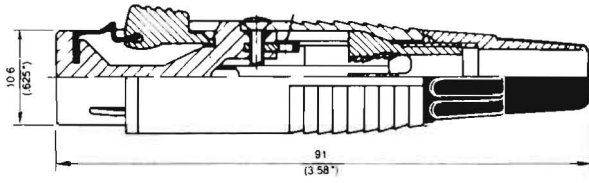


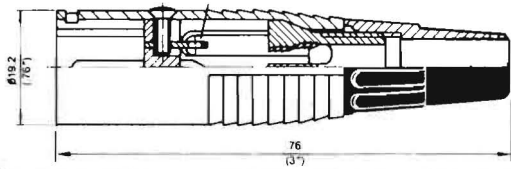
# CONNECTORS

**“THE SWISS CONNECTION”**

## PROFESSIONAL XLR-TYPE CABLE CONNECTORS



NC\*FC Female

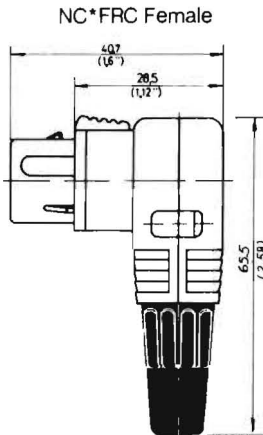


NC\*MC Male

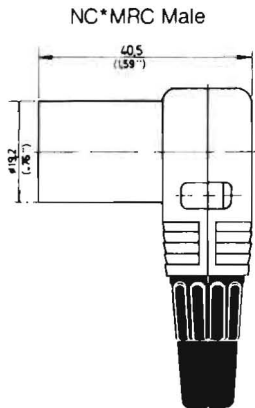
These remarkable connectors are simple to disassemble and reassemble. It is not necessary to remove the flex relief, simply push cable through flex relief and the internal chuck-type cable clamp. After soldering, the contact insert is pushed into the housing and screw fastened. The flex relief is turned clockwise, tightening the chuck around the cable.

The conductive shells are made of a select, tough alloy which is satin-nickel or black-chrome finished. Inserts are fiberglass reinforced high-temperature hard plastic. Durable alloy pins and sockets are either silver or gold plated. Connectors are available in 3, 4, 5 or 6 pin configurations.

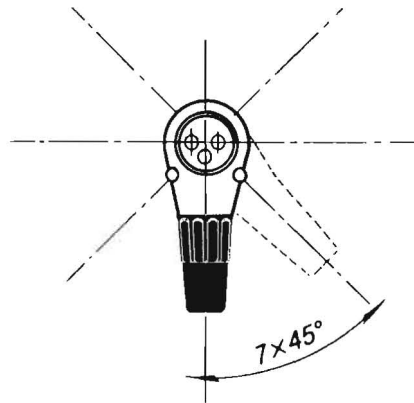
## PROFESSIONAL XLR-TYPE RIGHT-ANGLE CABLE CONNECTORS



NC\*FRC Female



NC\*MRC Male

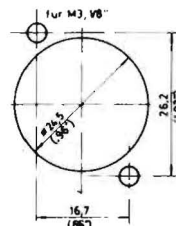
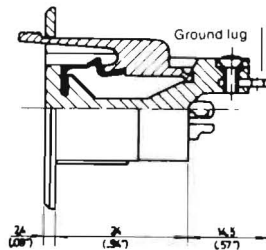
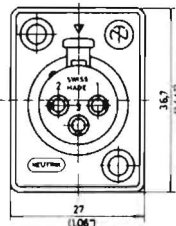


Compact right-angle connector, low-profile, 7 x 45° indexing of main body allows highest packing density.

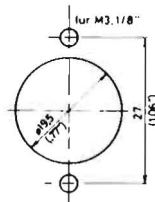
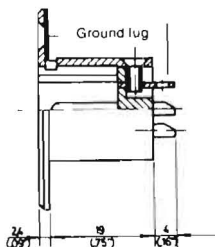
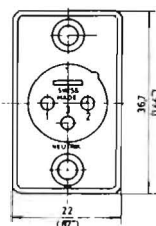
Available in 3, 4, 5 or 6 pin configurations, silver or gold plated contact pins.

## PROFESSIONAL XLR-TYPE PANEL RECEPTACLES

NC\*FP female



NC\*MP male



Construction details, materials and specifications similar to cable connectors above.

Standard, compatible mounting hole sizes.

Available in 3, 4, 5 or 6 pin configurations, silver or gold plated contact pins.

\*When ordering, in place of asterisk (\*) insert 3, 4, 5 or 6 to indicate number of contacts. Each of the above is available in a variety of finish and contact plating.

### Housing Finish/Contact Plating

Nickel / Silver  
Black Chrome / Silver  
Black Chrome / Gold

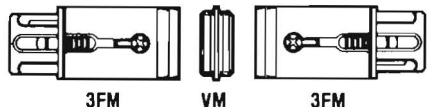
### Model # Suffix

none (standard)  
BAG  
B

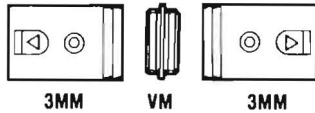
### Example Model #

NC3FC  
NC3FC-BAG  
NC3FC-B

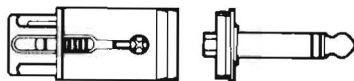
## SUGGESTED MODULAR COMBINATIONS



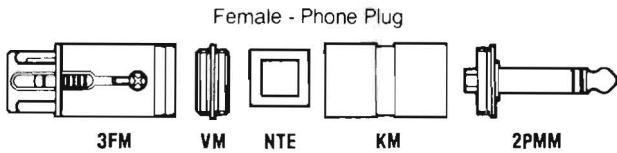
Female - Female



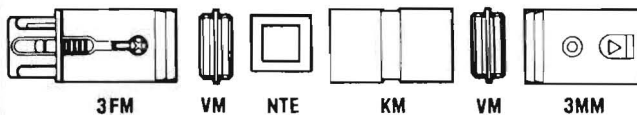
Male - Male



Female - Phone Plug



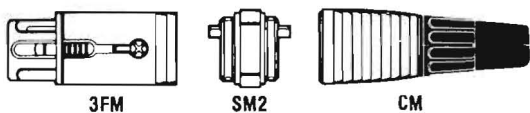
Female - Phone Plug with Transformer



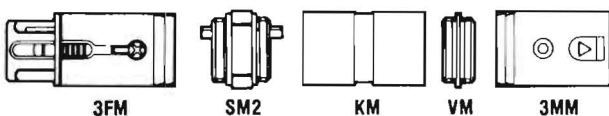
Female - Male, with Transformer



Phone Plug with Transformer

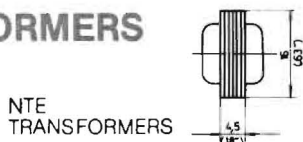


Female Connector, with Switch / remote start-stop, etc.



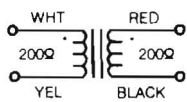
Switch-selected pad or Transformer, amplifier, equalizer, filter, etc.

