Preliminary Technical Service Manual

MODEL 263X

De-Esser

dbx Professional Products
May 1, 1991

dbx®

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User/Operator Description

INSPECTION and INSTALLATION

Your unit 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 there is such evidence, don't destroy the carton or packing material, and notify your dealer immediately.

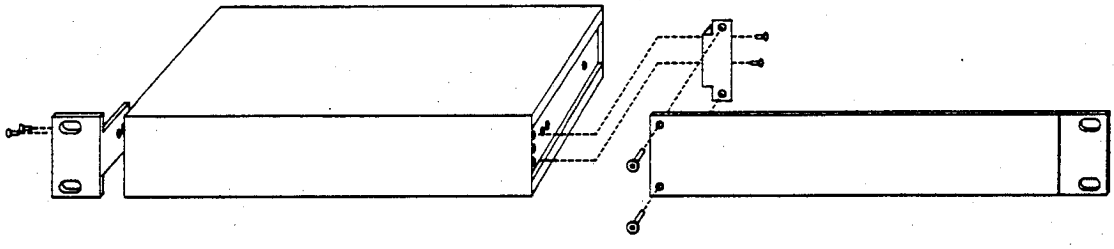
It's a good idea in any case to save the carton and packing should you ever need to ship the unit.

In the event of initial problems, contact your dealer first; your unit was thoroughly inspected and tested at the factory.

In addition to your new 263X, the carton should contain this owner's manual and a warranty/registration card. Please fill the card out and send it to us. The carton also should contain hardware for rack-mounting both a single unit (screws, a long [half-rack-width] ear, a small L-bracket, and a short rack ear) and two units together (side plates along with a screwdriven joiner). See below.

No special ventilation is required in any installation; other components may be stacked above or below the unit provided they don't generate excessive heat.

Here's rack-mounting for a single unit:

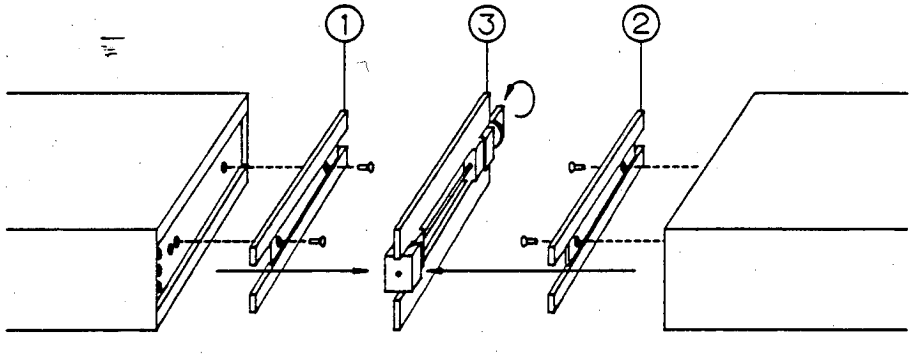


It may help to line everything up on a table as you tighten the screws. The enclosed sticker with circuit-action graphs may be placed on the long rack ear.

Here's rack-mounting for a 263X and a 463X or 163X, or other "-63X" series units (or a pair of 263Xes):

1 & 2) Attach side panels;

3) Bring units together, lining up the side panels with the screw-joiner catches, and then gently tighten the screw to close the catches.



CONTENTS

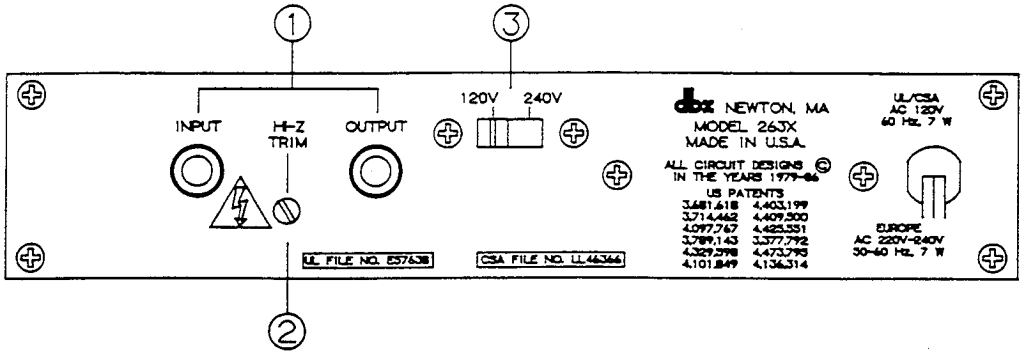
PERFORMANCE SPECIFICATIONS

Frequency response	20 Hz-20 kHz ±1 dB
THD	0.1% (no de-essing)
Equivalent input noise	-85 dBv unweighted
Maximum input	18 dBv
Maximum output	18 dBv into 600 ohms
Input impedance	391 k-ohms, single-ended
Output impedance	22 ohms, single-ended (designed to drive 600 ohms or greater)
Automatic de-essing operating range	+18 to -35 dBv
Maximum attentuation	Greater than 20 dB, variable
Crossover point	800-8k Hz, variable
Filter type	12 dB/octave lowpass, 6 dB/octave derived highpass, phase-coherent
Gain	Unity (rear input); 0-20 dB (mike input)
Attack time	Program-dependent: 2 ms for 10 dB de-essing 600 us for 20 dB de-essing
Release time	Program-dependent: 26 ms for 20 dB de-essing (750 dB/s)
Power requirements	100-120/220-240 V ac, switchable; 50-60 Hz; 7 W

Notes

1) Specifications are subject to change.
2) All voltages are rms (root-mean-square).
3) 0 dBv is defined as 0.775 V regardless of load impedance. Subtract 2.2 from the dBv figure to convert to dBV (i.e., referred to 1 V). When the load impedance is 600 ohms, this particular dBv is also known as "dBm."
4) Noise figures are for 20 Hz-20 kHz.
5) Attack time is the time required to reduce the signal to 63% of the final level during de-essing; release time is the time required to restore gain to 90% of the original level after de-essing.
6) "dbx" is a registered trademark of dbx, Newton, Mass. USA, a division of BSR North America Ltd.

REAR

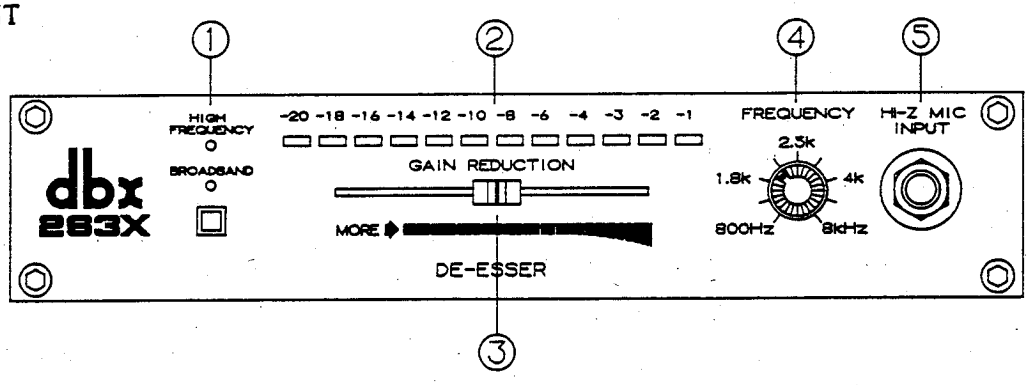


1 INPUT, OUTPUT. These jacks are for a line-level input and ouput and are the standard 2-circuit ("mono") 1/4" phone type, where the tip carries the signal and the sleeve carries the ground.

2 Hi-Z trim. This screwdriver control sets the gain of the preamp for the microphone input (see front panel). The gain is set at the factory at +20 dB (all the way right, or clockwise) and shouldn't be changed unless your mike output is very hot. All the way left (ccw) is unity (0 dB) gain.

3 VOLTAGE SWITCH. This must be properly set for your ac voltage; be sure to check before plugging in and powering up. For nominal 220-V operation an adaptor plug on the ac cord will be required.

FRONT



1 HIGH FREQUENCY or BROADBAND LEDs and pushbutton. This button controls the processing bandwidth and should be switched according to what works better sonically -- which usually means High Frequency for performance or recording and Broadband for mixing. See the discussion About De-Essing, p. 5.

2 GAIN REDUCTION LEDs. These 12 LEDs show in decibels how much de-essing is taking place.

3 GAIN REDUCTION/DE-ESSER slider. Moving this slider to the right, in the MORE direction, increases the amount of sibilance -- excessive "ess" sounds -- reduction. Start in the middle, which is a good choice for the majority of situations. We'll discuss this in detail later.

4 FREQUENCY. This thumb knob varies the circuit for specific sibilance frequency ranges. Start around 4 kHz and adjust by ear; discussion later, too.

5 Hi-Z MIC. INPUT jack. This connects to the 263X's low-noise FET preamp. Anything plugged into this jack overrides the rear input. There's enough gain that virtually all high-impedance mikes can be plugged in directly; a trim is on the rear for very hot ones.

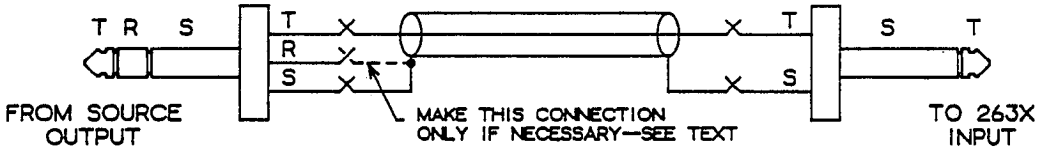
HOOKUPS

Inputs and Outputs

The line-level inputs and outputs are single-ended (unbalanced) and should be connected to other such equipment with single-conductor shielded cable, as shown here.

