CONNECTORS

"THE SWISS CONNECTION"
PROFESSIONAL XLR-TYPE CABLE CONNECTORS

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.

*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.

<table>
<thead>
<tr>
<th>Housing Finish/Contact Plating</th>
<th>Model # Suffix</th>
<th>Example Model #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel / Silver</td>
<td>none (standard)</td>
<td>NC3FC</td>
</tr>
<tr>
<td>Black Chrome / Silver</td>
<td>BAG</td>
<td>NC3FC-BAG</td>
</tr>
<tr>
<td>Black Chrome / Gold</td>
<td></td>
<td>NC3FC-B</td>
</tr>
</tbody>
</table>
SUGGESTED MODULAR COMBINATIONS

<table>
<thead>
<tr>
<th>3FM</th>
<th>VM</th>
<th>3FM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female - Female</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3MM</td>
<td>VM</td>
<td>3MM</td>
</tr>
<tr>
<td>Male - Male</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3FM</td>
<td>VM</td>
<td>2PMM</td>
</tr>
<tr>
<td>Female - Phone Plug</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3FM</td>
<td>VM</td>
<td>NTE</td>
</tr>
<tr>
<td>Female - Male, with Transformer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3FM</td>
<td>SM2</td>
<td></td>
</tr>
<tr>
<td>Female Connector, with Switch/remote start-stop, etc.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

- NTE-4 (yellow): Ratio 1:4 (2000:3 kΩ) Bandwidth: 30 Hz - 40 kHz
- NTE-103 (orange): Ratio 1:30:1 (2000:20kΩ) Bandwidth: 30 Hz - 90 kHz

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.

TRANSFORMERS

- NTE-4 (yellow): Ratio 1:4 (2000:3 kΩ) Bandwidth: 30 Hz - 40 kHz
- NTE-103 (orange): Ratio 1:30:1 (2000:20kΩ) Bandwidth: 30 Hz - 90 kHz

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 CONNECTOR, XLR-TYPE

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

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): > 10MΩ
- Contact resistance: < 3mΩ
- Flammability UL94: V-0
- Operating temperatures: -40°C to +65°C

Materials
- Contact material: CuZN40Pb3
- Contact plating: gal Ag, 3um
- Contact insert material: die-cast zinc
- Shell material: PBTP gr, red
- Latchlock: Spring-Steel, CK60
- Cable clamp: POM
- Strain relief bushing: PU (red)

Dimensions
- Cable diameter (special version): 3.8 - 7.5 mm (6 - 8mm)
- Max. wire size: 0.5mm² (AWG 20)
- Right angle cable connectors: UL listed EB3054

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 B Black Chrome/Silver
- NC3MM B Black Chrome/Gold

Three Contact Female
- NC3FM Nickel/Silver contacts
- NC3FM B 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
- M17x1 internal
- NAM-4 M17x1 external
- NAM-4 M17x1 internal
- NAM-5 5/8" 27 tpi external
- NAM-5 5/8" 27 tpi internal
- NAM-5 3/8" Internal
A completely new concept for modern assembly methods.

- insert mounts on PCB 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) PCB boards
- connectors may be used to retain the PCB 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 Silver Contacts
- NC3MD-H-BAG Male Black-Chrome Housing

**Vertical PCB (Straight leads)**

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

**Solder Lug Version**

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

**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/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
- NP2C-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"

The K-Check consists of a test finger, battery compartment (containing 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

"THE SWISS CONNECTION"
Distributed by:

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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 (~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 (>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 WITH 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 (=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 (>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 photographic-type battery

Estimated Battery Life: >2 years under normal use

Case Material: Aluminum with matte-black finish

Overall Dimensions (including test probe and female XLR-type connector): 120 mm (=4-3/4 in.) long x 22 mm (=7/8 in.) in diameter

Net Weight (less battery): 80 g (=2-3/4 oz)

Included Accessories:
PX-23 5.6-volt mercury photographic-type battery
200-mm (=7-7/8-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
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
- 2 CONTACT CARRIERS in radial and 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 crimp or 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
  - chuck-type cable clamp
  - bushing

The NEUTRICON system incorporates numerous features in terms of:
- Contact integrity with self-cleaning action
- Overall system reliability and ruggedness
- Labor and time saving assembly
- Choice of configuration
- Minimum components
- 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 self-cleaning action. The contact pins are available for either crimping or soldering to cable assemblies prior to insertion 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 damage to cable sleeve and stress on contact assembly. This unique Neutrik innovation has proven itself manifolds 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 matte 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

The maximum depth of the connector is 24 mm / 0.94".
### COMPONENT DESCRIPTION

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Material</th>
<th>Packaged</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR 8</td>
<td>Strain relief—chucking &amp; bushing</td>
<td>PA6.6 (POM)</td>
<td>10</td>
</tr>
<tr>
<td>CC 1 s</td>
<td>Contact pin, crimp, silver</td>
<td>CuBe 2, gal 2 Ag</td>
<td>100</td>
</tr>
<tr>
<td>CC 1 g</td>
<td>Contact pin, crimp, gold</td>
<td>CuBe 2, gal 1 Cu</td>
<td>100</td>
</tr>
<tr>
<td>CS 1 s</td>
<td>Contact pin, solder, silver</td>
<td>CuBe 2, gal 2 Ag</td>
<td>100</td>
</tr>
<tr>
<td>CS 1 g</td>
<td>Contact pin, solder, gold</td>
<td>CuBe 2, gal 0.5 Cu</td>
<td>100</td>
</tr>
<tr>
<td>RI 8</td>
<td>Radial contact carrier</td>
<td>PA 6.6 15% GR</td>
<td>10</td>
</tr>
<tr>
<td>TI 8</td>
<td>Tangential contact carrier</td>
<td>PA 6.6 15% GR</td>
<td>10</td>
</tr>
<tr>
<td>SC 8</td>
<td>Cable connector housing (with locking system)</td>
<td>ZnAlCu1C, gal swCr</td>
<td>10</td>
</tr>
<tr>
<td>MC 8</td>
<td>Mating connector housing</td>
<td>ZnAlCu1C, gal swCr</td>
<td>10</td>
</tr>
<tr>
<td>RP 8</td>
<td>Chassis receptacle housing</td>
<td>ZnAlCu1C, gal swCr</td>
<td>10</td>
</tr>
</tbody>
</table>

