dbx

Model 3BX III

Three-Band
Dynamic-Range Expander
with Impact Restoration

SERVICE MANUAL

CONTENTS

SPECIFICATIONS (performance minimums)

Expansion	To 50% increase, maximum 12 dB upward and 20 dB downward
Impact restoration	To +12 dB (upward only), program-dependent
Frequency response	+0.5 dB 20 Hz - 20 kHz, any setting
Dynamic range	107 dB
Total harmonic distortion (THD), no expansion	0.15%
Intermodulation distortion (IMD) IHF or SMPTE	0.1%, any setting
Equivalent input noise	-90 dBV
Attack rates	Program-dependent, optimized for each band
Release rates	Linear expander program -dependent, optimized; impact restorer adjustable
Maximum input and output	7 V

Notes

1) Specifications are subject to change without notice.

2) All data are for 20 Hz-20 kHz unless otherwise specified; line inputs are driven by a source impedance of 1 k-ohms and outputs are loaded by 10 k-ohms in parallel with 1000 pF; all voltages are rms (root-mean-square).

3) Dynamic range is defined as the difference between the maximum rms output signal and A-weighted noise. All noise figures are A-weighted.

4) Frequency response figures are for pink noise (or music).

5) SMPTE IMD is measured with 60 Hz and 7 kHz mixed 4:1; IHF (difference-tone) IMD is measured with 19 kHz and 20 kHz mixed 1:1; output 1 V.

6) Inputs and outputs have identical polarity.

7) All dbx home products are designed to be used with components whose output impedance is less than or equal to 5 k-ohms. All units are designed to drive loads of at least 5 k-ohms in parallel with 1000 pF or less.

CIRCUIT DESCRIPTION

SCHEMATIC CONVENTIONS

The 3BX III is a stereo unit, with two independent, identical signal paths. We will refer here to the left channel only (channel 1). Almost all of its components are identified by designations ending in L (e.g., C705L, R708L); the right channel's component designations generally end in R; and components common to the channels generally end in numbers (e.g., C803, R801). Furthermore, components are coded according to their function within the system. The 700 series indicates the signal path or detector path (the detector section is common to both channels, so 700 components ending in a number are in this area, while those ending in L or R are in the signal path). The 800 series indicates the power supply. Finally, the L## series indicates the LED display (e.g., RL21, UL05).

SIGNAL PATH

Refer to Fig. 1, a block diagram of the signal path (note that L, R suffixes are not shown and that test points [TPs] are for both channels, left first.) Audio input signals first are buffered by 1/2-U701L and its associated circuitry. The output of 1/2-U701L is TP1 (TP2, right channel). The signal there should be identical to that at the input except for a small attenuation (-0.83 dB) and a roll-off at 175 kHz.