## TRANSFORMERS



NTE TRANSFORMERS

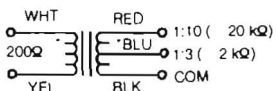
NTE-1 (red)  
Ratio 1:1 (200Ω:200Ω)  
Bandwidth: 30 Hz - 40 kHz



NTE-4 (yellow)  
Ratio 1:4 (200Ω:3 kΩ)  
Bandwidth: 30 Hz - 40 kHz



NTE 103 (orange)  
Ratio 1:3/1:10  
(200Ω:20kΩ/2 kΩ)  
Bandwidth: 30 Hz - 90 kHz



## FLEXIBLE MICROPHONE SHAFTS

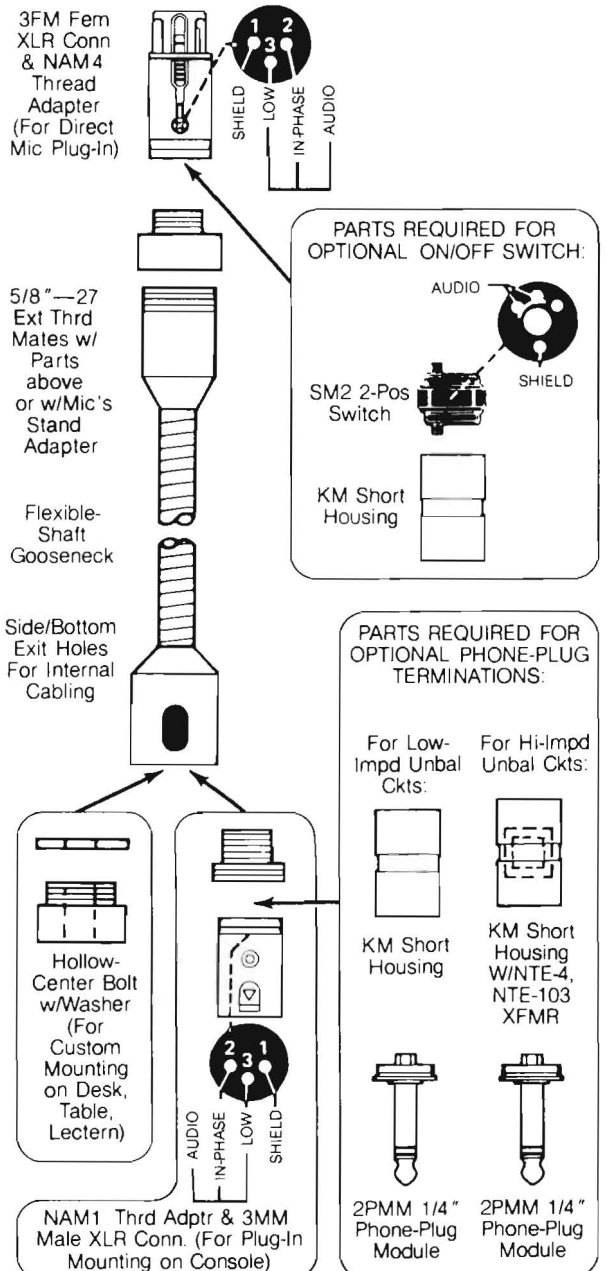
GN- 7E: 7 inches long  
GN-14E: 14 inches long  
GN-20E: 20 inches long  
GN-7E & GN-14E also available in black finish (add suffix BLK)

### TECHNICAL DATA

	GN-7E	GN-14E	GN-20E
Length (to top seating plane)	163mm (6-7/16")	341mm (13-7/16")	494mm (19-7/16")
Net Weight (gooseneck only)	115g (4oz)	200g (7oz)	425g (15oz)
Max. Permissible Mic Weight (with gooseneck on horizontal surface)	450g (16oz)	255g (9oz)	450g (16oz)
Gooseneck Diameter:	11mm	11mm	15mm

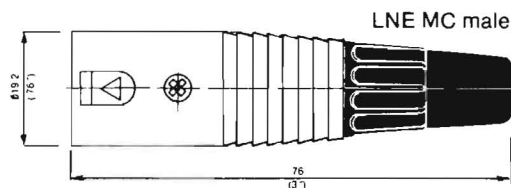
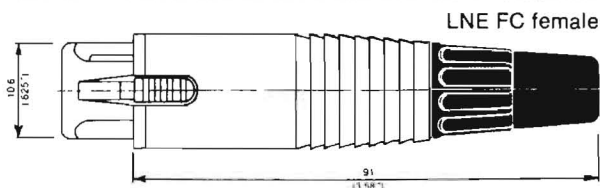
The GN-Series Flexible-Gooseneck kits (GN-7E 7-inch unit, GN-14E 14-inch unit and GN-20E 20-inch unit) offer an unprecedented degree of versatility in mounting microphones to suit a wide range of applications. As shown in the assembly diagram below, each kit consists of interchangeable modules - mating parts that may be threaded and wired together in various combinations to create several different physical and electrical configurations.

STD PARTS W/KIT (XLR PINOUT SHOWN ARE WIRING VIEW):



The goosenecks are supplied complete with male & female 3-pin XLR-type adapters and a hollow bolt for tabletop mounting and NAM 1, NAM 4 adapters. For details, ask for engineering data sheet.

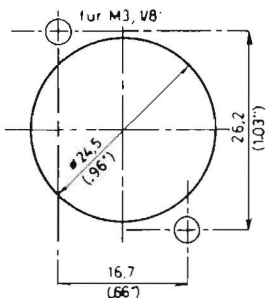
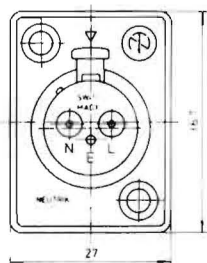
## "LNE" A.C. CABLE CONECTOR, XLR-TYPE



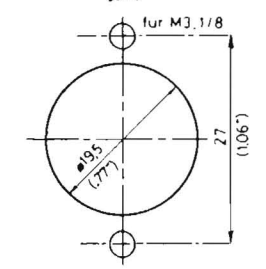
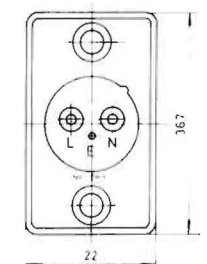
## "LNE" A.C. PANEL RECEPTACLE, XLR-TYPE

The LNE series is a compact size, heavy duty a.c. connector with superior mechanical ruggedness and firm, positive locking feature.

LNE FP female



LNE MP male



### Electrical Data

Number of contacts: 2 + PE (hot, neutral, ground)  
 Operating voltage: 250 VAC/120 VAC  
 Rated current (20°C): 6A  
 Test voltage (IEC 65): 4240 V/peak  
 Insulation resistance (after 48H, 30°C, 95%rh): > 10<sup>9</sup>Ω  
 Contact resistance: < 3mΩ  
 Flammability UL94: V-0  
 Operating temperatures: -40 ÷ +65°C

### Materials

Contact material: CuZn40Pb3  
 Contact plating: gal Ag, 3um  
 Contact insert material: PBTP gr, red  
 Shell: die-cast zinc  
 ZnA14CuI, gal Cu, Ni  
 Spring-Steel, CK60  
 POM  
 PU (red)

### Latchlock:

Cable clamp:

Strain relief bushing:

### Dimensions

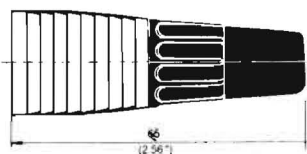
Cable diameter (special version): 3.8 ÷ 7.5 mm (6 - 8mm)  
 Max. wire size: 0,5mm<sup>2</sup> (AWG 20)

### Right angle cable connectors:

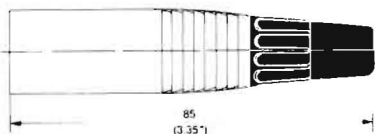
LNE-FRC - female, nickel finish  
 LNE-MRC - male, nickel finish

UL listed E83054

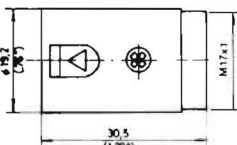
## CONNECTOR MODULES AND ADAPTERS



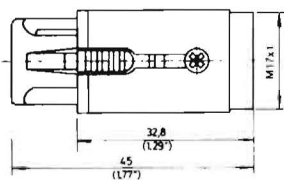
Cable Module  
 CM Nickel  
 CMB Black Chrome



