

Operating Manual

OPTIMOD-Studio Chassis

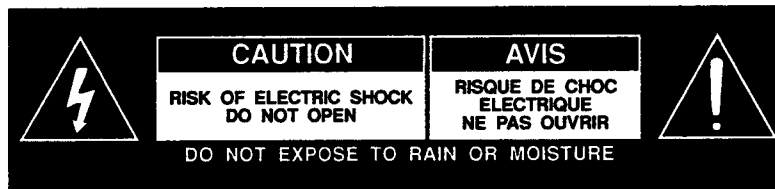
Automatic Gain Controller

8200ST

orban[®]

IMPORTANT NOTE: Refer to the unit's rear panel for your Model #.

Model Number:	Description:
8200ST/U	OPTIMOD-Studio Chassis, 2 channel, 115V
8200ST/E	OPTIMOD-Studio Chassis, 2 channel, 230V



CAUTION: TO REDUCE THE RISK OF ELECTRICAL SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

WARNING: TO REDUCE THE RISK OF FIRE OR ELECTRICAL SHOCK, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.



This symbol, wherever it appears, alerts you to the presence of uninsulated dangerous voltage inside the enclosure — voltage that may be sufficient to constitute a risk of shock.



This symbol, wherever it appears, alerts you to important operating and maintenance instructions in the accompanying literature. Read the manual.

IMPORTANT SAFETY INSTRUCTIONS

All the safety and operating instructions should be read before the appliance is operated.

Retain Instructions: The safety and operation instructions should be retained for future reference.

Heed Warnings: All warnings on the appliance and in the operating instructions should be adhered to.

Follow Instructions: All operation and user instructions should be followed.

Water and Moisture: The appliance should not be used near water (e.g., near a bathtub, washbowl, kitchen sink, laundry tub, in a wet basement, or near a swimming pool, etc.).

Ventilation: The appliance should be situated so that its location or position does not interfere with its proper ventilation. For example, the appliance should not be situated on a bed, sofa, rug, or similar surface that may block the ventilation openings; or, placed in a built-in installation, such as a bookcase or cabinet that may impede the flow of air through the ventilation openings.

Heat: The appliance should be situated away from heat sources such as radiators, heat registers, stoves, or other appliances (including amplifiers) that produce heat.

Power Sources: The appliance should be connected to a power supply only of the type described in the operating instructions or as marked on the appliance.

Grounding or Polarization: Precautions should be taken so that the grounding or polarization means of an appliance is not defeated.

Power-Cord Protection: Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the appliance.

Cleaning: The appliance should be cleaned only as recommended by the manufacturer.

Non-Use Periods: The power cord of the appliance should be unplugged from the outlet when left unused for a long period of time.

Object and Liquid Entry: Care should be taken so that objects do not fall and liquids are not spilled into the enclosure through openings.

Damage Requiring Service: The appliance should be serviced by qualified service personnel when:

- The power supply cord or the plug has been damaged; or
- Objects have fallen, or liquid has been spilled into the appliance; or
- The appliance has been exposed to rain; or
- The appliance does not appear to operate normally or exhibits a marked change in performance; or
- The appliance has been dropped, or the enclosure damaged.

Servicing: The user should not attempt to service the appliance beyond that described in the operating instructions. All other servicing should be referred to qualified service personnel.

The Appliance should be used only with a cart or stand that is recommended by the manufacturer.

Safety Instructions (European)

Notice For U.K. Customers If Your Unit Is Equipped With A Power Cord.

WARNING: THIS APPLIANCE MUST BE EARTHED.

The cores in the mains lead are coloured in accordance with the following code:

GREEN and YELLOW - Earth BLUE - Neutral BROWN - Live

As colours of the cores in the mains lead of this appliance may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:

The core which is coloured green and yellow must be connected to the terminal in the plug marked with the letter E, or with the earth symbol, (⊕), or coloured green, or green and yellow.

The core which is coloured blue must be connected to the terminal marked N or coloured black.

The core which is coloured brown must be connected to the terminal marked L or coloured red.



The power cord is terminated in a CEE7/7 plug (Continental Europe). The green/yellow wire is connected directly to the unit's chassis. If you need to change the plug and if you are qualified to do so, refer to the table below.

WARNING: If the ground is defeated, certain fault conditions in the unit or in the system to which it is connected can result in full line voltage between chassis and earth ground. Severe injury or death can then result if the chassis and earth ground are touched simultaneously.

CONDUCTOR		WIRE COLOR	
		Normal	Alt
L	LIVE	BROWN	BLACK
N	NEUTRAL	BLUE	WHITE
E	EARTH GND	GREEN-YELLOW	GREEN

AC Power Cord Color Coding

Safety Instructions (German)

Gerät nur an der am Leistungsschild vermerkten Spannung und Stromart betreiben.

Sicherungen nur durch solche, gleicher Stromstärke und gleichen Abschaltverhaltens ersetzen. Sicherungen nie überbrücken.

Jedwede Beschädigung des Netzkabels vermeiden. Netzkabel nicht knicken oder quetschen. Beim Abziehen des Netzkabels den Stecker und nicht das Kabel erfassen. Beschädigte Netzkabel sofort auswechseln.

Gerät und Netzkabel keinen übertriebenen mechanischen Beanspruchungen aussetzen.

Um Berührung gefährlicher elektrischer Spannungen zu vermeiden, darf das Gerät nicht geöffnet werden. Im Fall von Betriebsstörungen darf das Gerät nur von befugten Servicestellen instandgesetzt werden. Im Gerät befinden sich keine, durch den Benutzer reparierbare Teile.

Zur Vermeidung von elektrischen Schlägen und Feuer ist das Gerät vor Nässe zu schützen. Eindringen von Feuchtigkeit und Flüssigkeiten in das Gerät vermeiden.

Bei Betriebsstörungen bzw. nach Eindringen von Flüssigkeiten oder anderen Gegenständen, das Gerät sofort vom Netz trennen und eine qualifizierte Servicestelle kontaktieren.

Safety Instructions (French)

On s'assurera toujours que la tension et la nature du courant utilisé correspondent bien à ceux indiqués sur la plaque de l'appareil.

N'utiliser que des fusibles de même intensité et du même principe de mise hors circuit que les fusibles d'origine. Ne jamais shunter les fusibles.

Eviter tout ce qui risque d'endommager le câble secour. On ne devra ni le plier, ni l'aplatir. Lorsqu'on débranche l'appareil, tirer la fiche et non le câble. Si un câble est endommagé, le remplacer immédiatement.

Ne jamais exposer l'appareil ou le câble à une contrainte mécanique excessive.

Pour éviter tout contact avec une tension électrique dangereuse, on n'ouvrira jamais l'appareil. En cas de dysfonctionnement, l'appareil ne peut être réparé que dans un atelier autorisé. Aucun élément de cet appareil ne peut être réparé par l'utilisateur.

