

MILITARY SPECIFICATION

MICROPHONE, DYNAMIC M-96(*)/A

This specification has been approved by the
Bureau of Naval Weapons, Department of the Navy.

1. SCOPE

1.1 Scope - This specification covers one type of boom-suspended microphone designated Microphone, Dynamic M-96/A, for use in Military equipment.

1.2 Classification - The Microphone, Dynamic M-96/A shall be of one type and shall consist of the following items:

<u>Items</u>	<u>Appl. Para.</u>
Microphone Element, Dynamic M-95(*)/UR	3.4.1.3.1
Boom Assembly	3.4.1.3.2

When a complete Dynamic Microphone is not required, any one item or combination of items may be procured accordingly as specified in the procurement document. (See 6.3)

2. APPLICABLE DOCUMENTS

2.1 General - The following documents of the issue in effect on the date of invitation for bids, form a part of this specification to the extent specified herein:

SPECIFICATIONS

Military

MIL-P-642	Plugs, Telephone
MIL-E-5272	Environmental Testing, Aeronautical and Associated Equipment, General Specification for
MIL-E-5400	Electronic Equipment, Aircraft, General Specification for
MIL-C-10392	Cables, Special Purpose, Electrical (miniature)
MIL-P-17555	Preparation for Delivery of Electronic, Electrical, and Electro-Mechanical Equipment and Associated Repair Parts

MIL-N-18307

Nomenclature and Nameplates for
Aeronautical Electronic and
Associated Equipment

2.2 Availability of Documents

- (1) When requesting specifications, standards, drawings, and publications refer to both title and number. Copies of this specification and applicable specifications required by contractors in connection with specific procurement functions may be obtained upon application to the Commanding Officer, Naval Supply Depot, Code CDS, 5801 Tabor Avenue, Philadelphia 20, Pennsylvania.

3. REQUIREMENTS

3.1 Qualification - The microphones furnished under this specification shall be a product which has been tested and has passed the qualification tests specified herein, and has been listed on or approved for listing on the applicable qualified products list.

3.2 Parts and Materials - In the selection of parts and materials, fulfillment of major design objectives shall be the prime consideration. In so doing the following shall govern:

- (1) Parts and materials requirements shall conform to Specification MIL-E-5400.
- (2) Nonrepairable subassemblies, as outlined in Specification MIL-E-5400, shall be used when practicable. The general size of the subassembly, and the amount of circuitry to be included therein shall be approved by the procuring activity. Nonrepairable subassemblies must be reliable. A mean-time-to-failure of more than 5000 hours should be the goal of each.
- (3) When previously produced models of this equipment did not use nonrepairable subassemblies, the design shall not be changed to employ nonrepairable assemblies without the approval of the procuring activity.

3.2.1 Nonstandard Parts and Material Approval - Approval for the use of nonstandard parts and materials shall be obtained as outlined in Specification MIL-E-5400.

3.3 Design and Construction

3.3.1 General - The equipment shall conform with all the applicable requirements of Specification MIL-E-5400 for design, construction and workmanship, unless otherwise specified herein.

3.3.2 Service Conditions - The microphone shall operate satisfactorily under any of the environmental and mechanical service conditions or reasonable combination of these conditions as specified in Specification MIL-E-5400 for Class I equipment, except as modified herein:

3.3.2.1 Altitude - Operation at altitudes in excess of 15,000 feet is not required.

3.3.3 Standard Conditions - The following conditions shall be used as a basis to establish normal performance requirements and for making laboratory bench tests on the microphone:

Temperature	Room ambient 30°C (± 10°C)
Altitude	Normal ground
Vibration	None
Humidity	Room ambient up to 90% relative humidity

3.3.4 Total Weight - The weight of the microphone M-96/A shall not be greater than 3.5 ounces.

3.3.5 Interchangeability - The equipment shall meet the interchangeability requirements as defined in Specification MIL-E-5400.

3.3.6 Operational Stability - The microphone shall operate with optimum performance for 500 hours, continuously or intermittently.

3.3.7 Operating Life

3.3.7.1 Reliable Operating Life - The microphone shall have a reliable operating life of at least 1000 hours without removal for bench servicing. Parts requiring servicing or replacement at the end of this interval to renew this service life shall be specified by the manufacturer.

3.3.7.2 Total Operating Life - The microphone shall have a minimum total operating life of 5000 hours with reasonable servicing and replacement of parts. Parts requiring replacement within this interval and the life of such parts shall be specified by the manufacturer.

3.3.8 Nomenclature and Nameplates - Nomenclature assignment and nameplate approval for equipment identification shall be in accordance with the requirements of Specification MIL-N-18307.

3.3.8.1 Marking - Each microphone shall be permanently and legibly marked as shown in Figure 1. The manufacturer's trade mark may be added if desired.

3.3.9 Provisions for Maintenance and Field Testing - Provision for maintenance and field testing shall be as specified in Specification MIL-E-5400.

3.3.10 Insulating and Housing Materials - Insulating and housing materials shall comply with the following requirements, as applicable.

3.3.10.1 Molded Plastic-Material - Molded plastic-material shall be of such character and quality that it will withstand all service conditions, including test conditions outlined in Section 4 of this specification, without evidence of affecting the performance requirements of the microphone.

3.3.10.2 Insulating and Impregnating Compounds - All such compounds including varnishes, waxes and the like, shall be suitable in every respect for each particular application. Under all service conditions including test conditions outlined in Section 4 of this specification, the compound shall adequately preserve the dielectric strength of the insulation to which it is applied. A compound shall not, either in the state of its original application or as a result of aging under service conditions, show any injurious effect upon the insulation it is designed to protect, and shall not cause corrosion or deterioration of adjacent metal or plastic parts.

3.3.10.3 Cementing Compounds - Any cementing compound used in the construction of the microphone shall be of such a character and quality that it will withstand all service conditions including test conditions outlined in Section 4 of this specification without evidence of loosening or otherwise affecting the performance requirements of the microphone.

3.3.11 Cleaning and Finishing of Metal Parts

3.3.11.1 Cleaning - Where cleaning operations on metal parts are not specified in detail, they shall be in accordance with the best suitable commercial practice.

3.3.11.2 Non-Ferrous Metals and Alloys - Copper, Brass, Bronze, Beryllium-Copper and other similar materials shall be plated or otherwise suitably finished or enclosed to provide protection against corrosion and deterioration. The kind of plating or finish applied shall depend upon the characteristics of the individual part and its use in the microphone. The plating or finish used for each individual part shall be such as to provide good appearance, corrosion and deterioration resistance, and long life for that part. Various problems such as soldering, fitting, assembly, reaction with adjacent parts and the like, must be considered in the selection of the plating or finish.

3.3.11.3 Soldering Flux - Only resin, or resin and alcohol, may be used as a flux in the assembly of this equipment or any part thereof, except that an acid flux may be used on all-metal, non-electrical subassemblies provided that they are thoroughly and completely cleaned of all traces of the acid immediately after the soldering operation has been completed.

