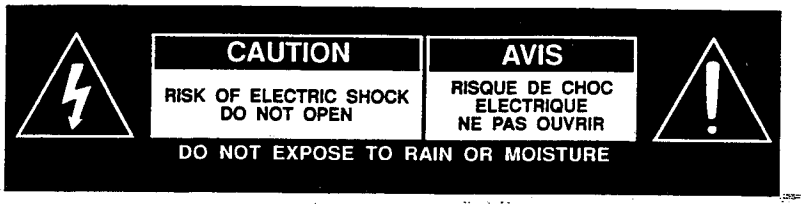
MODEL 168A

STUDIO DYNAMICS PROCESSOR

dbx®

OPERATION/SERVICE MANUAL



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.

This Manual is part number 18-2039-B

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CAUTION

RISK OF ELECTRIC SHOCK
DO NOT OPEN

ATTENTION: RISQUE DE CHOC ELECTRIQUE - NE PAS OUVRIR

WARNING: TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK DO NOT EXPOSE THIS EQUIPMENT TO RAIN OR MOISTURE

The symbols shown at left are internationally accepted symbols that warn of potential hazards with electrical products. The lightning flash with arrowpoint in an equilateral triangle means that there are dangerous voltages present within the unit. The exclamation point in an equilateral triangle indicates that it is necessary for the user to refer to the owner's manual.

These symbols warn that there are no user serviceable parts inside the unit. Do not open the unit. Do not attempt to service the unit yourself. Refer all servicing to qualified personnel. Opening the chassis for any reason will void the manufacturer's warranty. Do not get the unit wet. If liquid is spilled on the unit, shut it off immediately and take it to a dealer for service. Disconnect the unit during storms to prevent damage.

U.K. MAINS PLUG WARNING

A moulded mains plug that has been cut off from the cord is unsafe. Discard the mains plug at a suitable disposal facility. **NEVER UNDER ANY CIRCUMSTANCES SHOULD YOU INSERT A DAMAGED OR CUT MAINS PLUG INTO A 13 AMP POWER SOCKET.** Do not use the mains plug without the fuse cover in place. Replacement fuse covers can be obtained from your local retailer. Replacement fuses are 13 amps and MUST be ASTA approved to BS1362.

LITHIUM BATTERY WARNING

CAUTION!
This product contains a lithium battery. There is danger of explosion if battery is incorrectly replaced. Replace only with an Eveready CR 2032 or equivalent. Make sure the battery is installed with the correct polarity. Discard used batteries according to manufacturer's instructions.
ADVARSEL!
Lithiumbatteri - Eksplosjonsfare. Ved utskifting benyttes kun batteri som anbefalt av apparatfabrikanten. Brukt batteri returneres apparatleverandøren.
ADVARSEL!
Lithiumbatteri - Eksplosionsfare ved fejlagtig håndtering. Udskiftning må kun ske med batteri av samme fabrikat og type. Levér det brugte batteri tilbage til leverandøren.
VAROITUS!
Paristo voi räjähtää, jos se on virheellisesti asennettu. Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppin. Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.
VARNING!
Explosionsfara vid felaktigt batteribyte Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren. Kassera använt batteri enligt fabrikantens instruktion.

THE FCC REGULATION WARNING

This equipment generates and uses radio frequency energy, and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interferences to radio and television reception. It has been type tested and found to comply with the limits for a class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules,which are designed to provide reasonable protection against such interference in a residential installation.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception (can be determined by turning the equipment off and on), the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna.
- Move the equipment away from the receiver.
- Relocate the equipment with respect to the receiver.
- Plug the equipment into a different outlet so that equipment and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful: "How to Identify and Resolve Radio-TV Interference Problems." This booklet is available from the US Government Printing Office, Washington D.C. 20402, Stock No. 004-000-00345-4.

SAFETY INSTRUCTIONS (EUROPEAN)

NOTICE FOR 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.

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

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.

IMPORTANT!

FOR YOUR PROTECTION, PLEASE READ THE FOLLOWING:

WATER AND MOISTURE: 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). Care should be taken so that objects do not fall and liquids are not spilled into the enclosure through openings.

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.

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.

FUSING: If your unit is equipped with a fuse receptacle, replace with only same type fuse. Refer to replacement text on the unit for correct fuse type.

CONTENTS

2 . . . . . INSPECTION

2 . . . . . INTRODUCTION
2 . . . . . 168A Operation/Service Manual
2 . . . . . The dbx 168A Studio Dynamics Processor
3 . . . . . Applications

4 . . . . . OPERATING CONTROLS
4 . . . . . Front Panel
5 . . . . . Rear Panel

6 . . . . . OPERATING NOTES
6 . . . . . Leveling and Compression
. . . . . (Using the DENSITY, DRIVE and GAIN HOLD Controls)
7 . . . . . De-Essing
7 . . . . . Spectral Enhancement
8 . . . . . Stereo-Tracking and Independent Two-Channel Operation.
8 . . . . . OUTPUT Level Control and PEAK OUTPUT LEVEL Meter

8 . . . . . CONNECTING THE 168A TO YOUR SYSTEM
8 . . . . . Basic Connection/Installation
10 . . . . . Audio Input and Output Cabling

13 . . . . . TECHNICAL SUPPORT, FACTORY SERVICE
13 . . . . . Technical Support, Factory Service
13 . . . . . Registration Card and User Feedback

14 . . . . . MAINTENANCE
14 . . . . . Servicing Note
14 . . . . . Getting Inside the Chassis
14 . . . . . Alignment and Performance Evaluation

19 . . . . . PROBLEMS AND POSSIBLE CAUSES

21 . . . . . SPECIFICATIONS

23 . . . . . CIRCUIT DESCRIPTION

29 . . . . . PARTS LIST
30 . . . . . Obtaining Spare Parts
36 . . . . . Vendor Codes

37 . . . . . SCHEMATICS, ASSEMBLY DRAWINGS

45 . . . . . ABBREVIATIONS TABLE

46 . . . . . INDEX

48 . . . . . WARRANTY
48 . . . . . United States Warranty
48 . . . . . International Warranty

QUICK SETUP

To get your unit up and running as quickly as possible, do the following steps. For more detailed information, refer to the specified pages.

- ☐ Unpack and Inspect the 168A Package. Page 2
- ☐ Connect the 168A To Your System. Page 8
- ☐ Set Levels and Controls as Needed. Page 4

INSPECTION

1. Unpack and inspect the 168A package.

Your 168A was carefully packed at the factory in a protective carton. Nonetheless, be sure to examine the unit and the carton for any signs of damage that may have occurred during shipping. If obvious physical damage is noticed, contact the carrier immediately to make a damage claim. We suggest saving the shipping carton and packing materials for safely transporting the unit in the future.

Verify that the 168A package contains the following:

- ☐ 168A Unit and AC Line Cord
- ☐ Operation/Service Manual (including Registration Card)

INTRODUCTION

168A Operation/Service Manual

Congratulations on choosing the dbx 168A. We recommend that you take a moment and read through the 168A manual. While your 168A manual provides all the necessary explanations of controls, operating notes and installation steps to help you get your unit up and running to its fullest extent, we've also included additional information to support the unit throughout its life. The 168A manual provides detailed servicing information, including a Performance Evaluation, Circuit Description, Block Diagram and a complete set of 168 Schematics and Assembly Drawings. In addition, we've included an Index (to help you find information as quickly as possible) and an Abbreviations Table (in case you are unfamiliar with any of the terms used in the text). Both the Index and Abbreviations Table can be found in the back of this manual.

The dbx 168A Studio Dynamics Processor

The dbx Model 168A Studio Dynamics Processor is an integrated automatic gain control (AGC) device of the highest professional quality. The 168A has a versatile Compressor that can smoothly and unobtrusively ride gain or assertively increase punch and density. The 168A also controls excessive sibilance levels and provides high and low frequency spectral enhancement as desired. The 168A achieves its outstandingly transparent audio performance by finely-tuned control circuitry that eliminate the dynamic distortions that are present in most conventional compressors and limiters, and through use of a quiet, low-distortion dbx® VCA to ensure negligible static distortion and noise.

Features

- ☐ The 168A uses dbx's newly-developed Servo Timed Binary™ level detection scheme and hybrid feedforward/feedback Compressor control circuit (patent pending) to achieve outstandingly smooth, low-distortion compression.
- ☐ Release time is adjustable to optimize processing for single tracks or mixed program material. Sound can be tight and punchy, or completely transparent.
- ☐ A defeatable "silence gate" prevents noise rush-up, holes, pumping, and breathing by inhibiting sudden gain increases once the signal level falls below a preset threshold (during pauses or low-level program material).
- ☐ Adjustable feedforward De-Esser guards against excessive sibilance, tracking input levels to ensure consistent de-essing over an input level range of greater than 20dB.
- ☐ High-Frequency Spectral Enhancement circuit is an "automatic equalizer" that adapts to the input program, continuously analyzing it to estimate the amount of equalization needed at every moment.
- ☐ Low-Frequency Spectral Enhancement is a special fourth-order bass equalizer that permits substantial boost around 80Hz without creating muddy-sounding mid-bass.
- ☐ Either stereo-tracking or independent two-channel operation is possible.
- ☐ Two LED meters per channel simultaneously display gain reduction and peak output levels.

- ☐ Balanced, floating inputs and outputs are EMI-suppressed; the 168A is compatible with the levels and impedances found in both professional and semi-professional applications.
- ☐ 30dB gain reduction range is achieved with industry-standard dbx VCAs.
- ☐ Hard-wire bypass switches allow the operator to preserve system continuity if the circuitry or AC power fails.

Applications

The flexibility and natural sound of the 168A make it ideally suited to recording studio, broadcast production studio, motion picture, video sound applications, and sound reinforcement.

Recording Studios and Broadcast Production

The 168A can be used to protect any digital recording device, VTRs, ATRs, or cart machines from overload during transfer without coloring the audio, or it can be set to apply effects as desired.

With the DENSITY control set towards 0 the 168A will subtly reduce the dynamic range of an entire production or mix without affecting sound texture. Higher settings, towards 10 provide effective gain riding on single tracks, increasing "punch" and intelligibility and substantially changing the sound texture of the voice or instrument. Applied to a mix, higher settings increase apparent loudness and density without overt pumping or distortion. In all cases, the DENSITY control is useful in governing the uniformity of loudness in the processed audio.

Use the HIGH SPECTRAL ENHANCEMENT control to increase brightness and definition without excessive harshness. Use the LOW SPECTRAL ENHANCEMENT control to increase bass punch without making the low end sound tubby or boomy.

The 168A is an effective voice processor. With the DENSITY control set towards 10, the Compressor effectively tames the level variations usually found in a live mic output, while the De-Esser can subdue any excessive sibilance. The Spectral Enhancement circuits can add life to vocal tracks, making them sound crisp and authoritative. The 168A's smoothness and silence-gating guarantee uniform, punchy voice quality without noise rush-up during pauses.

Motion Picture and Video Post Production

The 168's processing can be used to maintain consistent audio levels between different scenes when editing. The Enhancer circuit can add intelligibility to poorly dubbed dialogue. The De-Esser can prevent sibilance from sounding harsh and/or becoming distorted in optical transfers. Even sound effects can benefit from the Enhancer's HF and LF circuitry by becoming fuller and more defined.

Sound Systems

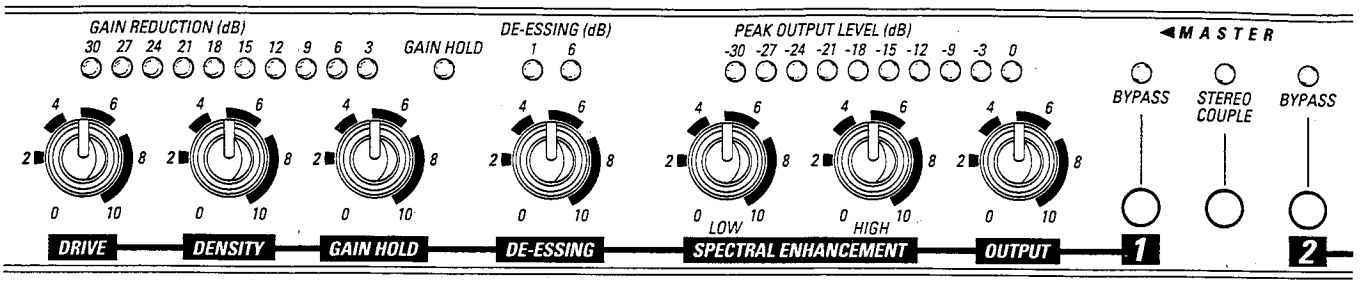
The 168A has several valuable applications in sound systems. With the DENSITY control set to the higher side of the scale, the 168A is excellent for treating individual sources (like vocal or instrument microphones) without overt side-effects. The De-Esser makes the 168A particularly valuable on vocal microphones.

Because the HF Enhancer is program-adaptive, it has less tendency to cause acoustic feedback than a fixed equalizer would. If feedback commences, the enhancer dynamically reduces the amount of enhancement to limit or stop the feedback.

You can use the Compressor to process the overall sound system. Set the DENSITY control between 0 and 2, and set the DRIVE control so that the indicator displays less than 12dB of gain reduction. This operates the 168A's Compressor on the "soft-knee" part of its curve, preserving much of the dynamics of the performance while still using the available amplifier power more effectively.

OPERATING CONTROLS

Front Panel



Note: The following controls are available for both channels of the 168A Studio Dynamics Processor (except for the STEREO COUPLE button — see below).

GAIN REDUCTION (dB) Meter: This meter shows the true peak gain reduction in dB. If the LED at the far right of the meter lights, no further gain reduction is available. When the STEREO COUPLE button is pressed In, the Channel 2 GAIN REDUCTION meter tracks the Channel 1 GAIN REDUCTION meter.

DRIVE Control: The DRIVE control determines the amount of gain reduction by adjusting the level of the audio being input into the Compressor.

DENSITY Control: Use this control to speed up or slow down the program-dependent release time (in order to match the processing to the type of audio being processed). The scale is arbitrary because the release time is automatically varied according to the nature of the program material (to minimize audible compression-induced side effects). Higher settings (towards 10) are faster.

GAIN HOLD Control and GAIN HOLD LED: The GAIN HOLD acts as a "silence gate," determining the input level below which the Compressor Gain circuitry is "frozen" to prevent noise rush-up during pauses and low-level program material.

The GAIN HOLD LED lights when the input level falls below those set by the GAIN HOLD control. This indicates that the Compressor's Gain control circuitry is "frozen."

DE-ESSING Control and 1(dB) and 6(dB) LEDs: Use this control to set the sensitivity of the De-Esser as a percentage of the average program level at the 168A's input. This means that the De-Esser tracks the input level so the amount of de-essing remains constant with changes in input level.

The first segment of the De-Esser meter (green LED, labeled 1) lights when the De-Esser has caused 1dB of gain reduction; the second segment (red LED, labeled 6) lights when 6dB of gain reduction occurs. It is normal for both segments of the meter to light when you are using a substantial amount of de-essing, but when the red segment lights, you should listen carefully to make sure that you are not over-de-essing the program material.

LOW SPECTRAL ENHANCEMENT Control: The 168A's LOW SPECTRAL ENHANCEMENT simultaneously applies an 80Hz boost and 250Hz cut to the program. This lets you apply substantial bass boost without making the program sound muddy or boomy due to excessive mid-bass boost.

HIGH SPECTRAL ENHANCEMENT Control: This control determines the amount of High-Frequency Spectral-Enhanced signal added to the input signal. Spectral Enhancement is a form of dynamic phase and amplitude equalization. Continuous analysis of the input signal intelligently and automatically determines the amount of equalization necessary at each moment to achieve detailed, defined audio that is never shrill or over-sibilant.

OUTPUT Control and PEAK OUTPUT LEVEL (dB) Meter: The OUTPUT control sets the level at the balanced line output.

The PEAK OUTPUT LEVEL meter indicates the absolute peak level at the 168A's XLR output, reading within 0.5dB of the true peak value of a 10-microsecond pulse. If the red segment of the meter lights, then the 168A is clipping and you should turn down the appropriate OUTPUT control.

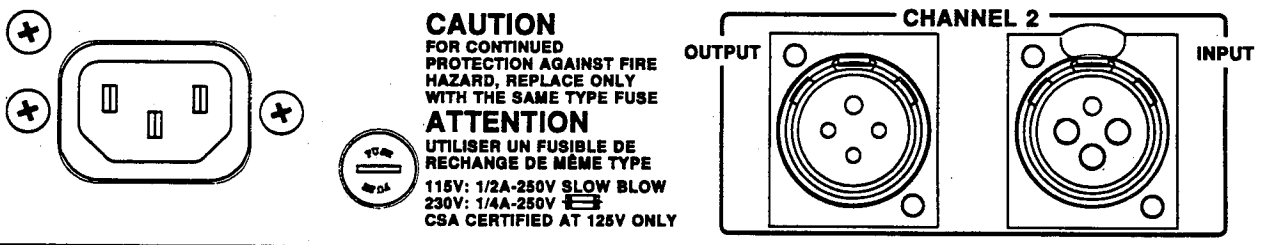
STEREO COUPLE Button and MASTER LED: Press this button In to set the 168A for stereo operation. In this mode, Channel 1 becomes the "master," in that both channels are now controlled by the Channel 1 controls (the Channel 2 controls become inactive, "slaving" to the Channel 1 "master" controls). Both Compressors receive identical gain reduction to better preserve stereo imaging. The amount of gain reduction is determined by the channel that requires the most gain reduction at any given instant. The Channel 2 GAIN REDUCTION meter and GAIN HOLD LED will track the same indicators in Channel 1. (The De-Essers always operate independently because their short release times preclude stereo imaging problems. Their operation is unaffected by the STEREO COUPLE button, except that their thresholds are both controlled by the Channel 1 DE-ESSING control.)
Note: With the STEREO COUPLE button Out, the two audio channels function independently.

The MASTER LED indicates Channel 1 and 2 are stereo-coupled, with Channel 1 as the master.

BYPASS Button and BYPASS LED: Press this button In to create a "hard-wire bypass" of the 168A's circuitry (i.e., unaltered input signal will pass through the unit even if the power cord connection is unplugged). In Bypass, the input is sent to the output, bypassing the 168A's processing and controls and presenting unaltered signal at the 168A's OUTPUT jacks. Bypass is especially useful for making comparisons between processed and unprocessed signals.

The BYPASS LED turns red when the BYPASS button is pressed In. It is green when the channel is active.

Rear Panel



AC Cord: This jack accepts an IEC-type power cord (as shipped with the unit). Plug the cord into the unit and mains power. Note that the 168A does not have a power switch. It is recommended that the 168A be On at all times. Power consumption is low. If you do not plan to use the 168A for an extended period of time, unplug it.

WARNING: Be sure to verify both your actual line voltage and the voltage for which your Model 168A was set, as indicated on the rear panel of your unit. Connection to an inappropriate power source may result in extensive damage which is not covered by the warranty.

FUSE: For safety, the fuse must be Slow-Blow, ½-amp for 115V, or ¼-amp (250mA) "T" type for 230V.