Pour éviter les risques de décharge électrique et d'incendie, protéger l'appareil de l'humidité. Eviter toute pénétration d'humidité ou fr liquide dans l'appareil.

En cas de dysfonctionnement ou si un liquide ou tout autre objet a pénétré dans l'appareil couper aussitôt l'appareil de son alimentation et s'adresser à un point de service après-vente autorisé.

Safety Instructions (Spanish)

Hacer funcionar el aparato sólo con la tensión y clase de corriente señaladas en la placa indicadora de características.

Reemplazar los fusibles sólo por otros de la misma intensidad de corriente y sistema de desconexión. No poner nunca los fusibles en puente.

Proteger el cable de alimentación contra toda clase de daños. No doblar o apretar el cable. Al desenchufar, asir el enchufe y no el cable. Sustituir inmediatamente cables dañados.

No someter el aparato y el cable de alimentación a esfuerzo mecánico excesivo.

Para evitar el contacto con tensiones eléctricas peligrosas, el aparato no debe abrirse. En caso de producirse fallos de funcionamiento, debe ser reparado sólo por talleres de servicio autorizados. En el aparato no se encuentra ninguna pieza que pudiera ser reparada por el usuario.

Para evitar descargas eléctricas e incendios, el aparato debe protegerse contra la humedad, impidiendo que penetren ésta o líquidos en el mismo.

En caso de producirse fallas de funcionamiento como consecuencia de la penetración de líquidos u otros objetos en el aparato, hay que desconectarlo inmediatamente de la red y ponerse en contacto con un taller de servicio autorizado.

Safety Instructions (Italian)

Far funzionare l'apparecchio solo con la tensione e il tipo di corrente indicati sulla targa riportante i dati sulle prestazioni.

Sostituire i dispositivi di protezione (valvole, fusibili ecc.) solo con dispositivi aventi lo stesso amperaggio e lo stesso comportamento di interruzione. Non cavallottare mai i dispositivi di protezione.

Evitare qualsiasi danno al cavo di collegamento alla rete. Non piegare o schiacciare il cavo. Per staccare il cavo, tirare la presa e mai il cavo. Sostituire subito i cavi danneggiati.

Non esporre l'apparecchio e il cavo ad esagerate sollecitazioni meccaniche.

Per evitare il contatto con le tensioni elettriche pericolose, l'apparecchio non deve venir aperto. In caso di anomalie di funzionamento l'apparecchio deve venir riparato solo da centri di servizio autorizzati. Nell'apparecchio non si trovano parti che possano essere riparate dall'utente.

Per evitare scosse elettriche o incendi, l'apparecchio va protetto dall'umidità. Evitare che umidità o liquidi entrino nell'apparecchio.

In caso di anomalie di funzionamento rispettivamente dopo la penetrazione di liquidi o oggetti nell'apparecchio, staccare immediatamente l'apparecchio dalla rete e contattare un centro di servizio qualificato.

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8200ST

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Orban 8200ST

OPTIMOD-Studio Chassis

Operating Manual

page	contents
1-1	Section 1: Introduction Orban OPTIMOD-STUDIO CHASSIS 8200ST
2-1	Section 2: Installation Installation
3-1	Section 3: Operation 8200ST Controls and Meters Example Control Settings More About 8200ST Audio Processing
4-1	Section 4: Maintenance Getting Inside the Chassis Performance Evaluation
5-1	Section 5: Troubleshooting Problems and Possible Causes Technical Support Factory Service Shipping Instructions
6-1	Section 6: Technical Data Specifications Circuit Description Parts List Schematics, Assembly Drawings Abbreviations

INDEX on next page

Index

A

- abbreviations 6-33
- accessories 6-2
- AGC button 3-7
- applications 1-3
- assembly drawings 6-23
- audible distortion 3-7, 5-3
- audio
 - connections 2-6 - 2-8
 - input/output 2-6 - 2-8
 - tape recorder 3-8
- automatic gain control (AGC) 3-7

B

- balanced inputs 2-9
- bargraph driver 6-8, 6-12
- block diagram 6-23
- buzzes 5-2

C

- cable shielding 2-7, 2-9
- chassis ground 2-9
- chassis, getting inside 4-2
- circuit boards
 - access to 4-2
 - front panel 4-2
- circuit description 6-4
- circuit ground 2-9
- clicks 5-2
- clipper-defeat jumpers 2-5
- clipping
 - bias 3-5, 6-9
 - distortion 5-3
 - transient 3-7
- common-mode rejection 2-9
- component
 - numbering system 6-4
 - vendors 6-22
- compression 3-7, 6-6
- connectors, audio 2-7
- control settings 3-4
 - broadcast transmission 2-2, 3-5
 - FM subcarriers 3-5
- controls 3-2
- COUPLE switch
 - loss of memory on power-down 5-3
- covers, removing/replacing 4-2
- customer support 5-4

D

- dBu (defined) 4-4, 6-33
- de-essing 3-7
- density 6-4
- distortion 5-3, 6-6

F

- factory service 5-4
- front panel 3-2
- fuse 2-6, 6-2

G

- gain reduction 3-7
 - meter 3-7, 6-6
- gate, detector 6-7
- gating 3-7, 5-3, 6-6
 - control circuits 4-3
- grounding 2-9, 5-2
 - difficult situations 2-10
 - ground loop 2-9, 2-10

H

- harshness 5-3
- high-frequency
 - limiter 3-7, 4-3, 6-9
 - pre-emphasis 3-8
- hum 5-2

I

- impedance 2-8
- input 6-6
 - attenuators 3-7, 6-5
 - balanced 2-9
 - buffer 6-5
 - impedance 2-7
 - level 2-7
 - overload point 2-7
 - stages 4-3
- installation 2-1

J

- jumpers
 - access to 4-2
 - positions 2-4

K

- keep-alive circuit 6-12

L

- level calibration 2-11
- leveling 3-7, 6-6
- logic circuit 6-12
- loudness 3-5

M

- meter calibration 6-11
- meters 3-2, 4-3, 6-2
 - red zone 3-7
- MODULATION meter 3-9

N

- noise rush-up, pumping 3-7, 5-3

O

- operation 3-1
- options 6-2
- ordering parts 6-14 - 6-15
- output
 - impedance 2-8
 - level 2-7
 - stages 4-3
 - unbalanced load 2-8
- overshoot 5-2

P

- packing for shipment 5-5
- parts, ordering 6-15
- parts list 6-14

peak

- clippers 5-2
- control 5-2, 6-9
- level 3-7, 3-9
- output level meter 6-11
- performance evaluation 4-3
- physical dimensions 6-2
- power 2-3
 - cord 2-3, 2-6
 - supplies 4-3, 5-2, 6-13
- power requirements 6-2
- pre-emphasis 3-8, 5-3, 6-9
- pre-emphasis jumper 2-5
- product features 1-3

