OMNIA

AUDIO PROCESSOR

INSTALLATION & OPERATION MANUAL

GREETINGS!

Welcome to Omnia, the embodiment of a fresh, new concept in broadcast or netcast signal processing. Omnia applies an advanced design philosophy that yields performance and flexibility heretofore unavailable. Omnia delivers crystal-clear highs, thundering bass and amazing loudness, with none of that "digital grunge aftertaste!"

Omnia is a *fully* digital system that can be configured to match the processing needs of any broadcaster. For FM broadcasters there's the original versions: Omnia.fm or Omnia.fm.jr with integral stereo encoders; for AM broadcasters there's Omnia.am; for broadcasters using the DAB system there's Omnia.dab; and for Internet webcasters there's Omnia.net. There are a number of accessories available including additional memory cards and, for Omnia.fm users, a FM Composite Filter and three field-upgradable software modules to add processor functionality: HOT, Veris and Space-EFX (which may also be combined with the HOT or Veris plug-in).

Omnia's flexibility is built-into the design. Instead of keeping the processing algorithms on a set of EPROMs or proprietary potted modules, the system's DSP (Digital Signal Processing) resources are entirely configured through software contained on a plug-in PC Card (PCMCIA-type). Even fundamental rearrangements of the system architecture can be easily accomplished in the field by plugging in a new PC card or, by using the supplied Windows-based remote control application, through remote software download via local serial RS-232 connection or via the Internet through the supplied plug-in modem card.

Omnia, the promise of digital. . . delivered.

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SAFETY INSTRUCTIONS

1. **Read All Instructions.** All safety and operating instructions must be read before operating the product.

2. **Retain All Instructions.** All safety and operating instructions must be retained for future reference.

3. **Heed All Warnings.** All warnings on the product and those listed in the operating instructions must be adhered to.

4. **Follow All Instructions.** All operating and product usage instructions must be followed.

5. **Heat.** This product must be situated away from any heat sources such as radiators, heat registers, stoves, or other products (including power amplifiers) that produce heat.

6. **Ventilation.** Slots and openings in the product are provided for ventilation. They ensure reliable operation of the product, keeping it from overheating. These openings must not be blocked nor covered during operation. This product should not be placed into a rack unless proper ventilation is provided through following the manufacturer's recommended installation procedures.

7. **Water and Moisture.** Do not use this product near water—for example; near a bath tub, wash bowl, kitchen sink or laundry tub; in a wet basement; or near a swimming pool or the like.

8. **Attachments.** Do not use any attachments not recommended by the product manufacturer as they may cause hazards.

9. **Power Sources.** This product must be operated from the type of power source indicated on the marking label and in the installation instructions. If you are not sure of the type of power supplied to your facility, consult your local power company.

10. **Grounding and Polarization.** This product is equipped with a polarized AC plug with integral safety ground pin. Do not defeat the safety ground in any manner.

11. **Power Cord Protection.** Power supply cords must be routed so that they are not likely to be walked on nor pinched by items placed upon or against them. Pay particular attention to the cords at AC wall plugs and convenience receptacles, and at the point where the cord plugs into the product.

12. **Lightning.** For added protection for this product during a lightning storm, or when it is left unattended and unused for long periods of time, unplug it from the AC wall outlet. This will prevent damage to the product due to lightning and power line surges.

13. **Overloading.** Do not overload AC wall outlets, extension cords, or integral convenience outlets as this can result in a fire or electric shock hazard.

14. **Object and Liquid Entry.** Never push objects of any kind into this product through openings as they may touch dangerous voltage points or short-out parts that could result in a fire or electric shock. Never spill liquid of any kind on the product.

15. **Accessories.** Do not place this product on an unstable cart, stand, tripod, bracket, or table. The product may fall, causing serious damage to a child or adult, and serious damage to the product. Any mounting of the product needs to follow manufacturer's installation instructions.

16. **A Product and Cart Combination** should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the product and the cart combination to overturn.

17. **Servicing.** Refer all servicing to qualified servicing personnel.

18. **Damage Requiring Service.** Unplug this product from the wall AC outlet and refer servicing to qualified service personnel under the following conditions:
    a. When the AC cord or plug is damaged.
    b. If liquid has been spilled or objects have fallen into the product.
    c. If the product has been exposed to rain or water.
    d. If the product does not operate normally (following operating instructions).
    e. If the product has been dropped or damaged in any way.
    f. When the product exhibits a distinct change in performance. This indicates a need for service.

19. **Replacement Parts.** When replacement parts are required, be sure the service technician has used replacement parts specified by the manufacturer or that have the same characteristics as the original parts. Unauthorized substitutions may result in fire, electric shock, or other hazards.

20. **Safety Check.** Upon completion of any repairs to this product, ask the service technician to perform safety checks to determine that the product is in proper operating condition.

21. **Cleaning.** Do not use liquid cleaners or aerosol cleaners. Use only a damp cloth for cleaning.

HAZARD/WARNING LABELS

C A U T I O N

RISK OF ELECTRIC SHOCK
DO NOT OPEN

WARNING: SHOCK HAZARD - DO NOT OPEN
AVIS: RISQUE DE CHOC ELECTRIQUE - NE PAS OUVRIR

CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE ANY COVER OR PANEL. NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

WARNING: TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THE OMNIA TO RAIN OR MOISTURE.

The **Exclamation Point symbol**, within an equilateral triangle, alerts the user to the presence of important operating and maintenance (servicing) instructions in product literature and instruction manuals.

The **Lightning Flash With Arrowhead symbol**, within an equilateral triangle, alerts the user to the presence of uninsulated dangerous voltage within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock.

WARNING—This equipment generates, uses and can radiate radio frequency energy. If not installed and used in accordance with the instructions in this manual it may cause interference to radio communications. It has been tested and found to comply within the limits for a Class A computing device (pursuant to Subpart J of Part 15 FCC Rules), which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference.

CANADA WARNING—This digital apparatus does not exceed the Class A limits for radio noise emissions set out in the Radio Interference Regulations of the Canadian Department of Communications. Le present appareil numerique n'emet pas de bruits radioelectriques depassant les limits applicables aux brouillage radioelectrique edicte par le ministere des Comminications du Canada.

CE CONFORMANCE—This device complies with the requirements of the EEC Council Directives: 93/68/EEC (CE Marking); 73/23/EEC (safety—low voltage directive); 89/336/EEC (electromagnetic compatibility). Conformity is declared to these standards: EN50081-1, EN50082-1.

LITHIUM BATTERY CAUTION—Danger of explosion if the internal lithium battery is replaced incorrectly. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the battery manufacturer's instructions.

USE OF SHIELDED CABLING—To conform to the CE requirements for High Frequency radiation, shielded cables must be used for all audio and data connections. For analog audio and digital connections, the cable shield must connect to the XLR-type connector shell (chassis ground).

N O T I C E S

All versions, claims of compatibility, trademarks, etc. of hardware and software products not made by Cutting Edge, but mentioned in this manual or other accompanying material, are informational only. Cutting Edge makes no endorsement of any particular product for any purpose, nor claims any responsibility for its operation or the accuracy of the presentation.

Warranty Registration and Software Updates

Omnia's operation is almost entirely determined by software. A continuous program of improvement ensures that the product remains at the "cutting edge." In order to be notified of new software releases, be sure to fax or mail in the registration form.

Trademarks

Cutting Edge, the Cutting Edge logo, *Omnia*.fm, *Omnia*.fm.jr and "The Promise of Digital…*Delivered!*" are trademarks of TLS Corporation. All other trademarks mentioned in this work are the property of their respective holders.

Copyright

Copyright ©1997-2000 TLS Corporation. All rights reserved. Published by Cutting Edge, who reserves the right to make improvements or changes to the products described herein (which may affect the product specifications) and to revise this manual as required without notice.

Repair Procedures

You must contact Cutting Edge for a Return Authorization number before returning any products. Packages without proper authorization may be refused. Write the RA number on the shipping label side of the returned package. Be sure to adequately insure your shipment. Customers in North America can contact Cutting Edge customer support at +1 (216) 241-3343. In Europe, Contact Cutting Edge Europe at +49 81 61 42467 (Germany). All other customers should contact their local Cutting Edge dealer to verify the problem and contact Cutting Edge to arrange for repair. Refer to Chapter 10: Troubleshooting & Service for more details.

Caution

The installation and servicing instructions presented in this manual are for use by qualified installation and service 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 personnel.

Warning

To reduce the risk of electrical shock, do not expose this product to rain or moisture.

S P E C I F I C A T I O N S

All measurements referenced to 100% output. It is not possible to quantify the specifications of the gain controlling functions of the AGC and limiter sections due to the dynamic nature of the Omnia system under program conditions. To properly evaluate these functions, there is only one known precise set of test gear for that—your ears! Listen and judge carefully.

Audio performance
- Frequency Response: ±0.2 dB, 50 Hz - 15 kHz (50 Hz - 10 kHz for Omnia.am)
- System Distortion: 0.017% THD, flat or de-emphasized
- Signal-to-Noise Ratio: >80 dB, flat or de-emphasized
- Channel Separation: >85 dB, 10 Hz - 15 kHz (50 Hz - 10 kHz for Omnia.am)

Analog I/O Section
- Left & Right Audio Inputs: 10 k load impedance, electronically balanced bridging input, 20-bit analog-to-digital converter
- Maximum Input Level: +24 dBu
- Connector: XLR, female, EMI suppressed
- Discrete Left/Right Audio Outputs: 600 Ω load or greater, electronically balanced, 18-bit digital-to-analog converter, flat frequency response or pre-emphasized (50 or 75 μs)
- Connector: XLR, male, EMI suppressed

Digital I/O Section
- Configuration: Stereo AES/EBU
- Input Sampling Rates: 32 kHz, 44.1 kHz, 48 kHz, sample rate converter provided
- Input Connector: XLR, female, EMI suppressed, balanced and floating
- Output Sampling Rate: 48 kHz
- Output Connector: XLR, male, EMI suppressed, balanced and floating

Composite I/O Section (Omnia.fm and Omnia.fm.jr only)
- SCA / RBDS Subcarrier Input: BNC, unbalanced
- Impedance: 1 k or greater load
- Signal: 53 kHz subcarrier is summed into composite output.
- Software controls: Input level, Output level High pass filter
- Multiplexed Output Connectors: Two BNC, unbalanced

Pilot Output (Omnia.fm and Omnia.fm.jr only)
- Connector: BNC, unbalanced
- Signal: Square-wave reference signal for RBDS or other 57 kHz subcarrier service
- Level: 0 – 1 V p-p (typ). Maximum output 5 V p-p.
- Software control: Output level
- Composite Output Level: 0 – 10 Vp-p, software adjustable

Computer Interface
- Configuration: RS-232 (DB-25 connector) for local serial connection. Optional PC Card modem for dial-up connection.
- Communications: Windows®-based Omnia Remote Control application (supplied).

Remote Control Interface
- Configuration: Eight software-controlled (through the supplied remote application) remote inputs sensing both go low and go high transitions.
- Connector: DB-9, EMI suppressed.

Power
- Universal power supply accepts 100-240 VAC, 50-60 Hz, 50 VA.
- Connector: IEC, detachable 3-wire power cord, EMI suppressed.

Dimensions & Weight
- 19" wide x 16.25" deep x 5.25" high (48.3 x 41.3 x 13.4 cm)
- 32 lbs. (14.5kg), net

In the interests of product improvement, Cutting Edge reserves the right to change, add or modify any specification.

WARRANTY

This Warranty covers "the Products," which are defined as the various audio equipment, parts, software and accessories manufactured, sold and/or distributed by TLS Corp., d/b/a Cutting Edge (hereinafter "Cutting Edge").

With the exception of software-only items, the Products are warranted to be free from defects in material and workmanship for a period of two years from the date of receipt by the end-user. Software-only items are warranted to be free from defects in material and workmanship for a period of 90 days from the date of receipt by the end-user.

This warranty is void if the Products are subject to Acts of God, including (without limitation) lightning; improper installation or misuse, including (without limitation) the failure to use telephone and power line surge protection devices; accident; neglect or damage.

EXCEPT FOR THE ABOVE-STATED WARRANTY, CUTTING EDGE MAKES NO WARRANTIES, EXPRESS OR IMPLIED (INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE).

In no event will Cutting Edge, its employees, agents or authorized dealers be liable for incidental or consequential damages, or for loss, damage, or expense directly or indirectly arising from the use of any of the Products or the inability to use any of the Products either separately or in combination with other equipment or materials, or from any other cause.

In order to invoke this Warranty, notice of a warranty claim must be received by Cutting Edge within the above-stated warranty period and warranty coverage must be authorized by Cutting Edge. If Cutting Edge authorizes the performance of warranty service, the defective Product must be delivered, shipping prepaid, to: Cutting Edge, 2101 Superior Avenue, Cleveland, Ohio 44114.

Cutting Edge, at its option will either repair or replace the Products and such action shall be the full extent of Cutting Edge's obligation under this Warranty. After the Products are repaired or replaced, Cutting Edge will return them to the party that sent the Products, and Cutting Edge will pay for the cost of shipping.

Cutting Edge's authorized dealers are not authorized to assume for Cutting Edge any additional obligations or liabilities in connection with the dealers' sale of the Products.

Cutting Edge products are to be used with registered protective interface devices which satisfy regulatory requirements in their country of use.

INSTALLATION

E ven though we believe the Omnia is the easiest processor to install in its class, please take a few minutes to read through this chapter before proceeding with the installation.

Omnia Preinstallation Tasks

This section offers common procedures for installing any version Omnia processor. Additional model-specific information is given in the chapters on specific versions (Omnia.fm and .fm.jr in Chapter 4, Omnia.am in Chapter 5, Omnia.dab in Chapter 6 and Omnia.net in Chapter 7).

Omnia Components

By now, you've unpacked the shipping carton to at least gain access to this manual. Be sure to inspect the Omnia and shipping carton for any shipping damage, which must be reported to your carrier for any claims.

The Omnia shipping box includes the following components:

➤ Omnia processor (containing the DSP hardware)

➤ Omnia PC card (holding the DSP software)

➤ Omnia modem card

➤ Omnia Remote Control program (on a single 3 1/2" floppy disk)

➤ Omnia Operating Manual

➤ Warranty Registration Card (fill it out and return it)

➤ IEC Power Cord

PC Card & Modem Card Installation

Before physically installing Omnia, or even plugging in the power cord, make sure the Omnia PC Card and Omnia modem card are installed into the two card slots on the back panel. Installation or removal must be done with the power *off* unless directed otherwise.

The PC Card is inserted into the top card slot (Memory) with the Omnia label facing up. Insert the Modem Card into the bottom card slot (Modem) below the Omnia PC Card. Both the PC Card and Modem Card are keyed to prevent mis-insertion. Press the cards into the slot until their release buttons, to the right of the cards, pop out about 1/2" [12.70 mm]. This indicates the cards are properly seated in the PCMCIA slots.

Note: You must use the modem card supplied with your Omnia, no other modem cards are approved for use at this time. We cannot assume correct operation of any other modem card, nor can we provide support.

Omnia PC Card, label side
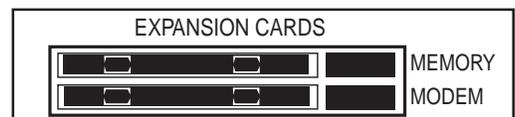
Rear Panel PC Card Slots

The PC Card that is used in Omnia is not a *generic* PCMCIA card that you might find in a local computer store. It's a card that is specifically designed for this product. If you insert a card of unknown origin, you risk extensive damage to the unit and a complete voiding of the warranty!

Note: The Omnia PC Card must remain in the carriage unless you are prompted by the system to remove it. Randomly removing the Omnia PC Card without system instruction may cause unpredictable operation and PC Card data damage.

During operation of the Omnia, it is possible to remove the Omnia PC Card without interrupting the processing. There are a few Omnia PC Card utilities that can be performed which require this. They are described in *Housekeeping* in Chapter 2, Omnia Operation.

The Omnia is normally installed into a 19" equipment rack. But, before rack mounting the Omnia, ensure that the internal jumper and switch positions are appropriately set for your installation as outlined in the next section. Also, refer to the chapter on your model Omnia for additional information on where to locate your Omnia processor.

Internal Switch & Jumper Settings

There is one internal AGC switch (applicable to any model Omnia that's using the analog inputs) and two jumpers (applicable only to Omnia.fm's Composite outputs) that may need to be changed from their factory defaults. Read through the switch and jumper descriptions to determine if they need to be changed for your installation.

If they need to be changed, the top cover of the Omnia must be removed. Use care when working inside the Omnia. Take appropriate measures to avoid product damage due to static discharge.

Place the Omnia on an antistatic work surface, unconnected to AC power, before removing the top cover (held in place by nine #1 Phillips screws).

REMOVE NINE SCREWS
TO REMOVE COVER

Omnia Top Cover Removal

Analog Input Headroom Protection Limiter

When the analog inputs are being used, an analog input protection limiter is engaged by default. This very fast-acting peak limiter is set to respond to any signal peak that approaches within 2 dB of clipping the 20-bit A/D converter. Since the operating level is nominally about 18 - 20 dB below the clip level, the limiter should never become active. However, should a condition arise where the audio level threatens clipping in the A/D converter, the limiter activates to prevent one of the nastiest forms of distortion.

Even though this limiter uses a high quality VCA, there may be those "audiophiles" who wish to disable the limiter. This is done by changing a slide switch on the A/D board *inside the unit.* The A/D board is a square "daughter" board that sits on the motherboard near the rear panel XLR connectors as shown in the illustration. A single blue slide switch, labeled *AGC,* is on this board. Use a small screwdriver to slide the switch *away* from the *In* position. The limiter is now defeated.

Note: When the limiter is defeated, so is the *Analog Gain* software parameter that sets the input sensitivity. With the limiter Out, the input sensitivity is fixed at +4 dB.

Composite Output Load Jumpers
(for Omnia.fm only)

Input Overdrive Limiter
On/Off Switch

10 Ω Setting
(Default)

75 Ω Setting

MAIN PC BOARD

IN   AGC

DAUGHTER
BOARD
(ADC board)

DSP CARD GUIDE SUBPANEL

AGC In (Default)

No Input AGC
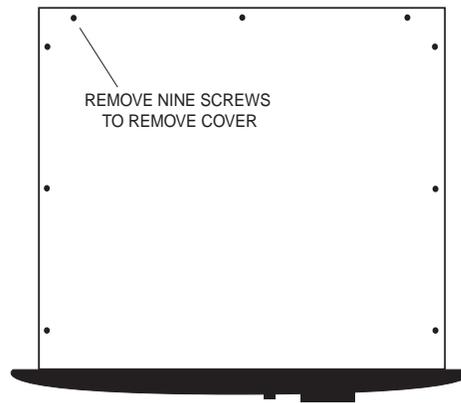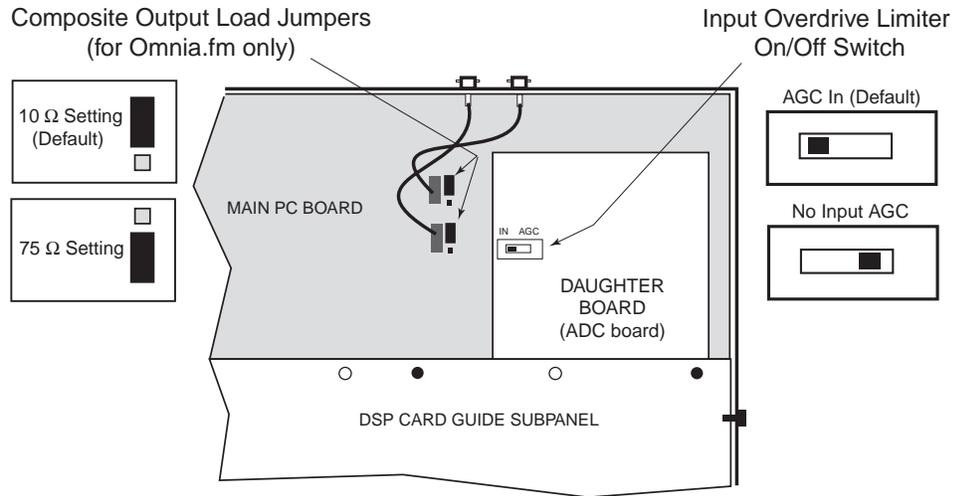
Omnia Internal View, Right Rear, Jumper & Switch Locations

Composite Output Series Load **(Omnia.fm only)**

The default Composite output series load is 10 Ω, which is appropriate for the vast majority of FM exciter connections. However, exciters manufactured before 1975 need 75 Ω series resistance. Two jumpers on the motherboard allow the composite outputs to be independently set for either 10 Ω or 75 Ω. The jumpers are located next to the composite coax cable PC board sockets. The jumpers are set, by default, in the 10 Ω position. Changing the jumper to the other position changes the series resistance to 75 Ω.

Once all internal changes are finished, reinstall the top cover, making sure all nine Phillips screws are reinstalled.

AC Environment

Since the Omnia is microcomputer-based, it requires the same clean AC environment as any computer system. Even though the Omnia has internal AC input transient suppression, we recommend that transient suppressors/ voltage regulation or an Uninterruptible Power Supply (UPS) be employed as well. This is especially recommended when installing Omnia at a transmitter site. Heavy transient demands on power lines, from normal switching to lightning strikes, have been known to wreak havoc with data in computer systems. This is another reason we ask that you give your AC environment thorough consideration before plugging in your Omnia processor.

Omnia Installation & Connections

As these instructions cover the entire Omnia family of processors, there may be some connections listed that are not used on your specific model. Refer to the individual model chapter for additional details specific to your Omnia version. Throughout this section reference is made to Omnia's "software parameters." These are part of the User Interface, which is covered in Chapter 2, Omnia Operation.

Rack Mounting

The Omnia requires 3RU (5.25") of rack space and four rack screws for mounting. You must leave at a minimum one rack unit of empty space above the processor to enhance ventilation and to prolong component life. Install a 1RU (1.75") vented or solid panel to fill this space. It is recommended that another 1RU blank panel be installed below the processor for the same reason, if rack space is not at a premium.
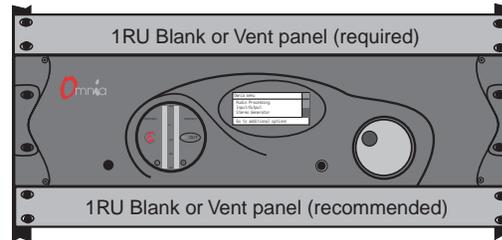
Omnia 19" Rack Mounting
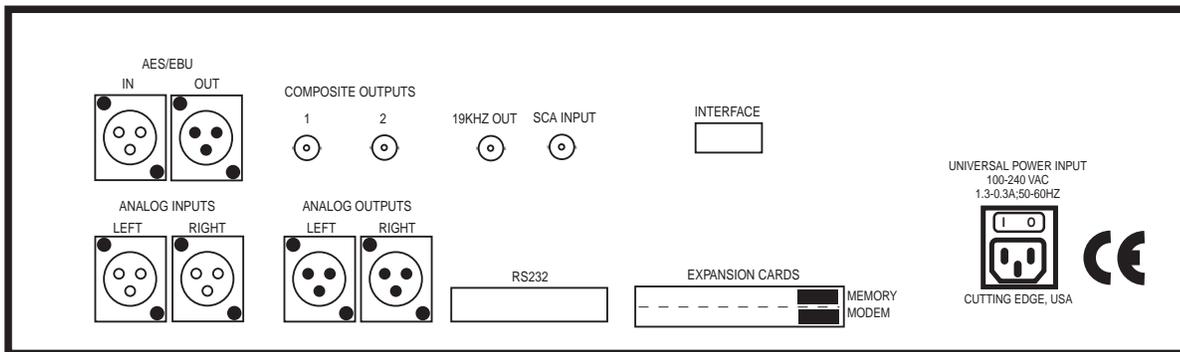
Omnia Back Panel Connections

AC Connection (IEC)

The Omnia uses a universal power entry module with integral AC switch just above the IEC power cord receptacle. The Omnia can operate on AC mains voltages from 100 to 240 VAC, 50/60 Hz since a self-adjusting switching power supply is used. In the USA, plug the supplied AC power cord into the Omnia and then into an isolated ground AC outlet. Outside of the USA you must obtain an appropriate local IEC power cord.

Press the "**I**" side of the rear panel power switch to turn on the unit. The Omnia is designed to be turned on and left on. Press the "**O**" side of the switch to turn off the Omnia for servicing.

When power is first applied, the Omnia takes ten to fifteen seconds to load the DSP code off the PC Card. During system power-up, the front panel LCD screen displays several status screens while the operating software and DSP code is loaded. Once the main Omnia Menu is shown on screen, the Omnia is ready for use.

Audio Inputs (Female XLR)

Balanced XLR-type connectors are used to input both analog and AES-3 digital audio. Even though both analog and digital cables can be connected, only one input can be set active. Input selection is done through the *Input Source* software parameter setting. The *Analog* input is the factory default selection.

The stereo analog inputs are designed for standard +4 dBu balanced signals. The digital AES-3 input accepts any sampling rate between 32 and 50 kHz. No user adjustment is necessary since a sample rate converter is built into the unit. Individual channel gain and level setting for both analog and digital is done using the *Input & Output* software parameter settings.

A Note About Relative Phase: If the relative phase of your installation including the Omnia differs from your existing system, it could cause your announcers to feel they sound "weird" in their headphones. If this happens, then the relative phase of the processor is 180 degrees from what your air talent have been used to hearing. To remedy this situation, you could reverse the wiring polarity to both of the Omnia's analog inputs (is pin 2 or is it pin 3 that's hot!?, in the Omnia, pin 2 is hot). However, it's a lot easier to accomplish this same function by changing the *Input Phase* software parameter setting.

Discrete Audio Outputs—Analog & Digital (Male XLR)

Individual Left and Right analog outputs are available on two male XLR jacks, as is a single stereo AES-3 output. The 48 kHz digital output is produced directly from the output of the final processing section. The analog output is derived from a D/A converter driven from the digital output.

Note: Both the analog and digital AES-3 outputs are always active and can be used simultaneously.

Composite Outputs (BNC) - For Omnia.fm versions only

These two low impedance outputs (Composite 1 and Composite 2) are each capable of driving up to 50 feet of coax cable. The output levels are individually adjustable between the outputs so the unit can operate as a "composite DA" to drive a variety of equipment. The output levels and other stereo generator settings are set through software parameters.

19 kHz Data Output (BNC) - For Omnia.fm versions only

This TTL-level 19 kHz square wave output can be used as the reference signal for any SCA generator that operates at 57 kHz or other multiple of the 19 kHz pilot frequency. Using the 19 kHz clock from the Omnia stereo generator makes it much easier to phase lock the SCA signal to the pilot frequency. This is extremely helpful in eliminating intermodulation components that might exist between the pilot and SCA signal. For RDS users, this feature is very useful.

SCA Input (BNC) - For Omnia.fm versions only

Any SCA signal above 53 kHz can be added to the composite outputs of the Omnia by routing the SCA signal through the SCA INPUT connector. The SCA signal is mixed directly into both composite outputs. A high-pass filter on the SCA input provides additional crosstalk protection from the SCA to the main channel composite signal. The SCA modulation is controlled through software parameters.

RS-232 & Interface Connection (DB-25M and DB-9F)

For a local bidirectional computer connection with the Omnia, connect a standard serial cable (*not* a null modem cable) between the RS-232 connector and a serial port connector on the computer. Typically, a DB-25 male to DB-9 female serial cable is required. Communication requires that the Omnia Remote Control software

be loaded onto the local computer and that the modem port be properly configured for the Windows® environment.

The Remote Control application is covered in detail in Chapter 9, *Accessories*.

Interface

The 9-pin female Interface connector uses eight pins as "trigger" inputs with the ninth pin as the ground reference. The trigger inputs can be used to dynamically alter the Omnia's operational attributes in response to logic signal transitions. The Omnia responds uniquely on each trigger input to both go-high and go-low transitions. With eight inputs, and two possible triggers (logic go-high and go-low), sixteen unique "trigger scripts" can be written to control the Omnia in response to these trigger input logic transitions.

The Trigger Script Interface Editor is covered in detail in Chapter 9, *Accessories*.

2

O M N I A   O P E R A T I O N

W ith the Omnia rack-mounted, connected to an input and an output, and turned on, it's about time to learn how to operate it! This chapter covers the User Interface, the all-important window into the Omnia processor.

The Omnia User Interface

The Omnia front panel user interface consists of a large jog-wheel, a small recessed push-button, an LCD screen, two LED meters and a headphone monitor jack.