INPUT Jacks (Channel 1 and 2): The INPUT jacks accept either balanced or unbalanced signals. Pins 2 and 3 are symmetrically balanced and floating; thus, either can be used as "HOT" without difficulty. Pin 1 is connected to 168A chassis ground. Nominal input level is +4dBu and clipping level is +24dBu.

OUTPUT Jacks (Channel 1 and 2): The OUTPUT jacks are driven by floating active-balanced amplifiers that simulate a true transformer output. This allows the load at the OUTPUT to be either balanced with respect to ground, or single-ended to ground (unbalanced) with very little difference (less than 0.5dB) in the 168A's output level. *For proper unbalanced operation, the unused pin (either pin 2 or 3) MUST be grounded.*

Pins 2 and 3 are symmetrically balanced and floating; thus, either can be used as "HOT" without difficulty. Pin 1 is connected to 168A chassis ground. Nominal output signal level is +4dBu into 600Ω, and typical maximum output signal level is +25dBu into a balanced 600Ω load.

OPERATING NOTES

Leveling and Compression (Using the DENSITY, DRIVE and GAIN HOLD Controls)

Use the DENSITY control to set the ratio between leveling (i.e., compression with a slow release time) and compression with a fast release time. The DENSITY control determines the rate of correction, that is, how fast the gain recovers when the audio level drops. Lower rates (settings toward 0) apply a leveling effect that gives a more natural sound texture, but less consistent sound level. These settings are most useful for mixed material. Higher rates (settings toward 10) produce compression with a faster release time. This is useful for single tracks, increasing "punch" and "intelligibility" to substantially change the sound texture, while subtly changing the level of the material. When applied to mixed material, higher settings increase program density and apparent loudness.

The DRIVE control determines the overall amount of gain reduction by setting the signal level going into the gain control circuitry. Turning this control clockwise will increase the input signal, and therefore increase the amount of applied gain reduction. The GAIN HOLD control sets the level (with respect to the 168A's input) below which the gain circuitry will freeze its gain to prevent noise rush-up during pauses and low-level passages.

> The 168A'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 dedicated expander/gate like the dbx 172 or 274 can be used before the 168A.)

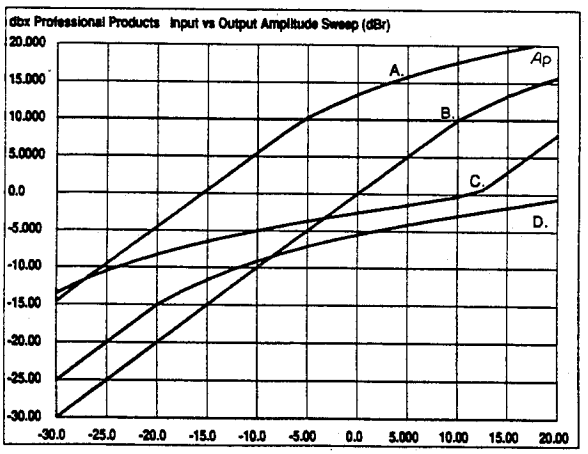
Be careful not to adjust the controls to produce so much gain reduction that the LED at the far left of each GAIN REDUCTION meter lights. When this LED is lit, the Compressor has run out of gain reduction range, the circuitry is being overloaded, and various nastinesses are likely to commence.

Because the 168A uses dbx's OverEasy circuitry to produce a soft-knee compression curve, the 168A's output level increases significantly as the input level increases from 0dB to 20dB. An input level 20dB above the threshold of compression produces 10dB gain reduction, and the 168A's output level is 10dB higher than it was at the threshold of compression.

10dB gain reduction is the end of the OverEasy curve; from 10dB to 30dB gain reduction the compression ratio is fixed at approximately 4.5:1. This 4.5:1 compression ratio retains some of the program's dynamic "feel" while still effectively controlling the level at the 168A's output.

Special circuitry forces the average level at the 168A's output to be approximately constant regardless of the setting of the DENSITY control. (Without this circuitry, the average level would tend to rise as the DENSITY control was advanced clockwise.)

> With any setting of the DENSITY control, the release rate in dB/second is constant when there is more than 10dB gain reduction. Below 10dB, the release rate slows progressively.



A. DRIVE: @ 2:00, OUTPUT: @ 12:00
B. DRIVE: Fully CCW, OUTPUT: Fully CW
C. DRIVE: @ 10:00, OUTPUT: Fully CW
D. DRIVE: @ 12:00, OUTPUT: @ 12:00

Figure 1: Compression Ratio Versus Level

De-Essing

The De-Esser is a very fast limiter that causes additional gain reduction in the main VCA whenever the amount of high frequency power in the input signal (above about 6kHz) exceeds a preset ratio of the total signal power, as set by the DE-ESSING control. Set the DE-ESSING control so that sibilance levels sound natural and well-balanced with the rest of the program material.

The De-Esser works best with voice that has not been mixed with other program material, because the De-Esser can confuse other sounds in mixed program (like cymbals) with sibilance, causing unnatural and undesired gain reduction. As always, experiment and let your ears determine if a given piece of program material can benefit from the 168A's De-Esser.

Because their short release times preclude stereo imaging problems, the two De-Essers in the 168A operate independently, regardless of the position of the STEREO COUPLE button. This prevents gain reduction in one stereo channel from causing audible "holes" and other modulation effects in the other channel. (When the 168A is in Stereo Couple, Channel 1's DE-ESSING control sets the threshold for both channels.)

The De-Esser controls sibilance by measuring the ratio between the power above 6kHz and the total program power, and by assuming that it has detected an "ess" if this ratio exceeds a threshold set with the DE-ESSING control. This process works over an input range of approximately 20dB; at lower levels it is gated so that the De-Esser does not mistake the normal program noise floor for sibilance and duck it unnaturally.

Spectral Enhancement

The High Spectral Enhancement circuit constantly analyzes the relative high frequency spectral content of the input program material and dynamically boosts high frequency power as necessary on a moment-by-moment basis. Unlike a fixed equalizer, it does not over-equalize program material that already has enough highs. For example, it is smart enough not to exaggerate sibilance in voices, yet it equalizes other components of the vocal sound to significantly improve presence and intelligibility.

When you record tracks in the production studio, you usually set the HIGH SPECTRAL ENHANCEMENT control in the area between 3 and 5. Unlike a conventional fixed equalizer, the setting of this control is surprisingly non-critical because the circuit is always making intelligent decisions about how much equalization is needed at each moment. If the source material is dull-sounding, the circuit will automatically produce large amounts of EQ; if it is very bright, the circuit will create very little additional high frequency boost.

The Low Spectral Enhancement circuit is an equalizer with a specially shaped curve that simultaneously boosts the 80Hz region while cutting at a 250Hz center. Accordingly, it is useful in creating punchy bass (including a "big," chesty, male voice sound) without introducing a muddy or boomy quality in the mid-bass. Adjust it to taste by ear.

In broadcast production, use Low Spectral Enhancement sparingly. Bass frequencies use a great deal of modulation without creating proportional loudness. While a good multiband transmission processor (like an Orban OPTIMOD™) will tend to undo the worst of the damage, nothing takes the place of using this control with care and restraint.

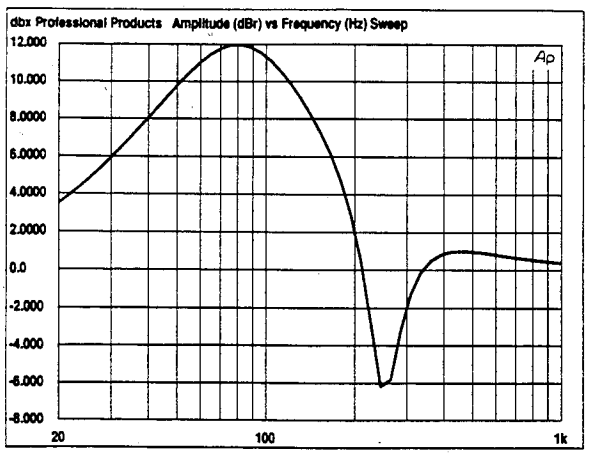


Figure 2: LF Detail Equalization Curve (LF DETAIL at 10)

Stereo-Tracking and Independent Two-Channel Operation.

The 168A can be used for stereo or independent dual-channel operation. To ensure stable stereo imaging, press the STEREO COUPLE button In (so that the MASTER LED lights). In this mode, all gain reduction caused by the Compressor will track the channel requiring the *greater* amount of gain reduction, and only the Channel 1 operating controls are active (except for the BYPASS button, which controls the Channel 2 hard-wire bypass and which is always available). Additionally, the De-Essers always produce independent amounts of de-essing. However, their thresholds are both set by the Channel 1 DE-ESSING control when the STEREO COUPLE button is pressed In.

When the STEREO COUPLE button is Out, the left and right channels can produce different amounts of gain reduction. This is always appropriate when the 168A is processing independent program material in its two channels (which it can readily do because its interchannel crosstalk is very low). Additionally, uncoupled operation can sometimes benefit recorded material with significant channel imbalance (usually caused by sloppy production practices in broadcast applications). Independent operation of the 168A's Compressor can correct such imbalance, provided that you set the DENSITY control low enough to prevent it from causing major, disturbingly large shifts of the stereo image.

OUTPUT Level Control and PEAK OUTPUT LEVEL Meter

The PEAK OUTPUT LEVEL meter monitors the peak signal level at the 168A's output and reflects the effect of all operating controls, including the OUTPUT level control. Unlike a quasi-peak meter such as an EBU-standard PPM, the 168A's PEAK OUTPUT LEVEL meter reads absolute, instantaneous peak levels, clearly indicating any clipping that occurs in the signal path. Ordinarily, it is unwise to permit the red LED in the PEAK OUTPUT LEVEL meter to light; if it does, turn the OUTPUT control counterclockwise to eliminate the overload.

CONNECTING THE 168A TO YOUR SYSTEM

Basic Connection/Installation

The 168A can be used with any +4dBu line-level device (See below to select for –10dBV operation). Some common examples include: mixing consoles, electronic musical instruments, patch bays, and signal processors. For more specific cabling information, refer to Audio Inputs and Outputs on the following pages.

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

For all connections, refer to the following steps:

Allow about 20 minutes for installation. Installation consists of optional resetting of input level jumpers, optional mounting of the 168A in a rack, connecting audio and connecting power.

1. **Turn Off all equipment before making any connections.**

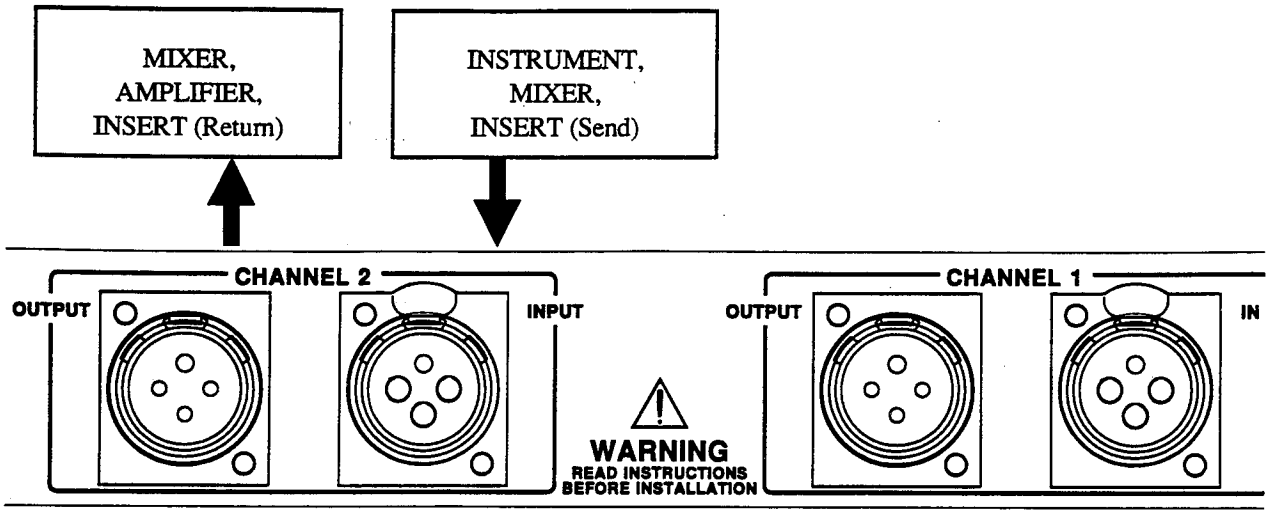
2. **Reposition input level jumpers. (Optional)**

   The 168A is shipped with its input ready for operation with +4 to +8dBu nominal levels. You can move internal jumpers to increase the input sensitivity so that the input will optimally accommodate –10dBV nominal levels.

   A. Remove all screws holding the top cover in place, then lift it off.

B. To operate the input with –10dBV nominal levels, reposition jumpers JA, JB, JC, and JD on the main circuit board to the –10 position (see Figure 4).

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



3. Mount the 168A in a rack. (Optional)

The 168A requires one standard rack unit (1¾ inches, 4.4 cm). There should be a good ground connection between the rack and the 168A chassis — check this with an ohmmeter.

Mounting the unit directly 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°F (45°C) when equipment is powered.

4. Connect audio input and output.

Typical patch points include: a mixer's channel or subgroup inserts when using the 168A on individual instruments or tracks; the mixer's main outputs or bus inserts when mixing; an instrument preamp's effects loop when using the 168A for guitar or bass; main outs of a submixer (e.g., keyboard mixer) as the signal is sent to main mixer; between a DAT's output and an analog cassette input. When using a chain of processors, the 168A may be placed either before or after effects or dynamic processors. We recommend you use common sense and experiment with different setups to see which one provides the best results for your needs.

5. Plug in the AC power cable to power On the unit.

A. Check the line voltage.

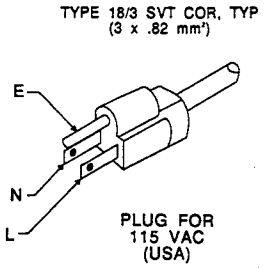
The 168A is shipped for 115V or 230V, 50 or 60Hz operation. Refer to the unit's rear panel to verify your unit's precise line voltage.

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

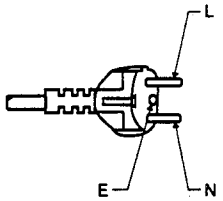
Use a ½-amp 3AG 250V Slow Blow fuse for 115V operation; use a ¼-amp (250mA) "T"-type fuse for 230V operation.

C. 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.



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



CONDUCTOR		WIRE COLOR
L	LIVE	BROWN
N	NEUTRAL	BLUE
E	EARTH GND	GREEN-YELLOW

Figure 3: AC Line Cord Wiring

Audio Input and Output Cabling

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 168A with musical instruments or home-type equipment, single-conductor shielded cable may be the only practical alternative. In this case, the ¼" phone to XLR cable should be wired as follows: The TIP (+) of the shielded cable (i.e., the cable's ¼" phone plug) should be wired to pin 2 of the cable's XLR plug (because the 168A XLR jack is wired Pin 2), the shield of the ¼" plug should be wired to pin 3 of the XLR plug, and pins 1 and 3 of the XLR plug should be tied (wired) to each other. This cable wiring is applicable for both input and output connections made to the 168A.

Connectors

Input and output connectors are XLR connectors.

For 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 COLD, the other pin is automatically HOT.

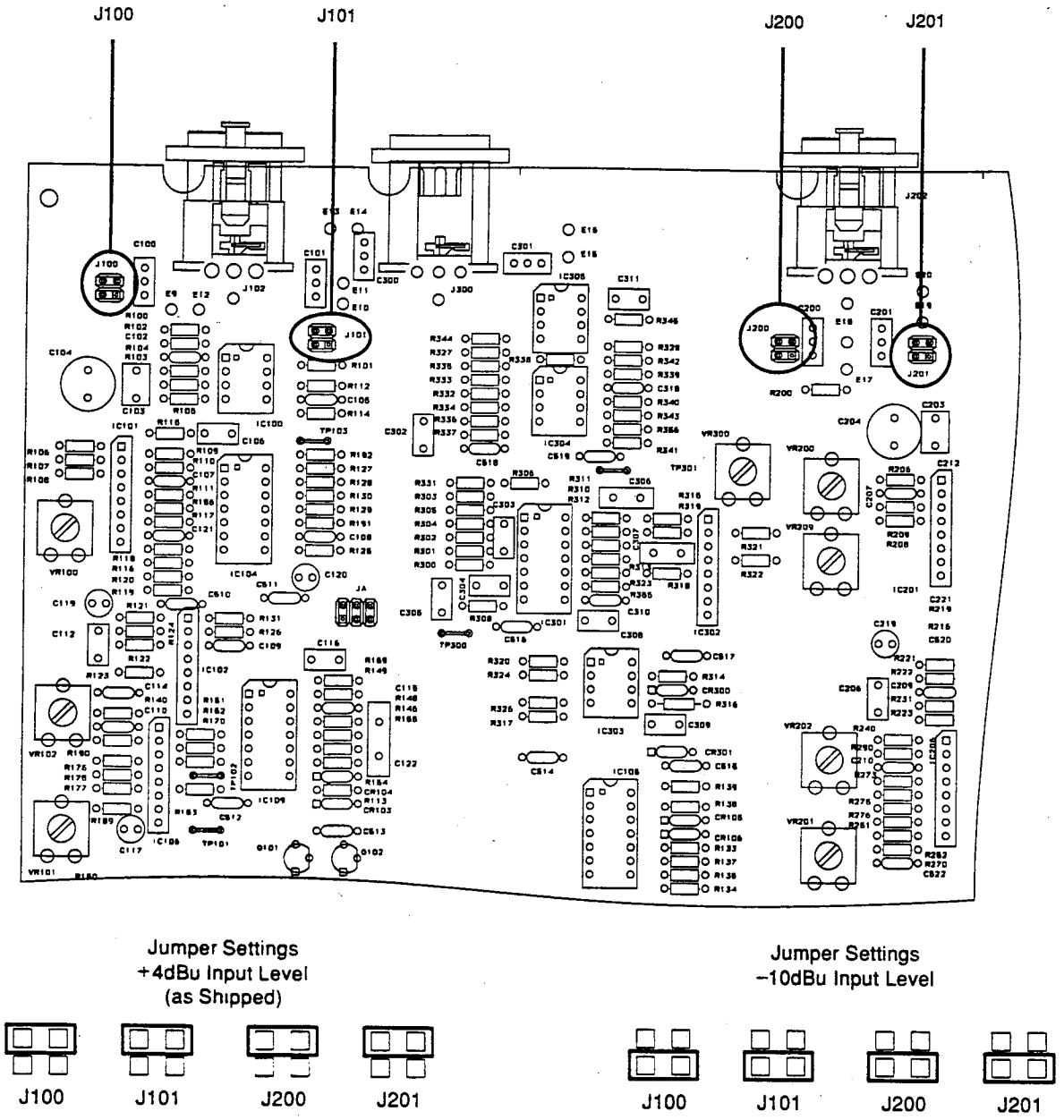


Figure 4: Input Level Jumpers

Input

The nominal input level is between −10 and +8dBu, selectable in two ranges by jumpers. The absolute overload point is +24dBu.

