Section 5 Troubleshooting

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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.

Problems and Possible Causes

Always verify that the problem is not the source material being fed to the 8282, or in other parts of the system.

RFI, Hum, Clicks, Or Buzzes

A grounding problem is likely. Review the information on grounding on page 2-17.

The 8282 has been designed with very substantial RFI suppression on its analog and digital input and output ports, and on the AC line input. It will almost always operate adjacent to high-powered transmitters without difficulty. In the most unusual circumstances, it may be necessary to reposition the unit to reduce RF interference, and/or to reposition its input and output cables to reduce RF pickup on their shields.

Buzz can be caused by Incidental Carrier Phase Modulation (ICPM), where the visual carrier interferes with the aural carrier. This can be caused by poor transmitter tuning and/or by insufficient bandwidth in the antenna system's notch diplexer. ICPM has particularly severe consequences in the BTSC and EIAJ stereo systems, and the transmitter often requires updating in order to successfully transmit stereo.

Poor Peak Modulation Control

The 8282 ordinarily controls peak modulation to an accuracy of ±1%. This accuracy will be destroyed if the signal path following the 8282 has poor transient response. Almost any link can cause problems. Even the TV aural exciter can have insufficient flatness of response and phase linearity (particularly at low frequencies) to disturb peak levels. Section 1 of this manual contains a complete discussion of the various things that can go wrong.

Even if the transmission system is operating properly, the TV aural modulation monitor or reference receiver can falsely indicate peak program modulation higher than that actually being transmitted if the monitor overshoots at high or low frequencies. Many commercial monitors have this problem, but most of these problem units can be modified to indicate peak levels accurately.

In the BTSC stereo system, the stereo encoder must contain sharp linear low-pass filters to protect the pilot tone from interference and to avoid aliasing between the stereo main channel and subchannel (and vice-versa). These filters will almost certainly cause overshoot. Fortunately, experience has shown that this overshoot causes no interference or other damage and can be ignored. Most TV stereo modulation monitors have circuitry to ignore short-duration overshoots so that they will not indicate peaks of this nature.

Audible Distortion On-Air

Make sure that the problem can be observed on more than one receiver and at several locations. Multipath distortion at the monitoring site can be mistaken for real distortion.

Verify that the source material at the 8282's audio inputs is clean. Heavy processing can exaggerate even slightly distorted material, pushing it over the edge into unacceptability. The subjective adjustments available to the user have enough range to cause audible distortion at their extreme settings. Advancing the MULTI-BAND CLIP and/or FINAL CLIP DRIVE controls too far will inevitably cause distortion. Setting the LESS-MORE control in the 5-Band Music presets beyond "9" will cause audible distortion of some program material.

If you are using the 8282's analog inputs, the headroom of the 8282's analog-to-digital (A/D) converter must be correctly matched to the peak audio levels expected in your system (using the "SETUP" screen). If your peak program level exceeds the peak level you have specified on setup, the 8282's A/D converter will clip and distort. (See page 2-38).

If you are using an external processor ahead of the 8282, be sure that it is not causing problems. For example, if a "stereo enhancer" is used, be sure that it does not significantly increase the average level of the stereo difference channel (L–R). This will almost certainly exaggerate multipath distortion.

> The Orban 222A Stereo Enhancer is fully compatible with the 8282 and will not cause this problem.

Audible Noise on Air

(See also **RFI, Hums, Clicks, or Buzzes** on page 5-2.)

Excessive compression will always exaggerate noise in the source material. The 8282 has two systems that fight this problem. The *compressor gate* freezes the gain of the AGC and compressor systems whenever the input noise drops below a level set by the GATE THRESHOLD dB control, preventing noise below this level from being further increased. In the Five-Band structure, *dynamic single-ended noise reduction* can be used to reduce the level of the noise below the level at which it appears in the input. Both of these features are explained in Section 3 of this manual.