3.4 Detail Requirements - The design and assembly of the microphone shall be such that the microphone is inherently stable as to mechanical and electrical characteristics. The detailed mechanical and electrical design of the microphones shall be accomplished by the contractor, subject to the requirements of this specification. The requirements are detailed herein only to the extent considered necessary to obtain the desired mechanical and electrical characteristics and performance, and permanence of the same.

3.4.1 Microphone, Dynamic M-96/A - The microphone assembly shall meet the following requirements:

3.4.1.1 Function - The microphone shall convert normal speech input to electrical signals suitable for connection, via a preamplifier, into the speech amplifiers, and/or modulators of radio or audio equipment. The microphone shall discriminate in favor of the speech signals and against ambient noise. A low output level, characteristic of dynamic microphones, requires a suitable preamplifier to raise the level to that available from a carbon microphone. This amplifier is normally supplied in the aircraft.

3.4.1.2 Form Factor - The microphone shall have the general configuration shown in Figure 1.

3.4.1.3 Contents - The M-96/A microphone shall be an assembly composed of the following:

- (1) Microphone Elements, Dynamic M-95/UR
- (2) Boom Assembly, Consisting of
 - (a) Boom
 - (b) Cord and Connectors

3.4.1.3.1 Microphone Elements, Dynamic M-95/UR - The M-95/UR shall be individually interchangeable with components previously manufactured and shall be compatible with the required preamplifier. The M-95/UR shall be a dynamic transducer housed in a plastic case and shall meet the interchangeability requirements of Specification MIL-E-5400. The combination of the M-95/UR and the external preamplifier shall provide the performance specified in paragraphs 3.5 to 3.5.15 inclusive.

3.4.1.3.2 Boom Assembly - The Boom Assembly shall consist of a breakaway wire boom with cord and connectors as follows:

3.4.1.3.2.1 Boom - The Boom shall be a breakaway type having dimensions and details shown in Figure 1.

3.4.1.3.2.2 Cord and Connectors - The cord (Figure 2) shall be compatible with the boom (Figure 1) and shall have two conductors of type WD-27/U in accordance with Specification MIL-C-10392. The cord shall be terminated on one end with a connector, which may be molded to the cord, that is compatible with the receptacle of the M-95/UR. This connector shall be locked in with set screws provided with the M-95/UR microphone element. The other end of the cord shall be terminated with a PJ-292 in accordance with Specification MIL-P-642, or equivalent such as U-173/U.

3.4.2 Accessories - The microphone shall operate with the following accessory. However, the accessory shall not be supplied as part of the equipment.

3.4.2.1 Interconnecting Box J-1013/AIC - The microphone shall be capable of operation with the transistorized microphone amplifier contained in the Interconnecting Box J-1013/AIC, or equivalent.

3.5 Performance

3.5.1 General - Unless otherwise specified, values set forth to establish the requirements for satisfactory performance apply to performance under both standard and extreme service conditions. When reduced performance under the extreme conditions is acceptable, tolerances or values setting forth acceptable variations from the performance under the standard conditions will be specified.

3.5.2 Sensitivity - The audio output of the microphone when measured as specified in 3.5.3 at a sound pressure level of 115 db above 0.0002 dyne per sq. cm. and at a frequency of 1000 cps, shall be 48.5 ± 3 db above 1 millivolt, under all standard and service conditions and shall not vary by more than 3 db after being subjected to any, or all, of the service conditions specified herein, except salt spray. At an altitude of 10,000 feet the sensitivity shall not fall below the sensitivity at sea level by more than 3 db.

3.5.3 Frequency Response - The frequency response of the microphone, when measured as specified in paragraph 4.5.3.3, compared to the response of 48.5 ± 3 db at 1000 cps, shall be within the limits shown in Figure 3. However, the difference between any two successive readings, 100 cycles apart up to 1000 cps, or 250 cps apart above 1000 cps, shall not exceed 2.5 db under all standard or service conditions. The response shall fall off at a rate of not less than 3 db per octave below 300 cps and 6 db per octave above 4000 cps.

3.5.4 Distortion - At any frequency between 300 and 4000 cps when the sound pressure at the face of the microphone is 115 db above 0.0002 dyne per square centimeter, the harmonic distortion in the output of the microphone shall not exceed 4% under standard conditions or 5% after being subjected to service conditions.

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3. 5. 5 Linearity - The output of the microphone shall be a linear function of the input sound pressure in the range of from 80 to 125 db above 0. 0002 dyne per square centimeter.

3. 5. 6 Impedance - The impedance of the microphone shall be 5 ± 1 ohms between 300 to 4000 cps before preamplification under standard or service conditions and shall be measured in accordance with 4. 5. 3. 4.

3. 5. 7 Pressure Equalization - The response of the microphone at 1000 cps shall not vary by more than 2. 0 db from its initial response while the microphone is subjected to a pressure increase corresponding to a descent from an altitude of 15, 000 feet (16. 7 inches of mercury) to sea level (30. 0 inches of mercury) at a rate of 5000 feet per minute. Refer 4. 5. 4. 2.

3. 5. 8 Stray Magnetic Field - The stray magnetic field of the microphone shall not cause more than a 3 degree deflection of a magnetic compass when tested as required by 4. 5. 10.

3. 5. 9 Noise Immunity Characteristic - Under standard conditions the signal-to-noise ratio shall be at least 15. 0 db in favor of the signal, for noises of the types encountered in aircraft, boats, tanks, and other vehicles when measured in accordance with 4. 5. 3. 5.

3. 5. 10 Salt Spray - The response of the microphone 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 herein for 100 hours. There shall be no evidence of destructive corrosion. Refer 4. 5. 6.

3. 5. 11 Temperature Shock - The response of the microphone shall not vary more than 3 db from its initial response at any frequency between 300 and 4000 cps after being subjected to the temperature cycling test specified in 4. 5. 7 and the resultant signal-to-noise ratio shall not be reduced by more than 2 db.

3. 5. 12 Temperature Extremes - The response of the microphone 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 test described in 4. 5. 5.

3. 5. 13 Impact - The microphone shall withstand the impact test specified in 4. 5. 11 with no resultant structural failure or other defects. 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. 5. 14 Vibration - The average response of the microphone shall not change by more than 3 db over the 300 to 4000 cps frequency range as a result of the vibration test in 4. 5. 9.

3. 5. 15 Humidity - The response of the microphone 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. 5. 8.

4. QUANTITY ASSURANCE PROVISIONS

4. 1 Classification of Tests - The sampling, inspection and test of Microphones, M-96/A, shall be classified as follows:

- (1) Qualification Tests - Qualification Tests are those tests accomplished on samples submitted for qualification as a satisfactory product.

