NEUMANN U64

linear admittance cardioid

CONDENSER MICROPHONE PROGRAM

NEUMANN
THE CONDENSER MICROPHONE SYSTEM
— ITS REAL MEANING

Condenser Microphones, for all their vaunted quality characteristics, such as wide and smooth frequency response and low distortion, are fundamentally simple devices in spite of their seeming complexity.

The various component parts which make up a condenser microphone system are detailed in this brochure as they pertain to the NEUMANN U-64. What is of utmost importance to a prospective condenser microphone purchaser is this fact: The condenser element is the microphone! Regardless of the shape, size or electronic techniques employed, all else is hardware. Even though cleverly engineered and precisely assembled, there is still relatively little genius needed in the design of the hardware aspect of condenser microphones. The expert knowledge, art and experience, particularly as practiced by the scientists and craftsmen of the Neumann Laboratories, lie in the province of the condenser element, the intrinsic microphone itself.

Certain microphone buyers erroneously have come to assume that the word "condenser" associated with a microphone is synonymous with ultimate quality. This rather widespread misconception has caused some buyers to be led astray, with resultant disappointment, from the real objective of quality by an intriguing use of hardware.

That NEUMANN does continue to develop new electronics is exemplified, in only one case, by the universally acclaimed U-67. However, the NEUMANN design philosophy will not permit microphone performance to be sacrificed, no matter how slight the degree, by associated electronic circuitry or components.

The NEUMANN U-64 condenser element depicted, and presently to be discussed in detail, is a particular example of NEUMANN dedication. During recent years there has been a marked obsession with hardware on the part of many condenser microphone manufacturers. Conversely NEUMANN directed itself toward effecting a major quality improvement where it REALLY counts — at the source. The result, the U-64 condenser element, gains NEUMANN a substantial lead in the field, so that you can expect to see this same condenser element for many years to come; indeed it may appear in different hardware dress, but only when such electronic developments can be accommodated without any sacrifice in quality.

WHERE IT ALL BEGINS — THE CONDENSER ELEMENT, AN INNOVATION

The U-64 condenser element basically consists of an extremely thin Mylar base material something less than 1/4" in diameter with a conducting surface of pure gold only molecules thick. The gold is applied by a vacuum evaporating process reflecting nearly 40 years of research, development and experience by the NEUMANN Organization. Immediately behind this membrane assembly is an acoustical phase shift network. The condenser element and acoustical delay network are so accurately engineered as to produce the true cosine function which mathematically defines the cardioid curve. Figure 1 displays the directional characteristic of the NEUMANN U-64 microphone at different frequencies. The cardinal direction of sound pickup is in line with the axis of the microphone, i.e. it is pointed at the source of sound. The frequency response of the U-64 microphone is charted in figure 2. The unusually flat frequency response to sounds at angles as much as 135 degrees from the front of the microphone, inspired the name LINEAR ADMITTANCE CARDIOID.
THE AMPLIFIER

TO PROVIDE A USABLE OUTPUT SIGNAL FROM THE CONDENSER ELEMENT

The principle function of the internal amplifier stage is to convert the extremely high impedance of the condenser element to a usable standard low impedance. This amplifier has little or no gain, as the actual signal output of the condenser element is many times the output of dynamic or ribbon type microphones.

The amplifier circuit uses the low noise type 7586 plug-in Nuvistor. As in all NEUMANN microphones, the audio circuit is complete within the microphone housing itself, including the astatically wound output transformer to avoid hum pickup. Operation of the microphone is permitted as much as 400 feet from the associated regulated power supply with no deterioration of quality.

A polarizing voltage of 51 volts D.C. is applied to the condenser element. This exceptionally low polarizing voltage, characteristic of all NEUMANN microphones, obviates many operational difficulties, such as humidity sensitivity, encountered with condenser microphones utilizing polarizing voltages of up to 200 volts.

Additional circuitry is furnished to provide a switchable 10 dB reduction in the signal level delivered by the condenser element prior to input to the impedance converting amplifier. This convenience permits close miking applications of the NEUMANN U-64 in high intensity sound fields without fear of microphone amplifier overload.

Interconnection between the microphone and its power supply is made by means of a 5 conductor shielded cable equipped with 5 pin XLR type connectors.

THE POWER SUPPLY

A NECESSARY ELEMENT IN ALL CONDENSER MICROPHONE SYSTEMS

The NEUMANN U-64 microphone program is the most versatile in adaptation to a wide range of varying microphone applications on the world market today. Four different power supplies are available, allowing multiple microphone users to gain a serious economic advantage over single system costs. The N6u is the basic power supply for one U-64, the N62u powers a pair of U-64's and the N66u powers six U-64's. The N66k power supply for six U-64's is a 19 inch rack mountable unit for permanently wired installations.