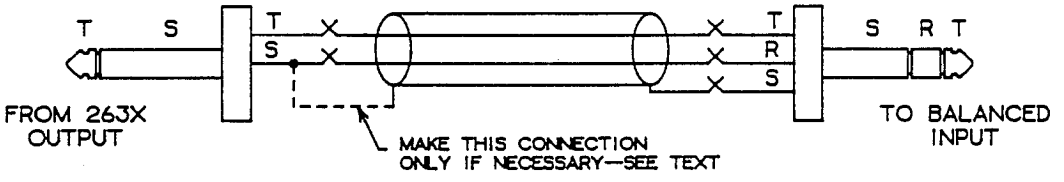
2-Circuit ("Mono") Plugs and Single-Conductor Shielded Cable

This will work fine for balanced inputs, too, but if the 263X input is connected to source equipment with balanced outputs, the next hookup should be used. Most balanced sources will work without the dotted connection between the ring (-) output and the sleeve (the ground -- this is true for "active-balanced" and "ground-referenced" outputs). This floating condition unbalances a balanced source, which is usually okay. However, some sources require the dotted connection, e.g., "transformer-isolated" balanced outputs. We recommend making the connection only if necessary for your installation, because some active balanced and ground-referenced outputs may be damaged by doing so. Consult the owner's manual.



Balanced Outputs and the 263X Line Input, Single-Conductor Shielded Cable

To take advantage of the balancing capability provided by the balanced inputs, the following connection may be used when the 263X output is connected to a device with balanced inputs.



Balanced Inputs and the 263X Line Output, Two-Conductor Shielded Cable

The connection between the shield and the sleeve at the 263X end of the cable should be made only if hum develops in your installation.

The Hi-Z mike input is single-ended (unbalanced) also and should be connected to mike outputs with single-conductor shielded cable as shown at the top of this page for line-level jacks. By the way, with hi-Z mikes avoid long cable runs, as they can reduce high-frequency response.

SETTING UP

Which Input?

Use the rear-panel (line) input in recording or performance when the mike to be de-essed is already preamplified, as through a console. When mixing or submixing, the signal from the deck (or console) goes here as well.

Use the front-panel Hi-Z input either in the studio for adding quick (direct-input) overdubs or in performance when no mixing console is used.

Setup

Start with the Frequency knob at midpoint (4 kHz), the button switched to High Frequency, and the slider in the middle. Listen to the vocal (or whatever) and move the slider right or left (more or less) until the sibilance or "spitty" sounds are reduced agreeably. Then fine-tune the Frequency knob as necessary, adjusting for the best tonal character to the "ess"es, although 4 kHz usually gives good results.

Then slowly push the slider right or left until the desired amount of de-essing is achieved, fine-tuning the Frequency knob if needed, again noting that best results are usually obtained with mid-region settings.

The Hi-Z mike trim

This screwdriver trim is rarely necessary in practical applications; most of the time it won't need to be adjusted. It should be reset ONLY if you hear distortion while using the Hi-Z input: the mike is probably overdriving the Hi-Z input and the gain must be changed.

To adjust it, use your mike through the 263X with the slider to the far left. Listen to the output. Turn the Hi-Z trim down (ccw) until the distortion disappears. If distortion is still audible with the trim all the way down, the problem is not in the 263X.

ABOUT DE-ESSING WITH THE 263X

High Frequency or Broadband?

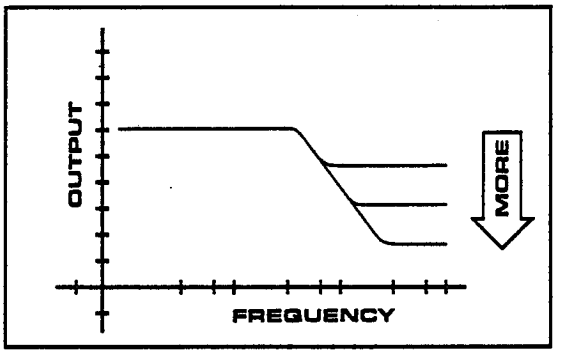
In order to detect that harsh, spitty sound of excess sibilance, all incoming signals are split into two frequency bands regardless of this button setting. Too much "ess" content shows up as too much high frequencies relative to lows; the 263X circuit responds whenever this happens. The button controls what happens to the signal you hear at the 263X output when the detector circuit recognizes an "ess."

If the button is set to the HF position, the circuit reduces the high-frequency band only -- which (as noted) is generally the best choice for live situations and recording. This brings down only the frequencies where excessive "ess"es are located.

The Broadband setting helps more during mixdown, for excess sibilance tends to saturate tape, producing low-frequency modulation products -- distortion -- during playback. In this setting the entire frequency spectrum gets attenuated, which reduces the level of the distortion along with the sibilance.

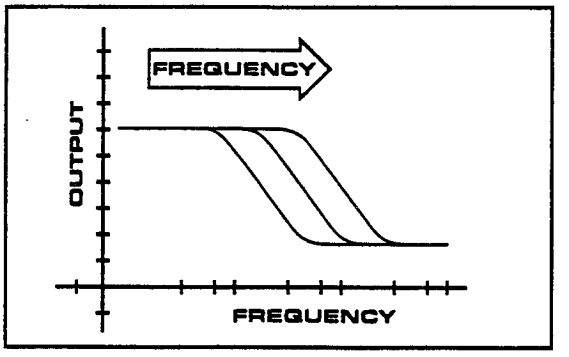
The slider

This governs the overall amount of processing. With most material, mid-settings will work well; these reduce the "ess" just enough to put the balances aright. Vary them to suit your ear. Also experiment with wider departures from the middle for non-vocal material, but be advised that far-right settings may cause sibilants to sound swallowed, even comical.



The Frequency knob

This sets the crossover point between the high and low bands (again, 4 kHz is a good starting point). Subtle variations can be achieved with fine-tuning and a close ear on the characteristics of the vocal. Note that this knob varies the crossover point for the detector even when you're in the Broadband setting. The technically minded will want to know that the 263X band-splitting filters are phase-coherent, ensuring accurate phase relationships at the output after the signals are recombined.



Some Elementary Phonetics

Sibilance is the hissing or rushing sound produced by blowing air thru a constricted (narrowed) mouth opening or across the edge of the teeth, as in the "s" and "ssh" in "sash." Sibilants contain predominantly high-frequency components with a sharp rise above 1 kHz and most of the energy in the 4-10 kHz band, centered on 6-8 kHz. Much of the energy in non-sibilant speech (vowels and semi-vowels) for both sexes lies in the 200-400 Hz octave with a rolloff above 1 kHz. The singing voice has the same spectral distribution but usually contains additional small energy peaks and often a larger peak between 2 and 3 kHz, which can be 5 to 10 dB louder than for the same non-singing voice.

Because of the way it detects excesses of high-frequency energy, the 263X is very effective for vocal problems wider-ranging than sibilance. Many sharp high-frequency sounds cause difficulty in recording and sound-reinforcement situations; those produced by blocking the air flow and then suddenly releasing it ("f"s, "th"s, etc., in addition to the sibilants) will be successfully handled by the 263X. For example, the "t" in "top" has a substantial peak around 8 kHz with little energy below 4 kHz; this type of sound can be as troublesome as any.

Current studio and performance equalization often boosts the lead vocal track in the 4-8 kHz region, for doing so improves intelligibility and crispness and makes the vocal cut through the hot mixes typical of rock productions. This is fine until problem passages occur: the boost can cause an increase to the point where (in extreme cases) one has trouble distinquishing between sibilance and cymbal crashes. Compression on vocal tracks also commonly aggravates sibilance, for time constants that otherwise sound smooth on vocals are often too slow to catch the elusive "ess." Further, the energy contained in "ess" sounds is usually lower than the rest of the vocal program, which means that sibilants receive less compression than other parts of the vocal, causing them to sound louder. (A given mike can be another aggravating factor.) But not all causes of excessive sibilance are electronic. The normal levels vary widely from one voice to another and from one mike technique to another, and inherently harsh sibilants often ruin an otherwise pleasing singing voice.