- (2) Acceptance Tests - Acceptance Tests are those tests accomplished on microphones manufactured and submitted for acceptance under contract.
 - (a) Individual Tests - Individual Tests are those tests conducted on each microphone submitted for acceptance under the contract.
 - (b) Sampling Tests - Sampling Tests are those test accomplished on a quantity of microphones as approved by the Bureau of Naval Weapons and which have previously passed Individual Tests.
- (3) Life Tests - Life Tests shall be conducted by the contractor at his plant. These tests shall be started as soon as practicable on an early production microphone.

4.2 Qualification Tests - Qualification Tests are to be made on samples submitted for qualifications as satisfactory production units. These tests shall be conducted at a laboratory and under conditions satisfactory to the Bureau of Naval Weapons and shall consist of all the tests listed in 4.4. Table I. Ten units shall be submitted for qualification tests. Modifications required as a result of these tests shall be incorporated in the microphone prior to resubmission for qualification. Requests for authorization of qualification tests shall be addressed to the Bureau of Naval Weapons.

4.3 Acceptance Tests - The contractor shall furnish all samples and shall be responsible for accomplishing the required tests under the supervision of the cognizant Government Inspector. Contractors not having laboratory testing facilities satisfactory to the government for sampling tests shall engage the services of a commercial testing laboratory acceptable to the Bureau of Naval Weapons. The contractor shall furnish test reports, in duplicate, via the cognizant Government Inspector, showing quantitative results for all tests required by this specification, and signed by an authorized representative of the contractor or laboratory as applicable. Acceptance or approval of material during course of manufacture shall in no case be construed as a guarantee of the acceptance of the finished product. Acceptance of the finished product shall be upon a lot basis after satisfactory completion of all required tests. Acceptance tests shall consist of the following tests.

4.3.1 Individual Tests - Each microphone submitted for acceptance shall be subjected to the individual test to determine compliance with requirements of material, workmanship, and operational adequacy. As a minimum, each microphone shall be subjected to the tests specified in Table I.

4.3.2 Sampling Tests - Sampling tests shall be conducted on samples from each lot as specified in the following paragraph.

4.3.2.1 Sampling Instructions - One microphone from the first 10 production microphones, thereafter two from each lot of 100, or fraction thereof, as selected by the cognizant Government Inspector shall be given the specified sampling tests.

4.4 Tests Required - The microphone sample shall be subjected to the tests listed in Table I and any other tests deemed necessary by the Bureau of Naval Weapons or the cognizant Government Inspector to determine compliance of the microphone with the requirements of this specification.

TABLE I

<u>Inspection or Test</u>	<u>Test Procedure</u>	<u>Qualification Test</u>	<u>Individual Tests</u>	<u>Sample Tests</u>
Examination of Product	4.5.3.1	x	x	x
Operation Test	4.5.3.2	x	x	x
Frequency Response	4.5.3.3	x		x
Response Measurements	4.5.3.3.1		x	
Impedance Measurement	4.5.3.4	x	x	x
Signal-To-Noise Ratio	4.5.3.5	x	x	x
Pressure Cycling	4.5.4.1	x		
Pressure Equalization	4.5.4.2	x		x
Temperature Extremes	4.5.5	x		
Temperature Shock	4.5.7	x		x
Salt Spray	4.5.6	x		
Humidity	4.5.8	x		
Vibration	4.5.9	x		x
Stray Magnetic Field	4.5.10	x		x
Impact	4.5.11	x		*
Cord Test	4.5.12	x		
Life Test	4.8	x	**	

NOTES:

* These tests shall be performed on the sample microphone from the first 10 production units and on the sample units for every fifth lot.

** Life tests shall be made as per schedule of 4.6.3 and not on Individual or Sampling Test Basis.

4.5 General Test Procedure

4.5.1 Test Circuit Apparatus - The test circuit apparatus shall be assembled and connected as shown on Figures 4 and 5 and shall consist of the equipment described as follows:

4.5.1.1 Vacuum Tube Voltmeters - The vacuum tube voltmeters (VTVM) used in the test circuit shall have a flat frequency response (plus or minus 1 db) from 100 to 10,000 cps and shall be capable of measuring voltages from 0.001 to 10 volts root mean square (vrms).

4.5.1.2 Audio Oscillator - The audio oscillator shall have a waveform distortion not greater than 2%. It shall be used with a high quality amplifier capable of driving a Western Electric 555 speaker, or approved equivalent, to a level of 120 db re 0.0002 dyne per square centimeter.

4.5.1.3 Sound Source - The sound source shall be a Western Electric 555 speaker, or approved equivalent. The distortion in the output of the sound source at each frequency shall be such that the second harmonic is at least 35 db, the third at least 40 db, and the fourth at least 45 db below the fundamental.

4.5.1.3.1 Baffle - A wooden ring shall be mounted on the front of the sound source, as shown on Figure 5, in a plane parallel with the face of the microphone.

4.5.1.3.2 Coupler - A brass coupler, of the dimensions shown in Figure 6 shall be mounted concentrically on the sound source of Figure 5.

4.5.1.4 Base - The test equipment shall be mounted on a rigid base of suitable design.

4.5.1.5 Signal-to-Noise Ratio Test Apparatus - The Signal-to-Noise Ratio Test Apparatus shall be similar or equal to that detailed in Figure 7 and the test circuit similar or equal to that shown in Figure 8.

- (1) Noise Source - By means of a suitable test apparatus and circuit, Figures 7 and 8, provision shall be made for the production of the noise spectrum, Table II, at an rms sound pressure of 115 db above a reference level of 0.0002 dyne per square centimeter as measured at the microphone diaphragm. The "noise" source shall be a loudspeaker capable of producing a sound pressure of 115 db above a reference level of 0.0002 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, 1/4 inch from the mouth of the signal speaker which shall be short-circuited during adjustments of the noise spectrum.
- (2) Signal Source - By means of the apparatus as set up previously, provision shall also be made for the production of the following signal spectrum, Table III, at a rms sound pressure of 115 db above a referenced level of 0.0002 dyne per square centimeter. The "signal" source shall be the driver unit. The calibrating microphone shall be positioned 1/4 inch directly in front of the driver unit.

TABLE II
NOISE SPECTRUM

<u>Frequency cps</u>	<u>Sound pressure in db relative to sound pressure at 130 cps</u> Ref.
40	0
70	0
130	0
300	-5
600	-9
1000	-13
2000	-17
3000	-19
4000	-21

TABLE III
SIGNAL SPECTRUM

<u>Frequency cps</u>	<u>Sound pressure in db relative to sound pressure at 130 cps.</u> Ref.
130	0
300	+7
600	+8
1000	+5
2000	-3
3000	-7
4000	-9

4.5.2 Test Calibration Procedure - The condenser microphone shall be mounted in the test equipment by a spring holding clip which replaces C in Figure 5, (a dummy case and baffle will not be used). A 1/4 inch air gap shall separate the coupler and the condenser microphone grid. The microphone axis shall coincide with the center line of the mouth of the sound source. After having determined the electrical input to sound source required to yield a constant sound pressure level of 115 db re 0.0002 dyne per square centimeter, the condenser microphone shall be replaced by the Microphone M-96/A in the spring holding clip. The geometric center-line of the grid of the microphone shall coincide with the center-line of the mouth of the sound source. A 1/4 inch air gap shall separate the coupler and the grid of the microphone under test.

