

## 640AA CONDENSER MICROPHONE

*Tops for FM*

**Use** — The Western Electric 640AA Condenser Microphone offers numerous distinctive advantages both to the acoustical technician and to the broadcast studio engineer.

As a laboratory instrument this microphone incorporates the most recent technical advances in the precision measurement of sound intensity over a wide range of temperature and humidity conditions. Accurate, scientific production tests of other sound instruments such as receivers, loudspeakers and microphones may also be obtained through its use.

In the broadcasting field, when associated with its companion RA-1095 Amplifier, the 640AA Microphone provides a means for ultra-faithful program pick-up especially in auditoriums or in large studios which have proper acoustical characteristics for use of the remote single microphone pick-up



Figure 7 — 640AA Microphone.



Figure 8 — 640AA Microphone and its associated RA-1095 Amplifier.

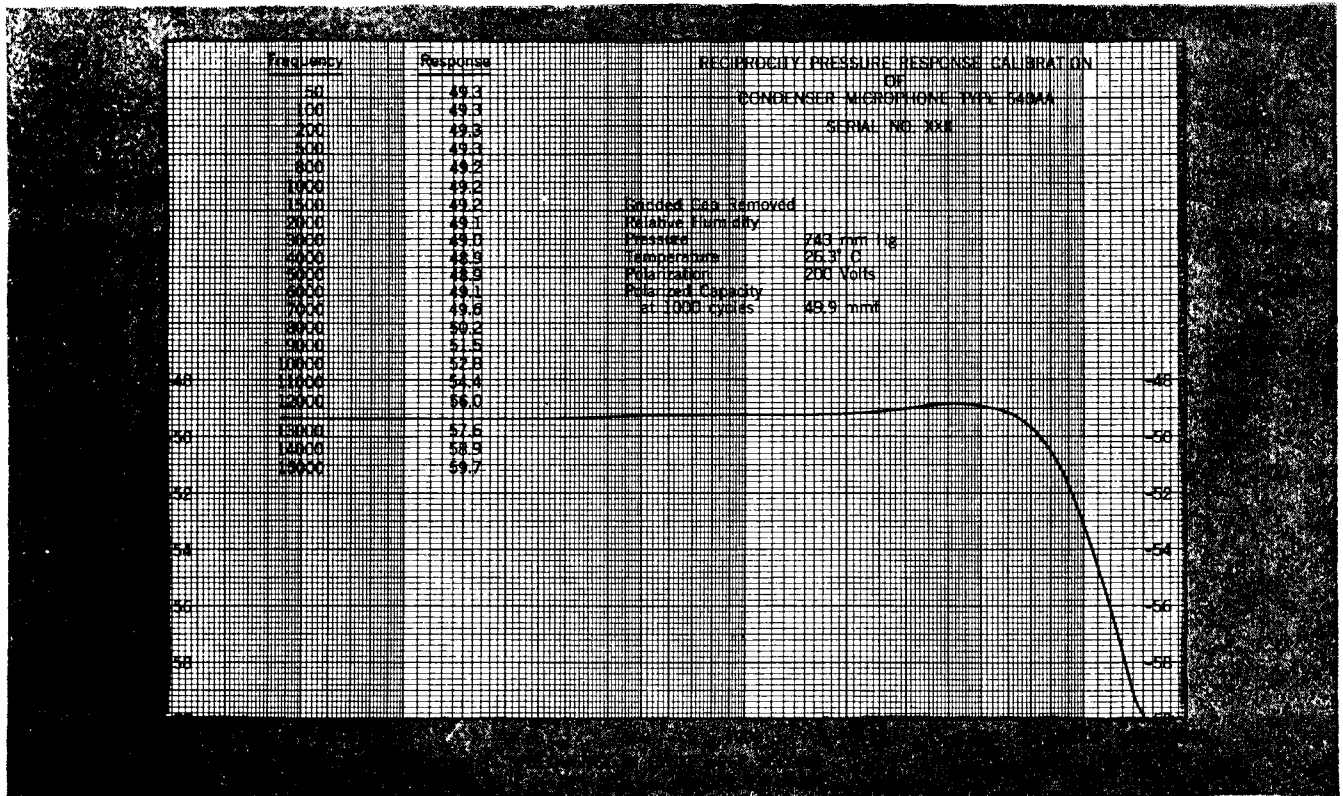


Figure 9 — Typical Pressure Calibration Chart of 640AA Condenser Microphone.

technique. This application is particularly effective where orchestras or similar large groups are involved. Another ideal application is for use as a cast microphone in broadcast stations and motion picture studios.