R

- rack-mounting unit 2-6
- registration card (first page)
- regulated dropout 6-13
- regulated voltage 6-13
- release shape 3-7, 6-6
- release time 3-7, 6-6
- RF suppression 5-2, 6-5
- RFI 2-3
 - filter 2-3
- ringing 5-2

S

- schematics 6-23
- security cover 6-2
- service 5-4
- shipping
 - instructions 5-5
- shipping damage 2-2
- shrillness 5-3
- specifications 6-2
- stereo mode 3-9
- swept sine wave measurements 3-8
- swept sine wave tests 6-9

T

- tape 3-8
- technical support 5-4
- thumps 6-6
- tilt 5-2
- timing module 6-6
- transmitter pre-emphasis 2-3
- troubleshooting 5-1

U

- unbalanced load 2-8
- unregulated voltage 6-13

V

- VCA's 4-3, 6-6
- VOICE 6-4
- VOICE button 3-7
- VOICE switch
 - loss of memory on power-down 5-3
- voltage regulators 5-2, 6-13

W

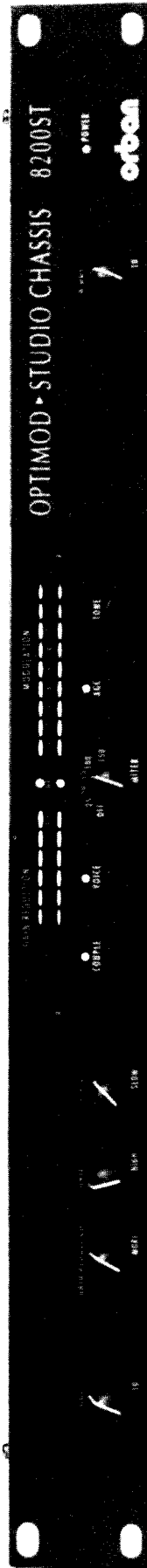
- warranty (inside back cover)
- XLR connectors 2-7

Section 1

Introduction

page contents

1-3 Orban OPTIMOD-STUDIO CHASSIS 8200ST



Orban OPTIMOD-STUDIO CHASSIS 8200ST

The 8200ST provides transparent gain riding, adjustable compression, high-frequency limiting and absolute peak control — all in a space-saving, rugged, 1-rack unit high package. The flexibility and natural sound of the 8200ST is ideally suited to many broadcast applications; in particular, protecting discrete studio-to-transmitter links when using OPTIMOD audio processing.

Barely adequate signal-to-noise ratio often makes the land line or microwave studio-to-transmitter link the weakest part of the broadcast chain. The 8200ST's transparent gain control translates to improved effective dynamic range for the link and improved signal quality at the receiver. Switch-selectable pre-emphasis limiting and peak control ensure proper matching the 8200ST to any standard transmission medium.

Features include:

- Up to 25dB of gain reduction for two channels of audio.
- Defeatable "Silence Gate" — not a conventional noise gate, but a circuit that freezes the level controller's gain when signals drop below threshold. This gate prevents rush-up of background noise during quieter passages and exaggeration of breathing during pauses in spoken voice.
- Flexible level controls: A smooth leveler, activated when the AGC button is ON, provides slow gain riding. A second, much faster level controller (one that works in conjunction with the smooth leveler) can be activated with the VOICE button.
- Five switchable HF Limiter pre-emphasis curves (25 μ s to 150 μ s): These pre-emphasis curves allow the HF limiting to complement the medium being protected.
- Built-in 400Hz line-up tone generators for easy system alignment.
- Two LED bargraphs per channel simultaneously displaying gain reduction and peak operating levels.
- Independent or stereo operation, controlled via front panel COUPLE button.
- Class-A VCAs with inherently low noise and distortion.
- Broadcast-quality interfacing with EMI-suppressed, balanced and floating inputs and outputs.
- Defeatable clipper: follows the HF limiter for absolute peak protection.

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Section 2

Installation

page contents

2-2	Installation
2-3	Figure 2-1: AC Line Cord Wiring
2-4	Figure 2-2: Jumper Settings
2-10	Figure 2-3: Suggested Ground Scheme



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

Allow about 45 minutes for installation.

Installation consists of unpacking and inspecting the 8200ST, optional defeating of transmitter's pre-emphasis, optional resetting of clipper, output pre-emphasis and tone level jumpers, mounting the unit in a rack, connecting audio and power, calibrating the 8200ST's MODULATION meters and clipping level, and setting its controls for normal operation.

The 8200ST simultaneously provides level control and protects against overmodulation. When Orban's OPTIMOD-AM, OPTIMOD-HF, or OPTIMOD-FM 8200 is used at the transmitter, the 8200ST replaces the OPTIMOD's internal AGC, which should be defeated according to instructions found in the OPTIMOD manual.

For OPTIMOD-FM 8100A or 8101, and OPTIMOD-TV 8180A or 8182A, the Orban Studio Chassis designed for that model can also be used, although the high frequency limiting of the 8200ST allows better modulation control for pre-emphasized STLs.

1. Unpack and inspect.

If you note obvious physical damage, contact the carrier immediately to make a damage claim.

Packed with the 8200ST are:

AC Power Cord
Operating Manual
Warranty/Registration Card
Safety Sheet

- Save all packing materials!* If you should ever have to ship the 8200ST (e.g., for servicing), it is best to ship it in the original packing materials because both the carton and packing material have been carefully designed to protect the unit.
- 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 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. (If it is lost, photocopy the duplicate on page 1-6). We do not sell our customer's names to anyone.



2. Check the line voltage, fuse and power cord.

- DO NOT connect power to the unit yet!*
- Check the VOLTAGE SELECTOR. This is on the rear panel.

The 8200ST is shipped configured for either 90-130V or 180-260V, 50Hz or 60Hz operation, as indicated on the rear panel. Refer to the unit's rear

panel for your Model # and the inside of the front cover of this manual for your Model #'s line voltage setting. To change the operating voltage, set the VOLTAGE SELECTOR to 115V (for 90-130V) or 230V (for 180-260V) as appropriate.

- c Check the value of the fuse and change the fuse if the value is incorrect.
Use a 1/2-amp 3AG 250V Slow-Blow for 115V operation, or 1/4-amp "T" type (250mA) Slow-Blow fuse for 230V operation.
- 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 8200ST's Model #. The green/yellow wire is connected directly to the 8200ST chassis.

If you need to change the plug to meet your country's standard and you are qualified to do so, see Figure 2-1. Otherwise, purchase a new mains cord with the correct line plug attached.