NEUMANN power supplies are all solid state, stabilized, and of etched circuit board construction. They are equipped with AC connectors, fuses, audio output and interconnecting cable connectors all of American types. Audio output impedance permits operation into American pre-amplifiers of from 30 to 250 Ohms input impedance.

The multiple power supplies have the additional safety feature that even in the event of a short circuit on one supply section, the operation of the other microphones is virtually unaffected; cross talk between supply circuits is more than 120 db down.

PARTICULAR ADVANTAGES AND APPLICABILITY

The U-64 is an especially useful microphone for a large variety of applications, from moderately close miking conditions using the acoustic foam anti-pop screen furnished, to distant miking applications such as suspending microphones in auditoriums.

The frequency response of the NEUMANN U-64 microphone exhibits a slight drop below 40 cps to compensate for the normal bass rise at close range typical of all pressure gradient microphones. At the high frequency end, the response shows a rise of approximately 2.0 dB to overcome the usual deficiency in high frequencies due to room absorption of the distant (or reverberant) sound field.
A wide variety of accessories for special operating conditions are available in the NEUMANN U-64 microphone program as listed below.

<table>
<thead>
<tr>
<th>Accessory</th>
<th>Description</th>
<th>Price</th>
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<tbody>
<tr>
<td>Z-118</td>
<td>Wind screen — for outdoor application</td>
<td>$17.50</td>
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<tr>
<td>EA-21</td>
<td>Elastic suspension — for effective isolation from mechanical shock</td>
<td>$15.00</td>
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<tr>
<td>Z-68</td>
<td>Auditorium cable hanger — permits a microphone to be adjusted to any angle while suspended by its own cable</td>
<td>$9.50</td>
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<tr>
<td>ST-100</td>
<td>Small collapsible tripod plastic table stand, with swivel</td>
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<tr>
<td>UC-11</td>
<td>Extension cables — available in standard lengths of 25, 50, or 100 feet</td>
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<tr>
<td>UC 11/25</td>
<td>25 ft extension cable</td>
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<td>UC 11/50</td>
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<tr>
<td>UC 11/100</td>
<td>100 ft extension cable</td>
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<tr>
<td>Bulk cable</td>
<td>For cables of special lengths, compute at 20¢/ft above basic price UC-11/25</td>
<td>at 20¢/ft</td>
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U-64 systems can be ordered complete as such or in various combinations. Multiple systems may be purchased with fewer than the full microphone complement for later completion. The following table lists all individual U-64 components and prices.

**TABLE OF U-64 COMPONENTS**

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<td><strong>SYSTEMS</strong></td>
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<tr>
<td>U-64-6P</td>
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<tr>
<td>U-64-6R $1560.00</td>
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In ordering multiple systems less certain components, add the individual prices of only those components wanted to arrive at total price.

Prices are professional net delivered and are available through franchised NEUMANN microphone dealers in the United States and Canada. Multiple systems are available to recognized sound contractors under special conditions.

**RELATED NEUMANN MICROPHONES EMPLOYING THE SAME CONDENSER ELEMENT**

The KM-64 miniature condenser microphone is nearly identical in appearance and operation to the U-64. It differs in that it employs the low filament current AC-701k triode rather than the type 7586 Nuvistor used in the U-64. The connector is the familiar 6 pin miniature Tuchel permitting use with existing NEUMANN NKM power supplies and Nagra tape recorders. Furthermore the KM-64 can be powered from the NEUMANN BB-12 miniature transistorized battery supply. The KM-64 is available as microphone only or as a complete system. The cost is moderately higher than the U-64.

The SRM-64 stage microphone is an execution of the KM-64 with amplifier located in the base of a specially constructed stand. The condenser element is connected to the amplifier input by a long coaxial tube sliding within the stand to permit a wide range of height adjustment. Overload protection is not provided. Price is somewhat higher than KM-64.
A VARIETY OF
PRACTICAL
APPLICATIONS

Illustrated are certain specific applications of NEUMANN U-64 systems together with key components supplied with each system.

THEATRES, AUDITORIUMS AND MUSIC CENTERS

For theatre footlight usage or for suspension in large halls where quality sound and numerous microphones are the requirement, the U-64-6R system for permanent wiring including the N66k power supply illustrated and six U-64 microphones provide a perfect solution at an attractive per microphone cost figure. If permanent wiring is not contemplated, the U-64-6P with 6 way portable power supply N66u is equally applicable and provides portability as well.

