INSTALLATION AND OPERATING INSTRUCTIONS

for the

ALTEC M11 MICROPHONE SYSTEMS

featuring the

ALTEC 21B MINIATURE CONDENSER MICROPHONE
THE M11 MICROPHONE SYSTEMS

M11A with 152A Cable Set
21B Microphone
150A Base
P518A Power Supply
152A Cable Set

M11A with 153A Cable Set
21B Microphone
150A Base
P518A Power Supply
153A Cable Set

M11B with 152A Cable Set
21B Microphone
150A Base
P519A Power Supply
152A Cable Set

M11B with 153A Cable Set
21B Microphone
150A Base
P519A Power Supply
153A Cable Set
ALTEC M11 MICROPHONE SYSTEMS

SPECIFICATIONS

FREQUENCY RANGE: 20 cycles through 15,000 cycles.
OUTPUT LEVEL: -48DB. re 1 milliwatt for a sound field of 10 dynes/cm².
DIRECTIONAL CHARACTERISTIC: OMNIDIRECTIONAL.
HUM PICKUP: Microphone not susceptible to magnetic fields.
LOW FREQUENCY CUT-OFF POSITIONS: 20 cycles, 40 cycles, 120 cycles.
OUTPUT IMPEDANCES: Nominal, 30 ohms, 250 ohms, 500 ohms.
RMA ratings, 38 ohms, 150 ohms, 600 ohms.
POWER REQUIREMENTS: 117 Volts, 60 cycles A.C.
ELECTRICAL CAPACITANCE OF 21B MICROPHONE: Approximately 6 micromicrofarads.
OUTPUT VOLTAGE OF 21B MICROPHONE ALONE (open circuit): Approximately -50 DB. re 1 Volt per
dyne/cm².
VACUUM TUBES: 1-6AU6.
RECTIFIERS: 1—Fansteel BC-029M. (Selenium dry disc type).
1—Fansteel ADL-22. (Selenium dry disc type).
150A BASE: Length, 8-3/16". Diameter at base, 1/4". Diameter at top, 13/16". Weight, 5/4 oz.
COMBINED LENGTH 21B MICROPHONE, 150A BASE AND 152A CABLE SET CONNECTOR: 11/2".
COMBINED LENGTH 21B MICROPHONE, 150A BASE AND 153A CABLE SET CONNECTOR: 10 3/4".
P518A POWER SUPPLY: Height, 7 1/2"; Width, 8 3/4"; Depth, 6"; Weight, 11 1/4 pounds.
P519A POWER SUPPLY: Height, 3 1/2"; Width, 19"; Depth, 6 9/16"; Weight, 11 1/2 pounds.
M11A SYSTEM: Weight (unpacked), 13 pounds 9 ounces.
M11B SYSTEM: Weight (unpacked), 13 pounds 9 ounces.
FINISH: 21B Microphone, bright steel; 150A Base, satins black; P518A and P519A, gray.
MOUNTING: 1/8" to 27 or suspension.
152A CABLE SET: Length with connectors, 25 feet; Weight, 1 pound 11 ounces.
153A CABLE SET: Length with connectors, 25 feet; Weight, 1 pound 11 ounces.
RR-6B9 MULTI-CONDUCTOR CABLE: Diameter, 9/32"; Weight per hundred feet, 5 pounds.

INTERCONNECTION OF COMPONENTS

The 21B Microphone is shipped in position on the
150A Base. Attachment is by threads on the outside of
the shell of the Microphone. Be sure the Microphone
is screwed tightly into position. Connection is made to
the inner shield and to the center terminal through
spring contacts. Connections should not be made by
other means. It is recommended that the 21B Micro-
phone be kept mounted on the Base at all times.
Connection between the 150A Base and the 152A or
153A Cable Set is made through Cannon P8 type locking
latch connectors. Normal precautions should be taken
in handling the cable so that it is not bent sharply as in
knotting, or abraded across sharp corners. Connection
of the cable to the P518A or P519A Power Supply is
made by inserting the P8 type Cannon connector into the
Power Supply receptacle marked "INPUT."
Connect the A.C. line to any supply of 117 Volts 60
cycle alternating current. Fuse protection is provided by
a .5 ampere type 3AG Littlefuse.