**Description** — The 640AA Condenser Microphone is furnished in a bright metal, cylindrical housing approximately 1" in diameter and 1" long. It is similar to its predecessor, the 640A Microphone, except for improved stability with respect to time, temperature and humidity.

For laboratory and test applications, the order should specify that the unit be supplied calibrated. This calibration will be in accordance with procedures established by the U.S. Bureau of Standards, Cruft Laboratories and Bell Telephone Laboratories, Inc. The stability of the 640AA Microphone is such that it will hold its calibration constant over a long period of time when treated with reasonable care. The stainless steel diaphragm and the diaphragm supporting ring have approximately the same expansion coefficients, thus assuring accurate sound measurements over an unusually wide range of ambient temperature.

This microphone is provided with a removable grid over the face of the diaphragm to afford mechanical protection under normal program pick-up conditions.

The pressure response characteristic shown in Figure 9, which is applicable only to measurements in small chambers, is approximately constant to 6,000 cycles per second and then falls off uniformly to the extent of about 8 db at 15,000 cycles per second. Being a condenser microphone it is de-

signed to work into a high impedance grid circuit of a closely associated amplifier stage. The pressure response level of the microphone unit (less amplifier), in the 50 to 6,000 cycle range with 200 volts polarizing potential, is approximately 49.5 db below 1 volt (open circuit) per dyne per square centimeter. Pressure and free-field levels are identical from 50 to 500 cycles per second.

A chart (Figure 9) is supplied with *calibrated microphones* which, in addition to the pressure response curve, shows the conditions of test, namely, the polarized capacity at 1,000 cycles, polarizing voltage, relative humidity, barometric pressure, ambient temperature and other conditions of calibration. This chart also tabulates the response values for the specific instrument in convenient steps from 50 to 15,000 cycles per second. In order for the calibration to apply exactly, the instrument should be used under conditions identical to those under which it was calibrated. Suitable correction factors can, of course, be determined at the point of use if these conditions must be altered.

### Features

- Precision measurement of sound intensity.
- Ideal for measuring frequency response of sound instruments.
- Unvarying excellence under a wide range of temperature and humidity.
- Removable cover for mechanical protection.
- Small size diaphragm improves fidelity, forestalls phase



distortion, approaches "Ideal" of "point pick-up."

In combination with the RA-1095 Amplifier, it is especially adaptable for ultra-faithful pick-up in auditoriums, large studios, or cast microphone in small studios. Especially effective for single microphone pick-up technique for large orchestras and choral or similar groups. Compactness.

### Specifications for the 640AA Microphone

**Frequency Response:** Pressure Response—See Figure 9.

Free-Field Response—See Figure 10.

**Sensitivity:** Approximately 49.5 db below 1 volt (open circuit) per dyne per square centimeter with 200 volts d-c polarizing potential.

**Operates Into:** High impedance grid circuit of closely associated vacuum tube amplifier (such as Western Electric RA-1095 Amplifier).

**Output Impedance:** Essentially that due to its capacitance which is approximately 50 mmf. to 60 mmf.

**Polarizing Voltage:** 200 volts d-c from well regulated quiet supply.

**CAUTION:** Polarizing voltage exceeding 200 volts should not be applied as high voltages may damage the instrument.

**Mounting:** Mount in structure containing first amplifier stage.

**External Connection:** The microphone should be connected to the grid of the vacuum tube by means of a short, well-shielded, low capacitance lead to center contact at rear of instrument. The cylindrical shell of the microphone should be connected to the ground of the vacuum tube circuit thereby serving as a shield for the inner components.

**Dimensions:** Cylindrical shape approximately 1" diameter and 1" long.

**Weight:** Approximately 1½ ounces.

**Protection:** Provided with a dust cap for each end of the

cylinder when instrument is not in use.

**Installation**— In mounting the 640AA Microphone, it is important that its associated amplifier be arranged mechanically so as to preserve as nearly as possible the freedom from distortion of the sound field which is inherent in the small physical proportions of the microphone element.