(0dBu = 0.775Vrms; for this application, the dBm @ 600Ω 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 600Ω or less.

- ☐ 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 connector (#2 or #3) that is considered HOT by the standards of your organization. Connect the black wire to the pin on the XLR connector (#2 or #3) that is considered COLD by the standards of your organization.
- ☐ In **low RF fields** (like a studio site), do not connect the cable shield at the 168A 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 168A input.
- ☐ If the output of the driving unit is unbalanced and does not have separate CHASSIS GROUND and – (or COLD) output terminals, connect both the shield and the black wire to the common (–) or ground terminal of the driving unit.

Output

The electronically-balanced and floating output of each channel simulates a true transformer output. The *source* impedance is 30Ω. In addition, there is a 1000pF capacitor between each side of the output (HOT and COLD) to the chassis for RFI suppression. The output is capable of driving loads of 600Ω or higher to +24dBm (balanced) or +21dBm (unbalanced).

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 COLD pin of the XLR connector (pin 2 or 3, depending on your organization's standards) to circuit ground, and take the HOT 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 168A'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 HOT by the standards of your organization. Connect the black wire to the pin on the XLR connector (#3 or #2) that is considered COLD 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 168A 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 168A 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!

Difficult Situations

Because it is not always possible to determine if the equipment driving or being driven by the 168A 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 5 are not universally applicable.

If you follow Figure 5 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 COLD pin on the 168A's XLR connector to ground and see if the buzz goes away. Either pin 3 or pin 2 will work as the COLD 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 168A. To minimize hum or buzz, it may be necessary to connect pins 1 and 3 of a cable's XLR plug. This applies to both input and output connections.

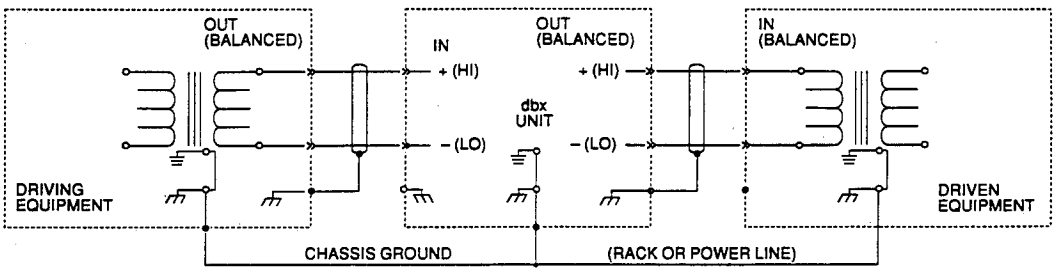


Figure 5: Suggested Ground Scheme

TECHNICAL SUPPORT, FACTORY SERVICE

Technical Support, Factory Service

The 168A is an all-solid-state product with components chosen for high performance and excellent reliability. Each 168A is tested, burned in and calibrated at the factory and should require no internal adjustment throughout the life of the unit. We recommend that your 168A be returned to the factory only after referring to the manual and consulting with Customer Service.

Our phone number, fax number and address are listed on the inside front cover. When you contact dbx Customer Service, be prepared to accurately describe the problem. Know the serial number of your unit — this is printed on a sticker attached to the rear panel.

Note: Please refer to the terms of your Limited Two-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. In all cases, you are responsible for transportation charges to the factory. dbx will pay return shipping if the unit is still under warranty.

Shipping Instructions: Use the original packing material if it is available. 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.

Registration Card and User Feedback

We appreciate your feedback. After you have an opportunity to use your new 168A, please complete the Registration Card (located at the back of this manual), detach it from the manual and return it.

MAINTENANCE

Servicing Note

Important: The 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 Controls and Operating Notes section of this manual unless you are qualified to do so. Refer all servicing to qualified service personnel.

Getting Inside the Chassis

The 168A has two circuit boards: a main board containing almost all audio circuitry and the power supply, and a piggyback board behind the front panel containing the display circuitry.

1. **Access the circuit boards by removing the seven screws holding the top cover in place, then lift it off.**

2. **Access the solder side of the main circuit board by removing the board from the chassis. Refer to the following steps.**

   A. Remove the primary and secondary transformer lead power plugs from their board-mounted connectors. To remove the primary plug, you must release its lock; squeeze in both sides of the plug and pull the plug out from its connector. Note where both plugs go so you can reassemble the unit correctly later.

   B. Remove the push-on knobs from the front panel by pulling them firmly away from the panel.

   C. Unlock the XLR-type connectors by turning each connector's locking device with a small screwdriver.

   D. Unfasten the piggyback display board by removing the three screws that hold the board in place (Use a Phillips screwdriver). Then lift off the board.

   E. Loosen the four Allen-head screws that hold the front panel in place, then set the front panel aside.

   F. Remove the three screws that fasten the main circuit board (Use a Phillips screwdriver).

   G. Lift the circuit board out of the chassis.

3. **Reassemble the unit by following the above instructions in reverse order.**

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

Alignment and Performance Evaluation

These instructions are for thoroughly checking the performance of the 168A. The evaluation includes checks of the Power Supplies, Balanced Output Amplifier, Compressor, De-Esser, HF Enhancer, Gain Hold, LF Enhancer and Stereo Coupling.

This procedure is useful in detecting and diagnosing problems, and for routinely checking performance.

See assembly drawings in the back of this manual for locations of components, jumpers, and test points. *All jumpers and test points are located on the main circuit board.*

Perform procedures in order without skipping steps. The following equipment is required:

Oscilloscope:	DC-coupled, with at least 5MHz vertical bandwidth.
Digital voltmeter:	Accurate to 0.1%.
Audio voltmeter:	Accurate to 2%. Audio Precision System 1, Sound Technology 1710B (or equivalent) preferred.
Low-distortion audio oscillator:	With verified residual distortion below 0.003%. Audio Precision System 1, Sound Technology 1710B (or equivalent) preferred.
THD analyzer:	With verified residual distortion below 0.003%. Audio Precision System 1, Sound Technology 1710B (or equivalent) preferred.

1. **Remove the top cover.**

   A. Remove the seven screws that hold the top cover in place, then lift off the top cover.

2. **Record all Control and Internal Jumper Settings.**

3. **Check Power Supplies.**

   A. Verify the following resistances:

Between:	And:	Resistance:
Power cord ground pin	Chassis	Short circuit
Each of the power cord blades	Chassis	Open circuit
One power cord blade	The other blade	36Ω (for a 115V unit) 140Ω (for a 230V unit)

   B. Power the unit.

   C. Verify that the negative unregulated power rail is between –18V and –26V, and that the positive unregulated power rail is between +18V and +26V.

      Measure the negative unregulated voltage across C505 and the positive unregulated voltage across C504.

   D. Verify that the outputs of the ±15V regulators are 15.00V ±0.75V.

      Measure the negative regulated voltage across C506 and the positive regulated voltage across C507. The positive regulated voltage can also be measured between ground and pin 8 of any 8-pin IC on the circuit board; the negative regulated voltage appears at pin 4.

   E. Verify with an oscilloscope that the noise and ripple on the regulated power supply rails is below 4mV peak.

   F. Set the Channel 1 and 2 controls as follows:

DRIVE	0
DENSITY	0
GAIN HOLD	0
DE-ESSING	0
LOW SPECTRAL ENHANCEMENT	0
HIGH SPECTRAL ENHANCEMENT	0
OUTPUT	10
STEREO COUPLE	Off

4. **Balanced Output Amplifier Test.**

   A. Connect a 600Ω resistor between pins 2 and 3 of the Channel 1 output connector.

      A 620Ω ½-watt resistor will do.

   B. Using the DC voltmeter, verify that the DC voltage between pins 2 and 3 of the Channel 1 output connector is less than 100mV.

      There should be no signal applied to the inputs.

   C. Connect pin 1 to pin 3. Verify that the DC voltage between pins 1 and 2 of the Channel 1 output connector is less than 50mV.

   D. Connect pin 1 to pin 2. Verify that the DC voltage between pins 1 and 3 of the Channel 1 output connector is less than 50mV.

E. Verify (with an oscilloscope) that both pin 2 of the Channel 1 output connector and pin 3 of the Channel 1 output connector are free of "popcorn" noise or oscillation when observed against ground.

F. Repeat steps 4-A through 4-E for Channel 2.

5. Compressor Test.

A. Connect the audio oscillator between pins 2 and 3 of the Channel 1 input connector.

If the oscillator output is unbalanced, ground pin 3.

B. Set the oscillator's frequency to 1kHz and its output level to +11dBu.

0dBu = 0.775Vrms. The dBm/600Ω scale commonly found on test instruments can be read as dBu for this application.

C. Connect a THD analyzer, audio voltmeter, and oscilloscope to the 168A's output.

D. Center VCA SYMMETRY trimmer VR100.

E. Trim the audio oscillator's output level to make the audio voltmeter read +10dBu.

F. Verify that the –15dB segment of the PEAK OUTPUT LEVEL meter lights, and that the output signal is a sine wave of normal appearance.

G. Set the BYPASS 1 switch out. Verify that the BYPASS lamp turns Off and changes to green, and that approximately +11dBu (the oscillator's output) appears at the 168A's output connector.

The BYPASS 1 switch creates a hard-wire bypass when it is out and its associated BYPASS lamp is Off.

H. Press the BYPASS 1 switch in.

Verify that the BYPASS lamp turns On.

I. Adjust VCA SYMMETRY trimmer VR100 for minimum THD at the 168A's output.

Verify that THD is below 0.05% in a 20Hz to 20kHz bandwidth.

J. Verify that THD is below 0.05% in a 20Hz to 20kHz bandwidth with the audio oscillator set to 20Hz, 2kHz, and 20kHz and the 168A's output level at +10dBu.

K. Turn the DRIVE control clockwise until you observe clipping at the 168A's output.

This requires saturating the Compressor control loop, so all segments of the GAIN REDUCTION meter should be lit. Verify that this is true.

L. Verify that the output level is at least +23.5dBu when you first see clipping and that all segments of the PEAK OUTPUT LEVEL meter are lit.

This test will only be successful if the 168A's output load is balanced. If one side of the 168A's output is grounded, the maximum output level before clipping is typically +21dBu and you will see the output clip slightly before the 0dB lamp on the PEAK OUTPUT LEVEL meter lights.

M. Adjust the DRIVE control to make the GAIN REDUCTION meter indicate 27dB of gain reduction.

N. Mute the oscillator and measure the time interval between the mute and when the 9dB lamp in the GAIN REDUCTION meter turns Off.

This time should be 13 seconds ±2 seconds.

O. Reset the DRIVE control to 0.

Verify that no segments of the GAIN REDUCTION meter are lit.

P. Measure the noise at the output in a 20-20kHz bandwidth.

The noise should be less then –82dBu. Verify that there is no "popcorn" noise or oscillation.

Q. Repeat the above test of the Compressor for Channel 2.

Substitute:	For:
VR200	VR100

6. De-Esser and HF Enhancer Test and Alignment.

A. Unmute the oscillator and set its frequency to 1kHz.

The oscillator level should still be set so that the 168A's output level is +10dBu.

B. Observe TP100 (pin 7 of IC107) with the oscilloscope, AC-coupled. Adjust VR108 so that the waveform is as close as possible to pure second-harmonic (2kHz).

C. Decrease the oscillator output level by 20dB (to approximately –4dBu).

The exact level is not critical.

D. Observe TP101 (pin 7 of IC106) with the oscilloscope, AC-coupled. Adjust VR102 so that the waveform is as close as possible to pure second-harmonic.

E. Set the oscillator frequency to 20kHz and its level to make the level at the 168A's output +10dBu.

The oscillator's output level should be approximately +11dBu.

F. Set the DE-ESSING control to 10.

G. Adjust VR101 so that the 168A's output level is –8dBu.

H. Set the oscillator frequency to 4kHz, Verify that the 168A's output level increases to +2.5dBu ±1dB.

This verifies the operation of the high-pass filter before IC107.

I. Set the DE-ESSING control to 0.

J. Set the HIGH SPECTRAL ENHANCEMENT control to 10.

Verify that the output level increases to +17dBu, ±1dB @ 4kHz.

K. Adjust VR300 to minimize the THD at the 168A's output.

The THD should be less than 0.05%.

L. Set the HIGH SPECTRAL ENHANCEMENT control to 0.

M. Repeat the above test of the De-Esser and HF Enhancer circuits for Channel 2.

Substitute:	For:
TP200 (IC207 pin 7)	TP100 (IC107 pin 7)
TP201 (IC206 pin 7)	TP101 (IC106 pin 7)
VR400	VR300
VR201	VR101
VR202	VR102
VR208	VR108

7. Gain Hold Circuit Test.

A. Set the GAIN HOLD control to 5.

B. Reduce the output level of the oscillator until the GAIN HOLD light turns On.

Verify that the 168A's output level is −16dBu ±4dB.

C. Set the GAIN HOLD control to 0.

Verify that the GAIN HOLD lamp turns Off.

D. Repeat the above test of the Gain Hold circuit for Channel 2.

8. LF Enhancer Test.

A. Set the oscillator frequency to 80Hz, and set its level to produce 0dBu at the 168A's output.

B. Set the LOW SPECTRAL ENHANCEMENT control to 10.

Verify that the 168A's output level increases to +12dBu ±2dB.

C. Set the oscillator frequency to 250Hz.

Do not change its output level.

Verify that the 168A's output level decreases to −6dBu ±1dB.

D. Set the LOW SPECTRAL ENHANCEMENT control to 0.

E. Repeat the above test of the LF Enhancer circuit for Channel 2.

9. Channel 2 Balance Adjustment.

A. Set the STEREO COUPLE switch to On.

Make sure that the Channel 2 controls are still set as in step 3-F.

B. Connect the oscillator to the 168A's Channel 2 input.

C. Connect the AC voltmeter to the 168A's Channel 2 output. Adjust VR209 (ADJUST Channel 2 BALANCE) so that the meter indicates +10dBu.

10. Stereo Coupling Test.

A. Verify that the STEREO COUPLE switch is On.

Continue to drive the Channel 2 input and to observe the Channel 2 output. To test the stereo coupling function, you will verify that, with the STEREO COUPLE switch set to On, you can use the Channel 1 operating controls to control the Channel 2 processing circuitry.

B. Advance the Channel 1 DRIVE control clockwise until you see the Channel 1 and Channel 2 GAIN REDUCTION meters indicate that gain reduction is occurring.

Verify that both meters read identically. Verify that the Channel 2 output level increases approximately 3dB as you increase the gain reduction from approximately 12dB to 25dB G/R.

C. Set the Channel 1 GAIN HOLD control to 5.

D. Mute the oscillator.

Verify that both GAIN HOLD lamps turn On and that the readings of the GAIN REDUCTION meters do not change.

E. Restore the oscillator.

F. Set the Channel 1 DRIVE control to 0.

G. Set the oscillator frequency to 4kHz. Do not change the level.

H. Set the Channel 1 DE-ESSING control to 10.

Verify that the level at the 168A's output decreases to +2.5dBu ±2dB.

I. Set the Channel 1 DE-ESSING control to 0.

J. Set the Channel 1 HIGH SPECTRAL ENHANCEMENT control to 10.

Verify that the level at the Channel 2 output increases by approximately 7dB.

K. Set the Channel 1 HIGH SPECTRAL ENHANCEMENT control to 0.

L. Set the oscillator frequency to 250Hz. Do not change the level.

M. Set the Channel 1 LOW SPECTRAL ENHANCEMENT control to 10.

Verify that the level at the Channel 2 output decreases by approximately 6dB.

N. Set the Channel 1 LOW SPECTRAL ENHANCEMENT control to 0.

O. Decrease the setting of the Channel 1 OUTPUT control, and verify that the level at the Channel 2 output decreases accordingly.

This concludes testing the stereo coupling function.

P. Disconnect all test instruments from the 168A.

11. Restore controls and internal jumpers to your desired operating settings.

Return all controls and jumpers to the positions recorded in step 2.

12. Replace the top cover.

Replace the seven screws that hold it in place.

PROBLEMS AND POSSIBLE CAUSES

Always verify that the problem is not in the source material being fed to the 168A, or in other parts of the system.

RFI, Hum, Clicks, Or Buzzes

Check grounding. (Review the information on grounding on page 12.)

The 168A's moderate RF suppression should suffice in most installations. However, installation next to a high-power transmitter could still cause problems. Additional RF suppression, careful examination of the grounding scheme, and other techniques familiar to the broadcast engineer may be required. In particular, the 168A's RF suppression is maximally effective above 10MHz, and installation at a powerful LW and MW (AM) site might require additional suppression (such as a 0.01µF ceramic disk capacitor between pins 1 and 3 of the input XLR connector, and another 0.01µF capacitor between pins 2 and 3 of the XLR connector).

Power Supply Problems

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

Regulators IC512 and IC513 are frequency-compensated by C506, C507 at their outputs to prevent high-frequency oscillations. If C506 or C507 is ever replaced, be sure to use a low-inductance aluminum electrolytic. (A tantalum can fail because the current-delivering capacity of the power supply can cause a runaway condition if the dielectric is punctured momentarily; a high-inductance aluminum can fail to prevent a regulator from oscillating.) Check for oscillation on the power bus with an oscilloscope if C506 or C507 is replaced.

Noise Pumped Up During Pauses

The GAIN HOLD control is probably set too low. Set it so that the GAIN HOLD lamp turns On during pauses.

Audible Distortion

First make sure that the program material presented to the 168A's inputs is clean and distortion-free.

If the GAIN REDUCTION meters display 30dB of gain reduction, reduce the amount of gain reduction by turning the DRIVE control more counterclockwise. If the PEAK OUTPUT LEVEL meters' red segments are lighting, reduce the output level by turning the OUTPUT control more counterclockwise.

Setting the DENSITY control higher than 5 can sometimes cause audible distortion in the bass because the very fast release time begins to modulate each individual cycle of the bass waveform. If this occurs, turn down the DENSITY control. (Special circuitry in the 168A greatly reduces this effect by comparison to many other compressors operated at equally fast release times.)

If peak input levels at the 168A's input exceed +24dBu, this will clip the input stage.

De-Esser Causes Pumping or Distortion

The De-Esser is a wideband circuit that causes quick gain reduction of the entire program. If it is used to excess (particularly with mixed program material) it can have undesirable audible side effects. The De-Esser is most effective on voice that has not been mixed with other program material. It is far better to de-ess unmixed voice than to wait until the voice has been mixed with other material and then try to salvage the track.

Excessive leakage on the vocal track could cause the De-Esser to mis-behave. In this instance, try gating the track before the 168A.

HF Spectral Enhancer Causes Excessive Noise

The High Frequency Spectral Enhancer tries to estimate how much high frequency boost is appropriate for a given piece of program material. If the program is dull but noisy (like a bad cassette), the HF Spectral Enhancer will try to make it brighter and can pull up hiss to objectionable levels. (The hiss will often be audibly modulated by the program because the HF Spectral Enhancer is program-adaptive.) The only option is to reduce the setting of the HIGH SPECTRAL ENHANCER control until the effect is no longer objectionable.

The AKG Acoustics group of companies manufactures several processors that are more suitable for this type of low-quality material because they also have built-in dynamic single-ended noise reduction circuits. The dbx Project 1 296 features hiss reduction and Spectral Enhancement at a lower price. The dbx 563X and 929 "Silencers™ " provide over 30dB of hiss reduction only.