The LCD screen displays menus, parameter settings, the AGC bargraphs or the Limiter bargraphs. The Push-Button toggles between the two types of LCD screen: the menus and the bargraphs. The menus are used during initial setup and for adjusting the processing parameters. In normal day-to-day operation, one of the bargraphs is typically displayed to dynamically indicate the real-time signal processing.
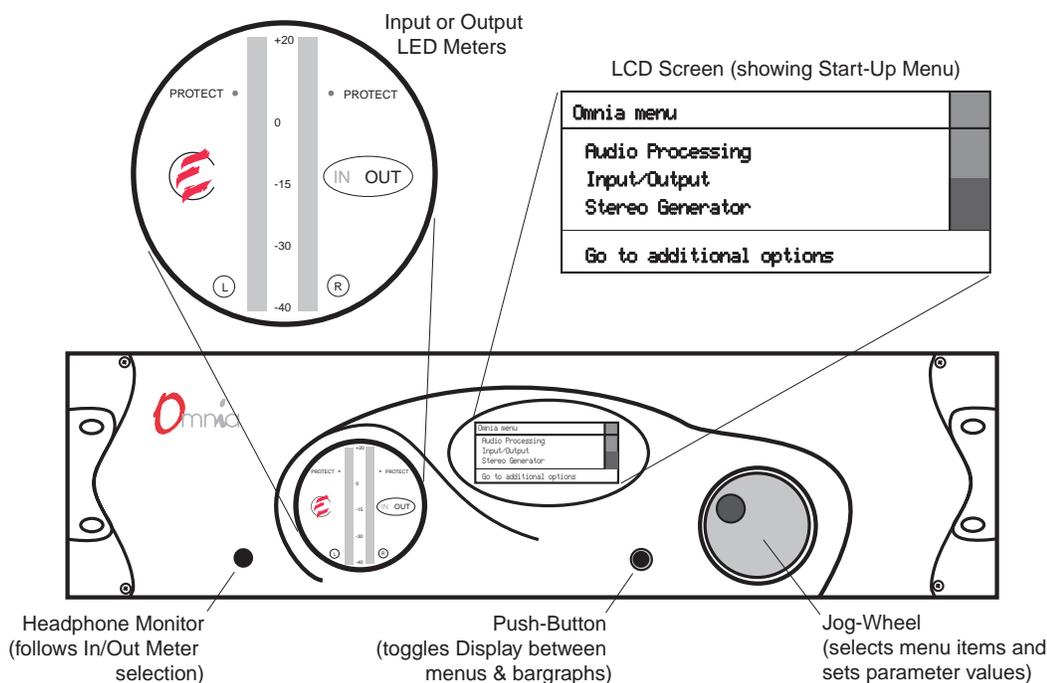
Omnia Front Panel Controls & Displays

The two LED meters display either the audio input or output levels for the Left and Right channels. An IN or OUT indicator lights to identify the meter source. The headphone monitor audio follows the metering source selection. The headphone monitor level is set using the *Headphones* software parameter.

Rotating the Jog-Wheel moves a highlighting bar up or down through menus and parameter choices. Pressing the jog-wheel (called "clicking") selects the highlighted menu item or parameter choice. When editing the parameter values, rotating the jog-wheel adjusts the parameter's value up (by rotating CW) or down (CCW).

Once the desired value is reached, clicking the jog-wheel saves the value and returns the display to the previous menu or sub-menu. Thus pressing or clicking the jog-wheel serves as, depending upon the LCD screen, an *Enter, Select* or *Return* command.

The **Enter**, **Return** or **Select** button. Pressing the Jog-Wheel once selects the highlighted menu item or accepts the current parameter value. Think of it as a vertical mouse button.

Clockwise rotation moves the cursor downward in menus or increases the value when editing parameters

CW

CCW

Counterclockwise rotation moves the cursor upward in menus or decreases the value when editing parameters

Jog Wheel Use

Main Menu Orientation

When Omnia is first turned on several start-up screens are displayed. After ten to fifteen seconds the ***Omnia Main Menu*** is displayed with a sliding *menu bar* along the right side of the screen to indicate your position within the menu hierarchy. A multipurpose help line is located at the bottom of the display.

Note: After a time-out, the help line will cycle through: the current preset name, the status of dayparts, and the day and date. The time is displayed at the right side.

The Omnia menu system has been designed to be intuitive and simple to use, with a minimum of sub-menu layers. Most operating parameters are found less than three sub-menus deep. This allows multiple processing changes to be made "on-the-fly" with relative ease. The complete system is managed through the four menu choices on the main ***Omnia Menu***. They are: ***Audio Processing***, ***Input & Output***, ***Display*** and ***Utility***. A fifth sub-menu, ***Stereo Generator***, is added for the Omnia.fm and Omnia.fm.jr versions.
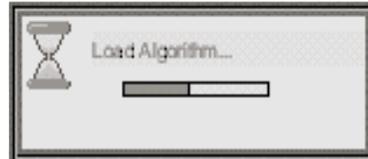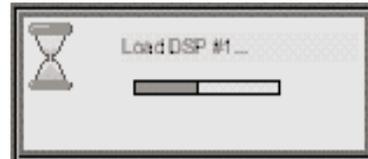
Typical Omnia Startup Screens
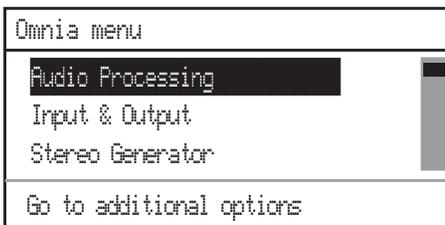
Omnia Main Menu Items

The *Audio Processing* menu item is shown highlighted in the illustration. The highlighting is controlled by the jog-wheel. Rotate the jog-wheel CW to step the highlighting down through the menu items. When the desired menu item is reached, press the jog-wheel once ("click") to select that item. If the item has sub-menus (like Audio Processing), then the *Audio Processing* menu choices will be displayed. If the menu item is a parameter selection, then the parameter choices or a bargraph value indicator is displayed. Rotating the jog-wheel steps through the choices and raises (when rotated CW) or lowers (when rotated CCW) the parameter value. Click the jog-wheel to select the parameter.

When a sub-menu is displayed, the top menu item will always be the return arrow. Highlight the return arrow and then "click" to move back to the next higher menu.

Return Arrow

The Menu Tree

The menu tree for the Omnia.fm is shown on the next page (page 2-4). It has all five of the possible main menu items listed along the left side. The branching sub-menus and parameters connect in the order they are encountered in the menu system. The *Audio Processing* sub-menu is the same for all Omnia versions, although some of the *Edit Parameters* choices will differ between models. The Input & Output sub-menu is similar between versions with only Pre-emphasis and De-emphasis not being used in some models (Omnia.am also adds several choices). The Stereo Generator section is identical between the Omnia.fm and Omnia.fm.jr versions, but is not used on other versions. The Display and Utility sub-menus are identical in all Omnia versions.

Note: Each Omnia version has its own chapter that includes a menu tree that is specific to that model Omnia.

Omnia Menu Items

This section gives an overview of the menus, sub-menus and parameters on the Omnia. Refer to the Omnia.fm Menu Tree on the following page for the menu structure. The *Omnia Software Configuration* section, starting on page 2-8, gives in-depth description and usage instructions on each menu item and parameter selection.

Omnia Main Menu

This menu has four items in Omnia.am, Omnia.net and Omnia.dab: Audio Processing, Input & Output, Display and Utility. A fifth item: Stereo Generator is added on the Omnia.fm and Omnia.fm.jr versions only.

Audio Processing

It is from the Audio Processing sub-menu items—***Select Preset*** and ***Edit Parameters***, that the Omnia processing power is unleashed. Omnia is equipped with numerous presets that can be selected to instantly configure the Omnia processing. The presets are selected using *Select Preset*. Selecting ***Edit Parameters*** opens up the parameter editing sub-menu which allows any processing parameter to be "fine-tuned" to tailor your processing. *Save to Card* allows the edited preset to be saved to the PC Card as a new User Preset.

Input & Output

This sub-menu provides level adjustment for the discrete left and right inputs and outputs, selection of analog or AES-3 input, level control of the front panel headphone output, as well as whether pre-emphasis and de-emphasis is applied on the Omnia.fm and Omnia.fm.jr versions. These are generally "set once" selections or parameters, adjusted during installation and then generally left alone.

Stereo Generator (Omnia.fm and Omnia.fm.jr only)

This sub-menu has the adjustments for the Composite Output Levels, Pilot Level, L-R Gain, SCA Mix Level, Separation and Pilot Phase.

Display

This sub-menu has the adjustments for the LCD screen (*Contrast* and *Backlight)* and the LED metering source selection (monitor the Input or monitor the Output).

Utility

Numerous maintenance and utility functions are nested within this sub-menu. Housekeeping of *Preset* and *System* data, along with PC Card maintenance is provided here. Enabling *Dayparts* as well as setting *Security* features to prevent tampering by unauthorized personnel, are also provided under this sub-menu.

Audio Processing

- Select Preset
- Edit Parameters
- Undo Edit
- Save to Card
- Save to Card As
- Editing Mode — Normal / Expert

- Wideband AGC — Parameters
- Bass — Parameters
- Warmth — Parameters
- Xover — Parameters
- Multiband AGC — Parameters
- Multiband Limiter — Parameters
- Mixer — Parameters
- Clipper — Parameters
- Composite Clipper — Parameters

Input & Output

- Input Levels — Analog Gain
  - Input Left
  - Input Right
  - Input Phase — Normal/Invert
- Output Levels — Output Left
  - Output Right
- Headphones
- Input Source — Analog / AES/EBU
- Pre-emphasis — None / 50 μs / 75 μs
- De-emphasis — None / 50 μs / 75 μs
- Mono Mode — Parameters

Stereo Generator

- SCA Level — Parameters
- Composite 1 — Parameters
- Composite 2 — Parameters
- Pilot Level — Parameters
- Phase Adjust — Parameters
- Separation — Parameters

Display

- LED Source — Input/Output
- Contrast
- Backlight

Utility

- About...
- Preset
  - Delete
  - Rename
  - Copy Single
  - Copy All
- System Attributes
- Card Maintenance — Copy Entire
  - Erase User Data
  - Load Defaults
  - Load from Card
  - Save to Card
- Daypart Table
  - Show All
  - Add Part
  - Modify Part
  - Remove Part
  - Load from Card
  - Save to Card
  - Current State — Enabled / Disabled
- Security — Lock Unit
  - Login
  - Lock Password
  - Engineer Password
  - Enable Remote
  - Disable Remote
  - Select Parameters
- Set Time
- Set Date
- Ctrl Port Baud — Parameters
- Reload Software

Omnia.fm Menu and Submenu Summary

There is also a selection to save the state of the Omnia operating system. *Save to Card* makes a "copy" of the system configuration, storing it on the PC Card. This simplifies getting back to "square one" when numerous adjustments have been made, but you want to start over. If a power failure should occur, Omnia restarts using the last saved operational settings. This means all Input & Output settings are restored, as well as the processing settings. If the system was not backed up and saved to the PC Card, then the system restores itself to the last known saved set of parameters (which will be the factory defaults if you don't use *Save to Card*!). We suggest you backup the system after any parameter editing is finished.

User Interface Access

The user interface can be password-protected for controlled access. Even for those with access, the parameter editing functions (Main Menu > Audio Processing > Edit Parameters) can be limited to the Normal Mode (the default mode). For experienced engineers, individual parameters can be edited using Expert Mode.

Normal Mode, which is the simpler form of operation, is intended for the novice or newcomer to processing adjustment who may not have an experienced background in audio processing. This level provides just three adjustable parameters: *Thunder, Sizzle* and *Thrust*. As you might guess, these three areas are probably the most asked about parameters that programmers look to have adjusted. Each control works independently of the others and can safely be adjusted by nontechnical personnel.

Expert Mode is for the professional who requires detailed control of *all* processing parameters. Such parameters as attack/release times, gate thresholds, multiband EQ settings and clipping drive are available at this level through a graphical block diagram editor interface. CAUTION! This mode could cause an end user to "crash and burn" if they do not understand the power that is available or the processing concepts involved.

Processing Presets

Omnia is equipped with numerous processing presets, provided as starting points for customizing the sound of your station and its format. Cutting Edge does not warrant in any way that these presets are the *de facto standards* for the format names used. Each was derived in an effort to create a generic starting point for each respective format. In some markets, these presets may sound too strong or aggressive. In others, they might not be aggressive enough. Our experiences with the presets in an earlier product, the Unity 2000, were that the presets were judged to be about 50% good and 50% bad. That feedback indicated to us that we were probably about in the middle of the playing field with respect to where the presets need to be to serve as a starting point for any given market.

With all of that having been said, please rely on the presets to get yourself going. From there, we can provide assistance, if you desire, or you can venture off to discover new frontiers of processed sound. It is our belief that there is not any *nirvana* of processed sound, or *special secret* preset that we keep for only the Big Stations. Each station in each market is unique unto itself. Try to remember that when "crafting" that special sonic personality for your station. Omnia gives you the power to create a sound totally different from, and better than, your competitors. Enjoy that power!

We could publish the entire preset list, but chances are that we will continue to develop new or modify existing presets. So, a list that is guaranteed to be obsolete would be of little help. Besides, the name of each should be self-explanatory. If you need more clarification, please contact the technical support department.

Format Presets

Each Omnia comes with processing presets designed for that model Omnia that cover most broadcasting formats or netcasting applications. Some models have only a handful, whereas Omnia.am includes 27 presets (plus a test tone!). A preset contains the saved values for every parameter listed in the menu tree for that model. When a preset is loaded, these values configure the Omnia's processing.

The factory presets can be used as-is, or they can be used simply as a starting point to tailor the processing for a specific requirement. Any of the preset's parameters can be edited (using *Main Menu > Audio Processing > Edit Parameters*) to obtain the desired sound using either the Normal or Expert editing modes. The edited preset can then be saved to the PC Card as a User Preset and selected just like the factory presets. Editing presets is covered in detail in Chapter 8, Editing Presets. This section covers how to select and load a preset.

Selecting A Preset

From the *Main Menu*, highlight and click *Audio Processing*. Then highlight and click *Select Preset*. The name of the preset that is currently running is displayed. Use the jog-wheel to scroll through the list to find a preset to load. Once the desired preset name is displayed, click the jog-wheel to immediately load that preset into the Omnia. This also returns you to the Select Preset menu item.

Note that once you move the jog-wheel to display another preset name, a message below the preset name indicates the previous selection, i.e., "(was Jazz-6AM)" will be shown if that was the currently running preset. This serves as a reminder, so you can reselect that preset in case you change your mind about changing presets, since there is no way to "cancel" selecting a new preset to load.

A thermometer bar along the left side of the window indicates where you are in the list of presets. All User Presets are added onto the end of the list, so they will be found when the bar is toward the bottom of the thermometer.

Daypart Automation

Presets can be scheduled in advance to automatically load based upon specific daypart requirements. Dayparting can be set to occur on specific days, on a daily basis, on weekdays-only or on weekends-only. The daypart schedule and settings can also be saved to the PC Card.

Even though dayparting can be configured using the Omnia menus, it is far easier to set up and adjust the dayparting using the Daypart Table Editor included with the Omnia Remote Control application. See Daypart Editor in Chapter 10, Accessories, for more information on using this editor.

Input Source Selection & Analog Input Gain Adjustment

The following two exercises are a useful introduction to the Omnia user interface. Start from the top of the Main Menu (as displayed when the unit is first turned on). The first exercise chooses a parameter selection:

1. Rotate the jog-wheel to highlight *Input & Output*.

2. Select this menu item by "clicking" the jog-wheel (push once on the jog-wheel). The Input & Output sub-menu is presented.

3. Rotate the jog-wheel CW to scroll down to highlight *Input Source*.

4. Click the jog-wheel to select *Input Source*. An expanded edit box appears with the word *ANALOG* shown in large type (this is the default input selection).



```
Input & Output
 ←
 Input Levels
 Output Levels
GO TO ADDITIONAL OPTIONS          10:10AM
```

Input & Output Sub-Menu

5. Rotate the jog-wheel to alternate between the available parameter choices, in this case: ***ANALOG*** and ***AES/EBU***. Note that the choices do not "wrap around." You must rotate the jog-wheel CCW to return to a previous choice.

6. With *ANALOG* displayed, click the jog-wheel. The selection takes effect and the screen returns to the sub-menu item (*Input Source*).

The next exercise adjusts a parameter that uses a value:

1. From the ***Input & Output*** sub-menu, rotate the jog-wheel until *Input Levels* is highlighted.

2. Click the jog-wheel to select and display the *Input Levels* sub-menu.

3. The highlighted item is the *Analog Gain* parameter. Click to select.

4. An expanded edit box appears at the bottom of the display with a level bar displayed in the middle. Rotate the jog-wheel CW to increase the input gain in 0.5 dB steps. Rotate the jog-wheel CCW to decrease the input gain in 0.5 dB steps. The current setting display "5.5 dB" updates as the jog-wheel is moved. Just below the current setting is the previous setting display
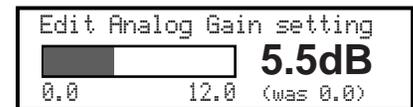
Analog Gain Parameter Display

"was 0.0." All parameters display the previous setting below the current setting as soon as the jog-wheel is rotated. This allows the parameter to be easily returned to its previous setting.

The *Analog Gain* parameter sets the gain for both channels. Normally, this adjustment is made while monitoring the input LED meters. Peak indications hitting 0 dB (where the LEDs turn red) or a little higher, is proper. This corresponds to a system headroom of about 18 dB. If further gain or attenuation is required, the individual left/right channels can be adjusting using the ***Input Left*** and ***Input Right*** parameters (which are the next menu items below Analog Gain).

5. Once the desired gain is reached, click the jog-wheel to accept and use the value and to return to the sub-menu item (*Analog Gain*).

All of the Omnia's software parameters are set in similar fashion through scrolling through menus and sub-menus to select which parameter to edit. The parameter choices or values are then selected by rotating the jog-wheel until the desired setting is displayed. Clicking the jog-wheel selects the parameter value and returns to the menu or sub-menu item.

Note: Changing the parameter value or choice changes the audio output so that changes can be auditioned in real time.

The next chapter (Chapter 3, Processing Overview) presents an overview of the Omnia processing. Chapter 8, Editing Presets, gives more information on editing parameters including procedures for editing the factory presets to create your own custom presets.

Omnia Menu Selections

This section presents more detailed information on each menu and sub-menu item and their parameter choices or value settings. This procedure is used for all parameter selection and editing:

1. Use the jog-wheel to highlight a menu item or sub-menu item.

2. Click the jog-wheel to open up that item.

3. Once a parameter is displayed, highlight and click the name to open up the parameter value edit box.

4. Use the jog-wheel to adjust the value or change the parameter choice.

5. Click to accept the value and return to the sub-menu.

Audio Processing

This sub-menu has six items: Select Preset, Edit Parameters, Undo Edit, Save to Card, Save to Card As and Editing Mode.

Select Preset

Opens up a selection box to select a factory preset or a user preset that was previously saved to the PC Card.

Edit Parameters

What happens when this menu item is selected is dependent upon the *Editing Mode* selection (either **Normal** or **Expert**). Regardless of which editing mode is used, an editing change made in one mode is reflected in the other mode's parameter value settings. Normal mode allows nontechnical personnel to make processing changes without having to understand details about AGC levels, attack and release times, etc.

Editing Parameters in Normal Mode

To make it easy to obtain the desired sound, only three general parameters are available: *Thunder*, *Sizzle* and *Thrust*. As might be surmised from the names, Thunder deals with the bottom end bass sound, Sizzle sets the high end sound and Thrust adjusts the voice-range or presence sound. Changing one of these three parameters is equivalent to individually selecting (and changing) multiple Expert Mode parameter settings. For instance, changing the Thunder setting affects the levels of the Deep, Phat and Warm Bass settings simultaneously. Likewise, individually changing the Deep, Phat or Warm Bass settings in Expert Mode will affect the Thunder level displayed when the editing mode is changed to Normal Mode.

Editing Parameters in Expert Mode

This is a very different editing experience than that found in Normal mode. Expert Mode opens up a processing block diagram on the LCD screen. The first block's name "AGC Wideband" flashes, indicating that it's the current parameter. To edit the AGC Wideband parameters, click the jog-wheel. A list of the parameters relevant to that part of the processing algorithm is shown (in this case; Phase Rotator, Wideband AGC, etc.). To edit another block's parameters, rotate the jog-wheel until the desired block name is flashing and then click the jog-wheel. Expert Mode editing is covered in more detail in Chapter 8, Editing Presets.

Undo Edit

Restores the last edit operation.

Save to Card

Saves the current parameters to the PC Card, overwriting any previous settings saved under the current Preset name. This function cannot be used with factory presets, since they cannot be changed. If a factory preset is changed, and the changes should be saved, use **Save to Card As** to save the changes under a new name.

Save to Card As

Opens up a Preset Naming dialog box to allow the Preset name to be changed before saving the preset to the PC Card. Preset names can be up to 20 characters in length. All of the standard (non-extended) ASCII characters are valid. Click the jog-wheel to select a highlighted character to change. Then rotate the jog-wheel to step through all the possible characters. Once the desired character is displayed, click the jog-wheel to select that character. The highlighting moves to the next character. When the last character is reached, rotate the jog-wheel to highlight **Save**. Click to save the preset. Highlight **Cancel** to cancel the **Save to Card As** operation.

Editing Mode

Selects between Normal and Expert Edit Modes. The factory default is Normal Mode. This selection can be password protected to prevent changes.

Input & Output

This sub-menu has five main items: Input Levels, Output Levels, Headphones, Input Source, Mono Mode, plus two additional items (Pre-Emphasis and De-Emphasis) in the Omnia.fm / .fm.jr models and four additional items (Asym Mode, Tilt EQ, Tilt Frequency and HP Filter) in the Omnia.am model.

Input Levels

Four parameters are under this sub-menu item: Analog Gain, Input Left, Input Right and Input Phase

Analog Gain

Active only when the analog inputs are used and when input AGC is active (the default setting). This parameter sets the input operating reference level between -15 dBu and +4 dBu. The factory default setting is +4 dBu. To change input sensitivity, use the jog-wheel to adjust the level in 0.5 dB steps, with 0 dB having the least amount of gain and 12 dB having the maximum gain. Use the LED meters (set for Input Monitor) to make this adjustment so that signal peaks read at 0 dB or a little higher. Peaks at 0 dB correspond to -18 dBFS (decibels below Full Scale digital, i.e. the digital clip point) or headroom of 18 dB. If further gain or attenuation is required, or if the signal levels are not balanced between channels, the *Input Left* and *Input Right* parameters can be adjusted to compensate.

Note: The *Analog Gain* parameter is not active when the AGC analog input limiter is defeated (refer to the *Input switch & Jumper* section on page 1-2). In this condition, the input sensitivity is fixed at +4 dBu.

Input Left and Input Right (Digital Input Level)

These level controls are active when either Analog input or AES/EBU input is selected since their adjustments take place in the digital domain. The factory default setting is +4 dBu. To change input level, rotate the jog-wheel to adjust the level in 0.5 dB steps. Use the LED meters (set for Input Monitor) to make this adjustment so that signal peaks read at 0 dB or a little higher. Peaks at 0 dB correspond to -18 dBFS (decibels below Full Scale digital, i.e. the digital clip point) or headroom of 18 dB. These are the only level controls for the AES/EBU input. For analog inputs they work in conjunction with the *Analog Gain* parameter and are typically used to fine-tune the balance between the channels.

Input Phase

If the relative phase relationship of the Omnia is different from your existing system, a backup system, or the system you may be comparing it to, it could cause your announcers to think they sound "weird" when monitoring through the system using their headphones. If this happens, the relative phase of the Omnia is 180 degrees different from what your announcers are used to. To remedy this, you can reverse the polarity with this menu selection.

Output Levels (Digital Output Level)

Adjustment of the left/right audio levels is done in the same manner as setting the input levels, except that the LED meters would be set for Output Monitoring. Since these settings take place before the D/A converter, the settings affect both digital (AES/EBU) and analog outputs.

Note: Both the analog and digital AES/EBU outputs are active at the same time. Connections can be made simultaneously to the analog and digital outputs, as well as the composite outputs on the Omnia.fm & .fm.jr.

Headphones

The front panel headphone output is active at all times and its audio signal is always flat (its de-emphasis automatically follows the *Pre-Emphasis* choice on Omnia.fm & .fm.jr). This parameter adjusts the output level for the front panel headphone jack only.

Note: The *Output Levels* parameter should be set before setting the *Headphones* level, since it affects the headphone levels when switched for output monitoring.

Input Source

Selects whether the input is supplied by the Analog or Digital input.

Mono Mode

Selects between stereo and mono. When mono is selected, allows the left channel, right channel, or a sum of the two input channels, to feed both left and right outputs with a mono signal.

Pre-Emphasis (for Omnia.fm and Omnia.fm.jr only)

For FM broadcasting worldwide, some form of time constant pre-emphasis, typically 50 μs or 75 μs, is employed. For North and South America, 75 μs is used. In Europe, Australia and New Zealand, 50 μs is employed. The factory default pre-emphasis setting is *75 μs*. The pre-emphasis selection affects the operation of the audio processing and is applied to both the composite and discrete outputs. The pre-emphasized signal at the Left/Right outputs can be restored to flat, if needed, by the *De-Emphasis* parameter selection.

To set the Pre-Emphasis, rotate the jog-wheel to cycle through the three choices: *None*, *50 μs* or *75 μs.* Click the jog-wheel to set the pre-emphasis selection.

Note: Normally, the *None* selection would not be used in FM transmission applications, but is provided in instances where processing of a flat signal is desired. One example would be when preprocessing prior to a satellite uplink in distributed radio networks.

De-Emphasis (for Omnia.fm and Omnia.fm.jr only)

The Left/Right outputs are pre-emphasized under normal circumstances, such as when feeding an outboard stereo generator or discrete microwave studio-transmitter link. The same applies when feeding a digital exciter from the AES/EBU output. These outputs can also be de-emphasized for installations that require a flat response, as is the case when feeding land lines. The factory default de-emphasis setting is *75 μs*.

To change the De-Emphasis setting, rotate the jog-wheel to cycle through the three choices: *None*, *50 μs* or *75 μs*. Click the jog-wheel to set the de-emphasis selection. If choosing a de-emphasis time constant, be sure it matches the pre-emphasis time constant. Bear in mind that selecting *None* means that the outputs have pre-emphasis, assuming that one of the time constants was selected in *Pre-Emphasis*.

Note: The *De-Emphasis* setting does not affect the composite output, which always follows the *Pre-Emphasis* setting.

Asymmetrical Modulation (Omnia.am only)

Asymmetrical positive modulation is possible by adjusting this parameter. The range of adjustment is between +100% and +150% modulation.

Tilt EQ (Omnia.am only)

Sets the amount of tilt compensation in the Omnia.am's output. To perform the procedure, an oscillator and oscilloscope will be required. See Chapter 5, Omnia.am for details.

Tilt Frequency (Omnia.am only)

Sets the frequency where tilt compensation starts. See Chapter 5, Omnia.am for details.

LP Filter (Omnia.am only)

Sets the frequency of the low pass filter used at the output of the Omnia.am. See Chapter 5, Omnia.am for details.

Stereo Generator (Omnia.fm and Omnia.fm.jr only)

Six parameters are set under this sub-menu: SCA Level, Composite 1, Composite 2, Pilot Level, Phase Adjust, and Separation. See Chapter 4, Omnia.fm for more information on the settings in this sub-menu.

Display

Three parameters are set under this sub-menu: LED Source, Contrast and Backlight.

LED Source

Sets the source for the LED meters on the Omnia's front panel between Omnia's Input and its Output. The headphones follow this selection.

Contrast

Adjusts the brightness difference between the lightest and darkest segments in the front panel display. Note that if this setting is mis-adjusted the display will "disappear."

Backlight

Adjusts the LCD's backlight to compensate for room brightness.

Housekeeping

An important activity after any Preset editing session or system parameter adjustment is to always save these changes to the Omnia PC Card. It is also a good idea to occasionally backup your Omnia PC Card to another PC Card for safe keeping away from the system. These activities are done using the Utility menu. There are various system options available—ranging from copying the PC Card to restoring basic operational default parameters. To access these functions, select the *Utility* menu. Scroll down and select **System Attributes.**

The Utility Menu

There are nine parameters or sub-menus reached through this menu item: About. . ., Preset, System Attributes, Card Maintenance, Daypart Table, Security, Set Time, Set Date and Reload Software.

About

This parameter displays various screens describing the software revisions that are currently being used.

Preset

This sub-menu has four parameters: *Delete*, *Rename*, *Copy Single* or *Copy All.* The first three function on a single User Preset. Select **Delete** to permanently delete a User Preset from the PC Card. Select **Rename** to change the name of an existing User Preset. Select **Copy Single** to copy one of the User Presets to another PC Card. Select **Copy All** to select all user Presets to copy to another PC Card.

System Attributes

There are three parameters under this sub-menu item: *Load Defaults*, *Load From Card* and *Save to Card*.

Load Defaults

Reloads all of the default parameters into the system. This is the same as a warm boot command on a computer. All Input & Output levels are reset to the factory default settings.

Load From Card

Allows processing settings to be loaded into the system from a different PC Card. When selected, follow the instructions presented on the LCD screen to perform this function.

Save To Card

Creates a backup of the system software and writes it to the PC Card. This is a good safety practice that will create a backup of data that is also stored in the nonvolatile RAM within the Omnia. Think of this as a PC Card backup to what is stored internally. When selected, a naming dialog box appears.

Card Maintenance

From the *Utility* sub-menu, the **Card Maintenance** sub-menu gives access to PC Card maintenance. Two choices are provided:

Copy Entire

Allows the user to make a duplicate of the PC Card which could be used in a different Omnia processor.

Caution: It should restated here that when making a copy of the PC Card, spares **must** be obtained from Cutting Edge. Failure to do so may result in damage to the unit, which will void the warranty.

Erase User Data

Choose this selection when you want to erase all *user* information on the PC Card. When this function is selected, the PC Card is restored to the initial default settings, and only the factory presets are available. This restores the card to a condition when first delivered from the factory. Before this function is implemented, a pop-up screen will ask for confirmation before actually erasing the card. Follow the instructions presented on the screen to carry out this function.

Daypart Table

The audio processing in the Omnia can be automatically adjusted by dayparts. This permits different presets to be invoked according to a schedule that you create. The start day can be any specific day of the week, weekdays (M-F), weekends (S-S), or every day (All). Dayparts must end within a 24 hour period. Over 450 individual events can be programmed within a 7-day interval. Sub-menus allow viewing and setup of dayparts. These sub-menus include:

Show All

Displays all of the currently defined dayparts through a series of dialog boxes.

Add Part

Permits the creation of dayparts. Using various screens, you can select the start day and time, the end time, and preset.

Note: If there is no daypart selected for an interval of time, the system defaults to the preset selected by the user before dayparting is enabled.