The free-field response characteristics of the 640AA Microphone mounted on the RA-1095 Amplifier are shown in Figure 10. The difference in shape between the zero degree free-field curve, and the pressure calibration shown in Figure 9, is due almost entirely to diffraction effects which result when the microphone is placed in a free sound field, and not to the amplifier which has practically no effect on the shape of the response characteristic. The range covered, it will be noted, is admirably suited to the highest quality AM or FM program transmission requirements. With the line of sound approach normal, or perpendicular to the plane of the diaphragm, (0 degrees), the response is approximately constant for sounds in the frequency range between 50 and 1,000 cycles per second. Above 1,000 cycles the response rises gradually to a maximum of about 8 db at 8,000 cycles, then drops uniformly to a level which at 15,000 cycles per second is roughly equal to that at 1,000 cycles per second.

As illustrated in Figure 10, the response of the 640AA Microphone varies somewhat in the higher frequencies depending on the direction from which the sound wave approaches the diaphragm.

For pick-ups such as are common in broadcast applications, the small, bullet shaped Western Electric RA-1095 Amplifier described on the following page serves ideally both as a mounting for the 640AA Microphone and as a means of providing the unit with first stage amplification and polarizing voltage. Where a microphone boom or other similar device is used to direct the microphone toward a given sound source, the amplifier should be shock-mounted by means of soft springs or rubber supports to isolate the elements from possible mechanical vibrations which are likely to produce noise.

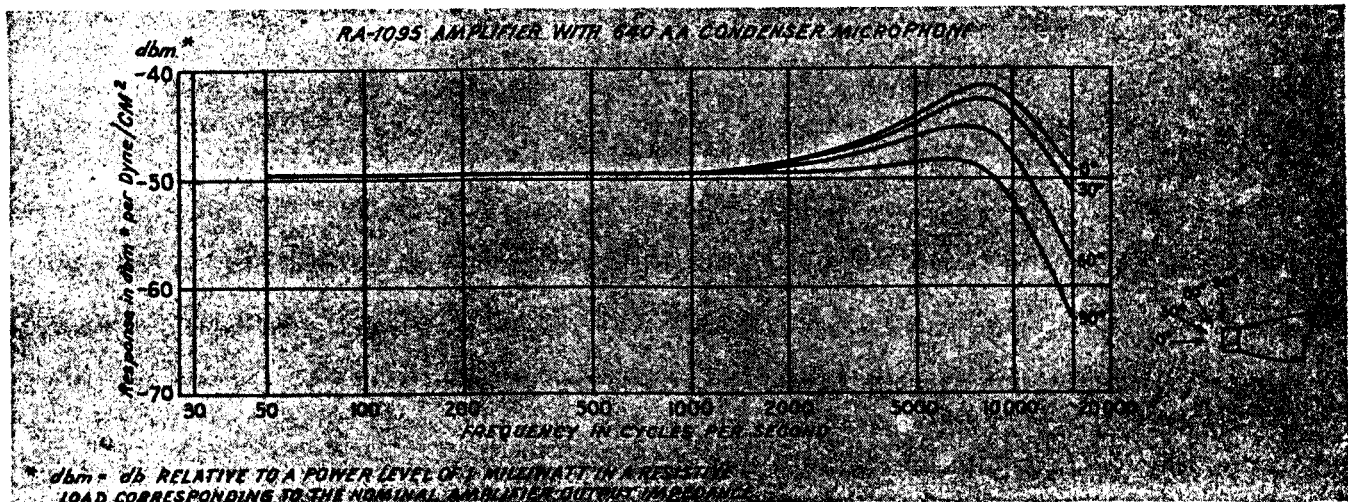


Figure 10 — Typical Free-Field Curve of 640AA Microphone mounted on the RA-1095 Amplifier.

# Western Electric

## AMPLIFIER RA-1095

**Use** — The RA-1095 Amplifier is a small, single stage amplifying unit developed especially for use with the 640 type Condenser Microphone.

**Description** — Streamlined in shape, this amplifier is approximately  $7\frac{3}{4}$ " long by  $2\frac{1}{2}$ " in diameter and weighs only  $1\frac{3}{4}$  lbs. All components are housed in a removable spun metal casing which is normally finished in bright chromium but can be obtained in a non-reflecting dark aluminum, wrinkle gray.

