Section 4
Maintenance

page contents

* Not included in preliminary manual.

CAUTION

The installation and servicing instructions in this manual are for use by qualified personnel only. To avoid electric shock, do not perform any servicing other than that contained in the Operating Instructions unless you are qualified to do so. Refer all servicing to qualified service personnel.

Routine Maintenance

No routine maintenance of this product is required.

The red acrylic window is best cleaned with a special anti-static cleaner/polish such as Kleenmaster Brillianizer which is formulated especially for plastics. We highly recommended Brillianizer because it contains wax which prevents static discharge of plastic surfaces and repels the adhesion of fingerprints (It is also excellent for cleaning painted panels, glass chromium, and other plastic items during installation). Brillianizer is generally sold through plastic supply houses, hardware stores, and auto supply stores.

To prevent scratching, use a very soft clean cloth and do not rub dry.

After a number of years, the inside of the red acrylic windows are likely to become darkened with fine dust, especially where the surrounding air contains tobacco smoke. Only simple disassembly is required to access it for cleaning. Cotton swabs may be more convenient as applicators and polishing tools.

If the front panel becomes soiled, clean it with a mild household detergent and a damp cloth. Stronger solvents should not be used because they may damage plastic parts, paint, or the silk-screened lettering(99% isopropyl alcohol can be safely used).

Replacing the back-up battery

An internal battery protects the 764A's memory during power failures and temporary disconnection. The battery will normally last up to 5 years.

IMPORTANT

Before replacing the battery, download the contents of memory through the MIDI, RS-232, or RS-422 interface (see page 3-21 or 3-24 to save presets while the battery is being replaced.

The right most decimal point on the display will flash when the battery needs to be replaced. To replace the battery, first disconnect the 764A from AC power, and remove its top cover (see page 4-3). Replace the battery with a 3-volt lithium battery, such as Duracell® DL2032 (see Fig. 4-1 for location of battery), then replace the top cover. The memory will be protected for only 15 to 30 seconds after the battery is removed — so work quickly!

Fig. 4-1: Location of Memory Back-up Battery

Getting Inside the Chassis

To access the circuit boards, remove all ten screws holding the appropriate cover in place, then lift that cover off.

Remove the *top cover* for access to the jumpers on the component side of the channel A analog circuit board. After removing the top cover, remove the three screws from each mounting flange (at the front of either side, behind the front panel) to access the rear of the front panel circuit board.

Remove the *bottom cover* for access to the jumpers on the component side of the channel B analog circuit board or the solder side of the digital circuit board.

When replacing the covers, replace all screws snugly (be careful not to strip the threads by fastening the screws too tightly).

Performance Evaluation, Alignment

IMPORTANT: Because the 764A circuitry is highly stable, routine performance evaluation and alignment are *not* required and *not* recommended. The following evaluation procedure is extremely thorough, and is included primarily for reference.

PROCEDURE NOT AVAILABLE FOR PRELIMINARY MANUAL

Section 5 Troubleshooting

page contents

* Not included in preliminary manual.

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(per UL 813)

Problems and Possible Causes

Always verify that the problem is not in the source material being fed to the 764A, or in other parts of the system.

Keys do not respond:

The controls may be locked — see page 3-18. If the display and key lights are dark, check to see that the unit is plugged in.

Security code lost:

If the security code is lost, remove the 764A's top cover, and press LOCKOUT RESET button S1 to unlock the controls. S1 is located on the digital circuit board about 3 inches (8 cm) behind the RECALL key.

Error messages:

E - 1 : Time-out error or component failure on the optional MIDI or RS-232 interface board. Turn power OFF, then ON and try again.

E - 2 : Memory or front panel send attempted with MIDI channel (or RS-232 baud rate) set to OFF (see page 3-21 or 3-24).

E - 3 : Slave unit cannot be accessed.

E - 4 : Invalid data received. Try to resend data.

E - 5 : Time-out.

Flashing decimal point on the display:

The memory back-up battery is low and should be replaced. See page 4-2.

Memory loss after power failure:

The memory back-up battery is dead or missing. If the contents of memory were archived through the MIDI or RS-232 interface prior to the power failure, reload the memory (see page 3-21 or 3-24) *after* replacing the battery (see page 4-2).

Program mutes when key pressed:

The audio output is muted momentarily when RECALL or COMPARE is pressed. Cross-fading eliminates potential pops caused by large level changes when switching from one set of control settings to another. Because this cross-fading may not be wanted in some applications, it is defeatable. Press OPTIONS and then UP until c-fade on is seen in display. Pressing NO will shut the cross-fade function off. The display will then indicate whether cross-fading is 'c-fade on', on, or 'c-fade off', oF.

