

# Section 2

# Installation

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### **CAUTION**

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

## Installation of 2200

Allow about 2 hours for installation.

Installation consists of: (1) unpacking and inspecting the 2200, (2) optional resetting of jumpers for 2200 options (composite output impedance, input termination, input sensitivity), (3) checking the line voltage setting, fuses and power cord, (4) mounting the 2200 in a rack, (5) connecting inputs, outputs and power, (6) setting the GROUND LIFT switch, (7) and optional connecting of remote control leads.

When you have finished installing the 2200, proceed to “System Setup,” on page 2-16.

### 1. Unpack and inspect.

- A If you note obvious physical damage, contact the carrier immediately to make a damage claim. Packed with the 2200 are:

- 1 Operating Manual
- 1 Quick Setup Guide
- 1 Line Cord
- 2 ½A Replacement Fuses for “U” and “J” Versions
- 2 250mA Replacement Fuses for “E” Version
- 1 Orban green screwdriver (Xcelite R3323)
- 1 Booklet: *Audio Quality in the FM Plant*

- B *Save all packing materials!* If you should ever have to ship the 2200 (e.g., for servicing), it is best to ship it in the original carton with its packing materials because both the carton and packing material have been carefully designed to protect the unit.

- C **Complete the Registration Card and return it to Orban.** (please)

The Registration Card enables us to inform you of new applications, performance improvements, and service aids that may be developed, and it helps us respond promptly to claims under warranty without our having to request a copy of your bill of sale or other proof of purchase. Please fill in the Registration Card and send it to us today. (The Registration Card is located after the cover page).

We do not sell or give away our customer’s names to anyone.

## 2. Change standard factory configuration, if required.

*[Skip this step if your installation does not have any special requirements.]*

The 2200 is supplied from the factory with its jumpers set to the configuration correct for most installations.

Stereo Encoder Composite Output Impedance	0 $\Omega$
Input Impedance	10k $\Omega$
Input Sensitivity	-10dBu or greater (+5dBu to +27dBu peak)

- A  To change any jumpers you must remove the top cover of the 2200 to access the main circuit board. (Make sure power is not connected.) Remove all screws holding the cover in place, then lift it off. (Be careful not to strip threads when opening the cover.)
- B  Refer to Figure 2-1 to find the jumpers on the main circuit board and to position them according to your application.



The following information is provided to explain each jumper and its settings in detail.

- Stereo encoder composite output impedance.

*[Do not change the default 0 $\Omega$  jumper setting unless your installation needs 75 $\Omega$  source impedance.]*

The stereo encoder is shipped from the factory with 0 $\Omega$  source impedance. This is correct for virtually all installations. However, the 2200 stereo encoder can be changed to 75 $\Omega$  source impedance if desired.

The frequencies in the stereo baseband are low by comparison to RF or video, and the characteristic impedance of coaxial cable is not 75 $\Omega$  at lower frequencies, so the transmission system will have more accurate amplitude and phase response (and thus, better stereo separation) if the cable is driven by a very low source impedance (0 $\Omega$ ) and is terminated with greater than 1k $\Omega$  at the exciter.

However, a few broadcast organizations require that FM composite be transmitted in impedance-matched coaxial cable with 75 $\Omega$  source and load impedances.

**To change the source impedance of one or both of the composite outputs:**

To change the source impedance of composite output #1, move jumper JA to the “75 $\Omega$ ” position (Fig 2-1). To change the source impedance of composite output #2, move jumper JB to the “75 $\Omega$ ” position (Fig 2-1).

- Analog left/right input termination.

*[Do not change the default setting unless your installation requires 600 $\Omega$  termination on the analog left/right inputs.]*

The analog left/right inputs are shipped from the factory with balanced bridging (10k $\Omega$ ) input impedance. However, the 2200 analog inputs can be changed to 600 $\Omega$  input impedance.

**To change the input impedance of the analog left/right inputs:**

Move jumpers J301 and J305 according to Figure 2-1. Jumper J301 sets the left channel and jumper J305 sets the right channel.

- Set analog left/right input sensitivity.

*[Skip this step if your installation will supply the 2200 with nominal input level of  $-10\text{dBu}$  or greater ( $+5\text{dBu}$  to  $+27\text{dBu}$  peak).]*

The analog left/right inputs are shipped from the factory with input sensitivity to accommodate inputs whose absolute maximum peak level is between  $+5\text{dBu}$  and  $+27\text{dBu}$ .

If VU meters are used,  $+5\text{dBu}$  to  $+27\text{dBu}$  absolute peak corresponds to a 0VU level of approximately  $-9\text{dBu}$  to  $+13\text{dBu}$ .

If PPMs are used,  $+5\text{dBu}$  to  $+27\text{dBu}$  absolute peak corresponds to a PPM level of approximately  $-2\text{dBu}$  to  $+20\text{dBu}$ .

However, in unusual circumstances where the input level is very low, the 2200 analog inputs can be changed for greater sensitivity. This usually occurs only when the studio-to-transmitter link is a long telephone or post line with a passive equalizer at the receive end and no amplifier to make up the loss of the line and the equalizer.

**To increase the input sensitivity of the analog input to accommodate absolute peak levels of  $-17\text{dBu}$  to  $+5\text{dBu}$  (nominal levels down to  $-30\text{dBu}$ ):**

Move jumpers J302, J303, J306, J307 and J308 according to Figure 2-1. Jumpers J302 and J303 set the left channel and jumpers J306 and J307 set the right channel. Jumper J308 sets the control circuit to recognize the new input sensitivity.

- c □ Replace the 2200 top cover.

Replace all screws snugly. (Be careful not to strip threads by fastening the screws too tightly.)



## 2200 Rear Panel

**Voltage Selector** (for Model Numbers 2200/U, 2200-D/U, 2200/E and 2200-D/E) can be set to 115V (for 100-132V operation) or 230V (for 200-264V operation); (for Model 2200/J and 2200-D/J) set to 115V (for 89-120V operation).

**Fuse** values can be changed to support 115V or 230V operation. Fuse must be 3AG Slow-Blow,  $\frac{1}{2}$ -amp for 115V, or  $\frac{1}{4}$ -amp (250mA) “T” type for 230V.

**Power Cord** is detachable and is terminated in a “U-ground” plug (USA standard), or CEE7/7 plug (Continental Europe), as appropriate to your 2200’s Model Number.

**GND LIFT (Ground Lift) Switch** can be set to GND (to connect the 2200’s circuit ground to its chassis), or to LIFT (if you are using the 2200’s stereo encoder, and are driving its composite output into an *unbalanced* exciter input).

**Remote Control Interface** is provided to connect the 2200 to a remote control. The 2200 remote control accepts a DB-25 connector and supports user-programmable selection of up to eight inputs for any one of the following parameters: user presets, factory presets, bypass, tone, exit test, stereo, mono left, mono right, mono sum, analog input, digital input (Model 2200-D only), digital input + J.17 pre-emphasis (Model 2200-D only).

A valid signal is a momentary transition from no-current to current flowing through the particular remote signal pins. Current must flow for at least 50ms for the signal to be interpreted as valid. It is acceptable to apply current continuously to an input, DC or AC. Do not exceed 9 volts unless you use an external current-limiting resistor that limits current to 10mA.

**COMPOSITE 1 OUTPUT and COMPOSITE 2 OUTPUT** are provided, each with independent output level control (via front panel Comp 1 and Comp 2 controls). Each output uses a BNC connector.