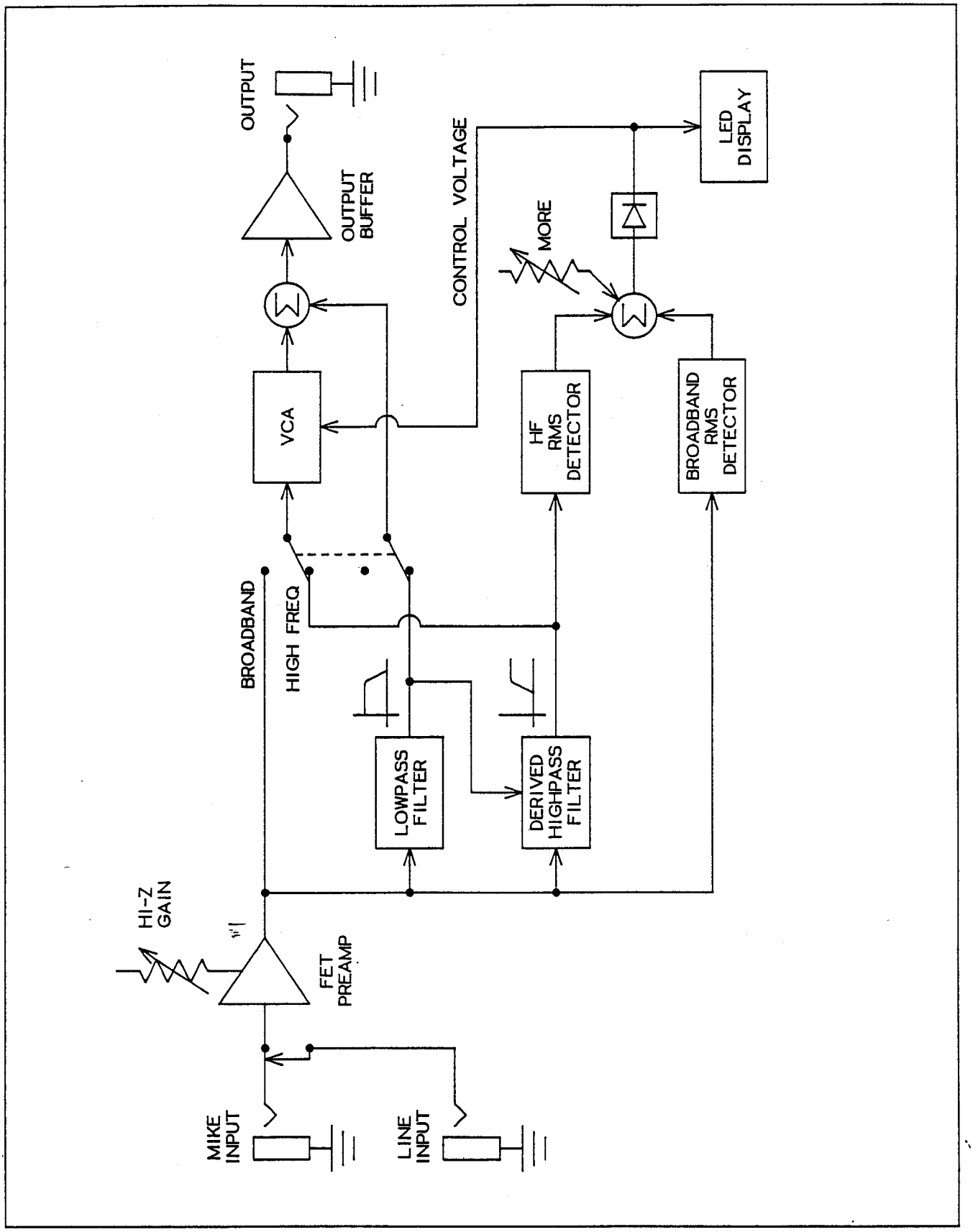
The annoyance of excessive sibilance increases when they are transmitted through a channel with limited dynamic range. Broadcast and recording engineers can face a major problem since hot high-frequency signal levels leave little headroom. And in large-scale sound-reinforcement applications, an extra 6 dB of headroom may require hundreds or thousands of extra watts of amplifier power, especially when compression has increased the relative sibilant level. Proper control can prevent high-frequency clipping and tweeter burnout and will enable higher sound-pressure levels without a large increase in amp output. Equalization is often used in an attempt to cure these problems, particularly if they arise from heavy vocal compression. But sibilants can occupy a fairly broad portion of the important 4-8 kHz intelligibility band, and a static EQ dip in this area will cause loss of articulation and dull sound. Equalization is not the solution.

Other Applications

The 263X has surprising uses in processing instruments. Any signals that have large high-frequency levels without accompanying low frequencies can be modified; depending on the control settings, changes can be subtle or obvious. Guitar plucks processed through the 263X will be mellower, with less pick noise and less bite at the start of each note. "Spitty" brass will benefit likewise. Try both HF and Broadband modes as you experiment.

We have noted that mid-settings of the slider give natural-sounding results and that far-right settings cause exaggerated effects. But on synthesizers and drums, go ahead and try extreme settings, and experiment to find new effects on other instruments.

BLOCK DIAGRAM



Technical Description

263X Service Manual

Contents:

Circuit Descriptions (Theory of Operation)

Audio Signal Path

Preamp (Input Buffer)

The incoming audio signal is first buffered by the LF353 type op-amp, U1A. Ac coupling is thru C2 to the FET input stage of U1A. The input impedance of 391k ohms is determined by the sum of R1 and R2. C1 provides some RF supression, shunting to ground high frequency signals greater than about 1MHz. When the front panel Hi-Z Mic input is used, R3 is connected to ground thru the sleeve of the input plug activating the gain trim, R4. The gain can be adjusted from unity (0dB) to a maximum of 10 (20dB). When the rear panel input is used, the signal travels via shielded cable thru the tip-shunt of the front panel jack and then to U1A. One end of R3 is now left open and the circuit will have unity gain regardless of the setting of R4. Correct operation of this circuit can be checked at TP1. The output of the preamp is then sent to the Broadband RMS Detector, the Lowpass Filter, and to the VCA (when in Broadband mode).

Lowpass Filter

U1B inverts the signal and feeds it to the second-order lowpass filter made up of U5A and its associated components. The cutoff frequency is varied over a range of 800Hz to 8kHz by the front panel Frequency control, R25, a dual reverse log taper pot. The high frequency portion of the signal at the output of U5A falls off at 12dB per octave with the -3dB point at 800Hz when the pot is set to its minimum resistance, counter-clockwise position. The -3dB point shifts to 8kHz when the pot is set to its full resistance, clock-wise position. The response of this filter is checked at TP2 and the signal is routed to the one input of the Highpass filter and to the Mixer/Output Buffer when the High Frequency mode is selected via the front panel switch, S1.

Highpass Filter

U5B is used to subtract the Broadband signal from the Lowpassed signal. The result is a "Derived Highpass" response in which the low frequencies fall off at a rate of 6dB per octave below the cutoff point set by the Lowpass filter described above. This method of filtering has the advantage of being "Phase Coherant" and when the Highpass and Lowpass filter outputs are combined, the result is the original Broadband signal waveform exactly, without any phase-shift related distortion. The output U5A is sent to the HF RMS Detector and to the VCA when the High Frequency mode is selected.

VCA

The input to the VCA (Voltage Controlled Amplifier) is either the Boradband signal from the Preamp or the Highpassed signal from U5B depending on the position of the front panel High Frequency/Broadband switch. In either case, this input is ac coupled thru C19 and R41 to pin 1 of U6, the dbx integrated circuit VCA. The ratio of the input current (at pin 1) to the output current (pin 8) is controlled by the voltage applied to pins 2 and 4. Positive voltages here produce attenuation and negative voltages produce gain. The actual scaling is -6mV per dB. If, for example, the voltage applied to pins 2 and 4 is +36mV, then the current gain will be -6dB and the output current will be half as big as the input current. Since the actual output signal at pin 8 is a current, it cannot be viewed easily with an oscilloscope and is best checked after it has been converted into a voltage by the Mixer/Output Buffer described below. R45 is used to adjust the VCA symmetry and is set to minimize distortion and offset. For a complete description of the VCA design and operation see dbx application note ANXXX.

Mixer/Output Buffer

The output current of the VCA is fed to the summing junction (pin 2) of the Output Buffer, U7, and converted into a voltage by R51. This signal is then fed to the Output jack thru R53. R53 provides some protection to U7 from improper output connections and sets the output impedance at 22 ohms. The other 22 ohm resistor, R52, is inside the feedback loop and does not contribute to the output impedance. C24 and C25 roll off the gain at very high frequencies, necessary for the closed-loop stability of the op-amp. This 5534 op-amp will drive a 600 ohm load to +18dBv.

When the front panel switch is in the High Frequency position, the lowband signal is summed with the VCA signal at U7 thru R48 and C21. In the Broadband position, C21 is connected to ground.

Control Voltage Path

RMS Dectors (General)

The heart of the level sensing circuitry in the 263X is the dbx patented RMS integrated circuit. This IC takes an ac signal at its input and produces a dc voltage at its output that is proportional to the true rms level directly in dB. The input (pin 1) is a current, requiring a resistor in series from a voltage source, and acts basically like a summing junction. This input resistor sets the nominal level at which the output (pin 7) is 0 volts. This output is a low impedance voltage source and can drive external circuits directly. the scaling of the output is always +6mV/dB. Along with this dc voltage is a small amount of ripple which is at twice the input frequency. The "RMS SYM" trim pot adjusts this ripple for perfect symmetry. Attack and release time constants are adjustable with external components connected to pin 6. For a more detailed explanation of this IC see dbx application note ANXXX.

Broadband RMS Dector

The Broadband RMS Detector, U2, is used to determine the overall level of the input signal to the 263X. The input to U2 (pin 1) comes from the Input Buffer, which is ac coupled thru C5. The dc output (pin 7) is scaled at +6mV/dB as described above and is 0 volts when the input is approximately -10dBv in level. This is the "Level Match" point. When the input signal is 0dBv, for example, the output will be about +60mV. That is, 0dBv is 10dB above "Level Match", and 10dB x +6mV/dB = +60mV. The attack and release time constants are set by R14 and C8. The release time is 750dB per second which is about 6 times faster than is normally used in compressor/limiter applications. Symmetry is adjusted via R7. The output is inverted by U3B and can be checked at TP5.

High Frequency RMS Detector

Another RMS Detector, U4, is used to determine the level of the high frequency portion of the input signal. This signal comes from the output of the Highpass Filter, U5B, and is ac coupled thru C15. Symmetry is adjusted with R32 and the output is monitored at TP6.

CV Processor

A sibilant or "ess" is detected when the ratio of high frequency content to broadband level exceeds a certain amount. When this occurs, a control voltage is generated in proportion to this imbalance and is sent to the VCA where the audio signal is attenuated.