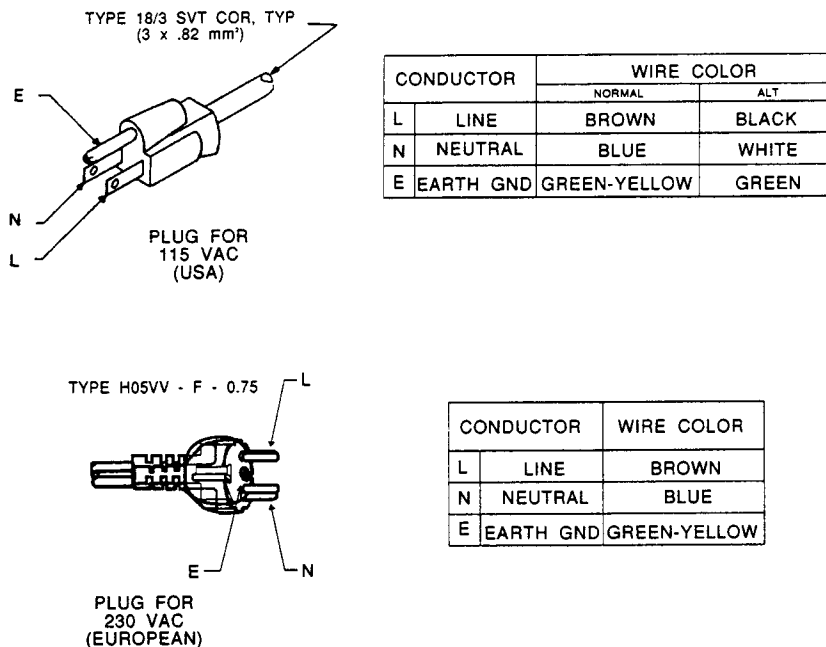
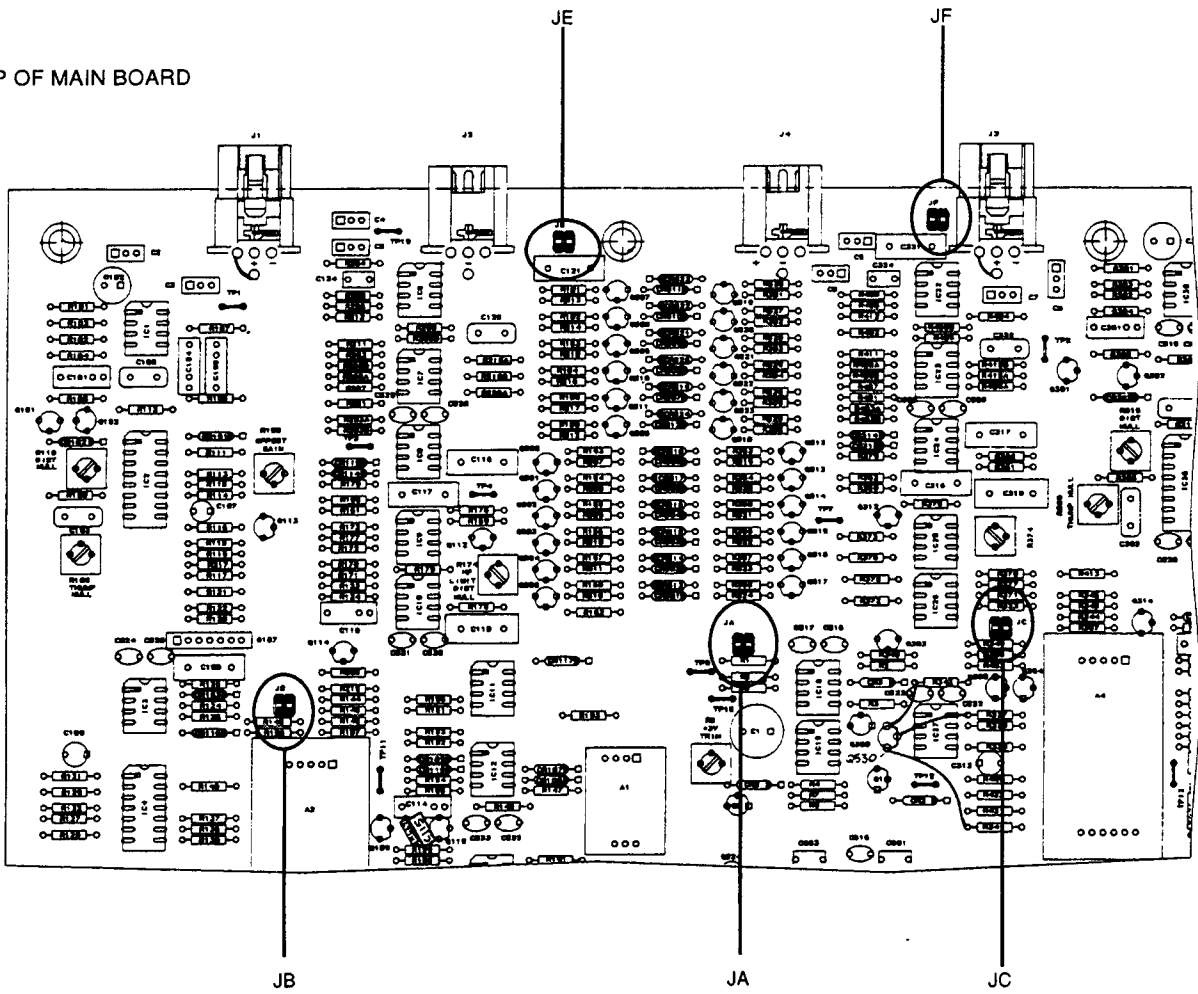


Figure 2-1: AC Line Cord Wiring

3. Defeat your STL transmitter's pre-emphasis. (optional)

The STL transmitter's pre-emphasis network may introduce overshoots that will increase peak modulation without any increase in average modulation. We therefore strongly recommend that you defeat the transmitter's pre-emphasis (freeing the transmitter from such potential overshoot), and use the 8200ST to provide the necessary pre-emphasis.

TOP OF MAIN BOARD



Clipper Jumpers

*CLIPPER ON



JA

CLIPPER OFF



JA

Output Pre-Emphasis Jumpers

*FLAT

LEFT OUTPUT



JE

RIGHT OUTPUT



JF

PRE-EMPHASIZED

LEFT OUTPUT



JE

RIGHT OUTPUT



JF

Line-up Level Jumpers

*PEAK

LEFT OUTPUT



JB

RIGHT OUTPUT



JC

AVG

LEFT OUTPUT



JB

RIGHT OUTPUT



JC

Figure 2-2: Jumper Settings (*Factory Configuration)

If the transmitter's pre-emphasis cannot be defeated, then configure the 8200ST for FLAT output (see step 4, below). In this case average modulation levels may have to be reduced to accommodate the overshoots, reducing the signal-to-noise ratio achieved in the link.