**ANALOG INPUT and ANALOG OUTPUT** provided to support left and right audio signals through XLR-type connectors.

**Digital AES/EBU INPUT and AES/EBU OUTPUT (Model 2200-D only)** are provided to support two-channel AES/EBU-standard digital audio signals through XLR-type connectors.

**3. Check the line voltage, fuse and power cord.**

A  *DO NOT connect power to the unit yet!*

B  Check the voltage selector. This is on the rear panel.

Refer to the unit’s rear panel for your Model Number and the inside of the front cover of this manual for your Model Number’s line voltage setting.

Model Numbers 2200/U, 2200-D/U, 2200/E and 2200-D/E are shipped configured for either 100-132V or 200-264V, 50Hz or 60Hz operation, as indicated on the rear panel. To change the operating voltage, set the voltage selector to 115V (for 100-132V) or 230V (for 200-264V) as appropriate.

Model Number 2200/J and 2200-D/J are shipped for 89-120V, 50/60Hz operation. The voltage selector should be set to 115V (for 89-120V).

C  Check the value of the fuse and change the fuse if the value is incorrect.

For safety, the fuse must be Slow-Blow 1/2-amp for 115V, or 250mA (1/4-amp) “T” type for 230V.

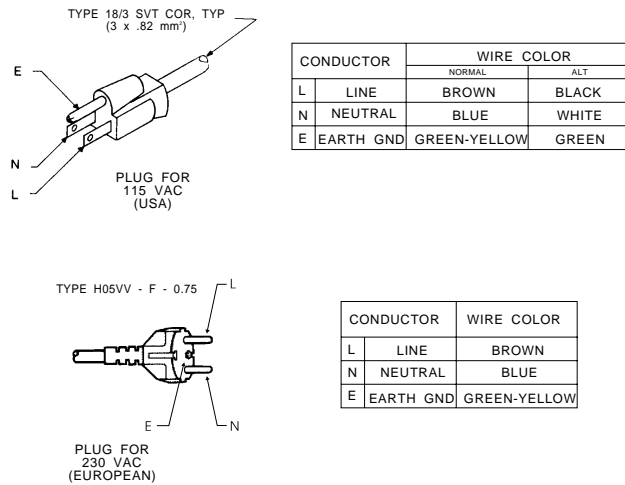


Figure 2-1: AC Line Cord Wire Standard

D  Check power cord.

AC power passes through an IEC-standard mains connector and an RF filter designed to meet the standards of all international safety authorities.

The power cord is terminated in a “U-ground” plug (USA standard), or CEE7/7 plug (Continental Europe), as appropriate to your 2200’s Model Number. The green/yellow wire is connected directly to the 2200 chassis.

If you need to change the plug to meet your country’s standard and you are qualified to do so, see Figure 2-2. Otherwise, purchase a new mains cord with the correct line plug attached.



#### **4. Set Ground Lift switch.**

The GND LIFT switch is located on the rear panel.

The GND LIFT switch is shipped from the factory set to ground (to connect the 2200's circuit ground to its chassis ground). If you are using the 2200's stereo encoder, and are driving its composite output into an *unbalanced* exciter input, set the GND LIFT switch to LIFT.

This will break a ground loop that could otherwise occur.

Unbalanced exciter inputs can cause hum and noise because it is difficult to control the system grounding. If hum or noise appears that cannot be cured by resetting the GND LIFT switch, we suggest that you install the optional Orban CIT25 Composite Isolation Transformer at the exciter's input to balance it. If you use the CIT25, set the 2200's GND LIFT switch to GND.

If you are not using the 2200's stereo encoder, set the GND LIFT switch to ground.

#### **5. Mount the 2200 in a rack.**

The 2200 requires one standard rack unit ( $1\frac{3}{4}$  inches/4.4 cm).

There should be a good ground connection between the rack and the 2200 chassis — check this with an ohmmeter to verify that the resistance is less than  $0.5\Omega$ .

Mounting the unit over large heat-producing devices (such as a vacuum-tube power amplifier) may shorten component life and is not recommended. Ambient temperature should not exceed  $113^{\circ}\text{F}/45^{\circ}\text{C}$  when equipment is powered.

Equipment life will be extended if the unit is mounted away from sources of vibration, such as large blowers.

The shorter the baseband cable run from the 2200 to exciter, the less likely that ground loops or other noise problems will occur in the installation. If you require a long cable run, it is usually best to mount the RF exciter close to the 2200, and to make the long cable carry the RF output from the exciter to the transmitter's RF power amplifiers.



## 6. Connect remote control. (optional)

The 2200 has extensive remote control provisions, which are described on page 2-34.

Optically-isolated remote control connections are terminated in a type DB-25 male connector located on the rear panel. It is wired according to Fig. 2-2. To select the desired function, apply a 5-12V AC or DC pulse between the appropriate REMOTE terminals. The (-) terminals can be connected together and then connected to ground at pin 1 to create a REMOTE COMMON. If you use 48V, connect a 3.6K 10%, 1-watt carbon composition resistor in series with the REMOTE COMMON or the (+) terminal to provide current limiting. A current-limited +9VDC source is available on pin 25.

In a high-RF environment, these wires should be short and should be run through foil-shielded cable, with the shield connected to the connector shell at both ends.

### PIN ASSIGNMENT

1. COMMON
2. REMOTE 1+
3. REMOTE 2+
4. REMOTE 3+
5. REMOTE 4+
6. REMOTE 5+
7. REMOTE 6+
8. REMOTE 7+
9. REMOTE 8+
- 10-13. N/C
14. REMOTE 1-
15. REMOTE 2-
16. REMOTE 3-
17. REMOTE 4-
18. REMOTE 5-
19. REMOTE 6
20. REMOTE 7-
21. REMOTE 8-
- 22-24. N/C
25. +9VDC

### REMOTE INTERFACE

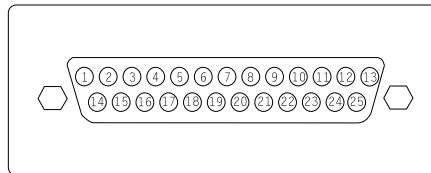


Figure 2-2: Wiring the 25-pin Remote Control Connector

## 7. Connect inputs and outputs.

See the hook-up and grounding information on the following pages.

Audio Input and Audio Output Connections	Page 2-10
Composite Output	Page 2-12
AES/EBU Digital Input and Output (2200-D only)	Page 2-11
Grounding	Page 2-12

## Audio Input and Output Connections

### Cable

We recommend using **two-conductor foil-shielded cable** (such as Belden 8451 or equivalent), because signal current flows through the two conductors only. The shield does not carry signal, and is used only for shielding.

### Connectors

- **Input and output connectors** are XLR-type connectors.

In the XLR-type connectors, pin 1 is CHASSIS GROUND, while pin 2 and pin 3 are a balanced, floating pair. This wiring scheme is compatible with *any* studio wiring standard: If one pin is considered LOW, the other pin is automatically HIGH.