4.5.3 Test Methods - Tests required by this specification shall be conducted in accordance with the following procedures:

4.5.3.1 Examination of Product - Each microphone shall be examined carefully to determine conformance with this specification with respect to material, weight, dimensions, construction and workmanship.

4.5.3.2 Operational Test - Each equipment shall be operated. The period of operation shall be long enough to permit the equipment temperature to stabilize and to check sufficient characteristics and record adequate data to assure satisfactory equipment operation (include Impedance Measurement 4.5.3.4 and Response Measurement 4.5.3.5).

4.5.3.3 Frequency Response - Response measurements shall be made, between 300 and 4000 cps, at intervals of 100 cps up to 1000 cps, at intervals of 250 cps from 1000 to 4000 cps inclusive. The output voltage, amplified, of the microphone unit, measured across the 100 ohm resistor, R2 shown on Figure 4, shall be plotted in decibels re 1 millivolt versus frequency. Refer 3.5.2.

4.5.3.3.1 Response Measurements (Individual Tests) - Each microphone shall be subjected to response tests at no less than 5 approved frequencies, such as 300, 600, 1000, 2000, 3000, 4000 cps. The specified frequencies to be used will be determined by the procuring agency on the basis of tests made and information gained in the initial stages of production. 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.

4.5.3.4 Impedance Measurement - Apply an audio frequency between 300 and 4000 cps from an oscillator to the microphone connector in series with a 10 ohms $\pm 1\%$ resistive load. The gain of the oscillator shall be adjusted so that the voltage drop across the resistive load shall be 10 millivolts $\pm 2\%$. The voltage drop across the microphone, in millivolts, shall be taken as the impedance of the microphone measured in ohms.

4.5.3.5 Measurement of the Signal-to-Noise Ratio - The microphone under test shall be mounted in the test rig by the same means described in 4.5.2 with the front grid of the microphone 1/4 inch from the mouth of the signal speaker. (A baffle will not be used). The noise spectrum (Table II) shall be applied and the microphone output measured. The noise spectrum shall be removed and the signal spectrum (Table III) applied. The output of the microphone shall be measured. The signal-to-noise ratio shall be the quotient of these measured values. Refer 3.5.9.

4.5.4 Altitude

4.5.4.1 Pressure Cycling - The microphone 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 shall then be measured and shall not show a decrease in output in excess of 4 db.

4.5.4.2 Pressure Equalization - The microphone shall be placed in an altitude chamber and the pressure inside the chamber reduced to that corresponding to an altitude of 15,000 feet (approximately 16.7 inches of mercury). The response of the microphone 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) as required by 3.5.7.

4.5.5 Temperature Extremes

4.5.5.1 Low Temperature - Expose the microphone 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.

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

4.5.6 Salt Spray - The microphone shall be subjected to the salt spray test in accordance with Specification MIL-E-5272 for a period of 100 hours. The microphone shall be washed in tap water to remove excess salt deposits and then excess moisture removed. The response characteristics shall be measured immediately after removal from the salt spray chamber. Refer 3.5.10.

4.5.7 Temperature Cycling - The microphone shall be subjected to the temperature shock test, Procedure I of Specification MIL-E-5272 for 5 complete cycles. The microphone shall be removed from the chamber and response measurements made after stabilization at room temperature. Refer 3.5.11.

4.5.8 Humidity - The microphone shall be subjected to the humidity test Procedure I of Specification MIL-E-5272. Refer 3.5.15.

4.5.9 Vibration - The microphone 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 test shall be conducted for a period of one hour. The response characteristics of the microphone shall be measured immediately after the test for vibration. Refer 3.5.14.

4.5.10 Stray Magnetic Field Measurements - Stray magnetic field measurements shall be made in a shielded room or in an area proved to the satisfaction of the cognizant Government Inspector to be free from appreciable magnetic disturbances. The microphone under test shall be rotated on its axis at various points on the surface of an 8 inch radius sphere surrounding a Keuffel and Esser Type No. 5600 compass or approved equivalent. Refer 3.5.8.

4.5.11 Impact Test - 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. Refer 3.5.13.

4.5.12 Cord Test Method - The microphone cord shall be tested in accordance with Specification MIL-C-10392 to determine conformance with 3.4.1.3.2.2.

4.6 Life Tests - The microphone shall be subjected to a Life Test at the contractor's plant under the following simulated service conditions:

Temperature	Normal room temperature
Altitude	Normal room
Humidity	Room ambient

4.6.1 Test Data - The contractor shall keep a daily record as to the performance of the equipment, making particular note of any deficiencies or failures. In the event of part failures during this test, the defective part shall be replaced and the operation resumed for the balance of the test period. A record shall be kept of all failures throughout the test. This record shall indicate the following.

- (1) Part type number
- (2) The circuit reference symbol-number
- (3) The part function
- (4) Name of the manufacturer
- (5) Nature of the failure
- (6) The number of hours which the part operated prior to failure.

4.6.1.1 Failure Report - In the event of a failure the Government Inspector shall be notified and the cause of failure immediately determined. If the cause of the failure indicates material or design corrections are necessary, the Bureau of Naval Weapons shall determine if such corrective action is necessary prior to acceptance of additional microphones.

4.6.2 Test Duration - The duration of the Life Test shall be 300 hours.

4.6.2.1 Test Periods - The test may be run continuously or intermittently. Any period of operation shall be of sufficient duration to permit the equipment temperature to stabilize. Periodically the equipment shall be turned on and off several times and put through all phases of its performance.

4.6.2.2 Performance Check - At approximately eight-hour intervals during the test, a limited performance check shall be made. The performance check proposed by the contractor shall be subject to approval by the Bureau of Naval Weapons.

4.6.3 Life Test Schedule - The microphone to be tested shall be representative of the current production in all significant aspects of design and manufacture. It shall be selected by the Government Inspector from equipments which have passed the Individual Tests. The Life Test shall be performed on the following quantities of microphones unless otherwise stated in the contract or approved by the Bureau of Naval Weapons.

<u>Quantity of Equipment Offered for Acceptance</u>	<u>Quantity to be tested</u>
First 25	1
Next 26 to 200	1
Next 201 to 500	1
Over 500	1 for each additional 500 or fraction thereof

4.6.4 Reconditioning of Test Samples - Microphones which have been subjected to the Life Test shall be reconditioned as follows:

- (1) On completion of the Life Test, the microphones shall be reworked by the contractor by replacing all "wear" items. The "wear" item shall be determined by agreement between the contractor and the Bureau of Naval Weapons.
- (2) After reworking, the contractor may submit the microphones for acceptance under the contract.