The inverted output of the Broadband Detector is summed with the output of the High Frequency Detector at U3A. The diodes CR3 and CR4 make this opamp an "ideal diode" whose output is 0 volts when the sum of the input signals is negitive and has a gain of -2.6 when the sum of the input signals is positive. This effectively subtracts the High Frequency signal from the Broadband signal. Since these signals have been converted into dB by the RMS Detectors, this difference is not dependent on the absolute level of the signals. An offset voltage is summed here as well from the front panel "More" slider, R22. This voltage determines the threshold of the difference when the de-essing action will begin. An additional offset is added by R18 and is used to calibrate the "More" control.

The output of U3A is scaled at +16mV/dB and is checked at TP7.

LED Display

Q1 provides a constant current of approximately 10mA for the string of 12 LEDs. The comparators U8, U9, and U10, shunt this current to the -15v supply when the control voltage (16mV/dB) is greater than the reference at the plus input of each comparator section. When the control voltage is less than the reference voltage, indicating gain reduction at the VCA, the comparator section becomes an open circuit and allows the current to flow thru the LED connected to that section, turning it on. All LEDs above this point will be on, and all LEDs below this point will be off.

Power Supply

The voltage selector switch, located on the rear panel, connects the dual primary windings of the power transformer in parallell for 120 volt operation and in series for 240 volt operation. The center tapped secondary of the transformer reduces the primary voltage to about 48v ac rms, which is full-wave rectified by the diodes CR19, CR20, CR21, and CR22. The plus and minus 24v dc is smoothed by capictors C34, C35, C36 and C37 and checked at TP11 and TP12. The voltage regulators U11 and U12 reduce this voltage to a constant + and - 15 volts dc which is used for most of the circuitry in the 263X and can be monitored at TP9 and TP10 respectfully. The front panel "High Frequency" and "Broadband" LEDs are connected to the +24v supply thru R72 and is used to indicate the position of switch S1 and that the line cord is connected to a live ac mains.

Troubleshooting and alignment

Before atempting any troubleshooting or alignment, study the 263X owners manual to familiarize youself with the unit. The manual covers the operation of all controls, specifications for inputs and outputs, correct hook-up etc. The following procedures assume a basic understanding of the operational details of the 263X.

1. Instruments Required:
   A. Audio-frequency sine-wave oscillator with 50-ohm output impedance (Kron-Hite 4200A or equivalent).
   B. Oscilloscope with 10-MHz bandwidth and 2mV per division sensitivity. (Philips PM 3233 or equivilent)
   C. Dc voltmeter capable of measuring 1mV (Fluke 8060A or eq).
   D. Ac voltmeter with rms response (Fluke 8086A or eq).

2. Inspection and warm-up:
   Inspect the unit for any signs of external damage such as a cut line cord or broken controls. Check the position of the voltage selector switch on the rear panel and insure that it is set correctly for the ac mains voltage you are using. Connect the 263X to a live ac outlet and let it warm up for at least 10 minuites before making any adjustments.

3. Disassembly:
   Be sure the 263X is disconnected from any ac outlet. Refer to the exploded mechanical view and locate the four corner rear panel screws, MXX. Remove only these corner screws and slide out the rear panel about 4 inches. Carefully disconnect the transformer secondary cables from the main PCB by sliding apart at the connector. Pull only on the connector body, if you pull on the wires they will break. Set the rear panel aside for now and remove the for corner screws, MX, from the front panel using the special hex wrench supplied in the accessory kit. The front panel and main PCB will now slide out of the chassis intact.
   Inspect the PCB for any signs of damage such as burnt-out resistors or broken wires. It is not necessary to remove the front panel from the main PCB unless service is necessary on the LED board or the Frequency pot. Reconnect the transformer secondary to the main PCB, connect the line cord to a live ac outlet, and let the unit warm back up for a few minutes.

4. Power Supply Check:
   Before attempting any calibration or troubleshooting, check that the power supply is working correctly. Verify the following:

Probe location	Test Condition	Tolerance
TP9	+15.00v	+/- 500mV
TP10	-15.00v	+/- 500mV
TP11	+24 V dc	+/- 3 V dc, 750mV ripple
TP12	-24 V dc	+/- 3 V dc, 750mV ripple

5.Alignment Procedure:

Under normal conditions, the 263X should not require re-calibration for the life of the unit. Alignment is necessary only if the unit has been disturbed mechanically or if replacement of critical components has been necesary.

A.Broadband RMS Symmetry:

1.Connect the audio oscillator to the rear panel Input jack on the 263X.
2.Set the oscillator for 200Hz sine wave at 0dBv level.
3.Monitor TP4 with oscilloscope and adjust R7 for a symmetrical 400Hz sine wave. Amplitude should be approximately 7mV pp (+/- 3mV).
4.Using the dc voltmeter, verify that the dc level at TP4 is +70mV (+/-20mV).
5.Remove the connection fron the Input jack and verify that the level is now -170mV at TP4 (+/- 40mV).

B.High Frequency RMS Symmetry:

1.Remove any connections to Input jack and check that the dc level at TP6 is -300mV (+/- 50mV).
2.Set front panel Frequency control CCW (800Hz marking).
3.Set audio oscillator for a 200Hz sine wave at 0dBv and connect to the rear Input jack.
4.Monitor TP6 with oscilloscope and adjust R32 for a symmetrical 400Hz sine wave. Amplitude should be 7mV (+/- 3mV).
5.Set oscillator to 10kHz at 0dBv and verify that the dc level is now +60mV (+/-15mV).

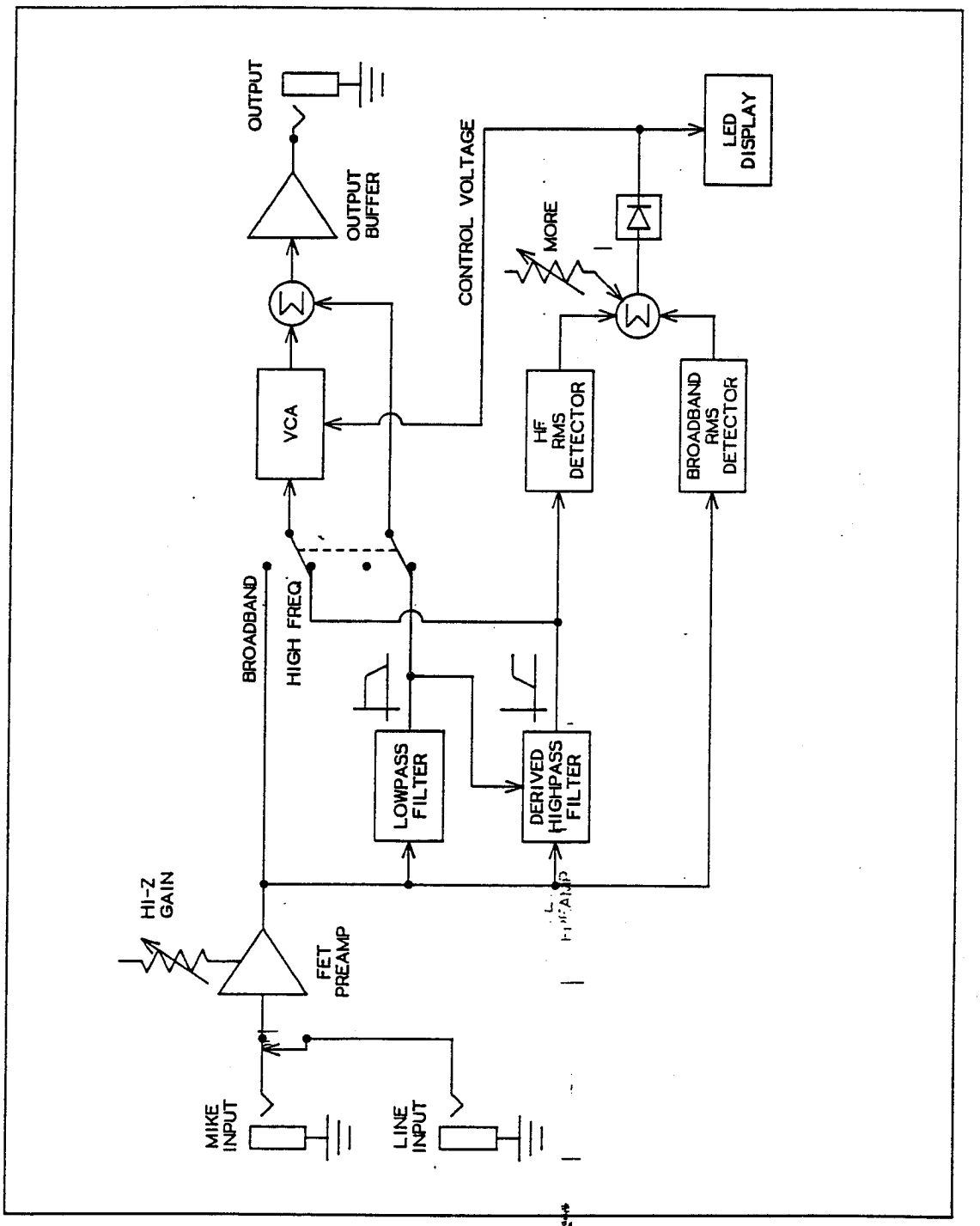
C.Offset Adjust:

1.Set oscillator for a 20kHz sine wave at 0dBv and connect to rear Input jack.
2.Set front panel More control fully right.
3.Set front panel Frequency control CW (8kHz marking).
4.Locate and set R18 fully CCW.
5.Slowly rotate R18 CW untill the last (-20) LED just turns on to full intensity.
6.Set the More control fully left and verify that all the Gain Reduction LEDs are now off.
7.Slowly move the More control to the right and note that the LEDs turn on one at a time and that two or more LEDs never turn on at the same instant of time.
8.Reduce the oscillator level to -30dBv and verify that all Gain Reductior LEDs are still lit.
9.Remove the oscillator connection from the Input jack and verify that all but the last two LEDs are now off. It is OK if less than two LEDs are lit.