### Analog Audio Input

- **Nominal input level** between  $-30\text{dBu}$  and  $+8\text{dBu}$  will result in normal operation of the 2200. (See step 2 on page 2-3 for a full discussion).  
( $0\text{dBu} = 0.775\text{Vrms}$ . For this application, the  $\text{dBm} @ 600\Omega$  scale on voltmeters can be read as if it were calibrated in  $\text{dBu}$ .)
- The **peak input level that causes overload** is dependent on the setting of the AI CLIP control. It is adjustable from  $-17\text{dBu}$  to  $+27\text{dBu}$  in two ranges.
- The **electronically-balanced input** uses an ultra low noise and distortion differential amplifier for best common mode rejection, and is compatible with most professional and semi-professional audio equipment, balanced or unbalanced, having a source impedance of  $600\Omega$  or less. The input is EMI suppressed.
- Input connections are the same whether the driving source is balanced or unbalanced.
- Connect the red (or white) wire to the pin on the XLR-type connector (#2 or #3) that is considered HIGH by the standards of your organization. Connect the black wire to the pin on the XLR-type connector (#3 or #2) that is considered LOW by the standards of your organization. (Note: International Standard is pin 2 HIGH.)
- \*In **low RF fields** (like a studio site), do not connect the cable shield at the 2200 input — it should be connected at the source end only. In **high RF fields** (like a transmitter site), also connect the shield to pin 1 of the male XLR-type connector at the 2200 input.
- If the output of the driving unit is unbalanced and does not have separate CHASSIS GROUND and (–) (or LO) output terminals, connect both the shield and the black wire to the common (–) or ground terminal of the driving unit.

## Analog Audio Output

- **Electronically-balanced and floating outputs** simulate a true transformer output. The source impedance is  $30\Omega$ . The output is capable of driving loads of  $600\Omega$  or higher; maximum output level is +20dBu. The outputs are EMI suppressed.
- If an **unbalanced output** is required (to drive unbalanced inputs of other equipment), it should be taken between pin 2 and pin 3 of the XLR-type connector. Connect the LOW pin of the XLR-type connector (#3 or #2, depending on your organization's standards) to circuit ground, and take the HIGH output from the remaining pin. No special precautions are required even though one side of the output is grounded.
- Use two-conductor foil-shielded cable (Belden 8451, or equivalent).
- At the 2200's output (and at the output of other equipment in the system), connect the cable's shield to the CHASSIS GROUND terminal (pin 1) on the XLR-type connector. Connect the red (or white) wire to the pin on the XLR-type connector (#2 or #3) that is considered HIGH by the standards of your organization. Connect the black wire to the pin on the XLR-type connector (#3 or #2) that is considered LOW by the standards of your organization.

## AES/EBU Digital Input and Output (2200-D Only)

Model 2200-D includes an AES/EBU digital input/output connector. These follow the AES/EBU standard.

- Use  $110\Omega$  shielded twisted-pair cable (Belden 1800A, or equivalent). The length of cable, cable characteristics, and quality of termination become extremely important because AES/EBU signals have a spectrum with significant energy to 6MHz. Do not use standard audio cable for AES/EBU applications.

Impedance mismatching and noise are the most common causes of trouble with AES/EBU signals, usually manifesting as pops or clicks in the output audio, or total loss of synchronization lock. Impedance mismatching can be caused by use of an inappropriate cable type, poor cable termination technique, or improper termination of the transmission line either in the source, or receiver equipment. Induced noise may prevent the AES/EBU receiver from locking to the incoming data stream. For this reason, cable length is generally recommended to be less than 100 meters (approx. 328').

Each digital input or output line carries both the left and right stereo channels. The digital input clip level is fixed at 0dB relative to the maximum digital word (0dBFS). Since the input meters monitor clip levels, the maximum digital input will make the meters display 0dB. The reference level is adjustable using either the DI REF VU or DI REF PPM controls. The reference level determines the amount of gain reduction. The output level is adjustable using the DO 100% control. This control is in dB, referenced to full scale, and is adjustable from 0.0dBFS to -20dBFS.

## Composite Output

- There are two independent composite baseband outputs (containing the encoded stereo signal and the stereo pilot tone).

Each output has an independent output level control and can be strapped for  $0\Omega$  or  $75\Omega$  source impedance. Each output can drive up to 8V peak-to-peak into  $75\Omega$  in parallel with up to  $0.047\mu\text{F}$  in cable and input capacitance before any noticeable performance degradation occurs.

- Connect the 2200's composite output to the exciter input with up to 100 feet (30.5m) of RG-58/U or RG-59/U coaxial cable terminated with BNC connectors.

Longer runs of coax may increase problems with noise, hum, and RF pickup at the exciter. In general, the least troublesome installations place the 2200 close to the exciter and limit the length of the composite cable to less than 6 feet (1.8m).

We do not recommend that the exciter input be terminated by  $50\Omega$  or  $75\Omega$  unless this is unavoidable. Because the frequencies in the stereo baseband are low by comparison to RF or video, and because the characteristic impedance of coaxial cable is not constant at very low frequencies, the transmission system tends to have more accurate amplitude and phase response (and thus, better stereo separation) if the coax is driven by a very low impedance source and is terminated with greater than  $1\text{k}\Omega$  at the exciter end. This also eases thermal stresses on the output amplifier in the stereo encoder, and can thus increase equipment life.

If the Orban CIT25 Composite Isolation Transformer is used, the exciter *must* present a  $1\text{k}\Omega$  or greater load to the transformer for proper transformer operation.

Designed to be installed adjacent to each exciter, the CIT25 Composite Isolation Transformer provides ground loop isolation between the OPTIMOD-FM composite output and the exciter's input, and presents OPTIMOD-FM with a balanced floating load.

## Grounding

Very often, grounding is approached in a "hit or miss" manner. But with care it is possible to wire an audio studio so that it provides maximum protection from power faults and is free from ground loops (which induce hum and can cause oscillation).

In an ideal system:

- All units in the system should have *balanced inputs*. In a modern system with low output impedances and high input impedances, a balanced input will provide common-mode rejection and prevent ground loops — regardless of whether it is driven from a balanced or unbalanced source.

The 2200 has balanced inputs.

## (Grounding continued)

- All equipment *circuit grounds* must be connected to each other; all equipment *chassis grounds* must be connected together.
- In a low RF field, *audio cable shields* should be connected at one end only — preferably the source (output) end.
- In a high RF field, *audio cable shields* should be connected to a solid earth ground at both ends to achieve best shielding against RFI.
- Whenever coaxial cable is used, shields are automatically grounded at both ends through the terminating BNC connectors.

## Power Ground

- Ground the 2200 chassis through the third wire in the power cord. Proper grounding techniques *never* leave equipment chassis unconnected to power/earth ground. *A proper power ground is essential to safe operation.* Lifting a chassis from power ground creates a potential safety hazard.



## Circuit Ground

To maintain the same potential in all equipment, the circuit (audio) grounds must be connected together:

- Circuit and chassis ground should always be connected by setting the 2200's GND LIFT switch to GND, *except* when the 2200's optional stereo encoder composite output is driving an **unbalanced exciter input**. This is an unbalanced-to-unbalanced connection, so the ground loop that would otherwise occur must be broken by setting the 2200's GROUND LIFT switch to LIFT.

Alternately, you can balance and float the exciter input with the Orban CIT25 Composite Isolation Transformer — (call Orban Customer Service).

- *In high RF fields*, the system is usually grounded through the equipment rack in which the 2200 is mounted. The rack should be connected to a solid earth ground by a wide copper strap — wire is completely ineffective at VHF because of the wire's self-inductance.