Channel 2 Operating Controls Do Not Work In Stereo Mode

This is similar to most 2-channel dbx products. In Stereo mode, the 168A's Channel 1 operating controls affect both Channels 1 and 2 and the Channel 2 controls do nothing. The only exception is the BYPASS switches, which are always independent. Because the De-Essers always *operate* independently (even though their thresholds are both controlled by the Channel 1 DE-ESSING control in stereo mode), the Channel 1 and 2 De-Essers will often show different amounts of gain reduction even in stereo mode.

SPECIFICATIONS

Note: 0dBV = 1.0Vrms; 0dBu = 0.775Vrms Specifications are subject to change.

Performance

Frequency Response (20-20kHz): ±0.25dB below Compressor and De-Esser Thresholds (HIGH SPECTRAL ENHANCEMENT and LOW SPECTRAL ENHANCEMENT Off)

RMS Noise (20-20kHz): >106dB (108dB typical) below output clipping (HIGH SPECTRAL ENHANCEMENT and LOW SPECTRAL ENHANCEMENT Off).

Interchannel Crosstalk: Better than –80dB, 20-20kHz.

Audio Input

Impedance: >10kΩ, active balanced, EMI-suppressed.

Operating Level: Usable with –10dBV to +8dBu lines. (2 ranges — selectable by internal jumpers) (0dBu = 0.775Vrms; for this application, the dBm @ 600Ω scale on voltmeters can be read as if were calibrated in dBu.)

Connectors: Female XLR. Pin 2 and 3 are symmetrically balanced and floating; thus, either can be used as "HOT" without difficulty.

Audio Output

Impedance: 30Ω, ±5% electronically balanced and floating to simulate true transformer output. Minimum load impedance is 600Ω. Output can be unbalanced by grounding pin 2 or 3 of output XLR.

Level: Front-panel controls allow use with –10dBm to +8dBm systems. Output clipping level is >+20dBm @ 600Ω (unbalanced load); >+23.5dBm @ 600Ω (balanced load).

Connectors: Male XLR. Pin 2 and 3 are symmetrically balanced and floating; thus, either can be used as "HOT" without difficulty.

Compressor

Attack Time: Program-dependent: >1 Second for very small increases in level, decreasing to approximately 10mS for large increases

Release Time: Adjustable between approximately 1dB/sec and 75dB/sec, program-dependent.

Compression Ratio OverEasy® curve provides constantly increasing ratio as input level increases from 0dB to 20dB above threshold. For input levels beyond 20dB above threshold, ratio exceeds 4:1.

Range of Gain Reduction: >30dB.

Interchannel Tracking: ±0.5dB (with STEREO COUPLE active; button pressed in).

Total Harmonic Distortion (+10dBu Output Level): <0.05% at 1kHz (with HIGH SPECTRAL ENHANCEMENT and LOW SPECTRAL ENHANCEMENT Off, DENSITY at 0 and 15dB gain reduction). Typically <0.05% 20-20kHz. (As with any compressor, low frequency distortion will rise as the release time decreases.)

SMPTE Intermodulation Distortion (+10dBu Output Level): <0.08% (60/7,000Hz 4:1 with 15dB gain reduction; DENSITY control at 0).

Gain Reduction Element: dbx 2155 VCA.

De-Esser

Characteristic: The De-Esser performs quick, wideband gain reduction whenever the ratio of power above approximately 6kHz to the total signal power exceeds a threshold set by the user with the DE-ESSING control.

Distortion: The De-Esser uses the same VCA as the Compressor and therefore adds no significant distortion to the system specification.

Release Time: Approximately 30ms, program-dependent.

Interchannel Coupling: Each channel's De-Esser operates independently at all times (the use of fast release times precludes disturbances of the stereo image's stability).

High Frequency Spectral Enhancer

Characteristic: The HF Spectral Enhancer is a program-controlled shelving equalizer. Its control circuit monitors the relative high frequency power content of the program and dynamically adjusts the equalization to make this high frequency content more consistent at the HF Spectral Enhancer's output.

Maximum HF Boost: Approximately 15dB.

Total Harmonic Distortion: The HF Spectral Enhancer will add no more than 0.05% THD to the program material present at its input. (Because it receives the output of the Compressor and De-Esser, it will amplify any harmonics generated in this earlier circuitry as would any other HF equalizer.)

Noise: The noise floor of the HF Enhancer circuit itself at maximum boost is more than 106dB below its output clipping level, and is determined by the dbx 2155 VCA that it uses as a variable-gain element. (Because it receives the output of the Compressor and De-Esser, it will amplify any noise generated in this earlier circuitry as would any other HF equalizer.)

Low Frequency Spectral Enhancer

Characteristic: The LF Spectral Enhancer is a fourth-order equalizer with a bell-shaped boost at 80Hz and a bell-shaped cut at 250Hz. The ratio between the boost and cut (in dB) is approximately 2:1. The LOW SPECTRAL ENHANCEMENT control determines the absolute amount of boost and cut, 0 to +12dB. (see Figure 2.)

Noise and Distortion: The noise and distortion introduced by the LF Spectral Enhancer are well below noise and distortion introduced by the rest of the 168A's circuitry.

Physical

Dimensions: 19″ (48.3 cm) wide, 10⅜″ (26.4 cm) deep, 1¾″ (4.5 cm) high.

Operating Temperature Range: 32-113°F (0-45°C).

Humidity: 0-95% RH, non-condensing.

Power Requirements: 115/230 volts AC ±10%, 50-60Hz, 16VA. IEC-standard detachable mains cord. EMI-suppressed.

Fuse: Use a ½-amp 3AG 250V Slow Blow fuse for 115V operation; use a ¼-amp (250mA) "T"-type fuse for 230V operation.

Warranty

Two Year, Parts and Labor: Subject to the limitations set forth in dbx's Standard Warranty Agreement.

CIRCUIT DESCRIPTION

On the following pages, a detailed description of each circuit's function is accompanied by a component-by-component description of that circuit. Keywords are highlighted throughout the circuit descriptions to help you quickly locate the information you need.

The circuitry is described in eight major blocks: Input Buffer, VCA (Voltage-Controlled Amplifier), Compressor, De-Esser, High Frequency Enhancer, Low Frequency Enhancer, Metering, and Power Supply.

Whenever circuitry is duplicated for the left and right channels, only the left channel will be described (except for details of the Stereo Coupling function).

1. Overview

The block diagram on page 38 illustrates the following overview of 168A circuitry.

The 168A signal path consists of a differential line receiver, a main VCA, a summing amplifier that adds the output of the main VCA to signals that create the high frequency and low frequency enhancement, and a balanced output buffer.

Low Frequency Enhancement is created by adding the output of a special filter circuit to the output of the main VCA.

The 168A control circuitry consists of a Compressor, De-Esser, and High Frequency Enhancer. The Compressor and De-Esser control signals (which are in dB-linear form) are summed and drive the main VCA. The High Frequency Enhancer control signal drives the enhancement VCA, which is fed from a high-pass filter, and whose output is summed with the output of the main VCA.

2. Input Buffer.

The signal enters the 168A in balanced form, receives modest RF suppression, and is then applied to a very low-noise opamp configured as a differential amplifier whose gain can be strapped for –2.8dB or +8.9dB. When both non-inverting and inverting inputs are driven by a source impedance that is small with respect to 10kΩ (as 600Ω or less would be), the amplifier is essentially insensitive to signal components that appear equally on the non-inverting and inverting inputs (such as hum), and responds with full gain to the difference between the non-inverting and inverting inputs. It therefore serves as an "active transformer."

Component-Level Description:

C100, C101 are integrated LC filters that remove most RF from the input leads to the chassis. Although this RF suppression is modest, it should be adequate for the vast majority of installations.

Opamp IC-100A receives the filtered signal. This opamp will overload if its differential input exceeds approximately +24dBu (0dBu = 0.775Vrms; for this application, the dBm @ 600Ω scale on voltmeters can be read as if were calibrated in dBu).

3. Voltage-Controlled Amplifiers.

The voltage-controlled amplifier (VCA) used in the 168A is a low-noise dbx VCA. Its gain (in dB) is proportional to the voltage applied to its gain control port. It is a current in/current out device, so its input is a virtual ground and its output must be applied to a current-to-voltage converter circuit.

Component-Level Description:

If IC101 is not perfectly balanced, "thumps" due to control current feedthrough can appear at its output. These are eliminated by applying DC offset to IC101 through R108 and VCA SYMMETRY control VR100.

The gain of IC101 is determined by the sum of (1) a fixed voltage produced by the

DRIVE control VR104, (2) a fixed voltage produced by the OUTPUT control VR103, (3) the Compressor control voltage appearing at output of IC105-D, and (4) the De-Esser control voltage appearing at the output of IC109-C. IC104-B sums all but the De-Esser control voltage.

C107 bypasses the gain control port of IC101 to prevent oscillation and possible noise contamination of the control signal.

IC100-B is a current-to-voltage converter that receives IC101's output current and outputs a proportional voltage. Servo IC104-A removes any DC offset at IC104-B's output.

4. Compressor Control.

The Compressor is a hybrid feedback/feedforward circuit (patent pending). The Compressor's level detector is itself a feedback-type compressor containing a separate VCA. This "pilot compressor" is used only to develop a control voltage that is processed before being applied to the main audio VCA. (The audio passing through the second VCA is used only to develop the feedback control signal and is not applied to the audio path of the 168A.) The output of the second VCA is looped back to a level detector and smoothing circuit, which develops a gain-control signal that is applied to the second VCA, closing the feedback loop. This gain control signal is further filtered and then passed through a "soft knee" generating circuit before its application to the main audio VCA.

The Compressor timing circuit generates a control signal that enables the 168A to achieve natural-sounding control and very low modulation distortion. The DENSITY control allows a 75:1 variation in the basic release dynamics, which are determined by the timing circuit based on the history of the input. Recovery can be halted by the Gain Hold gating circuit, which freezes the release process if the input level falls below a level set by the GAIN HOLD control.

In stereo mode, both channels of the pilot compressor use Channel 1's front-panel operating controls and control circuitry. The output of the Channel 2 pilot VCA is applied to a second pair of comparators, whose outputs are ORed with the outputs of the comparators receiving the Channel 1 audio and then applied to the Channel 1 timing circuit. The gain control port of the Channel 2 pilot VCA is switched to receive the same control voltage as the Channel 1 pilot VCA. In turn, the gain control port of the Channel 2 main audio VCA is switched to receive the same Compressor control voltage as the Channel 1 main audio VCA. (The De-Essers remain independent to prevent de-essing in one channel from punching audible "holes" in the other channel's audio.)

The GAIN REDUCTION meter consists of ten comparators with open collector outputs. The ten LEDs in the meter are connected in series, and a current source forces a constant current into the LED string. As the input voltage to the comparators decreases, they progressively shunt to the –15 volt rail the current that would ordinarily flow through the LEDs, turning Off all LEDs closer to the –15 volt rail. The comparators are biased with equal voltage increments, producing a meter whose scale is linear. (Because the gain control voltage is linear in dB, this produces a dB-linear meter scale.)

Component-Level Description:

VCA IC102 receives the input signal. IC104-C translates the output current of VCA IC102 into a voltage, which is applied to comparators IC108-A and IC108-B. Resistors R142, R143, R144 create positive and negative reference voltages that determine the threshold of the comparators and thus, the threshold of compression.

The outputs of IC108 are open-collector transistors. They force a current through R145, which is mirrored at the collector of Q100, a common-base amplifier. The timing circuit receives this current and produces a well-smoothed control voltage output at the output of buffer IC105-B. Buffer IC105-A produces a control voltage suitable for application to the gain control input of IC102, closing the compression feedback loop. The gain control input of IC102 also receives the output of DRIVE control VR104 and, through buffer IC109-A, control VR105.

The DRIVE control applies a fixed gain control signal to IC102, attempting to adjust its gain. However, the Compressor feedback loop ensures that the output level of

IC102 stays roughly constant. So the more gain that the DRIVE control attempts to force IC102 to produce, the more gain reduction is produced by the Compressor. Thus the DRIVE control determines the amount of gain reduction in the Compressor.

Through current source Q102, control VR105 determines the average amount of current removed from the timing circuit (and thus the release speed). Pulling Q102's collector to –15V (through IC110-A) diverts the release current from the timing circuit, defeating the release process and freezing the gain.

OverEasy circuit IC105-C, IC105-D receives the output of the timing circuit and generates a soft-knee compression characteristic by progressively increasing its gain as its input increases. The circuit is arranged so that 20dB of gain reduction in the pilot compressor circuit becomes 10dB gain reduction at the output of the OverEasy circuit. Beyond this, the compression ratio becomes approximately 4.5:1. CR105 generates the increasing gain as it conducts more and more heavily with increasing input. CR106 and associated components provide temperature compensation.

IC104-B sums the output of the OverEasy circuit with fixed offset voltages from the DRIVE and OUTPUT controls. The output of IC104-B is summed with the output of the De-Esser (IC109-C) and applied to the gain control port of IC101. The output of IC104-B also feeds the STEREO COUPLE switch. When the unit is in stereo mode, the output of IC104-B thus determines the gain of both Channels 1 and 2 (other than de-essing; the De-Essers remain independent because the De-Esser control voltage is summed with the output of IC104-B directly at the gain control port of IC101).

The gain-holding gate is activated when the output of IC110-A is negative, and defeated when it is open (the outputs of quad comparator IC110 are open-collector). The gate circuit gets its information about the input level from the output of broadband rms detector IC106. IC110-A and IC110-B receive the output of IC106. GAIN HOLD control VR107 sets the reference voltage on IC110-A and IC110-B, determining the threshold (referred to the 168A's audio input level) where gating occurs. IC110-A's output defeats the release process by diverting release current from the timing circuit. IC110-B drives the GAIN HOLD indicator circuit.

To save current, the Channel 1 GAIN HOLD, Channel 2 GAIN HOLD, and MASTER lamps are in series. IC110-D turns the Channel 1 GAIN HOLD lamp On and Off by diverting its current to the –15V supply. When the channels operate independently, IC111-C turns the Channel 2 GAIN HOLD lamp On and Off by shorting it out with Q103. When the 168A is in stereo mode, the output of IC111-C is forced to the –15V rail by R180 and R181, turning Q103 Off. In stereo mode, the collector of Q104 goes to ground, permitting IC110-C and IC110-D to switch identically. Thus IC110-C causes both the Channel 1 GAIN HOLD and Channel 2 GAIN HOLD lamps to switch simultaneously, following the Channel 1 hold circuit.

Current source Q503, R542, R543, R544, CR506 applies a constant current to the series-connected diodes in LED assembly CR4. A string of ten comparators IC508-C to IC510-D receives the dB-linear gain reduction voltage. The comparators are biased with DC reference voltages (by voltage divider string R511, R513-R521, R546) from 0.9 to 9.0VDC in 0.9V steps. Each 0.9V step corresponds to 3dB additional gain reduction. When the gain reduction is less than 3dB, the gain reduction voltage is less than 0.9V and all the outputs of all comparators are active negative, shunting current from the series-connected LED string. As the gain reduction increases, the output of each comparator in turn becomes open collector and current is permitted to flow in the LED string until it encounters a comparator whose output is still active negative, at which point the active comparator shunts the current away from the rest of the LEDs.

A 50 or 60Hz "dither" signal is injected into the reference voltage string through C527, R512 (connected to the power transformer secondary). This AC signal modulates the turn-on threshold of each comparator, causing the LEDs to appear to smoothly fade

On and Off instead of switching abruptly.

5. De-Esser.

The De-Esser uses the outputs of a pair of dbx rms detectors, one which measures the power level of the broadband input signal to the 168A and the other which measures the power in this signal above 6kHz. The difference between the outputs of the two detectors (which are linear in dB) represents the ratio of these two powers (in dB). The De-Esser monitors this ratio. If it exceeds a threshold set by the DE-ESSING control, the De-Esser develops a control voltage that quickly reduces the gain of the main audio path VCA to effect de-essing.

Component-Level Description:

IC106 is a dbx rms detector. It receives the 168A's input signal through C112 and R140, which roll off very low frequencies that do not appreciably contribute to the ear's perception of loudness. Its output (on pin 7) is linear in dB and is applied to the inverting input of differential amplifier IC109-B.

A second dbx rms detector IC107 receives the 168A's input signal as processed through third-order 6kHz high-pass filter IC109-D (and associated components). The output of IC107, corresponding to the power contained in the input signal's high frequencies, is applied to the non-inverting input of differential amplifier IC109-B. The output of IC109-B is thus proportional to the difference (in dB) between the broadband signal power and the high frequency signal power. This signal remains constant even if the absolute input level varies over a wide range, provided only that the ratio between the broadband and high frequency powers in the input signal does not change.

The output of IC109-B is summed with the output of the DE-ESSING control VR106 in threshold amplifier IC109-C and associated components. When the ratio between the broadband and high frequency powers in the input signal is small, the output of threshold amplifier IC109-C (at the anode of CR104) is at ground and no de-essing occurs. As the output of IC109-B goes more positive (showing that the ratio between the broadband and high frequency powers in the input signal has become larger and that an "ess" sound is probably occurring), the output of IC109-C starts to go negative, decreasing the gain of IC101 and controlling sibilance levels.

This de-essing control voltage is applied to the DE-ESSING meter, consisting of IC111-A, IC111-B, and associated components. It operates similarly to the Compressor GAIN REDUCTION meter (see page 24) except that it uses resistor R188 instead of an active current source.

The output of VR106 is applied to one input of electronic switch IC203-A. When the 168A is in stereo mode, this switch applies the voltage output from the Channel 1 DE-ESSING control to the Channel 2 de-essing circuitry so that the Channel 1 DE-ESSING control determines the threshold of de-essing in both channels. (Although their *thresholds* are the same, the Channel 1 and Channel 2 de-essing circuits continue to operate independently, usually applying different amounts of de-essing to Channels 1 and 2, depending on the program content in each channel.)

6. High Frequency Spectral Enhancer.

The signal representing the ratio between the broadband and high frequency powers in the input signal is applied to the smoothing circuit (with a much slower time constant than the De-Esser). The output of the smoothing circuit controls the gain of a VCA to effect a shelving high frequency equalizer by adding the output of a 6dB/octave high-pass filter to its input signal with gain determined by the VCA's control signal. The sum of the smoothed ratio signal and a fixed dB offset set by the HIGH SPECTRAL ENHANCEMENT control determines the amount of equalization. This system smoothly increases HF boost when input signals contain a relatively small amount of high frequency power, thus adapting the amount of equalization to the input program moment-by-moment.

Component-Level Description:

Summing amplifier IC303-A receives the output of differential amplifier IC109-B, representing the difference (in dB) between the broadband signal power and the high frequency signal power. This signal is summed with the output of VR302, the HIGH SPECTRAL ENHANCEMENT control. Because the control signals are linear in dB at this point in the circuit, this has the effect of attenuating or amplifying the control signal (by adding or subtracting a fixed dB offset). The taper of the control is chosen so that, in its extreme counterclockwise range, it abruptly applies large amounts of attenuation, ensuring that the HF enhancement signal is attenuated to negligible levels when the control is fully counterclockwise.