D.High Frequency/Broadband Attenuation Check:

1.Connect oscillator to rear Input jack and set for 10kHz sine wave at 0.0dBv level.
2.Set More control fully left.
3.Set the front panel switch to the Broadband (IN) position and check tha the Broadband LED is lit.
4.Connect the ac voltmeter to the rear panel Output jack and verify that the level is 0.0dBv (+/- 1dB).
5.Set the More control fully right and verify that the level is now -17.! dBv (+/- 1.5dB).
6.Set the front panel switch to the High Frequency (OUT) position and

BLOCK DIAGRAM



Test Procedures

2/12/26
REV 2

263X Test Procedure

A. Power Supply
1. Monitor TP7 and verify +25 volts dc (+/- 2 volts) with less than 0.8 volts ripple.
2. Monitor TP8 and verify -25 Vdc (+/- 2v) with less than 0.8V ripple.
3. Monitor TP 9 and verify +15Vdc (+/- 0.5V).
4. Monitor TP 10 and verify -15Vdc (+/- 0.5V).

B. Broadband (BB) RMS Symetery
1. Connect 200Hz, 0dBv sine wave to rear Input jack.
2. Monitor TP4 and adjust R7 for a symetrical 400Hz sine wave, approximately 7 mV pp (+/- 3mVpp).
3. Verify that dc level at TP4 is now +70mV (+/- 20mV).
4. Remove connection from Input and verify that dc level is now -170mV (+/- 40mV).

C. Highpass (HP) RMS Symetery
1. Monitor TP6 and verify -300mV dc (+/- 50mV).
2. Set front panel Frequency control CCW (800Hz).
3. Connect 200Hz , 0dBv sine wave to Input jack.
4. Adjust R32 for symetrical 400Hz sine wave , approximately 7 mV pp (+/- 3mV pp).
5. Set generator frequency to 10k Hz and verify dc level is now +60mV (+/- 15mV).

D. Offset Adjust
1. Set generator to 20kHz.
2. Set More control fully right.
3. Set front panel Frequency control CW (8k Hz).
4. Rotate R18 fully CCW.
5. Slowly rotate R18 CW untill the last (-20) LED just turns on to full intensity.
6. Set More control fully left and verify all GR LEDs now off.
7. Slowly move the More control right, and verify that the GR LEDs turn on one at a time and that two or more GR LEDs never turn on at the same instant of time.
8. Reduce input level to -30 dBv and verify that all GR LEDs are still lit.
9. Remove signal from Input and verify that all but the last two DE LEDs are now off. It is acceptable if less than two LEDs are lit.

E. HF/BB Attenuation Check
1. Connect 10kHz, 0.0 dBv to rear Input.
2. Set More control fully left.
3. Set front panel switch to the In position (Broadband) and verify that the Broadband LED is lit.
4. Monitor rear panel Output and verify signal level is 0.0dBv (+/- 1dB).

5. Set More slider fully right and verify Output level is now -17.5 dBv (+/- 1.5dB).
6. Set front panel switch to High Frequency position and verify that Output is now -3.0dBv (+/- 1.5dBv). High Frequency LED should be lit.
7. Set front panel Frequency control CCW (800 Hz) and verify Output level is now -17.5 dBv (+/- 1.5 dB).
8. Set More control fully left and verify Output level is now 0.0 dBv (+/- 1.0 dB).

F. Input Gain Trim
1. Connect -20dBv, 1kHz sine wave to HI-Z MIC Input.
2. Set R4 ccw (min) and verify -20dBv at TP 1 (+/- 1.5dBv).
3. Set R4 cw (max) and verify 0.0dBv at TP 1 (-1.5, +2.5 dBv)

G. VCA Symmetry
1. Connect a low distortion, 1kHz, 0dBv, sine wave to rear panel Input.
2. Set More control fully left.
3. Set Frequency control CW (8kHz).
4. Set front panel switch to Broadband mode.
5. Using a suitable analyzer connected to rear panel Output, adjust R45 for minimum THD. THD should be less than 0.05 %.
6. Select High Frequency mode. THD should still be less than 0.05 %
7. Set Frequency control CCW.
8. Set More control fully right and verify that THD is less than 1.5% (the -4 GR LED should be lit , +/- 1 LED).
9. Set front panel switch to Broadband.
10. Change generator frequency to 50Hz and verify THD is less than 0.05 %.

H. Output Offset
1. Remove any connection from Input and verify that d.c. level at Output is less than +/- 20mV. Note reading.
2. Connect 10kHz, 0dBv sine wave to Input and verify that d.c. at Output is within 25mV of above reading.

I. Noise
1. Remove any connection from INPUT jack.
2. Set MORE control fully left.
3. Verify that OUTPUT noise (20Hz to 20kHz bandwidth) is less than -82dBv unweighted and -85dBv "A" weighted.

J. FREQUENCY RESPONSE
1. Set front panel Frequency control to midposition (2.5kHz).
2. Set More control fully left.
3. Set front panel switch to Broadband position.
4. Using a suitable gererator and meter, apply 2kHz at 0dBv to Input and note reading of output level.
5. Change generator frequency to 20Hz, 200Hz, and 20kHz. Verify that the Output level at each frequency is within +/- 1.0 dB of the reading at 2kHz.
6. Set front panel switch to High Frequency position and repeat steps J-4 and J-5.

263X Test Points

TP1: Input preamp output (pin 1, U1, LF353).
TP2: LP output (pin 1, U5).
TP3: HP output (pin 7 U5).
TP4: BB RMS output (pin 7, U3).
TP5: -BB RMS output (pin 7, U3).
TP6: HP RMS output (pin 7 U4).
TP7: CV (16mV/dB, after More control).
TP8: Base of Q1 (14.3v nominal).
TP9: +15 volts (pin 3,U11).
TP10: -15 volts (pin 3, U12).
TP11: +25 volts (unreg).
TP12: -24 volts (unreg).

Schematics, Assembly Drawings, Parts List

dbx

CABLE, 1 CONDUCTOR SHIELDED
BROWN, 6.5" LONG

USE ON: 263X

PL 320265

REV. 00

SHEET 2 OF 2

ITEM	REF. DESIGNATION	DESCRIPTION	PART NUMBER	QTY	
1		CABLE, SHIELDED, #26AWG, BROWN 1-CONDUCTOR WITH DRAIN WIRE	310709	6.5"	
2					
3		TEFLON TUBING .027 I.D.	310298	A/R	
4		SHRINK TUBING .187 I.D.	310570	A/R	
5					
6					
7					
8					
9					
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16					
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18					
19					
20					

dbx

CABLE, 1 CONDUCTOR SHIELDED RED, 6.5" LONG

USED ON: 263X

PL 320264

REV. 00

SHEET 2 OF 2

ITEM	REF. DESIGNATION	DESCRIPTION	PART NUMBER	QTY	
1		CABLE, SHIELDED, #26 AWG, RED 1 CONDUCTOR WITH DRAIN WIRE	310707	6.5"	
2					
3		TEFLON TUBING .027 I.D	310298	A/R	
4		SHRINK TUBING .187 I.D	310570	A/R	
5					
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dbx

CABLE, 1 CONDUCTOR SHIELDED GRAY, 6.5" LONG

USED ON: 263X

PL 320266

REV. 00

SHEET 2 OF 2

ITEM	REF. DESIGNATION	DESCRIPTION	PART NUMBER	QTY	
1		CABLE, SHIELDED, #26 AWG, GRAY 1-CONDUCTOR WITH DRAIN WIRE	310708	6.5"	
2					
3		TEFLON TUBING .027 I.D	310298	A/R	
4		SHRINK TUBING .187 I.D	310570	A/R	
5					
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dbx

PACKING & SHIPPING ASSEMBLY (DO)

USE ON 263X(DO)