## Older Exciters

**Most exciters have straightforward wideband inputs, and no special considerations are involved.** If you have an older exciter requiring special wideband interfaces, contact Orban Customer Service.

## 8. Power up the 2200.

- A  Plug in the 2200's power cord.

With no input program material, the red Gated LED and one of the green Function LEDs should be on. The AGC meter should indicate 10.0.

The main screen appears in the front window display.

```
on air:CLASSICAL PROTECT
AnlgIn-Stereo
```

The main or "home" screen shows which processing preset is selected to be on-air, the type of input (analog or digital), and the stereo encoder mode.

If the main screen does not appear, repeatedly press the Escape button until it does appear.

## 9. Physical installation is complete.

- A  Continue with system software configuration, on page 2-16.

We recommend you browse through the explanation of 2200 front panel controls and meters (on the following pages) before you begin configuring system software.

## 2200 Front Panel

**Screen Display** labels the four soft key buttons and provides control setting information.

Screen Saver feature: The screen has a built-in screen saver that turns off the backlight after approximately one hour. The screen turns back on when any front panel control is touched. Note that buttons don't perform their normal function when the screen is blank. Similarly, the control knob's first turn is not read, until it stops for a second or so.

**Contrast Button** adjusts the optimum viewing angle of the screen display. Press this button to cycle through four contrast settings for the screen display.

**Four Soft Key Buttons** provide access to all 2200 functions and controls. The functions of the buttons change with each screen according to the labels at the bottom of each screen. Push a button:

**To select options** (always identified on the screen by all-capital-letter words surrounded by left and right vertical bars), press the button directly below the option.

**To change a parameter setting** (always identified by lower-case letters or numerals), hold down the button directly below the parameter setting, turn the control knob to scroll through choices, and release the button to set the parameter.

**Control Knob** is used for changing data in one of three methods.

To scroll through submenu choices: Presets (on Recall Preset screen), FULL CONTROL parameters (on Modify Processing FULL CONTROL screen) and 8 Remote Interfaces (on System Setup REMOTE INTERFACE screen).

To change a parameter setting, by *simultaneously holding down a soft key*. The parameters being changed take effect immediately, except for the following system level controls: MODE (on test screen), MODE (on Stereo Encoder screen), INPUT, AO PRE-E, DO PRE-E, DO RATE, DO SYNC and XTLK TEST. The setting for these controls do not take effect until the soft key is released.

To adjust the LESS-MORE control. Adjusting this control changes the sound immediately.

**Escape Button** returns the user to the previous screen; pressing this button repeatedly will always return you to main screen, which shows the on-air preset name.

**Recall Preset Button** brings up a screen that displays the current on-air preset and next preset (which can be changed by turning the control knob). To put a different preset on-air, turn the control knob to find the preset desired, then press the RECALL NEXT soft key.

When the button's yellow LED is lit, the Recall Preset screen is displayed.

**Modify Processing Button** brings up a screen to modify parameters for the current on-air preset. For Two-Band presets: LESS-MORE, EQ and FULL CONTROL. For the Protection preset, DRIVE and 30HzHPF.

When the button's yellow LED is lit, the Modify Processing screen (or one of its submenus) is displayed.

**System Setup Button** brings up a screen to modify system settings (such as I/O levels). There are four System Setup submenus: I/O CALIB, STEREO ENCODER, REMOTE INTERFACE, TEST.

When the button's yellow LED is lit, the System Setup screen (or one of its submenus) is displayed.

**Gain Reduction Meters** indicate AGC, Bass, and Master Gain Reduction. All three meters operate over a  $-25.0\text{dB}$  to  $2.5\text{dB}$  range. Note that the AGC and Bass meters are off when the Protect preset is on-air.

**HF Limiting LEDs** light when the high-frequency content of audio is being limited by the very fast high-frequency limiters. These LEDs indicate when greater than  $0.5\text{dB}$  HF limiting is occurring.

**Gated LED** indicates gate activity, lighting when the input audio falls below the threshold set by the gate threshold control (Modify Processing screen GATE THRS control). When this happens, the compressor's recovery time is drastically slowed to prevent noise rush-up during low-level passages.

**Composite Meter** is a 10-segment bargraph showing the stereo encoder's composite output level before the composite level controls.

**Function Button** selects which of three functions are displayed in the Function meters: Enhance, L/R Input or L/R Output.

**Function LEDs** indicate which function is currently displayed by the Function meters: Enhance, L/R Input or L/R Output. Press the Function button to toggle between the three functions.

**Function Meter** indicates level of Enhance, L/R Channel Input or Output, as selected with Function button. The meters operate over a  $-27\text{dB}$  to  $0\text{dB}$  range. Input meters are referenced to clip level. Output meters are referenced to 100% modulation level. HF Enhance meter shows the active amount of enhancement activity. Since the HF Enhancement is program-dependent, it will vary with source material and the HF parameter. Note: HF Enhance is displayed only on the left-hand meter, below "HF."

#### Stereo Encoder Screwdriver-Adjustable Controls

Orban supplies a special green-handled flat-blade screwdriver (Xcelite R3323) to adjust the stereo encoder controls.

**Comp 1** sets the output level of Composite Output 1.

**Comp 2** sets the output level of Composite Output 2.



## Basic System Setup

Allow about 30 minutes for system setup.

You can set up all of the 2200's required settings through Basic System Setup. It is a guided procedure for adjusting all of the setup adjustments needed to get you on the air. System setup consists of: (1) setting the pre-emphasis, (2) setting the analog input peak level, (3) setting the input reference level, (4) adjusting composite, analog or digital output level and (5) recalling a processing preset.

The 2200 also contains a few special-feature parameters that are not included in this section. These parameters can be adjusted immediately after Basic System Setup is completed, or they can be implemented during normal operation. All the I/O CALIB, STEREO ENCODER, REMOTE INTERFACE and TEST parameters are covered in depth, beginning on page 2-27.

To complete the following steps, you need to have a basic understanding of how to use the 2200's front panel controls:

**To change display contrast**, repeatedly press the Contrast button to adjust the display for best clarity.

**To select options** (always identified on the screen by all-capital-letter words surrounded by left and right vertical bars), press the button directly below the option.

**To change a parameter setting** (always identified by lower-case letters or numerals), hold down the button directly below the parameter setting, turn the control knob to scroll through choices, and release the button to set the parameter. Note that most parameters take effect immediately when you turn the control knob. Some settings (e.g., INPUT status) will not take effect until the soft key button is released.

### 1. Begin System Setup.

- A  If you have not done so already, plug in the 2200's power cord. The main screen (shown below) appears in the window display.

If the main screen does not appear, repeatedly press ESC until it does appear.

```
on air:CLASSICAL PROTECT
AnlgIn-Stereo
```

**Change preset to CLASSICAL PROTECT** — This preset facilitates the **most accurate initial setup**: If on-air: is not CLASSICAL PROTECT, press the Recall Preset button, hold down the next: soft key button and turn the control knob to scroll through preset list to CLASSICAL PROTECT, then release the button and press RECALL NEXT soft key button.

Note: User can choose their preferred preset *after* setup is completed.

## 2. Set pre-emphasis to the standard used in your country.

- A  Press System Setup button to access the System Setup screen.



- B  From the System Setup screen, press the STEREO ENCODER soft key button.



- C  Set processing Pre-Emphasis

[50µs] or [75µs]

This controls the pre-emphasis of the internal processing's high-frequency limiters, and the pre-emphasis of the stereo encoder's output. It does not control whether analog or digital left/right outputs are flat or pre-emphasized.