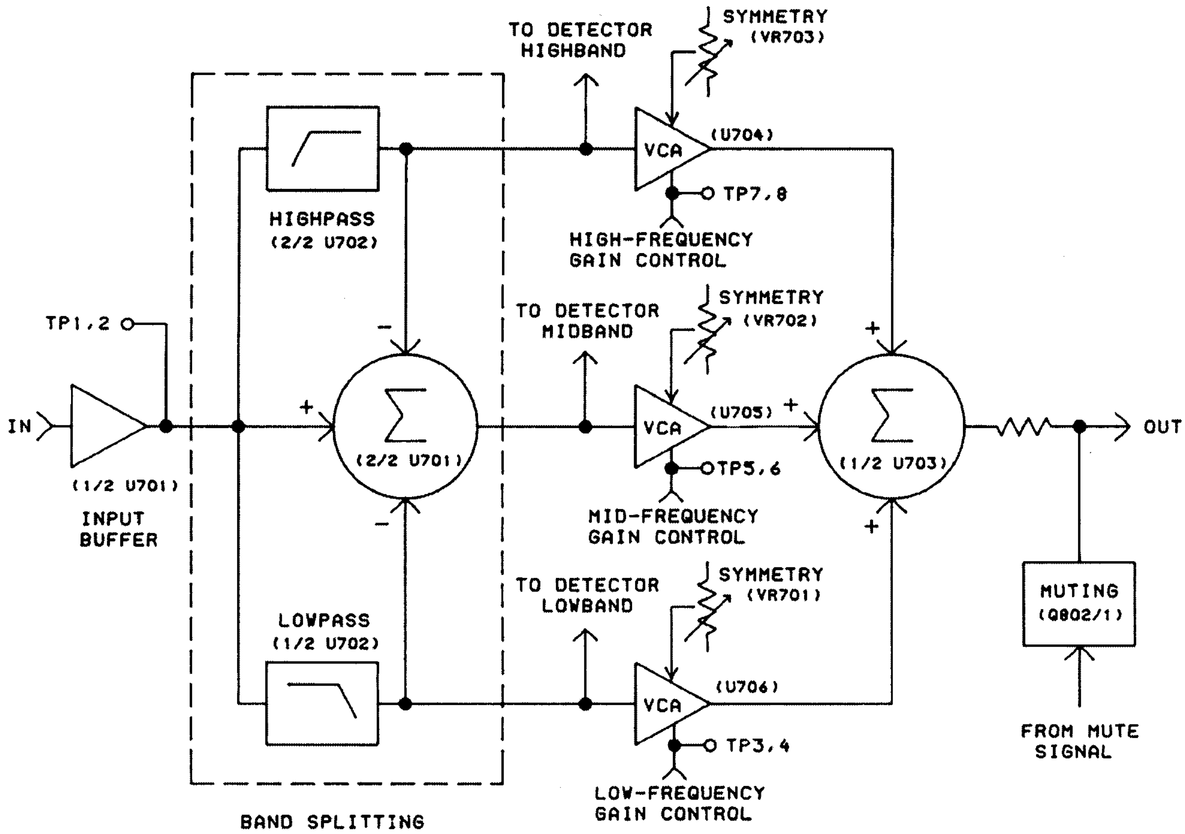


Figure 1, Signal Path

This signal is applied to a 4.21 kHz, two-pole high-pass filter (2/2-U702L), a 210 Hz, two-pole low-pass filter (1/2-U702L), and a summing stage (2/2-U701L). The summer subtracts the outputs of the high-pass and low-pass filters from the output of the buffer, forming a band-pass filter with cut-offs at about 4.21 kHz and 210 Hz. Its roll-off will be 6 dB/octave (with some peaking at each corner frequency), while that of the high-pass or low-pass filters is 12 dB/octave. Fig. 2 shows the frequency responses of these filters. Note that in their pass-bands the high-pass and low-pass filters are unity (0 dB) gain.

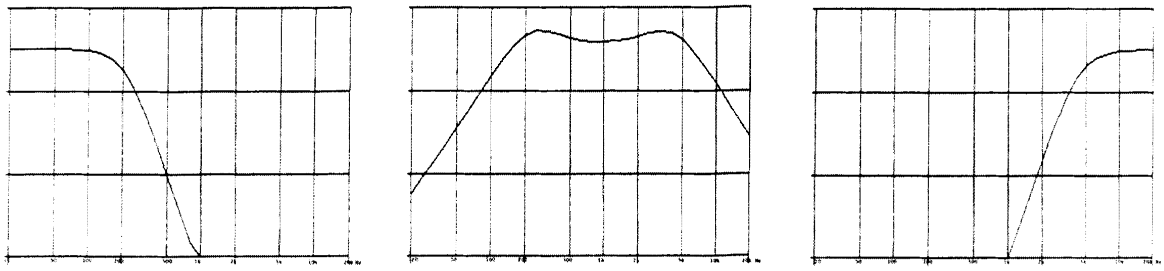


Figure 2, Low, Mid, and high Filters, 10 dB/division

The outputs of each filter are applied to the inputs of voltage-controlled amplifiers (VCAs), one each for the low (U706L), mid (U705L), and high (U704L) ranges. The gain of each VCA is independently controlled by a voltage derived from the rms-level detector for each band and the front-panel control settings. This circuitry is described in the Control-Voltage Path section, next page.