SPEAKER'S ROSTRUM AND STEREO

For ultimate reliability necessitating a pair of microphones for sound pickup, or to provide two separate feeds, the NEUMANN U-64-2 dual microphone system with N62u power supply illustrated and two U-64 microphones is ideal at a considerable saving over the cost of two single systems. The stereo possibility with the U-64-2 system is obvious. However, it may not be so apparent to the prospective buyer of his first pair of NEUMANN microphones that precision manufacture and rigorous quality control obviate the need for matching of microphones. All microphones of one type manufactured by NEUMANN are matched most accurately as a matter of production technique.

RADIO STATION ANNOUNCE POSITIONS

Using the acoustic foam anti-pop screen supplied, a single NEUMANN U-64 system furnishes a station with improved quality where it counts most — where it begins. Announcers need no longer sound less live than the recorded material. Employing only the necessary cardioid pattern, the U-64 completely satisfies announce requirements, and the on-air quality improvement is noticeable to listeners with even the smallest of receivers. Illustrated is the single U-64 system with included acoustic foam anti-pop screen.

RECORDING AND TELEVISION STUDIOS

Used on boom or stand for medium distance as well as more distant microphone placement, the U-64 microphone program finds versatile application. The name NEUMANN is a household word in the Phonograph Record Industry and among independent recording studios and TV networks. NEUMANN represents a standard of quality by which other microphones and recording equipment are measured. A single U-64 system is illustrated.

PLACES OF WORSHIP

At the pulpit or suspended, the NEUMANN U-64, in single or multiple systems, can provide the quality sound now demanded in these usually troublesome sound applications. In fact, many churches faced with difficult acoustical problems, appearing to require a completely new sound installation throughout, have found a simpler and more economical solution in replacing their old microphones with NEUMANN microphones. The rest of the equipment then proved perfectly satisfactory. Illustrated is the N62u dual power supply with one U-64 on the Z-68 accessory auditorium hanger and one U-64 with Z-118 wind screen.
NEUMANN
U64
TECHNICAL
DATA

MICROPHONES

Acoustic Operation: Pressure gradient transducer
Frequency Response: 40 — 18,000 Hz
Condenser Element:
Construction: Vacuum gold deposited Mylar with acoustical delay network
Capacitance: App. 35 pF
Directional Characteristic: Cardioid
Overload Protection: Built-in 10 dB switchable
Total harmonic distortion: \(\leq 0.5\%\) to 120 dB SPL, to 130 dB SPL with overload protection
Effective Output Level: \(-43\ dBm\) re 10 dyn/cm^2 or \(-137\ dBm\) EIA Gm rating
Unweighted Noise: \(\leq 17\ \text{MicroVolts across 1KOhm}\)
Weighted Noise: \(\leq 29\ \text{Phon (Equivalent to 91 dB S/N ratio re 0.5% THD)}\)
Output Impedance: 150/250 Ohms nominal, 30/50 Ohms at slight reduction in output level
Gain of Amplifier at 1 KC: App. \(-25\ dB\)
Amplifier Complement: 1 Type 7586 Nuvistor, available locally
Connector: 5-pin XLR type
Included Accessories: Acoustic foam anti-pop screen
Finish: Matte satin chrome, or non-reflecting dark gray (special order)
Size and Weight: \(\frac{3}{4}"\) diameter x \(4\frac{1}{2}"\) long, \(3\frac{1}{8}\) oz.

POWER SUPPLIES

Audio Output Connector: 3 Pin XLR type (not on N66k)
Mains Voltages: 117/127/220/240 Volts — 50/60 Hz
Fuse: 100mA at 117/127 Volts
Power Consumption: N6u — 10 VA
DC Voltages: 6.2V (135 mA), 120V (0.9 mA)
Noise Voltages: \(\leq 0.4\ mV, \leq 0.7\), respectively
Included Accessories: AC power cord, Mating XLR connectors (except with N66k)
Finish: Hammer tone gray
Size and Weight: N6u Single U-64 Portable Size 8\(\frac{3}{4}"\) x 4\(\frac{1}{4}"\) x 4", 4 lbs.
N62u Dual U-64 Portable Size 8\(\frac{3}{4}"\) x 4\(\frac{1}{4}"\) x 4", 7 lbs.
N66u six U-64 Portable Size 19\(\frac{1}{2}"\) x 3\(\frac{3}{4}"\) x 7", 9 lbs.
N66k six U-64 Rack Mount Supply Size 19\(\frac{1}{2}"\) x 3\(\frac{3}{4}"\) x 6\(\frac{1}{4}"\), 7 lbs. 3 oz.