RFI, hum, clicks, or buzzes:

A grounding problem is likely. Review the information on grounding in Section 2.

The 764A's moderate RF suppression should be adequate for the vast majority of installations. However, installation next to a high-power transmitter may still cause problems. Additional RF suppression, careful examination of the grounding scheme, and other techniques familiar to the broadcast engineer may have to be employed.

Power supply problems:

The voltage regulators are operated conservatively, and can be expected to be extremely reliable. Before replacing the regulators, check to see whether other abnormalities in the circuitry (such as a shorted IC) have caused excessive current demand which is in turn causing the regulator ICs to either limit current or go into thermal shutdown (the two built-in protective modes).

Regulator ICs are frequency-compensated by capacitors at their outputs to prevent high-frequency oscillations. If one of these capacitors is ever replaced, be sure to use a low-inductance aluminum electrolytic. (A tantalum can fail because the current-delivering capacity of the power supply can cause a runaway condition if the dielectric is punctured momentarily; a high-inductance aluminum can fail to prevent a regulator from oscillating.) Check for oscillation on the power bus with an oscilloscope if C12, C13, C15, or C18 on the digital circuit board is replaced.

Output module failure:

The 5532 and 411 opamps used in the balanced output module may be freely replaced as necessary. However, the circuit is extremely sensitive to the characteristics of the resistors, so field repair of resistor failure (which is very unlikely) requires replacement of the entire output module in question if adequate headroom and common-mode rejection are to be maintained (see page 5-7 for information about factory service).

Diagnostic Routines

NOT AVAILABLE FOR PRELIMINARY MANUAL

Components: Fault Diagnosis, Replacement

If you want to troubleshoot on the component level instead of returning the unit to the factory for service, read the circuit description in Section 6 before continuing. Servicing on the component level requires a deeper understanding of 764A circuitry.

Here are some suggestions for component-level troubleshooting:

IC opamps are operated such that the characteristics of their associated circuits are essentially independent of IC characteristics and dependent only on external feedback components. The feedback forces the voltage at the (−) input terminal to be extremely close to the voltage at the (+) input terminal. Therefore, if you measure more than a few millivolts difference between these two terminals, the IC is probably bad.

Exceptions are ICs used without feedback (as comparators) and ICs with outputs that have been saturated due to excessive input voltage because of a defect in an earlier stage. However, if an IC's (+) input is more positive than its (−) input, yet the output of the IC is sitting at −14 volts, the IC is almost certainly bad. The same holds true if the above polarities are reversed. Because the characteristics of the 764A's circuitry are essentially independent of IC opamp characteristics, an opamp can usually be replaced without recalibration.

A defective opamp may appear to work, yet have extreme temperature sensitivity. If parameters appear to drift excessively, freeze-spray may aid in diagnosing the problem. Freeze-spray is also invaluable in tracking down intermittent problems. But *use it sparingly*, because it can cause resistive short circuits due to moisture condensation on cold surfaces.

See the introduction to the parts list on page 6-5 for detailed information on **ordering parts**. Nearly all parts used in the 764A have been very carefully chosen to make best use of both major and subtle characteristics. For this reason, parts should always be replaced with *exact duplicates* if so indicated in the parts list. It is very risky to make 'close-equivalent' substitutions because of the possibility of altering performance and/or compliance with regulatory requirements. Certain parts are selected to tighter than normal specifications (most such parts are noted in the parts list — but it is almost always wiser to return the defective board to the factory for service). Certain parts require partial recalibration if replaced, and this may or may not be practical in the field (such parts are also noted in the parts list).

It is important to use correct technique when replacing components mounted on printed circuit boards. Failure to do so may result in circuit damage and/or intermittent problems. Because solder flows well into the through-holes of the double-sided plated-through circuit boards used in the 764A, a technique like the following is required.

To replace a component:

1) Remove the old component.

It is sometimes easier to cut the offending components from its leads, then removing the leads as described below.

A❑ Clear each lead to be removed by melting the solder *on the solder side* (underneath) of the printed circuit board. As soon as the solder is molten, vacuum it away with a spring-actuated de-soldering tool (like the Edsyn Soldapullt®).