The output of IC303-A is applied to smoothing circuit R316, R317, C309, CR300, CR301. The smoothed signal is buffered by IC303-B, whose output is applied to the gain control port of VCA IC302.

IC302 receives the output of high-pass filter C306, R315. IC301-C transforms IC302's current output into a voltage. The output of IC301-C is applied through coupling capacitor C308 and summing resistor R313 to the input of summing amplifier IC301-D, which also receives the input signal. The summation of the output of high-pass filter C306, R315 with the input signal produces a high-pass 6dB/octave shelving equalizer whose breakpoint and amount of equalization are determined moment-by-moment by the gain of IC302.

The output of VR302 is applied to one input of electronic switch IC203-B. When the 168A is in stereo mode, this switch applies the voltage output from the Channel 1 HIGH SPECTRAL ENHANCEMENT control to the Channel 2 HF enhance circuitry so the amount of HF enhancement in both channels is controlled from the Channel 1 control panel.

7. Low Frequency Spectral Enhancer.

The low frequency enhancer is a fourth-order equalizer that simultaneously creates a bell-shaped boost at 80Hz and a bell-shaped dip at 250Hz. Equalization is created by summing the output of a filter sidechain with its input through the LOW SPECTRAL ENHANCEMENT control.

Component-Level Description:

IC301-A and associated components form a non-inverting band-pass filter centered at 80Hz. IC301-B and associated components form an inverting band-pass filter centered at 250Hz. IC301-B receives the sum of the equalizer's input signal and the output of IC301-A through R300 and R331 respectively. The LOW SPECTRAL ENHANCEMENT control VR301-A receives the sum of the outputs of IC301-A and IC301-B. This sum is mixed with the equalizer's input signal in summing amplifier IC301-D. It can be shown that this arrangement is equivalent to cascading two independent peaking and dipping equalizers.

VR301-A is half of a dual-gang control. When the 168A is in stereo mode, the other half of this control is connected in place of the Channel 2 LOW SPECTRAL ENHANCEMENT control so the amount of LF enhancement in both channels is controlled from the Channel 1 control panel.

8. Balanced Output Driver.

The output driver is a circuit that simulates the characteristics of a transformer by means of complex cross-coupled positive and negative feedback paths. It can drive balanced or singled-ended loads with essentially no change in output level. Its average DC output is forced to zero by a common-mode servo amplifier. Its gain (defined as the difference between its outputs divided by its input) is 1.5, and its output impedance is 30Ω.

Component-Level Description:

The two halves of an NE5532 opamp IC304 provide inverting (IC304-A) and non-inverting (IC304-B) outputs. The nature of the load is sensed by observing the voltage developed across R335 and R342 and feeding this information back to the opamps. The operation of the circuit can only be further justified by a detailed mathematical analysis, which is beyond the scope of this circuit description.

Servo amplifier IC305 and associated components ensures that the average DC voltage between the two outputs of the line driver is zero. These outputs are summed into integrator IC305, C311 through R344 and R345. The integrator develops a voltage at its output that is injected into the line driver through R338. Feedback forces the voltage at the inverting input of IC305 to be equal to ground (the voltage at its non-inverting input). When the circuit is at equilibrium, no current flows in or out of the integration capacitor C311. So the average voltage applied to R344 and R345 must also be zero, as desired.

The output of the line driver is applied to hard-wired BYPASS switch S300, and then to the output of the 168A through RFI-suppression components C300 and C301. These provide RFI suppression effective for most environments. However, their effectiveness decreases at low radio frequencies (below about 10MHz), and a 168A operated at a LW or MW (AM) transmitter site might require additional suppression if RF fields are very high there.

9. PEAK OUTPUT LEVEL Meter.

The PEAK OUTPUT LEVEL meter consists of ten LEDs that monitor the output level of the 168A's processing circuitry just before the balanced output driver. The meter is driven by a peak detector that can read the peak level of a 10-microsecond pulse with an accuracy of 0.5dB (typical) when compared to its reading on a steady-state tone. It thus provides a true peak-reading capability, rather than a quasi-peak capability like an EBU-standard PPM.

Component-Level Description:

The output of IC301-D is rectified by an inverting half-wave precision rectifier IC500-A and associated components. Double the output of the rectifier is summed (through R531) with its input to create a full-wave rectified signal at the (+) input of IC500-B (pin 5). The rectifier has a voltage gain of 0.89.

IC500-B operates as a dual-time constant peak detector. A DC voltage equal to the peak value of the rectified signal at pin 5 of IC500-B is developed at the top of C500, which is charged by IC500-B's pin 7 through diode-connected transistor Q500. IC-500C buffers this voltage and provides feedback to IC500-B's pin 6, "telling" IC500-B how to charge C500, C501 so that the output of IC500-C accurately follows the peak value of the waveform on IC500-B's pin 5.

To achieve the very fast response needed, the peak-holding capacitors C500 and C501 are relatively small. To achieve a sufficiently slow recovery time with a practical value resistor (R534 = 22M), R534 is bootstrapped to the output of IC-500C through R537. R536 introduces enough DC offset to always produce approximately 0.5V across R537. This multiplies the effective value of R534 by 30 and slows the recovery time as desired.

The meter driver circuit associated with LED array CR2 receives the output of peak detector IC-500C (pin 1). Other than its providing a VU (rather than a linear) scale and receiving dither voltage in a different part of the reference voltage divider, the operation of this circuit is identical to the operation of the circuit driving the CR4 LED array (see above).

10. Power Supply.

Two pairs of full-wave diode rectifiers supply unregulated voltage. The nominal unregulated voltage is ±22 volts DC at rated line voltage. This will vary widely with line voltage variations. Regulator dropout will occur if the unregulated voltage falls below about ±17.8 volts.

A pair of overrated 500mA "three-terminal" IC regulators supply regulated voltages. Because they are operated conservatively and are internally protected, the regulators can be expected to be reliable.

Component-Level Description:

The two pairs of full-wave diode rectifiers that supply unregulated voltage are located in package CR5. The rectifier pairs drive energy storage capacitors C504 and C505. The power transformer can be strapped for either 115-volt or 230-volt operation by a rear panel switch (the two sections of the primary are paralleled for 115-volt operation and connected in series for 230-volt operation).

The pair of ICs that supply regulated voltages are "three-terminal" IC regulators IC12, IC13. IC12 and IC13 are frequency-compensated by C506, C507 at their outputs to prevent high-frequency oscillations. Small 0.1µF/25V ceramic capacitors bypass the power busses to ground locally throughout the board to prevent signal-carrying ICs from oscillating due to excessive power-lead inductance.

(Replace C506 and C507 with low-inductance aluminum electrolytic capacitors *only* — see "Power supply problems" on page 20.)

PARTS LIST

Parts are listed by ASSEMBLY, then by TYPE, then by REFERENCE DESIGNATOR. Widely used common parts are not listed; such parts are described generally below (examine the part to find exact value). See the following assembly drawings for locations of components.

SIGNAL DIODES, if not listed by reference designator in the following parts list, are:

dbx part number 22101-000, Motorola part number 1N4148, also available from many other vendors. This is a silicon, small-signal diode with ultra-fast recovery and high conductance. It may be replaced with 1N914 (BAY-61 in Europe).

(BV: 75V min. @ Ir = 5µA; Ir: 25nA max. @ Vr = 20V; Vf: 1.0V max. @ If = 100mA; trr: 4ns max.) See Miscellaneous list for ZENER DIODES (reference designator VRxx).

RESISTORS should only be replaced with the same style and with the exact value marked on the resistor body. If the value marking is not legible, consult the schematic or the factory. If you do not use exact replacements, you will compromise performance and stability.

Unless listed by reference designator in the following parts list, you can verify resistors by their physical appearance:

Metal film resistors have conformally-coated bodies, and are identified by five color bands or a printed value. They are rated at 1/8 watt @ 70°C. Their resistance has a tolerance of ±1% and a temperature coefficient of 100 PPM/°C. dbx part numbers 20038-xxx through 20045-xxx, USA Military Specification MIL-R-10509 Style RN55D, manufactured by Dale, KOA, Phillips, R-Ohm (CRB-1/4FX), R-Ohm (R-25), SEI, Spectrol and Stackpole and TRW/IRC.

Carbon film resistors have conformally-coated bodies, and are identified by four color bands. They are rated at 1/4 watt @ 70°C. Their resistance has a tolerance of ±5%. dbx part numbers 20001-xxx, manufactured by Dale, KOA, Phillips, R-Ohm (R-25), SEI, Spectrol and Stackpole.

Carbon composition resistors have molded phenolic bodies, and are identified by four color bands. The 0.090 x 0.250 inch (2.3 x 6.4 mm) size is rated at ¼ watt, and the 0.140 x 0.375 inch (3.6 x 9.5 mm) size is rated at ½ watt, both ±5% tolerance. dbx part numbers 2001x-xxx, USA Military Specification MIL-R-11 Style RC-07 (¼ watt) or RC-20 (½ watt), manufactured by Allen-Bradley, Stackpole and TRW/IRC.

Carbon trimmer potentiometers have .405-inch (10.287 mm) circular bodies, and are identified by printing on their sides. They are rated at .15 watt @ 40°C. Their resistance has a tolerance of ±20%. dbx part number 20535-xxx, manufactured by Piher and Murata.

Mini resistors have conformally-coated bodies. Carbon film mini resistors are identified by four color bands and are rated at ⅛ watt @ 70°C. Their resistance has a tolerance of ±5% and a temperature coefficient of 100 PPM/°C (dbx part numbers 20085-xxx through 20092-xxx). Metal film mini resistors are identified by five color bands and are rated at ⅛ watt @ 70°C. Their resistance has a tolerance of ±1% (dbx part numbers 20094-xxx through 20101-xxx) or ±0.1% (dbx part numbers 20102-xxx through 20109-xxx) and a temperature coefficient of 100 PPM/°C. All mini resistors are USA Military Specification MIL-R-10509 Style RN50D, manufactured by Dale, KOA, Phillips, R-Ohm (R-25), SEI, Spectrol and Stackpole.

Obtaining Spare Parts

Special or subtle characteristics of certain components are exploited to produce an elegant design at a reasonable cost. It is therefore unwise to make substitutions for listed parts. Consult the factory if the listing of a part includes the note "selected" or "realignment required."

dbx normally maintains an inventory of tested, exact replacement parts that can be supplied quickly at nominal cost. Standardized spare parts kits are also available. When ordering parts from the factory, please have available the following information about the parts you want:

dbx part number
Reference designator (e.g., C3, R78, IC14)
Brief description of part
Model, serial, and "M" (if any) number of unit — see rear-panel label

To facilitate future maintenance, parts for this unit have been chosen from the catalogs of well-known manufacturers whenever possible. Most of these manufacturers have extensive worldwide distribution and can be contacted through their local offices. Addresses for each manufacturer's USA headquarters are given on page 36.

REF DES	DESCRIPTION	dbx P/N	VEN (1)	VENDOR P/N	ALTERNATE VENDORS (1)	NOTES
FINAL ASSEMBLY						
Miscellaneous						
	Transformer	55019.000	DBX			
MAIN BOARD ASSEMBLY						
Miscellaneous						
J6	Cable Assy, Flat, 16 Pin, 3 inches	42028-030	ORB			
J8	Cable Assy, Flat, 16 Pin, 3 inches	42028-030	ORB			
J102	Connector, XLR, PC Mount, Female	27054-003	NEU	NC 3 FD-H		
J202	Connector, XLR, PC Mount, Female	27054-003	NEU	NC 3 FD-H		
J300	Connector, XLR, PC Mount, Male	27053-003	NEU	NC 3 MD-H		
J400	Connector, XLR, PC Mount, Male	27053-003	NEU	NC 3 MD-H		
Capacitors						
C100,101	Filter, EMI, W/BEAD, 50V,1000PF	29508-210	TAI	STB102KB		
C102	Ceramic, Axial, 100V, 5%; 10pF	21127-010	KEM	C410C100J1G5CA		
C103	Met. Polyester, 50V, 5%; 0.1uF	21445-410	PAN	ECQ-V1H104JZ		
C104	Alum., Radial, NP, 50V, 20%; 47uF	21253-647	PAN	ECEA1HN470S		
C105	Ceramic, Axial, 100V, 5%; 100pF	21127-110	KEM	C410C101J1G5CA		
C106	Met. Polyester, 50V, 5%; 0.1uF	21445-410	PAN	ECQ-V1H104JZ		
C107	Ceramic, Axial, 100V, 5%; 1000pF	21127-210	KEM	C410C102J1G5CA		
C108	Ceramic, Axial, 100V, 5%; 100pF	21127-110	KEM	C410C101J1G5CA		
C109-111	Ceramic, Axial, 100V, 5%; 1000pF	21127-210	KEM	C410C102J1G5CA		
C112	Met. Polyester, 50V, 5%; .015uF	21445-315	PAN	ECQ V1H153JZ		
C113	Ceramic, Axial, 100V, 5%; 680pF	21127-168	KEM	C410C681J1G5CA		
C114,115	Ceramic, Axial, 100V, 5%; 1000pF	21127-210	KEM	C410C102J1G5CA		
C116	Met. Polyester, 50V, 5%; .047uF	21445-347	PAN	ECQ V1H473JZ		
C117,118	Alum., Radial, NP, 50V, 20%; 1.0uF	21253-510	PAN	ECEA1HN010S		
C119,120	Alum., Radial, NP, 50V, 20%; 3.3uF	21253-533	PAN	ECEA1HN3R3S		
C121	Ceramic, Axial, 100V, 5%; 1000pF	21127-210	KEM	C410C102J1G5CA		
C122	Ceramic Disc, 1kV, 20%; 0.0033uF	21113-233	CRL	DD-332	MUR	
C200,201	Filter, EMI, W/BEAD, 50V,1000PF	29508-210	TAI	STB102KB		
C202	Ceramic, Axial, 100V, 5%; 10pF	21127-010	KEM	C410C100J1G5CA		

FOOTNOTES:
(1) See Vendor abbreviations
(2) No Alternate Vendors known at publication
(3) Actual part is specially selected from part listed, consult Factory
(4) Realignment may be required if replaced, see Circuit Description and/or Alignment Instructions

SPECIFICATIONS AND SOURCES FOR REPLACEMENT PARTS

dbx Model 168A
Final Assembly - Miscellaneous.
Main Board Assembly - Miscellaneous, Capacitors.

REF DES	DESCRIPTION	dbx P/N	VEN (1)	VENDOR P/N	ALTERNATE VENDORS (1)	NOTES
Capacitors (continued)						
C203	Met. Polyester, 50V, 5%; 0.1uF	21445-410	PAN	ECQ-V1H104JZ		
C204	Alum., Radial, NP, 50V, 20%; 47uF	21253-647	PAN	ECEA1HN470S		
C205	Ceramic, Axial, 100V, 5%; 100pF	21127-110	KEM	C410C101J1G5CA		
C206	Met. Polyester, 50V, 5%; .015uF	21445-315	PAN	ECQ V1H153JZ		
C207	Ceramic, Axial, 100V, 5%; 1000pF	21127-210	KEM	C410C102J1G5CA		
C208	Ceramic, Axial, 100V, 5%; 100pF	21127-110	KEM	C410C101J1G5CA		
C209-211	Ceramic, Axial, 100V, 5%; 1000pF	21127-210	KEM	C410C102J1G5CA		
C212	Met. Polyester, 50V, 5%; 0.1uF	21445-410	PAN	ECQ-V1H104JZ		
C213	Ceramic, Axial, 100V, 5%; 680pF	21127-168	KEM	C410C681J1G5CA		
C214,215	Ceramic, Axial, 100V, 5%; 1000pF	21127-210	KEM	C410C102J1G5CA		
C216	Met. Polyester, 50V, 5%; .047uF	21445-347	PAN	ECQ V1H473JZ		
C217,218	Alum., Radial, NP, 50V, 20%; 1.0uF	21253-510	PAN	ECEA1HN010S		
C219,220	Alum., Radial, NP, 50V, 20%; 3.3uF	21253-533	PAN	ECEA1HN3R3S		
C221	Ceramic, Axial, 100V, 5%; 1000pF	21127-210	KEM	C410C102J1G5CA		
C222	Ceramic Disc, 1kV, 20%; 0.0033uF	21113-233	CRL	DD-332	MUR	
C300,301	Filter, EMI, W/BEAD, 50V,1000PF	29508-210	TAI	STB102KB		
C302,303	Met. Polyester, 50V, 5%; 0.01uF	21445-310	PAN	ECQ-V1H103JZ		
C304	Met. Polyester, 50V, 5%; .0033uF	21445-233	PAN	ECQ B1H332 F1		
C305	Met. Polyester, 50V, 5%; 0.01uF	21445-310	PAN	ECQ-V1H103JZ		
C306	Met. Polyester, 50V, 5%; .0022uF	21445-222	PAN	ECQ B1H222 F1		
C307	Met. Polyester, 50V, 5%; .001uF	21445-210	PAN	ECQ B1H102 F1		
C308,309	Met. Polyester, 50V, 5%; .047uF	21445-347	PAN	ECQ V1H473JZ		
C310	Ceramic, Axial, 100V, 5%; 100pF	21127-110	KEM	C410C101J1G5CA		
C311	Met. Polyester, 50V, 5%; 0.1uF	21445-410	PAN	ECQ-V1H104JZ		
C318	Ceramic, Axial, 100V, 5%; 10pF	21127-010	KEM	C410C100J1G5CA		
C400,401	Filter, EMI, W/BEAD, 50V,1000PF	29508-210	TAI	STB102KB		
C402,403	Met. Polyester, 50V, 5%; 0.01uF	21445-310	PAN	ECQ-V1H103JZ		
C404	Met. Polyester, 50V, 5%; .0033uF	21445-233	PAN	ECQ B1H332 F1		
C405	Met. Polyester, 50V, 5%; 0.01uF	21445-310	PAN	ECQ-V1H103JZ		
C406	Met. Polyester, 50V, 5%; .047uF	21445-347	PAN	ECQ V1H473JZ		
C407	Met. Polyester, 50V, 5%; .001uF	21445-210	PAN	ECQ B1H102 F1		
C408	Met. Polyester, 50V, 5%; .0022uF	21445-222	PAN	ECQ B1H222 F1		
C409	Met. Polyester, 50V, 5%; .047uF	21445-347	PAN	ECQ V1H473JZ		

FOOTNOTES:
(1) See Vendor abbreviations
(2) No Alternate Vendors known at publication
(3) Actual part is specially selected from part listed, consult Factory
(4) Realignment may be required if replaced, see Circuit Description and/or Alignment Instructions

SPECIFICATIONS AND SOURCES FOR REPLACEMENT PARTS

dbx Model 168A
Main Board Assembly - Capacitors.