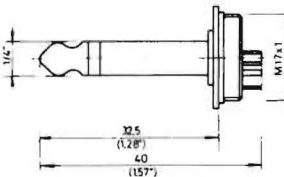
Cable Module, long  
 CML Nickel  
 CMBL Black Chrome



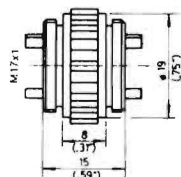
Three Contact Male  
 NC3MM Nickel/Silver contacts  
 NC3MM BAG Black Chrome/Silver  
 NC3MM B Black Chrome/Gold



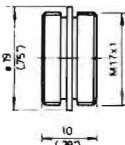
Three Contact Female  
 NC3FM Nickel/Silver contacts  
 NC3FM BAG Black Chrome/Silver  
 NC3FM B Black Chrome/Gold



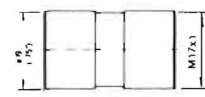
Phone plug  
 NP2PMM 2 circuit (mono)



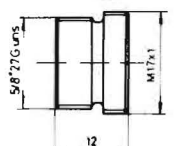
Switch Module  
 SM2  
 2 position (SPDT) Black



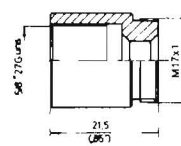
Connecting Module  
 VM Silver  
 VMB Black



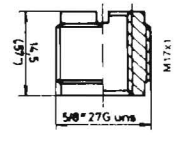
Housing Module  
 KM Nickel  
 KMB Black Chrome



Thread Adapter  
 NAM-1  
 M17X1 external  
 5/8" 27 tpi external

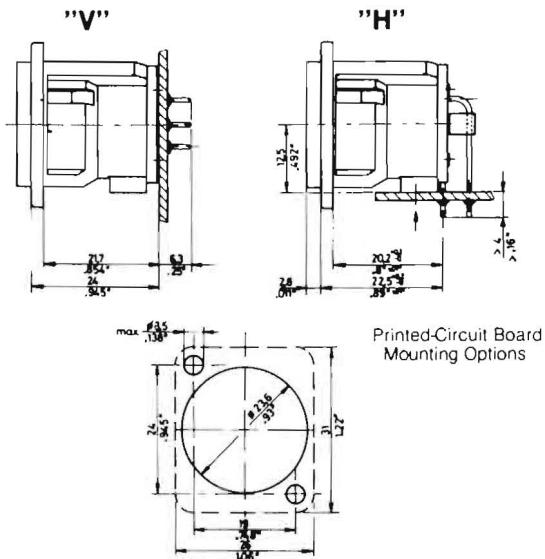


Thread Adapter  
 NAM-4  
 M17X1 external  
 5/8" 27 tpi internal



Thread Adapter  
 NAM-5  
 5/8" 27 tpi external  
 3/8" internal

## "D" SERIES XLR-TYPE RECEPTACLE; UNIQUE PRINTED CIRCUIT MOUNT



A completely new concept for modern assembly methods.

- insert mounts on PC board, shell mounts on panel
- insert mates with shell from rear and is locked from front without any screws, using only a 2 mm (0.08") screwdriver
- same housing used for both male and female versions
- requires less panel space (1.06" x 1.22") (26 x 31 mm)
- complete PC board with inserts attached may be repeatedly removed and re-installed for service purposes without removing the shells or any fasteners
- for vertical (V) or horizontal (H) PC boards
- connectors may be used to retain the PC board in the chassis without strain on the solder pads (self-tapping) 2.2 mm / 3/32" screws)
- complete RF shielding via 3-point coaxial ground contact to shell of mated connector
- locking or non-locking versions available
- available in three-pin version only

### Horizontal PCB (Right angle leads)

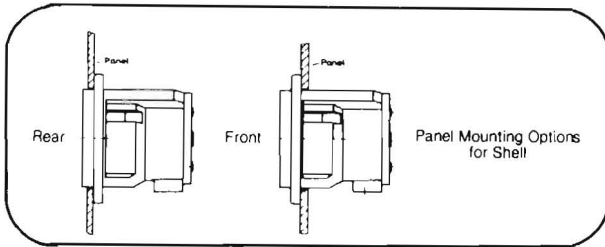
NC3FD-H	Female	} Nickel Housing
NC3MD-H	Male	
NC3FD-H-BAG	Female	} Silver Contacts
NC3MD-H-BAG	Male	
		} Black-Chrome Housing
		} Silver Contacts

### Vertical PCB (Straight leads)

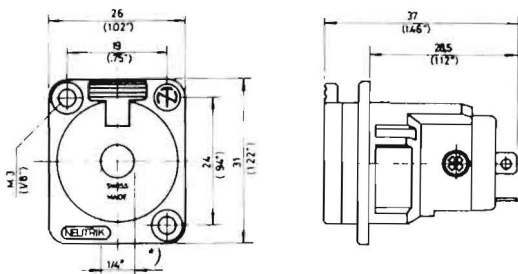
NC3FD-V	Female	} Nickel Housing
NC3MD-V	Male	
NC3FD-V-BAG	Female	} Silver Contacts
NC3MD-V-BAG	Male	
		} Black-Chrome Housing
		} Silver Contacts

### Solder Lug Version

NC3FD-L	Female	} Nickel Housing
NC3MD-L	Male	
NC3FD-L-BAG	Female	} Silver Contacts
NC3MD-L-BAG	Male	
		} Black-Chrome housing
		} Silver Contacts

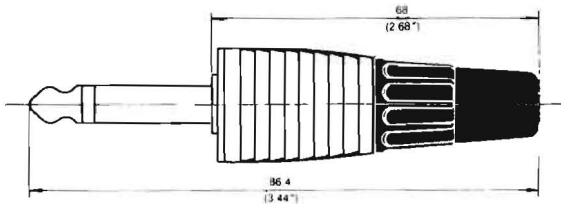


## PROFESSIONAL LOCKING PHONE JACK AND HEAVY DUTY PHONE PLUG.



Professional, locking Phone Jack. All three contacts silver-plated, spring-loaded (CuBe) and isolated from housing. (Removal of red insulating shoulder washer from insert retaining screw will ground "sleeve" contact to housing.) Die-cast housing, dimensionally compatible with Neutrik "D" Connectors. Solder termination. Mates with all 1/4 inch 2- and 3-circuit Phone Plugs.

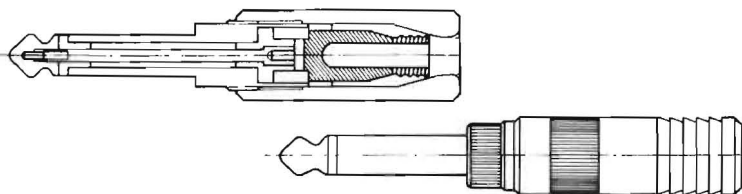
NJ3FP6C:	Nickel Housing
NJ3FP6C-BAG	Black-Chrome Housing



Professional 2-circuit (mono) Phone Plug with nickel-plated steel shaft. Same cable chuck/flex relief system as used in NEUTRIK XLR-type cable connectors.

NP2MC:	Nickel Housing
NP2MC-BAG:	Black-Chrome Housing

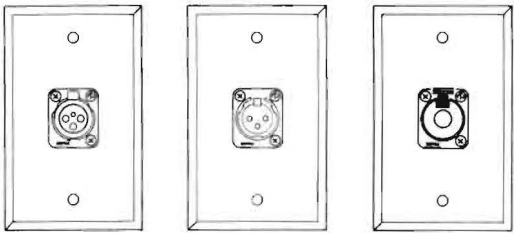
## PROFESSIONAL (ALL METAL) PHONE PLUG



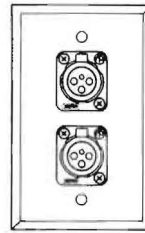
Professional 2-circuit (mono) and 3-circuit (stereo) phone plugs. All-metal construction with chuck-type strain relief system. For positive cable grip without damage and ease of assembly.