Set this control to the pre-emphasis standard in your country:

75µs	NORTH, CENTRAL, SOUTH AMERICA
50µs	EUROPE, ASIA, AFRICA, PACIFICA EXCEPT
75µs	TAIWAN, KOREA, THAILAND

Hold down the button directly below the words "PROC PRE-E," turn the control knob counterclockwise to choose 50µs, or clockwise to choose 75µs, then release the button.

## 3. Set Analog Output pre-emphasis.

*[Skip this step if you are not using the 2200's analog outputs.]*

- A  Press System Setup button to access the main System Setup screen.
- B  From the System Setup screen, press the I/O CALIB soft key button.



- C  Press ANLG OUTP CALIB soft key button.

	AO 100%		AO PRE-E	
	-22.1dBu		pre-emph	

- Set Analog Output pre-emphasis status.

[flat] or [pre-emph]

This controls whether the analog left/right outputs produce a flat signal, or a pre-emphasized signal, following the pre-emphasis set with Stereo Encoder PROC PRE-E control in step 2 above.

Hold down the button directly below the words “AO PRE-E,” turn the control knob counterclockwise to choose flat, or clockwise to choose pre-emphasis, then release the button.

#### 4. Set Digital Output pre-emphasis status.

*[Skip this step if you are not using the 2200-D's digital output. Digital I/O parameters only available with Model 2200-D.]*

- Press System Setup button to access the main System Setup screen.
- From the System Setup screen, press the I/O CALIB soft key button.

	ANLG INP		DIG INP		ANLG OUTP		DIG OUTP	
	CALIB		CALIB		CALIB		CALIB	

- Press DIG OUTP CALIB soft key button.

	DO 100%		DO PRE-E		DO RATE		DO SYNC	
	-2,8dBFS		flat		32kHz		internal	

- Set DO PRE-E (Digital Output pre-emphasis status).

[flat], [pre-emph], [J.17], or [J.17+pre-e]

Within the audio processing, the audio signal is pre-emphasized to either 50 $\mu$ s or 75 $\mu$ s (as set with Stereo Encoder PROC PRE-E control in step 2 above).

Hold down the button directly below the words “DO PRE-E,” turn the control knob to scroll through the output pre-emphasis choices, then release the button to set the parameter.

[flat]: Set the 2200-D's digital output to flat if the output feeds a digital STL modem using lossy bit-rate reduction (such as Marti MD-2, Moseley DSP 6000, and TFT DMM92); these modems are *not* designed to carry pre-emphasized AES/EBU data.

[pre-emph]: Use the pre-emph setting when the AES/EBU digital output of the 2200-D is sent directly to the AES/EBU input of a digital exciter, such as the Harris "Digit." Also, if you are using a digital link with no data rate reduction, the 2200-D's output should remain pre-emphasized.

[J.17], or [J.17+pre-e]: Use these settings to apply J.17 pre-emphasis or J.17 plus the pre-emphasis set in step 2 above.

**5. Enable Analog Inputs.**

*[Skip this step if you do not have Model 2200-D or if you are not using the analog inputs.]*

- A  Press System Setup button to access the main System Setup screen.
- B  From the System Setup screen, press the I/O CALIB soft key button.



- C  Press ANLG INP CALIB soft key button.



- D  Enable Analog Inputs.

[analog], [digital] or [dig+J17]

Hold down the button directly below the word "INPUT," turn the control knob counterclockwise to choose analog, then release the button to set the parameter.

**6. Adjust analog left/right input peak clipping level.**

*[Skip this step if you are not using the 2200's analog inputs.]*

- A  Press the meter button so that the L/R Channel Input meters are active.
- B  Press System Setup button to access the System Setup screen.



- c  From the System Setup screen, press I/O CALIB soft key button.



- d  Press ANLG INP CALIB.



- e  Set Analog Input Clip level.

This step calibrates the level at which the 2200's A-D (Analog-to-Digital) converter clips to the absolute maximum peak level that your installation supplies to the 2200's analog input.

This setup maximizes the 2200's signal-to-noise ratio. If the clip level is set too low, the 2200's analog-to-digital converters will overload and distort on program peaks. If the clip level is set too high, the signal-to-noise ratio will suffer. Use care and attention in setting this adjustment.

- a) Play program material from your studio at a much higher level than normal — turn the faders up all the way! This will produce the highest peak level output that your system can produce.
- b) Adjust the 2200's AI CLIP so that the program peaks just reach to about  $-3\text{dB}$  on the L/R Channel Input meters.

Hold down the button directly below the words "AI CLIP," turn the control knob to scroll from  $+5.0\text{dBu}$  to  $+27.0\text{dBu}$  (or  $-17.0\text{dBu}$  to  $+5\text{dBu}$ , if input sensitivity jumpers were reset), then release the button.

**Observe the L/R Channel Input meters on the 2200 for a long period of time; be sure to observe live announcer voice. If this setting is mis-adjusted, distortion will result.**

**0dB indicates input clipping on the 2200. These meters should never peak as high as 0dB with program material.**

- c) If you are using an Orban 4000A Transmission Limiter or Orban 8200ST OPTIMOD ahead of the 2200, activate the tone oscillator on either unit. Then adjust the 2200's AI PEAK so that the 2200's L/R Channel Input meters reads  $-3\text{dB}$ .

**7. Calibrate analog inputs to your standard studio level.**

*[Skip this step if you are not using the 2200's analog inputs.]*

- A  Press the meter button so that the L/R Channel Input meters are active.
- B  Press System Setup button to access the System Setup screen.



- c  From the System Setup screen, press I/O CALIB soft key button.



- d  Press ANLG INP CALIB.



- e  Set Analog Input Reference level.

This step calibrates the 2200 to the level to which your studio operators peak their program material on the studio meters. This assures that the 2200's processing presets will operate in their preferred range.

Note that in this step, we are calibrating to the normal indication of the studio meters; this is quite different from the actual peak level.

**Calibration with Audio:** Follow these steps if you are able to interrupt or distort programming. This will achieve the most precise calibration. You may adjust this level with a standard reference/line-up level tone from your studio or with program material.

**Calibration by Numbers:** Follow these steps if you cannot interrupt or distort programming.

**Calibration with Audio**

- a) Depending on whether you monitor program levels by VU or PPM meters at the console or mixer, adjust the appropriate 2200 reference level control (either AI REF VU or AI REF PPM) for an average of -10dB on the Master Gain Reduction meter when audio is peaking at normal levels (e.g., 0VU).

Hold down the appropriate reference level soft key button, turn the control knob to scroll to the appropriate level, then release the button.

### **Calibration by Numbers**

- a) Depending on whether you monitor program levels by VU or PPM meters at the console or mixer, adjust the appropriate 2200 reference level control (either AI REF VU or AI REF PPM) to your studio's reference level.

Hold down the appropriate reference level soft key button, turn the control knob to scroll to the appropriate level, then release the button.

## **8. Enable Digital Input.**

*[Skip this step if you do not have Model 2200-D or if you are not using the digital input.]*

- A  Press System Setup button to access the main System Setup screen.
- B  From the System Setup screen, press the I/O CALIB soft key button.

ANLG INP CALIB	DIG INP CALIB	ANLG OUTP CALIB	DIG OUTP CALIB
-------------------	------------------	--------------------	-------------------

- C  Press DIG INP CALIB soft key button.