Note: You can cancel the **Add Part** operation at any time by selecting the **Cancel** option on any of the daypart **Add Part** screens. The system will warn the user if the daypart being added overlaps one of the dayparts already defined.

Modify Part

Permits editing of dayparts already created. The system prompts the user to select one of the currently defined dayparts, and then displays the same sequence that the user would see when doing an *Add Part*, allowing you to edit the daypart. The user can then change the start day and time, end time, or preset associated with the daypart being edited.

Remove Part

Permits removal of a daypart. The system prompts the user to select one of the currently defined dayparts, and then prompts the user with a *Continue To Delete?* dialog with a *Yes/No* option. If the user selects *Yes*, the selected daypart is deleted.

Load from Card

Retrieves daypart data stored on the PCMCIA card. This operation will restore any dayparts that were previously saved to the card with the *Save to Card* operation, described below.

Save to Card

Backs up daypart information onto the PCMCIA card (for safety and sharing with others). It saves all of the currently defined dayparts and the daypart state to the Omnia PC card. These settings can be loaded later by selecting the *Load from Card* option.

Current State [Enabled/Disabled]

Activates or deactivates the use of created dayparts. If *Enabled*, then the system will automatically change presets as specified by any of the dayparts defined. If *Disabled*, then the system will not use any of the dayparts defined.

Security

Security permits "lockout" of the unit to prevent unauthorized personnel from making adjustments to the Omnia. **Normal** mode allows read-only access to the Omnia and its menu structures. **Engineer** mode allows full access to control of the unit. Sub-menus include:

Lock Unit

Immediately locks the unit. A dialog box is presented for password entry to unlock the unit.

Log-in

Permits access at one of two security levels (**Normal** or **Engineer**), using the appropriate password. **Normal** mode allows read-only access to the Omnia and its menu structures. An **Engineer** mode allows full access to control of the unit. Default passwords supplied with the unit are:

Normal mode: vito (all lower case)

Engineer mode: tomtom (all lower case)

Note: You can only Log-in at the same access level at which the unit was locked. In other words, if you locked the unit while in the Engineer mode, you must supply the Engineer password. If you locked the unit in the Normal mode, either the Normal or Engineer passwords will unlock the unit.

Caution: Do **not** attempt to assign the same password to both security levels! You will lock yourself out permanently!

To change a password, use the standard click and turn of the jog-wheel to select the character position you wish to change, and to select the character for that position.

After choosing a new password, continue rotating the jog-wheel until *OK* is highlighted. Push on the jog-wheel. The password is now saved. If you wish to cancel this operation, just scroll onto the *Cancel* box and press the jog-wheel. The operation is canceled.

Lock Password

Allows changing the name of the password for "**Normal**" access. Can be performed either from "**Normal**" or "**Engineer**" security levels.

Engineer Password

Allows changing the name of the password for "**Engineer**" access. Can be performed either only from the "**Engineer**" security level.

Enable Remote

Allows remote control access to individual system parameters previously inhibited by the *Disable Remote* command (see below). In other words, you can selectively cancel individual parameters that were disabled for remote access. A list of parameters that have been disabled, through the *Disable Remote* menu, to remote users is displayed. When a parameter is selected, it becomes available to "**Engineer**" password users to edit through the remote software. Selecting **None** exits the *Enable Remote* screen without changing the current settings.

Disable Remote

Allows the user to restrict access to a list of system parameters so that remote users won't be able to change the selected parameters. When the *Disable Remote* option is selected, a list of the system parameters that are editable through the remote is displayed. When a parameter is selected, it is no longer editable through the remote command interpreter. Selecting **None** exits the *Disable Remote* screen without disabling any parameters. To restore a parameter so that it can be edited by remote users, use the *Enable Remote* option.

Set Time

Sets the current time for the unit, which needs to be performed before dayparts can be used. The time is set using the familiar "turn and push" action of the jog wheel.

Note: The time can be synchronized to ":00" seconds by pressing the jog wheel in synchronization with the seconds indicator of an external clock. To maintain accurate dayparting, periodically reset the internal clock to your external reference.

Note: An additional menu will prompt you to set the unit to Daylight Saving or Standard time.

Set Date

Sets the current date, which needs to be performed before dayparts can be used. The date is set using the familiar "turn and push" action of the jog wheel.

Control Port Baud

This option sets the communications port communications parameters.

Reload Software

This option loads the operating software from the PC Card into the Omnia memory.

Bargraph Display Screens

Two bargraph screens are available on the Omnia.fm and Omnia.dab models: one for the AGC activity and a second for the Limiter activity. The Omnia.fm.jr, Omnia.am, Omnia.net models have only one combined "Process" bargraph screen showing the WideBand AGC bargraph and either three or four limiter bargraphs.

The bargraph screens are displayed by pressing the front panel push-button. This changes the LCD from showing menus to displaying the AGC screen (or the single Proc bargraph display in some models). Rotate the jog-wheel clockwise to display the Limiter activity bargraphs. Rotate the jog-wheel counterclockwise to return to the AGC activity bargraphs.

AGC Display

The mode of operation for the AGC section is basically the same for both the WideBand AGC and the multiband AGCs. Each AGC section has an individual *GATED* indicator that operates as determined by the individual *Gate* setting for that particular band. The bargraphs are capable of indicating up to 25 dB of gain reduction on a linear scale.
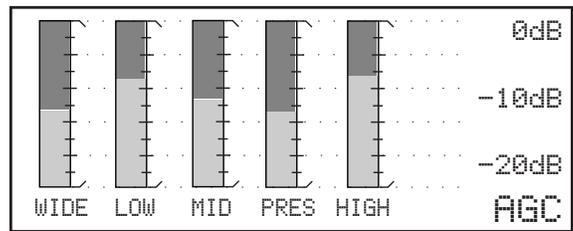
Omnia AGC Activity Bargraph Display

Note: The only operating difference between the wideband and multiband AGCs is that the wideband AGC will "recover" to a platform of 10 dB of gain reduction if it is gated over a long period of time. If gating occurs in the multiband section, recovery behavior will depend on the Return to Platform (*RTP)* settings employed (see Chapter 8, Editing Presets, for an explanation of RTP).

Limiter Display

The Limiter bargraphs provide a wealth of information about Omnia's peak control. The limiter algorithms have the ability to modify the style of peak control that is employed on a moment by moment basis. This can be seen if observed over a period of time, say a few minutes. During normal operation, the limiter indicators will have a dynamic "bounce" that you will be able to get a feel

Omnia Limiter Activity Bargraph Display

for. But every now and then, the limiter will very quickly show a large amount of gain reduction. Notice that the response is very fast. To accommodate this indication, Omnia provides an additional indicator bar that shows the most recent indication of large scale gain control. This action will recover very slowly, and return to "rest" with the main bargraph. This action will be easily noticed on material that is very dynamic in texture.

Another feature of the limiters, which is not indicated by a separate indicator, is the limiter *"Hold"* function. During brief pauses in limiter activity the bargraphs will "freeze" to show that the limiter has entered the *Hold* function of the algorithm; this is akin to the *GATE* function in the AGCs. This will be easily noticed whenever there is a "dry" voice being processed. The Limiter bargraphs, like the AGC section, can indicate up to 25 dB of gain reduction.

Process Display

The wideband AGC section has an individual *GATED* bargraph that operates as determined by the *Gate* setting for that band. The bargraph is capable of indicating up to 25 dB of gain reduction.

Note: It is normal for the wideband AGC to "recover" to a platform of 10 dB of gain reduction if it is gated over a long period of time.
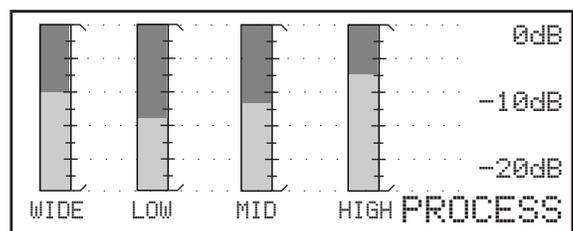
Omnia.fm.jr, Omnia.am and Omnia.net Single Bargraph Display

Refer to page 8-3 (Editing Presets chapter) for more information on interpreting and using the various bargraph displays.

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PROCESSING OVERVIEW

This section presents an overview of the Omnia processor using the block diagram from the Omnia.fm to provide a functional order to the various processing sections. Not all processing sections discussed in this section are found in each Omnia model. Refer to the chapter on your Omnia model for additional processing information including a version-specific block diagram and a menu tree. Parameter Worksheets for each model Omnia can be found in Appendix B.

Note: More detailed technical information about the audio processing employed in Omnia can be found in the Technical Papers section on the Omnia web site (www.omniaaudio.com).

The Omnia and Audio Processing

Omnia consists of nine general processing sections that are used in most versions. These include an input AGC circuit for initial level control, bass and warmth EQ adjustment sections, a multiband AGC and limiter, a mixer circuit and a limiter or compressor at the output. The block diagram presents these processing blocks as used in the Omnia.fm.
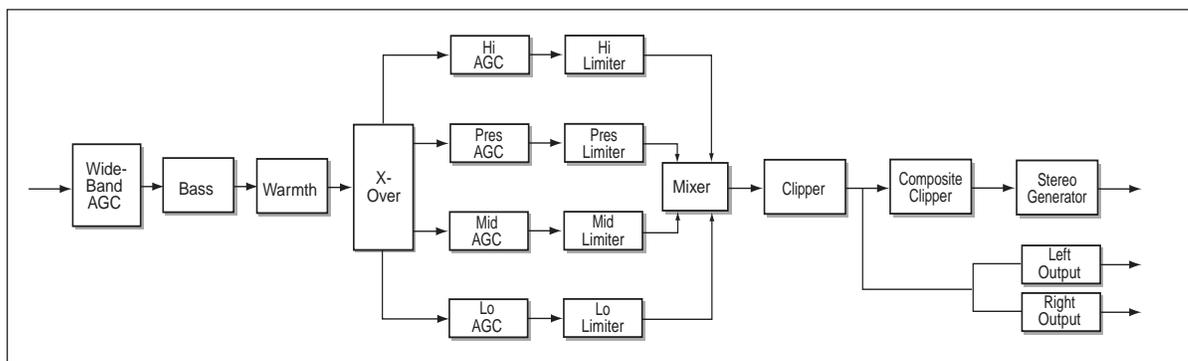
Omnia.fm Block Diagram

Wideband AGC: A very flexible wideband leveler section to provide transparent and smooth control of the input program. This is achieved through two significant innovations: a dual referenced gate and an intelligent "makeup" gain algorithm. The dual gate reference is a unique process that references the input dynamics to a "rolling" reference level.

A user-adjustable Make-Up Gain feature uses an algorithm incorporating a *hidden* control signal that knows when a sustained softer portion of program is occurring. It then "fills in" the softer section so that the average level is increased. This allows the overall AGC function to operate with a slower time constant, yielding lower intermodulation distortion without losing loudness in the softer passages.

As an example, with classical music, the orchestra might be playing along at a fairly robust level, then enter into a quiet passage. A conventional AGC would hold the softer passage down until it was able to slowly recover, keeping the soft passage much too quiet! With Omnia's new *makeup gain* function, the hidden, faster time constant will allow a quick recovery, but *only during the softer passage.* As soon as the orchestra starts to play louder, the "makeup" time constant yields control to the primary AGC circuit, hence returning gain to the previous platform level. This sophistication better preserves the dynamic integrity of the signal.

A built-in phase rotator ensures symmetrical clipping of positive and negative peaks. But, for a more musically transparent sound, this feature can be defeated. As can the entire Wideband AGC section to facilitate the use of external AGCs.

Bass *EQ*: For those who demand *thunderous* bass, the Omnia's got it! Up to 12 dB of "thunder" can be added to shake your listener's walls! This is not some simple bass EQ, but rather a sophisticated concept that takes into consideration the time alignment of the low frequencies as they pass through the entire system. This allows loud, clean low end, with no sacrifice to the overall loudness of your signal. The Deep Bass and Phat Bass parameters are found under the Bass menu in most Omnias. Deep Bass is a shelf boost at 90 Hz that utilizes a phase linear 12 dB/octave slope to produce the shelving EQ function. Phat Bass is a unique enhancement that adds filtered harmonics to the bass frequencies. Low frequency texture is emphasized with this parameter. Older materials sound fuller (or phatter) with the added illusion of loudness.

Warmth EQ: The Warm Bass parameter is found under the Warmth menu in most Omnias. Warm Bass is a shelf boost that functions up to 150 Hz. Adjusting Warm Bass compensates for program material that is naturally lacking in upper-bass punch. The parameter is adjustable over a 6 dB range.

Phase Linear, Time Aligned Crossover: This network is time aligned to keep the full audio spectrum exactly synchronized through the entire system. This reduces the chance for any phase errors to occur at the crossover frequencies when the audio bands are summed back together after dynamic processing. The crossover is phase linear in design. The result: a truer, more natural sound. Four bands are used in Omnia.fm (and most other versions as well) but only three bands are used in the Omnia.fm.jr and in the Omnia.fm.jr presets found on the Omnia.fm.

Most multiband audio processors must make a compromise in the crossover area: either provide true phase linearity, or dynamic flat response. The problem with implementing only the former is that, under dynamically controlled conditions, peaks or notches will occur at the crossover frequencies once the bands are recombined. In an effort to minimize this problem in older designs, crossover frequencies were phase-offset, so when they were recombined, these peaks and notches would be minimal—thus maintaining some degree of flatness. Such a compromise results in the loss of phase linearity, which reduces clarity. In Omnia's DSP implementation, the crossover network is carefully time-aligned so the recombined spectrum remains flat, regardless of the amount of gain control being applied within any band. This yields a phase linear response, so that no harmonic content is ever displaced in time. The result: a truer, more natural sound.

Multiband AGC (not used in Omnia.fm.jr): This section uses the same algorithm as described above in the Wideband AGC, except that it is spread over four independently operating bands. The control functions for each band have been optimized for that range of frequencies. The only significant difference between the Wideband and Multiband AGCs is that, in the latter case, additional controls, like adjustable recovery speed, are provided to establish how each band "recovers" when gated. Recovery can also be defeated so that the gain will "freeze" when gating occurs.

This Multiband AGC has numerous capabilities that were impossible to perform in the analog domain—precise RMS calculation, for example. Analog RMS is calculated using a simple RC time constant operating in the log domain. Since analog exponential circuits are prone to drift, they are usually kept very simple. This RC time constant is used to calculate the average level of the audio (its RMS value). This is suitable when measuring a single frequency, or a very narrow range of frequencies, but with an audio processor, we need to perform this function with music. Even within the framework of a multiband processor, the single time constant can produce inconsistent results under various dynamic conditions. Here is where DSP comes in handy. Using a newly developed algorithm for RMS calculation, the DSP will calculate the average level as a rolling average. This will adapt the averaging to changes in the dynamic conditions, resulting in a more musical, natural sound.

Multiband Dynamic Peak Limiter: These are not just simple limiter sections using single time constants, but

rather a process that can make adjustments based upon the "peak weight" of the signal. The sophisticated algorithm relies upon a *peak-weighted* calculation to determine the strength of a transient peak. It then determines if very fast dynamic control is required. In this fashion, faster timing is used only when necessary, and then only under certain conditions that are dictated by the density of the peak signal. A built-in *Hold* feature allows the limiter to rest momentarily in order to reduce IM distortion.

The system uses different algorithms for each of the bands: The low and mid bands use a *feedback* configuration, which produces a larger, warmer sound on lower frequencies. The presence and high bands utilize a *feedforward* design that maintains a more open, natural and musical texture on higher frequencies. Four bands are used in Omnia.fm and three bands are used in Omnia.fm.jr. Other parameter adjustments include drive, limiter threshold, and the attack and release times.

Non-Aliasing, Distortion Controlled Final Limiter: This is where previous DSP attempts have failed, resulting in "digital grunge" and the unflattering phrase "that digital sound." Omnia's proprietary method generates no aliasing products and does *not* need to over-sample the audio data, thus conserving valuable DSP power. This reduces audible processing distortion while producing a clean, loud signal. Users have reported that this implementation exceeded the "smoothness" of a well-designed analog limiter.

In addition, the limiting functions are expanded so that the peak control is based upon a *peak-weighted* calculation. This is a method that can calculate the strength of a transient peak and then determine if very fast dynamic control is required. This operates around the main peak control function. In this fashion, the extreme, faster timing is used only when necessary, and then only under certain conditions that are dictated by the density of the peak signal. If the peak is very short in nature, then the limiter will ignore it and let it pass onto the next processing stage (the clipper).

In addition, a new ***Prediction Analysis Clipper*** (P.A.C.) mode compensates for overshoots that invariably result when an AES/EBU interconnection, involving multiple stages of sample rate conversion and lowpass filtering, is used. Under these conditions:

· Overshoots occur whenever down-conversion of a 44.1 or 48 kHz sample rate to 32 kHz sampling is performed

· The tight transition slope of the 16 kHz filter in the sample rate converter is a significant contributor to overshoots

· The problem occurs only with signal components above 5 kHz.

Yet:

· We do not want to reduce the slope of the lowpass filter in the audio processor, as it degrades sound quality.

· Adding more clippers and filters only increases distortion.

Fortunately, it's possible to pre-compensate for predicted occurrences of overshoots by the use of supplementary control signals. These are applied to the upper audio spectrum by the Omnia's main clipper algorithm—the same one employed to eliminate *digital grunge!*

As a practical matter, the use of the *Prediction Analysis Clipper* reduces overshoots in the sample rate converted signal path from a worst case of 20% to less than 3%.

Stereo Generator /Encoder (Omnia.fm and Omnia.fm.jr only) : With an all-digital, numeric implementation, theoretically perfect performance is approached. Stereo separation is typically greater than 65 dB. Suppression of the 38 kHz carrier is greater than 75 dB. User parameters include separation, pilot phase, pilot level and composite output level.

***Selectable Composite Clipper with Phase Linear Composite Low Pass Filter (Omnia.fm and Omnia.fm.jr
only:*** This feature is provided for those who wish to "turbo-charge" their FM signal. This clipper does not
interfere with the 19 kHz pilot, because the pilot is added post-clipper. There is also a digital implementation of
the *Dividend* Composite Filter, which allows composite processing to be used without generating *any* harmonic
content in the SCA spectrum. With 3 dB of composite processing employed, all content above 53 kHz is
suppressed by 75 dB. This precise spectral management contributes to loudness, since it ensures that no wasted
energy is transmitted.

4
OMNIA.FM & FM.JR

T his chapter presents important installation and operational information that is specific to the Omnia.fm and Omnia.fm.jr.

Processor Location

Believe or not, this is an important consideration! Where you choose to locate the processor—at the studio or at the transmitter—can have a profound impact on the overall performance. We present a few considerations that will aid in making this decision.

In most applications, installing the processor at the transmitter site provides a solid coupling between the processor and the FM exciter. Since there is nothing between the processor and the exciter to degrade the tightly-controlled output, modulation performance will be maximized. The drawback to this setup is that the unit is located in a remote location that is usually a very noisy environment. However, having the unit located afar is mitigated by Omnia's remote control capability.

If the plan is to set up the processor at the studio, consideration must be given to these STL factors:

- Is the STL path a clean shot? If the path is noisy, especially if a composite STL is used, unwanted composite noise can be added to the processed signal through the STL receiver, and that can waste modulation and degrade sonic performance.

- Is the STL Discrete or Composite? If a discrete system is used, there must be a provision for a stereo generator/encoder at the transmitter. In that instance, it is imperative that this stereo generator/encoder not introduce any distortion or overshoot to the system. Most stand-alone stereo generator/encoders employ some form of low pass filter and safety clipper. These sections can add distortion and overshoot if not set up properly. If a composite STL is used, the multiplexed output of Omnia can be connected directly to the STL. At the transmitter location, the composite receiver can be connected to the exciter.

- Overshoots: Some analog STL systems are known to generate overshoots due to their design deficiencies. One known culprit is the "bounce" that can be created by an inefficient modulator/demodulator of the STL system. This can steal 1 - 2 dB of modulation, and that's lost loudness. A method to verify that a composite STL system is free of overshoots is to connect a oscilloscope to the STL receiver and monitor the composite waveform, paying special attention to the integrity of any low frequency square waves. Of interest is the "squareness" of the low frequency waveform, and if there is any noticeable "grass" or "peaky" looking waveforms that would exceed the peak level of the low frequency signals. The low frequency waveform should look very "square." If it appears to "tilt" in any manner, then there is a coupling problem in the STL system. (We'd offer further information here on the "how and why" this occurs, but that could consume a whole chapter unto itself!) Simply stated, the problem could be due to either AC coupling in the STL system or "bounce" generated by either the modulator or demodulator of the STL. Sometimes it's a little of both!

If you notice any "grass" exceeding the peak level of the low frequency waveforms, there could be noise getting into the system somewhere. That can occur if the RF path is noisy due to RF signal loss. This "grass" can also be created if the composite path through the STL system is not linear through the 53 kHz bandwidth that a composite signal requires. This would create overshoots to the processed signal.

A simple fix for either of these two problems is to employ a composite clipper at the transmitter site. But beware: This could lead to additional audible distortion due to the added clipping of the overshoots.

While the above items must be given some thought, there are many advantages to installing the processing at the studio. If the STL link operates in a solid fashion, superior performance can be achieved, along with having easy access to the processing for monitoring and adjustment.

Omnia.fm Connections

The power in the low frequency region is so strong that it may affect the performance of some exciters. It is imperative that the exciter has a dual speed PLL in the AFC, or it may unlock. This is not the fault of the audio processor, but of the exciter. For those who wish to have good, solid, powerful bass on the air, this is a key point that cannot be overlooked, or loudness will be lost due to inefficient modulation.

Interfacing With A Digital Exciter

Although the current rage is to create the *all-digital* broadcast transmission path, there are some key issues to be aware of or you can sacrifice loudness in an attempt to gain quality. I know what you must be thinking right now: "How can they say this when *everything* is digital!"

One issue concerns the sampling rate of the audio processor and the input to the exciter. It is possible to have two differently sampled systems interfaced in the digital domain. This compatibility is made possible through a neat little device known as the "sample rate converter." A device that outputs digital audio data using a 48 kHz sampling rate can be converted *down* to a lower rate of, say, 32 kHz Unfortunately, this can create overshoots, which rob loudness. Detailed information can be found in the technical papers *Digital Broadcast Audio Processing: Finally The New Frontier* and *Omnia.fm: An Engineering Study* on the Cutting Edge web page (www.omniaaudio.com).

We strongly believe that any stereo generator for FM must use a 48 kHz sampling rate. In this manner, any processor that is connected to the stereo generator can't overshoot. Unfortunately, there are others who are building DSP stereo generators that use a lower sampling rate than 48 kHz However, reducing the sampling rate of the Omnia runs the risk of creating the nasty *digital sound.*

The key is the sampling rate. If the digital exciter is *actually* operating at a 48 kHz sampling internally, then there is no problem. But, should the exciter provide a *downward* conversion of the 48 kHz sampling rate from the Omnia, then you could have overshoot problems.

Output Connection Possibilities

The choices are:

Left/Right Analog: Given the other choices, this is the least-recommended procedure. The stereo generator in the Omnia provides superior performance, so you should use it instead of the one provided in the exciter.

Analog Composite: If you don't object to going partially analog, this will provide excellent peak control and sound quality.

AES/EBU: The new Prediction Analysis Clipper that can be activated within the clipper section mitigates much of the overshoots resulting from the "sample rate roller coaster" of multiple rate conversions and lowpass filtering. However, it cannot make up for potential sonic degradations.

Pre-Emphasis: Where To Insert?

Another item of concern is with pre-emphasis. Most digital exciters can generate pre-emphasis within their DSP stereo generator. This is overkill! Omnia provides not only the proper pre-emphasis for any region in the world, but also exhibits excellent peak control of the pre-emphasized signal so that no overshoots occur. Using the pre-emphasis in the digital exciter will not guarantee this type of performance. Here's some background in the context of operating in a complete digital environment:

1. Most exciter manufactures will recommend the use of their pre-emphasis network. If that was done, then the incoming audio data from the processor must be *de-emphasized* before it reaches the exciter. Why perform the emphasis function twice? Also, and more importantly, if the pre-emphasis phase delay is not **exactly the same** as the previous de-emphasis in the processor, overshoots will occur! Therefore, it is far more advantageous to employ pre-emphasis only once—in the Omnia—and then set the exciter to accept a *flat* input. The overshoot problem is greatly reduced.

2. We understand why the exciter manufacturers have provided these pre-emphasis options. It has to do with digital codec STLs. Research has shown that pre-emphasized audio routed through a codec is not very *friendly* sounding. Hence the de-emphasis in the processor, and second pre-emphasis in the exciter. That's a poor example of a Band-Aid. If you are in a situation where you need to use a codec STL, then locate the processor at the transmitter. This totally eliminates any codec abnormalities to the processed audio, along with letting the processor have the best possible electrical coupling to the exciter, be it analog or digital.

You can find more detailed information in the Technical Papers on the Cutting Edge web page (www.omniaaudio.com).

If your desire is to create an all-digital transmission path, please be aware of the topics that have been discussed here. Should you experience any problems with overshoot or added distortion, you should look to the function of the digital exciter and its stereo encoder. As a reference, you can easily make signal comparisons with the analog outputs from the Omnia system, especially the composite output. Viewing the signal on an oscilloscope will reveal that the output is well controlled, with no overshoots, but providing a clean baseband spectrum.

Digital Exciter Connection Considerations

The physical connection to a digital exciter is through an AES/EBU connection. Using a shielded audio cable with appropriate XLR connectors on each end, connect the Omnia to the exciter. The exciter should be set for *flat* input, which means that the exciter is not adding any pre-emphasis to the input signal.

In the *Configuration* section that follows, set the Omnia de-emphasis option to *None*. This ensures that the output from the processor is now pre-emphasized. You will also need to adjust the output levels. Since the digital exciter will provide the stereo generator function, set the output levels for the discrete left/right channels. This is done in the *Output Levels* sub-menu, which is a subset of the *Main I/O Settings* menu.

When editing processing parameters, you will probably want to engage the P.A.C. (Prediction Analysis Clipper) function in the Clipper stage. This allows the clipper to compensate for overshoots that result from the interaction of the AES/EBU output of the Omnia with succeeding digital audio stages.

Stereo Generator Menu Items

Six parameters are set under this sub-menu which is only available in the Omnia.fm and .fm.jr versions: SCA Level, Composite 1, Composite 2, Pilot Level, Phase Adjust, and Separation.

SCA Level

Use this parameter to set SCA modulation, as observed with a calibrated modulation monitor.

Note: Any change in the *Composite Output* setting also affects this level, since the two output controls are in series. Should you have to adjust the composite output, you will probably need to reset the *SCA Level* adjustment.

Composite 1 & Composite 2

These parameters individually set the levels on the two Composite outputs. The output level range can provide over 10 volts peak/peak. Use the jog-wheel to select the modulation level. Once the desired peak modulation level is displayed, click the jog-wheel to set the level.

Use program material and a calibrated modulation monitor to set modulation. Reference tones can't be used since the RMS level of a steady state tone does not *crest* at 100% modulation.

Tip: If you have an accurate modulation monitor (and you should!), you can use the pilot as a reference to set the overall modulation level. To do this, adjust the pilot level so that the display on the Omnia reads the desired pilot modulation (such as 8%) level (see procedure immediately below). Now set your modulation monitor to observe pilot modulation. Then, adjust the Omnia's composite output level so that the modulation monitor's display matches the pilot level you set on the Omnia. Total modulation will then be automatically correct!

Pilot Level

Sets the pilot level between 6 and 12% relative to 100% modulation using 0.1% steps. To defeat the pilot, adjust the range to below 6%; the screen then indicates the pilot is *OFF*.

Pilot Phase

This parameter sets the phase relationship between the 19 kHz pilot and the 38 kHz suppressed carrier. The system default is 0.0°, as the performance of the DSP stereo generator borders on the theoretically perfect. Should the phase need adjustment in order to offset time domain errors in the overall transmission system, the phase can be changed ±12°, in 2° increments. We recommend that a calibrated modulation monitor be used for this adjustment. If one is not available, the tried and true "bow tie" method using an out-of-phase 100 Hz tone will suffice. If you are not familiar with this method, contact Cutting Edge tech support for details.