Use a **30-watt soldering iron** — do *not* use a soldering gun or a high-wattage iron! DO NOT OVERHEAT THE BOARD. Overheating will almost surely cause the conductive foil to separate from the board base. Even with care, it is easy to blister the enamel solder-mask coating (in most cases, this is no cause for concern: the coating is there mainly to prevent moisture from condensing between the traces and to simplify wave-soldering).

B❑ Release the component by gently wiggling each of the leads to break solder webs, then lift the component out.

2) Install the new component.

A❑ Bend the leads of the replacement component so they will fit easily into the appropriate circuit board holes.

B❑ Solder each lead to the bottom side of the board.

Use a 30-watt soldering iron and a good brand of *rosin-core* solder. Make sure that the joint is smooth and shiny.

If no damage was done to the plated-through hole when the old component was removed, soldering of the top (component side) pad is not necessary. But if removal did not progress smoothly, it would be prudent to solder each lead on the component side of the hole to avoid potential intermittent problems.

C❑ Cut each lead of the replacement component close to the solder (underneath) side of the circuit board with a pair of diagonal cutters.

D❑ Remove all residual flux with a cotton swab moistened with a solvent.

Suitable solvents include 99% isopropyl alcohol, 1,1,1-trichloroethane (sold as Energine Fireproof Cleaning Fluid), and naphtha (sold as Energine Regular Cleaning Fluid).

Make sure that the flux has actually been removed, and not just made less visible by smearing. While most rosin fluxes are not corrosive, they can slowly absorb moisture and become sufficiently conductive to degrade circuit performance.

Technical Support and Factory Service

If the troubleshooting information in this manual doesn't help you solve your problem, contact Orban Customer Service. Be prepared to accurately describe the problem, including the results of diagnostic tests you have performed. Know the serial number (and 'M' number, if any) of your 764A — these are printed on a label attached to the right side panel of the 764A.

Always contact Customer Service before returning a product to the factory for service. Often, a problem is due to misunderstanding, or is relatively simple and can be quickly fixed after telephone consultation. In any case, products will be accepted for factory service *only* after Customer Service has issued a Return Authorization number. This number flags the returned unit for priority treatment when it arrives on our dock, and ties it to the appropriate information file.

Telephone:	(800) 227-4498	in USA (except CA, HI, AK)
	(415) 957-1067	from California, Hawaii, Alaska, and elsewhere
Telex:	17-1480	
FAX:	(415) 957-1070	

Shipping Instructions

To ship the complete unit, use the original packing material if it is available. If it is not, use a sturdy, double-wall carton no smaller than 22 × 15½ × 4 inches (56 × 40 × 10 cm) with a minimum bursting test rating of 200 pounds (91 kg). Place the chassis in a plastic bag (or wrap it in plastic) to protect the finish, then wrap cushioning material around it. Do not pack the unit in crumbled newspaper — use bubble sheets, large foam beads, thick fiber blankets, or similar packing materials. Put at least 1.5 inches (4 cm) of cushioning on all sides of the unit, and tape the cushioning in place to prevent shifting during shipment. Close the carton without sealing it and shake it vigorously — if you can hear or feel the unit move, use more packing. Seal the carton with 3-inch (8cm) reinforced fiberglass or polyester sealing tape (narrow or paper tapes won't hold), top and bottom in an H pattern. Mark the package with the name of the shipper, and with these words in red:

DELICATE INSTRUMENT, FRAGILE!

Insure the package appropriately. Ship prepaid, *not collect.* Do not ship parcel post. Your Return Authorization number must be shown on the label, or the package will *not* be accepted.

The terms of the Orban Limited One-Year Standard Warranty are detailed on a separate Warranty Certificate supplied with the unit. After expiration of the warranty, a reasonable charge will be made for parts, labor, and packing if you choose to use the factory service facility. Repaired units will be returned C.O.D. In all cases, transportation charges (which are usually quite nominal) are paid by the customer.

Section 6
Technical Data

page contents

* Not included in preliminary manual.

Specifications

Performance

Bandwidth: Adjustable throughout a 0.1 to 5.0 octave range.

Boost/cut: +16dB to −40dB (−45dB notch typical).

Frequency response: ±0.25dB, 20–20,000Hz (with BOOST/CUT controls set to 0).

Tuning ranges: LF bands: 20–625Hz; MLF bands: 50–2,500kHz; MHF bands: 120–10,000Hz; HF bands: 640–20,000Hz.

The **764A** has one each of LF, MLF, MHF and HF bands in each channel.

Square wave response: No spurious ringing occurs at any output level (the only observable ringing is the ringing theoretically associated with the equalization curve being used).