NP2C - Mono, Nickel Finish
NP3C - Stereo, Nickel Finish

## WALL MOUNTING PLATES



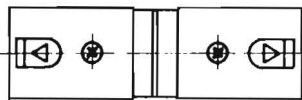
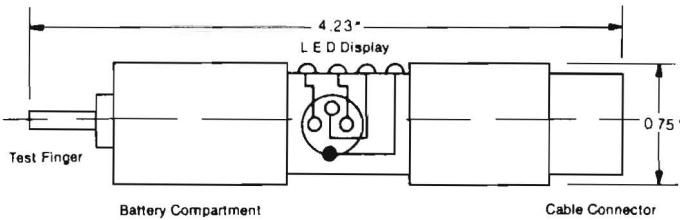
**Single gang box with single receptacle**  
 103F Female, NC3FD-L  
 103M Male, NC3 MD-L  
 103P Lockable phone jack, NJ3FP6C



**Single gang box with dual receptacles**  
 203F 2X female, NC3FD-L  
 203M 2X male, NC3MD-L  
 203FM female/male, NC3FD/NC3MD  
 203P 2X lockable phone jack, NJ3FP6C

Custom made configurations of the above and in combination with 4, 5 and 6 pins standard XLR-types are available upon request.

## CABLE TESTER "K-CHECK"



**NAM8 BAG**  
 3-pin XLR-Male Connector  
 3-pin XLR-Male Connector



**NAM9 BAG**  
 3-pin XLR Male Connector  
 Phone Jack, 1/4", 3 circuit

The K-Check consists of a test finger, battery compartment (containing 5.6V mercury battery), an LED-Display and a 3-contact female XLR-type connector. Each red LED is keyed to a corresponding contact ("pin number") in the female connector. Connection between the test finger and any contact in the female connector will cause the appropriate red LED to light. Connection between the test finger and the shell (housing) of the female connector (or any connector plugged into it) will cause the green (ground) LED to light. If connection is made to two or more contacts in the female connector, LED's will light for each contact involved. It is easy to see how this can speed cable testing.

## NEUTRIK CONNECTORS



QUALITY · RELIABILITY · DEPENDABILITY



**NEUTRIK**

**NEUTRIK PRODUCTS**  
 77 SELLECK STREET  
 STAMFORD, CT. 06902 (203) 348-2121

*Product design and prices are subject to change without notice.*

**"THE SWISS CONNECTION"**  
 Distributed by:

#### INTRODUCTION

The Neutrik K-Check is a highly useful service aid designed for fast and efficient testing of audio cables and connectors, and the input circuits of audio electronics. Although exceptionally easy to use, the K-Check is nonetheless quite versatile — in addition to *basic continuity*, it also indicates *relative impedance* and *series capacitance* in any circuit under test. Compact, lightweight and battery-powered, the K-Check can be carried and used anywhere. It will fit in a shirt pocket, belt holster or tool kit — and is equally effective on location, in the studio, on a production line or at a test bench.

#### DESCRIPTION

As shown in the upper photograph, the K-Check consists of a test probe, a battery compartment, a three-contact female XLR-type connector, an accessory plug-in test lead and a four-LED test display. The essential features and functions of these elements are as follows:

For positive, non-slip contact with both male and female XLR-type connectors (and other types of connectors and leads as well), the K-Check's test probe has a concave tip and a 2.4-mm ( $\approx 0.094$ -in.)-diameter shaft. The probe may be unscrewed, when necessary, to reach the battery compartment just behind it. (See the Battery Loading/Replacement section for details.)

The K-Check's three-contact female XLR-type connector serves as a convenient test interface with cables that have a corresponding male XLR-type connector at one end. The plug-in test lead is intended for use with cables that do *not* have the necessary male XLR-type connector, or for general-purpose continuity testing with the K-Check.

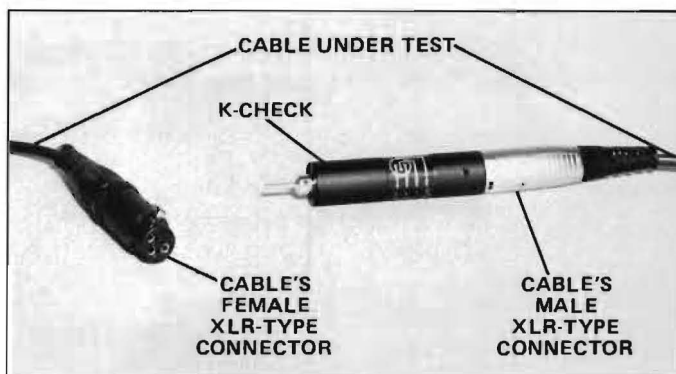
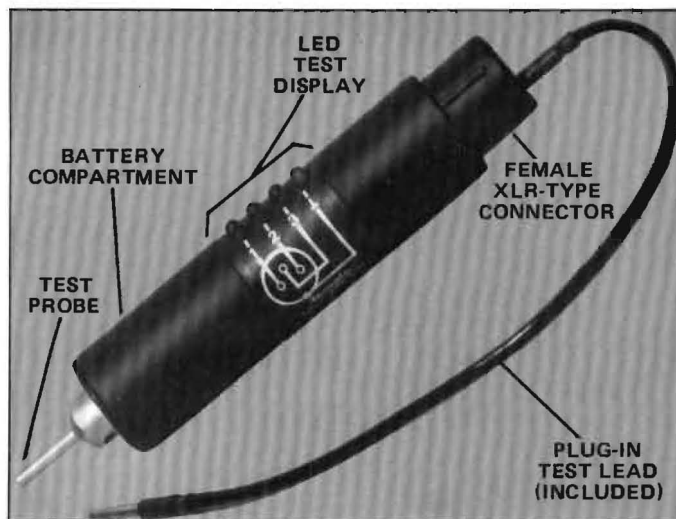
Each red LED in the K-Check's test display is numerically keyed to a corresponding contact (1, 2, 3) of the K-Check's female XLR-type connector; the green LED corresponds to the shell (housing) of the connector. Whenever the circuit between the K-Check's test probe and any contact(s) on its female connector is *externally* completed (via the cable, connector or circuit under test), the corresponding LED(s) will light. *The relative brightness and/or duration of each LED's indication signifies the following circuit conditions:*

- **Bright:** direct connection between two points under test.
- **Dim:** low or medium impedance between two points under test.
- **Dark:** high impedance ( $\geq 10k$  ohms) or open circuit between two points under test.
- **Flash:** normally, series capacitor between two points under test (flash duration proportional to circuit time-constant).

#### OPERATION

The K-Check's inherent versatility should now be readily apparent. Thus, various types of cables, connectors and input circuits can be speed-tested as follows:

**CABLES W/THREE-PIN MALE XLR AT ONE END:** As shown in the lower photograph, simply plug the cable's male connector into the K-Check's female connector. Then, at the other end of the cable, touch the K-Check's test probe to each contact (and shell) of the cable's connector. For each contact touched, monitor the K-Check's corresponding LED(s) for the appropriate indication.



**OTHER TYPES OF CABLES:** If the cable under test does *not* have a male XLR-type connector at one end, use the plug-in test lead included as a link between any contact of the K-Check's female connector and each contact at one end of the cable. Then, at the other end of the cable, use the K-Check's test probe and LED test display to indicate continuity. For faster testing of cables having female XLR-type connectors or 1/4-inch phone plugs at *both* ends, the NAM-8 and NAM-9 adapters, respectively, are available as optional accessories. (See the Technical Data section and appropriate photographs for further details.)