Separation

The stereo "soundfield" can be reduced by 3 dB or 6 dB, or the Omnia can be set for mono operation, in addition to being set for standard stereo. The reduction of the stereo soundfield can be used to suppress processing-induced multipath that can occur with heavier levels of processing on stereo programming. When a setting of -3 dB or -6 dB is used, the amount of perceived stereo effect is reduced, but in difficult RF signal coverage areas, the amount of perceived multipath that might occur from heavy processing will be reduced as well. This occurs due to the reduction in RMS level of the L-R sub-channel in the composite signal. The Omnia defaults to a setting that uses the full stereo L-R signal. We suggest that you leave it in that mode, but the other settings are available for those who wish to experiment.
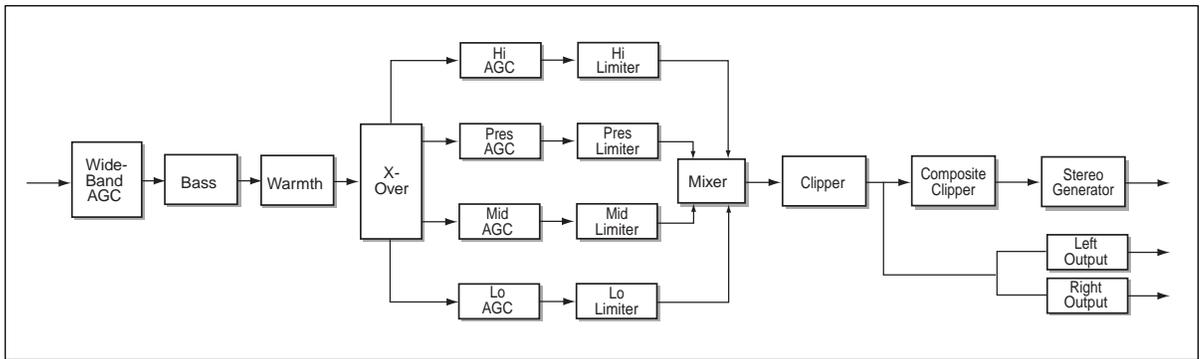
Omnia.fm Processor Block Diagram
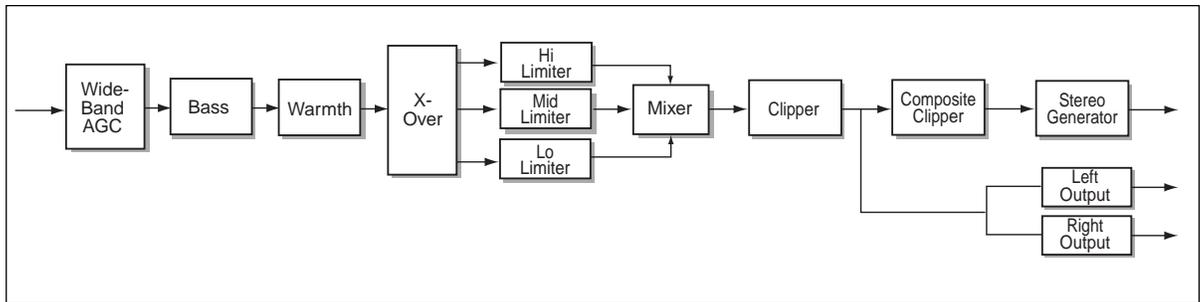
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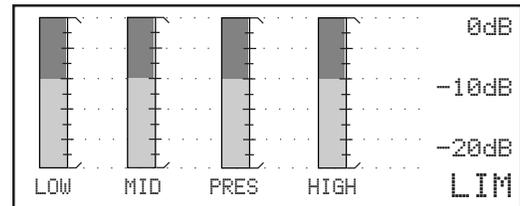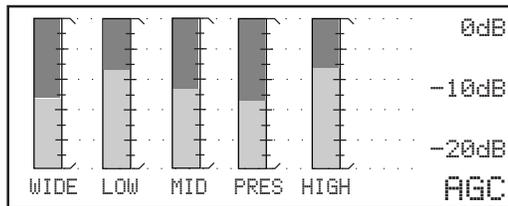
The AGC & Limiter Bargraphs used in the Omnia.fm
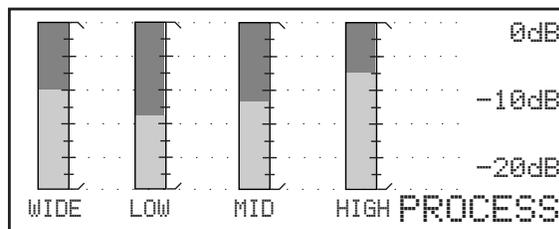
Simplified Bargraphs used in the Omnia.fm.jr

Omnia .FM & .FM.JR

Audio Processing
- Select Preset
- Edit Parameters
- Undo Edit
- Save to Card
- Save to Card As
- Editing Mode — Normal / Expert

- Wideband AGC — Parameters
- Bass — Parameters
- Warmth — Parameters
- Xover — Parameters
- Multiband AGC — Parameters
- Multiband Limiter — Parameters
- Mixer — Parameters
- Clipper — Parameters
- Composite Clipper — Parameters

Input & Output
- Input Levels
  - Analog Gain
  - Input Left
  - Input Right
  - Input Phase — Normal/Invert
- Output Levels
  - Output Left
  - Output Right
- Headphones
- Input Source — Analog / AES/EBU
- Pre-emphasis — None / 50 μs / 75 μs
- De-emphasis — None / 50 μs / 75 μs
- Mono Mode — Parameters

Stereo Generator
- SCA Level — Parameters
- Composite 1 — Parameters
- Composite 2 — Parameters
- Pilot Level — Parameters
- Phase Adjust — Parameters
- Separation — Parameters

Display
- LED Source — Input/Output
- Contrast
- Backlight

Utility
- About...
- Preset
  - Delete
  - Rename
  - Copy Single
  - Copy All
- System Attributes
  - Load Defaults
  - Load from Card
  - Save to Card
- Card Maintenance
  - Copy Entire
  - Erase User Data
- Daypart Table
  - Show All
  - Add Part
  - Modify Part
  - Remove Part
  - Load from Card
  - Save to Card
  - Current State — Enabled / Disabled
- Security
  - Lock Unit
  - Login
  - Lock Password
  - Engineer Password
  - Enable Remote
  - Disable Remote
  - Select Parameters
- Set Time
- Set Date
- Ctrl Port Baud — Parameters
- Reload Software

Omnia.fm Menu and Submenu Summary

O M N I A . A M

T his chapter presents important installation and operational information that is specific to the Omnia.am. An Omnia.am block diagram and a Menu and Submenu Summary is on page 5-3. An Omnia.am Parameters Worksheet can be found in Appendix B-4. Use it as a master sheet for photocopying so that the parameter settings for any custom presets can be recorded.

Processor Location

Believe or not, this is an important consideration! Where you choose to locate the processor—at the studio or at the transmitter—can have a profound impact on the overall performance. We present a few considerations that will aid in making this decision.

In most applications, installing the processor at the transmitter site provides a solid coupling between the processor and the transmitter. Since there is nothing between the processor and the transmitter to degrade the tightly-controlled output, modulation performance will be maximized. The drawback to this setup is that the unit is located in a remote location that is usually a very noisy environment. However, having the unit located afar is mitigated by Omnia's remote control capability.

Processing Presets

Omnia.am is equipped with numerous processing presets that are provided as a starting point for customizing the sound of your station and its format. Cutting Edge does not warrant in any way that these presets are de facto standard for the formats listed. Each of them was derived in an effort to create a generic starting point for the respective formats. In some markets, these presets may sound too strong or aggressive. In others, they might not be enough. Our experiences with the presets in our earlier product, the Unity AM, were that the presets were judged to be about 50% good and 50% bad. That feedback indicated to us that we were probably about in the middle of the playing field with respect to where the presets need to be to serve as a starting point for any given market.

With all of that having been said, please rely on the presets to get yourself going. From there, we can provide assistance, if you desire, or you are off to discover new frontiers of processed sound. It is our belief that there is not any nirvana of processed sound, or special secret preset that we keep for only the Big Stations. Each station in each market is unique unto itself. Try to remember that when crafting that special sonic personality for your station. Omnia.am gives you the power to create a sound totally different from, and better than, your competitors. Enjoy that power!

We could publish the entire preset list, but chances are that we will continue to develop new or modify existing presets. So, a list that is guaranteed to be obsolete would be of little help. Besides, the name of each should be self-explanatory. If you need more clarification, please contact Cutting Edge.

Omnia.am Adjustments

There are several unique software parameters under the Input & Output menu that pertain only to the Omnia.am

Asymmetrical Modulation

Asymmetrical positive modulation is possible by adjusting the *Asym Mod* parameter. The range of adjustment is between +100% and +150% modulation.

Tilt EQ and Frequency

Low frequency tilt and equalization controls have been provided after the Omnia.am clipper section to compensate for the deficiencies of older transmitters. To perform the alignment procedure, an audio oscillator and an oscilloscope are required.

Note: The output level of the Omnia.am must be reduced before starting this procedure. Raise it only after instructed to do so in order to produce no more than 50% to 75% modulation. Failure to do this may overstress or even damage older transmitters.

1. Set the audio oscillator to output a 50 Hz sine wave at 0 dBu. Connect the oscillator to the Omnia.am inputs. Adjust the input levels so that at least 10 dB of gain reduction is seen on the WideBand-AGC bargraph. Increase the output of the LF Limiter section of the Mixer to the maximum value. Increase the Clipper Drive to the +6 dB setting. This should produce sufficient clipping on the 50 Hz tone.

2. Increase the output level of the Omnia.am to produce no more than 50% to 75% modulation as shown on the station's modulation monitor

3. Connect a RF sample to the oscilloscope input and observe the signal. The modulated carrier should appear on the screen. Of importance here is how the clipped 50 Hz waveform looks. It should be a *flat-top*, if there is no tilt in the transmitter. If Tilt is visible, proceed with the adjustments in step 4.

4. Use a mixture of the *Tilt EQ* and *Tilt Freq* parameters to flatten out the tilt in the waveform. Upon accomplishing this, the Tilt adjustment is complete. Normal programming may be applied and the Omnia.am output level adjusted for the desired negative and positive modulation levels.
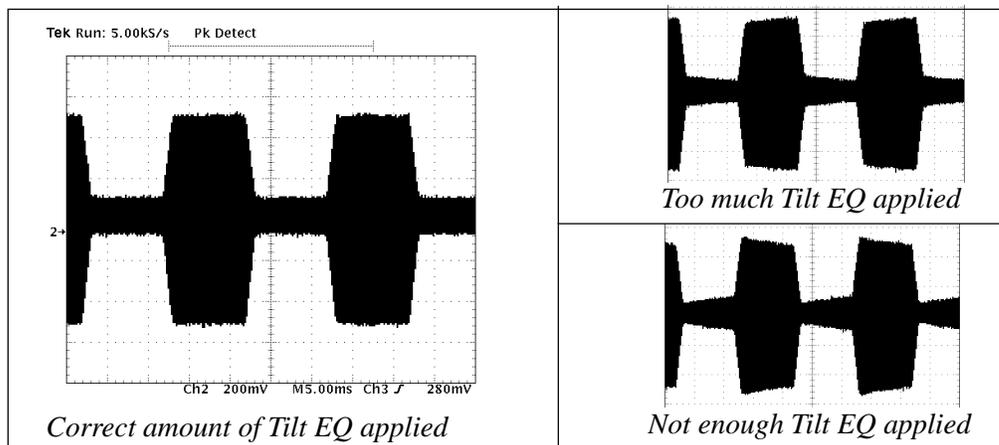
Oscilloscope displays showing Tilt EQ adjustments

LP Filter

This parameter adjusts the cutoff frequency of the Omnia.am post clipper low pass filter to match that of the regulatory agency requirements. Cutoff frequencies of 4, 6 and 10 kHz have been provided.
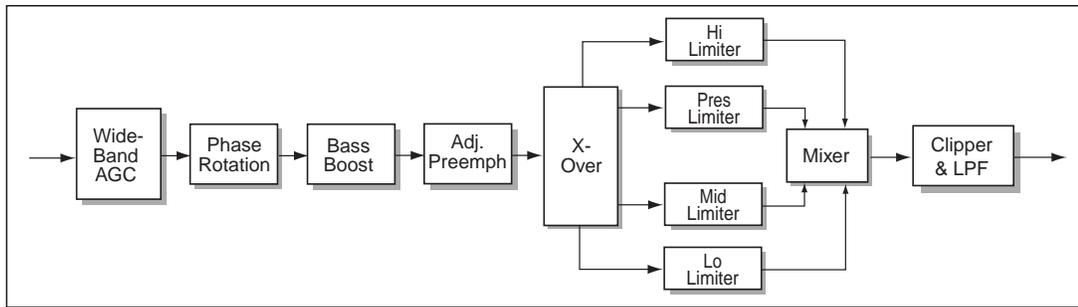
Omnia.am Block Diagram
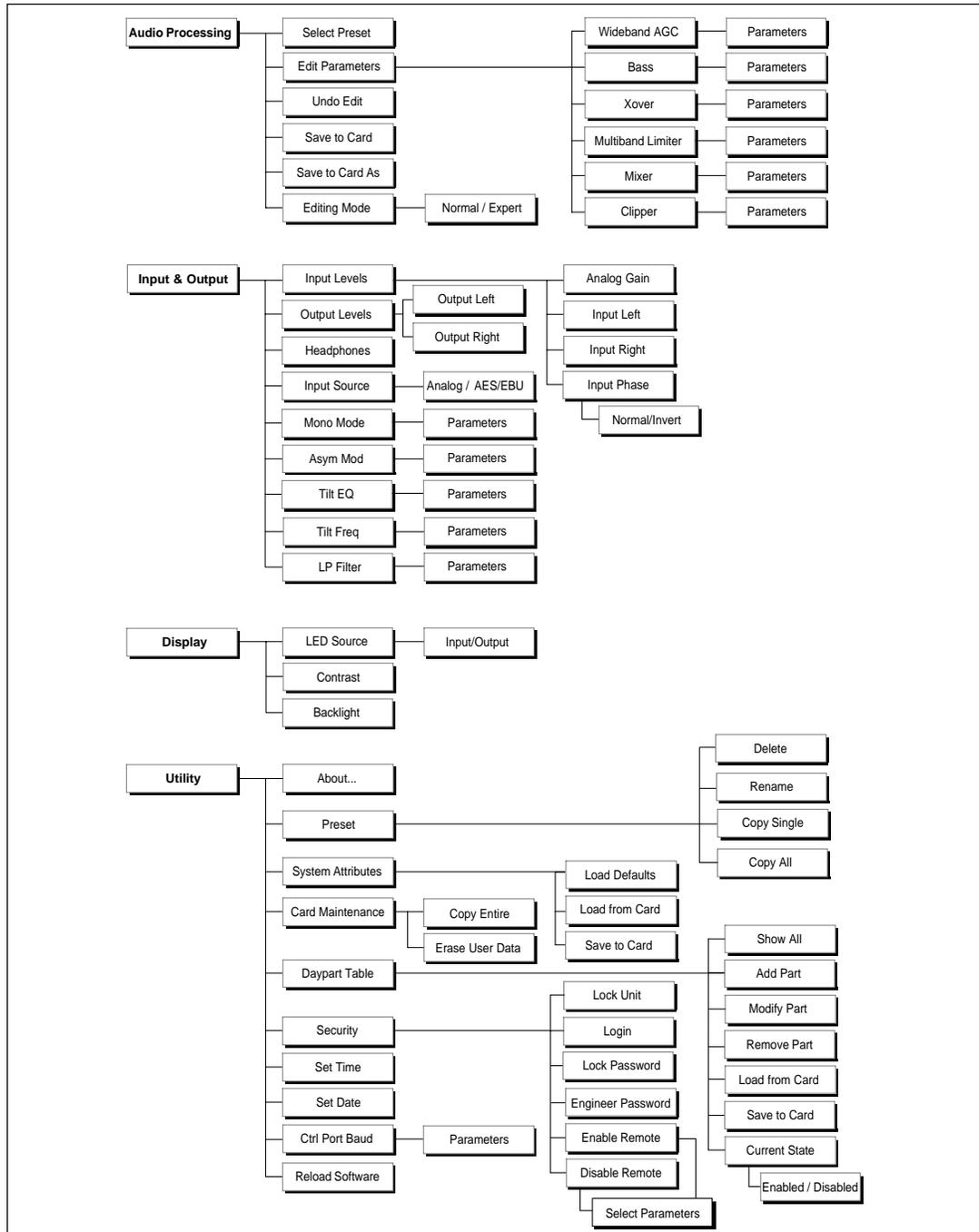
Omnia.am Menu and Sub-Menu Summary

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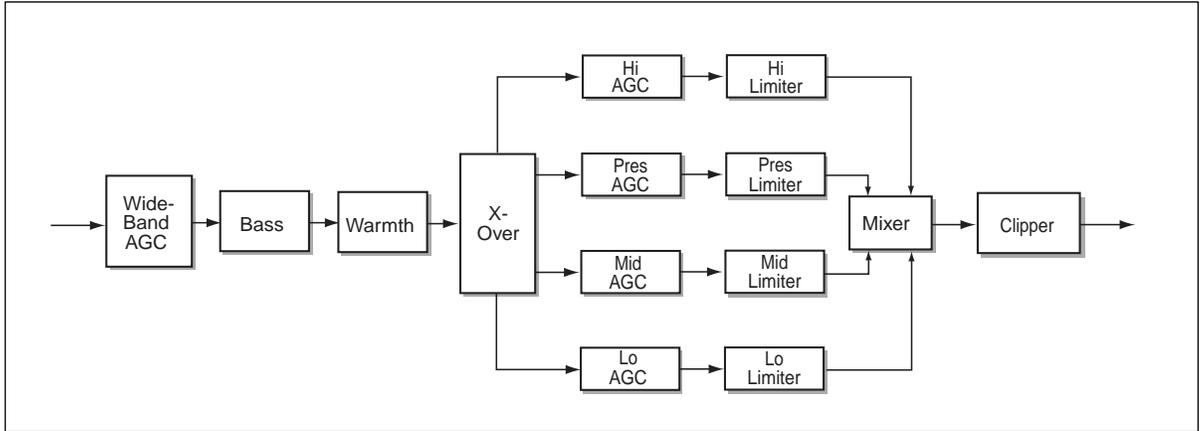
Omnia.dab Block Diagram

Preset Name:		Station:		By:	
				Date:	

EXPERT EDITING MODE		OMNIA SYSTEM SETTINGS	
WIDEBAND AGC		**INPUT & OUTPUT**	
Phase Rotator		Analog Gain	
Wideband AGC		Input Left	
AGC Drive		Input Right	
Attack		Input Phase	
Release		Output left	
Make-Up Gain		Output Right	
Gate Thresh		Headphones	
		Input Source	
BASS		Mono Mode	
Deep Bass			
Phat Bass			

WARMTH	
Warm Bass	

CROSSOVER	
Low Gain	
Mid Gain	
Pres Gain	
Hi Gain	

AGC	LO BAND	MID BAND	PRES BAND	HIGH BAND
Attack				
Release				
Make-Up Gain				
Gate Thresh				
RTP Speed				
RTP Level				

LIMITER	LOW BAND	MID BAND	PRES BAND	HIGH BAND
Drive				
Limit Thresh				
Attack				
Release				
Hold Thresh				

MIXER	LOW BAND	MID BAND	PRES BAND	HI BAND
Level				

CLIPPER		NORMAL EDITING MODE	
Drive		Thunder	
P.A.C.		Sizzle	
		Thrust	

Omnia.dab Worksheet
See Appendix B for a full-page worksheet designed for photocopying.

Omnia .DAB

Audio Processing
- Select Preset
- Edit Parameters
  - Wideband AGC — Parameters
  - Bass — Parameters
  - Warmth — Parameters
  - Xover — Parameters
  - Multiband Limiter — Parameters
  - Mixer — Parameters
  - Clipper — Parameters
- Undo Edit
- Save to Card
- Save to Card As
- Editing Mode
  - Normal / Expert

Input & Output
- Input Levels
- Output Levels
  - Output Left
  - Output Right
    - Analog Gain
    - Input Left
    - Input Right
    - Input Phase
      - Normal/Invert
- Headphones
- Input Source
  - Analog / AES/EBU
- Mono Mode
  - Parameters

Display
- LED Source
  - Input/Output
- Contrast
- Backlight

Utility
- About...
- Preset
  - Delete
  - Rename
  - Copy Single
  - Copy All
- System Attributes
  - Load Defaults
  - Load from Card
  - Save to Card
- Card Maintenance
  - Copy Entire
  - Erase User Data
- Daypart Table
  - Show All
  - Add Part
  - Modify Part
  - Remove Part
  - Load from Card
  - Save to Card
  - Current State
    - Enabled / Disabled
- Security
  - Lock Unit
  - Login
  - Lock Password
  - Engineer Password
  - Enable Remote
  - Disable Remote
- Set Time
- Set Date
- Ctrl Port Baud
  - Parameters
- Reload Software

Omnia.dab Menu and Submenu Summary

Omnia.net Block Diagram

Preset Name:		Station:	By:
			Date:

EXPERT EDITING MODE		OMNIA SYSTEM SETTINGS	
WIDEBAND AGC		**INPUT & OUTPUT**	
Phase Rotator		Analog Gain	
Wideband AGC		Input Left	
AGC Drive		Input Right	
Attack		Input Phase	
Release		Output left	
Make-Up Gain		Output Right	
Gate Thresh		Headphones	
		Input Source	
BASS		Mono Mode	
Deep Bass			
Phat Bass			

WARMTH		NORMAL EDITING MODE	
Warm Bass		Thunder	
		Sizzle	
		Thrust	

CROSSOVER	
Low Drive	
Mid Drive	
Hi Drive	

LIMITER	LOW BAND	MID BAND	HIGH BAND
Limit Thresh			
Attack			
Release			

MIXER	LOW BAND	MID BAND	HI BAND
Level			

Omnia.net Worksheet
See Appendix B for a full-page worksheet designed for photocopying.

Audio Processing
- Select Preset
- Edit Parameters
- Undo Edit
- Save to Card
- Save to Card As
- Editing Mode → Normal / Expert

Edit Parameters →
- Wideband AGC → Parameters
- Bass → Parameters
- Warmth → Parameters
- Xover → Parameters
- Multiband Limiter → Parameters
- Mixer → Parameters

Input & Output
- Input Levels → Analog Gain / Input Left / Input Right / Input Phase → Normal/Invert
- Output Levels → Output Left / Output Right
- Headphones
- Input Source → Analog / AES/EBU
- Mono Mode → Parameters

Display
- LED Source → Input/Output
- Contrast
- Backlight

Utility
- About...
- Preset → Delete / Rename / Copy Single / Copy All
- System Attributes → Load Defaults / Load from Card / Save to Card
- Card Maintenance → Copy Entire / Erase User Data
- Daypart Table → Show All / Add Part / Modify Part / Remove Part / Load from Card / Save to Card / Current State → Enabled / Disabled
- Security → Lock Unit / Login / Lock Password / Engineer Password / Enable Remote / Disable Remote / Select Parameters
- Set Time
- Set Date
- Ctrl Port Baud → Parameters
- Reload Software

Omnia.net Menu and Submenu Summary

EDITING PRESETS

M any broadcasters will be amazed at the dramatic sonic improvements Omnia delivers right out of the box using one of the factory presets. Some will want to tailor the presets slightly to create a more "custom" sound. A few broadcasters will wish to delve in and really modify the parameter settings to create their own "signature sound."

If you're new to audio processing, we recommend proceeding with caution. Your success in getting the most out of your Omnia processor starts with knowing your objectives beforehand. If your goal is to be the moment-to-moment loudest station and obtain extreme amounts of detail and quality, please keep in mind that there *are* limits. Thus far, there has never been any research, nor ratings information, that has indicated that being the moment-to-moment loudest station on the dial is of sole benefit. Generally it gives a select few individuals the false security that louder is better and that the added distortion from added loudness doesn't generate a negative effect on your listeners. Be careful.

Having said all of this, though, we firmly believe that Omnia will get you closer to your ideal than any other processor or combination of processors. Omnia is definitely capable of generating moment-to-moment loudness; it has the *muscle*. The point of view presented in the paragraph above is motivated by an effort to encourage broadcasters to create good, *competitive* loudness while maintaining a high degree of quality.

Clarify Your Processing Objectives

Whether one is seeking better overall quality or specific spectral improvements, try to articulate and write down your goals. Do you want a little more loudness or "presence" on the dial? Are there certain characteristics of the sound of other stations in your market that you want to emulate or surpass? Are there any you want to avoid? This point is probably the most contentious issue with regards to adjusting processing. Please give thought— real thought, to how you'd like your station to sound. What do we mean by that? Well, if your desire is to add loudness, and in most cases it probably will be, decide on the *degree* of loudness that you want. Is the goal to be *competitively* loud with respect to other stations on the dial, or must you be the *kingpin*, the moment-to-moment loudest thing known to God and Man? This will impact how you set up the processing.

Engineering, programming, and management should all participate in the development of these objectives. After all, processing can have a direct effect on the bottom line of your station. A little bit of agreement before installation can save you a whole lot of disagreement afterwards.

Set Aside Some Time

It can take some serious time to optimize the audio processing for your station. We realize that in our business today, time is a precious commodity. But please don't try to install the Omnia in between other major projects or the week your boss or your assistant is on vacation. Make certain in advance that the staff members who helped you set your objectives will be available to consult with you when you adjust the Omnia.

How much is enough time? We feel that working with a system for at least a week is a good starting point. We don't suggest that you drop everything for a solid week. What we do recommend is that you install the Omnia during a week when you can spend a few hours per day on the project.

The Adjustment Procedure

1. Review your objectives.

2. Once on the air, proceed from processing similar to what you currently are using and then, if desired, become more aggressive. A careful approach is less likely to draw hasty, or negative, opinions.

3. Listen for awhile, then adjust. Try to avoid the temptation to "fiddle" with adjustments moments after getting the system on the air. Remember, you should evaluate the operation over time, not moment to moment! When it is time to adjust, the provided Worksheets (found in the Appendix) can assist in establishing improved settings of operation.

4. In making changes to the system, do not make hasty or radical changes. Also, do not make too many different adjustments all at once. If too many parameters are changed at one time, it is hard to determine which change made the difference. That can be frustrating whether the change made you station sound better or worse. Take your time. You have a great deal of processing power at your finger tips. In order for you to become "sonically" comfortable, you should learn the limits of each function. Try making changes in different operating levels. We suggest making changes in increments of no more than 0.5 dB - 1 dB, or 1 or 2 increments. Try turning different functions on and off. Working this way, you will be able to get a better feel for what the Omnia is capable of producing.

5. Use the "sleep on it method:" Spend time adjusting and then listening, and when the system gets to a point where it sounds good, stop for the day. In making changes, there does come a time when the ears become less and less sensitive to adjustments performed. The ears sort of "burn out." That is why spreading the adjustment period over a number of days is recommended. If it still sounds good after you have "slept on it," quit adjusting. If it does not, continue with small iterations until you're satisfied. If the procedure is working, you will find that each day the discrepancies become smaller and you're making fewer adjustments.

6. When you get it where you like it, **stop and enjoy!**

The Processing Display

In addition to the menus, the LCD screen also provides processing information in the form of bargraphs indicating Processing activity. The processing display is activated by pressing the recessed push-button located to the lower right of the LCD screen. From any menuing screen, pressing the push-button will switch the LCD screen to the bargraph display.

WideBand-AGC and Limiter Displays

The bargraphs for the Processing section provide a wealth of information about the peak control in Omnia. The limiter algorithms have the ability to modify the style of peak control that is employed on a moment by moment basis. This can be seen if observed over a period of time, say a few minutes. During normal operation, the limiter indicators will have a dynamic "bounce" that you will be able to get a feel for. But every now and then, the limiter will very quickly show a large amount of gain reduction. Notice that the response is very fast. To accommodate this indication, Omnia provides an additional indicator bar that shows the most recent indication of large scale gain control. This action will recover very slowly, and return to "rest" with the main bargraph. This action will be easily noticed on material that is very dynamic in texture.

Another feature, not indicated in a separate indicator, is the limiter "*Hold*" function. During brief pauses in limiter activity, the bargraphs "freeze" to show the limiter has entered the *Hold* function of the algorithm; akin to the *Gate* function in the AGCs. This is most easily noticed when there is a "dry" voice being processed. The Limiter bargraphs, like the AGC section, can indicate up to 25 dB of linear gain reduction.

Interpreting Processing Displays

Through observation of the processing bargraphs, significant information can be acquired and analyzed about the audio signal on a moment-by-moment basis.

Since Omnia is capable of performing many different processing functions at different times, the display bargraphs may indicate various kinds of operation. This is based upon dynamic range differences in the program material. For program material that is already processed or lacking dynamic range, this will cause the bargraphs to indicate differently than material that possesses a high degree of dynamic range. This is because audio signals that lack dynamic range, naturally or by previous processing, will possess a high level of RMS energy and a low level of peak energy. Conversely, audio signals with wide dynamic range possess lower levels of RMS energy but higher levels of peak energy.
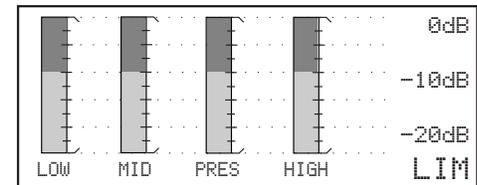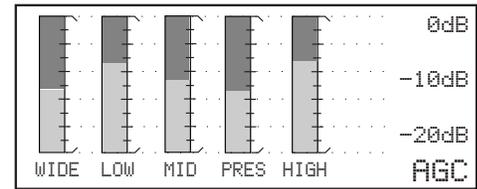
Processing Bargraphs

Program material that has low dynamic range, high RMS and low peak levels will generate more activity in the AGC sections and less activity in the Limiter sections in the displays. This is due to the AGC section responding to the RMS energy while the Limiter section reacts to peak energy. When these situations occur, it is normal for the unit to indicate more AGC action as compared to Limiter action. Sometimes the Limiter section may not indicate any action! Examples might include heavily processed commercials or music, or music with passages of sustained level. A good example is the Aerosmith CD "Pump." This recording has very little dynamic range. Try any up-tempo selection from this disk and you will see the WideBand-AGC section make initial adjustments along with small amounts of limiting. Once adjusted, the WideBand-AGC section will be deep in gain reduction, although with little movement, and limiting action will be minimal.

When the programming has wide dynamic range, with low RMS but high peak levels, the opposite will occur. The Limiter section becomes active, while the AGC section will appear not to respond. During these situations it is possible that the Limiter sections could approach full scale, while the AGC section may only indicate half scale. Examples are: vocal passages or live voice, classical music, or passages with transient levels. Good test examples: almost anything classical; almost anything by Steely Dan!

Also keep in mind that the AGC section will operate much more slowly than the Limiter sections. This is in part due to the nature of each function. Remember, the AGC section operates on the RMS energy, which is calculated over an "integration" time by the signal processor. It is during the integration time that the "average" level is established, and gain adjustments, if needed, are made. This is why the AGC section will move slower, since they are making changes, as needed, over relatively long time periods.

