL-L-10547. Caseliners for fiberboard boxes, PPP-B-636 and PPP-B-640, may be omitted provided all center and edge seams and manufacturer's joints are sealed and waterproofed with pressure sensitive tape in accordance with the applicable fiberboard box specification. Shipping containers shall be closed, strapped or banded in accordance with the applicable box specification or appendix thereto. The gross weight of wood or wood-cleated boxes shall not exceed 200-pounds; fiberboard boxes shall not exceed the weight limitations of the applicable fiberboard box specification. Fiberboard boxes conforming to class 2 of PPP-B-636 closed, sealed and banded as specified herein may be used as the shipping container when specified.

5.2.2 *Level B.* Microphones packaged as specified (see 6.2), shall be packed in containers conforming to any one of the following specifications at the option of the contractor:

Specification	Box	Classification
PPP-B-576	Wood-Cleated, Veneer Paper Overlaid.	Class 1
PPP-B-585	Box, wirebound, wood	Class 1
PPP-B-591	Box, wood cleated, fiberboard.	Overseas
PPP-B-601	Box, wood cleated, plywood	Overseas
PPP-B-621	Box, nailed wood	Class 1
PPP-B-636	Fiberboard	Class 1
PPP-B-640	Fiberboard-corrugated triple wall.	Class 1

Shipping containers shall be closed in accordance with the applicable box specification or appendix thereto. The gross weight of wood or wood-cleated boxes shall not exceed 200-pounds; fiberboard boxes shall not exceed the weight limitations of the applicable fiberboard box specification. When specified, intermediate fiberboard boxes conforming to PPP-B-636 closed as specified herein may be used as the shipping container.

5.2.3 *Level C.* Microphones packaged as specified (see 6.2), shall be packed in containers, at the lowest rates, in a manner which will insure acceptance by common carrier and will afford protection against physical or mechanical damage during direct shipment from the supply course to the first receiving activity for immediate use. This level in general shall conform to the Uniform Freight Classification Rules and Regulations or other carrier regulations as applicable to the mode of transportation and may be the supplier's commercial practice when such meets the requirements of this level

5.3 *Marking.* In addition to any special marking required by the contract or order, interior packages and exterior shipping containers shall be marked for shipment in accordance with MIL-STD-129.

6. NOTES

6.1 *Use.* Microphone Units M-6A/UR and M-51/UR are intended to be used in Military aircraft, boats, tanks and vehicles as a part of a boom-suspended or other type of microphone.

6.2 *Ordering data.* Procurement documents should specify the following:

- (a) Title, number, and date of this specification and any amendment thereto.
- (b) Type required
- (c) Number of preproduction samples required (12 sample units of each item cited in section 1 are generally required)
- (d) Level of packaging and level of packing required for shipment (Level A, level B, and level C)
- (e) Marking and shipping of samples
- (f) Place of final inspection.

Notice. When Government drawings, specifications or other data are used for any purpose other than in connection with a definitely related government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use or

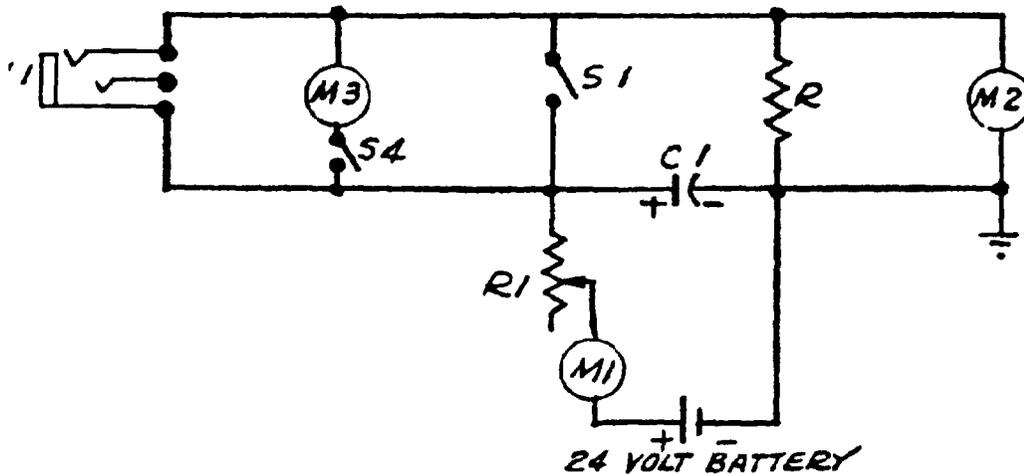
sell any patented invention that may in any way be related thereto.