The VCA's gain in decibels is proportional to the voltage at pin 3 of each IC. Ideally the gain is 0 dB when the voltage is 0.00 mV; gain trims in the control-voltage (CV) path (see section 6 in the Alignment section) allow for a small adjustment. When pin 3 is positive, the gain in dB is negative (less than unity); when pin 3 is negative, the gain in dB is positive (greater than unity). Also under ideal conditions, variations in pin 3 voltage will not cause any variations in the dc level at the output of a VCA, but in the 3BX III, symmetry adjustments (VR701L for the low band, VR702L for the mid, VR703L for the high) are provided to compensate for non-ideal performance. (See the Alignment Procedure, sections 5.1 through 5.6, p.12 and following.) For a detailed explanation of this part, refer to the booklet on the VCA IC.

The outputs of all three VCAs are connected to a single summer stage, 2/2-U703 (in the right channel this stage is 1/2-U703). This op-amp converts the VCA-current output to a voltage signal and recombines the three bands into one. Note that the signal at pin 6 of U703 (pin 8 of the VCAs) is a current, not a voltage, which means that there won't be very much voltage at pin 6 of U703 even if the VCA is working properly. By the way, a relatively large signal at this pin (more than 10-20 mV) usually indicates a fault with U703.

The output of 2/2-U703 goes through an RC-coupling stage (R731L, C776L, R732L) before connecting to the FET-based muting circuit (Q802 in the left channel, Q801 in the right channel). These FETs are turned on for a short time whenever power is applied or turned off, to attenuate the output during power-up and power-down transients.

Finally, the signal passes to the switching circuitry. The switching allows the 3BX III signal path (a) to come either before or after a tape deck plugged into the tape jacks of the 3BX III, (b) to receive its signal from either the tape deck or the source, and (c) to bypass the circuitry.

CONTROL-VOLTAGE (CV) PATH

The 3BX III has two main purposes: first, to make loud signals louder while making soft signals softer (upward and downward expansion), and second, to emphasize musical transients (impact restoration). The three rms detectors translate the signal level in each of the three bands into voltages (at dc or nearly so) that indicate how loud the input signal is in each of these bands. These voltages can then be processed and used to control the gain of the VCAs in the 3BX III to accomplish its two purposes. Choosing the correct time constants for the rms detectors in the first place is critical to doing this job right. Then the rms-detector signals must be processed to find the transients and produce signals suitable for increasing the music's impact. All of this detecting and processing takes place in the CV-path section of the 3BX III.

Refer to Fig. 3, a block diagram of the CV path. The audio signals at the outputs of each of the signal-path filters are connected to the inputs of three rms-level detectors, one for each band (U707 is the low-band detector, U708 the mid-band, U709 the high-band). For each band, the left- and right-channel signals are summed at pin 1 of the rms-detector IC. For a detailed explanation of this part, refer to the booklet on the rms-detector IC.