INPUT analog	DIG STAT lock	DI REF VU -19.5dBFS	DI REF PPM -19.5dBFS
-----------------	------------------	------------------------	-------------------------

Note: If DIG STAT is no lock, then the AES/EBU digital input is not valid. Check connections, cabling, and digital source.

- D  Enable Digital Input.

[analog], [digital] or [dig+J17]

Hold down the button directly below the word "INPUT," turn the control knob clockwise to choose digital, or digital+J17, then release the button to set the parameter.

## **9. Calibrate Digital Input to your standard studio level.**

*[Skip this step if you do not have Model 2200-D or if you are not using the 2200-D's digital input.]*

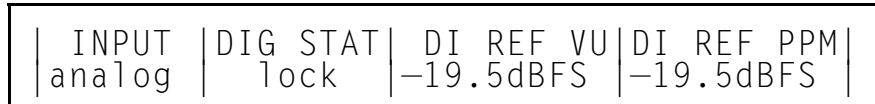
- A  Press System Setup button to access the System Setup screen.



- B  From the System Setup screen, press the I/O CALIB soft key button.



- C  Press DIG INP CALIB.



- D  Set Digital Input Reference level.

This step calibrates the 2200 to the level to which your studio operators peak their program material on the studio meters. This assures that the 2200's processing presets will operate in their preferred range.

Calibrate with Audio if you are able to interrupt or distort programming. This will achieve the most precise calibration.

Calibrate by Numbers if you cannot interrupt or distort programming.

#### Calibrate with Audio

- a) Play program material from your studio, peaking at the level to which you normally peak program material (typically 0VU if your console uses VU meters).
- b) Adjust the appropriate 2200 reference level control (either DI REF VU or DI REF PPM) for -10dB on the AGC Gain Reduction meter.

Hold down the appropriate reference level soft key button, turn the control knob to scroll to the appropriate level, then release the button.

#### Calibrate by Numbers

- a) Adjust the appropriate 2200 reference level control (either DI REF VU or DI REF PPM) for your studio's reference level. Note that the numbers you see represent dB below digital full-scale.

Hold down the appropriate reference level soft key button, turn the control knob to scroll to the appropriate level, then release the button.



**10. Adjust Composite Output level controls.**

*[Skip this step if you are not using the 2200's composite outputs.]*

- A  Feed the 2200 with program material or the built-in 400Hz TEST tone.

To turn on the TEST tone:

- a) Press System Setup button.
- b) Press TEST soft key button.
- c) Set TONE to 400Hz: Hold down the TONE soft key button, turn the control knob to 400 Hz, then releasing the button.
- d) Activate 400Hz test tone: Hold down the MODE soft key button, turn the control knob to scroll to tone, then release the button.

To turn off TEST tone:

Hold down the MODE tone soft key button, turn the control knob to scroll to operate, then release the button.

- B  Adjust the 2200's Comp 1 and Comp 2 level controls — screwdriver slots on the left side of the front panel — for 100% Total Peak Modulation of your FM exciter, as indicated on a modulation monitor, or modulation indicator on your exciter. In the U.S., you can modulate higher than 100% when using SCAs. Refer to the appropriate FCC rules.

If using a composite STL, adjust the 2200's Comp 1 and Comp 2 level controls for 100% Total Modulation of your composite STL transmitter, as indicated on the STL's modulation indicator. Then adjust your STL's receiver output level control and/or FM exciter composite input level control for 100% Total Modulation of your FM exciter, as indicated on a modulation monitor, or modulation indicator on your exciter.

- C  Continue to step 12.

**11. Adjust Analog Left/Right or Digital Output level controls.**

*[Skip this step if you are not using the analog Left/Right or Digital Outputs.]*

- A  Press System Setup button to access the main System Setup screen.
- B  Access analog or digital output level control. (Press ANLG OUTP CALIB or DIG OUTP CALIB as required.)

<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="border-right: 1px solid black; padding: 2px 10px;">AO 100%</td> <td style="padding: 2px 10px;">AO PRE-E</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 2px 10px;">-22.1dBu</td> <td style="padding: 2px 10px;">pre-emph</td> </tr> </table>	AO 100%	AO PRE-E	-22.1dBu	pre-emph
AO 100%	AO PRE-E			
-22.1dBu	pre-emph			

or

<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="border-right: 1px solid black; padding: 2px 10px;">DO 100%</td> <td style="border-right: 1px solid black; padding: 2px 10px;">DO PRE-E</td> <td style="border-right: 1px solid black; padding: 2px 10px;">DO RATE</td> <td style="padding: 2px 10px;">DO SYNC</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 2px 10px;">-2.8dBFS</td> <td style="border-right: 1px solid black; padding: 2px 10px;">flat</td> <td style="border-right: 1px solid black; padding: 2px 10px;">32kHz</td> <td style="padding: 2px 10px;">internal</td> </tr> </table>	DO 100%	DO PRE-E	DO RATE	DO SYNC	-2.8dBFS	flat	32kHz	internal
DO 100%	DO PRE-E	DO RATE	DO SYNC					
-2.8dBFS	flat	32kHz	internal					

c  Set Output level.

Hold down AO 100% or DO 100%, as applicable, and adjust the knob.

Adjust the output level controls for 100% Total Modulation of your FM exciter, or discrete left/right STL, as indicated on a modulation monitor, or modulation indicator on your exciter or STL. In the U.S., you can modulate higher than 100% when using SCAs. Refer to the appropriate FCC rules.

## 12. Select a preset that complements the program format of your station.

This step selects the processing to complement the program format of your station.

After this step, you can always select a different processing preset, modify presets to customize your sound, and store these presets as user presets.

A  Press Recall Preset button to access the Recall Preset screen.



B  From the Recall Preset screen, select a preset.

Turn the control knob to scroll through the preset list. When you find a desired preset, press the RECALL NEXT soft key button. Press Escape button to return to main screen.

## 13. System Setup Completed!

If you want to set up additional input/output parameters, or reset any setup adjustments, continue to "System Setup Controls," on the following pages. If you are ready to use the 2200, proceed to Section 3 for important 2200 operation information.

## System Setup Controls

System Setup includes access to the following 2200 controls: I/O Calibration, Stereo Encoder, Remote Interface and Test mode. This section provides steps to access these System Setup controls, and descriptions of their respective controls and parameters.

### I/O CALIB (I/O Calibration)

I/O Calibration provides the user with control of the audio input and output settings. Model 2200 provides control of analog I/O settings. Model 2200-D provides control for both analog and digital I/O settings.

#### To access I/O Calibration controls:

- a  Press the meter Function button so that the L/R Channel Input meters are active.
- b  Press System Setup button to access the System Setup screen.



- c  From the System Setup screen, press I/O CALIB soft key button.



- d  Access the desired input and output controls. Press the appropriate soft key, located directly below the words that indicate the I/O control you wish to adjust.

To change any of the I/O Calibration controls, hold down the soft key button directly below the screen function you wish to change, turn the control knob counterclockwise and/or clockwise to find the desired setting, then release the button.

## ANLG INP CALIB (Analog Input Calibration)

### ● INPUT

[analog], [digital] or [dig+J17]

This sets the analog inputs, the AES/EBU digital input, or the AES/EBU digital input + J.17 pre-emphasis as the audio source.

Note: Digital sources are only available with Model 2200-D.