**INPUT CIRCUITS:** Inputs of amplifiers, consoles, mixers, tape recorders and the like may be tested to determine if they are balanced or unbalanced, and low or high in impedance. Simply check continuity between the various contacts of each input connector, and between the various contacts and the chassis (ground) of the unit under test. Again, the plug-in test lead included will be required for doing this. If the input connector is a 1/4-inch phone jack or RCA-type pin jack, we suggest that you make a short adapter cable for faster testing. The adapter cable should have the appropriate phone plug or RCA-type plug at one end and a three-pin male XLR-type connector at the other end (to mate with the K-Check's female connector).

**CAUTION:** To protect the K-Check and the unit under test from possible damage, do *not* test any inputs while power is applied to that unit.

## BATTERY LOADING / REPLACEMENT

The K-Check uses a PX-23 5.6-volt mercury photographic-type battery which should last for two or more years under normal use. To load the battery (or replace it with a fresh one), first unscrew the K-Check's test-probe assembly. (If the assembly is fastened too tightly to be unscrewed by hand, insert one end

of the included plug-in test lead into the hole on the test probe's chuck, and use the tip of the lead as a torque lever.) Next, load the battery into the K-Check's battery compartment with its positive (+) terminal facing *out*. Then screw the test-probe assembly back onto the K-Check.

## TECHNICAL DATA

### Built-In Test Fittings:

2.4-mm ( $\approx 0.094$ -in.)-diameter concave-tip test probe at one end; three-contact female XLR-type connector at other end

### Four-LED Test Display:

Red LEDs "1", "2" and "3" correspond to contacts 1, 2 and 3 respectively of mated male XLR-type connector on cable under test

Green LED corresponds to shell or housing of mated male XLR-type connector on cable under test

### Test-Display Indications (each LED):

Bright: direct connection between two points under test

Dim: low/medium impedance between two points under test

Dark: high impedance ( $\geq 10k$  ohms) or open circuit between two points under test

Flash: normally, series capacitor between two points under test (flash duration proportional to ckt time-constant)

Battery Required: One PX-23 5.6-volt mercury photo type

Estimated Battery Life:  $\geq 2$  years under normal use

Case Material: Aluminum with matte-black finish

Overall Dimensions (including test probe and female XLR-type connector): 120 mm ( $\approx 4\text{-}3/4$  in.) long x 22 mm ( $\approx 7/8$  in.) in diameter

Net Weight (less battery): 80 g ( $\approx 2\text{-}3/4$  oz)

### Included Accessories:

PX-23 5.6-volt mercury photographic-type battery

200-mm ( $\approx 7\text{-}7/8$ -in.)-long plug-in flexible test lead with male XLR-type pin at each end

### Optional Accessories (photographs below):

NAM-8 adapter for testing cables with female XLR-type connectors at both ends (adapter has three-pin male XLR-type connector at each end)

NAM-9 adapter for testing cables with 1/4-in. phone plugs at both ends (adapter has three-pin male XLR-type connector at one end, three-contact 1/4-in. phone jack at other end; XLR-type connector's pins 1, 2 and 3 internally connected to phone jack's sleeve, tip and ring respectively)

## OPTIONAL ACCESSORIES

NAM-8 TEST ADAPTER



NAM-9 TEST ADAPTER



22-1281-10MI



## NEUTRIK PRODUCTS

A NORTH AMERICAN PHILIPS COMPANY

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# NEUTRICON™

## CIRCULAR CONNECTOR SYSTEM



### INTRODUCTION

The NEUTRICON modular connector system represents an innovative and economical approach to a broad variety of connector requirements, fulfilling the most demanding standards in terms of reliability and durability as well as offering a practical solution to ease of assembly.

The system consists of only eight (8) components and permits pin arrangements from one (1) to eight (8) contacts in any desirable configuration.

The eight modular system components are:

3 HOUSINGS, precision crafted zinc-alloy with black-chrome finish a) chassis receptacle housing b) cable connector housing and c) mating cable connector housing.

2 CONTACT CARRIERS in d) radial and e) tangential orientation, thereby providing a male and female assembly respectively and either one may be used selectively in any of the three housings.

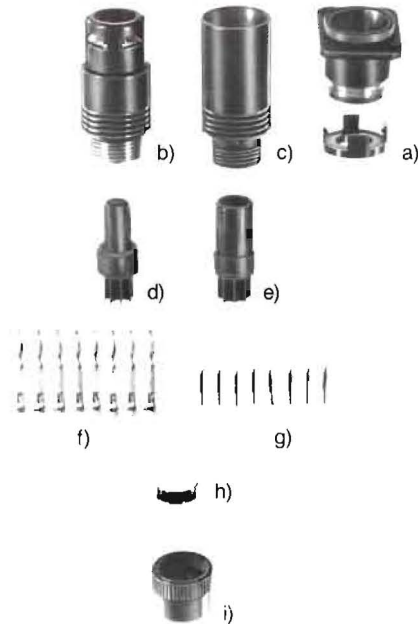
1 CONTACT PIN type for either f) crimp or g) solder connection. Easy, snap-in insertion into either one of the two contact carriers, for up to eight (8) contact points.

2 STRAIN RELIEF components

h) chuck-type cable clamp and i) bushing.

The NEUTRICON system incorporates numerous features in terms of 1) contact integrity with self-cleaning action 2) overall system reliability and ruggedness 3) labor and time saving assembly 4) choice of configuration 5) minimum components 6) coding of connectors through choice of contact pin positioning to prevent incorrect mating.

Neutrik's well-established reputation for uncompromising Swiss quality and precision is reflected in each detail of these connectors. They have been designed for professional, industrial and commercial applications—wherever reliability and performance are the foremost requirements.



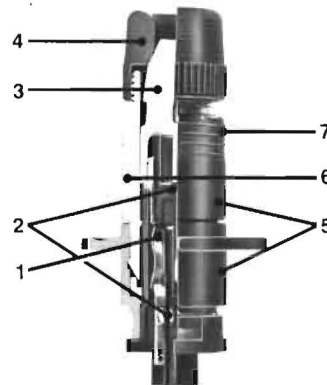
### DESCRIPTION

The Beryllium-Bronze contact pins (1) are standard silver or optionally gold plated and are formed to provide a) large contact surface and b) self-cleaning action. The contact pins are available for either crimping or soldering to cable assemblies prior to insertion (snap-in) into the tangential or radial contact carriers.

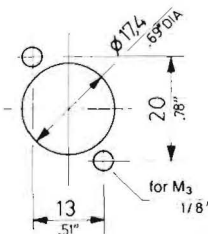
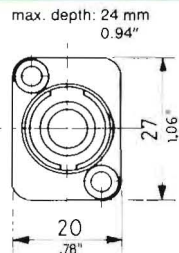
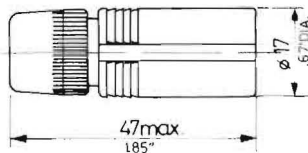
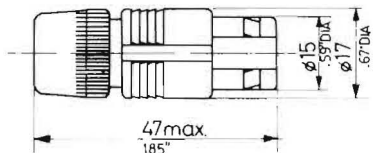
The radial or tangential contact carriers (2) are coded for proper insertion into the rear of any of the three housings and, after assembly, are held into place by the chuck (3) and bushing (4) of the cable strain relief, requiring no retention screw.

The self-adjusting strain relief, accommodating cable diameters from 3-7 mm, prevents a) damage to cable sleeve and b) stress on contact assembly. This unique Neutrik innovation has proven itself manifold in the XLR-series of audio connectors.