OUTPUT CONNECTIONS

The output of the M11 System appears at the end
2-conductor shielded cable. As shipped the M11
connected for 250 ohm output (RMA rating
150 ohms) Figure B shows connections for 30 ohms
(RMA 38 ohms), 250 ohms (RMA 150 ohms), or 500
ohms (RMA 600 ohms) output.

TERMINATION

The output of the M11 System is designed to connect
directly into either a resistive load equal to the nominal
output impedance or an input transformer whose sec-
dary side is terminated in a resistance of proper value.
When the microphone system is connected to an input
Transformer whose secondary is not terminated in a
resistor, it is necessary to either place a resistor of
proper value across the input transformer secondary or
to terminate the microphone system output as shown in
Figure B.
Failure to provide proper termination will usually
cause peaks in the frequency response at both high
and low frequencies. The degree of this distortion is
determined by the characteristics of the input transformer.
DISCUSSION OF M11 MICROPHONE SYSTEM
COMPONENTS AND THEIR FUNCTIONS

ALTEC 21B MICROPHONE

A cross-section diagram showing essential electrical and mechanical portions of the 21B Microphone is shown in Figure C. The essential parts, electrically, consist of a diaphragm and an electrode or backplate in close proximity. The backplate and diaphragm being closely spaced constitute an electrical capacitance which varies with microscopic mechanical deflection of the diaphragm caused by pressure variations in the sound wave. The backplate or center terminal is polarized with respect to the diaphragm through a very high resistance so that a fixed charge accumulates on the center terminal. As the sound pressure causes the capacity of the microphone to vary, the voltage between the center terminal and diaphragm also varies, the resulting signal being applied to the grid of a vacuum tube.

The surface of the diaphragm adjacent to the center terminal is formed of insulating material, eliminating the problem of electrical breakdown between these parts. The function of the inner shield which surrounds the center terminal is described in the discussion of the 150A Base.

THE 150A MICROPHONE BASE

The 150A Microphone Base encloses a vacuum tube whose function is to translate the voltage generated at extremely high impedances by the microphone to a nearly equal voltage at low impedance so that the signal can be faithfully transmitted over lengths of cable to subsequent apparatus. The circuit of the impedance translating tube in the 150A Base is shown in Figure D. The microphone backplate receives its polarization through the elevation of cathode voltage above ground potential. It is a property of the cathode follower circuit that its input impedance is extremely high whereas its output impedance is low. Also the effect of any capacity connected between cathode and grid is greatly reduced by the cathode follower action. Connection of the inner shield in this manner permits the microphone to be separated by a short distance from the vacuum tube. The extension between tube and microphone is intended to take the fullest advantage of the diminuitive size of the microphone by furnishing a minimum visual and acoustical obstacle size.
Since the impedance translating tube furnishes an electrical signal at a low impedance, about 1000 ohms, it is possible to transmit the signal to a considerable distance from the microphone. Furthermore, the resistors and condensers which supply the impedance translator can be located at the far end of the interconnecting cable. Therefore, the bulk at the microphone is reduced to the minimum consistent with reliable tube operation and with esthetic and operational considerations.

The Microphone Base may be separated by as much as 400 feet of cable from the Power Supply without encountering any difficulties. Beyond 400 feet larger conductors should be used for the heater leads to avoid excessive voltage drop.

The above cable sets are normally supplied in 25 foot lengths but may be had in any lengths on special order. The cable (Type RR6839) is also available separately. Cable construction is shown in Figure E and connection of the cable to the Cannon Plugs is shown in Figure F.

Signal transmission through this cable is equivalent to the use of coaxial cable. The three inner conductors which carry the signal have high capacity between them in the circuit. The outer conductors carry the other tube functions, all of which are at ground potential for signal. Therefore, the outer conductors serve to shield the inner, signal conductors.