If digital lock is lost, the unit automatically switches to analog input. The unit automatically returns to digital input after 1 second of lock.

Note that dig+j17 de-emphasizes the digital signal according to the CCITT J.17 standard.

### ● AI REF VU and AI REF PPM

Analog Input REference VU: in two ranges, [−18.0dBu to +21.0dBu] or [−40.0dBu to −1.0dBu], jumper-selectable, in 0.5dB steps.

Analog Input REference PPM: in two ranges, [−13.0dBu to +26.0dBu] or [−35.0dBu to +4.0dBu], jumper-selectable, in 0.5dB steps.

Note: AI REF VU and AI REF PPM have two ranges; high and low, dependent on the input sensitivity jumper settings (see page 2-3). As shipped, the 2200 uses the higher range.

Note: AI REF VU and AI REF PPM are the same control at the system level and simply display the data in two scales. Moving either one changes the other.

This step sets the center of the 2200's gain reduction range to the level to which your studio operators peak their program material on the studio meters. This assures that the 2200's processing presets will operate in their preferred range.

You may adjust this level with a standard reference/line-up level tone from your studio or with program material.

Note that in this step, we are calibrating to the normal indication of the studio meters; this is quite different from the actual peak level or, in the case of PPMs, the actual average or RMS level.

If you know the reference VU or PPM level that will be presented to the 2200, set the appropriate AI REF to this level, but do verify it with the steps shown directly below.

The complete procedure for calibrating AI REF level is given in Basic System Setup, step E, page 2-22. Follow the complete procedure to calibrate the 2200 to your standard studio level.

To verify the correct setting of AI REF level with program material:

Recall the CLASSICAL PROTECT preset.

Observe the Gain Reduction meter on a wide range of program material, voice and music. It should average between 5.0 and 15.0dB.

Also observe the Gated indicator. It should go out when program is present.

If the Gain Reduction meter averages less gain reduction (higher on the meter), or if the Gated indicator stays on when program material is present, go back to the I/O CALIB screen, and re-adjust the AI REF level to a lower level.

If the AGC Gain Reduction meter averages more gain reduction (lower on the meter), go back to the I/O CALIB screen, and re-adjust the AI REF level to a higher level.

When finished, reset AGC to out if required, (e.g., if that was its setting prior to verifying AI REF level).

Model 2200-D only: This control has no effect on the AES/EBU digital input.

- **AI CLIP (Analog Input Peak/Clip Level)**

[+5.0dBu to +27.0dBu] or [-17.0dBu to +5.0dBu], 0.5dB steps.

Note: AI CLIP has two ranges; high and low, dependent on the input sensitivity jumper settings (see page 2-3). As shipped, the 2200 uses the higher range.

This setting calibrates the level at which the 2200's A-D (Analog-to-Digital) converter clips to the absolute maximum peak level that your installation supplies to the 2200's analog input.

This setting maximizes the 2200's signal-to-noise ratio. If the AI CLIP level is set too low, the 2200's analog-to-digital converters will overload and distort on program peaks. If AI CLIP is set too high, the signal-to-noise ratio will suffer. Use care and attention in setting this adjustment.

The complete procedure for calibrating AI CLIP level is given in Basic System Setup, step 6, page 2-20. Follow the complete procedure to calibrate the 2200 to your standard studio level.

If you know the maximum peak level that will be presented to the 2200, set AI CLIP to about 2dB higher than this level (for safety).

To verify the correct setting of AI CLIP with program material:

Press L/R Channel Input button to view the Input meters.

Access the AI CLIP control in the System Setup AI INP CALIB screen.

Observe the L and R Input meters (the two meters on the right) on a wide range of program material, including live studio voice. The meters should never reach as high as 0dB, which is the level at which the input A-D converter clips. But on the highest peaks, the meters should indicate as high as -3dB.

Be sure to observe the meters on live voice, which tends to have higher level peaks than recorded music.

If necessary, re-adjust the AI CLIP level.

Model 2200-D only: This control has no effect on the AES/EBU digital input.

### ANLG OUTP CALIB (Analog Output Calibration)

- **AO 100% (Analog Output Level)**

[-22.1dBu to +20.0dBu], 0.1dB steps

Adjusts the analog left/right output level. The level indication on the screen is the maximum peak output level that the processing will produce to modulate the transmitter to 100% peak modulation.

- **AO PRE-E (Analog Output)**

[flat] or [pre-emph]

Controls whether the analog left/right outputs produce a flat signal, or a pre-emphasized signal, following the pre-emphasis set with Stereo Encoder PROC PRE-E control.

### DIG INP CALIB (Digital Input Calibration)

Note: Digital Input controls are only applicable to Model 2200-D. Digital input uses sample rate conversion. The internal process rate is always based on internal clock.

- INPUT

[analog], [digital] or [dig+J17]

This selects the digital or analog input of the 2200-D. When digital (or digital+J17) is selected, and the digital input (incoming clock) is lost, the 2200-D will switch to analog input. The unit automatically returns to digital input after 1 second of lock. Note that you can also manually switch between analog input and digital input.

Note that dig+J17 applies J.17 de-emphasis to the incoming digital audio.

- DIG STAT

[lock] or [no lock]

DIG STAT is not user-adjustable. It indicates the status of the digital input, either locked (if the AES/EBU digital input is valid) or unlocked (if it is not valid). When digital input is unlocked and input was selected as digital, then the input has automatically switched to the analog input.

- DI REF VU and DI REF PPM

Digital Input REFERENCE VU: [−30.0dBFS to −10dBFS], in 0.5dBFS steps.

Digital Input REFERENCE PPM: [−22.0dBFS to −2.0dBFS], in 0.5dBFS steps.

Note: DI REF VU and DI REF PPM are the same control at the system level and simply display the data in two scales. Moving either one changes the other.

The incoming audio signal can be referenced from −30dB to −10dB of the maximum allowable digital word.

### DIG OUTP CALIB (Digital Output Calibration)

Note: Digital Output controls are only applicable to Model 2200-D.

- DO 100% (Digital Output Level)

[−20.0dBFS to 0.0dBFS], in 0.1dB steps

This control provides up to 20dB of attenuation to the digital output level. This level indicates the digital output level corresponding to 100% modulation, in dB below digital full-scale.

- DO PRE-E

[flat], [pre-emph], [J.17] or [J.17+pre-e]

Within the audio processing, the audio signal is pre-emphasized to either 50 $\mu$ s or 75 $\mu$ s (as set with Stereo Encoder PROC PRE-E control). This control sets whether the digital AES/EBU output remains pre-emphasized,

produces a flat signal, applies J.17 pre-emphasis, or applies a combination of J.17 and previously set pre-emphasis.

**Important:** The 2200-D has the ability to produce an AES/EBU output signal with the pre-emphasis removed. It is sometimes desirable to locate the 2200 at the studio site, with its output feeding a digital STL. However, digital STL modems using lossy bit-rate reduction (such as Marti MD-2, Moseley DSP 6000, and TFT DMM92) are not designed to carry pre-emphasized AES/EBU data. The AES/EBU inputs applied to these units must be flat. If this is your configuration, you must make the 2200-D's AES/EBU output flat.

When the AES/EBU digital output of the 2200-D is sent directly to the AES/EBU input of a digital exciter, such as the Harris "Digit," the 2200-D's output should remain pre-emphasized. Also, if you are using a digital link with no data rate reduction, the 2200-D's output should be pre-emphasized.