PL 580405

REV. 01

SHEET 2 OF 2

ITEM	REF. DESIGNATION	DESCRIPTION	PART NUMBER	QTY	
1		MAIN ASSEMBLY	400158	1	
2					
3		ACCESSORY KIT PACKING ASSEMBLY	580406	1	
4		GIFT BOX	390205	1	
5		END CAP (SNOW BOX)	390195 9004005163	2	
6		PLASTIC BAG, 12 X 16	390203	1	
7		MANUAL	600335	1	
8		WARRANTY CARD	600038	1	
9					
10		PLASTIC BAG, 7 X 12	390204	1	
11					
12		TAPE, TRANSPARENT, ADHESIVE BACKED, 1/2" WIDE	310692	A/R	
13					
14		SAFETY INSTRUCTION INSERT	600357	1	
15					
16					
17					
18					
19					
20					

lbx MAIN P.C. BOARD ASSEMBLY E-ESSER | USED ON 26 X | PL 360547 | REV. 03 | SHEET 2 OF 7

EM	REF. DESIGNATION	DESCRIPTION	PART NUMBER	QTY
1		P.C. BOARD FABRICATION	260547	1
2				
3				
4				
5				
6	R1, 54, 55, 56, 57, 58, 69	RESISTOR 1K 1/4W 5%	054102	7
7	R2,	" 390K 1/4W, 5%	054394	1
8	R3	" 4K7 1/4W, 5%	054472	1
9	R7, 18, 32, 45	POT 50K TRIM HORIZONTAL MTG.	070031	4
10				
11	R8, 11, 33, 36	RESISTOR 39K 1/4W, 5%	054393	4
12	R9, 34	22K 1/4W, 5%	054223	2
13	R10, 35, 52, 53	22 1/4W, 5%	054220	4
14	R21	1M21 1/4 1%	011214	1
15	R12, 39	560K 1/4W, 5%	054564	2
16	R13	620K 1/4W, 5%	054624	1
17	R6, 14, 40, 49	1M 1/4W, 5%	054105	4
18	R19	2M2 1/4W, 5%	054225	1
19	R20	RESISTOR 26K1 1/4W, 1%	012612	1
20	R4	POT, TRIM 47K (R.P.)	070360 5221473131	1

lbx	MAIN P.C. BOARD ASSEMBLY -E-ESSER	USED ON 263X	PL 360547	REV 03	SHEET 3 OF 7

ITEM	REF. DESIGNATION	DESCRIPTION	PART NUMBER	QTY
1				
2				
3				
4	R15, 16, 17, 23, 24	RESISTOR, 10K, 1/4W, 1%	011002	10
5	R28, 29, 30, 31, 38			
6	R25	POT, ROTARY, DUAL 20K (REV LOG) ±20%	070359	1
7	R26, 27	RESISTOR 1K5 1/4W, 5%	054152	2
8	R37	22M 1/4W, 5%	054226	1
9	R41, 48, 50	20K 1/4W, 5%	054203	3
10	R42	80R6 1/4W, 1%	018069	1
	R43	47 1/4W, 5%	054470	1
12	R44	100K 1/4W, 5%	054104	1
13				
14	R46	49R9 1/4W, 1%	014999	1
15	R47	5K6 1/4W, 5%	054562	1
16	R51	20K 1/4W, 1%	012002	1
17	R67	825K 1/4W, 1%	018253	1
18	R68	RESISTOR 110K 1/4W, 1%	011103	1
19				
20				

dbx	MAIN P.C. BOARD ASSEMBLY .E-ESSER	USED ON 2x ,x	PL360547	REV O_	SHEET 4 OF 7

ITEM	REF. DESIGNATION	DESCRIPTION	PART NUMBER	QTY
41	R59, 60, 61, 62, 63,	RESISTOR, 2K, 1/4W, 5%	054202	9
42	R64, 65, 66, 70			
43				
44	R71	2K7, 1/4W, 5%	054272	1
45	R72	2K4, 1/2W, 5%	070361	1
46				
47				
48				
49				
50				
1	C1	CAPACITOR, 120P, CD, Y5E 10%	121271	1
52	C2	100N, MY, MINI, 50V 5%	123149	1
53	C3, 4, 9, 10, 13, 14, 22,			
54	C23, 26, 27, 28, 29	10N, CD, Z5U ±20%	121535	14
55	C30, 31			
56	C5, 6, 17, 36, 37	1/50V, RAD, EL, +50% -10%	127084	5
57	C7, 16, 38, 39	10/50V, RAD, EL, ±20%	127201	4
58				
59	C11	6N8, MY, MINI, 100V 5%	123129	1
60	C12	CAPACITOR 12N, MY 50V 5%	123029	1

dbx

MAIN P.C. BOARD ASSEMBLY
E-ESSER

USED ON 263X

PL 360547

REV. 03

SHEET 5 OF 7

ITEM	REF. DESIGNATION	DESCRIPTION	PART NUMBER	QTY	
61	C8, 18, 19, 21	CAPACITOR, 3U3/50V, RAD, EL, ±20%	127100	4	
62	C20	1N, CD, Y5E, ±10%	121432	1	
63	C24, 25	100P, CD, NPO, 500V ±10%	121257	2	
64	C34, 35	470/35V, RAD, EL, +50 -10 %	127492	2	
65	C40	22/25 V, RAD, EL, ±20%	127261	1	
66	C15	CAPACITOR, 560P CD, Y5F, 5%	121388	1	
67	C32, 33	CAPACITOR, 10N, CD, Z5U, 100V	121530	2	
68	CR1, 2, 3, 4	DIODE, 1N4148	140031	4	
69					
70					
71					
72					
73					
74					
75					
76					
77					
78					
79					
80					

dbx MAIN P.C. BOARD ASSEMBLY DE-ESSER | USED ON 26-X | PL 360547 | REV 03 | SHEET 6 OF 7

ITEM	REF. DESIGNATION	DESCRIPTION	PART NUMBER	QTY	
81					
82					
83	CR19-22	DIODE 1N4003GP	140022	4	
84					
85					
86	U1	OP AMP LF353	146241	1	
87	U2, 4	IC, RMS UPC1253H2	146742	2	
88	U3, 5	OP AMP, RC4558P	146061	2	
89	U6	IC, VCA UPC1252H2	146732	1	
90	U7	OP AMP, NE5534N	146281	1	
91	U8, 9, 10	" " LM339	146271	3	
92	U11	VOLTAGE REGULATOR 7815 +15V	146366	1	
93	U12	VOLTAGE REGULATOR 7915 -15V	146367	1	
94					
95	Q1	TRANSISTOR, 2SA1020	142094	1	
96					
97	S1	SWITCH, PUSH, 4PDT, (ALPS, SUL SERIES)	250101	1	
98					
99	J2, 3	PHONE JACK	280244	2	
100					

DI 360547

lbx	MAIN P.C. BOARD ASSEMBLY E-ESSER	USED ON 26 JX		PL360547	REV 03	SHEET 7 OF 7

ITEM	REF. DESIGNATION	DESCRIPTION	PART NUMBER	QTY
01		LED BOARD ASSEMBLY	460548	1
02				
03				
04				
05				
06				
07				
08				
09				
10				
11				
12	CN2	CONNECTOR, MALE, 3-PIN, RIGHT ANGLE	280249	1
13				
14		JUMPER, ZERO-OHM, 10MM LG.		29
15				
16		ROTARY KNOB	210347	1
17				
18		PUSH BUTTON	210344 1011175040	1
19				
20				

lbx	REAR PANEL ASSY	USED ON 26-X	PL 380228	REV: 00	SHEET 2 OF 2

ITEM	REF. DESIGNATION	DESCRIPTION	PART NUMBER	QTY
1		REAR PANEL SCREENED	290742	1
2				
3		TRANSFORMER, POWER 120/240V U/L CSA	230080 4206411207	1
4		SWITCH, SLIDE 110/220V (PNL MT)	250100 4411020279	1
5		MOLDED AC SWITCH COVER	210353	1
6		AC LINE CORD	320261 4631112070	1
7		STRAIN RELIEF BUSHING	310701	1
8				
9				
10				
11				
12		TAPPING SCREW #4 X 1/2" LG, PAN HD, X-RECESS, STL, BLACK OXIDE. (FOR AC SW)	310715	2
13				
14		MACHINE SCREW (BID-4008-ZN3K) FOR XFMR	311732 8242400800	2
15		HEX NUT (40-MS-ZN3A) FOR XFMR	311680 3032100040	2
16		TIE WRAP, 4" LONG	310124	1
17		SERIAL NUMBER LABEL	210349	1
18		ADHESIVE (LOCTITE) MEDIUM STRENGTH	310316	A/R
19		WIRE, BUSS, #18 AWG.	310303	A/R
20				

01 380228

dbx

MAIN ASSY DE-ESSER
MODEL 263X

USED ON 263X

PL 400158

REV C.

SHEET 2 OF 2

ITEM	REF. DESIGNATION	DESCRIPTION	PART NUMBER	QTY
1		PC BOARD ASSEMBLY	460547	1
2				
3		FRONT PANEL ASSEMBLY	380229	1
4				
5		REAR PANEL ASSEMBLY	380228	1
6				
7		CABINET	290731 1003005163	1
8				
9		SLIDE KNOB	210337 1004005163	1
10		SCREW, BUTTON HEAD, 4X12 TAPPING (FRONT PANEL)	311728 2000000939	4
11		SCREW, TAPPING, (BID-4212-ZN3K) (REAR PANEL)	311729 8542421200	4
12		SCREW, TAPPING, (BID-3006-ZN3A) (FOR PCB MOUNTING)	311730 8441300600	2
13		TIE WRAP, 4" LONG	310124	2
14				
15				
16		UL/CSA CAUTION LABEL	210168	1
17		LABEL, UL APVD	290201	1
18		CSA LABEL	210127	1
19				
20				

PL 400158

dbx

LED PC BOARD ASSEMBLY
DE-ESSER

USED ON 263X

PL 360548

REV. 0

SHEET 2 OF 2

ITEM	REF. DESIGNATION	DESCRIPTION	PART NUMBER	QTY
1		P.C. BOARD FABRICATION	260548	1
2				
3		LED HOLDER, 12 POSITION	280243 1006015163	1
4	Y29	JUMPER, ZERO OHM	110085	1
5	CN1	CONNECTOR, RIGHT ANGLE, 17 PIN	280245	1
6	CR6	LED, YELLOW, (BROADBAND) LN422YP	140203	1
7	CR7-18	LED, RECT, RED LTL-3211A	140198 4120632 11A	12
8	CR5	LED, GREEN (HIGH FREQ) LN322GP	140204	1
9				
10	R2	POT, 50K, SLIDE (F.P.) LINEAR TAPER	070358	1
11		SPACER, CLEAR THRU, NYLON .120 I.D. x .187 O.D. x .195 LONG	310532	2
12		SCREW, MACHINE, M3 x 12 FILLISTER HEAD, PHILLIPS DRIVE	311700	2
13		WASHER INT TOOTH #4 ST CAD	311642	2
14				
15				
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18				
19				
20				