4. Internal jumper configuration.

For transmission applications, we recommend you reset the 8200ST's jumpers, as follows:

CLIPPER	ON*
OUTPUT PRE-EMPHASIS	PRE-EMPHASIZED (see step 3, immediately above)
TONE LEVEL	PEAK*

*As Shipped From the Factory

- To change any jumpers you must remove the top cover of the 8200ST to access the main circuit board. (Make sure power is not connected.) Remove all screws holding the cover in place, then lift it off. When replacing the cover, replace all screws snugly. (Be careful not to strip the threads by fastening the screws too tightly.)
- Refer to Figure 2-2 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.

CLIPPER jumper (JA) ON; this setting enables the 8200ST's peak clippers, achieving absolute peak control prior to the 8200ST's de-emphasis.

If the 8200ST's de-emphasis is disabled, then the 8200ST's peak level will be absolutely limited. Otherwise, the maximum peak output level will approximately follow the chosen de-emphasis curve as a function of frequency.

OUTPUT PRE-EMPHASIS jumpers (JE, JF) PRE-EMPHASIZED; this setting disables the 8200ST's de-emphasis and feeds pre-emphasized audio to an STL or other broadcast device that does not have pre-emphasis.

The FLAT setting applies a de-emphasis filter (complementary to the pre-emphasis chosen with the 8200ST's front panel HF Limiter control) to the 8200ST's output to yield an overall "flat" response. Use the FLAT setting if you are feeding audio to an STL that has internal pre-emphasis.

TONE LEVEL jumpers (JB, JC) PEAK; this setting enables the 8200ST's built-in tone oscillator to produce a 400Hz peak reference level tone at 100% peak modulation.

"100% peak modulation" is the threshold of the 8200ST's peak clippers: peaks will never exceed this level when the peak clippers are activated. Use peak reference level in broadcast systems to align the 8200ST's output level to the 100% modulation level of the studio-to-transmitter link. You can also use peak reference level to align the 8200ST's output level to the maximum level of a digital link.

The peak reference level is only valid when the 8200ST's peak clippers are enabled and when the 8200ST is jumpered for pre-emphasized output. If the 8200ST's peak clippers are defeated, some peaks will exceed the peak reference level. If the output of the 8200ST is "flat," this will substantially (but inconsistently) *reduce* peak levels.

The tone level is set *before de-emphasis*. So if the 8200ST is strapped FLAT, the output will be slightly lower than 100% modulation with reference to very low frequencies unaffected by pre-emphasis. However, please note that any pre-emphasis in the equipment receiving the 8200ST's output will restore the tone to the correct level. In almost all cases, the modulation metering of such driven equipment occurs after its internal pre-emphasis, and the 8200ST's tone will therefore be at the appropriate level to set the modulation level of the driven equipment correctly.

When TONE LEVEL jumpers are set to AVERAGE, the tone level is approximately 18dB below 100% modulation. This level corresponds approximately to 0VU (when you use a VU meter to monitor line levels). We do not anticipate that many users will use the tone oscillator in this mode, but it is available for special line-up requirements.

5. Mount the 8200ST in a rack. (optional)

The 8200ST 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 8200ST chassis — check this with an ohmmeter.

Mounting the unit near large heat-producing devices may shorten component life and is not recommended. Ambient temperature should not exceed 113°F (45°C) when equipment is powered.

6. Connect audio input and output.

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

7. Connect power cord.

Be sure you have checked the voltage setting and fuse according to step 2 above.

A **Connect power.**

The green power light on the lower right of the front panel should light.

Audio Input and Output Connections

Wire:

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

Because use of single-conductor cables virtually eliminates any possibility of carefully controlling the system grounding scheme, it is **NOT RECOMMENDED!** Even so, it often does work adequately in low-RF environments.

Sometimes, particularly if you are using the 8200ST with musical instruments or home-type equipment, single-conductor shielded cable may be the only practical alternative. In this case, connect the inner conductors of the shielded cables to the (+) sides (pin 2) of the 8200ST input and output XLR connectors respectively. Connect the shield of the 8200ST *input* cable to pin 3 of the 8200ST's input XLR, and connect the shield of the 8200ST *output* cable to pin 3 of the 8200ST's output XLR. Internally connect pins 1 and 3 of both input and output XLRs within the connectors.

Connectors:

Input and output connectors are XLR connectors.

In the XLR 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 LO, the other pin is automatically HI.

Input:

Nominal input level is between -10 and $+8$ dBu. The absolute overload point is $+26$ dBu.

(0dBu = 0.775V RMS; for this application, the dBm @ 600 Ω scale on voltmeters can be read as if were calibrated in dBu.)

- The electronically-balanced input of each channel is compatible with most professional and semi-professional sound equipment, balanced or unbalanced, with a source impedance of 600 Ω or less.
- Input connections are the same whether the driving source is balanced or unbalanced.

Audio Input and Output Connections (Continued)

Input (Continued):

- Connect the red (or white) wire to the pin on the XLR connector (#2 or #3) that is considered HI by the standards of your organization. Connect the black wire to the pin on the XLR connector (#2 or #3) that is considered LO by the standards of your organization.
- In **low RF fields** (like a studio site), do not connect the cable shield at the 8200ST 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 connector at the 8200ST 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.

Output

The two electronically-balanced and floating outputs of each channel simulate a true transformer output. The *source* impedance is 30Ω . In addition, there is a 1000pF capacitor between each output (HI and LO) to the chassis for RFI suppression. The output is capable of driving loads of 600Ω or higher.

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 connector. Connect the LO pin of the XLR connector (pin 2 or 3, depending on your organization's standards) to ground, and take the HI 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 8200ST's output (and at the output of other equipment in the system), connect the cable's shield to the CHASSIS GROUND (pin 1) on the XLR connector. Connect the red (or white) wire to the pin on the XLR connector (#2 or #3) that is considered HI by the standards of your organization. Connect the black wire to the pin on the XLR connector (#3 or #2) that is considered LO by the standards of your organization.

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 is free from ground loops (which induce hum and can cause oscillation) and provides maximum protection from power faults.

- All units in the system must 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 8200ST has balanced inputs.)
- All equipment *circuit grounds* must be connected to each other; all equipment *chassis grounds* must be connected together.
- In low RF fields, *cable shields* must be connected at one end only — preferably the source (output) end.
- In high RF fields (such as transmitter sites), cable shields must be connected to a solid earth ground at both ends to maximize their RF shielding. This means that all equipment in such environments must have balanced inputs to prevent the ground loops that could otherwise be introduced.

Power:

- Ground the 8200ST 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 is a safety hazard. If there is a power fault to the chassis, death could result!