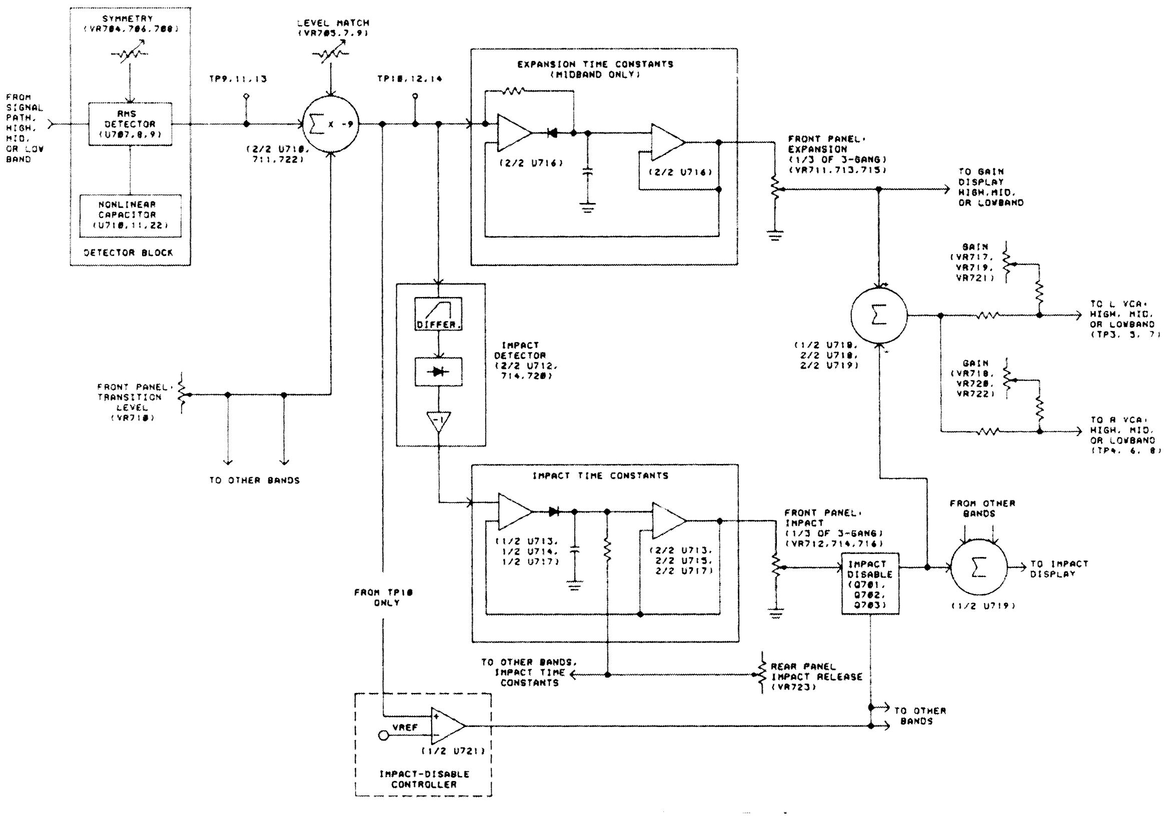


Figure 3, Control-Voltage Path

The output of these ICs (pin 7) is a dc voltage proportional to the dB signal level at the output of the filter that feeds them. TP9 is the low-band output, TP11 the mid-band, and TP13 the high-band. Table 1 shows the voltage and frequency required (simultaneously at the L- and R-channel inputs) to cause (ideally) 0.00 mV at pin 7 of each rms-detector IC. The exact calibration of these voltages is not critical, since adjustments are provided in the stage following the rms detector.

Input Voltage	Input Frequency	Rms IC	Test Point	Approx. Voltage
227 mV	100 Hz	U707	TP9	0.00 mV
88 mV	1 kHz	U708	TP11	0.00 mV
69 mV	10 kHz	U709	TP13	0.00 mV

TABLE 1
Input levels and frequencies (both channels driven)
for 0.00 mV at the rms output

Along with the dc voltage is a small amount of ripple. Ideally, it will be at twice the frequency of the input, with no fundamental. Trim pots (VR704 in the low band. VR706 in the mid. and VR708 in the high) are provided to allow this waveform to be adjusted for perfect symmetry (see the Alignment Procedure, sections 4.1-4.3, p.9 and following). For larger input signals the rms-IC output is positive, and negative for smaller input signals; it varies by 6 mV for each decibel of input-level change.