A threaded recess at the pointed end of the housing permits screwing the 640AA Microphone securely in place so that the two units present a uniform surface offering the least possible disturbance to the surrounding sound field.

The output level of this efficient combination for a given sound field is about 28 db higher than the 639 type high quality studio microphones and the signal-to-noise ratio compares favorably (see specifications). The frequency response characteristic of the amplifier is such as to assure optimum results from the use of the 640AA Microphone as an ultra-faithful pick-up device. The free-field frequency response characteristics for the combination are shown in Figure 10.

The amplifier is furnished complete with a selected 382A Vacuum Tube of the familiar "door knob" type. A row of terminals arranged alphabetically is provided on the outside of the amplifier base to permit strapping for different impedance conditions (see specifications). The amplifier case is designed to slip easily off the narrow end of the chassis frame to allow ready access to these connections.

### Features

- Designed specifically for 640AA Microphone.
- Ease of attachment.
- Ease of access to strapping arrangements.
- Variety of application.
- High signal-to-noise ratio.
- High output level for low sound field.
- Single stage amplifier.

### Specifications for the RA-1095 Amplifier

**Frequency Response:** See Curve Figure 10.

**Load Impedance:** 30-50 or 200-250 ohms.

**Operates From:** 640A or 640AA Condenser Microphone.

**Power Output Level:** Approximately  $-29.5$  dbm when used with the 640AA Microphone for a sound pressure of 10 dynes per square centimeter. Experience indicates that approximately ten dynes per square centimeter sound pressure is produced at conversational level three feet from microphone.

**Signal-to-Noise Ratio:** 85 db below 0.5 milliwatts measured with microphone elements replaced by shielded 45 micro-micro farad condenser.

**Distortion:** One per cent for an output of 0.5 milliwatts with a single fundamental frequency of 400 cycles. *Normal output level less than 0.0005 milliwatts.*

**Power Supply:** Quiet sources required for both filament and plate power.

*Filament:* 6.3 volts, 150 milliamperes, d-c.

*Plate:* 200 volts, 3 milliamperes, d-c.

**CAUTION:** *Plate voltages exceeding 200 volts should not be applied when the 640 type microphone is attached, as high voltages may damage the instrument.*

**External Connections:** Through 6 prong socket in base of Amplifier (Use Cannon 6 hole female plug P6-11). Suitable six conductor shielded cordage is available from our nearest distributor.

**Dimensions:** Approximately  $7\frac{3}{4}$ " long,  $2\frac{1}{2}$ " diameter.

**Weight:** Approximately  $1\frac{3}{4}$  pounds.

**Installation** — Because of the variety of applications for which this microphone is suited no mounting is supplied as a part of the amplifier. A shock-type mounting however should be used to insulate the microphone from the microphone support. Suitable mounting devices are available through our nearest distributor.

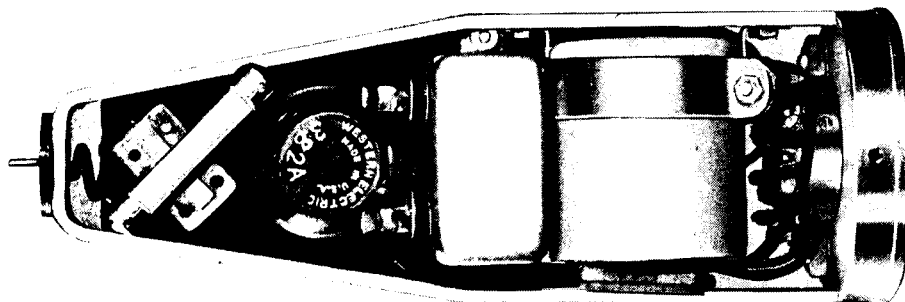


Figure 11 — RA-1095 Amplifier with Cover Removed.

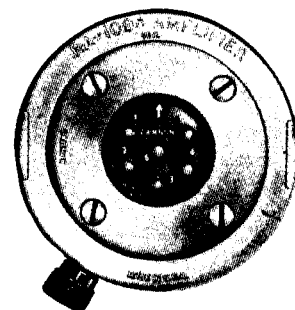


Figure 12 — Base of Amplifier Showing 6 Prong Socket.