With the Limiter sections, the intention is to control the peak activity. This is accomplished by controlling, or limiting, the highest crest, or peak, of the audio waveform. There is intrinsically little time available to get this job done. The Limiter section must quickly grab the signal, reduce the gain to the proper operating range, and then return the gain to normal until the next peak signal comes along. Peak energy must be detected and adjusted in a quick and accurate manner while, at the same time, not interfering with the sonic integrity of the audio signal. For this reason, the Limiter sections operate very quickly, and on an as-needed basis.

Since these displays are capable of providing a wide range of information, we do not recommend setting up this system to any specified amount of processing based upon meter indications. Instead, we recommend setting up the processing by using your ears to judge the sound. We provide the meters to analyze the signals and aid you on adjusting the specific parameters needed to achieve the desired sonic results.

Expert Mode Parameter Editing

The Omnia system architecture has a great number of audio processing functions and features. The following sections detail the adjustments one can make while in Expert Edit Mode. Normal Edit Mode (the factory default setting) limits one to just three main adjustments, which were covered in Chapter 2, Omnia Operation.

Before tackling this section you must be familiar with navigating through the menu system and be comfortable with the Omnia controls. If so, you're ready to tackle Omnia's more sophisticated adjustments. To edit a preset it must first be loaded into the Omnia. Once loaded, it can be modified to your heart's content. The changes can then be temporarily used, or they can be saved to the PC Card so they won't be lost.

The *Edit Parameters* sub-menu and those below it provide access to the heart of Omnia, where comprehensive and very fine adjustments to the audio processing are possible. We suggest that only those with experience in processing adjustment should make use of this section. Here is where the user can either shine and stand out on the dial, or crash and burn if they're not careful! That's right: Unlike other processors, we don't artificially limit the range of adjustments to try to keep you out of trouble—you better know what you're doing. This section of the manual will help you do just that.

Upon entering this menu, a unique graphical block diagram of the processing system appears. This block diagram not only indicates the architecture of the processing system, but provides access to the sub-menus for each of these parameters. Take a moment and rotate the jog-wheel. The diagram scrolls from left to right as different processing blocks are selected. Clicking the jog-wheel enters the sub-menu for that processing block. Parameter adjustment is then accomplished using the previously discussed

Expert Mode Parameter Editing Menu Display

methods—turning the jog-wheel to adjust a parameter, then clicking on it to effect the selection. The following paragraphs will provide insight on each of the parameters.

Notice in the lower right-hand corner of the screen there is a horizontal *scroll* indicator to show the exact location within the block diagram. This will help in navigating through the system.

Wideband AGC

There are numerous items to adjust in this selection. Of note are the *Attack* and *Release* functions. The lower numbers relate to slower time constants, and the larger numbers relate to faster time constants. Since the time constants are program-dependent, absolute time constant values (in ms) would be useless—therefore the use of numbers. Use a *higher* number if you want "fast" attack and release times, and *lower* numbers for slower attack and release times. The best sound quality is achieved with slow attack and release times; greater loudness is achieved with faster attack and release times.

The other item to note is the *Make-Up Gain* menu. This parameter sets the amount of gain to be filled in during quieter, softer program passages. The range is *OFF* to *7*. This function is also program dependent, and it interacts with the main time constants. As the attack/release times are modified, the system also scales the *Make-Up Gain* time constants. Use *less* makeup gain for processing more faithful to the source material; use *more* makeup gain for greater loudness and "density."

Use the *Drive* control to ensure you are in adequate gain-reduction. Having the control set too low can rob you of loudness, and defeat the "leveling" function of the wideband AGC in dealing with varying program levels.

Use the *Gate Thresh* control to set the level at which gating occurs, hence "freezing" the gain during short pauses. Judicious use will eliminate "pumping" effects that can lend an unnatural quality to the processing.

Bass & Warmth

The Bass sets the amount of "Thunder Boost." This parameter is adjustable in 1 dB steps up to 12 dB. This specialized, low frequency enhancement can deliver the thunderous bass so desired in most formats. The Warmth adjustment controls the amount of lower vocal range presence using the same type of controls as the Bass parameter.

X-Over

The crossover points are set in software and cannot be modified. You can however, change the output gain of each crossover filter. Consider these as "drive" controls to the respective multiband Limiter sections. These are some of the **key** adjustments you will be using to increase loudness! The greater the drive, the greater the loudness and the effect of dynamic equalization to achieve a consistent spectral balance. Increasing some bands while not others effectively adds emphasis to those boosted bands.
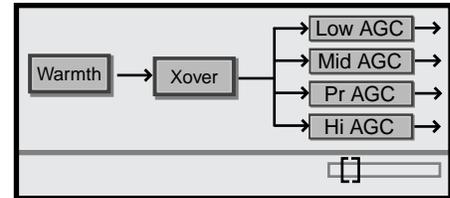
The Continuation of the Expert Mode Paramter Editing Menus

Adjustable Pre-emphasis (Omnia.am only)

Intelligibility can be improved by adding some presence boost using the adjustable pre-emphasis boost under the Xover menu. Up to 20 dB of boost is possible. Care should be used as boost is employed as too much enhancement can create a *strident* sound.

Multiband Limiters

Again these sections are fairly self-explanatory. The only new item is the **Hold Thresh**. This sets the threshold of where the limiter's *Hold* algorithm begins. When it's in the **OFF** position, the limiters will attack and release as you would expect them to. With **Hold Thresh** enabled, the limiters will momentarily stop and rest during very short pauses, especially during live speech. This function is similar to the **Gate** function in the WideBand-AGC.

Mixer

This is the summation of the multiband sections before the final limiter/clipper. Be careful when adjusting this section, as too much level from any particular band could cause an excessive amount of distortion to that range of frequencies. If your desire is to "EQ" the sound, you should perform that using the drive levels in the *X-Over* menu, the individual limiter drive controls, or a combination of both. This final mixer is mainly for minor "EQ" changes to the overall sound. Adjustment of this section should be done as a last resort.

Clipper (Omnia.fm and Omni.am only)

Very self-explanatory. Here is where the loudness versus quality trade-off is most evident. Adjustment is in 0.1 dB steps, so making minor changes will not create an abrupt overall change to the signal. Be careful with this one; there is a lot of available power here!

Asymmetrical Modulation (Omnia.am only)

Asymmetrical positive modulation is possible by adjusting the *Asym Mod* parameter. The range of adjustment is between +100% and +150% modulation.

Tilt EQ and Tilt Frequency (Omnia.am only)

Tilt compensation is performed using these two parameters. Refer to page 5-2 (Omnia.am chapter) for the procedure to set these adjustments.

Saving, Renaming and Deleting Presets

Upon completing a preset editing session, the processing changes should be stored. This writes the processing information to the PC Card through overwriting an existing preset or by creating a new one. It is also possible to delete presets that are not needed anymore. This frees up memory space for saving newer settings. Omnia has the capacity to store up to 50 User Presets.

Saving Presets

When processing adjustments are completed, a choice should be made to either save the changes over the existing preset or create a new User Preset. This is done from the *Audio Processing* menu. If you want to save the changes using the current preset name, choose the option *Save To Card* from the menu. When selected, the system will save the latest changes to the current preset name. A dialog box appears on-screen to verify this.

To save the preset under a new name, thus keeping the original preset and creating a **new** preset that will be added to the bottom of the preset list, use the *Save As* menu choice. When selected, a Preset Naming dialog box appears on the screen, so the characters in the new User Preset name can be entered.

The first character in the current preset name will be highlighted and flashing (the letter V in the illustration). To change this character, click the jog-wheel. This stops the flashing, indicating this character can now be changed. Turn the jog-wheel to step through the available ASCII characters. With the desired character shown, click the jog-wheel to select that character. This jumps the flashing highlight to the next character in the name. If the next character does not need to be changed, rotate the jog-wheel and the flashing highlight will step past each character in the name. Up to 20 characters can be used in a Preset name.

After entering the preset name's last character, rotate the jog-wheel until *OK* is highlighted. Click the jog-wheel to save the new preset. If you wish to cancel the save as operation, highlight the *Cancel* box and click the jog-wheel. The operation is canceled and the *Audio Processing* menu is displayed.
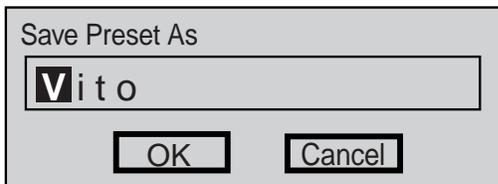
Note: You cannot save a preset using any of the factory-supplied preset names. A new name *must* be used, using the *Save As* menu option. This prevents accidentally overwriting the factory presets.

Save Preset As

V i t o

OK   Cancel

Preset Naming Dialog Box

Renaming A Preset

Renaming presets is not done under the *Audio Processing* menu, but rather is done under the *Utility* menu located off of the *Main Menu*. To rename a preset, select *Utility* from the *Main Menu*. From the sub-menu list,

select *Preset*, then select *Rename*. This opens up the Name Preset Dialog Box so that a new name can be entered.

Deleting A Preset

Using the *Preset* sub-menus under the *Utility* menus, as discussed in the previous section, the *Delete* option can be accessed. When chosen, a list of presets that can be deleted appears. Scroll down the list to the preset to be deleted, and click the jog-wheel. A confirmation dialog box appears. Use the jog-wheel to highlight either *Yes* or *No* and click the jog-wheel to complete the operation.

Getting The Sound You Want

If you believe that you're in a loudness war and you need to react, here are some suggestions that should help. Conversely, if you have the luxury to strive for increased sound quality, we've got suggestions for you, too! Please be advised that there will always be a subjective *compromise* whenever the desire is to shift to a *louder* personality on the dial. Omnia is designed to minimize the qualitative trade-offs that one needs to make.

We recommend that before starting the process of *cranking it up* just for the sake of it, try to figure out what sonic characteristics you feel are needed in order to be more competitive. In many instances it's not just increasing the drive to the limiters, clipper, or composite clipper. It can be as simple as creating an *illusion* of added loudness by changing a time constant parameter. There are known situations where the use of *stereo enhancement* can also create apparent loudness. Please don't bite at the first temptation to *crank* the system. Sometimes the old adage of *less is more* really applies!

Before delving into alternative processing possibilities, please give the next brief section some thought. It may help provide you with direction to your overall plan.

A Word About Loudness

Making this confession is a little like telling your parents you dented the car. But here it goes: It's OK for your station to be loud. *Very loud.*

In the past, loudness was a problem due to the limitations of the processors you had available to you. If you processed more heavily, then you either had to adjust your single processor outside of its "safe" range or use multiple boxes and risk conflicts among each other.

Omnia has changed all of that. It knows how to get a station sounding loud without the artifacts or grunge created by your current processor when you try to make it loud. And Omnia makes loudness an option for *all* formats.

One more confession. It's also OK for your station to *not* sound loud, yet sound incredibly musical and grunge-free, because the Omnia has given you the choice. Our intention is to provide you with a system that will maximize the audio quality of your signal, yet at the same time satisfy your competitive requirements.

Quality Versus Loudness

The trade-off between quality and loudness is primarily affected by the use of the limiting and clipping sections. While either function will generate more "dial presence," they both offer differing artifacts and side effects. With increased use of limiting, intermodulation distortion is increased. The added dynamic activity of the limiters causes the audio to sound as if it is "tight" or "squashed." This can be perceived to the ear as "pumping," "breathing," "dense," or "mushy."

When clipping is increased, harmonic distortion is increased. The audio level is in effect "running into the brick wall." This may cause the audio to sound "broken-up," "torn," "rough," or "edgy." As you might imagine, the harder limiters and clippers are driven, the louder the perception…and the more likely you have increased intermodulation and/or harmonic distortion.

The following sections are provided to assist you in designing the personality of your station's sound. As said earlier, there is no precise recipe for setting audio processing. There are a few basics that can get you more along the line of your desire. In the end, it will require a concerted effort of extended listening and subtle changes over time to achieve the desired results. And remember the guidelines discussed at the beginning of this section: know your goals, take your time, adjust methodically.

Increasing Loudness

Try to resist the temptation to *crank* on the aggressive processing sections. Those will add loudness, but usually at the cost of quality. Many times, building a little more RMS level in the WideBand-AGC section will do the trick. The following are some suggestions on where to begin to make changes. Try them in the order described.

Increasing loudness can be accomplished in four ways:

1. Alter the following parameters in the WideBand-AGC:

   • Increase the *Drive* to the WideBand-AGC sections.

   • Increase the *Release* time settings in each band (using the *Comp* sub-menu) to operate faster.

   • Increase the amount of *Make-Up Gain* in each band (using the *Comp* sub-menu).

2. Modify the Multiband Limiter sections:

   • Increase the *Drive* to each section.

   • Increase the *Release* time settings to operate faster.

   • Set the *Hold* threshold to a low value.

3. Drive the Clipper sections harder.

4. A combination of all of the above! Sounds crazy, but it's true! In this situation, resist the temptation to make too many changes at once. When that occurs, it becomes difficult to determine why, or why not, an adjustment made sense. Let one specific area at a time be the main focus. After that area is satisfactory, then move the focus to another area, as needed.

Based upon the above suggestions and theories, experiment with different styles of processing. Some broadcasters prefer to have their processing be perceptibly loud, but dynamic. This may not result in the loudest station on the dial, but it gives the illusion of loudness, yet retains detail and clarity. This can be done by centering the efforts in the Limiter sections, and avoiding the heavy use of the clipper.

A trick to consider here is to use very fast attack and release times in the multiband limiters, but make sure that they do not produce more than 5 dB - 7 dB of gain reduction. This keeps the IM distortion of the limiters to a minimum. Here the Limiter sections are relied upon to generate higher RMS levels, which translates into increases in perceived loudness.

If the quest is to produce the "loud and proud" appearance of the "big boys" in town, then the limiters and clippers should be leaned upon a bit more. *Loudness at all costs* is usually the reason for moving the processing in a direction like this. Using larger amounts of drive to the multiband limiters, along with faster release times

will generate a signal of consistent density. Also, an increase in clipping will further aid this. The effect of the processing set in this manner is that the audio is consistently loud at all times. The drawback is that the *density* can cause listener fatigue over a prolonged period of time.

While Omnia is designed to minimize listener fatigue, it is capable of generating large amounts of density that could eventually lead to fatigue. Be careful!

Adding More Detail—When Loudness Isn't The Last Word

Now that we've "squished the grape," lets look at what it takes to undo a heavily processed signal. Basically, just reversing the procedures listed above will do the trick:

1. Reduce the drive to the Clipper.

2. Back off on the influence of the Limiter stages:

   • Reduce the amount of **Drive**.

   • Reduce the **Release** time to slow down recovery.

   • Raise the threshold of the **Hold** function.

3. Ease up on the WideBand-AGC sections:

   • Reduce the **Drive** to the WideBand-AGC.

   • Reduce the **Release** time to operate slower.

   • Reduce the amount of **Make-Up Gain**.

Backing off the clipping sections first will allow the processing to still retain a level of loudness while restoring quality. Start with reducing the **Clipper** amount in 0.5 dB steps. It's surprising how much detail can be restored from just a small change of 0.5 dB. Generally, a change in the **Clipper** amount will have the most noticeable effect on quality, but it will also affect the relative loudness level, too. You'll need to find a "happy medium" that's right for you.

EQ Changes

Tailoring the shape of the overall audio spectrum can be done in three different sections:

1. The drive settings in the **X-Over** menu. This sets the drive to the multiband AGC sections.

2. The relative amount of **Drive** to the multiband limiters.

3. The setting of the final **Mixer**.

All three options will provide noticeable change in EQ. We suggest you use the first two listed options. In either case, an EQ change is still followed by a *dynamically* controlled stage. Therefore any excessive EQ change can be countered by either the subsequent AGC or Limiter.

The last option, the *Mixer*, is designed to provide a final *minor* trim to the spectrum. Since this stage is *after* all of the dynamic AGC and Limiting, a radical change in level in the *Mixer* will result in excessive clipping in that respective band. We suggest that any changes implemented here be limited to about 0.5 dB to 1.0 dB of boost. Naturally, any decrease in level can be done to any desired amount.

Thunder Bass

Omnia has the power to shake the walls with low end! If your source material has it, Omnia will process it and put it on the air with muscle! Making changes to this characteristic is done using these parameters, in the order listed:

1. Increase the amount of *Bass* boost.

2. Increase the drive to LF Lim with the appropriate control in the *X-Over* stage.

3. Speed up the *Release* time in the *LF Limiter* section.

Again, moderation is the key! If all of the above are utilized, then the possibility of causing severe low frequency buildup can occur. This would then produce the illusion of "lost" presence and high frequencies. Another concern is the creation of unwanted bass-induced IM distortion in the clipper. This can be perceived on midrange/presence frequencies whenever a sustained bass note is occurring. An example of this would be a strong bass signal "underneath" a sustained vocal passage. The vocal passage will begin to sound as if it "warbles" a little bit. This is caused by the heavily processed bass energy pushing the vocal frequencies in and out of the clipper unnecessarily.

Generally, an increase in the *Bass* boost function alone will provide a substantial and sufficient enhancement to the low end.

ACCESSORIES

Remote Control Software

Omnia Remote Control is a Windows (Windows 95, NT 4.0, or higher) program supplied with the Omnia processor. It allows either local or remote access to the Omnia from any PC running Windows 9x or NT. The software is supplied on a single 3 1/2" floppy disk. Updates, when issued, can be downloaded from the Cutting Edge web site (www.omniaaudio.com).

Software Installation

Using standard Windows procedures, run the **OmniaRemoteControl.exe** program from the floppy disk. The install program installs the program **remote.exe** onto the computer's hard disk and places the program name *Omnia Remote Control* in the Start Menu. The default location for the copied files is c:\Program Files\Cutting Edge\Omnia Remote Control.

Standard Windows procedures can be used to create a shortcut to the program on the desktop.

Note: When installing any updates of the software, it is recommended that the default program folder name (c:\Program Files\Cutting Edge\Omnia Remote Control) be changed to "Omnia Remote Backup" to avoid conflicts with potentially different versions of the connect.dat database file created by installing the updated remote.exe program. Once you have assured correct installation and operation of the updated files, the Omnia Remote Backup folder can be safely deleted.

Modem Connection for Remote Communications

Ensure that the Cutting Edge-supplied PCMCIA modem card is properly inserted into the lower PC Card slot on the back of the Omnia. It goes below the PC card containing the system software and presets. Press on the "XJACK" connector to extend the phone jack. Connect your phone line using conventional phone cords with RJ-11 jacks. Make a note of the phone number corresponding to this phone line.

Note: The modem card can only be installed or removed when the Omnia power is *off*. Only the PCMCIA modem card supplied by Cutting Edge is supported. We cannot assure correct operation if any other modem card is used, nor can we provide support.

RS-232 Connection for Local Communications

When a computer can be located near the Omnia, use a standard (*not* a null modem) serial cable with a DB-25 male connector on the Omnia end and a DB-9 female connector on the computer end (typical; check your computer for exact connector type).

Computer Setup Parameters for the Script Editor

The Omnia Remote Control software can be started and run without connecting to an Omnia, but the following equipment and connections are required before the Script Editor can be started:

1   A computer running Hyper-terminal or another VT-100 terminal emulator.

2   The Omnia Remote Software installed on the computer.

3   A serial cable from the Omnia to the computer. **This cable must be a "straight-through" cable. A null-modem cable will not work!**

The serial communications parameters of the terminal software must be set for:

        19200 Baud (Bits Per Second)
        8 Data Bits
        No Data Parity (None)
        1 Stop Bit
        Flow Control (None)

With these parameters set, one can now log onto the Omnia. Note that the system's master password will be required. The Remote Control software allows multiple connection profiles to be created so that either the dial-up or the serial connection can be used.

Trigger Interface Script Editor

The Omnia features a flexible scripting editor that allows complicated system parameter changes to be accomplished through a simple contact closure or open on one of the eight remote inputs on the 9-pin D-sub connector on the Omnia's back panel. When a remote trigger input is changed from sustained open to sustained closed, or vice versa, one or more system parameter changes can be initiated as set in that input's Trigger Script.

A Trigger Script is written using the Trigger Interface Script Editor, which is part of the Omnia Remote Control software. The Script Editor runs in a separate window from the Omnia Remote Control window. The Editor window is opened from under the Options menu (Edit Trigger Scripts). To open the Script Editor window, the computer running the Omnia Remote Software must be communicating with the Omnia.

Starting the Script Editor (Options / Edit Trigger Scripts) opens up the Script Editor window. The eight radio buttons along the left side select a trigger input script to display and edit. The top edit box shows the script for the go-high transition (contact open) for the selected input. The bottom edit box shows the script for the go-low transition (contact closure) for that input.

Script Editor Window

Clicking the Test button sends the displayed script to the Omnia for immediate execution. Use the command line window and/or any alert dialogs that pop up to view the success or failure of the script. Note that executing the script in this manner does not result in the script being downloaded or saved as a trigger script, it is simply run once to see if the script, as written, actually works.

The buttons along the bottom of the window load, save or download the current scripts being edited to the PC Card. Click "Save to Card" to permanently store the current scripts on the PC Card in one file. Click "Load from Card" to retrieve previously saved scripts. To download the scripts for use in the Omnia without saving to the PC Card, click "Apply" if further script editing will be done. Click "OK" to download the current scripts and close the Script Editor window. Click "Cancel" to close the window, discarding any changes made since the last "Apply" or "Save to Card."

Once the scripts are downloaded into the Omnia, they are executed when the appropriate logic transition occurs on their trigger input. The Omnia Remote Control application and the Script Editor do not have to be connected or running in order for the downloaded trigger scripts to execute.

Note: When a trigger script is actually executed, any problems in the execution will not be noted to the user. Also, do not use any commands which may require user input, as the user may not be at the unit when the commands are executed.

Script Command Definitions

The scripting commands available for use in the Script Editor are listed in bold lettering (e.g., **parts**). Their definitions (e.g., Displays the current daypart table) and usage examples are also listed. The commands have been divided by general functions (Dayparts, Presets, System parameters, etc.). In use, a command is typed in and then the enter or return key is pressed. If the command is executable (e.g., **parts**), then the command is run (e.g., a table of the dayparts is displayed), otherwise the cursor simply moves to the next entry line.

Dayparts

parts   Displays the current daypart table

partadd <day> <time>   Adds a daypart to the daypart table.

The "day" parameter can be assigned the following days: Sun, Mon, Tue, Wed, Thu, Fri, Sat, M-F, S-S, All. The "time" parameter must be defined using the following format: <hour>:<min><am | pm> . As an example, typing **Partadd Mon 5:00am <enter>** commands the Omnia to add a daypart on Monday at 5:00 am.

partremove   Removes a daypart from the current daypart list.

Example: **partremove Mon 5:00am <enter>**

partload   Loads a daypart from the PC Card.

partsave   Saves the current daypart to the PC Card.

Presets

presets   Lists all the currently available factory and user presets by index #.

preset <preset index #>   Selects the preset by index # from the list of available presets

Example: typing **preset 21 <enter>** commands the Omnia to load preset number 21 in the index list.

delete <preset index #>   Deletes a preset from the preset index list by its index number.

Example: typing **delete 21 <enter>** commands the Omnia to remove preset number 21 from the index list.

rename <preset index #><name>   Renames the preset by its index number.

Example: **rename 21 BOOGY <enter>**

save   Saves the preset under its current name.

Note that factory presets cannot be modified and saved under their own name. Use the '**saveas**' command when saving changes made to a factory preset.

saveas   Saves the preset under a different name.

Example: **saveas BOOGY <enter>**

sysdefaults   Restores the system attributes back to their factory defaults.

syssave   Saves the system attributes to the Omnia PC Card.

sysload   Loads the system attributes from the currently inserted Omnia Card.

Omnia Parameters for Expert Edit Mode

paras   Lists the modifiable parameters available for the current preset in a table format.

Example: typing **paras <enter>** displays the parameters for the current preset.

```
Bass
        16) Boost        [+5.0dB]
Clipper
        115) Drive       [+0.1dB]        116) P.A.C. [OFF]
Composite
        122) Drive       [+1.7dB]
Crossover
        17) Low Gain     [+6.0dB]        18) Mid Gain [+6.0dB]
        19) Pres Gain    [+6.0dB]        20) Hi Gain [+6.0dB]
Hi Band AGC
        51) Attack [5]                   52) Release [4]
        53) Make-Up Gain [6]
```

paravalues <index #>   Lists all possible values for the parameter at the given index number.

To find the index number for any parameter, use the '**paras**' command to list all parameters. As an example, to list the values for the Wideband AGC drive, which has the parameter value 1, type: **paravalues 1 <enter>** to display this table:

1) -14.0dB	2) -13.0dB	3) -12.0dB	4) -11.0dB
5) -10.0dB	6) -9.0dB	7) -8.0dB	8) -7.0dB
9) -6.0dB	10) -5.0dB	11) -4.0dB	12) -3.0dB
13) -2.0dB	14) -1.0dB	15) 0.0dB	16) +1.0dB
17) +2.0dB	18) +3.0dB	19) +4.0dB	20) +5.0dB
21) +6.0dB	22) +7.0dB	23) +8.0dB	24) +9.0dB
25) +10.0dB	26) +11.0dB	27) +12.0dB *	

para <para index #> <paravalues index #>   Sets a new value for the selected parameter.

Example: **para 1 26 <enter>** sets the WideBand AGC gain (parameter #1) to +11.0 dB (paravalue #26). The * indicates the default value.

Omnia Parameters for Normal Edit Mode

dparas   Lists the three modifiable parameters available in the Normal editing mode.

Example: typing **dparas <enter>** displays:

  1) Thunder [Expert]   2) Sizzle [Expert]   3) Thrust   [Expert]

dparavalues <para index>   Lists the possible values for one of the three normal editing mode parameters.

dpara <para index>[<para value index>]   This sets the desired (new) value to a parameter you wish to modify.

Example: **dpara 1 8 <enter>** sets the Thunder parameter to 8.

Omnia System parameters

sysparas   Lists all of the adjustable parameters in a table format.

Example: typing **sysparas <enter>** displays this table:

1) Input Source [AES/EBU]	2) Analog Gain [9.5dB]
3) Input Left [-8.6dB]	4) Input Right [-8.6dB]
5) Output Left [+10.2dB]	6) Output Right [+10.2dB]
7) SCA Level [-20.0dB]	8) Composite 1 [2.77 V]
9) Pilot Level [9.0%]	10) Phase Adjust [-8.0 deg]
11) Deemphasis [75uS]	12) Preemphasis [75uS]
13) Analog Phase [254]	14) LED Source [INPUT]
15) Backlight [60]	16) Contrast [70]
17) Headphones [-4.0dB]	18) Separation [STEREO]
19) Editing Mode [EXPERT]	20) Current State [ENABLED]
21) Composite 2 [1.87 V]	22) Input Phase [NORMAL]
23) Preemphasis ['n/a']	24) Ctrl Port Baud [19200]
25) Mono Mode [Stereo]	26) Asym Mod ['n/a']
27) Tilt Eq ['n/a']	28) Tilt Freq ['n/a']
29) HP Filter ['n/a']	

sysparavalues <para index #>   Lists all the possible values for any parameter.

Example: **sysparavalues 9 <enter>** displays a table listing the possible Pilot Level values:

1) OFF	2) 6.0%	3) 6.1%	4) 6.2%
5) 6.3%	6) 6.4%	7) 6.5%	8) 6.6%
9) 6.7%	10) 6.8%	11) 6.9%	12) 7.0%
13) 7.1%	14) 7.2%	15) 7.3%	16) 7.4%
17) 7.5%	18) 7.6%	19) 7.7%	20) 7.8%
21) 7.9%	22) 8.0%	23) 8.1%	24) 8.2%
25) 8.3%	26) 8.4%	27) 8.5%	28) 8.6%
29) 8.7%	30) 8.8%	31) 8.9%	32) 9.0% *
33) 9.1%	34) 9.2%	35) 9.3%	36) 9.4%
37) 9.5%	38) 9.6%	39) 9.7%	40) 9.8%
41) 9.9%	42) 10.0%	43) 10.1%	44) 10.2%
45) 10.3%	46) 10.4%	47) 10.5%	48) 10.6%
49) 10.7%	50) 10.8%	51) 10.9%	52) 11.0%
53) 11.1%	54) 11.2%	55) 11.3%	56) 11.4%
57) 11.5%	58) 11.6%	59) 11.7%	60) 11.8%
61) 11.9%	62) 12.0%		

The * indicates the default value.

syspara <syspara index #>[<sysparavalue index #>] Sets a system parameter to a new value using the system parameter index # and the system parameter value #.

Using the Script Editor

Now that the scripting commands have been defined, let's put them to work to create a Trigger Script. We'll use one of the most commonly requested operations that FM broadcasters want to easily accomplish: switching between mono and stereo operation.

This procedure can, of course, be done by manually using the Omnia front panel controls to turn off the 19 kHz pilot tone and to switch the input from stereo to mono left. But a far easier method is to use the Script Editor to create two Trigger Scripts that can be loaded into the Omnia to run in response to a single relay contact closure or open. The following scripts do just that—set the Omnia to automatically switch to mono in response to a sustained contact closure and to then return to stereo operation when that same contact is opened.

In scripts, all lines that begin with "syspara" must be followed by two numbers that identify the parameter and its new value. The "sysparas" table on page 9-5 listed all the parameter numbers. The value numbers and their settings for the Pilot Level were also shown on page 9-5. To list the values and parameter settings for any parameter, type in **sysparavalues** followed by a space and then the parameter's "syspara" number.

Trigger Script for Switching to Mono Operation

Trigger 1 will be set to switch the Omnia into mono operation when the contact closes and switch back to stereo when it opens. To create this script, open up the Script Editor and click radio button #1. Now click in the lower edit box to begin entering the Trigger 1 "Trigger Low" script. Type:

syspara 9 1 <enter>

This command sets the Omnia to turn off the 19 kHz pilot tone when it is run. "**syspara 9**" says to edit the Pilot Level. The "**1**" says select Off. Next, type in:

syspara 25 2 <enter>

This command sets the Omnia to switch the input to "mono left" when run. "**syspara 25**" says to edit the Mono Mode setting. The "**2**" says select mono left.