4.7 Pre-Submission Testing - No item, part or complete microphone shall be submitted by the contractor until it has been previously tested and inspected by the contractor and found to comply, to the best of his knowledge and belief, with all applicable requirements.

4.8 Rejection and Retest

4.8.1 Individual Tests - Each microphone which fails to meet all requirements set forth in 4.3.1 shall require immediate rejection and may be reworked as necessary to meet all the requirements of this specification.

4.8.2 Sampling Tests - If any microphone selected fails to successfully pass all sampling tests, it shall cause rejection of the lot represented until all units have been reworked as necessary to correct defects. Sampling of reworked microphones for retest shall be made by the cognizant Government Inspector as necessary to insure that all defects have been corrected.

4.8.3 Reworked Units - The reworked microphones which meet all requirements during retests may be accepted for delivery but complete details concerning the cause of failure and steps taken to insure correction of such causes in future production shall be forwarded by the cognizant Government Inspector to the Bureau of Naval Weapons.

4.8.3.1 Failures - Should samples selected from any lot of reworked microphones fail to meet all requirements during retest, the lot of microphones represented shall not be further reworked and submitted for further test without specific approval in writing from the Bureau of Naval Weapons.

5. PREPARATION FOR DELIVERY

5.1 General - All major units and parts of the equipment shall be packaged, packed and marked for shipment in accordance with the requirements of Specification MIL-P-17555. The level of preservation, packaging, and packing shall be specified by the procuring activity.

6. NOTES

6.1 Use - It is intended that this microphone be used with standard Navy headsets and protective helmets to convert normal speech input to electrical signals suitable for connection, via a preamplifier, into the speech amplifiers and/or modulators of radio or audio equipment.

6.2 Qualification - With respect to products requiring qualification, awards will be made only for such products as have, prior to the time set for opening of bids, been tested and approved for inclusion in the applicable Qualified Products List whether or not such products have actually been so listed by this date. The attention of the suppliers is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government, tested for qualification, in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. The activity responsible for the qualified products list is the Bureau of Naval Weapons, Department of the Navy, Washington 25, D. C. and information pertaining to qualification of products may be obtained from that activity.

6.3 Ordering Data - The procurement document should specify the following:

- (1) Title, number and date of this specification.
- (2) Either a complete Microphone, Dynamic M-96/A or any of the items of 1.2 as required.

6.4 Precedence of Documents - When the requirements of the contract, this specification, or applicable subsidiary specifications are in conflict, the following precedence shall apply:

- (1) Contract - The contract shall have precedence over any specification.
- (2) This Specification - This specification shall have precedence over all applicable subsidiary specifications. Any deviation from this specification, or from subsidiary specifications where applicable, shall be specifically approved in writing by the procuring activity.
- (3) Referenced Specifications - Any referenced specification shall have precedence over all applicable subsidiary specifications referenced therein. All referenced specifications shall apply to the extent specified.

6.5 The parentheses (*), when used in the type designation, shall be replaced by either a number or letter furnished by the procuring activity upon application by the contractor for assignment of nomenclature in accordance with 3.3.8. The complete type number shall be used on nameplates, shipping records and instruction books, as applicable.

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.