Custodians:

Army—Electronics Command
Navy—Bureau of Weapons
Air Force—ROAMA

Preparing activity:

Army—EL
Project No. 5965-0057



- J1 - MICROPHONE JACK, 3- CONTACT*
S1 - SWITCH, SPST
C1 - CAPACITOR, 100 MFD, 50 VOLT, ELECTROLYTIC
R1 - VARIABLE RESISTOR, 400 OHM
R - RESISTOR, 100 OHM
M1 - MILLIAMMETER, 0-200 MA, DC.
M2 - ELECTRONIC VOLTMETER, BALLANTINE MODEL 300, OR EQUAL
M3 - VOLTMETER, 0-10 VOLTS, DC, 1000 OHMS PER VOLT, MINIMUM
S4 - SWITCH, PUSH BUTTON, SINGLE CONTACT

FIGURE 1.

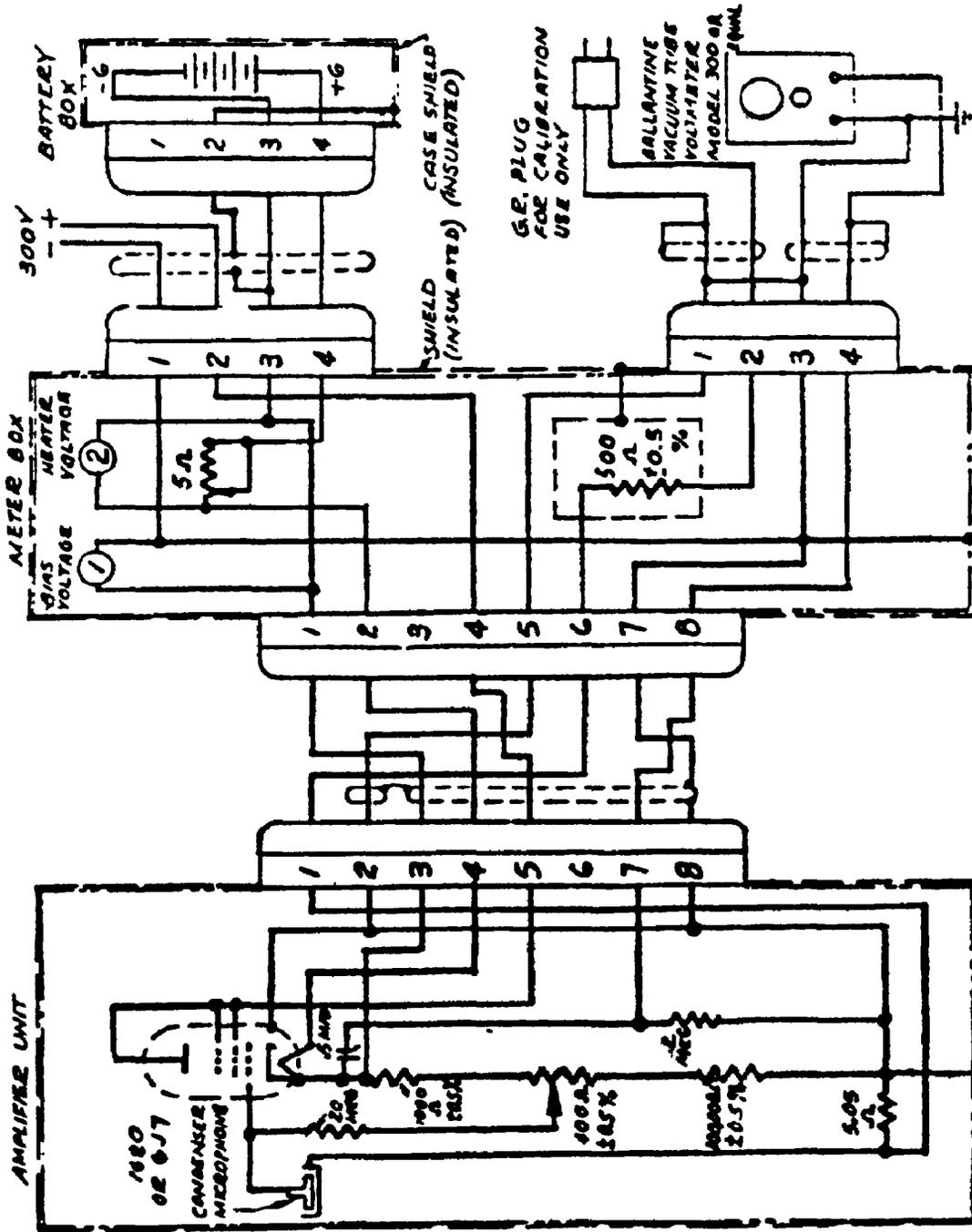
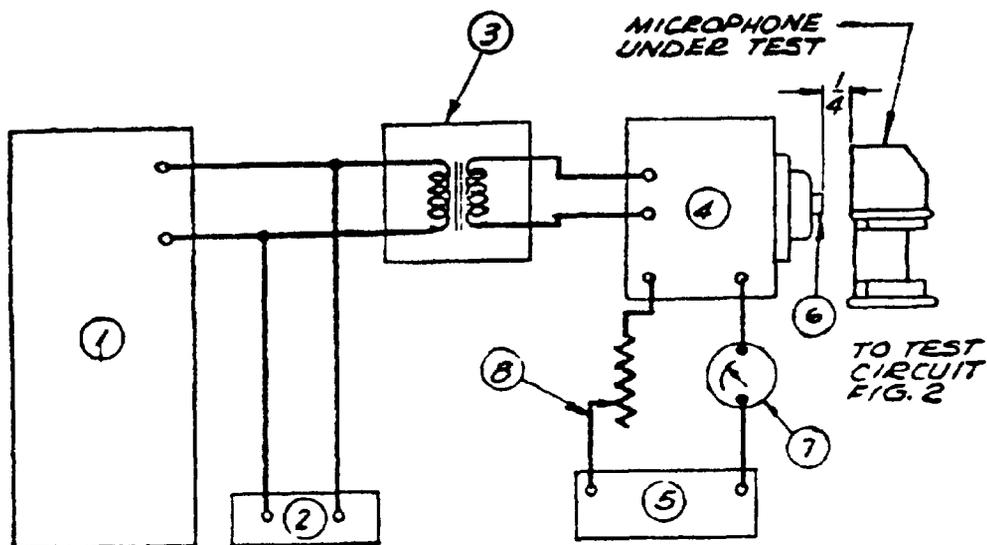


FIGURE 2.