Now, click in the top edit box (Trigger High Command Script) and type in:

syspara 9 32 <enter>

This tells the Omnia to activate the 19 kHz pilot with the injection level set to 9.0%. "**syspara 9**" says to edit the Pilot Level. The "**32**" says select 9.0% pilot level. Now type in:

syspara 25 1 <enter>

This tells the Omnia to switch the input to "Stereo." "**syspara 25**" says to edit the Mono Mode setting. The "**1**" says to select stereo mode.

These four commands are now a completed script for Trigger 1. To test the scripts, click the Test button above each edit box. If no errors or other displays are shown, then your script is ready to be used or saved. An error indication typically indicates you have a "typo" in one of your command lines. Verify the command is correct and that the index numbers for the parameters or parameter values are correct.

To use the scripts, they must be loaded into the Omnia. This is done by clicking Apply. Any previous scripts in the Omnia are replaced by the scripts in the Script Editor. To save the edited Script Editor scripts to the PC Card, click Save to Card. To recall previously edited scripts, click Load From Card. These can then be sent to the Omnia by clicking Apply.

To actually use the scripts you have just written requires that a sustained relay or a switch be connected between trigger input 1 (pin 1) and ground (pin 5) on the Interface connector on the Omnia's back panel. Setting the

relay or switch on (shorting pins 1 and 5 together), then causes the Omnia to follow the script for go low (the Omnia switches to Mono Left/Pilot off operation). Opening the switch or relay will then cause the Omnia to follow the go high script (the Omnia switches to stereo/pilot on operation).

Multiple operations, including ones that are vastly more complicated than what we have presented here, such as simultaneously changing to different presets when changing from stereo to mono, can be completed at the flip of any one of the eight switches or relays connected to the Omnia. And the eight relays or switches do not have to be switched locally: commands can even be initiated by a network satellite when a receiver with contact closures is being used.

Using the Script Commands

There are two ways to use the scripts that have been created. One is to use the scripts as Trigger Scripts, responding to contact closures and opens as previously discussed. The other involves integrating the scripts into the Omnia's daypart table. Because the Omnia is flexible, it allows one to use the same script for both options.

Initiating Trigger Scripts Through the Interface Connector

Trigger scripts give the user the ability to tie a series of commands (as set by the trigger script) to a simple high/low logic change that occurs on one of the eight input pins on the 9-pin D-sub Interface connector on the Omnia rear panel. The pins on the Interface connector are wired as follows:

> PIN 1 activates Trigger Script 1
> PIN 2 activates Trigger Script 3
> PIN 3 activates Trigger Script 8
> PIN 4 activates Trigger Script 6
> PIN 5 is connected to ground
> PIN 6 activates Trigger Script 2
> PIN 7 activates Trigger Script 4
> PIN 8 activates Trigger Script 7
> PIN 9 activates Trigger Script 5

Each pin that is to be used must first be programmed with a trigger script for both Go High and Go Low logic. To execute the Go Low script, a trigger input pin is connected via a sustained contact closure or switch to pin 5 (ground). To execute a Go High script, the ground is removed via a sustained open contact or switch. Each of the trigger pins (1, 2, 3, 4, 6, 7, 8, 9) is thus connected through a switch or relay to the Omnia ground on Pin 5.

Using the two trigger scripts from "Using the Script Editor" on page 9-6 as an example, whenever pin 1 is held low (contact or switch in a closed state), the Omnia will switch to mono mode (no Pilot and only the left input channel is used). When the pin 1 contact is opened up, the Omnia will switch to stereo operation (pilot on and both left and right input channels being used).

Initiating Trigger Scripts Through the Daypart Table

The Omnia Daypart table is typically used to change a Preset at a set day and time. But, when a trigger script is added to the Daypart table, the script can dynamically change one or multiple attributes when the Daypart is executed. A trigger script for use by the Daypart functions is written using command line interpreter commands from within the Omnia Remote Control software. These commands can be executed can be driven using the normal daypart features. (Refer back to page 9-3 for definitions of the command interpreter commands to better understand the power of this feature).

The "Daypart Editor," part of the Omnia Remote Control software, is used to create and manipulate dayparts. To access the advanced command script capabilities of the Editor, use the tabs near the existing Preset list. Selecting either "Start Script" or "End Script" will replace the Preset list with a text entry field to allow the entry of a script. There is also a test button on the page to force the Omnia to immediately run the current script.

At the bottom of the editor window is a check box to enable or disable the use of the script. A script may be entered and saved, but will not be executed until the enable box is checked. In version 1.60, the preset list also has an enable box which can be used to disable the default action of changing the preset in the event the daypart is to only execute the given scripts. A daypart can actually be disabled completely by not enabling either preset change, start script, or end script.

Start scripts execute at the beginning of a daypart, before making a preset change (if any). End scripts execute at the end of the daypart, after making any preset changes. The script information is stored and retrieved in the same means as other daypart information.

Dayparts can still be selected, etc. from the Omnia front panel interface. However, dayparts with scripts cannot be modified in any way from the Omnia front panel.

Note: Remember not to include any commands which may potentially prompt the user since a user may not be at the Omnia when the commands are executed.

Note: The remote control application does not have to be connected in order for the trigger scripts to execute.

10
TROUBLESHOOTING & SERVICE

T his chapter lists the various error messages that may be encountered while using Omnia. Also covered are some basic troubleshooting techniques for isolating possible Omnia problems in the field and how to obtain help or repair service from Cutting Edge.

Error Messages

Most error messages involve the Omnia PC Card. The messages are grouped by the part of the Omnia where they may be encountered: BIOS (errors displayed while starting or loading DSP), DAYPARTS (errors displayed while editing, saving or recalling daypart tables), PRESETS (errors displayed while editing, recalling or saving presets).

Most errors include a **<card error>**, **<storage error>** or **<preset error>** that will contain one of the following:

- "**device unavailable**" - Indicates no Omnia PC Card is inserted in the top card slot.

- "**device corrup**t" – Indicates a problem with the PC Card. This can occur if a PC Card is removed or if power is interrupted during a card write operation. The user storage area on the card should be defined when the error is encountered.

- "**not on device**" – Indicates the requested data (preset name, system settings, daypart) is not on the PC Card.

- "**device full**" – Indicates there is no more space available in the system or user storage area.

BIOS

Cannot initialize flash card <error code>

The system encountered an error initializing the PC Card interface or is unable to read from the PC card. This error may occur while the system is starting up and configuring the PCMCIA/flash card interface. It may also occur if the operating system is being loaded from an Omnia PC card and the card is not inserted correctly or is defective. Turn the Omnia's power off. Eject and reinsert an Omnia PC Card into the TOP card slot. Turn the Omnia back on to reload the system.

Insert card to continue!!!

No Omnia PC Card is inserted in the Omnia. Check that the correct Omnia PC card is properly inserted into the TOP card slot on the back of the unit.

Wrong type of flash card!!!

The BIOS expects an Omnia PC Card to be in the top card slot on the back of the unit, but has detected a different type of PC Card in that slot. Insert an Omnia PC Card in the top card slot to continue.

Dayparts

Cannot load dayparts, because 'newer version'

The dayparts on the PC card were created with an older version of the system software that is no longer compatible with the current Omnia software. The dayparts must be recreated using the newer software.

Cannot read dayparts, <card error>

The Omnia was unable to read the dayparts off of the PC Card. The <**card error**> indicates the reason.

Storage area corrupt. Define?

The user storage area on the card has not been initialized or is corrupt. The user storage area is used for storing all user presets, dayparts and system state information. This message occurs when a new card is being used for the first time, or when data on the card has become corrupt. If the data is corrupt, the system is unable to read or write user information to the card until the user storage section of the card has been "defined" or initialized. The system gives you the option of defining the user data area when this error occurs. Note that all previous user information saved to this card will be erased.

Cannot open dayparts, <card error>

The system was unable to load daypart information from the card. The <**card error**> indicates the reason.

Presets

Cannot save factory. Use save as

An attempt was made to perform a **Save to Card** operation on a factory preset. Factory presets are read-only, so use the **Save to Card as** option to save any changes under a different preset name.

No modification to undo

The **Undo Edit** option was selected when no changes have been made to the preset. Undo can only undo changes from the last time **Edit Parameters** was selected.

Can't save over factory preset <preset name>

An attempt was made to perform a **Save to Card as** using a factory preset name. Factory presets are read-only and can't be overwritten by a user preset with the same name. Save the preset under a different name.

Delete only non-running user presets

The system will not allow you to delete a preset if it is the preset currently running on the Omnia. If you want to delete the running preset, use **Select Preset** to load in another preset, then delete the previously running preset.

Rename only non-running user presets

The system will not allow you to rename the preset that is currently running on the Omnia. If you want to rename the running preset, use **Select Preset** to load in another preset, then rename the previous preset.

Can't rename to same name as running preset

The system will not allow you to rename the preset that is currently running on the Omnia. If you want to rename the running preset, use **Select Preset** to load in another preset, then rename the previous preset.

No user presets to copy

The **Copy All** or **Copy Single** option was selected from the preset utility menu, but there are no user presets on the Omnia PC card to copy.

Losing changes to current preset

The system will display this warning if a new preset is selected when changes have been made to the current preset that haven't been saved. Select **OK** to load in the new preset and lose the changes you have made to the previous preset, or **cancel** to exit so you can save your changes.

Cannot initialize system storage <error code>

The system was unable to set up its system storage area due to a memory or system error. Contact Cutting Edge for support.

No system attributes, <storage error>

The system storage area couldn't be configured for storing system settings. The <**storage error**> indicates the reason.

No card user section, <card error>

The user storage area for storing all user presets, dayparts and system state information on the Omnia PC Card has not been initialized or is corrupt. The <**card error**> indicates the reason. This message can occur when a new card is being used for the first time, or when data on the card has become corrupt. If the data is corrupt, the system cannot read or write user information to the card until the user section of the card is defined, or initialized. The system gives you the option of defining the user data area when this occurs.

Dead battery. Data lost. Contact Cutting-Edge

The battery in the Omnia needs to be replaced. The system storage area is maintained by battery when the unit is off, so any system settings stored will have been lost. The system will attempt to load system settings from the Omnia PC Card if the system storage area was lost, and will display a **Trying backup on card** dialog. If no system settings are found on the Omnia PC card, then the system will use factory default settings.

BIOS <version> too old. Call Cutting-Edge

The BIOS EPROM in the Omnia does not support features needed by the operating system loaded from the Omnia PC card. Contact Cutting Edge for a BIOS EPROM upgrade.

Cannot initialize modem card <error code>

The Omnia system was not able to configure a modem card inserted in the bottom PC Card slot on the back of the unit. Verify that a modem card is properly inserted, and that the modem card is supported by the Omnia system software. Only certain modem cards are approved for use with the from Omnia. Contact Cutting Edge customer support.

Define system storage area?

If the system has problems saving settings to the system storage area, then the user is prompted to define the storage area. The **Yes** option should be selected, as this allows the system to keep track of changes to the system state as you make them. If the **No** option is selected, then the system will display an **Auto save off** warning.

Return card to socket to continue

There is no Omnia PC Card inserted in the top card slot. To continue normal operation, insert an Omnia PC Card into the top card slot on the back of the unit.

Incorrect version or empty card. Use 'Upgrade'

The processing information on the card is not supported by the operating system currently running. The system will prompt with a second **Return same version to continue** dialog.

Invalid flash card

A non-supported PC Card has been detected. Make sure that the card is an Omnia PC Card obtained from Cutting Edge.

Destination card of smaller size

Displayed when the **Copy entire card** operation has been selected and the destination card has less memory than the source card. Make sure that the cards you are using are Omnia PC cards from Cutting Edge.

No user presets to copy

During a **Copy Single** or **Copy All** operation no user presets were found on the card.

Losing all system, preset, and daypart data

Selecting **Erase User Data** under the Card Maintenance menu displays this warning, allowing the user to cancel the erase operation. A second warning, **Erase data from current (inserted) card?**, will be displayed when **OK** is selected. If the currently running preset is a user preset stored in the user area on the card, an addition warning **Losing current preset, no return once erased**. will be displayed.

No user data section on card. Define?

The user storage area on the Omnia PC card has not been defined or initialized. This warning will be displayed the first time the card is used, or the first time user data is to be written to a card. The user storage area is used for storing all user presets, dayparts, and system state information, and needs to be defined before it can be used.

Failed routing, contact CE

An error occurred setting up the system routing while loading a preset. The Omnia PC Card may be corrupt or there may be a hardware problem. If available, try a different card. If it is not the card, then contact Cutting Edge for additional support.

Algorithm <algorithm name> not on the current card

A preset has been selected that does not have algorithm support on the current card. This error occurs when a preset was copied from a "newer card" to an "older card" that doesn't have processing support for the newer preset. For example, copying an Omnia.fm.HOT preset to an Omnia.fm card.

Preset <preset name> is not on the current card or **Preset <preset name> not found on card**

The requested user preset that is not on the current Omnia PC Card.

No presets are on the current card

An attempt was made to load a preset from a PC Card that contains no preset data.

Changing to this preset results in audio disruption

Displayed when the new preset that was selected requires different DSP software than is presently running. Select **No** to cancel loading and exit with no audio interruption. Select **Yes** to continue loading the new preset and the appropriate DSP software. The Omnia audio output is muted for about five seconds as the DSP software is loaded with the new preset parameters.

Cannot read <name>, <card error>

An error occurred during a PC Card read. The <**name**> being read may be a user preset, system state information or daypart information. The <**card error**> indicates the reason.

Cannot use <preset>, newer version

The preset <**preset**> can't be loaded, as it is incompatible with the system software currently running. The preset's parameters must be manually entered using a newer factory preset as a starting point.

Preset <preset name> exists. Write over?

Save to Card or **Save to Card as** was selected using a preset name that is already on the PC Card. Select **Yes** to overwrite the preset on the card or **No** to cancel.

Cannot write <preset name>, <preset error>

While saving a preset to the Omnia PC Card an error occurred. The <**preset error**> indicates the reason.

Cannot open <preset name>, <preset error>

An error occurred while saving or reading a preset off the Omnia PC Card. The <**preset error**> indicates the reason.

Cannot read card, <card error> or Cannot open card, <card>

The Omnia encountered an error opening the Omnia card for reading or during a read from the card. The <**card error**> indicates the reason.

Failed DSP <number> bootstrap, contact CE or Failed DSP <number> code, contact CE

A problem was encountered while loading the DSP code into one of the DSP boards. Either the processing data on the Omnia PC Card is corrupt, or there is a hardware problem with one of the DSP boards. Contact Cutting Edge for assistance.

Cannot delete <preset name>, <preset error>

An attempt to delete a preset from the card failed. The <**preset error**> indicates the reason.

<preset name> is already a factory preset

An attempt was made to perform a **Save to Card** with a factory preset, or a **Save to Card as** using the preset name of an existing factory preset. Factory presets are read-only and can't be overwritten or copied over by a user preset with the same name. Save the preset under a different name using **Save to Card as**.

Cannot delete old <preset name>, <card error>

A rename operation on a preset has failed. The <**card error**> indicates the reason.

Cannot open system, or **Cannot read system,** or **Cannot write system, because <error>**

An error occurred while saving or loading system settings on the system storage area. The <**error**> indicates the reason.

Cannot load system, because 'newer version'

The system settings in the nonvolatile system storage area or on the flash card couldn't be loaded because they were written by a version of the operating system that is no longer supported.

No previous system found

This warning is displayed when no system settings are found on either the nonvolatile system storage area, or on the Omnia card. The system first checks the nonvolatile system storage area, and then the Omnia card for system settings. If no settings are found on either, then the default system settings are used.

Losing current system settings

The **Load from Card** option under the System Attributes menu will display this warning, allowing the user to cancel the operation. Loading in new system settings will change the current settings for the Input & Output levels, stereo generator, front panel, and dayparts.

Omnia Field Servicing

Static Caution: The Omnia uses sophisticated microprocessor-controlled electronics that are susceptible to static electricity damage. Technicians must take all required precautions to create a static free environment before opening the Omnia chassis. Use of a hand or foot ground strap and an antistatic work surface are the appropriate methods to prevent static electricity damage to internal components.

As much as we like to think that Omnia is the *supreme* be-all, end-all product, we know it's possible an Omnia could develop a problem during use. Here are some guidelines on troubleshooting and servicing the Omnia in the field. The Omnia is probably closer to a sophisticated computer than to other broadcast equipment, so procedures and tests appropriate to computers are required. Should you decide to service the system in the field, the following tools are required:

- **Oscilloscope** with the ability to measure high speed digital signals.

- **Audio Test Set** with a low distortion audio generator and distortion/noise measuring function.

- **General Hand Tools**—Phillips #1 & #2 screwdrivers, hex driver—the computer/electronics basics!

- **Component Level Troubleshooting Ability**—either you have it or you don't! Honestly, this "tool" is vital as it requires more than a basic electronics understanding to troubleshoot the Omnia.

Should servicing be required, the Omnia must first be taken off-line and removed from the rack since all internal circuitry is accessed from the top of the unit.

Place the Omnia on an antistatic work surface. Read, and follow, the Static Caution note above before proceeding. To remove the top cover remove the nine #1 Phillips screws around the periphery.

Inside the Omnia, a subpanel is used to secure the six DSP boards in the standard Omnia. A seventh DSP board is installed for the HOT, Veris, or Space-EFX software modules. The subpanel must be removed to perform any tests on any of the DSP boards. The subpanel is secured to standoffs using six screws. Four screws, two from each side, secure the subpanel to the chassis.

Omnias have two cooling fans, either silver or black. If your Omnia has two *black* fans installed, locate Molex connector J16 and unplug the fan wiring harness. The fans can be disabled during testing without causing any heat problems, since the cover is open. Once the Molex connector is unplugged, the subpanel can be moved toward the rear of the unit to provide access to the DSP boards. The silver fans do not interfere with the subpanel movement.

Note: Since all of the DSP boards are identical, they are interchangeable. In trying to troubleshoot a problem that might be due to a specific DSP board, changing the order of the cards is a useful strategy.

REMOVE NINE SCREWS TO REMOVE COVER

Removing the Top Cover

PCMCIA CARD

SWITCHING POWER SUPPLY

MAIN PC BOARD

SUB-PC BOARD

DSP CARD GUIDE SUBPANEL

SUBPANEL SCREWS (x10)

DO NOT REMOVE THESE FOUR SCREWS
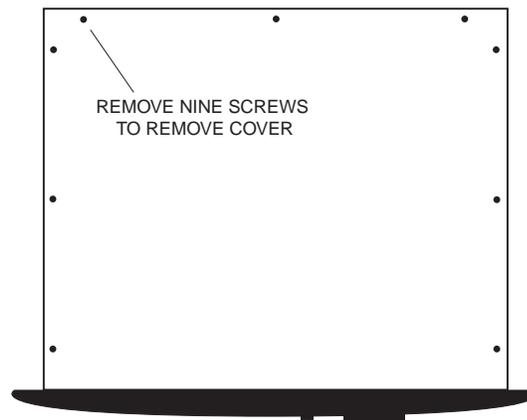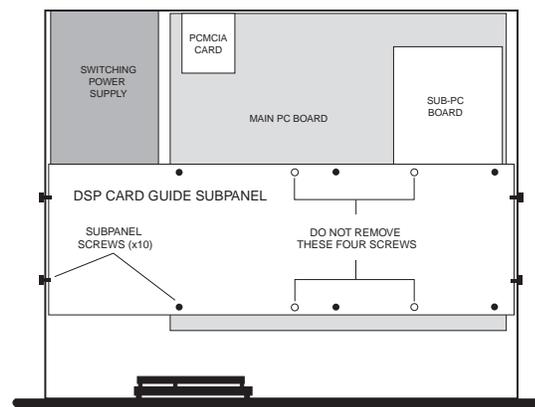
Omnia Internal View

Omnia Troubleshooting Guide

With regard to actually troubleshooting Omnia, try to ascertain some preliminary information before embarking on to in-depth problem solving. Give consideration to the following questions:

1. Is the unit totally *dead?* No audio input level, no audio output nor power indication? Is the LCD screen not operating nor illuminated? These would indicate a potential power supply problem, or some type of short circuit that would cause the power supply to shut down. If this is the case, examine the power supply. Be aware that the supply is a *switching* type. This means that it requires some form of load to start up and operate properly. But, it could be tested without a load to see if it provides a voltage output. Of course you did check to see that the power switch was in the ON position, and that the power cable was plugged into an active AC outlet!

2. The unit has power, but there's no audio output although the processing bargraphs are working. The first thing to verify is whether the front panel controls are operational. Verification of front panel operation helps narrow down where the problem is. Plug headphones into the audio monitor jack to see if there is audio there. Switch to monitor the output. If there is no monitor audio, try cycling the unit's power. If that doesn't bring the operation back to normal, then a hardware failure of some sort has occurred. If you get monitor audio but no output audio, verify that the outputs are connected correctly. An analog output connected to a digital device, or a digital output connected to an analog device won't pass audio! Connect the appropriate test generator to the output cables to verify analog/digital audio is making it to the next device.

The next condition to check is to see if the audio failure has caused the processing to cease. Using program material, check to see if the processing bargraphs are operating. If they are, then that's a fairly good indication that the basic DSP structure and the system host processor is working. At this point, it would be a good idea to see if the loss of audio is confined to only one output port, e.g. the composite output, discrete left/right outputs or the AES/EBU output. Check the signal at each of these locations. If the signal is dead at all three, then this points to a digital audio problem after the dynamic processing DSP chips. If one of the output sections is not operating, then it can be localized to that specific section.

Note: The composite outputs and the discrete left/right outputs are operated from different D/A converters. Hence, one of the outputs could fail without affecting the other. Likewise, a failure in the AES/EBU driver section could result in the digital output being dead, while the rest of the system is operational.

3. Unit has power, but no audio and no processing indications. This indicates some form of problem within the DSP environment, the host microprocessor or a combination of both. This would entail getting down and dirty with the digital *timing* signals. At best, trying to confirm logic levels at specific test points will help to localize the problem area. The following basic information can be used to verify the data signals.

Test Points On The Omnia Motherboard

TP1 - SDATA_AD   From B-audio card
TP2 - SDATA_DA   To B-audio card
TP3 - COMP DATA   To Comp D/A
TP4 - SC2-1-A-1   Frame Sync for Comp D/A
TP7 - AES-OUT-SDATA   To AES out IC converter
TP8 - SRC-OUT   Sample rate converter audio from AES input to DSP
TP9 - Pilot   TTL Level
TP10 - VCO-CLK   12 MHz CLK

Should your attempts to revive your Omnia prove futile, we recommend that you contact the Customer Service department for immediate attention.

Basic DSP Chip Information

Each DSP chip has these signals into the DSP: SRD data, SC 0 clock, SC 1 frame
Each DSP chip has these signals out of the DSP: STD data, SCK clock, SC2 frame

To see if the DSP is running, check that a digital signal is present at RP2 (pin 13 on the A DSP) and RP4 (pin 13 on the B DSP). These locations are labeled on each DSP card.

Obtaining Service

In the unlikely event that your Omnia is out of service and in need of assistance from Cutting Edge, please follow these procedures:

1. Customer Service personnel are available in Cleveland, Ohio, USA, Monday through Friday between about 9:30 A.M. and 6:00 P.M., Eastern time.

2. **Before** contacting the Customer Service department, please have a description of the symptoms/problems with the unit ready for the technician.

3. **Before** a unit is returned for service, it MUST have a Return Authorization (RA) number assigned to it. Units that arrive without an RA number will experience delays in service.

4. Return units packaged in the original shipping carton. This is a sophisticated (and expensive) piece of digital audio equipment that should be afforded the same care as an important computer would receive. Damage caused by improper packaging during shipping is not covered under warranty.

5. Loaner units are available on a first come, first served basis. Your Customer Service engineer will assist you with the necessary arrangements, when possible.

Via the World Wide Web

The Cutting Edge Web site has a wide variety of information which may be useful for product support, applications information, software updates, etc. The URL is: http://www.omniaaudio.com.

Via E-Mail

The customer service e-mail address for Cutting Edge is: support@omniaaudio.com.

Via Phone & Mail (USA and non-European Countries)

Customer service is available by telephone, Monday – Friday between 9:30 A.M. and 6:00 P.M., USA Eastern time zone. We're often here at other times as well, so feel free to try at any time!

Phone: +1.216.241.3343   **Fax:** +1.216. 241.4103

Shipping Information: *   Cutting Edge Customer Service
2101 Superior Avenue
Cleveland, Ohio 44114

Via Phone & Mail for Europe

Service is available from the Cutting Edge Europe office in Freising, Germany.

Phone: +49 81 61 42467   **Fax:** +49 81 61 42402

Shipping Information: *   Cutting Edge Europe
Johannistraβe 6
D-85354 Freising, Germany

* To ensure prompt service, the RA number must be written prominently on the shipping label side of the box.

A P P E N D I X A

CE Declaration of Conformity

Supplementary Information for our European Users

$$C \epsilon$$

Declaration of Conformity

Application of Council Directives: 93/68/EEC (CE marking); 73/23/EEC (safety-low voltage directive); 89/336/EEC (electromagnetic compatibility).

Standards to which conformity is declared: EN50081-1, EN50082-1.

Manufacturer's Name: Cutting Edge, TLS Corporation

Manufacturer's Address: 2101 Superior Avenue, Cleveland, Ohio, USA

Type of Equipment: Audio Processor

Model No.: Omnia

Serial No.: _____

Year of Manufacture: 1997   1998   1999   2000

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directives and Standards.

Place: Cleveland, Ohio, USA

Date: 4 September 1997

Signature: _____ (on file)

Full Name: Frank Foti

Position: President

CE Mark Conformance

3 November, 1997

Cutting Edge, TLS Corp.
2101 Superior Avenue
Cleveland, OH USA 44114

Supervision and summary by: _____ (on file)

Frank Foti

1.0 Introduction

1.1 Scope This record is intended to document Cutting Edge Omnia audio processor conformance with Council Directives: 93/68/EEC (CE marking); 73/23/EEC (safety-low voltage directive); 89/336/EEC (electromagnetic compatability).

Testing was conducted during the period May 1997 to October 1997.

1.2 Purpose Testing was performed to evaluate safety, emissions, and immunity, conformance to enable CE marking.

1.3 Conclusions The Cutting Edge Omnia audio processor was found to be compliant and CE marking was applied to the product.

CE Mark Conformance, contd.

Conformity is declared to the standards: EN50081-1, EN50082-1.

2.0 HF Radiated Emissions

2.1 Standards Applied The unit was laboratory evaluated according to standard: EN50081-1 using Measurement Document: EN55022, Class B.

2.2 Testing The unit was tested and evaluated by: Smith Electronics *

2.3 Test Results The unit was found to be in conformance for both radiated and line-conducted emissions.

3.0 Immunity

3.1 Standards Applied

> 3.1.1 ESD Susceptibility Measurement Document: IEC 1000-4-2 (IEC 801-2). Immunity to static electricity.

> 3.1.2 Radiated Susceptibility – HF Electric Field Measurement Document: IEC1000-4-3 (IEC 801-3).

> 3.1.3 Conducted Susceptibility – Power Line Measurement Documents: Burst/Transients: IEC1000-4-4 (IEC 801-4) Surge: IEC1000-4-5 (IEC 801-5) Voltage fluctuations: IEC1000-4-1 (IEC 801-1)

3.2 Testing

> **3.2.1 ESD Immunity** The unit was tested and evaluated by: Smith Electronics *

> **3.2.2 Radiated Immunity – RF Electric Field** The unit was tested and evaluated by: Smith Electronics *

> **3.2.3 Conducted Immunity – Power Line** Testing to IEC801-4 was conducted by: Smith Electronics *

> * Smith Electronics
> 8200 Snowville Rd.
> Cleveland, OH 44141 (USA)

CE

CE Conformance

This device complies with the requirements of EEC Council Directives: 93/68/EEC (CE marking); 73/23/EEC (safety-low voltage directive); 89/336/EEC (electromagnetic compatibility).

Conformity is declared to the following standards: EN50081-1, EN50082-1.

Lithium Battery Caution: Danger of explosion if the lithium battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Use of Shielded Cables

In order to conform to the CE requirements for HF radiation, shielded cables should be used for the audio and data connections. For audio connections, the cable shield should be connected to the XLR shell.

APPENDIX B

W orksheets for each model Omnia are found in this Appendix. They are designed to be used as master sheets for photocopying. Each has space for each parameter's settings to be recorded.

Preset Name:		Station:		By:	
				Date:	

EXPERT EDITING MODE

WIDEBAND AGC

Phase Rotator	
Wideband AGC	
AGC Drive	
Attack	
Release	
Make-Up Gain	
Gate Thresh	

BASS

Deep Bass	
Phat Bass	

WARMTH

Warm Bass	

CROSSOVER

Low Gain	
Mid Gain	
Pres Gain	
Hi Gain	

OMNIA SYSTEM SETTINGS

INPUT & OUTPUT

Analog Gain	
Input Left	
Input Right	
Input Phase	
Output left	
Output Right	
Headphones	
Input Source	
Preemphasis	
Deemphasis	
Mono Mode	

STEREO GENERATOR

SCA Level	
Composite 1	
Composite 2	
Pilot Level	
Phase Adjust	
Separation	

AGC	LO BAND	MID BAND	PRES BAND	HIGH BAND
Attack				
Release				
Make-Up Gain				
Gate Thresh				
RTP Speed				
RTP Level				

LIMITER	LOW BAND	MID BAND	PRES BAND	HIGH BAND
Drive				
Limit Thresh				
Attack				
Release				
Hold Thresh				

MIXER	LOW BAND	MID BAND	PRES BAND	HI BAND
Level				

CLIPPER

Drive	
P.A.C.	