- **DO (SAMPLING) RATE**

[32kHz], [44.1kHz] or [48kHz]

This control sets the data rate of the OPTIMOD digital output to 32kHz, 44.1kHz or 48kHz.

- **DO SYNC**

[internal] or [external]

This control determines whether the digital output sample rate is locked to the digital input sample rate, or whether internal sync (clock) is provided for 32, 44.1 and 48kHz output sample rates.

External sync is provided to sync the output to the input rate. In external mode, the digital output rate is derived from and frequency-locked to the digital input rate. If the input is 32kHz, the output will be 32kHz. If the input is 44.1kHz, the output will be 44.1kHz. If the input is 48kHz, the output will be 48kHz. The unit automatically switches to internal sync and selected output sample rate if the input rate exceeds +/-4% of the selected output rate (DO RATE). The unit automatically returns to external sync after 1 second at a valid sample rate.

DO SYNC may be external while INPUT is analog; in this case, the analog input provides the audio source and the digital input provides sync only for the digital output.

## Stereo Encoder (and processing Pre-Emphasis)

Stereo Encoder provides the user with control of the digital stereo encoder.

### To access Stereo Encoder controls:

- A  Press System Setup button to access the System Setup screen.



- B  From the System Setup screen, press STEREO ENCODER soft key button.



To change any of these controls, hold down the soft key button directly below the screen function you wish to change, turn the control knob counterclockwise and/or clockwise to find the desired setting, then release the button.

- **PROC PRE-E**

[50µs] or [75µs]

This controls the pre-emphasis of the internal processing's high-frequency limiters, and the pre-emphasis of the stereo encoder's output. It does not control whether analog left/right outputs are flat or pre-emphasized; they are controlled by AO PRE-E in the System Setup ANLG OUTP screen.

Set this control to the pre-emphasis standard in your country:

75µs	NORTH, CENTRAL, SOUTH AMERICA
50µs	EUROPE, ASIA, AFRICA, PACIFICA
	EXCEPT
75µs	TAIWAN, KOREA, THAILAND



- **MODE (modulation)**

[stereo], [pilotoff], [mono-L],[mono-R], [mono-SUM]

This control sets the modulation type, as follows:

stereo switches the 2200's stereo encoder on, with pilot on. The level of the pilot tone is adjustable with the PILOTLVL control (see below).

[pilotoff] switches the 2200's 19kHz stereo pilot tone off.

mono-L (mono from left) switches the 2200's stereo encoder off, using the left input as the program source.

mono-R (mono from right) switches the 2200's stereo encoder off, using the right input as the program source.

mono-SUM (mono from sum) sums the audio prior to processing and switches the 2200's stereo encoder off.

- **PILOTLVL (Pilot Level)**

[8.0 % to 10.0 %], 0.1 steps

This control sets the level of the 2200's 19kHz stereo pilot tone in percent modulation. The pilot will go off automatically if a mono mode is selected.

- **XTLK TEST (Stereo Generator Test)**

[normal], [main>sub] or [sub>main]

To facilitate measurement of main channel-to-subchannel [m>s] and sub-channel-to-main channel [s>m] crosstalk, two special test modes are provided. These apply the right channel audio directly to the main channel (L+R) or subchannel (L-R) inputs of the stereo encoder.

This control only affects the stereo encoder output, not the analog or digital audio outputs.

With XTLK TEST set to m>s or s>m, the MODE is automatically switched to stereo, and MODE is then limited to stereo or pilot off. When the user returns XTLK TEST to operate, the unit reverts to the MODE setting that was active when the test was first entered.

## Remote Interface

The 2200 features eight rear panel opto-isolated inputs that allow you to direct the 2200 to perform certain functions when a voltage (6-24V) is presented to the input. Functions are assigned in the System Setup Remote Interface control screen.

### To access Remote Interface controls:

- A  Press System Setup button to access the System Setup screen.



- B  From the System Setup screen, press the REMOTE INTERFACE soft key button.



To change any of these controls, hold down the soft key button directly below the screen function you wish to change, turn the control knob counterclockwise and/or clockwise to find the desired setting, then release the button.

The actions of the remote interface will update the main screen accordingly with the new on-air preset (e.g., preset name, tone or bypass). They will not change any other 2200 screen.

Remote Interface points can be assigned as follows:

[user pst x], where x stands for a numeral between 1 and 8: Switches a user preset on the air. Any of the eight user programming presets may be recalled by the control interface. A momentary pulse of voltage will switch this function.

[x], where x stands for a factory preset name: Switches a factory preset on the air. Any of the eight factory programming presets may be recalled by the control interface. A momentary pulse of voltage will switch this function.

[bypass]: Switches the 2200's into bypass mode. A momentary pulse of voltage will switch this function.

[tone]: Switches the 2200's test tone on. A momentary pulse of voltage will switch this function.

[exit test]: If a test preset is switched on the air, exit test reverts to the previous processing preset (from either tone or bypass modes, or from XTLK TEST).

[stereo]: Switches the 2200's stereo encoder on, and the pilot on (if it was off). A momentary pulse of voltage will switch this function.

[mono-L]: Switches the 2200's stereo encoder off, using the left input as the program source. A momentary pulse of voltage will switch this function.

[mono-R]: Switches the 2200's stereo encoder off, using the right input as the program source. A momentary pulse of voltage will switch this function.

[mono-SUM]: Switches the 2200's stereo encoder off, summing the audio prior to processing. A momentary pulse of voltage will switch this function.

[analog in]: Selects the analog inputs as the audio source. A momentary pulse of voltage will switch this function.

[digital in]: In Model 2200-D only; Selects the AES/EBU digital input as the audio source. A momentary pulse of voltage will switch this function.

[dig+J17 in]: In model 2200-D only; Selects the AES/EBU digital input as the audio source and applies J.17 de-emphasis prior to the processing. A momentary pulse of voltage will switch this function.

## TEST Mode

The 2200's Test Mode allow the user to calibrate, set up and test the transmission chain.

### To access Test Mode controls:

- A  Press System Setup button to access the System Setup screen.



- B  From the System Setup screen, press TEST soft key button.



To change any of these controls, hold down the soft key button directly below the screen function you wish to change, turn the control knob counterclockwise and/or clockwise to find the desired setting, then release the button.

#### ● MODE

[operate], [tone] or [bypass]

This control activates Tone Mode, Bypass Mode, or normal operate mode.

Select operate to use 2200 processing.

Select Tone to put a tone on-air. Test tones apply 100% L+R modulation.

Select Bypass to bypass 2200 processing. Note that bypass includes 50 $\mu$ s or 75 $\mu$ s pre-emphasis.

- TONE

[30 Hz], [100 Hz], [400 Hz], [1000 Hz], [10000 Hz], [BESSEL]  
or [15000 Hz]

This control set the frequency of the test tone. The tone is activated in Tone Mode (see above). The default tone frequency is 100Hz. The Bessel tone is 13.5868kHz. It causes +/-75kHz deviation of the FM carrier when the carrier frequency (as observed on a spectrum analyzer) nulls for the second time as the level of the tone is increased from zero modulation.

- BYPASS GAIN

[-18dB to +15dB], in steps of 1dB

This control sets the level of signal passed through the 2200 in Bypass Mode. The default bypass gain setting is 0dB. Increase or decrease the Bypass signal level, as desired.