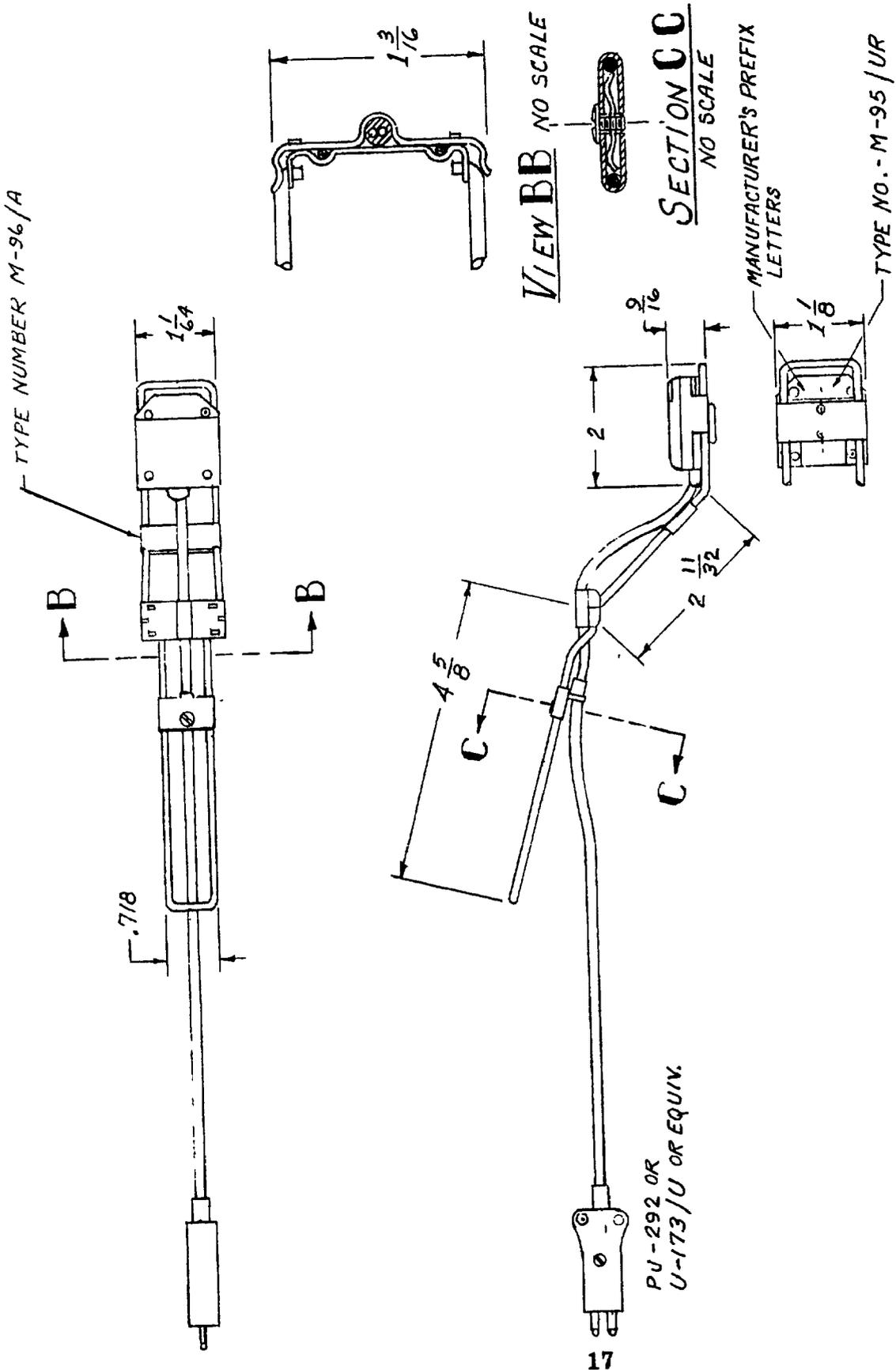


FIGURE 1 OUTLINE DIMENSIONS AND MARKINGS OF MICROPHONE AND BOOM M-96/A

SCALE: NONE

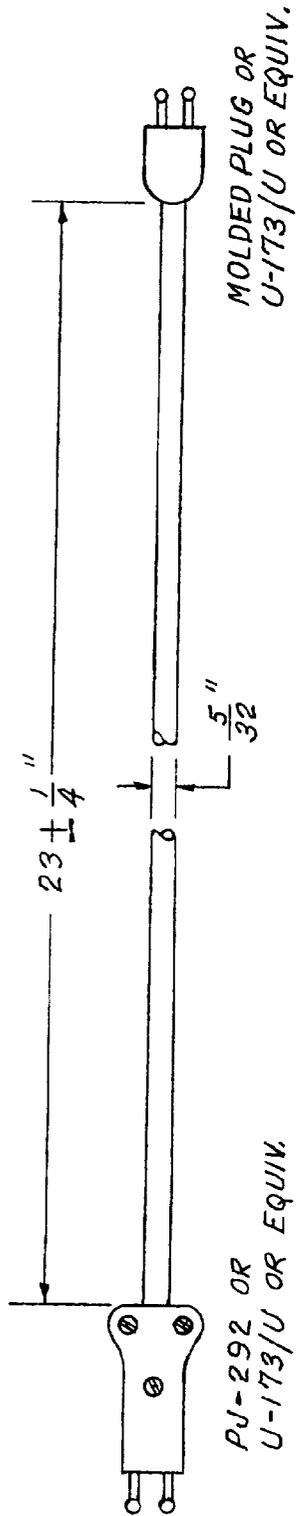


FIGURE 2. DIMENSIONS OF NON-RETRACTABLE CORD

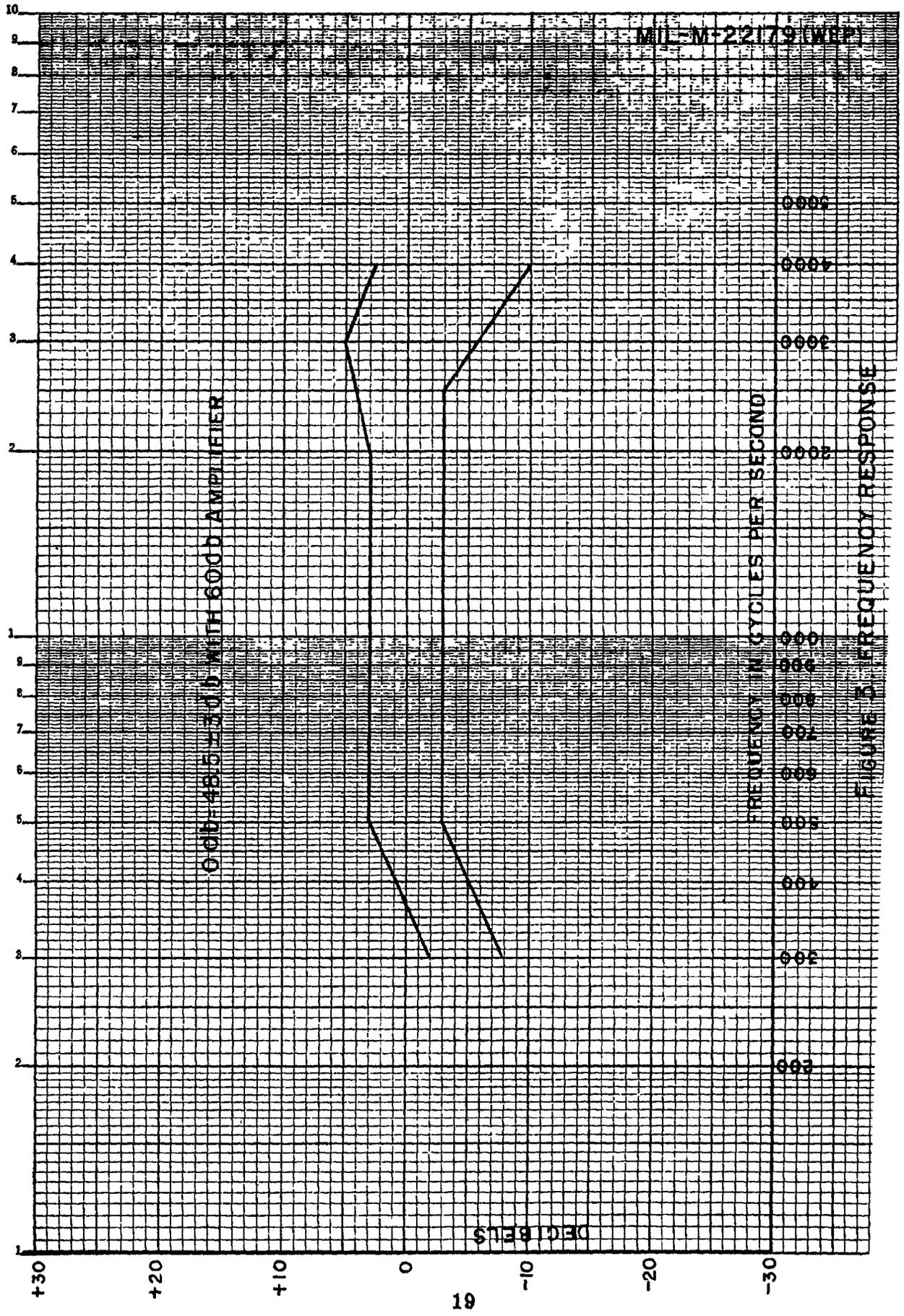
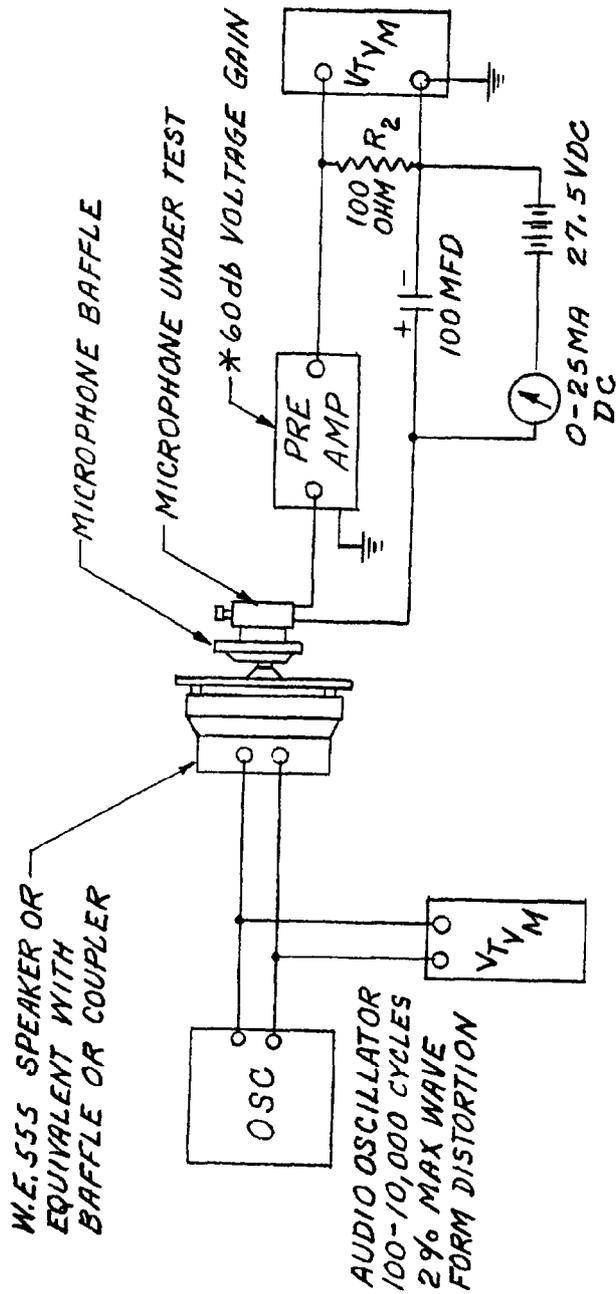