In television audio, the setting of the GATE THRESHOLD dB control is quite critical if you want the processing to be undetectable to the audience. If this control is set too low, then the 8282 will pump up quiet sounds such as ambiance and underscoring to unnaturally high levels. Refer to Section 3 of this manual for a further discussion.

If you are using the 8282's analog input, the overall noise performance of the system is usually limited by the overload-to-noise ratio of the analog-to-digital converter used by the 8282 to digitize the input. (This ratio is slightly better than 97dB.) It is important to correctly specify the A-I CLIP LVL dBu in the I/O CALIB screen to optimize the noise performance available from the analog-to-digital converter. You should specify the A-I CLIP LVL as the highest peak level that will be presented to the 8282 under normal operation. If, in an attempt to build in a "safety factor" or increase headroom, you specify a higher level than this, every 1dB of extra headroom that you gain will be accompanied by a 1dB increase in the 8282's noise floor.

The 8282's optional AES/EBU input is capable of receiving words of up to 20 bits. A 20-bit word has a dynamic range of approximately 120dB. The 8282's digital input will thus rarely limit the unit's noise performance even with very high amounts of compression.

If a studio-to-transmitter link (STL) is used to pass unprocessed audio to the 8282, the STL's noise level can severely limit the overall noise performance of the system because compression in the 8282 can exaggerate the STL noise. For example, the overload-to-noise ratio of a typical analog microwave STL may only be 70-75dB. In this case, it may be wise to use a companding noise reduction system (like dbx Type 2 or Dolby SR) around the STL. Composite STL systems with marginal paths or co-channel interference can cause noise (hiss) which will be most apparent when listening in stereo.

Whistle on Air, Perhaps Only in Stereo Reception

This could be caused by a number of problems, any of which could present a spurious tone (perhaps supersonic) to the input of an external stereo encoder. In any such case, the first thing to do is to examine the left and right analog outputs with a spectrum analyzer to see if any spurious tones are visible.

If the whistle is 532Hz, there could be a beat between the 8282's 32kHz sampling frequency and the 31.47kHz stereo subcarrier (in BTSC countries). In this case, the most probable cause is a failure of the 8282's digital-to-analog converter system (on the Analog I/O Card), including a failure of the reconstruction filters following the converter.

A whistle at another frequency might be associated with power supply oscillation, oscillation of any opamp in the digital-to-analog converter system, or composite STL problems.

Shrill, Harsh Sound

If you are using the Five-Band structure, this problem can be caused by excessively high settings of the BRILLIANCE and/or PRESENCE controls.

If you are driving an external stereo encoder with built-in pre-emphasis, you must set the 8282's output to FLAT on the SYSTEM SETUP screen (or the I/O CALIB screen) to prevent double pre-emphasis, which will cause very shrill sound.

Dull Sound

If the Protection or Two-Band structures are used, dull-sounding source material will sound dull on the air. The Five-Band structure will automatically re-equalize such dull-sounding source material to make its spectral balance more consistent with other program material.

If the 8282's output is set to FLAT on the SYSTEM SETUP screen (or the I/O CALIB screen), there will be no pre-emphasis unless it is supplied elsewhere in the system. This will cause very dull sound.

Commercials Too Loud

If you are using a Two-Band structure, make sure that the Loudness Controller (LOUD CNTRL ON/OFF) is activated on the preset that you are using. (You can check this by accessing the FULL CONTROL screen.)

If the Loudness Controller is active but you do not believe it is working hard enough, set its threshold lower using the FULL CONTROL screen (LOUD CNTRL THRESH).

Note that the Loudness Controller controls loudness to an absolute threshold and does not understand the context of the program. So if a commercial follows a piece of very quiet program material, the commercial may still seem loud even though the Loudness Controller is working properly.

The Five-Band structure does not have a loudness controller because its Five-Band processing intrinsically makes loudness from source to source much more uniform than does the Two-Band structure (when its Loudness Controller is defeated). For some program material the Two-Band structure with Loudness Controller enabled will control loudness more effectively than will the Five-Band structure. For such material you may wish to use a preset that employs the Two-Band structure with loudness control.