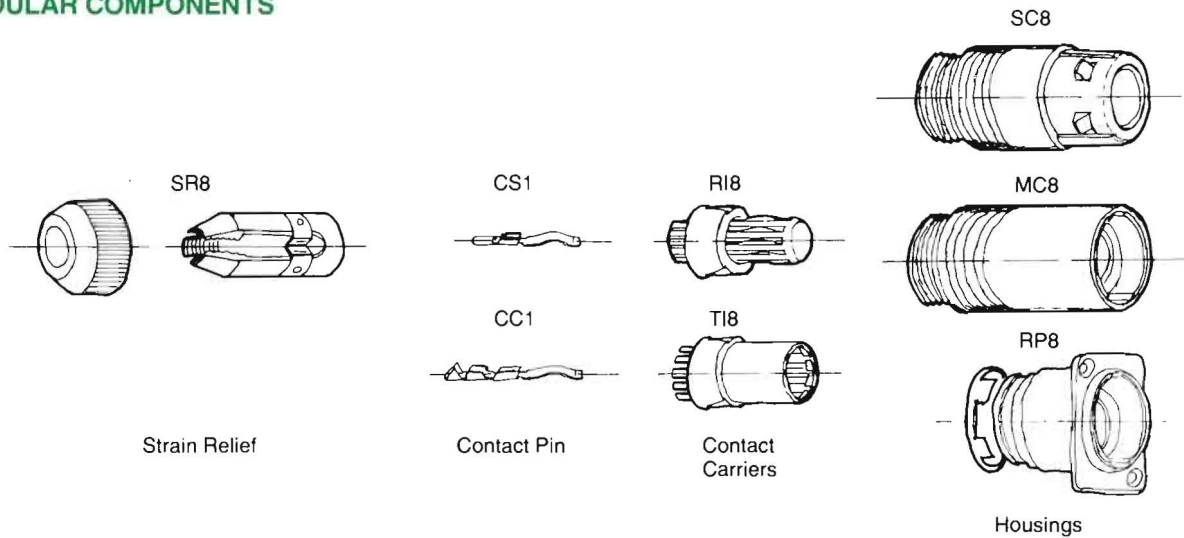
The precision crafted zinc alloy housings (5) are first copper and nickel plated and then finished with a wear resistant high quality matt-black chrome finish. The connector features a self-activating locking system (6); release can only be accomplished by pulling the cable connector housing (7). The cable shield may be connected co-axially via a separate contact to the connector housing, providing an effective RF shield.



### DIMENSIONS



## MODULAR COMPONENTS



## COMPONENT DESCRIPTION

Model #	Description	Material	Packaged
SR 8	Strain relief—chuck & bushing cable diameter 3-7 mm	PA 6.6 POM	10
CC 1 s	Contact pin, crimp, silver	CuBe 2, gal 2 $\mu$ Ag	100
CC 1 g	Contact pin, crimp, gold	CuBe 2, gal 1 $\mu$ Au	100
CS 1 s	Contact pin, solder, silver	CuBe 2, gal 2 $\mu$ Ag	100
CS 1 g	Contact pin, solder, gold	CuBe 2, gal 0.5 $\mu$ Au	100
RI 8	Radial contact carrier	PA 6.6 15% GR	10
TI 8	Tangential contact carrier	PA 6.6 15% GR	10
SC 8	Cable connector housing (with locking system)	ZnA14CuI, gal swCr Ms58 gal Cr	10
MC 8	Mating connector housing	ZnA14CuI, gal swCr	10
RP 8	Chassis receptacle housing	ZnA14CuI, gal swCr	10
WM	Assembly tool:	To insert pins into carrier	
WS	Jig:	Holds pins for proper assembly to color coded cable leads	
WC	Crimping tool:	Crimps cable leads to pins	

## TECHNICAL DATA

Number of Contacts:	1 to 8, selectable	Cable Diameter:	3-7 mm
Contact Arrangement:	Selectable	Operating Temperature:	40°C / + 90°C
	The selected number of contact pins are arranged into the radial contact carrier (RI 8) and correspondingly into the tangential contact carrier (TI 8)	Rated Current per contact	2.5 Amp
Wiring to Pins:	Crimp or solder	Operating Capacitance between 2 adjacent contacts:	~ 3 pF
Lead Diameter:	max. 0.2 mm <sup>2</sup> (24 AWG)	Rated Voltage per VDE 0110/72 section A:	125 V
Locking System:	self-activating, release via cable connector housing	Test Voltage:	1,500 V
Mechanical Force (insertion & withdrawal):	~ 30 N max., 8 contacts	Contact Resistance:	≤ 3mohm
		Insulation Resistance	
		Moisture Test IEC 68-2-3, Ca, 4 Days:	≥ 5.10 <sup>8</sup> ohm



**NEUTRIK PRODUCTS**  
**77 SELLECK STREET**  
**STAMFORD, CT. 06902 (203) 348-2121**

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**"THE SWISS CONNECTION"**  
**Distributed by:**



# NEUTRIK NEWS

DATE: November 82

CONTACT: Mr. Andrew Brakhan  
TELEPHONE: (203) 348-2121

NEUTRIK PRODUCTS

77 SELLECK STREET

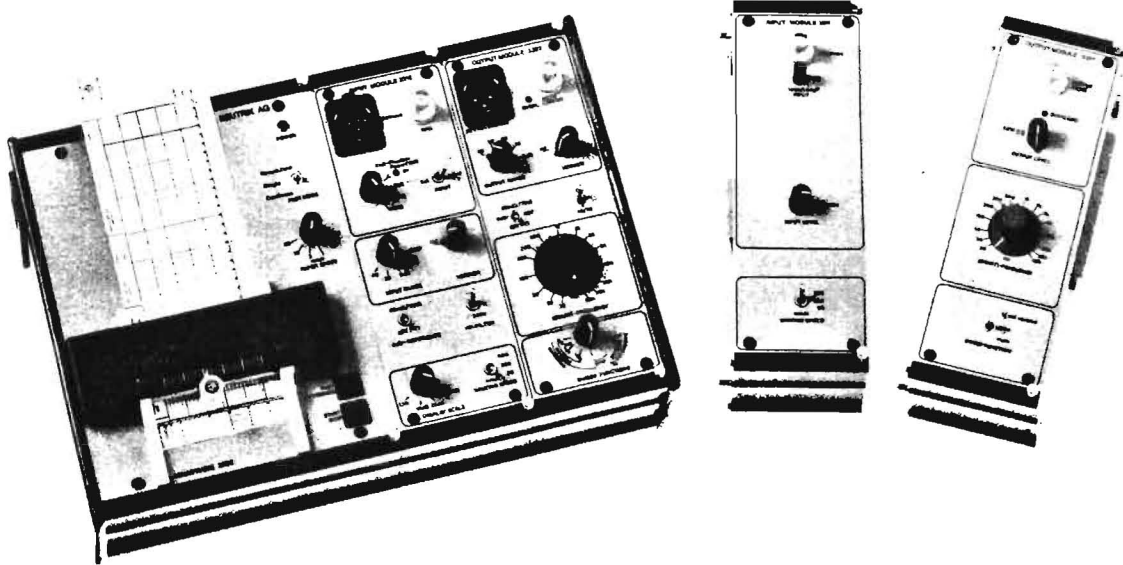
STAMFORD, CT 06902

The NEUTRIK 3300 AUDIOGRAPH system is a second generation, digitally controlled, precision audio analysis system.

It is a modular system: Its modules may be arranged to suit specific applications depending on the required functions, measuring tasks and level of sophistication. Data output is in the form of permanent, "hard-copy" function plots (graphs).

The 3300 is a high performance, laboratory quality, system featuring ease of operation coupled with a host of automatic functions capable of measuring all significant parameters of the audio/low frequency spectrum.

Due to its flexibility and expandability it is equally suited for use in portable applications such as systems set-up and maintenance, acoustical room analysis or noise-level logging as well as in laboratory, product design and production quality control applications.