REF DES	DESCRIPTION	dbx P/N	VEN (1)	VENDOR P/N	ALTERNATE VENDORS (1)	NOTES
Capacitors (continued)						
C410	Ceramic, Axial, 100V, 5%; 100pF	21127-110	KEM	C410C101J1G5CA		
C411	Met. Polyester, 50V, 5%; 0.1uF	21445-410	PAN	ECQ-V1H104JZ		
C418	Ceramic, Axial, 100V, 5%; 10pF	21127-010	KEM	C410C100J1G5CA		
C500-503	Met. Polyester, 50V, 5%; 0.01uF	21445-310	PAN	ECQ-V1H103JZ		
C504,505	Alum., Axial, 40V, -10% +100%; 470uF	21224-747	SIE	B41283-470-40	PAN	
C506,507	Alum., Radial, 25V, -20% +100%; 100uF	21206-710	PAN	ECE-A1EV101S		
C508-525	Ceramic, Axial, 50V, 20%; 0.1uF	21129-410	KEM	C410C104M5UCA		
C526	Met. Polyester, 50V, 5%; 0.01uF	21445-310	PAN	ECQ-V1H103JZ		
C527-531	Met. Polyester, 50V, 5%; 0.1uF	21445-410	PAN	ECQ-V1H104JZ		
C600-605	Ceramic, Axial, 50V, 20%; 0.1uF	21129-410	KEM	C410C104M5UCA		
C703,704	Tantalum, 35V, 10%; 2.2uF	21307-522	SPR	196D 225X9035JA1	MANY	
C705	Met. Polyester, 50V, 5%; .047uF	21445-347	PAN	ECQ V1H473JZ		
C706	Met. Polyester, 50V, 5%; 0.1uF	21445-410	PAN	ECQ-V1H104JZ		
C708,709	Tantalum, 35V, 10%; 2.2uF	21307-522	SPR	196D 225X9035JA1	MANY	
C710	Met. Polyester, 50V, 5%; .047uF	21445-347	PAN	ECQ V1H473JZ		
C711	Met. Polyester, 50V, 5%; 0.1uF	21445-410	PAN	ECQ-V1H104JZ		
Diodes						
CR5	Diode, Bridge, 200V, 1A	22301-000	VARO	VE-27	GI	
CR111	LED w/Housing; Bi-Color Red/Green	25120-009	LUMX	SSF-LXH303M-A009		
CR112	LED w/Housing; Green	25120-002	LUMX	SSF-LXH303M-A002		
CR113	LED w/Housing; Red	25120-001	LUMX	SSF-LXH303M-A001		
CR114,115	LED w/Housing; Yellow	25120-003	LUMX	SSF-LXH303M-A003		
CR208	LED w/Housing; Bi-Color Red/Green	25120-009	LUMX	SSF-LXH303M-A009		
CR209	LED w/Housing; Green	25120-002	LUMX	SSF-LXH303M-A002		
CR210	LED w/Housing; Red	25120-001	LUMX	SSF-LXH303M-A001		
CR516	LED w/Housing; 1-Red, 9-Yellow	25120-008	LUMX	SSF-LXH303M-A008		
CR526	LED w/Housing; 1-Red, 9-Yellow	25120-008	LUMX	SSF-LXH303M-A008		
CR527	LED w/Housing; 10-Red	25120-004	LUMX	SSF-LXH303M-A004		
CR537	LED w/Housing; 10-Red	25120-004	LUMX	SSF-LXH303M-A004		
CR608	Diode, Signal, Hot Carrier	22102-001	HP	HP5082-2800	MANY	
CR615	Diode, Signal, Hot Carrier	22102-001	HP	HP5082-2800	MANY	

FOOTNOTES:
(1) See Vendor abbreviations
(2) No Alternate Vendors known at publication
(3) Actual part is specially selected from part listed, consult Factory
(4) Realignment may be required if replaced, see Circuit Description and/or Alignment Instructions

SPECIFICATIONS AND SOURCES FOR REPLACEMENT PARTS

dbx Model 168A

Main Board Assembly - Capacitors, Diodes.

REF DES	DESCRIPTION	dbx P/N	VEN (1)	VENDOR P/N	ALTERNATE VENDORS (1)	NOTES
Inductors						
L1	Filter, Line	28012-000	DEL	03ME1		
Integrated Circuits						
IC100	Linear, Dual Opamp	24207-202	SIG	NE5532N	TI,EXR	
IC101,102	VCA	24725-902	NEC	uPC1252HC		
IC104,105	Linear, Dual Opamp	24216-000	TI	TLO74CN		
IC106,107	RMS	24724-902	NEC	uPC1253H2		
IC108	Quad Comparator	24710-302	NAT	LM339		
IC109	Linear, Dual Opamp	24216-000	TI	TLO74CN		
IC110,111	Quad Comparator	24710-302	NAT	LM339		
IC200	Linear, Dual Opamp	24207-202	SIG	NE5532N	TI,EXR	
IC201,202	VCA	24725-902	NEC	uPC1252HC		
IC203	Digital, MUXR/DMUXR	24640-302	MOT	MC14053BCP		
IC204,205	Linear, Dual Opamp	24216-000	TI	TLO74CN		
IC206,207	RMS	24724-902	NEC	uPC1253H2		
IC208	Quad Comparator	24710-302	NAT	LM339		
IC209	Linear, Dual Opamp	24216-000	TI	TLO74CN		
IC210	Quad Comparator	24710-302	NAT	LM339		
IC301	Linear, Dual Opamp	24216-000	TI	TLO74CN		
IC302	VCA	24725-902	NEC	uPC1252HC		
IC303	Linear, Dual Opamp	24206-202	TI	TL072CP	MOT	
IC304	Linear, Dual Opamp	24207-202	SIG	NE5532N	TI,EXR	
IC305	Linear, Single Opamp	24013-202	TI	TL071CP		
IC401	Linear, Dual Opamp	24216-000	TI	TLO74CN		
IC402	VCA	24725-902	NEC	uPC1252HC		
IC403	Linear, Dual Opamp	24206-202	TI	TL072CP	MOT	
IC404	Linear, Dual Opamp	24207-202	SIG	NE5532N	TI,EXR	
IC405	Linear, Single Opamp	24013-202	TI	TL071CP		
IC500	Linear, Dual Opamp	24216-000	TI	TLO74CN		
IC501-510	Quad Comparator	24710-302	NAT	LM339		
IC511	Linear, Dual Opamp	24216-000	TI	TLO74CN		
IC512	D.C. Regulator, 15V Positive	24304-901	NAT	LM78M15UC	TI,MOT	
IC513	D.C. Regulator, 15V Negative	24303-901	NAT	LM79M15AUC	TI,MOT	

FOOTNOTES:
(1) See Vendor abbreviations
(2) No Alternate Vendors known at publication
(3) Actual part is specially selected from part listed, consult Factory
(4) Realignment may be required if replaced, see Circuit Description and/or Alignment Instructions

SPECIFICATIONS AND SOURCES FOR REPLACEMENT PARTS

dbx Model 168A
Main Board Assembly - Inductors, Integrated Circuits.

REF DES	DESCRIPTION	dbx P/N	VEN (1)	VENDOR P/N	ALTERNATE VENDORS (1)	NOTES
Resistors						
VR103,104	Pot, Single; 10K (5050B)	20844-000	DBX			
VR105	Pot, Single; 50K (5015A)	20849-000	DBX			
VR106	Pot, Single; 10K (5015C)	20846-000	DBX			
VR107	Pot, Single; 50K (5050B)	20845-000	DBX			
VR203,204	Pot, Single; 10K (5050B)	20844-000	DBX			
VR205	Pot, Single; 50K (5015A)	20849-000	DBX			
VR206	Pot, Single; 10K (5015C)	20846-000	DBX			
VR207	Pot, Single; 50K (5050B)	20845-000	DBX			
VR301	Pot, Dual; 10K/10K (5050B)	20843-000	DBX			
VR302	Pot, Single; 10K (5015C)	20846-000	DBX			
VR401	Pot, Single; 10K (5050B)	20844-000	DBX			
VR402	Pot, Single; 10K (5015C)	20846-000	DBX			
Switches						
S100	Switch, Single, Push-Push; 6PDT	26127-000	SCH	PHA016UNEENN		
S300	Switch, Single, Push-Push; 4PDT	26126-000	SCH	PHA014UNEENN		
S400	Switch, Single, Push-Push; 4PDT	26126-000	SCH	PHA014UNEENN		
Transistors						
Q100,101	Transistor, Signal, NPN	23202-101	MOT	2N4400	FSC	
Q102	Transistor, Signal, PNP	23002-101	MOT	2N4402	FSC	
Q103,104	Transistor, Signal, NPN	23202-101	MOT	2N4400	FSC	
Q105	Transistor, Signal, PNP	23002-101	MOT	2N4402	FSC	
Q200,201	Transistor, Signal, NPN	23202-101	MOT	2N4400	FSC	
Q202,203	Transistor, Signal, PNP	23002-101	MOT	2N4402	FSC	
Q500,501	Transistor, Signal, NPN	23202-101	MOT	2N4400	FSC	
Q502-505	Transistor, Signal, PNP	23002-101	MOT	2N4402	FSC	

FOOTNOTES:
(1) See Vendor abbreviations
(2) No Alternate Vendors known at publication
(3) Actual part is specially selected from part listed, consult Factory
(4) Realignment may be required if replaced, see Circuit Description and/or Alignment Instructions

SPECIFICATIONS AND SOURCES FOR REPLACEMENT PARTS

dbx Model 168A
Main Board Assembly - Resistors, Switches, Transistors.

len-Bradley Co., Inc.
01-T South Second Street
lwaukee, WI 53204

ialog Devices, Inc.
ie Technology Way
) Box 9106
rwood, MA 02062-9106

CG Acoustics, Inc.
25 Alvarado Street
n Leandro, CA 94577

mphenol Corporation
3 Hall Avenue
illingford, CT 06492

ckman Industrial Corporation
41 Palm Street
llerton, CA 92635-1025

lden Electronic Wire & Cable
) Box 1980
chmond, IN 47374

urns, Inc
sistive Components Group
00 Columbia Avenue
verside, CA 92507

ssmann Division
oper Industries
) Box 14460
Louis, MO 63178

rnell-Dubilier Elec.
00 Rte. 23 North
ayne, NJ 07470

iff Electronics Company, Inc.
76 East Second Street
nicia, CA 94510

epcopal/Centralab
e Mepcopal

ystal Semiconductor Corporation
10-T. South Industrial Dr.
stin, TX 78744

S Corporation
7 North West Blvd.
chart, IN 46514

DEL Delta Products Corp
361 Fairview Way
Milpitas, CA 95035

DUR Duracell, Inc.
Berkshire Industrial Park
Bethel, CT 06801

ELSW Electro Switch
77 King Avenue
Weymouth, MA 02188

EMI Emico Inc.
123 Main Street
Dublin, PA 18917

EXR Exar Corporation
2222 Qume Dr.
PO Box 49007
San Jose, CA 95161-9007

FR Fair-Rite Products Corp.
PO Box J
Wallkill, NY 12589

FSC Fairchild Camera & Instr. Corp.
See National Semiconductor

GI General Instruments
Optoelectronics Division
See Quality Technologies

HA Harris Semiconductor
2460 N 1st Street
Suite 200
San Jose, CA 95131-0124

HO Hoyt Elect. Inst. Works
19 Linden St.
Penacook, NH 03303

HP Hewlett-Packard Co.
Components Group
640 Page Mill Road
Palo Alto, CA 94304

INS Intersil, Inc.
See Harris Semiconductor

ITW ITW Switches
An Illinois Tool Works Co.
6615 W. Irving Park Rd.
Dept. T
Chicago, IL 60634

KEY Keystone Electronics Corp.
31-07 20th Rd.
Astoria, NY 11105

LFE Littlefuse
A Subsidiary of Tracor, Inc.
800 E. Northwest Hwy
Des Plaines, IL 60016

LT Linear Technology Corp.
1630 McCarthy Blvd.
Milpitas, CA 95035

LUMX Lumex Opto/Components Inc.
292 E. Hellen Road
Palatine, IL 60067

MAL Mallory Capacitor Co.
Emhart Electrical/Electronic Gr.
4760 Kentucky Ave
Indianapolis, IN 46241

MAR Marquardt Switches, Inc.
2711-TR Route 20 East
Cazenovia, NY 13035

MAT Matsushita Electric Corp of America
One Panasonic Way
Secaucus, NJ 07094

ME Mepcopal/Centralab
A North American Phillips Corp.
11468 Sorrento Valley Road
San Diego, CA 92121

MID Hollingsworth/Wearnes
Hollingsworth Solderless Terminal Div.
357 Beloit Street
Burlington, WI 53105

MIL J.W. Miller Division
Bell Industries
306 E. Alondra
Gardena, CA 90247

MOT Motorola Semiconductor
PO Box 20912
Phoenix, AZ 85036

MUR Murata Erie North America
2200 Lake Park Drive
Smyrna, GA 30080

NAT National Semiconductor Corp.

NEL NEL Frequency Controls, Inc.
357 Beloit Street
Burlington, WI 53105

NOB Noble U.S.A., Incorporated
5450 Meadowbrook Industrial Ct.
Rolling Meadows, IL 60008

OKI OKI Semiconductor
785 N. Mary Ave.
Sunnyvale, CA 94086-2909

OHM Ohmite Manufacturing Company
3601 Howard Street
Skokie, IL 60076

ORB Orban
A division of AKG Acoustics, Inc.
1525 Alvarado Street
San Leandro, CA 94577

PAN Panasonic Industrial Company
Two Panasonic Way
7E-2T
Secaucus, NJ 07094

QT Quality Technologies, Inc.
610 North Mary Ave.
Sunnyvale, CA 94086

RAL Raltron Electronics Corp.
9550 Warner Ave.
Fountain Valley, CA 92708

RAY Raytheon Company
Semiconductor Division
350 Ellis Street
Mountain View, CA 94039

RCA RCA Solid State
See Harris Semiconductor

ROHM Rohm Corporation
8 Whatney
Irvine, CA 92718

SAE Stanford Applied Engineering, Inc
340 Martin Avenue
Santa Clara, CA 95050

SAN Sangamo Weston Inc.
Capacitor Division
See Cornell-Dubilier

SIG Philips Components - Signetics
North American Phillips Corp.
811 E. Arques
Sunnyvale, CA 94088

SPR Sprague Electric Co.
41 Hampden Road
PO Box 9102
Mansfield, MA 02048-9102

SW Switchcraft
A Raytheon Company
5555 N. Elston Avenue
Chicago, IL 60630

TAI Taiyo America, Inc.
700 Frontier Way
Bensenville, IL 60106

TDK TDK Electronics Corporation
12 Harbor Park
Port Washington, NY 11050

TI Texas Instruments, Inc.
PO Box 225012
Dallas, TX 75265

TOS Toshiba America, Inc.
9740 Irvine Blvd.
Irvine, CA 92718

TRW TRW Electronics Components
Connector Division
1501 Morse Avenue
Elk Grove Village, IL 60007

VARO Varo Semiconductor, Inc.
PO Box 469013
Garland, TX 75046-9013

WES Westlake
See Mallory Capacitor Co.

WIM The Inter-Technical Group Inc.
Wima Division
PO Box 23
Irvington, NY 10533

ZI ZILOG Inc.
210 Hacienda Ave.
Campbell, CA 95008

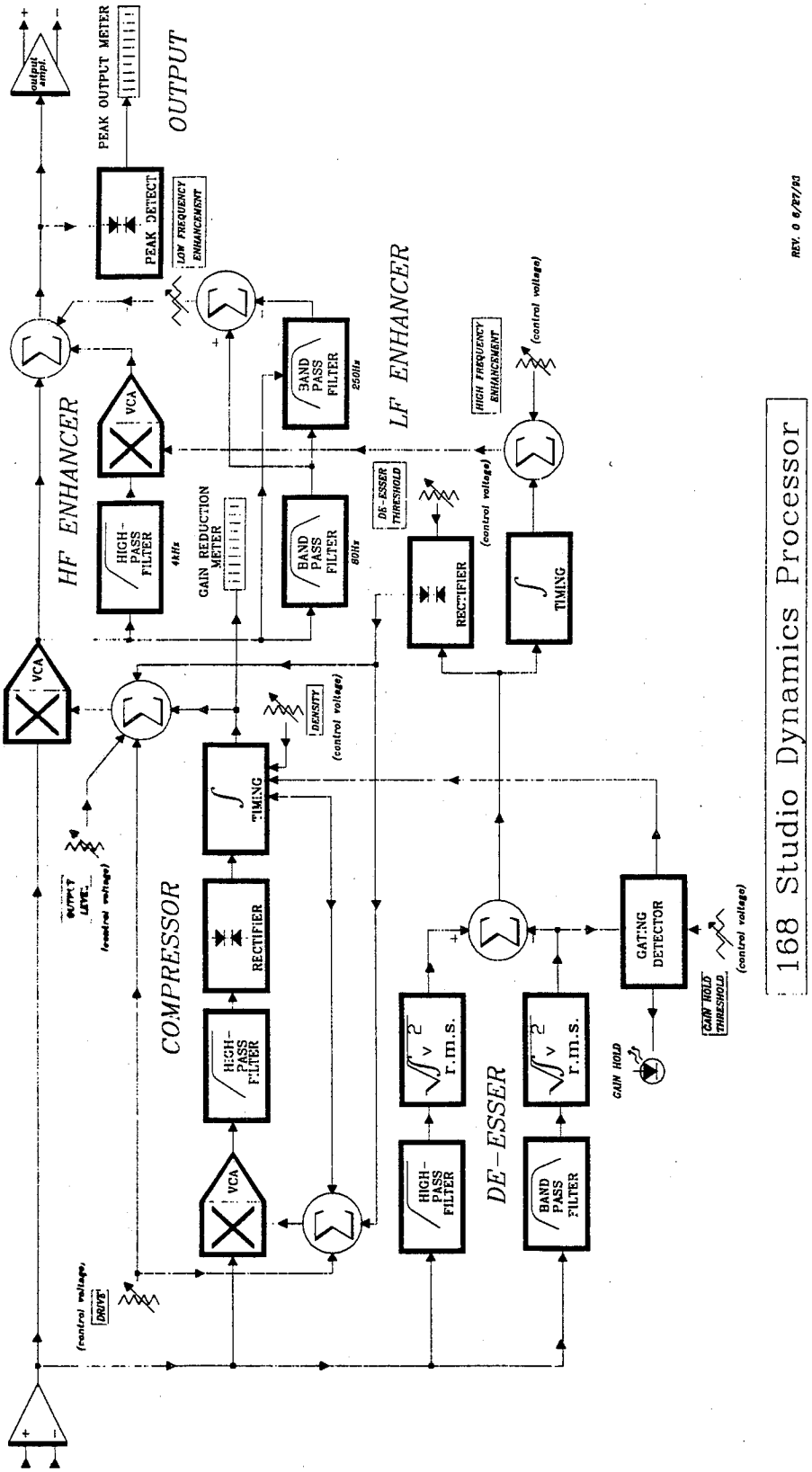
SCHEMATICS, ASSEMBLY DRAWINGS

The following drawings are included in this manual:

Page:	Function:	Circuit Board:	Drawing:
38	Block Diagram		
39	Audio Processing	Main, Display	Assembly Drawing
40	Channel 1	Main	Schematic 1 of 5
41	Channel 2	Main	Schematic 2 of 5
42	EQ, Output (Ch 1)	Main	Schematic 3 of 5
43	EQ, Output (Ch 2)	Main	Schematic 4 of 5
44	Display, Power	Display	Schematic 5 of 5

These drawings reflect the actual construction of your unit as accurately as possible. Differences between the drawings and your unit are almost undoubtedly due to product improvements or production changes that have not yet found their way into this manual. Such changes are included during periodic updates of this manual; major changes are described in addenda mailed to the registered owner of the unit.