System Will Not Pass Line-Up Tones at 100% Modulation

This is normal. Sine waves have a very low peak-to-average ratio by comparison to program material. The processing thus automatically reduces their peak level to bring their average level close to that of program material, promoting a more consistent and well-balanced sound quality. Recall the BY BYPASS preset to pass line-up tones transparently.

The 8282 can generate its own test tones, and these can be triggered from the 8282's optically-isolated remote control terminals, or by recalling a tone preset from the front panel, or by a remote computer connected to the RS-232 or RS-422 serial ports. Page 1-17 provides a further explanation.

System Will Not Pass Emergency Broadcast System ("EBS" USA Standard) Tones at the Legally-Required Modulation Level

See **System Will Not Pass Line-Up Tones at 100% Modulation** (directly above) for an explanation. The 8282 itself can generate the standard EBS tones at the correct modulation level. See page 2-66.

Interference from Stereo Into Subcarriers

Even slight amounts of clipping of the composite baseband in the BTSC and EIAJ systems can cause such interference. Such composite clipping result from your over-driving a composite link between the 8282's composite output and the exciter's input.

If the exciter is non-linear, this can cause crosstalk. In general, a properly-operating exciter should have less than 0.1% THD at high frequencies to achieve correct operation with subcarriers.

To prevent truncation of the higher-order Bessel sidebands of the FM modulation, the RF system following the exciter must be wideband (better than ±500kHz) and must have symmetrical group delay around the carrier frequency. An incorrectly-tuned transmitter can exhibit an asymmetrical passband which will greatly increase crosstalk into subcarriers.

Amplitude modulation of the carrier that is synchronous with the program ("synchronous AM") can cause program-related crosstalk into subcarriers. Synchronous AM should be better than 35dB below 100% modulation as measured on a synchronous AM detector with standard de-emphasis (50μs or 75μs).

The subcarrier receiver itself must receive a multipath-free signal, and must have a wide and symmetrical IF passband and a linear, low-distortion FM demodulator to prevent program-related crosstalk into subcarriers.

L–R (Stereo Difference Channel) Will Not Null With Monophonic Input

This is often caused by relative phase shifts between the left and right channels prior to the 8282's input. This will cause innocuous linear crosstalk between the stereo main and subchannels (and *vice-versa*).

General Dissatisfaction With Subjective Sound Quality

The 8282 is a complex processor which can be adjusted for many different tastes. For most users, the gamut offered by the LESS-MORE control is sufficient to find a satisfactory "sound." However, some users will not be satisfied until they have accessed the FULL CONTROL screens and have adjusted the subjective setup controls in detail to their satisfaction. Such users *must* fully understand the material in Section 3 of this manual to achieve the best results from this exercise.

By comparison to competitive processors, the 8282 offers a uniquely favorable set of trade-offs between loudness, brightness, distortion, and build-up of program density. If your audio does not seem to be up to the standards of other stations in your market, the cause is usually problems with the source material, overshoot in the transmission link (including the TV aural exciter) following the 8282, an inaccurate modulation monitor that is causing you to under-modulate the carrier, or excessively narrow and/or asymmetrical RF bandwidth in the transmitter/antenna system. A station may suffer from any combination of these problems, and they can have a remarkable effect upon the overall quality of a station's sound.

Section 1 of this manual provides a thorough discussion of system engineering considerations, particularly with regard to minimizing overshoot and noise.

Security Pascode Lost (When Unit is Locked Out)

If the unit is locked out, and you do not know the pascode number to access SYSTEM SETUP, you can unlock the unit and re-assign your pascode by completing the following steps:

1. Open up the 8282's front panel.

See page 4-3 for instructions.

A☐ Make sure that the 8282's AC POWER switch is OFF.