A North American Philips Company

The AUDIOGRAPH provides a unique combination of features and capabilities, among them:

- Basis of a complete, modular audio measurement system using unique "Building-Block" concept which is expandable, to handle nearly any audio/low-frequency measurement requirement
- Laboratory quality, yet uniquely portable
- Single or multiple plots in four colors on single-chart cards or continuously on multiple-chart rolls
- Servo-controlled writing (pen) system
- Automatic chart feed-in and feed-out and electronic pen lift
- Digitally-controlled system-functions are interlocked via data bus. Users may also construct their own modules to interface with the 3300
- Basic frequency range: 20 Hz to 40 kHz, swept sine wave plus 1/3-octave capacity
- True RMS measurement for complex waveforms
- Clock-driven stepper motor paper drive and oscillator sweep
- Adjustable, calibrated writing and speeds

Designed and manufactured to the exacting standards for which Swiss craftsmanship has been so deservedly famous, the AUDIOGRAPH system is designed for convenience and portability, while achieving measurement accuracy which challenges far more complex and costly equipment. The system is therefore equally adapted to use in field work such as system setup and maintenance, acoustical room analysis or noise-level logging, as it is for laboratory, product design or production quality-control applications.

Further, the 3300 provides permanent record of "before and after" performance. Either single-chart cards may be used for one or more superimposed plots, or continuous, multiple-chart rolls may be used to produce a series of single-plot recordings or level-vs-time recordings over a long period. A variety of grid designs will be available for various applications. Plotting is done with fiber-tip pens designed expressly for chart-recording applications.

Initially available modules (two input and two output) combine with the main-frame to produce a compact, self-contained frequency-response, crosstalk, reverberation-time and level-vs-time analyzer. As such, even this basic configuration of the AUDIOGRAPH system finds numerous applications in which it will quickly prove indispensable. These include the measurement and adjustment of frequency response and crosstalk-vs-frequency of:

- Amplifiers, preamplifiers, delay and reverberation equipment, noise-reduction and compressor/limiter equipment, other peripheral audio-processing equipment/systems
- Equalizers, filters, transformers
- Communications systems and links, including Studio-Transmitter link, telephone hybrids and patches, and low-speed data lines
- Tape recorders, including reel-to-reel, cassette, cartridge, film and video-recorder audio and cue tracks. (In addition, measurement of high-frequency stability, drop-outs, and monophonic compatibility performance.)

KEY FEATURES  
of the  
NEUTRIK 3300 AUDIOGRAPH SYSTEM

- Fast, accurate and automatic measurements.
- Ability to make multiple plots on a single chart.
- Uses both single-chart cards and multiple-chart paper rolls.
- Variety of grid designs.
- Grid aspect ratios (dB vs. frequency) meet IEC 263 requirements.
- High quality, long life, easy to change fiber-tip pens in six colors.
- Electronic pen lift mechanism.
- Automatic feeding, alignment and synchronization of charts.
- Paper drive and sweep oscillator controlled by the system clock, providing absolute synchronization between oscillator frequency and chart frequency markings.
- Adjustable, calibrated and symmetrical writing (pen) speed. Regulated by high-speed position-controlled servomechanism.
- Adjustable, calibrated paper speed.
- Adjustable plot-start frequency: 20 Hz to 40kHz.
- Manual oscillator frequency control (20 Hz to 40 kHz) for setting reference levels and pre-plotting system check.
- One-third-octave (1/2-, 1/3- and 1/6-oct. with 3322 module) warble generator. Statistically equivalent to 1/3-octave noise, but able to provide a continuous, non-segmented plot with consequently higher resolution. Faster settling time than that obtainable with noise, and filters allow faster measurement. Segmented (stepped) plot can also be made for 1/3-octave warble (3322 module).
- Short-circuit proof output stage.
- Input will accept microphone-level and high-level signals; also provides power for measurement microphone and input impedances from 2K to 1M.

- Measurement amplifier is calibrated for absolute-level measurement in dBV, dBm, or Volts.
- True RMS detector.
- Remote control capability.
- "Building-Block" concept with wide variety of modules and measurement capabilities.
- Portable.
- Phonograph pickup cartridges and tonearms.
- Loudspeakers, monitoring systems, sound-reinforcement systems. (Including measurement and equalization of complete, overall electroacoustic frequency response of reinforcement systems.) (Requires use of accessory NEUTRIK calibrated measurement microphone.)
- Other transducer/systems such as accelerometers, geophones, sonar and ultrasonic devices.

Reverberation time-vs.-frequency may be easily measured and plotted for rooms, auditoriums and artificial-reverberation units. Signal amplitude (electrical or acoustical)-vs.-time (logging) may be recorded for applications such as noise-pollution studies. Electrical impedance vs. frequency may be plotted for devices such as loudspeakers, filters, crossovers, equalizers and transformers.

## DESCRIPTION OF 3300 AUDIOGRAPH SYSTEM COMPONENTS

### Mainframe

The 3302 mainframe comprises the operational "brain" of the system, the Digital Logic Processor (DLP), the clock-driven, voltage-controlled, swept sine-wave oscillator (VCO), the chart recorder and the system power supply. The DLP controls the system operation, the VCO and the chart recorder. The chart recorder consists of a highly accurate, position-controlled pen servomechanism and clock-driven paper-drive stepper motor.

All communications (control and data), synchronization and power is distributed between the mainframe and modules, via the NEUTRIK Measurement Bus which further allows interfacing capability with various external equipment such as computer systems and other test equipment.

### Input Module

The input module -- of which two versions are available -- contains the input connector (s), measurement amplifier and related controls.

### Output Module

The output module -- of which two versions are available -- contains the controls for the sweep oscillator, 1/3-octave (1/2-, 1/3- and 1/6-octave in 3322 module) warble-tone generator and related controls, output amplifier controls and output connector.



SPECIFICATIONS  
(Preliminary)

MAINFRAME 3302

Paper Drive:

Writing speed: 0,1 - 0,3 - 1 - 3 - 10 - 30 mm/sec,  $\pm 0,5\%$   
In decay-time, fast forward, pull-in and -out  
status: 30 mm/sec

Recording paper: Single-chart cards, carton, or multiple-chart  
paper rolls (150 pcs.) Paper width: 68 mm, vertical  
scale: 50 mm, horizontal scale: 50 mm/decade or  
165 mm for 20 Hz to 40 kHz chart (According IEC 263)

Longitudinal resolution: 0,14 mm, equivalent to  $\frac{\Delta f}{f} = 644.10^{-3} \%$

Pen: Fiber-tip, long life, 6 colors

Pen lift: Electromagnetic, controlled by DLP

Pen speed: 1500 mm/sec max.

General:

Power requirements: 220/120 Vac  $\pm 10\%$ , 50-60 Hz, 50 VA

Operating temperature: 0 to 40°C (32 to 104°F)

Dimensions, overall: 210 x 160 x 85 mm

Weight net: 2,6 kp

System - Bus connector: 32 pole DIN 41612

Controls and their functions:

Power ON/OFF switch  
Pilot light  
Paper speed selector: Controls (presets) paper speed for the period of  
time where actual graph is recorded. All other paper  
speeds are controlled by the DLP. Can also be set  
externally via the bus.

Single chart/Reverb, plot/  
Continous plot switch: Defines "modus operandi" of unit and controls all  
associated logical functions automatically

Fast forward paper switch: Lifts pen up and moves chart forward at fastest  
speed. Can also be used to produce "dotted line  
plots".