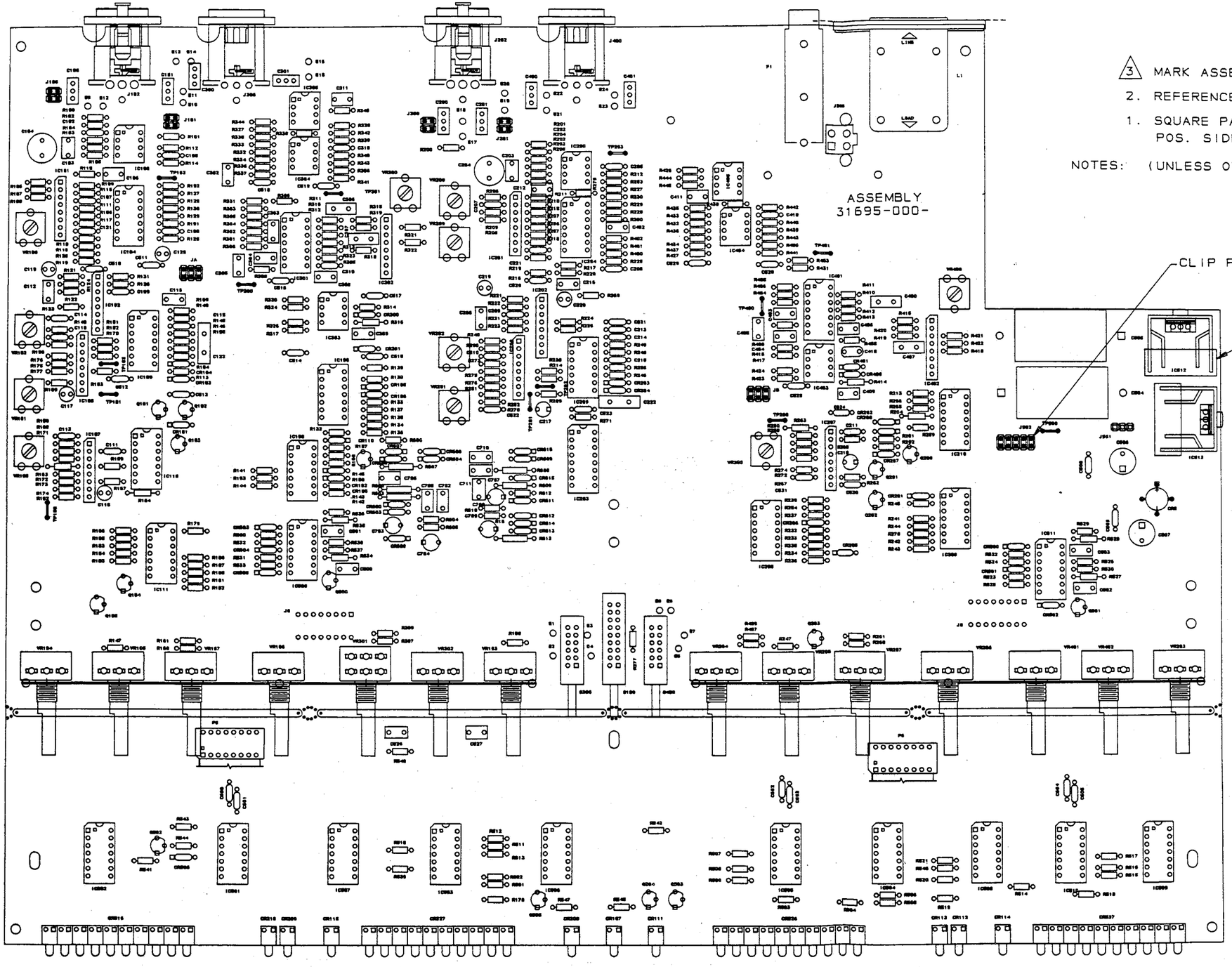
If you intend to replace parts, please see page 29.



REV. 0 6/27/93

168 Studio Dynamics Processor

(Simplified Block Diagram; Single Channel Only)



3 MARK ASSEMBLY REVISION LEVEL IN SPACE PROVIDED

2. REFERENCE SCHEMATIC DRAWING NO. 61136-000

1. SQUARE PADS INDICATE PIN 1 OF CONNECTORS, CATHODE OF DIODES POS. SIDE OF CAPS., PIN 1 OF IC'S

NOTES: (UNLESS OTHERWISE SPECIFIED)

J100 J101 J200 J201
+4dBu INPUT LEVEL

J100 J101 J200 J201
-10dBu INPUT LEVEL

JUMPER CONFIGURATION

dbx

TITLE: PCB ASSEMBLY
168A DYNAMICS PROCESSOR
31695-000-02

CHANNEL 1

SPARE

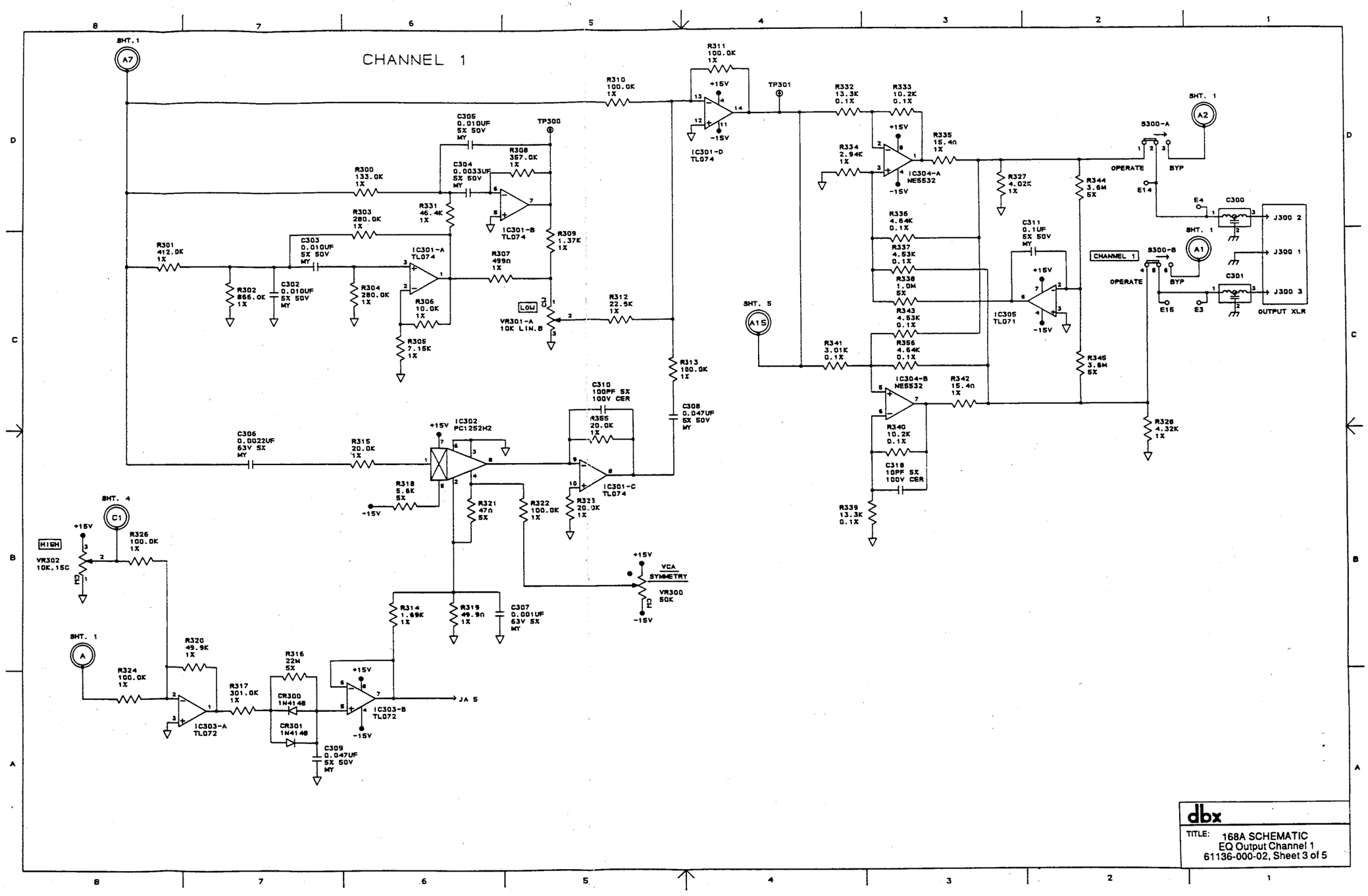
TITLE: 168A SCHEMATIC
Compressor/De-Esser Channel 1
61136-000-02, Sheet 1 of 5

CHANNEL 2

SHT. 4 B1 +4dbU
-10dBV
J200-B
J200-A
C200
J202 3
J202 1
J202 2
C201
R200 14.7K 1%
R202 5.11K 1%
R201 14.7K 1%
R203 5.11K 1%
J201-A
J201-B
-10dBV
SHT. 4 B2 +4dbU
R205 14.3K 1%
C202 10PF 5% 100V CER
R204 14.3K,1%
+15V
IC200-A NE5532
-15V
C204 47UF 20% 50V ALUM NON-POLAR
C203 0.1UF 5% 50V MY
R206 20.0K 1%
+15V
IC201 PC1252H2
TRIM CHANNEL BALANCE
VR209 5K
R257 5.76K 1%
R256 5.6K 5%
-15V
(+10 to -30dB)
OUTPUT
VR203 10K LIN.B
R216 374.0K 1%
R211 1.50K 1%
C207 1000PF 5% 100V CER
R207 470 5%
R208 100.0K 1%
SHT. 1 A6
R210 1.50K 1%
R209 31.6Ω 1%
C205 100PF 5% 100V CER
R212 20.0K 1%
TP203
SHT. 4 B3
IC200-B NE5532
R253 499.0K 1%
IC204-A TL074
C212 0.1UF 5% 50V MY
VR200 50K
VCA SYMMETRY
R215 3.9M 5%
IC208-C LM339
IC208-D LM339
N/C
SPARE
(0 to -40dB)
DRIVE
VR204 10K LIN.B
R217 154.0K 1%
C206 100PF 5% 100V CER
R225 20.0K 1%
IC202 PC1252H2
C219 3.3UF 20% 50V ALUM NON-POLAR
C220 3.3UF 20% 50V ALUM NON-POLAR
R221 20.0K 1%
R223 5.6K 5%
R222 470 5%
IC204-C TL074
R269 47.5K 1%
C216 0.047UF 5% 50V MY
R231 1.5K 5%
SHT. 1 A4
SHT. 1 A3
R226 1.00K 1%
R224 31.6Ω 1%
C209 1000PF 5% 100V CER
R227 127.0K 1%
R279 931.0K 1%
S100-D
COUPLE
R228 154.0K 1%
R229 165.0K 1%
R230 20.0K 1%
IC204-D TL074
R276 39.2K 1%
R273 22.6K 1%
VR202 50K
R275 220 5%
R280 10.7K 1%
TRIM SYMM
R244 42.2K 1%
IC208-A LM339
R245 1.69K 1%
CR207 1N4148
R241 26.7K 1%
R278 4.99K 1%
IC208-B LM339
CR202 1N4148
CR200 1N4148
R281 10.0K 1%
Q200 2N4400
CR201 1N4148
R243 42.2K 1%
R242 4.99K 1%
R282 66.5K 1%
N/C
Q201 2N4400
IC205-A TL074
CR610 1N4148
CR609 1N4148
R609 10M 5%
C707 2.2UF 63V
C708 2.2UF 63V
C709 2.2UF 63V
CR615 5082-2800
R610 2.00K 1%
R10 3.92K 1%
R608 22M 5%
C710 0.047UF 5% 50V MY
IC209-A TLO74
VR205 50K 15A
DENSITY
R247 499Ω 1%
Q203 2N4402
N/C
R246 100.0K 1%
Q202 2N4402
R612 1.50K 1%
CR611 1N4148
CR612 1N4148
CR613 1N4148
CR614 1N4148
R613 10K 5%
C711 0.1UF 5% 50V MY
IC205-B TL074
R232 49.9K 1%
R233 1.00K 1%
IC205-C TL074
-12m V/dB
R234 10.0K 1%
CR205 1N4148
R254 10.0K 1%
R239 232.0K 1%
IC205-D TL074
SHT. 5 B4
+300m V/dB
J8 2
R235 10.0K 1%
CR206 1N4148
R237 100.0K 1%
R236 1.0M 5%
R277 3.3K 5%
BYP
OP
S400-C
S400-D
IN
GRN
RED
CR208
J8 5 P8 5
J8 6 P8 6
J8 1
SHT. 1 A11
SHT. 1 A12
IC210-C LM339
IC210-D LM339
J6 7 P6 7
J6 5 P6 5
1 dB
CR209 GRN
DE-ESSING
6 dB
CR210 RED
C206 0.015UF 5% 50V MY
R240 39.2K 1%
IC206 UPC1253H2
R251 620K 5%
TP201
R252 10.0K 1%
R214 261.0K 1%
TP202
SHT. 4 B
R255 487.0K 1%
C222 .0033UF 20%
R238 261.0K 1%
IC209-B TL074
CR203 1N4148
CR204 1N4148
IC209-C TL074
COUPLE
S100-E
N/C
SHT. 1 A9
R289 2.0M 5%
C217 1.0UF 20% 50V ALUM NON-POLAR
R290 560K 5%
C210 1000PF 5% 100V CER
R259 12.4K 1%
IC210-A LM339
R261 365.0K 1%
R260 12.4K 1%
GAIN HOLD
VR207 50K LIN.B
IC210-B LM339
R264 1.21M 1%
R265 100.0K 1%
R266 100.0K 1%
SHT. 1 A14
TRIM SYMM
VR208 50K
R258 22.6K 1%
R274 39.2K 1%
R272 220 5%
R263 22M 5%
TP200
R262 10.0K 1%
R213 261.0K 1%
C214 1000PF 5% 100V CER
C215 1000PF 5% 100V CER
IC209-D TL074
C213 680PF 5% 100V CER
R250 39.2K 1%
IC207 UPC1253H2
R248 53.6K 1%
R268 560K 5%
C211 1000PF 5% 100V CER
C218 1.0UF 20% 50V ALUM NON-POLAR
R267 2.0M 5%
R271 1.21M 1%
SHT. 1 & 5 A10
SHT. 1 A13
IC203-A MC14053
MORE
DE-ESSING
VR206 10K,15C
R270 2.2M 5%
VR201 50K
DE-ESSER OFFSET TRIM

dbx

TITLE: 168A SCHEMATIC
Compressor/De-Esser Channel 2
61136-000-02, Sheet 2 of 5


CHANNEL 1
SHT. 1
A7
R310 100.0K 1%
R311 100.0K 1%
+15V
-15V
IC301-D TL074
TP301
R332 13.3K 0.1%
R333 10.2K 0.1%
R334 2.94K 1%
R335 15.4n 1%
IC304-A NE5532
R327 4.02K 1%
R344 3.6M 5%
SHT. 1
A2
S300-A
OPERATE
BYP
E14
E4
C300
J300 2
J300 1
J300 3
OUTPUT XLR
C305 0.010UF 5% 50V MY
TP300
R308 357.0K 1%
C304 0.0033UF 5% 50V MY
R300 133.0K 1%
R331 46.4K 1%
R303 280.0K 1%
IC301-B TL074
R309 1.37K 1%
R301 412.0K 1%
C303 0.010UF 5% 50V MY
IC301-A TL074
R307 499n 1%
R302 866.0K 1%
C302 0.010UF 5% 50V MY
R304 280.0K 1%
R306 10.0K 1%
R305 7.15K 1%
LOW
CW
HIGH
VR301-A 10K LIN.B
R312 22.5K 1%
SHT. 5
A15
R336 4.64K 0.1%
R337 4.53K 0.1%
R338 1.0M 5%
R343 4.53K 0.1%
R356 4.64K 0.1%
C311 0.1UF 5% 50V MY
IC305 TL071
CHANNEL 1
S300-B
OPERATE
BYP
SHT. 1
A1
E15
E3
C301
R341 3.01K 0.1%
R345 3.6M 5%
R313 100.0K 1%
C310 100PF 5% 100V CER
R355 20.0K 1%
C308 0.047UF 5% 50V MY
IC304-B NE5532
R342 15.4n 1%
R340 10.2K 0.1%
C318 10PF 5% 100V CER
R328 4.32K 1%
R339 13.3K 0.1%
C306 0.0022UF 63V 5% MY
R315 20.0K 1%
+15V
IC302 PC1252H2
R318 5.6K 5%
-15V
R321 470 5%
R322 100.0K 1%
R323 20.0K 1%
IC301-C TL074
SHT. 4
C1
R326 100.0K 1%
VR302 10K.15C
+15V
VCA SYMMETRY
VR300 50K
-15V
R314 1.69K 1%
R319 49.9n 1%
C307 0.001UF 63V 5% MY
SHT. 1
A
R320 49.9K 1%
R324 100.0K 1%
R316 22M 5%
R317 301.0K 1%
CR300 1N4148
CR301 1N4148
IC303-A TL072
IC303-B TL072
C309 0.047UF 5% 50V MY
JA 5
dbx
TITLE: 168A SCHEMATIC
EQ Output Channel 1
61136-000-02, Sheet 3 of 5

CHANNEL 2

SHT.2 B3

R410 100.0K 1%

R411 100.0K 1%

TP401

TP400

C405 0.010UF 5% 50V MY

C404 0.0033UF 5% 50V MY

R408 357.0K 1%

R400 133.0K 1%

R403 280.0K 1%

R431 46.4K 1%

IC401-B TL074

R409 1.37K 1%

R401 412.0K 1%

C403 0.010UF 5% 50V MY

IC401-A TL074

R407 499Ω 1%

R412 22.6K 1%

R402 866.0K 1%

C402 0.010UF 5% 50V MY

R404 280.0K 1%

R406 10.0K 1%

R405 7.15K 1%

COUPLE

S100-F

LOW

VR401 10K LIN.B

LOW(CH.1)