PL 360548

dbx FRONT PANEL ASSEMBLY | USED ON 260X | PL 380229 | REV. 00 | SHEET 2 OF 2

ITEM	REF. DESIGNATION	DESCRIPTION	PART NUMBER	QTY	
1		FRONT PANEL SCREENED	290740	1	
2					
3		PHONE JACK 1/4" PANEL MOUNT	280241 4500530106	1	
4		HEX NUT, 90 NI3E	311678 3032500090	1	
5		WASHER, FLAT PLASTIC BLACK	311653 2012105163	1	
6		WASHER, REAR	310698 2013005163	1	
7		SHIELDED CABLE 1-COND. GRAY, 6.5" LG	320266	1	
8		SHIELDED CABLE 1-COND. RED, 6.5" LG	320264	1	
9		SHIELDED CABLE 1-COND. BRN, 6.5" LG	320265	1	
10					
11					
12		WIRE AND LUG ASSEMBLY	320262	1	
13					
14					
15		DUST COVER (HIMELON)	210345 2015005163	1	
16		RUBBER ADHESIVE 1300 SCOTCH-GRIP BRAND	310717	A/R	
17					
18					
19					
20					

DI 380229

dbx Inc.	PACKING & SHIPPING ASSEMBLY (EU)	USED ON (263x, EU)	PL 580408	REV. 00A	SHEET 2 OF 2

ITEM	REF. DESIGNATION	DESCRIPTION	PART NUMBER	QTY	
1		MAIN ASSEMBLY	400158	1	
2					
3		ACCESSORY KIT PACKING ASSEMBLY	580406	1	
4		GIFT BOX	390205	1	
5		END CAP (SNOW BOX)	390195 9004005163	2	
6		PLASTIC BAG, 12 X 16	390203	1	
7		MANUAL	600335	1	
8				1	
9		RUBBER FOOT, BLACK	310704 2014005163	4	
10		PLASTIC BAG, 7 X 12	390204	1	
11		220V ADAPTER	280248	1	
12		TAPE, TRANSPARENT, ADHESIVE BACKED, 1/2" WIDE	310692	A/R	
13					
14					
15					
16					
17					
18					
19					
20					

dbx

3 PACK, PACKING & SHIPPING ASSEMBLY, MDL 263X

USE ON: 263X

PL 580407

REV 00

SHEET 2 OF 2

ITEM	REF. DESIGNATION	DESCRIPTION	PART NUMBER	QTY	
1		MASTER CARTON	390193	1	
2					
3		PACKING & SHIPPING MAIN ASSY	580405	6	
4					
5					
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17					
18					
19					
20					

DI 580407

dbx

ACCESSORY KIT PACKING ASSEMBLY, MODEL 263X

USED ON 263X

PL 580406

REV. CO

SHEET 2 OF 3

ITEM	REF. DESIGNATION	DESCRIPTION	PART NUMBER	QTY	
1		CARTON BOX - ACCESSORY	390194	1	
2					
3		RACK EAR	290729 1008005163	1	
4		RACK BRACKET	290726 2006005163	1	
5		SUB-PANEL	290727 1009005163	1	
6		6 (TAPTITE-S) BID 4008-ZN3K	311727 8642400800	4	
7		PLASTIC BAG, 3 x 12 1/2	390200	1	
8		PLASTIC BAG, 3 x 9	390201	1	
9		RACK PLATE, TAB-FRONT	210334 2004005163	1	
10		RACK SCREW	290728 2007005163	1	
11		RACK PLATE	210338 2003005163	1	
12		RACK PLATE, TAB-REAR	210335 2005005163	1	
13		WASHER, FLAT (WFLT-A-17-ZN3K)	310700 3021220017	1	
14		RACK PLATE KNOB	210336 1007005163	1	
15		RACK SCREW FOR KNOB, (MACHINE-JIS) 1-PAN-2006-ZN3K	311734 8112200600	1	
16		RACK INSERT	210339 2002005163	2	
17		6 (TAPTITE-S) FLT-4008-ZN3K	311726 8632400800	4	
18		SCREW BUTTON HEAD 4X4	311735 2000000927	2	
19		SCREW BUTTON HEAD 4X8	311725 2000000926	2	
20		SUB-PANEL LABEL	210351	1	

dbx

ACCESSORY KIT PACKING ASSEMBLY, MODEL 263X

USED ON 263X

PL 580406

REV 00

SHEET 3 OF 3

ITEM	REF. DESIGNATION	DESCRIPTION	PART NUMBER	QTY
21		PLASTIC BAG, 2¼ x 4½	390202	2
22		HEX DRIVE KEY 2.5mm A/F	310705 2016005163	1
23		TAPE, TRANSPARENT, ADHESIVE BACKED, ½" WIDE	310692	A/R
24		RUBBER FOOT, BLACK	310704 2014005163	4
25				
26				
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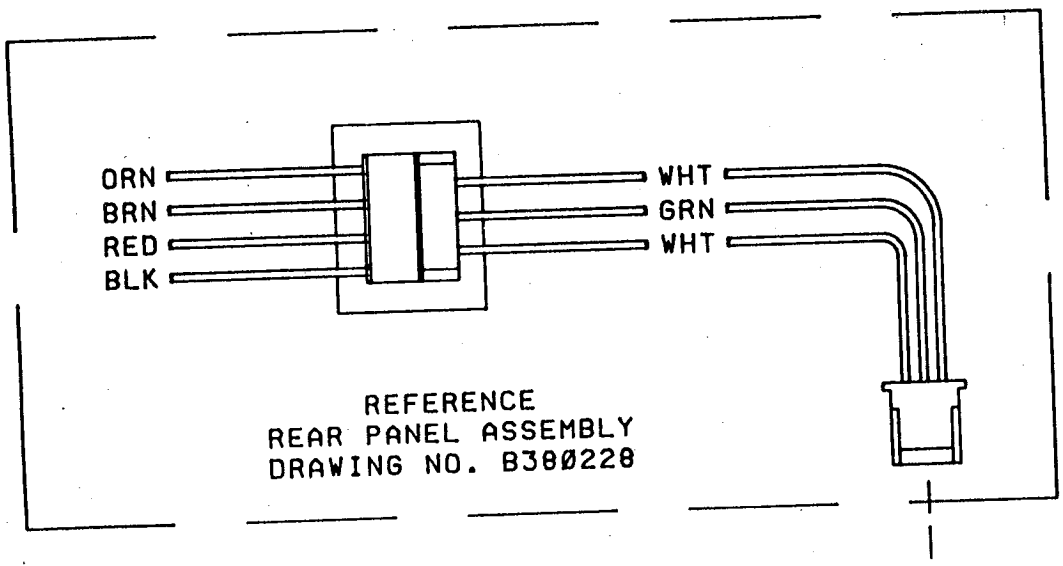