B☐ Remove Card #9 (Control Card) from its slot, insert the extender card (included with your 8282) into slot #9, then insert Card #9 into the extender card.

C☐ Set the AC POWER switch to ON.

D☐ Press Unlock Button S1. S1 is the black button located towards the rear of the card, about 1 inch from the top. Refer to the Control Card drawing on page 6-41 for the exact location of Button S1.

E☐ Set the 8282's AC POWER switch to OFF.

F☐ Remove Card #9 from the extender card, remove the extender card from slot #9, then re-insert Card #9 into its slot.

2. Close front panel.

See page 4-3 for instructions.

A☐ Access the SYSTEM SETUP SET PASCODE screen using the front panel soft keys. Refer to section 2 for details.

B☐ Complete security and Pascode programming, according to the instructions in Section 2 (page 2-57).

Make sure SYSTEM SETUP and SET PASCODE parameters in the SET PASCODE screen are set to YES for the system manager. Otherwise, SET PASCODE will be inaccessible when locked out.

Troubleshooting IC Opamps

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

Exceptions are opamps used without feedback (as comparators) and opamps with outputs that have been saturated due to excessive input voltage because of a defect in an earlier stage. However, if an opamp's (+) input is more positive than its (–) input, yet the output of the IC is sitting at –14 volts, the IC is almost certainly bad. The same holds true if the above polarities are reversed. Because the characteristics of the 8282's circuitry are essentially independent of IC opamp characteristics, an opamp can usually be replaced without recalibration.

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

Technical Support

If you require technical support, contact Orban customer service. Be prepared to accurately describe the problem. Know the serial number of your 8282 — this is printed on the rear panel of the unit.

Telephone: (1) 510/351-3500 or Write: Customer Service
Orban
or Fax: (1) 510/351-1001 1525 Alvarado Street
San Leandro, CA 94577 USA

Factory Service

Before you return a product to the factory for service, we recommend that you refer to this manual. Make sure you have correctly followed installation steps and operation procedures. If you are still unable to solve a problem, contact our Customer Service for consultation. Often, a problem is relatively simple and can be quickly fixed after telephone consultation.

If you must return a product for factory service, please notify our Customer Service by telephone, *before* you ship the product; this helps us to be prepared to service your unit upon arrival. Also, when you return a product to the factory for service, we recommend you include a letter describing the problem.

Please refer to the terms of your Limited One-Year Standard Warranty, which extends to the first end-user. After expiration of the warranty, a reasonable charge will be made for parts, labor, and packing if you choose to use the factory service facility. Returned units will be returned C.O.D. if the unit is not under warranty. Orban will pay return shipping if the unit is still under warranty. In all cases, transportation charges to the factory (which are usually quite nominal) are paid by the customer.

Shipping Instructions

Use the original packing material if it is available. If it is not, use a sturdy, double-walled carton no smaller than 23⅛ (H) x 22¼ (D) x 10⅞ (W) — 58.74 cm (H) x 56.52 cm (D) x 27.62 cm (W), with a minimum bursting test rating of 200 pounds (91 kg). Place the chassis in a plastic bag (or wrap it in plastic) to protect the finish, then pack it in the carton with at least 1.5 inches (4 cm) of cushioning on all sides of the unit. "Bubble" packing sheets, thick fiber blankets, and the like are acceptable cushioning materials; foam "popcorn" and crumpled newspaper are not. Wrap cushioning materials tightly around the unit and tape them in place to prevent the unit from shifting out of its packing. Close the carton without sealing it and shake it vigorously. If you can hear or feel the unit move, use more packing. Seal the carton with 3-inch (8 cm) reinforced fiberglass or polyester sealing tape, top and bottom in an "H" pattern. Narrower or parcel-post type tapes will not withstand the stresses applied to commercial shipments.

Mark the package with the name of the shipper, and with these words in red:

DELICATE INSTRUMENT, FRAGILE!

Insure the package properly. Ship prepaid, not collect. Do not ship parcel post.

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