### POWER SUPPLIES TYPES P518A AND P519A

These two power supplies are identical electrically, differing only in size and shape. The power supply furnishes the necessary plate and screen voltages and the heater current for the 6AU6 cathode follower impedance translator tube. The circuit of the power supply is shown in Figure G. Vacuum tubes are not used. Rectifiers are the selenium dry disc type which should operate without attention for many years.
The power supply also houses the components associated with the vacuum tube in the 159A Base together with the transformer through which the signal passes for transmission to following amplifiers or controls. While a cathode follower has a low output impedance it cannot be loaded with low values of resistance or impedance. Therefore, if the M11 Microphone System is to be operated into a mixer or into a preamplifier having an input transformer, the output transformer in the power supply is necessary.

If the M11 Microphone System is to be followed by a pre-amplifier in a permanent installation intervening transformers can be eliminated. In this case transmission should be directly from the cathode of the cathode follower through coaxial cable, then through a blocking condenser to the grid of the following amplifier.

**HUM BALANCE**

A screw driver adjustment for hum balance is accessible through a small hole in the front panel of the power supply. Experience to date indicates that this control is not necessary but it is provided as an added precaution in the event that it is needed under some unusual circumstances.

**LOW FREQUENCY CUT-OFF SWITCH**

The response of the condenser microphone inherently extends to very low frequencies. In some cases this is a disadvantage where rumblings at low frequencies are caused by ventilating systems or traffic. The low frequency cut-off switch located on the power supply reduces low frequency response at a rate of 6 DB per octave, being down approximately 6 DB at the frequencies indicated—20 cycles, 40 cycles, or 120 cycles. The 40-cycle position gives low frequency response at least equivalent to the best commercial microphones.

**SERVICE INSTRUCTIONS**

Difficulties with the M11 Microphone System are most readily diagnosed by means of voltage measurements using a high resistance voltmeter, (at least 10,000 ohms per volt).

**P518A Power Supply.** Remove the chassis of the power supply from its case. The chassis is attached to the front panel by four oval head screws and slides out when they are removed. This is most readily accomplished by laying the case on its back.

**P519A Power Supply.** Remove the front panel exposing the resistor board and components.

The power supplies will appear as shown in Figure H which shows the position of parts on the chassis with component values labeled. Typical operating voltages are shown.

With the Microphone System in operating condition, check voltages in the power supplies as shown. If voltages are abnormal, remove the microphone from the base. Unless the microphone needs repair all voltages should remain unchanged except for momentary surges. The input cable can be removed to check the power supply alone.

With the base and cable detached the heater supply voltage will rise to about 13 or 14 volts and the plate and screen voltages will rise to about 310 to 325 volts. No voltage will appear at the cathode since the 6AU6 Vacuum Tube is not connected and no current is flowing through its load resistor.

Assuming that the power supply alone is operating properly, add first the cable, then the base, then the microphone. Thus the component which is responsible
for difficulty can be isolated. Since voltage appears at
the cathode only when the 6AU6 Tube is operating, a
shorted blocking condenser connecting the cathode to
the transformer will not be detected except under oper-
ing conditions.

If the 150A Microphone Base is suspected after these
tests, (failure of cathode voltage to appear or failure of
the heater to draw current) the 6AU6 Vacuum Tube in
the 150A Base can be changed as follows:

Remove the 21B Microphone. Place the 150A Base on
its cable connector which makes a convenient withdrawal
tool. Remove the two oval head screws near the name-
plate. Grasp the cable connector firmly and gently
slide the exterior shell of the Base off of its interior
parts. The 6AU6 Vacuum Tube is now accessible for
replacement. Normally this tube should have a life
expectancy of two years or more operation. When
replacing the outer shell note that the nameplate should
be opposite the latch on the Cannon connector.

Do not attempt to make any adjustments or repairs
to the 21B Microphone. If the rear insulated portion has
accumulated dirt, it may be removed with a cotton swab
dampened, but not wet, with alcohol.

Complete repair facilities are available in either New
York or Hollywood.

GENERAL

We believe every facility has been provided to
permit you to obtain dependable, trouble-free opera-
tion while enjoying the high quality performance possi-
bilities of your Altec 21B Microphone. Enclosed with
these Instructions are some suggestions for use of the
microphone. We will appreciate hearing from users
with further suggestions for best results in order that
your experiences may be included in future issues of
our suggestions for use of these systems.