Grounding (Continued)

Difficult Situations:

Because it is not always possible to determine if the equipment driving or being driven by the 8200ST has its circuit ground internally connected to its chassis ground (which is always connected to the ground prong of the AC power cord, if present), and because the use of the AC power ground often introduces noise or other imperfections such as RFI, hum, clicks, and buzzes, the wiring techniques in Fig 2-3 are not universally applicable.

If you follow Fig 2-3 and hum or noise appears, don't be afraid to experiment. If the noise sounds like a low-level crackling buzz, then probably there isn't *enough* grounding. Try connecting the LO pin on the 8200ST's XLR connector to ground and see if the buzz goes away. Either pin 3 or pin 2 will work as the LO pin; the choice depends only on your organization's standards,

A ground loop usually causes a smooth, steady hum rather than a crackly buzz. If you have a ground loop, think carefully about what is going on, and keep in mind the general principle: one and *only one* circuit ground path should exist between each piece of equipment!

When a single-conductor shielded cable is used for audio connections, the shield will ordinarily receive chassis ground from the external equipment which it is connecting to the output of the 8200ST. To minimize hum or buzz, it may be necessary to connect pins 1 and 3 of the 8200ST's input and output XLR connectors together.

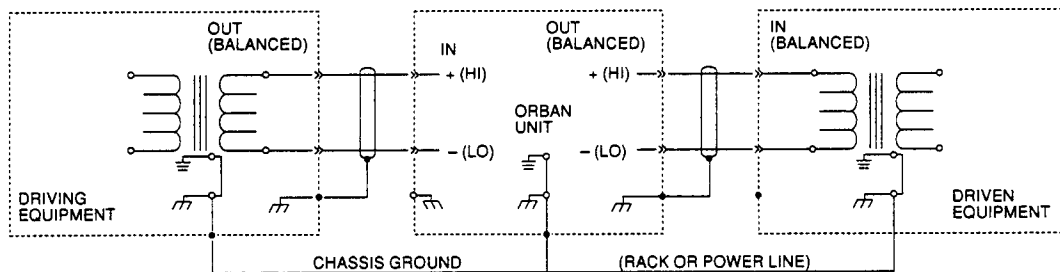


Figure 2-3: Suggested Ground Scheme

8. Calibrate MODULATION meters.

- A Press the TONE button.

The TONE lamp should light and the modulation meters should indicate "0." If they do not, restrap jumpers JB and JC to "peak." (See page 2-5.) The 8200ST is now producing a 400Hz sine wave at each output. The peak level of this tone corresponds to 100% modulation.

- B Adjust the L OUT and R OUT controls so that the transmitter or subcarrier generator is being driven to 100% modulation.

The L OUT and R OUT controls are now correctly calibrated to the transmitter. Provided that no significant overshoot occurs in the transmitter, the MODULATION meter will now give an accurate indication of peak modulation.

- C Press the TONE button to turn off the tone.

If the transmitter or subcarrier generator suffers from bounce or overshoot, you may have to reduce the L OUT and R OUT control settings to avoid peak over-modulation caused by overshoots on certain audio signals.

9. Set controls for normal operation with program material.

The following assumes that a VU meter is used to determine line drive levels with program material.

- A Set controls as follows:

HF LIMITER	Set to match the pre-emphasis of the transmission system
L OUT, R OUT	Do not change
GATE	12:00
RELEASE	12:00
VOICE	OFF
AGC	ON
COUPLE	ON

- B Feed the 8200ST either with tone at your system reference level (0VU), or with typical program material at normal levels.

- C Adjust the GAIN REDUCTION control for the desired amount of gain reduction.

We recommend 8-15dB gain reduction for most formats.

10. Set the studio chassis status on your OPTIMOD-FM 8200 to [YES].

[Skip this step if you are not using an OPTIMOD-FM 8200 with your 8200ST.]

To tell your 8200 that an Orban studio chassis is installed at your studio (feeding the STL link), set the studio chassis parameter to [YES]. This parameter can be set on the 8200's front panel SYSTEM SETUP I/O CALIB screen (see page 2-54 of the 8200 manual) or QUICK SETUP studio chassis status screen (see page 2-44 of the 8200 manual).

Installation Completed.

Section 3

Operation

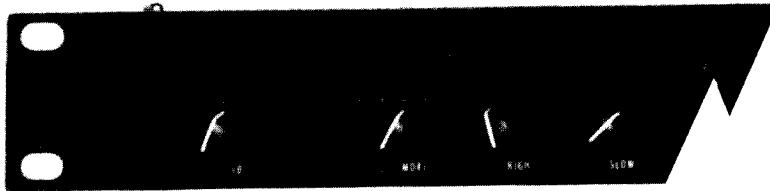
<u>page</u>	<u>contents</u>
3-2	8200ST Controls and Meters
3-4	Example Control Settings
3-7	More About 8200ST Audio Processing



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.

8200ST Controls and Meters



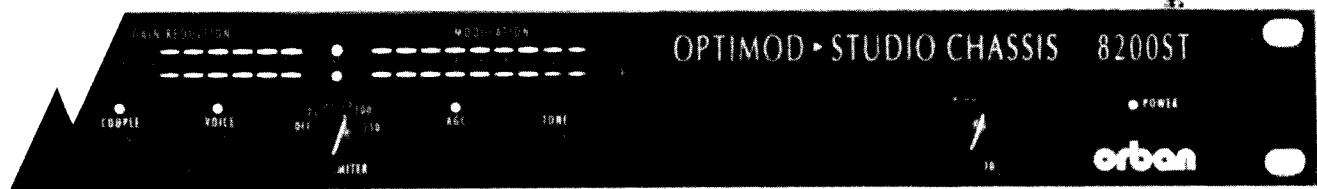
GAIN REDUCTION control simultaneously adjusts the left and right channel input drive levels for rapid, accurate stereo adjustment of gain reduction. Higher settings produce more gain reduction by increasing the signal being applied to the fixed threshold of the 8200ST's AGC/compressor circuitry. (The compression ratio of the AGC is very high, so the output level does not change significantly when you change GAIN REDUCTION.)

GATE control sets the threshold of the 8200ST's Silence Gate. The 8200ST's Silence Gate is not a conventional noise gate, but a circuit that freezes the level controller's gain when signal drops below threshold. It prevents rush-up of background noise during quiet passages and exaggeration of breathing during pauses in spoken voice. After gating, the gain moves slowly to the average amount of gain reduction over the past 30-second period.

RELEASE control speeds or slows the 8200ST's primary AGC level controller (when the AGC button is ON). When set to SLOW, the level controller acts as a slow leveler, keeping the long-term average level constant, but allowing the illusion of wide dynamics. As the control is turned toward FAST, the short-term dynamics are affected as well, resulting in a denser, punchier, more consistent sound. Quiet passages are made louder. The RELEASE control is only active when the AGC button LED is ON.