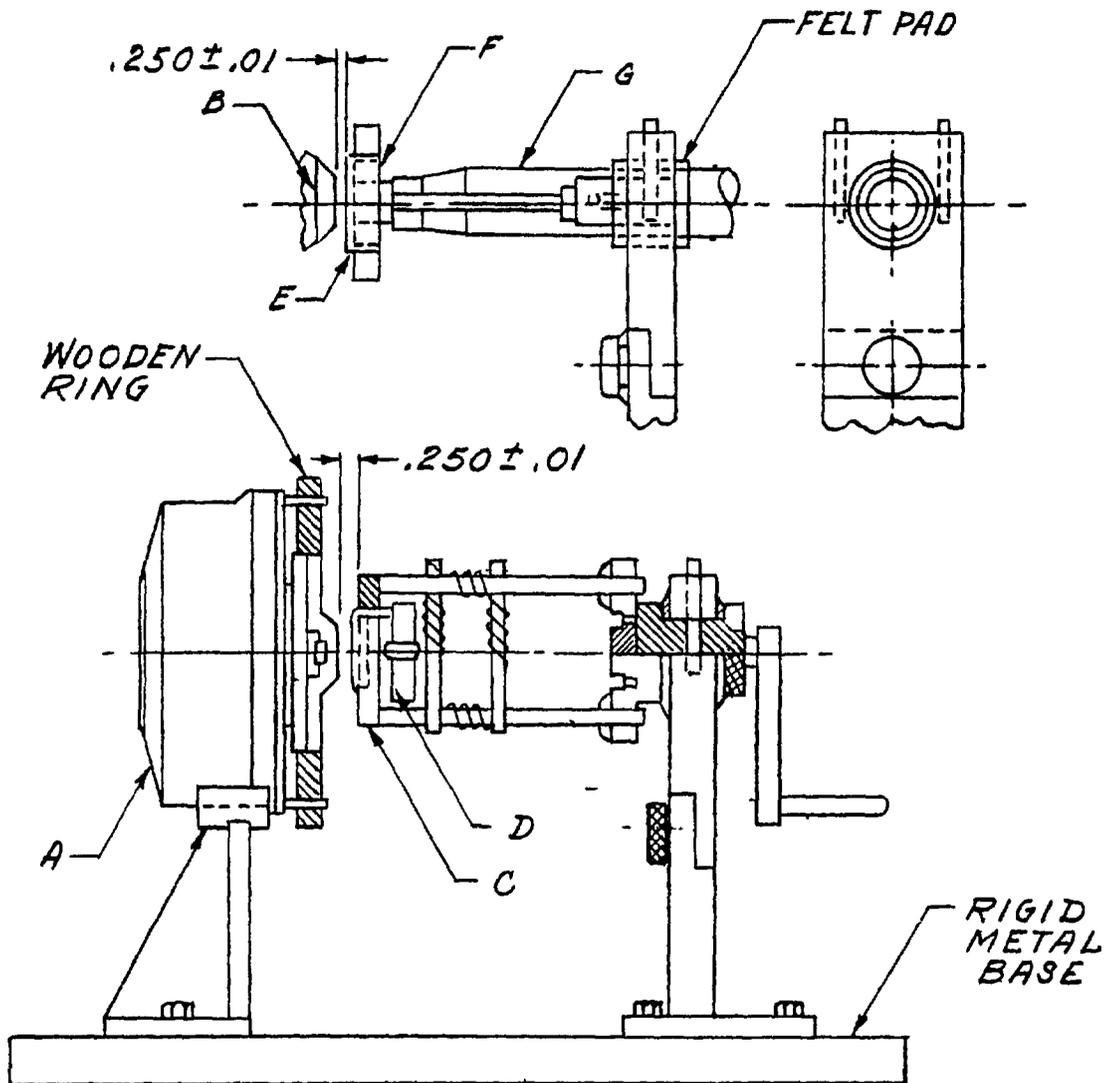
FIGURE 3. FREQUENCY RESPONSE



* THE PREAMPLIFIER SHALL HAVE THE FOLLOWING CHARACTERISTICS:

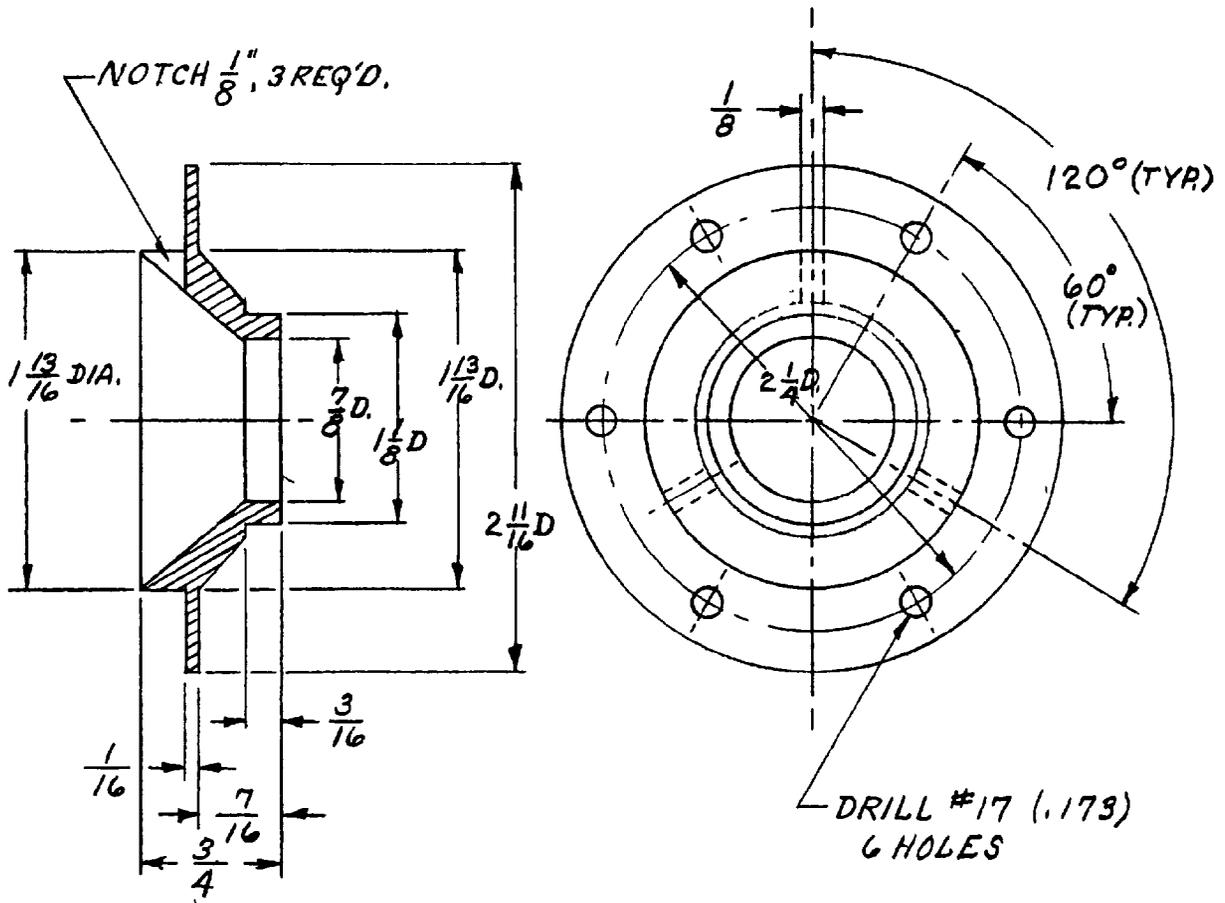
- (a) GAIN: 60 ± 1 db.
- (b) RESPONSE: ± 1 db FROM 100 CPS TO 10Kc/s.
- (c) INPUT IMPEDANCE: $50 \text{ OHMS} \pm 1 \text{ OHMS}$.
- (d) OUTPUT IMPEDANCE: $100 \text{ OHMS} \pm 10 \text{ OHMS}$.
- (e) DISTORTION: LESS THAN 1%.
- (f) LINEARITY: $300 \mu\text{V}$ TO .5 VOLT.

FIG. 4. STANDARD TEST CIRCUIT



- A. W.E. 555 SPEAKER DRIVER, OR EQUIV.
 B. MICROPHONE CALIBRATING COUPLER (FIG. 5).
 C. MICROPHONE BAFFLE
 D. MICROPHONE UNDER TEST.
 E. DUMMY MICROPHONE CASE FOR CALIBRATION.
 F. W.E. 640-A CONDENSER MICROPHONE WITH GRID, OR EQUIV.
 G. ——— AMPLIFIER.

FIGURE 5. TEST BASE ASSEMBLY



TOLERANCES-DIMENSIONS : FRACTIONAL $\pm \frac{1}{64}$
 DECIMAL $\pm .005$, ANGLES $\pm \frac{1}{2}^\circ$ UNLESS OTHERWISE NOTED.

FIGURE 6. BRASS COUPLER

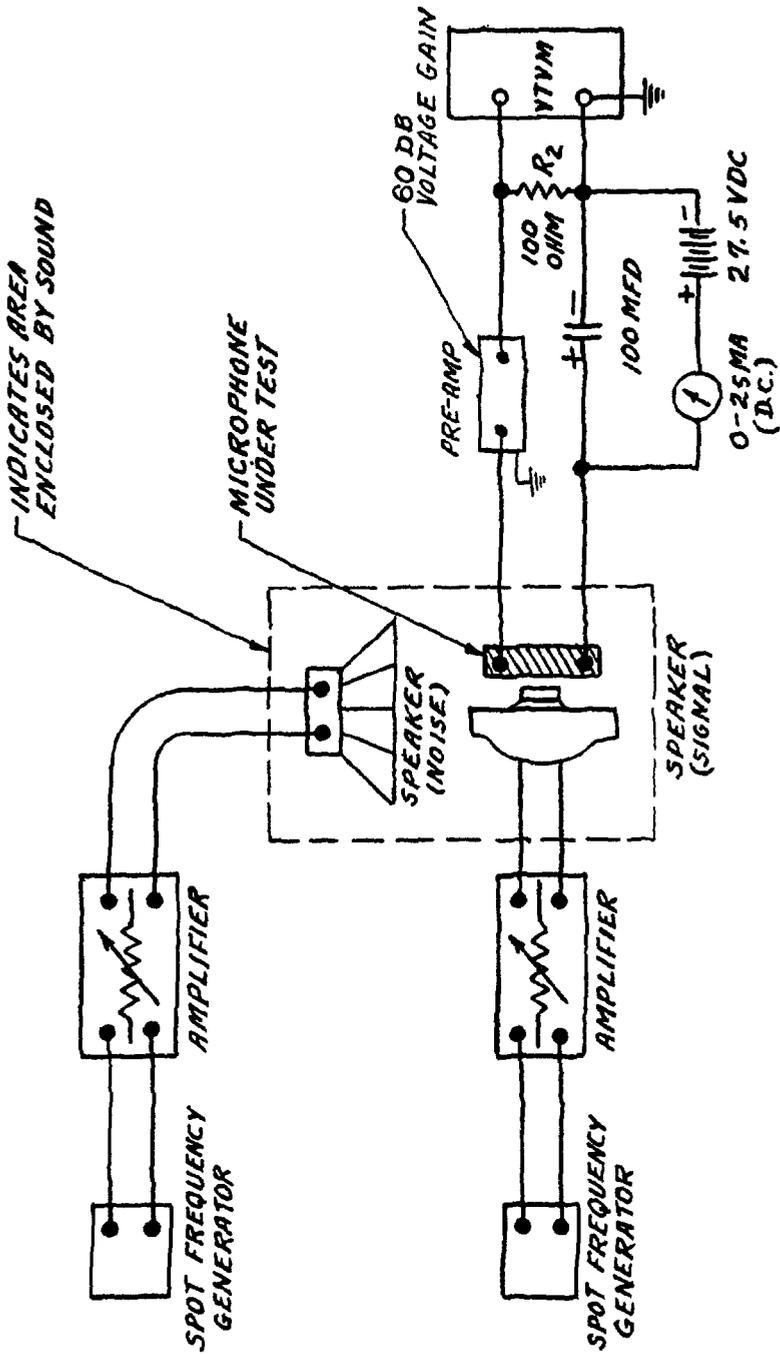


FIGURE 8.