VR301-B 10K LIN.B

C410 100PF 5% 100V CER

R455 20.0K 1%

R413 100.0K 1%

C406 0.047UF 5% 50V MY

IC401-C TL074

IC401-D TL074

+15V

-15V

C408 0.0022UF 63V 5%

R415 20.0K 1%

IC402 PC1252H2

R418 5.6K 5%

R421 47Ω 5%

R422 100.0K 1%

VCA SYMMETRY

VR400 50K

C407 0.001UF 63V 5% MY

R420 1.69K 1%

R419 49.9Ω 1%

SHT. 3 C1

SHT. 1 & 2 A10

HIGH

VR402 10K,15C

IC203-B MC14053

R423 100.0K 1%

R417 49.9K 1%

R424 100.0K 1%

B

SHT. 2

IC403-A TL072

R416 301.0K 1%

R414 22M 5%

CR401 1N4148

CR400 1N4148

C409 0.047UF 5% 50V MY

IC403-B TL072

→ JB 5

R432 13.3K 0.1%

R433 10.2K 0.1%

R434 2.94K 1%

IC404-A NE5532

R435 15.4Ω 1%

R436 4.64K 0.1%

R437 4.53K 0.1%

R438 1.0M 5%

R443 4.53K 0.1%

R466 4.64K 0.1%

R426 4.02K 1%

C411 0.1UF 5% MY

IC405 TL071

R444 3.6M 5%

R445 3.6M 5%

SHT. 5 A16

R441 3.01K 0.1%

IC404-B NE5532

R442 15.4Ω 1%

R440 10.2K 0.1%

C418 10PF 5% 100V CER

R427 4.32K 1%

R439 13.3K 0.1%

SHT. 2 B2

S400-A

OPERATE

BYP

E8

E21

C400

J400 2

SHT. 2 B1

S400-B

OPERATE

BYP

E7

E23

C401

J400 1

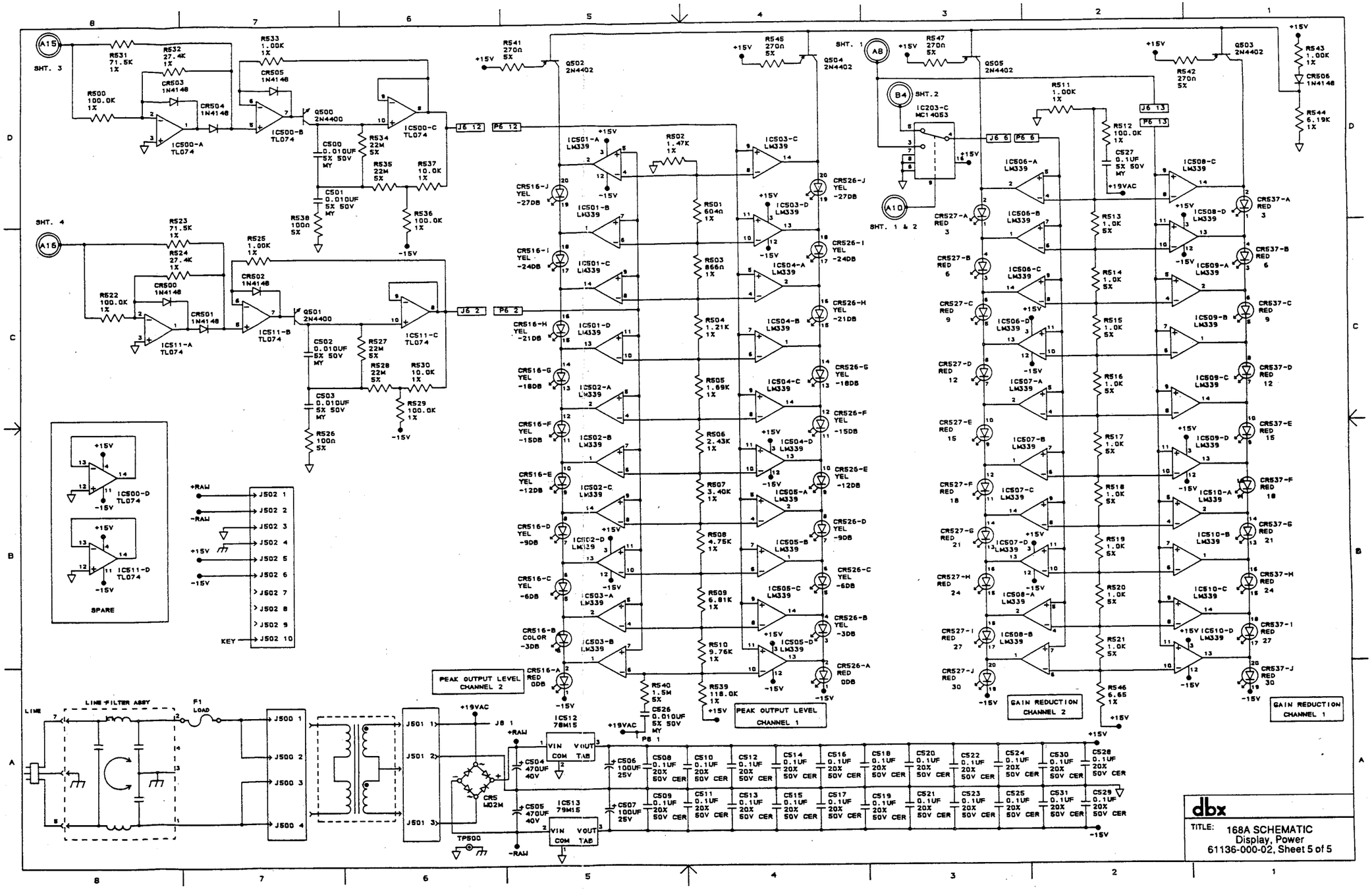
J400 3

OUTPUT XLR

CHANNEL 2

dbx

TITLE: 168A SCHEMATIC
EQ Output Channel 2
61136-000-02, Sheet 4 of 5


SHT. 3
SHT. 4
SHT. 1
SHT. 2
SHT. 1 & 2
R500 100.0K 1%
R531 71.5K 1%
R532 27.4K 1%
R533 1.00K 1%
CR503 1N4148
CR504 1N4148
CR505 1N4148
IC500-A TL074
IC500-B TL074
IC500-C TL074
Q500 2N4400
C500 0.010UF 5% 50V MY
R534 22M 5%
R535 22M 5%
R537 10.0K 1%
C501 0.010UF 5% 50V MY
R538 100Ω 5%
R536 100.0K 1%
R522 100.0K 1%
R523 71.5K 1%
R524 27.4K 1%
R525 1.00K 1%
CR500 1N4148
CR501 1N4148
CR502 1N4148
IC511-A TL074
IC511-B TL074
Q501 2N4400
C502 0.010UF 5% 50V MY
R527 22M 5%
R528 22M 5%
R530 10.0K 1%
C503 0.010UF 5% 50V MY
R529 100.0K 1%
R526 100Ω 5%
IC500-D TL074
IC511-D TL074
SPARE
+RAW
-RAW
KEY
J502 1
J502 2
J502 3
J502 4
J502 5
J502 6
J502 7
J502 8
J502 9
J502 10
R541 270Ω 5%
R545 270Ω 5%
Q502 2N4402
Q504 2N4402
R502 1.47K 1%
R501 604Ω 1%
R503 866Ω 1%
R504 1.21K 1%
R505 1.69K 1%
R506 2.43K 1%
R507 3.40K 1%
R508 4.75K 1%
R509 6.81K 1%
R510 9.76K 1%
R539 118.0K 1%
R540 1.5M 5%
C526 0.010UF 5% 50V MY
IC501-A LM339
IC501-B LM339
IC501-C LM339
IC501-D LM339
IC502-A LM339
IC502-B LM339
IC502-C LM339
IC502-D LM339
IC503-A LM339
IC503-B LM339
IC503-C LM339
IC503-D LM339
IC504-A LM339
IC504-B LM339
IC504-C LM339
IC504-D LM339
IC505-A LM339
IC505-B LM339
IC505-C LM339
IC505-D LM339
CR516-J YEL -27DB
CR516-I YEL -24DB
CR516-H YEL -21DB
CR516-G YEL -18DB
CR516-F YEL -15DB
CR516-E YEL -12DB
CR516-D YEL -9DB
CR516-C YEL -6DB
CR516-B COLOR -3DB
CR516-A RED 0DB
CR526-J YEL -27DB
CR526-I YEL -24DB
CR526-H YEL -21DB
CR526-G YEL -18DB
CR526-F YEL -15DB
CR526-E YEL -12DB
CR526-D YEL -9DB
CR526-C YEL -6DB
CR526-B YEL -3DB
CR526-A RED 0DB
PEAK OUTPUT LEVEL CHANNEL 2
PEAK OUTPUT LEVEL CHANNEL 1
R511 1.00K 1%
R512 100.0K 1%
C527 0.1UF 5% 50V MY
+19VAC
IC203-C MC14053
R542 270Ω 5%
Q503 2N4402
R543 1.00K 1%
CR506 1N4148
R544 6.19K 1%
IC506-A LM339
IC506-B LM339
IC506-C LM339
IC506-D LM339
IC507-A LM339
IC507-B LM339
IC507-C LM339
IC507-D LM339
IC508-A LM339
IC508-B LM339
IC508-C LM339
IC508-D LM339
IC509-A LM339
IC509-B LM339
IC509-C LM339
IC509-D LM339
IC510-A LM339
IC510-B LM339
IC510-C LM339
IC510-D LM339
CR527-A RED 3
CR527-B RED 6
CR527-C RED 9
CR527-D RED 12
CR527-E RED 15
CR527-F RED 18
CR527-G RED 21
CR527-H RED 24
CR527-I RED 27
CR527-J RED 30
CR537-A RED 3
CR537-B RED 6
CR537-C RED 9
CR537-D RED 12
CR537-E RED 15
CR537-F RED 18
CR537-G RED 21
CR537-H RED 24
CR537-I RED 27
CR537-J RED 30
R513 1.0K 5%
R514 1.0K 5%
R515 1.0K 5%
R516 1.0K 5%
R517 1.0K 5%
R518 1.0K 5%
R519 1.0K 5%
R520 1.0K 5%
R521 1.0K 5%
R546 6.65 1%
GAIN REDUCTION CHANNEL 2
GAIN REDUCTION CHANNEL 1
LINE FILTER ASSY
LINE
F1 LOAD
J500 1
J500 2
J500 3
J500 4
J501 1
J501 2
J501 3
J8 1
P8 1
IC512 78M15
IC513 79M15
CR5 W02M
TP500
C504 470UF 40V
C505 470UF 40V
C506 100UF 25V
C507 100UF 25V
C508 0.1UF 20% 50V CER
C509 0.1UF 20% 50V CER
C510 0.1UF 20% 50V CER
C511 0.1UF 20% 50V CER
C512 0.1UF 20% 50V CER
C513 0.1UF 20% 50V CER
C514 0.1UF 20% 50V CER
C515 0.1UF 20% 50V CER
C516 0.1UF 20% 50V CER
C517 0.1UF 20% 50V CER
C518 0.1UF 20% 50V CER
C519 0.1UF 20% 50V CER
C520 0.1UF 20% 50V CER
C521 0.1UF 20% 50V CER
C522 0.1UF 20% 50V CER
C523 0.1UF 20% 50V CER
C524 0.1UF 20% 50V CER
C525 0.1UF 20% 50V CER
C530 0.1UF 20% 50V CER
C531 0.1UF 20% 50V CER
C528 0.1UF 20% 50V CER
C529 0.1UF 20% 50V CER
dbx
TITLE: 168A SCHEMATIC
Display, Power
61136-000-02, Sheet 5 of 5

ABBREVIATIONS TABLE

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

AGC	automatic gain control
dBu	0dBu = 0.775V RMS. For this application, the dBm @ 600Ω scale on voltmeters can be read as if it were calibrated in dBu.
DTR	digital tape recorder
EBU	European Broadcasting Union
EMI	electromagnetic interference
G/R	gain reduction
HF	high frequency
IC	integrated circuit
IM	intermodulation (or "intermodulation distortion")
LC	inductor/capacitor
LED	light-emitting diode
LF	low frequency
LW	long wave
MW	medium wave
N/D	noise and distortion
ORed	In analog usage, this means taking the highest of two or more inputs
PA	public address system
PPM	peak program meter
RC	resistor/capacitor
RF	radio frequency
RFI	radio-frequency interference
RMS	root-mean-square
SPL	sound pressure level
STB	Servo Timed Binary
STL	studio-to-transmitter link
TRS	tip-ring-sleeve (stereo phone jack)
THD	total harmonic distortion
VCA	voltage-controlled amplifier
VHF	very high frequency
VTR	video tape recorder
XLR	a common style of 3-conductor audio connector

INDEX

A

abbreviations, 45
active transformer, 27
applications, 3
assembly drawings, 37, 39
audible distortion, 6, 20
audio
  connections, 9, 12
  input, 9, 11
  output, 9, 12
automatic gain control (AGC), 6

B

balanced inputs, 9, 11, 12
balanced output, 9, 12, 27
block diagram, 38
buzzes, 19

C

cable shielding, 10, 12
Channel 2 controls don't work, 20
chassis ground, 12
chassis, getting inside, 14
circuit boards
  access to, 14
  front panel, 14
circuit description, 23 - 29
circuit ground, 12
clicks, 19
clipping
  transient, 6
common-mode rejection, 12
components, vendors, 36
compression, 6, 24
connectors
  audio, 10
covers, removing/replacing, 14

D

dBu (defined), 16, 45
de-esser
  distortion, 20
  performance verification, 14
de-essing, 7, 26
density, 24
distortion, 20, 23

E

enhancer
  high frequency, 26
  low frequency, 27
equalizer
  high frequency, 26
  low frequency, 27

F

fuse, 22

G

gain reduction, 6
  meter, 6, 24
gate
  detector, 25
gating, 6, 20, 24
  control circuits, 14
ground loop, 12
grounding, 12, 19
  difficult situations, 12
  ground loop, 12

H

HF enhancer
  excessive noise, 20
  performance verification, 14
hum, 19

I

impedance, 12
input, 24
  attenuator, 6, 23
  balanced, 12
  buffer, 23
  impedance, 11
  level, 11
  overload point, 11
  stages, 14
input level jumpers, 8

J

jumpers
    access to, 14

L

leveling, 6, 24
LF enhancer
    performance verification, 14

M

meters,14
    calibration, 28
    driver, 26, 28
    red zone, 6

N

noise
    excessive, 20
    rush-up, pumping, 6, 20

O

ordering parts, 29 - 30
output
    driver, 27
    impedance, 12
    level, 11
    line driver, 14
    unbalanced load, 12

P

parts
    list, 29 - 30
    ordering, 30

peak
    level, 6, 8
    output level meter, 28
PEAK LEVEL meter, 8
performance evaluation, 14
physical dimensions, 22
power
    requirements, 22
    supplies, 14, 20, 29
problems, 19
product features, 2

R

rack-mounting unit, 9
recording studios, 3
regulated dropout, 29
regulated voltage, 29
release shape, 6
release time, 6, 24
RF suppression, 19, 23

S

schematics, 37, 39, 41, 43
sound systems, 3
specifications, 21
spectral enhancement, 7
stereo mode, 8, 20

T

thumps, 23
timing module, 24
troubleshooting, 19

U

unbalanced load, 12
unbalanced output, 27
unregulated voltage, 29

V

VCAs, 14, 23
voltage regulators, 20, 29

X

XLR connectors, 10

NOTES

WARRANTY

United States Warranty

Limited Warranty

This warranty is valid only for the original purchaser and only in the United States. We warrant dbx products against defects in material or workmanship for a period of two years from the date of original purchase for use, and agree to repair or, at our option, replace any defective item, except external power transformers, without charge for either parts or labor.

IMPORTANT: This warranty does not cover damage resulting from accident, misuse or abuse, lack of reasonable care, the affixing of any attachment not provided with the product, loss of parts, or connecting the product to any but the specified receptacles. This warranty is void unless service or repairs are performed by an authorized service center. No responsibility is assumed for any special, incidental or consequential damages. However, the limitation of any right or remedy shall not be effective where such is prohibited or restricted by law.

Simply take or ship your dbx product prepaid to our service department. Be sure to include your sales slip as proof of purchase date. (We will not repair transit damage under the no-charge terms of this warranty.) dbx will pay return shipping.

NOTE: No other warranty, written or oral is authorized for dbx products.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state. Some states do not allow the exclusion of limitations of incidental or consequential damages or limitations on how long an implied warranty lasts, so the above exclusion and limitations may not apply to you.

International Warranty

Bedingungen

dbx gewährt 2 jahre Garantie ab Verkaufsdatum auf nachweisbare Material- und Fabrikationsfehler (ausgenommen externe Netzgeräte). Der Garantieanspruch erlischt bei unsachgemäßer Handhabung, elecktrischer oder mechanischer Beschhädigung durch mißbräuchliche Anwendung sowie bei unsachgemäßer Reparatur durch nichtautorisierte Werkstätten. Zur Inanspruchnahme der angefürten Garantieleistung ist der Nachweis da Kaufes (ordentliche Rechnung da Verkäufers erforderlich). Transport-und Portospesen, welche aus der Einsendung des Gerätes zur Garantiereparatur erwachsen, können von dbx nicht übernommen werden, das Risiko der Zusendung trägt der Kunde. Die Garantie wird ausschließblich für den ursprünglichen Käufer geleistet.

Warranty Conditions

dbx warrants dbx products (except for external power transformers) against evident defects in material and workmanship for a period of two years from the date of original purchase for use. This warranty does not cover damage resulting from misuse or abuse, or lack of reasonable care, and inadequate repairs performed by unauthorized service centers. Performance of repairs or replacements under this warranty is subject to proof of purchase. Shipment of the defective item for repair under this warranty will be at the customer's own risk and expense. This warranty is valid for the original purchaser only.

Conditions de garantie

Pour toute mise en œvre de garantie ou de service après-vente, vous devez vous adresser à votre revendeur. Notre société assure au revendeur le remplacement gratuit des pièces détachées nécessaires à la réparation pendant deux ans, à partir de la date de votre facture, sauf en cas de non respect des prescritions d'utilsation ou lorsqu' une cause étrangère à l'appareil est responsable de la défaillance. Cette guarantie n'est pas applique pour les transformers external. Les dispositions stipulées ci-dessus ne sont pas exclusives du bénéfice au profit de l'acheteur de la garantie légale pour défaut et vice cachés qui s'applique, en tout état de cause, dans les conditions des articles 1641 et suivants du Code Civil.

Condizioni di garanzia

L'dbx presta garanzia per due anni dalla data della vendita per difetti di materiale e fabbriccazione che possono essere provati. Il diritto di garanzia cessa in caso di manipolazione impropria, danneggiamento electtrico o meccanico attraverso i'uso non approriato e riparazione inesperta eseguita da officine non autorizzate. E' indispensabile, per la prestazione della garanzia, presentare la carta di garanzia debitamente riempita dal rivenditore autorizzato e la fattura di vendita. Spese di trasporto che risultano dall'invio dell'implanto per la riparazione in garanzia, non possono essere assunte dall'dbx i'invio è a rischio e pericolo del cliente. La garanzia verrà data solo al primo acquirente.

Condiciones de garantia

dbx concede dos años de garantía (menos fuentes de poder exteriores) por defectos comprobables de material o de fabricación a partir de la fecha de venta. El derecho de garantía caduca en caso de procederse a una manipulación inadecuada en caso de producirse daño electrico o mecánico por uso indebido, así como también en caso de reparaciónes inadecuados por parte de talleres no autorizados. La prestación de la garantía está sujeta a la presentación de la factura de compra. dbx no asume ningún gasto de transporte o correo incurrido por el envio del aparato defectuoso para la reparación bajo garantía; el riesgo del envio ha de ser asumido por el cliente. La garantía se concede única y exclusivamente al comprador original.