COUPLE button determines whether the gain reduction of the left and right channels is independent or coupled to preserve a balanced stereo image. When set to ON, the gain reduction of both channels is determined by the channel that requires the *most* gain reduction at any given instant. When set OFF, the two channels of the 8200ST operate independently. This is useful for correcting a poorly balanced stereo program. (The high-frequency limiters *always* operate independently, since their short release times preclude stereo imaging problems. Their operation is unaffected by the COUPLE button.)

The COUPLE mode is active when the COUPLE button LED is ON.



VOICE button turns on the 8200ST's second AGC level controller (when the AGC button is ON). The fast compression function of this controller provides faster transient overshoot protection for better control of the wide dynamics of unprocessed voice. The second controller is only activated by those transients that are too fast for the slower AGC and which would otherwise cause overload. VOICE is also useful for controlling program material that has an unusually high peak-to-average ratio or is characterized by many abrupt level changes. The VOICE control is active when the AGC and VOICE button LEDs are ON. VOICE is appropriate for voice-only applications. However, if the processed output of the 8200ST will later be processed by an Orban multiband OPTIMOD broadcast processor (OPTIMOD-AM, -FM, -TV, or -HF), the final on-air result will be smoothest if VOICE is OFF. In this case, only leave VOICE ON if the program material is mainly speech that has not been previously compressed or peak limited.

HF LIMITER switch turns the high frequency limiter ON or OFF and determines the amount of HF control. The 25 μ s setting produces the least high-frequency limiting; the 150 μ s setting produces the most. The HF LIMITER is particularly effective at de-essing excessively sibilant voices, and is more effective than traditional sibilance-detecting de-essers when used on mixed program material. As a high-frequency limiter in transmission applications, the HF LIMITER ensures that the peak output signal is perfectly controlled to not exceed the selected pre-emphasis. If the internal pre-emphasis jumper is in the PRE-EMPHASIZED output position, the switch also determines the pre-emphasis at the 8200ST's output. The OFF setting defeats the high frequency limiter.

AGC button enables or disables the 8200ST's level control functions (the slow AGC, the faster AGC compressor, the Silence Gate, and stereo coupling). The AGC button is useful when you want to use the HF LIMITER (and clipper, if activated) alone without level control before it. Simply de-activate the AGC button to disable the level control.

TONE button activates the 8200ST's built-in alignment tone generator. Extremely useful at system setup, the 400Hz tone can be internally jumpered to operate at either 100% peak modulation or nominal studio operating level (see page 2-5). When set to 100% peak modulation, the peak level of this tone is the maximum peak level that will be produced by

the 8200ST with its Clipper activated. Use this tone to quickly align the 8200ST to transmitters, subcarrier generators and digital links. When set to nominal studio operating level, the tone is useful for setting average levels with a VU meter.

L OUT and R OUT controls adjust the output level. When using the 8200ST's peak controller circuitry to protect equipment down-line, these controls are used to set the maximum output of the 8200ST to just below the overload point of the equipment being protected.

GAIN REDUCTION meters display up to 25dB of gain reduction in each channel. If the red LED at the far left of the bargraph lights, no further gain reduction is available.

MODULATION meters indicate the peak operating level of the 8200ST at the output of all processing, but before the de-emphasis (if activated), **OUT** controls and balanced output amplifier. "0dB" corresponds to the threshold of the internal clipper and also to the peak level of the 400Hz tone produced by the built-in alignment tone generator when strapped for peak reference level. The actual output level of the 8200ST is determined by the **OUT** controls, which set the reference level at the 8200ST's XLR output from less than -10dBu to +24dBu. The meter reads within 0.5dB of the true peak value of a 10-microsecond pulse. The meter is particularly useful as a peak modulation indicator for a microwave STL or FM subcarrier generator that does not have accurately calibrated peak-reading meters.

GATE indicator lights when the input levels falls below the threshold set by the **GATE** control.

HF indicators light when HF limiting occurs.

COUPLE, VOICE, AGC, and TONE indicators light when their respective buttons are enabled (ON).

POWER indicator lights when the power cord is connected to the rear panel and an appropriate AC power source.

Example Control Settings

NOTE: These specific application setups are intended as a starting point for integration of the 8200ST into your system. Actual setups will vary with experience and experimentation. There are also many other applications which by their nature do not lend themselves to a chart-like presentation of recommended settings. In these applications, experience and experimentation are the best guides.

Level Control Before Digital Link

OUT	match the 8200ST's internal alignment tone (strapped for PEAK reference level) to the digital clip point.
HF LIMITER	OFF (or to complement any pre-emphasis used)
GAIN REDUCTION	for 5-10dB G/R (or for amount of AGC gain reduction required)
GATE	12:00
RELEASE	12:00
VOICE	set according to program material; OFF is usually appropriate unless material will not be later processed with an OPTIMOD broadcast processor.
AGC	ON
Clipper jumper (JA)	ON

Satellite Uplink

OUT	match the 8200ST's internal alignment tone (strapped for PEAK reference level) to the transmitter 100% modulation level.
HF LIMITER	OFF (or to complement any pre-emphasis used)
GAIN REDUCTION	for 5-10dB G/R (or for amount of AGC gain reduction required)
GATE	12:00
RELEASE	12:00
VOICE	set according to program material; OFF is usually appropriate, unless material will note be later processed with an OPTIMOD broadcast processor.
AGC	ON
Clipper jumper (JA)	ON

FM Subcarrier Generators

OUT	match the 8200ST's internal alignment tone (strapped for PEAK reference level) to 100% subcarrier modulation level.
HF LIMITER	150 μ s
GAIN REDUCTION	for 5-10dB G/R (or for amount of AGC gain reduction required)
GATE	12:00
RELEASE	12:00
VOICE	set according to program material; ON is usually appropriate.
AGC	ON
Clipper jumper (JA)	ON

Discrete Analog STL

OUT	match the 8200ST's internal alignment tone (strapped for PEAK reference level) to the transmitter 100% modulation level.
HF LIMITER	OFF (or to complement any pre-emphasis used)
GAIN REDUCTION	for 5-10dB G/R (or for amount of AGC gain reduction required)
GATE	12:00
RELEASE	12:00
VOICE	set according to program material; OFF is usually appropriate, unless program material is primarily unprocessed speech.
AGC	ON
Clipper jumper (JA)	ON

15kHz Analog Phone Lines

OUT	match the 8200ST's internal alignment tone (strapped for PEAK reference level) to the maximum peak level accepted by the phone lines.
HF LIMITER	OFF
GAIN REDUCTION	for 5-10dB G/R (or for amount of AGC gain reduction required)
GATE	12:00
RELEASE	12:00
VOICE	set according to program material; OFF is usually appropriate, unless program material is primarily unprocessed speech.
AGC	ON
Clipper jumper (JA)	ON

More About 8200ST Audio Processing

Gain Reduction (Using the GAIN REDUCTION control and meters)

The GAIN REDUCTION control determines the overall amount of gain reduction by setting the input signal level going into the gain control circuitry.