Total harmonic distortion: <0.02%, 20–20,000Hz at an output level of +18dBm into 600 ohms. Distortion decreases smoothly as level is reduced.

Noise at output: <−110dB below clipping, BOOST/CUT controls set to 0, LP FILTER control set to 20.4kHz, HP FILTER control set to 20Hz, and INPUT control set to 0.0dB).

Interchannel crosstalk: <−90dB, 20–20,000Hz.

Gain: +14dB to −∞dB(internal jumper to select gain range).

Installation

Input

Load impedance: ~20kΩ in parallel with 500pF, electronically balanced.

Driving impedance: Ideally 600Ω or less, balanced or unbalanced.

Nominal input level: −10dBV to +4dBu.

Absolute overload point: +26dBu.

Common mode rejection: >50dB, 50-60Hz.

RFI suppressed: Yes.

Connectors: Barrier strip (#5 screws) and XLR connectors.

Output

Load impedance: ≥600 ohms.

Source impedance: 30 ohms ±5%, balanced, floating.

Maximum output level: >+20dBm into 600 ohms.

OVERLOAD lamp: Lights for approximately 200ms when the instantaneous peak output of any amplifier in the equalizer is driven within 1dB of its clipping point.

RFI suppressed: Yes.

Connectors: Barrier strip (#5 screws) and XLR connectors.

Power

Power requirement: 115/230V AC (±10%), 50–60Hz, 16VA.

Connector: IEC mains connector with 3-wire 'U-ground' power cord and plug.

EMI suppressed: Yes.

Fuse: 1/2-amp 3AG 250V Slo-Blo fuse for 115-volt operation; 1/4-amp 3AG 250V Slo-Blo fuse for 230-volt operation.

Physical

Dimensions: 19 inches (48.3 cm) wide, 9 5/8 inches (24.5 cm) deep, 1 3/4 inches (4.5 cm) high.

Operating temperature range: 32–113°F (0–45°C)

Humidity: 0–95% relative humidity, non-condensing.

Options

MIDI interface: For sending data and commands between units — see page 3-21. Order RET-054.

RS-232 interface: For sending data and commands between units — see page XX. Order RET-055.

RS-422 interface: For sending data and commands between units — see page XX. Order RET-056.

Circuitry

Low-pass filters: Second-order Automatic Sliding Besselworth™ with 12dB/octave rolloff. Corner frequency is variable from 2kHz to 20kHz. Response shape changes smoothly from Bessel to Butterworth rolloffs as the LP FILTER control is adjusted from 2kHz to 20kHz.

High-pass filters: Third-order Butterworth with 18dB/octave rolloff. Corner frequency variable from 20Hz to 315Hz.

Memory

Capacity: 99 user-programmable registers for host unit; 99 user-programmable registers for slave unit.

Back-up: 5 year lithium battery.

Warranty

One year, parts and labor: Subject to limitations set forth in our Standard Warranty.

Circuit Description

NOT AVAILABLE FOR PRELIMINARY MANUAL

Parts List

NOT AVAILABLE FOR PRELIMINARY MANUAL

Schematics, Assembly Drawings

The following drawings are included in this manual:

Page	Function	Circuit Board	Drawing
6-7		All	Block Diagram

OTHER DRAWINGS NOT AVAILABLE FOR PRELIMINARY MANUAL

These drawings reflect the actual construction of your unit as accurately as possible. Any differences between the drawings and your unit are almost undoubtedly due to product improvements or production changes since the publication of this manual. Major changes are described in addenda to this manual.

If you intend to replace parts, please read page 6-5.

Abbreviations

Some of the abbreviations used in this manual may not be familiar to all readers:

AGC	automatic gain control
dBu	0dBu = 0.775V RMS. For this application, the dBm-into-600Ω scale on voltmeters can be read as if it were calibrated in dBu.
dBV	0dBV = 1V RMS.
DJ	disk jockey, an announcer who plays records in a club or on the air
EMI	electromagnetic interference
FCC	Federal Communications Commission (USA regulatory agency)
FET	field effect transistor
G/R	gain reduction
IC	integrated circuit
IM	intermodulation (or 'intermodulation distortion')
JFET	junction field effect transistor
LED	light-emitting diode
N&D	noise and distortion
RF	radio frequency
RFI	radio-frequency interference
RMS	root-mean-square
THD	total harmonic distortion
VCA	voltage-controlled amplifier
XLR	a common style of 3-conductor audio connector