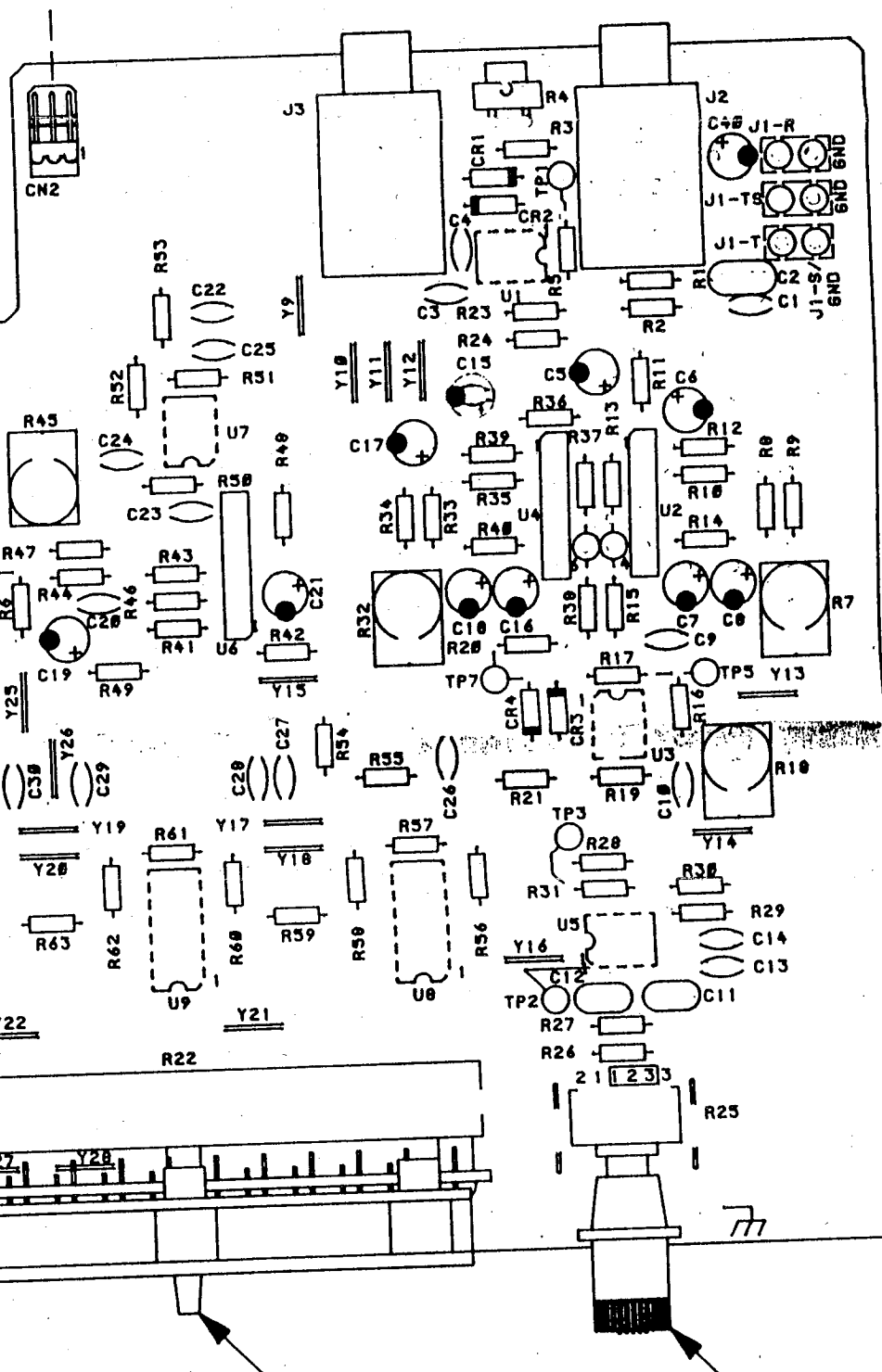

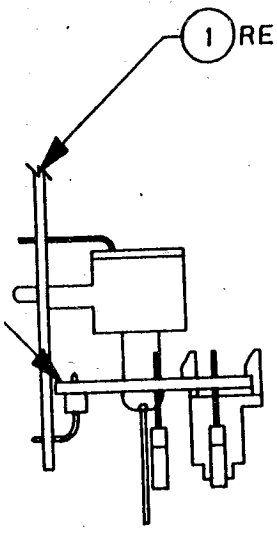

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SEE NOTE 2

1 1 6

263X | USED ON

REV	DESCRIPTION	DR	APP	DATE

REVISIONS

APPROVAL			
PRELIM	DATE	FINAL	DATE
DRAWN SS	12/2/85		12/13/85
CHECKED	12/12/85	CHECKED	
PROJ ENG	12/13/85	PROJ ENG	
CH ENG		CH ENG	
DFT MGR	12/13/85	RELEASED	

dbx NEWTON, MA. 02195

PRINTED CIRCUIT MAIN ASSEMBLY DRAWING

DE-ESSER

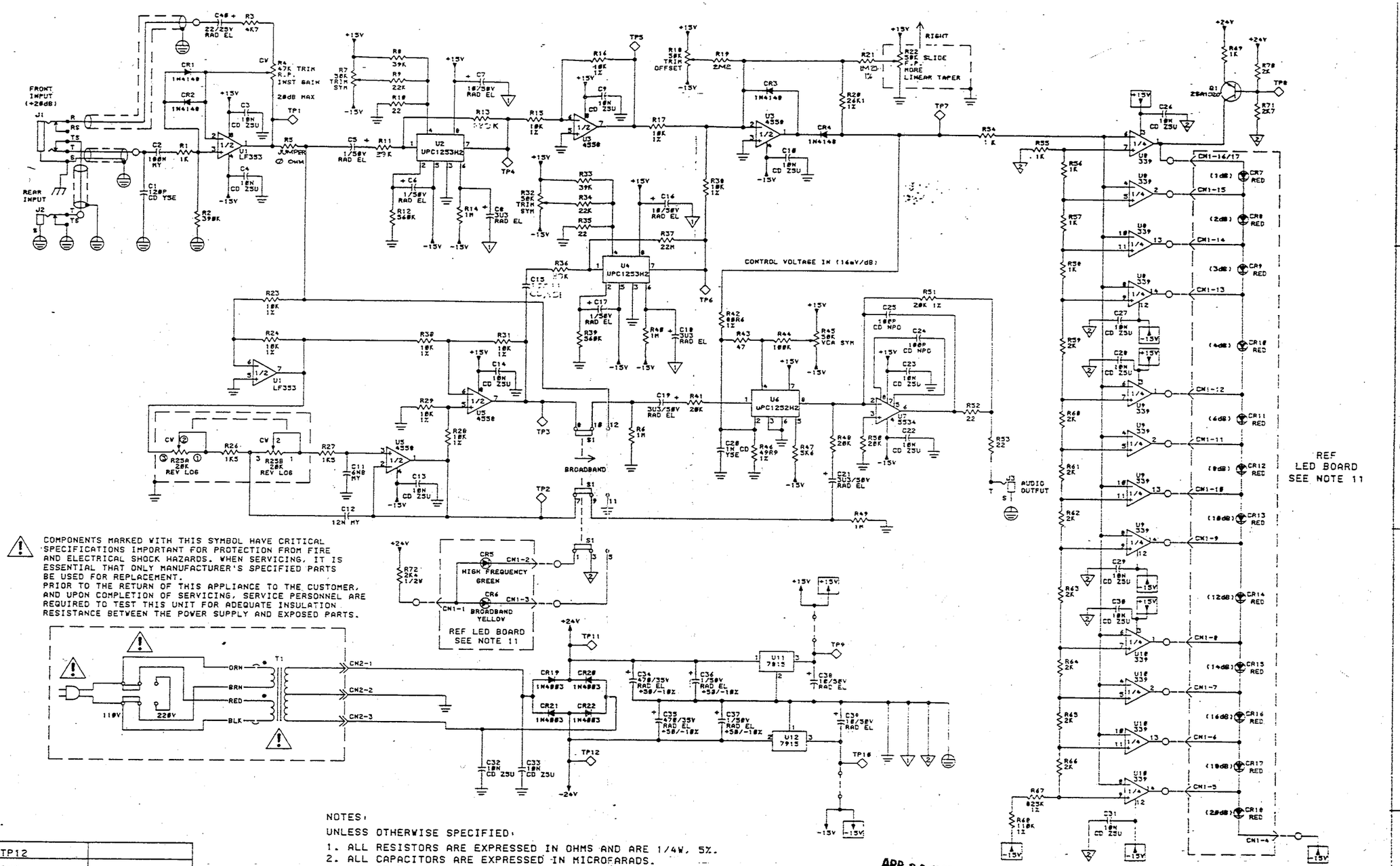
SCALE: 1/1	SIZE	NUMBER	REV
SHEET 1 OF 1	C	460547	06

4 3 2 1

dbx	WIRE AND LUG ASSEMBLY	USED ON 263X	PL 320262	REV. 00	SHEET 2 OF 2

ITEM	REF. DESIGNATION	DESCRIPTION	PART NUMBER	QTY	
1		WIRE #22 AWG PVC STRANDED BLK 2"	310181	1	
2					
3		SOLDER LUG, FLAT, .120D I.D., .33 LG	310713	1	
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

PL 320262



⚠ COMPONENTS MARKED WITH THIS SYMBOL HAVE CRITICAL SPECIFICATIONS IMPORTANT FOR PROTECTION FROM FIRE AND ELECTRICAL SHOCK HAZARDS. WHEN SERVICING, IT IS ESSENTIAL THAT ONLY MANUFACTURER'S SPECIFIED PARTS BE USED FOR REPLACEMENT.
PRIOR TO THE RETURN OF THIS APPLIANCE TO THE CUSTOMER, AND UPON COMPLETION OF SERVICING, SERVICE PERSONNEL ARE REQUIRED TO TEST THIS UNIT FOR ADEQUATE INSULATION RESISTANCE BETWEEN THE POWER SUPPLY AND EXPOSED PARTS.

REFERENCE DESIGNATIONS	
LAST USED	NOT USED
TP12	
CN2	
J3	
S1	
T1	
Q1	
U12	
CR22	
C40	
R72	

NOTES:
UNLESS OTHERWISE SPECIFIED:
1. ALL RESISTORS ARE EXPRESSED IN OHMS AND ARE 1/4W, 5%.
2. ALL CAPACITORS ARE EXPRESSED IN MICROFARADS.
3. ALL CD Z5U CAPACITORS ARE +/-20%.
4. ALL RAD EL CAPACITORS ARE +/-20%.
5. ▽ DENOTES GROUND IS CONNECTED TO MAIN GROUND AT ONLY ONE POINT.
6. ▽2 DENOTES GROUNDS ARE TIED TOGETHER AND CONNECTED TO MAIN GROUND AT ONLY ONE POINT.
7. ⏚ DENOTES GROUNDS ARE TIED TOGETHER AND CONNECTED TO MAIN GROUND AT ONLY ONE POINT.
8. +15V DENOTES VOLTAGES ARE TIED TOGETHER AND CONNECTED TO SUPPLY VOLTAGE AT ONLY ONE POINT.
9. -15V DENOTES VOLTAGES ARE TIED TOGETHER AND CONNECTED TO SUPPLY VOLTAGE AT ONLY ONE POINT.
10. SWITCH IS SHOWN IN THE "OUT" POSITION.
11. REFERENCE LED BOARD PARTS LIST NO. PL360548
12. R5 IS SHOWN ON BOARD B.T IS USED AS A JUMPER.

APR 28 1987

REV	DESCRIPTION	DR APP	DATE
	REVISIONS		

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APPROVAL	PRELIM	DATE	FINAL	DATE
DRAWN	SS	10/8/85		
CHECKED				
PROJ ENG				
CH ENG				
DFT MGR			RELEASED	

263X USED ON

dbx NEWTON, MA. 02195

SCHEMATIC
DE-ESSER

SCALE: NONE	SIZE	NUMBER	REV
SHEET 1 OF 1	C	340547	00