Start/Stop switch: Starts and stops paper transport and recording at  
any position

Input Module 3311

Measurement range:	-80 dBV to $\pm 10$ dBV (100 $\mu$ V to 3,16 V), logarithmic
Vernier attenuation range:	40 dB, 2 calibrated positions: 0 dB and -40 dB equals to 1 V or 70 mV for 0 dB indication on graph
Display scale range:	50 dB (2 dB per 2 mm division)
Input impedance:	100 k/50 pF, unbalanced, BNC-connector, separate 4 mm jack for feeding microphone 3381
Frequency response:	50 Hz - 20 kHz, $\pm 0,1$ dB, 20 Hz - 40 kHz $\pm 0,2$ dB, -3 dB $\geq$ 150 kHz
Rectifier response:	True RMS, crest factor $\geq 7$ , integration time depending on writing speed
Writing (Pen) speed:	50 - 200 - 500 mm/sec, symmetrical and linear rise and decay
Accuracy:	$\pm 0,2$ dB typical, $\pm 0,5$ dB max.

Controls and their functions:

Vernier level control:	Adjusts input sensitivity from 0 dBV (calibrated, equal to a sensitivity of 1V for 0 dB-line indication on the graph) to -40 dBV (equal to a sensitivity of 10 mV for 0 dB-line on the graph)
Writing speed selector:	Controls writing speed of pen, or - equivalent - rise and decay time (1, 0.25 and 0.1 sec for full swing)

Input Module 3312

Measurement range:	-80 dBV/dBm to +40dBV/dBm (100 $\mu$ V to 100 V), logarithmic
(Overall)	Linear: up to 100 V
Attenuator range:	4 x 20 dB steps, calibrated, from -40 to +20 dB, $\pm 0, 1$ dB
Attenuator, vernier:	$\geq 20$ dB, 0 dB position calibrated
Display scale range:	10 - 25- 50 dB, linear
Input impedance:	Balanced: 600 $\Omega$ 2 k, 10 k, 100 k//30 pF, XLR-connector Unbalanced: 1M//60 pF, BNC-connector 2 k balanced input supplies 15 V phantom voltage for microphones
Frequency response:	50 Hz - 20 kHz, $\pm 0,1$ dB, 20 Hz - 40 kHz $\pm 0.5$ dB
High-Pass filter:	50 Hz, 12 dB/octave (switchable)
Rectifier response:	True RMS, CF $\geq 7$ , integration time depending on writing speed
Writing (Pen) speed:	50 - 200- 500 mm/sec, symmetrical and linear rise and decay
Accuracy:	$\pm 0,2$ dB typical, $\pm 0,3$ max.

Controls and their functions:

Input selectors:	One selecting input connector, the other load impedance and supply of phantom voltage
Attenuator: (Range selector)	Selects input sensitivity, calibrated: 0 dB range equal to a sensitivity of 1 V (0 dBV) or 0,775 V (0 dBm) for a 0 dB-line indication on graph at all log. scale ranges. In linear scale range the calibrated full scale voltage ranges are: 1,25 mV-12, 5 mV-125 mV-1, 25 V-12,5 V
Vernier attenuation:	Provides fine adjustment of pen deflection over a 20 dB range
Reference level:	Selects 0 dB - reference to be 1 V or 0,775 V (dBV or dBm reading)
High-Pass filter:	In/out switch
Display scale:	Selects range of display scale to either 10 - 25 - 50 dB or linear (Voltage)
Writing (Pen) speed:	Controls writing speed of pen, or, equivalent, rise and decay time (1, 0.25 and 0.1 sec for full swing)

Output Module 3321

Frequency range:	20 Hz to 40 kHz
Frequency accuracy: (synchronization to graph)	$\frac{\Delta f}{f} \leq 0.15 \log f \%$
Frequency stability:	$\geq 3\%$ between 0° and 40°C
Amplitude linearity:	$\pm 0,15$ dB
Total harm. distortion:	$\leq 0.7\%$ from 100 Hz to 10 kHz $\leq 1\%$ from 20 kHz to 40 kHz
Start/man. frequency:	20 Hz to 40 kHz
Sweep type:	Continuous
Warble tone:	1/3 octave bandwidth, 5 Hz modulation frequency, triangular waveform, power spectrum equivalent 1/3 octave filtered pink noise
Output:	Unbalanced, BNC-connector
Max. output level:	2,5 W into 4 ohm (3,16 V), min. load 2 ohms, short circuit proof
Source impedance:	$\leq 0,1$ ohm
Attenuator:	Vernier, $> 40$ dB (min. output level $< 40$ mV)
<u>Controls and their functions:</u>	
Output level:	Sets output level over a range of 40 dB with a min. output level of $\sim 40$ mV into 4 ohm
Start/Manual:	Sets frequency manually for a fast "prechecking" and defines start-frequency from which response curve will be plotted in "single-mode" operation of main- frame. Defines also frequency at which decay time - curve will be automatically plotted in "decay-mode" operation of mainframe.
Warble/normal/mute:	Selects output for continuous sweep of 1/3-octave freq- uency modulated ("warbled") sweep, which is equal to 1/3-octave filtered pink noise or defeats output for, e.g. checking noise floor.

Output Module 3322

Frequency range:	20 Hz to 40 kHz
Frequency accuracy: (synchronization to graph)	$\frac{\Delta f}{f} < 0,15 \log f \%$
Frequency stability:	$\geq 3\%$ between $0^\circ$ and $40^\circ$ C
Amplitude linearity:	$\pm 0,1$ dB
Total harmonic distortion:	$\leq 0,7\%$ from 100 Hz to 10 kHz $\leq 1\%$ from 20 Hz to 40 kHz.
Start/man. frequency:	20 Hz to 40 kHz
Sweep type:	Continuous or 1/3 octave incremented (34 ISO center frequencies) 1/6, 1/3 1/2 octave bandwidth, 5 Hz modulation frequency, complex composite waveform to match 1/3 octave filtered pink noise
Output:	Balanced: max. 3,16 V open circuit galvanically isolated, XLR - connector unbalanced: max. 3,16 V (2,5 W into 4 ohms), BNC - connector
Source impedance:	Balanced: $\leq 15$ ohms, unbalanced: $\leq 0,1$ ohms, short circuit proof
Attenuator:	5 x 10 dB steps, calibrated vernier: 10 dB, min. output: $\sim 0,8$ mV
<u>Controls and their functions:</u>	
Output range:	Sets output level over a range of 50 dB calibrated in 5 steps.
Vernier:	Five ranges of 10 dB. Both output have same level for a load $\geq 200$ ohms
(Start) Frequency:	Sets frequency manually for fast "prechecking" and defines start-frequency of frequency plot or frequency at which decay time will be plotted automatically
Sweep function:	Selects output for continuous sweep of 1/3 octave warbled sweep or defeats output. Selects continuous or segmented increase of frequency in 1/3 octave increments in order to get 1/3 octave histograms and selects continuous or warbled sweep
All important functions can also be controlled from the outside via the 36-pin bus-connector.	

3300 AUDIOGRAPH  
SYSTEM COMPONENTS (MODULES)

3302	Mainframe, standard
3311	Input Module, basic
3312	Input Module, standard
3321	Output Module, basic
3322	Output Module, standard

FUTURE COMPONENTS

Tape Recorder/ Phono cartridge/ Turntable Analyzer  
Phase - Response Analyzer  
Sound - Level Monitor  
Spectrum and Distortion Analyzer  
Real-Time Analyzer  
Measurement Microphone Calibrator

ACCESSORIES

3381	Measuring Microphone (use with 3311 and 3312), 1/2"
3382	Balanced-output Measuring Microphone (use with 3312), 1/4"
3382	Artificial Ear (IEC R-303)
3204	Constant Sound Pressure Source
CA-2	Compression Amplifier
3351	Single-Chart Cards (100-pack)
3352	Multiple-Chart Roll (150 charts)
3355	Carrying case for mainframe and 2 modules
3356	Pen in 4 different colors