Be careful not to adjust the controls to produce so much gain reduction that the red LED at the far left of each GAIN REDUCTION meter lights.

Unlike the metering in some processors, the red segments of the 8200ST's GAIN REDUCTION meters give a warning that must be heeded. When the meter is in the red, the compressor has run out of gain reduction range, and various circuits will clip, causing objectionable distortion (and various nastinesses to commence).

Leveling and Compression (Using the RELEASE and VOICE controls)

RELEASE controls the "sound texture." As you adjust the RELEASE control towards FAST, the gain reduction activity becomes faster and faster. This serves two purposes; 1) The 8200ST brings lower level signals up much faster, and 2) the sound becomes denser, louder, and more consistent with a tightly-controlled dynamic range. FAST RELEASE is useful for producing a high impact sound. (To avoid possible distortion, you should set the VOICE function ON when using very fast RELEASE settings.) Settings towards SLOW tend to retain a full sense of dynamic range and add no coloration to the sound, only controlling long term average levels.

The VOICE control complements the RELEASE control. When VOICE is active (LED on), a fast-attack limiting function is added to the slow-attack leveling function. This is useful where you want fast response to abrupt level changes. This setting is ideal for speech. When used with RELEASE set near FAST, voices have excellent consistency.

Gating (Using the GATE control)

The GATE control sets the level below which the AGC will freeze to prevent noise rush-up during pauses and low-level passages. Gating is enabled when the AGC button is ON.

The 8200ST's gating function is *not* the same as a conventional "noise gate" because it is not intended to reduce noise or other undesired sounds below the level at which they occur in the original program. Its purpose is to prevent unnatural exaggeration of such material. (If needed, a conventional noise gate can be used before the 8200ST.)

High-frequency Limiting (Using the HF LIMITER control)

The 8200ST's high-frequency limiter is essentially a variable 6dB/octave low-pass filter that adapts to the spectrum of the program material to prevent overloading pre-emphasized media following the 8200ST. In addition to general-purpose high-frequency limiting, the high-frequency limiter may be useful in de-essing vocals that have already been mixed with

other program material. It performs this task significantly more smoothly than dedicated de-essers because its threshold does not follow the average input level, and because it cannot punch “holes” in the program.

The HF LIMITER switch enables or disables the high-frequency limiter and selects the pre-emphasis for the high-frequency limiter. These are all 6dB/octave curves which are up 3dB at $1/(2\pi T)$ Hz, where T is the time constant in seconds. 25 μ s produces the least high-frequency limiting; 150 μ s produces the most. Generally, the **pre-emphasis curve** should match that of the medium being protected (see the preceding “Example Control Settings” and the following table).

Because their short release times preclude stereo imaging problems, the high-frequency limiters of each channel operate independently, regardless of the position of the COUPLE button. The high-frequency limiter is located *after* the leveler/compressor and is essentially independent of it. Ordinarily, the leveler/compressor controls the input levels to the high-frequency limiter. **To use the high-frequency limiter independently**, set the AGC button OFF. When you use the 8200ST this way, adjust the GAIN REDUCTION control with particular care to avoid over-driving the high-frequency limiter or clipping the VCAs.

Pre-Emphasis	Up 3dB at	Application
none	—	Recording tape at 30ips; PCM digital links
25 μ s	6.37kHz	Recording tape at 15ips
37.5 μ s	4.24kHz	Recording tape at 7.5ips
50 μ s	3.18kHz	FM broadcast (Europe)*; PCM digital links with EIAJ pre-emphasis (50 μ s/15 μ s)
75 μ s	2.12kHz	FM broadcast*, cassette duplication**, microwave STLs
100 μ s	1.59kHz	Cassette duplication**
150 μ s	1.06kHz	FM SCA subcarriers

* FM broadcast pre-emphasis standards vary by country.

** Depends on tape quality and whether Dolby HX Pro[®] processing is used.

(To ensure accuracy in broadcast STL or SCA applications, the pre-emphasis network in the STL or SCA generator should be defeated, and the 8200ST's jumpers should be set for pre-emphasized output — see “Installation” in Section 2.)

If you hear high-frequency distortion, try switching the HF Limiter switch to a higher setting. If you hear excessive high-frequency loss, try a lower setting.

The thresholds, time constants, and compression ratios of the high-frequency limiter have been optimized for unobtrusive processing of dynamic program material. Sine waves do not resemble real program material. Consequently, if you make swept sine wave measurements on the high-frequency limiter, the curves that are produced will not be the exact inverses of the curves selected with the HF Limiter switch. (The primary reason for this is that the threshold of the high-frequency limiter has been set several dB above the steady-state threshold of the leveling circuit to avoid having transient overshoots from the leveling circuit cause unnecessary high-frequency gain reduction.)

Stereo-Tracking and Independent Two-Channel Operation (Using the COUPLE control)

The 8200ST is a stereo device and is unsuitable for dual-channel operation with unrelated program material in each channel. Setting the COUPLE button ON (for stereo mode operation) ensures stable stereo imaging. In this mode, gain reduction of both channels will follow the channel requiring the *greater* amount of gain reduction.

When the COUPLE button is OFF, the left and right channels can take separate amounts of gain reduction. This can sometimes be beneficial in broadcast applications where poor production practices have created recorded material with significant channel imbalance. Independent operation of the 8200ST's AGC can correct such imbalance, and its operation is usually slow enough to prevent audible motion of the stereo image.

Peak Levels and the Modulation Meter (Reading the MODULATION Meters)

The MODULATION meter monitors the signal prior to de-emphasis (if used) and the OUT controls. When you use 50 μ s pre-emphasis (or above), most program material produces frequent peaks at 100% modulation and will therefore hit the peak clippers in the 8200ST. The 8200ST's MODULATION meter will show this clearly. However, clipping density is very light by comparison to clipping density in an Orban broadcast transmission processor, and the subsequent de-emphasis rolls off any clipping-induced distortion into inaudibility.

When you are operating with no pre-emphasis, peaks at 100% will occur very rarely. (Most peaks will occur from -4 to -8dB below the clipping threshold at "0" on the meter.) This is because there is no de-emphasis to roll off any distortion caused by the peak clipper, so we decided to set the levels very conservatively to prevent clipping with almost any program material. 8200ST processing is specifically *not* designed to increase short-term program density; it is designed instead to handle the audio as gently and transparently as possible. In a broadcast system, the transmission audio processor (OPTIMOD-AM, -FM, -TV, or -HF) is far better suited to increase short-term density than is the 8200ST. Further, these transmission OPTIMOD units work best when they receive the cleanest possible audio, which the 8200ST is designed to provide.

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