### TECHNICAL DATA

- **Number of Contacts:** 1 to 8, selectable
- **Contact Arrangement:** Selectable
- **Wiring to Pins:** Crimp or solder
- **Lead Diameter:** max. 0.2 mm² (24 AWG)
- **Locking System:** Self-activating, release via cable connector housing
- **Mechanical Force (insertion & withdrawal):** ~30 N max., 8 contacts

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable Diameter</td>
<td>3-7 mm</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>40°C / -90°C</td>
</tr>
<tr>
<td>Rated Current per contact</td>
<td>2.9 Amp</td>
</tr>
<tr>
<td>Operating Capacitance between 2 contacts</td>
<td>~3 pF</td>
</tr>
<tr>
<td>Rated Voltage</td>
<td>125 V</td>
</tr>
<tr>
<td>Test Voltage</td>
<td>1,500 V</td>
</tr>
<tr>
<td>Contact Resistance</td>
<td>≤3 Mohm</td>
</tr>
<tr>
<td>Insulation Resistance</td>
<td>≥3.10^6 ohm</td>
</tr>
<tr>
<td>Moisture Test VDE 68-2-3, Ca, 4 Days</td>
<td>≥3.10^6 ohm</td>
</tr>
</tbody>
</table>

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**THE SWISS CONNECTION**

Distributed by:

![Neutrik Logo](image-url)
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 expandibility 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.
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.
- Digitally-controlled system-functions are interlocked via data bus. Users may also construct their own modules to interface with the 3300.
- Laboratory quality, yet uniquely portable.
- Basic frequency range: 20 Hz to 40 kHz, swept sine wave plus 1/3-octave capacity.
- Single or multiple plots in four colors on single-chart cards or continuously on multiple-chart rolls.
- True RMS measurement for complex waveforms.
- Servo-controlled writing (pen) system.
- Clock-driven stepper motor paper drive and oscillator sweep.
- Automatic chart feed-in and feed-out and electronic pen lift.
- 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.
MAINFRAME 3302

Paper Drive:

Writing speed: 0,1 - 0,3 - 1 - 3 - 10 - 30 mm/sec, ±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 $\frac{df}{f} = 644.10^{-3}$ %

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 ±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 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.

Paper speed selector: Defines "modus operandi" of unit and controls all associated logical functions automatically

Single chart/Reverb, plot/Continous plot switch: Lifts pen up and moves chart forward at fastest speed. Can also be used to produce "dotted line plots".

Fast forward paper switch: Starts and stops paper transport and recording at any position

Start/Stop switch:
Input Module 3311

Measurement range: -80 dBV to +10 dBV (100 µV 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, ±0.1 dB, 20 Hz - 40 kHz ±0.2 dB, -3 dB ≥ 150 kHz

Rectifier response: True RMS, crest factor ≥ 7, integration time depending on writing speed

Writing (Pen) speed: 50 - 200 - 500 mm/sec, symmetrical and linear rise and decay

Accuracy: ±0.2 dB typical, ±0.5 dB max.

Controls and their functions:

Vernier level control: Adjusts input sensitivity from 0 dBv (calibrated, equal to a sensitivity of 1 V 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)
Measurement range:

-80 dBV/dBm to +40 dBV/dBm (100 µV to 100 V), logarithmic

(Overall)

Attenuator range:

4 x 20 dB steps, calibrated, from -40 to +20 dB, ±0, 1 dB

Attenuator, vernier:

≥ 20 dB, 0 dB position calibrated

Display scale range:

10 - 25 - 50 dB, linear

Input impedance:

Balanced: 600 Ω 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, ±0,1 dB, 20 Hz - 40 kHz ± 0.5 dB

High-Pass filter:

50 Hz, 12 dB/octave (switchable)

Rectifier response:

True RMS, CF ≥ 7, integration time depending on writing speed

Writing (Pen) speed:

50 - 200 - 500 mm/sec, symmetrical and linear rise and decay

Accuracy:

±0,2 dB typical, ±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)
Frequency range: 20 Hz to 40 kHz
Frequency accuracy: $\frac{\Delta f}{f} \leq 0.15 \log f \%$
Frequency stability: $\geq 3\%$ between $0^\circ$ and $40^\circ C$
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: Continous
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)

Controls and their functions:

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 mainframe. Defines also frequency at which decay time curve will be automatically plotted in "decay-mode" operation of mainframe.
Warble/normal/mute: Selects output for continuos sweep of 1/3-octave frequency 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: \( \Delta f < 0.15 \log f \% \)

(synchronization to graph)

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 kHz to 10 kHz
\( \leq 1\% \) from 2 kHz 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: \( \approx 0 \), 8 mV

Controls and their functions:

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.
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