COMPOSITE CLIPPER

Drive	

NORMAL EDITING MODE

Thunder	
Sizzle	
Thrust	

Omnia.fm User Preset Parameters Worksheet

B-2

Preset Name:	Station:	By:
		Date:

EXPERT EDITING MODE

WIDEBAND AGC

Phase Rotator	
Wideband AGC	
AGC Drive	
Attack	
Release	
Make-Up Gain	
Gate Thresh	

BASS

Deep Bass	
Phat Bass	

WARMTH

Warm Bass	

CROSSOVER

Lo Gain	
Mid Gain	
Hi Gain	

OMNIA SYSTEM SETTINGS

INPUT & OUTPUT

Analog Gain	
Input Left	
Input Right	
Input Phase	
Output left	
Output Right	
Headphones	
Input Source	
Preemphasis	
Deemphasis	
Mono Mode	

STEREO GENERATOR

SCA Level	
Composite 1	
Composite 2	
Pilot Level	
Phase Adjust	
Separation	

LIMITER	LOW	MID	HIGH
Limit Thresh			
Attack			
Release			
Hold Thresh			

MIXER	LOW	MID	HI
Level			

CLIP

Drive	
P.A.C.	

COMP

Drive	

NORMAL EDITING MODE

Thunder	
Sizzle	
Thrust	

Omnia.fm.jr User Preset Parameters Worksheet

Preset Name:	Station:	By:
		Date:

EXPERT EDITING MODE

WIDEBAND AGC

Phase Rotator	
Wideband AGC	
AGC Drive	
Attack	
Release	
Make-Up Gain	
Gate Thresh	

BASS

Deep Bass	
Warm Bass	
Phat Bass	

CROSSOVER

Low Gain	
Mid Gain	
Pres Gain	
Hi Gain	
HF Eq	

OMNIA SYSTEM SETTINGS

INPUT & OUTPUT

Analog Gain	
Input Left	
Input Right	
Input Phase	
Output left	
Output Right	
Headphones	
Input Source	
Mono Mode	
Asym Mod	
Tilt EQ	
Tilt Freq	
LP Filter	

LIMITER	LOW BAND	MID BAND	PRES BAND	HIGH BAND
Limit Thresh				
Attack				
Release				

MIXER	LOW BAND	MID BAND	PRES BAND	HI BAND
Level				

CLIPPER	
Drive	

NORMAL EDITING MODE

Thunder	
Sizzle	
Thrust	

Omnia.am User Preset Parameters Worksheet

Preset Name:		Station:	By:
			Date:

EXPERT EDITING MODE

WIDEBAND AGC

Phase Rotator	
Wideband AGC	
AGC Drive	
Attack	
Release	
Make-Up Gain	
Gate Thresh	

BASS

Deep Bass	
Phat Bass	

WARMTH

Warm Bass	

CROSSOVER

Low Gain	
Mid Gain	
Pres Gain	
Hi Gain	

OMNIA SYSTEM SETTINGS

INPUT & OUTPUT

Analog Gain	
Input Left	
Input Right	
Input Phase	
Output left	
Output Right	
Headphones	
Input Source	
Mono Mode	

AGC	LO BAND	MID BAND	PRES BAND	HIGH BAND
Attack				
Release				
Make-Up Gain				
Gate Thresh				
RTP Speed				
RTP Level				

LIMITER	LOW BAND	MID BAND	PRES BAND	HIGH BAND
Drive				
Limit Thresh				
Attack				
Release				
Hold Thresh				

MIXER	LOW BAND	MID BAND	PRES BAND	HI BAND
Level				

CLIPPER

Drive	
P.A.C.	

NORMAL EDITING MODE

Thunder	
Sizzle	
Thrust	

Omnia.dab User Preset Parameters Worksheet

Preset Name:		Station:		By:	
				Date:	

EXPERT EDITING MODE

WIDEBAND AGC

Phase Rotator	
Wideband AGC	
AGC Drive	
Attack	
Release	
Make-Up Gain	
Gate Thresh	

BASS

Deep Bass	
Phat Bass	

WARMTH

Warm Bass	

CROSSOVER

Low Drive	
Mid Drive	
Hi Drive	

OMNIA SYSTEM SETTINGS

INPUT & OUTPUT

Analog Gain	
Input Left	
Input Right	
Input Phase	
Output left	
Output Right	
Headphones	
Input Source	
Mono Mode	

NORMAL EDITING MODE

Thunder	
Sizzle	
Thrust	

LIMITER	LOW BAND	MID BAND	HIGH BAND
Limit Thresh			
Attack			
Release			

MIXER	LOW BAND	MID BAND	HI BAND
Level			

Omnia.net User Preset Parameters Worksheet

Preset Name:		Station:	By:
			Date:

EXPERT EDITING MODE

WIDEBAND AGC

Phase Rotator	
Wideband AGC	
AGC Drive	
Attack	
Release	
Make-Up Gain	
Gate Thresh	

BASS

Deep Bass	
Phat Bass	

WARMTH

Warm Bass	

CROSSOVER

Low Gain	
Mid Gain	
Pres Gain	
Hi Gain	

OMNIA SYSTEM SETTINGS

INPUT & OUTPUT

Analog Gain	
Input Left	
Input Right	
Input Phase	
Output left	
Output Right	
Headphones	
Input Source	
Preemphasis	
Deemphasis	
Mono Mode	

STEREO GENERATOR

SCA Level	
Composite 1	
Composite 2	
Pilot Level	
Phase Adjust	
Separation	
Meta	

AGC

	LO BAND	MID BAND	PRES BAND	HIGH BAND
Attack				
Release				
Make-Up Gain				
Gate Thresh				
RTP Speed				
RTP Level				

LIMIT

	LOW BAND	MID BAND	PRES BAND	HIGH BAND
Drive				
Limit Thresh				
Attack				
Release				
Hold Thresh				

MIXER

	LOW BAND	MID BAND	PRES BAND	HI BAND
Level				

CLIP

Drive	
P.A.C.	

COMP

Drive	

NORMAL EDITING MODE

Thunder	
Sizzle	
Thrust	

Omnia.fm.hot User Preset Parameters Worksheet

Preset Name:		Station:		By:
				Date:

EXPERT EDITING MODE

WIDEBAND AGC

Phase Rotator	
Wideband AGC	
AGC Drive	
Attack	
Release	
Make-Up Gain	
Gate Thresh	
Space FX	
SpaceFXBass	

BASS

Deep Bass	
Phat Bass	

WARMTH

Warm Bass	

CROSSOVER

Low Gain	
Mid Gain	
Pres Gain	
Hi Gain	

OMNIA SYSTEM SETTINGS

INPUT & OUTPUT

Analog Gain	
Input Left	
Input Right	
Input Phase	
Output left	
Output Right	
Headphones	
Input Source	
Preemphasis	
Deemphasis	
Mono Mode	

STEREO GENERATOR

SCA Level	
Composite 1	
Composite 2	
Pilot Level	
Phase Adjust	
Separation	

AGC	LO BAND	MID BAND	PRES BAND	HIGH BAND
Attack				
Release				
Make-Up Gain				
Gate Thresh				
RTP Speed				
RTP Level				

LIMITER	LOW BAND	MID BAND	PRES BAND	HIGH BAND
Drive				
Limit Thresh				
Attack				
Release				
Hold Thresh				

MIXER

Low Band	
Mid Band	
Pres Band	
Hi Band	

CLIP

Drive	
P.A.C.	

COMP

Drive	

Omnia.fm.sp User Preset Parameters Worksheet

Preset Name:		Station:	By:	
			Date:	

EXPERT EDITING MODE	
WIDEBAND AGC	
Phase Rotator	
Wideband AGC	
AGC Drive	
Attack	
Release	
Make-Up Gain	
Gate Thresh	
Space FX	
SpaceFXBass	

BASS	
Deep Bass	
Phat Bass	

WARMTH	
Warm Bass	

CROSSOVER	
Low Gain	
Mid Gain	
Pres Gain	
Hi Gain	

OMNIA SYSTEM SETTINGS	
INPUT & OUTPUT	
Analog Gain	
Input Left	
Input Right	
Input Phase	
Output left	
Output Right	
Headphones	
Input Source	
Preemphasis	
Deemphasis	
Mono Mode	

STEREO GENERATOR	
SCA Level	
Composite 1	
Composite 2	
Pilot Level	
Phase Adjust	
Separation	

AGC	LO BAND	MID BAND	PRES BAND	HIGH BAND
Attack				
Release				
Make-Up Gain				
Gate Thresh				
RTP Speed				
RTP Level				

LIMITER	LOW BAND	MID BAND	PRES BAND	HIGH BAND
Drive				
Limit Thresh				
Main Attack				
Main Release				

MIXER	
Low Band	
Mid Band	
Pres Band	
Hi Band	

CLIP	
Drive	
P.A.C.	

COMP	
Drive	

Omnia.fm.hsp User Preset Parameters Worksheet

Preset Name:		Station:		By:	
				Date:	

EXPERT EDITING MODE

WIDEBAND AGC

Phase Rotator	
Wideband AGC	
AGC Drive	
Attack	
Release	
AGC Thresh	
AGC Ratio	
Platform Lev	
Make-Up Gain	
Gate Thresh	

CROSSOVER

Deep Bass	
Warm Bass	
Phat Bass	
Low Gain	
Mid Gain	
Pres Gain	
Hi Gain	

OMNIA SYSTEM SETTINGS

INPUT & OUTPUT

Analog Gain	
Input Left	
Input Right	
Input Phase	
Output left	
Output Right	
Headphones	
Input Source	
Preemphasis	
Deemphasis	
Mono Mode	

STEREO GENERATOR

SCA Level	
Composite 1	
Composite 2	
Pilot Level	
Phase Adjust	
Separation	

AGC	LO BAND	MID BAND	PRES BAND	HIGH BAND
Attack				
Release				
Make-Up Gain				
Gate Thresh				
RTP Speed				
RTP Level				

LIMITER	LOW BAND	MID BAND	PRES BAND	HIGH BAND
Drive				
Attack				
Release				
Smooth				
Limit Thresh				
Ratio				

MIXER

Low Band	
Mid Band	
Pres Band	
Hi Band	

COMP

Drive	

FINAL LIMIT

Drive	
Attack	
Release	
Smooth	
Limit Thresh	
Ratio	

Omnia.fm.veris User Preset Parameters Worksheet

Preset Name:		Station:	By:
			Date:

EXPERT EDITING MODE

WIDEBAND AGC

Phase Rotator	
Wideband AGC	
AGC Drive	
Attack	
Release	
AGC Thresh	
AGC Ratio	
Platform Lev	
Make-Up Gain	
Gate Thresh	
Space FX	
SpaceFXBass	

CROSSOVER

Deep Bass	
Warm Bass	
Phat Bass	
Low Gain	
Mid Gain	
Pres Gain	
Hi Gain	

OMNIA SYSTEM SETTINGS

INPUT & OUTPUT

Analog Gain	
Input Left	
Input Right	
Input Phase	
Output left	
Output Right	
Headphones	
Input Source	
Preemphasis	
Deemphasis	
Mono Mode	

STEREO GENERATOR

SCA Level	
Composite 1	
Composite 2	
Pilot Level	
Phase Adjust	
Separation	

AGC	LO BAND	MID BAND	PRES BAND	HIGH BAND
Attack				
Release				
Make-Up Gain				
Gate Thresh				
RTP Speed				
RTP Level				

LIMITER	LOW BAND	MID BAND	PRES BAND	HIGH BAND
Drive				
Attack				
Release				
Smooth				
Limit Thresh				
Ratio				

MIXER

Low Band	
Mid Band	
Pres Band	
Hi Band	

COMP

Drive	

FINAL LIMIT

Drive	
Attack	
Release	
Smooth	
Limit Thresh	
Ratio	

Omnia.fm.vsp User Preset Parameters Worksheet

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A P P E N D I X   C

Omnia.fm.HOT Software Module

T
he Omnia.fm.HOT software was born in the signal-processing battlefield of New York City. It uses the familiar Omnia user interface but requires an additional DSP card to handle the added software functions. Its unique topology, combined with complex limiter algorithms and optimized FM pre-emphasis control, squeeze every last bit of loudness out of your signal without creating unpleasant artifacts and distortions normally encountered by aggressive processing. The end result is really clean, truly loud and very listener-attractive. But the Omnia.fm.HOT is not just for loudness. All formats can benefit from its innovations.

The Omnia.fm.HOT accessory kit for the Omnia.fm processor consists of:

✓ **Omnia.fm.HOT PC Card** (holding the DSP Software)

✓ **DSP Board** (to add additional digital processing abilities)

✓ **Floppy Disk** (with the latest version of the Remote Control Software)

✓ **These instructions** (included in the back of your Omnia.fm manual as Appendix D)

Pre-Installation

To simplify setting parameters after installing the Omnia.fm.HOT software module, be sure to record all of your current settings on a Parameters Worksheet before starting the upgrade. If you daypart, be sure to record each daypart's settings on separate Worksheets. Because the DSP code included with Omnia.fm.HOT adds new algorithms using different parameters, you must re-enter your current parameters using either a new Omnia.fm.HOT preset or one of the existing Omnia.fm or Omnia.fm.jr presets as a starting point. See the note in the Selecting Presets section about using the Omnia.fm and Omnia.fm.jr presets with Omnia.fm.HOT.

Installation

Use care when handling the PC Card and the DSP board. Take appropriate measures to avoid product damage due to static discharge.

1. Take the Omnia out of service and place it on an antistatic work surface, unconnected to AC power.

2. Remove the top cover (held in place by nine #1 Phillips screws).

3. Remove the DSP subpanel screws and move the subpanel to access the empty DSP slot at the front of the motherboard. Refer to the illustration on the following page.

   The subpanel holds the DSP boards in place

REMOVE NINE SCREWS
TO REMOVE COVER
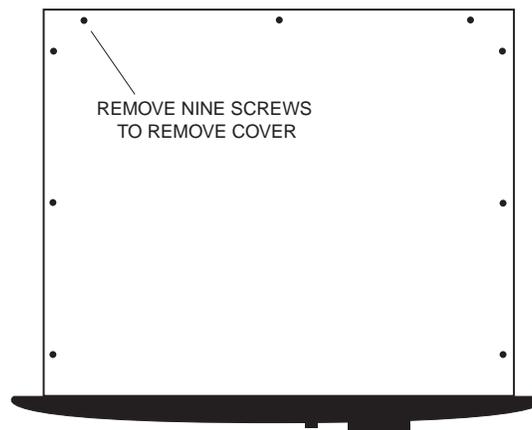
Top Cover Removal

using card guides on its bottom surface. It extends across the Omnia chassis three inches behind the front panel. Six #1 Phillips screws secure the subpanel to standoffs through the Main PC board. Four additional #1 Phillips screws fasten the subpanel to the chassis (from the outside). Do not remove the four screws holding the card guides to the subpanel.

Once the subpanel screws are removed, lift up the subpanel about ¼ inch and move it toward the rear of the chassis about two inches to access the front DSP board slot.

4. Carefully remove the DSP board from its antistatic packaging. Handle it by the edges to reduce the chance of static discharge damage. With the component side toward the Omnia's front panel, plug the DSP board into the two connectors in front of the other DSP boards. The board's top surface will line up with the other DSP boards when it is properly seated in the connectors.

5. Reinstall the subpanel (ten screws).

Move the subpanel back into position over the DSP boards. Set it down onto the standoffs using a slight rocking motion to ensure the DSP boards go into the card guide slots. When the DSP boards are in the card guides, the subpanel will sit squarely on top of the six standoffs. Reinstall the subpanel screws.

6. Replace the top cover (nine screws).

7. Remove the current PC Card from the top slot on the rear of the Omnia by pushing in the release button. Retain the PC Card for possible future use.

Internal View, with Subpanel Moved to Reveal Empty DSP Board Slot

PC Card & Modem PCMCIA Slots on Rear Panel

8. Install the Omnia.fm.HOT PC Card into the top slot. The release button pops out when it is properly seated.

9. Plug in AC power. Turn on the Omnia to verify that the unit starts normally.

10. Return the Omnia to its rack location. Select one of the Omnia.fm.HOT factory presets before returning it to service. Refer to Chapter 2 Operation, if you are not familiar with how to load a preset.
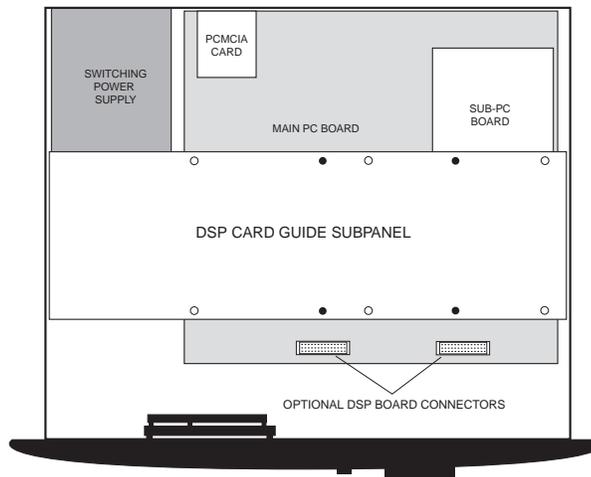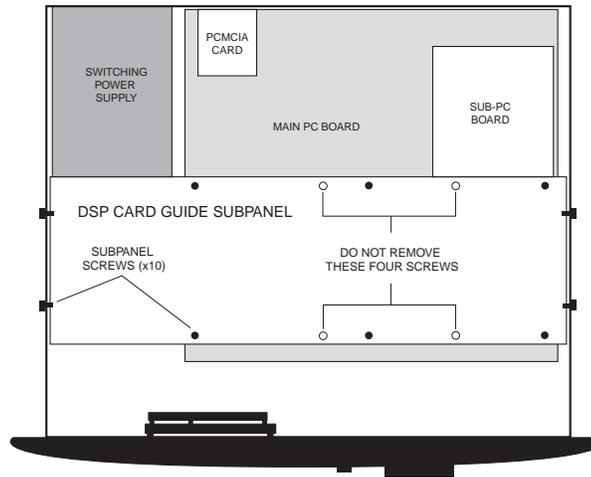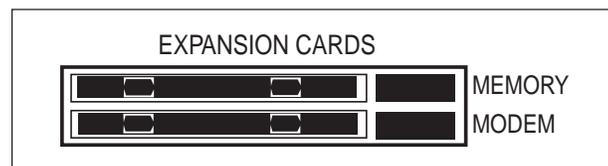
Omnia.fm.HOT Presets

Omnia.fm.HOT adds four additional levels of presets over those available in the Omnia.fm and Omnia.fm.jr: MEDIUM, LARGE, X-LARGE and THERMO. In addition, the Medium, Large and X-Large have two variances: COOL and HOT. Each level and variance was designed with a specific processing character and market condition in mind.

❖ MEDIUM (M HOT & M COOL) has a natural sound that's best suited for markets where processing is not too aggressive. It's also suitable in aggressive markets where an extremely open sound is desired.

❖ LARGE (L HOT & L COOL) is a more standard level of processing. Consistency, punch, openness and brightness are its main characteristics.

❖ X-LARGE (XL HOT & XL COOL) produces a loud "in your face" sound, yet it is extremely detailed. Definitely, a major market sound.

❖ THERMO…Use at your own risk!

Note: Both of the original preset groups, Omnia.fm and Omnia.fm.jr, are still available on the Omnia.fm.HOT PC Card.

Using the Omnia.fm.HOT Presets

Use the following guidelines to choose an appropriate preset based on your station's format (even though we firmly feel that processing is more market dependent than anything else). These presets are starting points since your specific needs may fall outside of these suggestions.

❖ **Light AC, Jazz, Country** – M COOL, M HOT, L COOL

❖ **AC, Urban AC, Smooth Jazz** – L COOL, L HOT

❖ **Hot AC, Rock, Urban** – L HOT, XL COOL, XL HOT

❖ **CHR, Urban Rap, Urban Hip Hop** – XL COOL, XL HOT, THERMO

Selecting Presets

Loading presets is covered in the Omnia manual, Chapter 2, Operation. You'll find that this new software still includes the original Omnia.fm and Omnia.fm.jr preset groups in addition to the new Omnia.fm.HOT group.

Caution! Changing to a new preset from another preset group (i.e., with an Omnia.fm preset being used an Omnia.fm.HOT preset is selected) will dim program audio for approximately 5 seconds as new DSP instructions are loaded. However, once any Omnia.fm.HOT preset is loaded, subsequent changes to other Omnia.fm.HOT presets will be instantaneous. This is also the case when switching within the Omnia.fm preset group or when switching within the Omnia.fm.jr preset group.

Editing the .HOT presets

Chapter 8, Editing Presets, provides an excellent description of how to customize the sound of the Omnia.fm by editing the preset parameters and saving them as a User preset. We suggest you thoroughly familiarize yourself with that section before proceeding. In Expert Editing mode you'll notice three new parameters in the Bass and Warmth menus: Deep Bass, Phat Bass and Warm Bass. These are covered in detail on the next page.

Brightness

One of the best features of the Omnia.fm.HOT software module is its ability to achieve greater levels of brightness. Each Omnia.fm.HOT preset is brighter than any other processor. To reduce brightness, turn down the Mixer High and/or Pres levels in 0.5 dB steps, reduce the High band X-Over level, or reduce the High and/or Pres band Limiter Drives. Turning up the High and Pres band Limiter Drives from the levels provided in the presets will increase the brightness, but care should be taken, particularly when adjusting parameters in the presence band.

Bass and Warmth

The Omnia.fm.HOT software produces incredibly punchy bass through the Deep Bass, Phat Bass and Warm Bass parameters. The Deep Bass and Phat Bass parameters are found under the Bass menu. To increase the bass, start by increasing the Deep Bass parameter. This is the parameter formerly known as Bass Boost. Deep Bass is a shelf boost at 90 Hz that utilizes a phase linear 12 dB/octave slope to produce the shelving EQ function. The adjustments are in 1 dB steps over a 12 dB range. Care should be taken when increasing the Deep Bass as it may decrease the overall loudness by causing excessive gain reduction in the mid band.

Phat Bass is a unique enhancement that adds filtered harmonics to the bass frequencies. Low frequency texture is emphasized with this parameter. Older materials sound fuller (or phatter) with the added illusion of loudness. When adding Phat Bass, we recommend that Deep Bass be cut by a few dB. Too much of these two functions can cause the bass to sound "overdone." Another method of increasing bass response is to increase Low band Limiter Drive.

The Warm Bass parameter is found under the Warmth menu. Warm Bass replaces the Warmth Boost parameter. It is a shelf boost that functions up to 150 Hz. Adjusting Warm Bass compensates for program material that is naturally lacking in upper-bass punch. The parameter is adjustable in 1 dB steps over a 6 dB range.

Loudness

By far the best method to achieve increased loudness with Omnia.fm.HOT is to go to the next higher preset. Should you wish to attempt to increase loudness without changing the preset, we suggest that you turn up the Limiter Drives, increase the Make-Up gains and/or speed up the Release Times in the AGC section, or lastly, turn up the Clipper and/or Composite Clipper Drive levels. Make each of these adjustments one at a time and listen in between adjustments. If excessive clipping exists after increasing loudness, then adjust the individual Limiter Thresholds to compensate.

Sonic Texture

To increase the density of any preset, speed up the individual Limiter Attack and/or Release Times or speed up the AGC Attack and/or Release Times.

To increase the openness of any preset, slow down the individual Limiter Attack and/or Release Times or slow down the AGC Attack and/or Release Times.

APPENDIX D

Omnia.fm.Veris Software Module

The Omnia.fm.Veris software is designed for critical formats such as Classical and Smooth Jazz. It uses the familiar Omnia.fm user interface but requires an additional DSP card to handle the added software functions. Its unique topology, developed in a joint collaboration with Swedish Radio of Stockholm, Sweden, creates the first truly hi-fi FM on-air processor. The emphasis is on preserving the natural tonal quality of the audio signal while improving the overall sonic appearance of the on-air audio. What the listener perceives is added loudness without all of the aural penalties that are normally associated with processing for larger dial presence.

The Omnia.fm.Veris update kit for the Omnia.fm processor consists of:

✔ **PC Card** (holding the DSP software)

✔ **DSP Board** (to add additional digital processing abilities)

✔ **Floppy Disk** (with the latest version of the Remote Control Software)

✔ **These instructions** (place at the back of your Omnia.fm manual as Appendix E).

Pre-Installation

To simplify parameter setup after installing the Omnia.fm.Veris software module, be sure to record all of your current settings on a Parameters Worksheet before starting the upgrade. If you daypart, be sure to record each daypart's settings on a separate Worksheet. Because the DSP code included with Omnia.fm.Veris adds new algorithms using different parameters, you must re-enter your current parameters using either a new Omnia.fm.Veris preset or one of the existing Omnia.fm or Omnia.fm.jr presets as a starting point. See the note in the section on Selecting Presets about using the Omnia.fm and Omnia.fm.jr presets with Omnia.fm.Veris.

Installation

Use care when handling the card and the board. Take appropriate measures to avoid product damage due to static discharge.

1. Take the Omnia out of service and place it on a work surface, unconnected to AC power.

2. Remove the top cover (held in place by nine #1 Phillips screws).

3. Remove the DSP subpanel screws and move the subpanel to access the empty DSP slot at the front of the motherboard per the illustration on the next page.

REMOVE NINE SCREWS
TO REMOVE COVER
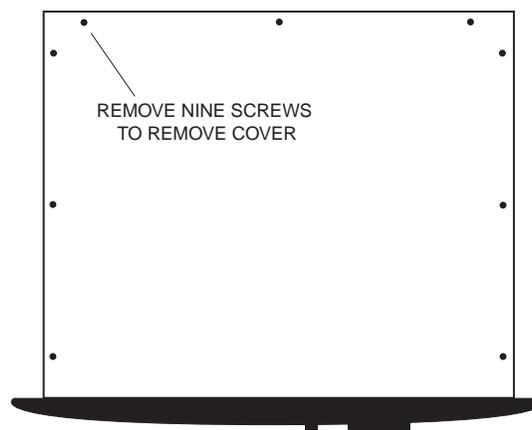
Top Cover Removal

The subpanel securely holds the DSP boards in place using card guides on its bottom surface. It extends across the Omnia chassis a few inches behind the front panel. Six #1 Phillips screws secure this subpanel to standoffs with four #1 Phillips screws fastening it to the chassis (from the outside). Do not remove the four screws holding the card guides to the subpanel.

Once the subpanel screws are removed, lift up the subpanel about ¼ inch and slide it toward the rear of the chassis about one inch in order to reveal the front DSP board slot.

4. Carefully remove the DSP board from its antistatic packaging. Handle it by the edges to reduce the chance of static discharge damage. With the component side toward the Omnia's front panel, plug the DSP board into the two edge connectors in front of the other DSP boards. The board's top surface will line up with the other DSP boards when its two connectors are properly seated.

5. Reinstall the subpanel (ten screws). Slide the subpanel back into position over the DSP boards. Set the subpanel down onto the standoffs using a slight forward/back motion to ensure the DSP boards go into the card guides. When the DSP boards are in the card guides the subpanel will sit squarely on top of the six standoffs. Reinstall the subpanel screws.

6. Replace the top cover (nine screws).

7. Remove the existing PCMCIA memory card from the top slot on the rear of the Omnia by pushing in the release button. Retain the PC Card for possible future use.

Internal View, with Subpanel Moved to Reveal Empty DSP Board Slot

PC Card & Modem PCMCIA Slots on Rear Panel

8. Install the Omnia.fm.Veris PC Card into the top slot. The release button pops out when it is properly seated.

9. Plug in AC power. Turn on the Omnia to verify that the unit starts normally.

10. Return the Omnia to its rack location. Select one of the Omnia.fm.Veris factory presets before returning it to service. Refer to Chapter 2, Operation, if you are not familiar with how to load a preset.
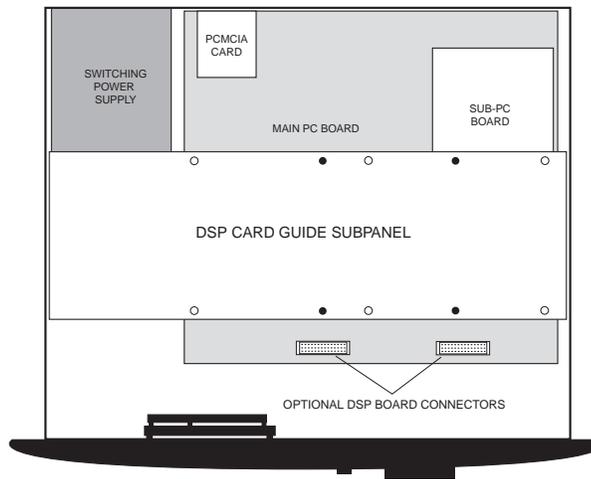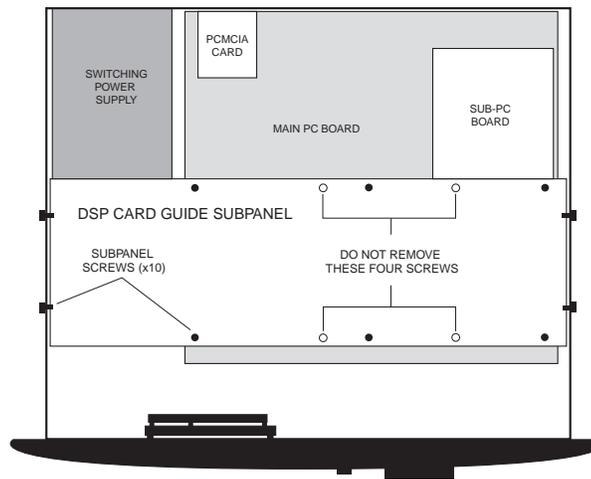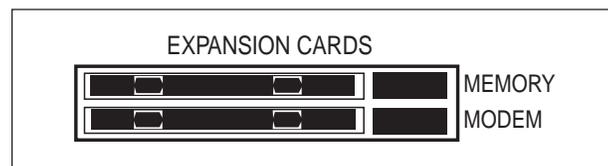
Omnia.fm.Veris Presets

Omnia.fm.Veris has four additional levels of presets over those found in the Omnia.fm: VERIS SLOW, VERIS MED, VERIS FAST and VERIS NOAGC. A different convention style was used to name these presets. Instead of using a radio format name, the Omnia.fm.Veris names are based upon the processing speed.