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* VOLTAGES MOUNTED WITH 150A MICROPHONE BASE DETACHED. ALL
VOLTAGES TO GROUND EXCEPT AS SHOWN.

FIGURE H
Altec model 21B omnidirectional capacitor microphone. (Courtesy Altec-Lansing)

**Altec 21B Capacitor Miniature Microphone**

The Model 21B *Altec Lansing* Omnidirectional Capacitor Microphone, Fig. 4-29, comprises the microphone assembly with base, which is essentially the housing for the associated vacuum tube and its circuits. In this design a glass-bonded mica, having a leakage resistance of more than 10^7 megohm is used as the insulator. The backplate structure, Fig. 14-30, consists of three stainless steel inserts: the backplate, the inner electrostatic shield and an outer threaded ring. The assembly is completely bonded under extreme pressure into one unit. The diaphragm is fabricated from a lamination of silicone and silica elements, held to thickness tolerances of 0.0002 in. The laminate structure upon completion is given a molecular coating of pure gold on one surface to form the necessary conductor. The diaphragm is pressure-held against a seating ring by a corrugated washer.

A sound-entrance channel, of 0.020 in. width, lies in a plane parallel to the diaphragm. This narrow slot aids in maintaining an omnidirectional pickup characteristic and provides complete mechanical protection for the diaphragm without creating any cavity resonances. The capacity of the microphone varies with sound pressures which actuate the diaphragm. This causes a corresponding change in voltage between the diaphragm and the backplate. The signal resulting is applied to the grid of the miniature 6AU6 at a termination of 10,000 megohms. The 6AU6 is used as an impedance matching tube in conjunction with a power supply as shown in Fig. 14-31. The backplate of the microphone gets its polarization through the eleva-
tion of the cathode voltage ground potential.

Selenium rectifiers provide necessary plate and screen voltages and the heater current for the 6AU6 cathode-follower tube. A matching transformer with a primary of 70,000 ohms is used to match the output of the 6AU6 to conventional loads of broadcast type preamplifiers. The sensitivity of the microphone extends well into the very low frequencies. As a matter of fact, it is only down approximately 3 db at 10 cycles. A switch mounted on the power supply reduces the low frequency response at the rate of 60 db per octave. The steps are 6 db at 20, 40 or 120 cycles. The sensitivity of the microphone is rated at -48 db below 1 milliwatt for a sound field of 10 dynes/sq cm at the transformer output. The open circuit voltage of the microphone is -50 db below a reference of 1 volt/dyne/sq cm, and the electrical capacitance is approximately 6 mmf.

One of the features of this small microphone is that the quality or frequency response remains unchanged at any distance from the sound source. The 21B microphone is ideally suited for one mike pickups and because of its compactness and shape is an outstanding type for television application.

STEVENS C-2S MICROPHONE SYSTEM

The Stevens Tru-Sonic Microphone (Fig. 14-32) eliminates conventional preamplifiers. The high efficiency necessitates no other amplification than the one-tube amplifier circuit incorporated in the Oscillator/Demodulator Unit to achieve an output of -15 dbm. when operated in the usual sound field of 10 dynes/cm². This level is equivalent to a ribbon microphone with a 40 db preamplifier.

Tru-Sonic Microphone systems operate on a principle which eliminates many of the disadvantages found in other types. It is set apart by the manner in which minute capacity changes in the diaphragm are utilized to control electri-
M-11 MICROPHONE SYSTEM

The M-11 Microphone System will continue to be available to those customers who prefer the graceful shape of the 150A Base to the compactness of the Lipstik type base. The M-11 System will incorporate the new 21C Microphone.

Components of the M-11 Microphone System are:
21C Condenser Microphone
150A Base
152A or 153A Cable Set
P-518A or P-519A Power Supply

NET PRICE: $230.00
Talent deserves
to be seen
as well as heard

ALL SOUND BY ALTEC
Microphones
Loudspeakers
Amplifiers

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