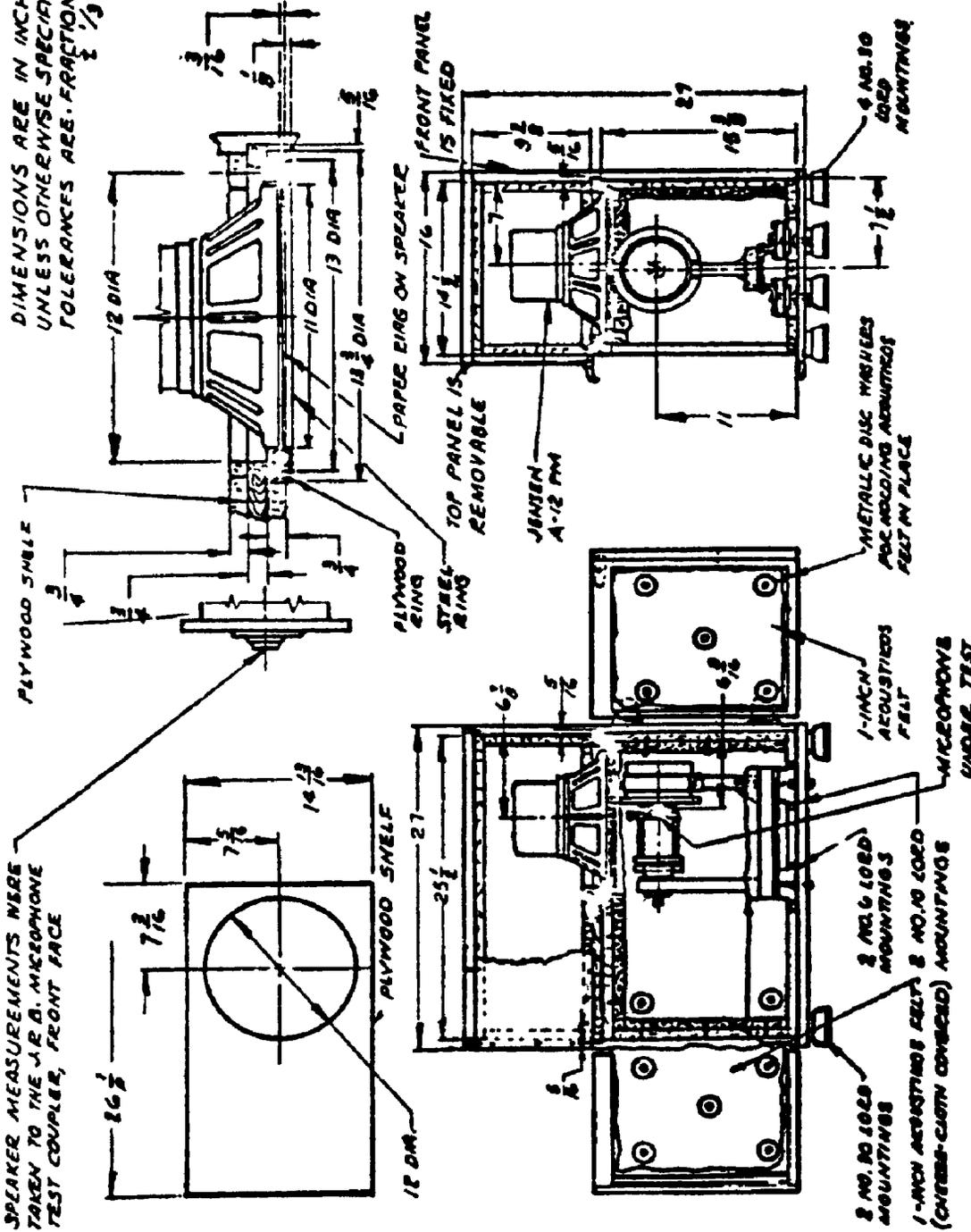


- ① AUDIO OSCILLATOR-GENERAL RADIO TYPE NO.713-B, OR EQUAL (CONNECT FOR 50 OHM OUTPUT)
- ② OUTPUT METER-GENERAL RADIO TYPE NO.483-C, OR EQUAL.
- ③ TRANSFORMER-GENERAL RADIO TYPE NO.541-C, OR EQUAL.
- ④ DRIVER UNIT-WESTERN ELECTRIC TYPE 555 RECEIVER, OR EQUAL.
- ⑤ STORAGE BATTERY - 12 VOLTS
- ⑥ COUPLER FOR V.I.E. NO.555 RECEIVER PER DRAWING SC-D-10598
- ⑦ AMMETER, 0.2 AMPS, DC
- ⑧ RESISTOR, VARIABLE, 0-5 OHMS, 10 WATTS, ADJUST TO MAINTAIN READING OF 1.5 AMPS ON METER ⑦

DIMENSIONS ARE IN INCHES

FIGURE 3

DIMENSIONS ARE IN INCHES
UNLESS OTHERWISE SPECIFIED,
TOLERANCES ARE FRACTIONS
 $\frac{1}{32}$



SPEAKER MEASUREMENTS WERE
TAKEN TO THE 1/8 IN. MICROPHONE
TEST COUPLER, FRONT FACE

JOHNS-MANVILLE ACOUSTIKOS
1-INCH FELT (CASES & CLAMP
COVERED).

ACOUSTI-CELOTEX 3/4 THK

FIGURE 4.