❖ **VERIS SLOW** provides maximum fidelity. It employs slower time constants in both the Multiband AGC and Multiband Limiter sections. This setting is recommended for Classical music formats.

❖ **VERIS MED** is a compromise between High Fidelity and Dial Presence. The time constants used are a bit faster in the Multiband AGC and Limiter sections. It is acceptable for Classical and Jazz music.

❖ **VERIS FAST** is used when more Dial Presence is desired. It utilizes faster time constants that create a signal with more density. Some Classical music can sound "processed" using this setting.

❖ **VERIS NOAGC** defeats the Multiband AGC sections leaving the Multiband Limiters to provide spectrally managed peak control. The spectral EQ balance provided by the Multiband AGC sections is eliminated in this preset. The Multiband Limiter time constant is conservatively set. This preset is useful whenever wide dynamics are desired, along with maintaining the EQ balance of the source program signal.

Note: The original Omnia.fm and Omnia.fm.jr, presets are still available on the Omnia.fm.Veris PC Card.

Using the Omnia.fm.Veris Presets

Use the following guidelines to choose an appropriate preset based on your station's format (even though we firmly feel that processing is more market dependent than anything else). These presets are starting points since your specific needs may fall outside of these suggestions.

❖ **Classical** – Veris Slow, Veris Med, Veris NoAGC

❖ **Smooth Jazz** – Veris Slow, Veris Med, Veris NoAGC

❖ **Jazz**–Veris Med, Veris Fast

Selecting Presets

Loading presets is covered in Chapter 2, Operation, in the Omnia manual. You'll find that this new software includes the original Omnia.fm and Omnia.fm.jr preset groups in addition to the new Omnia.fm.Veris group.

Caution! Changing to a new preset from another preset group (i.e., with an Omnia.fm preset being used an Omnia.fm.Veris preset is selected) will dim program audio for approximately 5 seconds as new DSP instructions are loaded. However, once any Omnia.fm.Veris preset is loaded, subsequent changes to other Omnia.fm.Veris presets will be instantaneous. This is also the case when switching within the Omnia.fm preset group or when switching within the Omnia.fm.jr preset group.

Fine Tuning

Chapter 8, Editing Presets, provides an excellent description of how to customize the sound of the Omnia.fm by editing the preset parameters and saving them as a User preset. We suggest you thoroughly familiarize yourself with that section before proceeding. In Expert Editing mode you'll notice three new parameters in the Bass and Warmth menus: Deep Bass, Phat Bass and Warm Bass. These are covered on the next page.

Brightness

One of the greatest features of the Veris software module is its ability to achieve greater levels of brightness. Each Veris preset is brighter than any other processor. To reduce brightness; turn down the Mixer High and/or Pres levels in 0.5 dB steps, reduce the high band X-Over level, or reduce the High and/or Pres band Limiter Drives. Turning up the High and Pres band Limiter Drives from the levels provided in the presets will increase the brightness, but care should be taken, especially when adjusting parameters in the presence band.

Bass and Warmth

The Omnia.fm.Veris software produces incredibly punchy bass through the Deep Bass, Phat Bass and Warm Bass parameters. The Deep Bass and Phat Bass parameters are found under the Bass menu. To increase the bass, start by increasing the Deep Bass parameter. This is the parameter formerly known as Bass Boost. Deep Bass is a shelf boost at 90 Hz that utilizes a phase linear 12 dB/octave slope to produce the shelving EQ function. The adjustments are in 1 dB steps over a 12 dB range. Care should be taken when increasing the Deep Bass as it may decrease the overall loudness by causing excessive gain reduction in the mid band.

Phat Bass is a unique enhancement that adds filtered harmonics to the bass frequencies. Low frequency texture is emphasized with this parameter. Older materials sound fuller (or phatter) with the added illusion of loudness. When adding Phat Bass, we recommend that Deep Bass be cut by a few dB. Too much of these two functions can cause the bass to sound "overdone." Another method of increasing bass response is to increase Low band Limiter Drive.

The Warm Bass parameter is found under the Warmth menu. Warm Bass replaces the Warmth Boost parameter. It is a shelf boost that functions up to 150 Hz. Adjusting Warm Bass compensates for program material that is naturally lacking in upper-bass punch. The parameter is adjustable in 1 dB steps over a 6 dB range.

Loudness

By far the best method to achieve increased loudness with Veris is to go to the next higher preset. Should you wish to attempt to increase loudness without changing the preset; turn up the Limiter Drives, increase the Make-Up gains and/or speed up the Release Times in the AGC section or, lastly, turn up the Clipper and/or Composite Clipper Drive levels. Make one adjustment then closely listen before making another adjustment. If excessive clipping exists after increasing the loudness, adjust the individual Limiter Thresholds to compensate.

Sonic Texture

To increase the density of any preset, speed up the individual Limiter Attack and/or Release Times or speed up the AGC Attack and/or Release Times.

To increase the openness of any preset, slow down the individual Limiter Attack and/or Release Times or slow down the AGC Attack and/or Release Times.

Veris Overview

Processing for Classical, Smooth Jazz and Jazz formats is usually considered to be an oxymoron. Why would *anyone **EVER*** consider applying signal processing to programming content that contains wide dynamic range, and an extreme high level of quality in performance and method of recording? Actually, because of new developments using DSP, processing can be employed for these formats with incredible results that improves the sonic quality of the FM Stereo transmission system. What is perceived is added loudness for this type of programming but without all of the aural penalties that are normally associated with processing for larger dial presence.

This is achieved by a totally new implementation of a transmission processor for broadcast. It does not revolve around the known designs that have been used for decades. This implementation does not use any form of hard limiter or clipper to provide precise peak control. While they are good for protecting against over-modulation, clippers are known to generate large amounts of Total Harmonic Distortion (THD) as they perform their peak truncation. Even for a short duration signal peak, the action of a clipper can be noticed when auditioned with high fidelity program content.

To reduce the side-effects of clipping, processors for Classical and Fine Arts programming must resort to reducing the amount of processing used to increase the amount of fidelity. By doing this, they also reduce the amount of dial-presence, which has negative affects to the listener. It has been mentioned by many Classical format broadcasters that while they require a high fidelity presentation, they also accept a caveat in the form of the programming becoming hard-to-hear at times due to road noise in a mobile environment. What they are seeking is a method that can provide high fidelity audio quality along with improved dial presence that reduces road noise for the mobile listener.

Processing For Mozart—Not Marilyn Manson

What sets Omnia.fm.Veris apart from conventional processing is the style of limiting system that is employed. In place of the aforementioned clipping function is a unique *Distributed Look-Ahead Limiter (DLAL)* which provides precise absolute peak control without the inherent harmonic distortion of a clipper. The look-ahead limiter is not new, it's been widely used by the British Broadcasting Corporation (BBC) for years, except not in this new configuration as designed by Cutting Edge and Swedish Radio.

Before detailing the *DLAL,* let's look at how a basic look-ahead limiter operates. In essence, the limiter has the ability to calculate the peak level of a signal over a specified period of time. While this is occurring, the audio is delayed by a like amount. Then as the control signal is applied to the audio gain function, the audio peak is reduced at the precise time that the control signal reaches maximum control level and the crest of the peak is reduced without truncation. This is how clipping is avoided.

As the illustration below shows, peak control is achieved without creating any harmonic distortion. If the audio level blocks were expanded to show detailed sinewaves, there would not be any peak truncation during the duration of limiting. Unfortunately there is no free lunch! A basic wideband simple look-ahead limiter will not create harmonic distortion, but it will generate Intermodulation Distortion (IMD). This type of distortion has a different type of sound to it, sort of a *busy* quality and can be as annoying as harmonic distortion (THD) especially with music.

LOOK-AHEAD LIMITER AUDIO INPUT LEVEL

A new larger amplitude enters the look-ahead window. By means of interpolation the control signal starts aiming at the lower gain value that is needed 2 ms later.

The final decreased gain value is reached exactly as the amplitude peak arrives.

The decreased gain value stays low another ms to prevent the gain from riding on close consecutive peaks.

LOOK-AHEAD LIMITER CONTROL SIGNAL

The normal release value takes over, returning the amplitude to normal.

-4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 MS

LOOK-AHEAD LIMITER AUDIO OUTPUT LEVEL

Simplified Look-Ahead Limiter Operation

Innovative Algorithm Design

The big difference between IMD and THD distortion is that THD is hard to eliminate and will contain out of spectrum components (Although those can be removed through precise filtering.). With IMD we know what will cause those products and how often. Therefore, a limiter can be designed to take advantage of look-ahead calculation time by adding ancillary control signals to monitor and remove IMD. Now music can be controlled in a precise manner without the audio quality suffering from the *busyness* of IMD.

Additionally, a limiter designed where the processing time constants; *attack* and *release*, are optimized in a manner that provides a transient *feel* to its operation, will sound very natural. To achieve this, the *attack* and *release* times must be set faster as frequency increases. In a look-ahead limiting system, this means each audio band requires a different processing delay.

$x(n)$ DEL 1 $x(n-D_1)$ $y(n)$

$g(n)$

$x_{peak}(n)$ -LT -LS $f(n)$

PEAK AT/RT $\log_2$ + 2^G SMOOTH
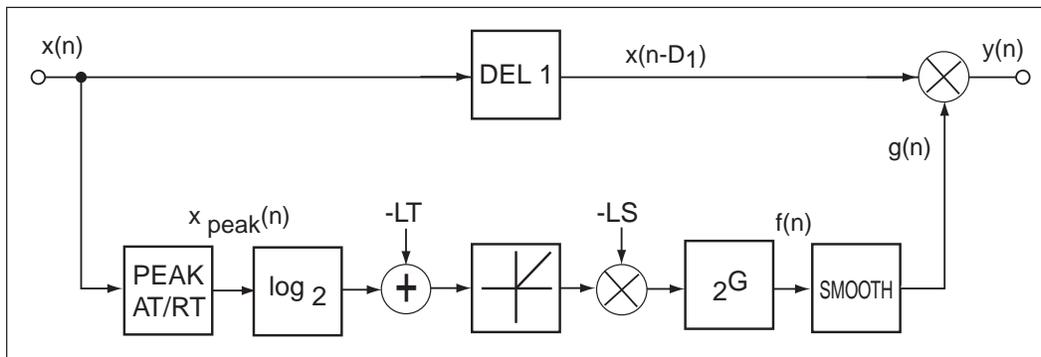
Look-Ahead Limiter Functional Block Diagram

D-6

Distributed Look-Ahead Limiter

It is vitally important that the audio signal remain time aligned, in order to maintain linear phase across the audio bandwidth. The *Distributed Look-Ahead Limiters* utilize matching delay functions so that at the point of recombination, all of the multiband limiters are delayed an equal amount, and phase linearity is maintained. This unique multiband architecture allows each band to be properly adjusted for precise limiting and natural sounding time constants. The total delay for the multiband section is set at 2.5 ms. By employing a multiband limiting system with program dependent IMD filters, IMD is further reduced.

After the multiband sections are recombined, a final look-ahead limiter is used to provide absolute peak control. Since the majority of peak limiting has been done in the multiband section, this final wideband limiter will not generate any audible processing artifacts. The final output signal will be controlled in an absolute fashion and possess a very low quotient of distortion component. Yielding High-Fidelity presentation for FM Stereo Transmission.

This processing method has the ability to sound cleaner than a conventional processor setup for Classical or Jazz music as it is not generating any harmonic distortion. In a side by side comparison, the conventional processor will sound softer as it must be operated liberally to avoid clipping. The *Distributed Look-Ahead Limiter* allows signal peaks to reach maximum modulation without audible distortion to generate a louder presentation, while maintaining superior fidelity.

Processing Topology

Omnia.fm.Veris differs from the stock configured Omnia.fm in the multiband limiter, preemphasis and final limiter sections. The multiband limiters employ the DLAL (Distributed Look Ahead Limiter) System. The Clipper section in the stock Omnia.fm is replaced with a final Look-Ahead Limiter. Preemphasis is employed just before the DLAL Network, as this eliminates the need of the Final Limiter having to operate broadband on an emphasized signal. This allows the DLAL to operate as a management system along the preemphasis curve. Following is the topology configuration:
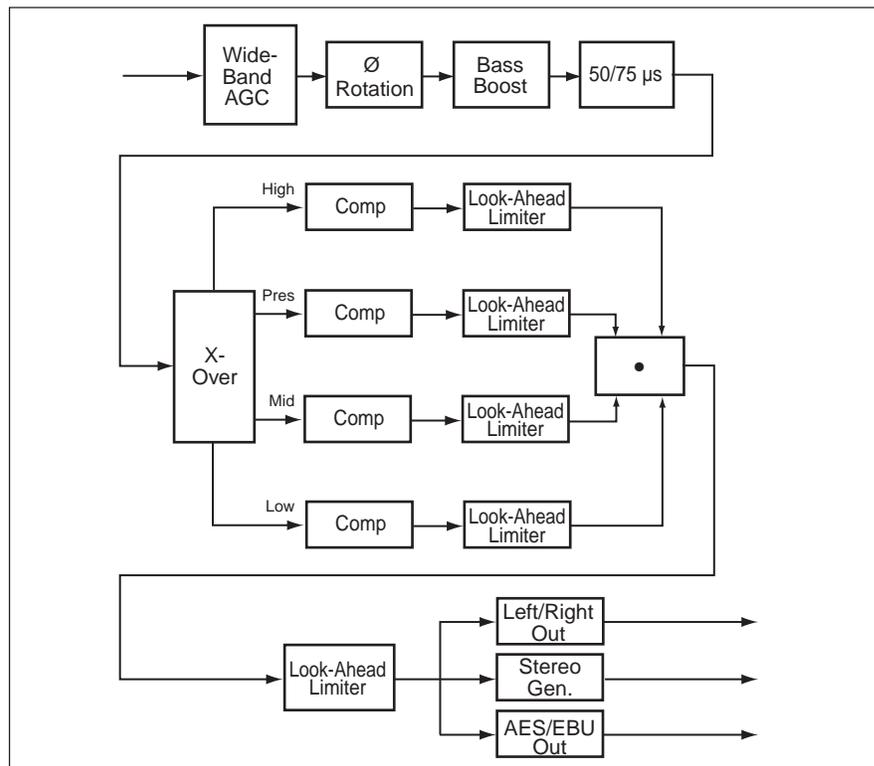
Omnia.fm.Veris Block Diagram

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A P P E N D I X   E

Space-EFX Software Module

Space-EFX is a DSP software module to enhance the stereo soundfield of a broadcast signal without causing unnatural imaging or exaggerated multipath. Program audio previously lacking in stereo width will have noticeably increased ambiance and dimension when Space-EFX is active. Vocals stay up-front and the sonic details of musical instruments are heard with an apparent slight loudness increase when listening in stereo.

Space-EFX constantly calculates the amount of stereo and monophonic information existing in the audio signal in order to determine how much enhancement to provide. In situations where the stereo signal is acceptable as-is, no enhancement is provided to prevent music or program content that already has a wide stereo image from having a "hole" put into the center of the sound stage. Refer to Stereo Enhancement Overview on page F-4 for a more detailed description of the Space-EFX DSP functions.

The Space-EFX accessory kit for the Omnia.fm, Omnia.fm.Veris or Omnia.fm.HOT processors consists of:

✓ **PC Card** (holding the DSP software)

✓ **DSP board** (to add additional digital processing abilities)

✓ **Floppy Disk** (with the latest version of the Remote Control Software)

✓ **These instructions** (place at the back of your Omnia.fm manual as Appendix F)

Pre-Installation

To simplify parameter setup after installing the Space-EFX software module, be sure to record all of your current settings on a Parameters Worksheet before starting the upgrade. If you daypart, be sure to record each daypart's settings on separate Worksheets. Although you can transfer existing saved presets from your current PC Card to the Space-EFX PC Card, it is better to reenter your current parameters and save them using a Space-EFX reset as a starting point. See the note in the Section on Selecting Presets for details.

Installation

Use care when handling the PC card and the DSP board. Take appropriate measures to avoid product damage due to static discharge.

1. Take the Omnia out of service and place it on an antistatic work surface, unconnected to AC power.

2. Remove the top cover (held in place by nine #1 Phillips screws).

3. Remove the DSP subpanel screws and move the subpanel to access the empty DSP slot at the front of

REMOVE NINE SCREWS TO REMOVE COVER

Top Cover Removal

E-1
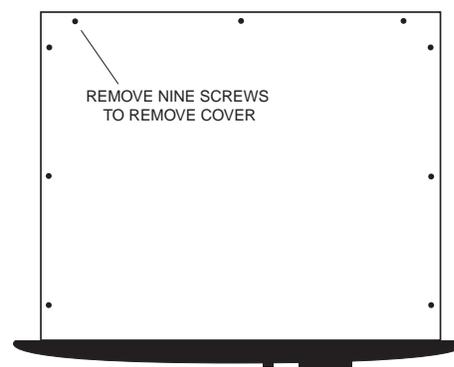
the motherboard per the illustration on the next page.

The subpanel securely holds the DSP boards in place using card guides on its bottom surface. It extends across the Omnia chassis three inches behind the front panel. Six #1 Phillips screws secure the subpanel to standoffs. Four additional #1 Phillips screws fasten it to the chassis (from the outside). Do not remove the four screws holding the card guides to the subpanel.

Once the subpanel screws are removed, lift up the subpanel about ¼ inch and move it toward the rear of the chassis about two inches to reveal the front DSP board slot.

4. Carefully remove the DSP board from its antistatic packaging. Handle it by the edges to reduce the chance of static discharge damage.

With the component side toward the Omnia's front panel, plug the DSP board into the two edge connectors in front of the other DSP boards. The board's top surface will line up with the other DSP boards when it is properly seated in the connectors.

5. Reinstall the subpanel (ten screws).

Move the subpanel back into position over the DSP boards. Set it down onto the standoffs using a slight rocking motion to ensure the DSP boards go into the card guide slots. When the DSP boards are in the card guides, the subpanel will sit squarely on top of the six standoffs. Reinstall the subpanel screws.

6. Replace the top cover (nine screws).

7. Remove your current PC Card from the top slot on the rear of the Omnia by pushing in the release button. Retain the PC Card for possible future use.

8. Install the Space-EFX PC Card into the top slot. The release button pops out when it is properly seated.

9. Plug in AC power. Turn on the Omnia to verify that the unit starts normally.

10. Return the Omnia to its rack location. Select one of the Space-EFX factory presets before returning it to service. Refer to Chapter 2, Operation, if you are not familiar with how to load a preset.
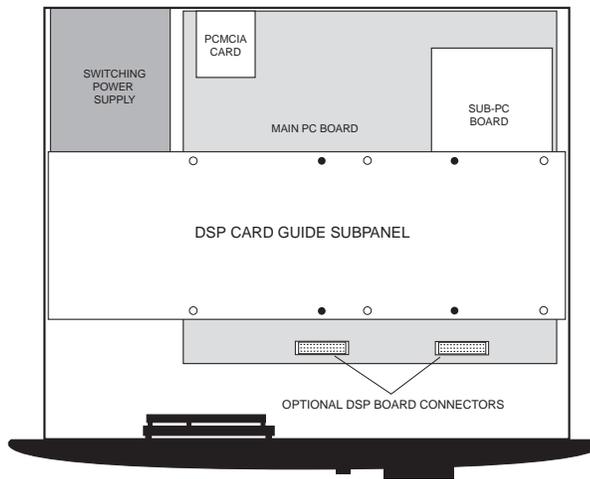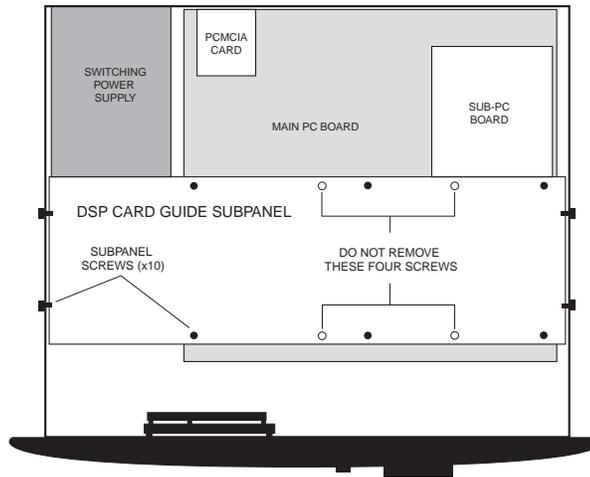
Internal View, with Subpanel Moved to Reveal Empty DSP Board Slot
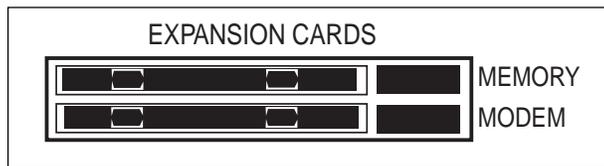
PC Card & Modem PCMCIA Slots on Rear Panel

Space-EFX Presets

The suffix "Space-EFX" is added to each of the standard Omnia presets. There are two adjustable parameters: Space-EFX and Bass EQ and an added bargraph indicator. The two adjustable parameters are located in the Wideband-AGC adjustment sub-menu (Audio Processing>Edit Parameters>Wideband AGC>Parameters).

❖ **SPACE-EFX** determines the maximum amount of spatial enhancement that may be added by the Space-EFX algorithm. For example, setting the Space-EFX value to "5" means the algorithm will only add up to that amount of enhancement when the algorithm deems it is actually necessary.

❖ **BASS EQ** applies a broad Bass boost to the L+R signal only. Adjustable in .5 dB steps up to 6 dB, Bass Boost compensates for the "thinner" sound that occurs when stereo enhancement is added to the stereo signal by maintaining the warmth in the mono signal.

❖ **A SPACE-EFX BARGRAPH** has been added to the Limiter screen to indicate the amount of enhancement activity by the algorithm. Even though this function is actually inserted earlier in the system, it is placed in the Limiter screen for space-saving reasons.

Note: All the standard Omnia.fm presets are still available on the Space-EFX PC Card.

Editing the Space-EFX Presets

Chapter 8, Editing presets, provides an excellent description of how to customize the sound of the Omnia.fm by editing the preset parameters and saving them as a User preset. We suggest you thoroughly familiarize yourself with that section before proceeding.

Before adjusting the Space-EFX parameters, make sure the main Omnia.fm processing is set up as it is normally operated. Your broadcast sound should be as it was before adding in the Space-EFX software module.

The system should be initially auditioned using light amounts of **Space-EFX**. An initial setting of 5 or 6 is recommended. Listen, over time, to a wide range of program material. The overall stereo soundfield will appear wider and be much more consistent sounding between sources—except, of course, when a mono source is present. If a mono signal sounds a bit thin, add about 3 dB of **Bass EQ** boost to restore warmth to the total sound of the system.

Selecting Presets

Loading presets is covered in detail in the Omnia manual, Chapter 2, Operation.

Caution! Changing from a standard Omnia.fm preset to an Space-EFX preset, or from an Space-EFX preset back to an Omnia.fm preset, will disrupt program audio for approximately 5 seconds as new DSP instructions must be loaded. However, once any Space-EFX preset is loaded, subsequent changes to other Space-EFX presets will not interrupt program audio.

Transferring Presets

Omnia users may wish to transfer existing User presets from their current PC Card to the Space-EFX PC Card once the Space-EFX is installed. To transfer User presets, follow this procedure:

To transfer your current User Presets:

1. Move to the UTILITY menu.

2. Pick PRESET > COPY SINGLE to copy one preset. Pick PRESET > COPY ALL to copy every User preset on a PC Card. You will be prompted to "Insert source card."

3. Remove the Space-EFX PC Card and insert your Omnia.fm PC Card. When ready, press the jog wheel (OK is displayed) .

4. When using COPY SINGLE, pick the preset to copy. When using COPY ALL go to step 5.

5. The prompt: "Insert card for writing <Preset name>" will appear. Remove the Omnia.fm card and insert the Space-EFX PC card.

6. After inserting the card, "Write" will display as each preset is copied to the new card.

7. Repeat steps 2 – 6 for additional single User preset copying.

8. When finished copying presets, the prompt: "Insert original card" will display. Click OK to select the current (Space-EFX) PC card.

You can now switch back and forth between your older Omnia.fm User presets and any new Space-EFX presets, with the caveat that doing so will cause a momentary interruption in program audio as stated in the Caution note in the Selecting Presets Section on page F-3.

Stereo Enhancement Overview

Enhancing a stereo broadcast signal typically involves some form of manipulation of the stereo imagine or "L-R" signal. Increasing the L-R level results in the stereo soundfield sounding audibly "wider." Stereo-produced music and commercials appear as if they have more "stereo" than before. While this effect can be pleasing to listen too, it must be carefully set, otherwise the relative amount of enhancement can vary noticeably from source to source due to the amount of stereo image signal that is present compared to the amount of mono, or center channel, signal.

Many stereo enhancement schemes operate almost solely on the stereo field image or L-R signal—whether as simple gain to the L-R signal, as AGC or as a Delayed L-R. The manipulation of the L-R signal is what brings upon the illusion of more stereo image depth than previously heard. What most ideas seem to forget is that adding emphasis to the L-R signal, without consideration to the L+R signal, can bring about several unwanted side-effects when it comes to broadcasting.

Unwanted 'Hole' In the Center Channel

Since the ratio of the L+R signal to the L-R signal can vary greatly from source to source, any enhancement that is set as a static addition to the L-R signal will lead to inconsistent stereo images and unnatural or unbalanced audio. For example, music with a centered vocalist with all ambient reverb in the stereo signal will sound overly "echoy" when L-R enhancement-only is added. This occurs because the L-R signal is manipulated (boosting the reverb) without any respect to the condition or amount of the L+R signal (in this case, the vocalist now drowning in reverb).

As a specific example, the song *Owner of A Lonely Heart* by YES has both a wide stereo field and a lot of effects that are added in stereo and/or out of phase. Adding additional enhancement to this song causes it to sound very unnatural, becoming overly "phazie" with what sounds like a hole punched right in the center of the stereo field.

To prevent too much ambiance, or a "hole" from forming in the middle of the sound stage, a stereo enhancement algorithm must have enough "smarts" to realize when the existing stereo image needs to remain intact with no alteration necessary.

Exaggerating Multipath

If the RMS level of the L-R signal is increased too much, multipath distortion will become exaggerated in weak signal areas. This occurs because the L-R energy that resides in the 23 kHz to 53 kHz stereo sub-channel becomes overly sensitive to the time delay reflections generated under multipath conditions. This transposes itself as added nonlinear distortion with stereophonic reception. Therefore, any stereo enhancement method for broadcasting must provide improvement to the stereo image with little or no additional L-R signal level.

The Answer… Sound Field Ratio

The Space-EFX DSP algorithm continuously calculates the ratio of the L-R information to the L+R information. A low ratio indicates there is a large amount of existing stereo signal present. A high ratio indicates there is little or no stereo information in the L-R signal. Thus, the higher the ratio the bigger the boost of the L-R signal to provide soundfield enhancement. With a low ratio there is little or no enhancement needed, hence none is added.

Of course, if the L-R signal is simply boosted, it will promote those signals and the audio will take on a hollow, thin or "echoy" sound. Thus, the relative level of the L+R signal must also be controlled so that enhancing the L-R information does not allow the reverb/ambiance to overpower the soundfield. Control of the L+R signal also prevents the unnatural "hole in the center channel" problem caused by spreading the soundstage by enhancing the L-R information. It also provides a reference for the image ratio and prevents any enhancement to left only and right only material. The means there is a more consistent stereo image from source to source. Plus there's not a negative effect to the L-R stereo modulation component that might cause aggravated multipath and material with a large stereo sound field does not become overexaggerated and unnatural sounding. With precise digital processing power, the Space-EFX algorithm is easily capable of performing the intricate calculations needed to generate a smooth and consistent sounding stereo sound field.

Algorithm Description

The Space-EFX algorithm is inserted between the Omnia's WideBand-AGC and the Bass EQ. The basis of the algorithm is a function known as the Sound Field Ratio (SFR). In simple terms, the SFR monitors the incoming audio as both a stereo signal (as the L-R component) and a mono signal (the L+R component). The instantaneous ratio of stereo to mono is calculated. The ratio dynamically changes from low to high depending upon the amount of stereo signal present.

The SFR determines the amount of increase that can be made to the stereo information by the enhancement signal. When a large stereo field is already present, the SFR signal tells the enhancement circuit to do nothing—leaving the stereo field as-is. While this occurs, switching Space-EFX IN or OUT of the circuit will not produce any audible difference in the amount of perceived stereo since it is not overexaggerating the stereo field and producing an unnatural effect or adding to potential multipath for FM broadcasting. Additionally, the SFR calculation is able to recognize whenever a left-only, or right-only signal is present. Under these conditions, Space-EFX is also defeated to insure no exaggeration to an existing wide stereo field.

Whenever manipulation of the L-R signal is performed, it is possible to cause the overall mix to sound a bit thinner as the increase in stereo image may take away from some of the low frequency bass response. The algorithm has a unique automatic Bass EQ designed into it so that any change in the L-R gain, will also add a subtle boost to the L+R Bass region. This maintains a solid rich texture to the overall spectrum.

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