The time-constant of the rms detector is dependent on the capacitance connected to pin 6. The larger the capacitor, the slower the time constant. The mid-band and high-band rms-detector ICs have small capacitors connected directly between pin 6 and ground (C731 in the mid band and C741 in the high band). Also connected to pin 6 is a larger capacitor (C720, C729, C740), which connects to an op-amp. This capacitor and the circuit to which it connects form a "nonlinear capacitor" with an equivalent "value" that changes with the signal conditions. If there are problems in verifying the expansion timing (see alignment procedure, section 7.2), check that this circuit is operating correctly by probing the output of the associated op-amp (pin 1 of U710 in the low band, of U711 in the mid band, and of U722 in the high band). The output of each op-amp should be a sinusoidal wave at twice the frequency of the input signal. See Table 2 for appropriate frequencies and levels.

Input Voltage	Input Frequency	Op-amp	Pin Number	Approx Voltage (p-p)
1.0 v	50 Hz	U710	1	60 mV
1.0 v	100 Hz	U711	1	540 mV
1.0 v	100 Hz	U722	1	510 mV

TABLE 2
Test conditions for the nonlinear-capacitor circuit

The rms-detector outputs connect to inverting buffer stages (2/2-U710, 2/2-U711, and 2/2-U722) with gains of 9. At these buffers, individual dc voltages from trim pots VR705, VR707 and VR709 are added to the rms-detector output voltages, and a single dc voltage from the Transition-Level control (VR710 on the front panel) is added to all three stages. The trim pots allow the outputs of the rms detectors to be calibrated to specific references (see the Alignment Procedure, sections 4.1, 4.2 and 4.3), and the front-panel control allows the entire system's unity-gain point (no upward or downward expansion) to be adjusted by the customer to match the levels in his or her stereo system.

TP10 is the low-band rms-buffer output, TP12 the mid-band, and TP14 the high-band. The CV path now splits in two, differently for the high- and low-bands from the mid-band. First the high band…

High-Band CV Path

TP14 connects directly to the high-band-expansion control (VR715) on the front panel. This is one section of a three-gang pot (the other sections are labelled VR713 and VR711) which controls the amount of rms-detector signal that eventually reaches pin 3 of the high-band VCA IC. Setting the pot for more expansion causes more of this signal to be allowed through. At 50% expansion, a 100 mV change at the rms output (TP13) causes a negative 50 mV change at pin 3 of the VCA (TP7). When the signal at TP14 is positive, the gain of the high-band VCA will be either negative in dB or 0, depending on the position of the expansion control. When TP14 is negative, the gain will be positive or 0. The wiper of the expansion control connects to the positive input of a summer stage 2/2-U719) whose output is sent on to the VCA.

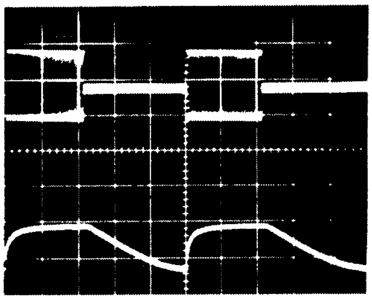
TP14 also connects to the impact detector (U720 and associated circuitry), which differentiates the rms-detector-output waveform and clips off the negative-going portions of it. Its output looks like a sharp positive-going spike every time a sudden increase in input-signal level takes place. This positive-going spike will cause the gain of the high-band VCA to increase (how much it increases depends on the setting of the Impact-Restoration control). Note that because the impact detector clips off the negative portions of the control signal, the impact restorer never causes negative gain (unlike the Expansion section). See Fig. 4, next page, for typical waveforms in the impact-restoration part of the CV path (note that column 'a' is low, 'b' is mid, 'c' is high). The output of the impact detector connects to a time-constant circuit (1/2-U717, 2/2-U717), which stretches this spike out for a time determined by the setting of the rear Impact-Release-Rate control (VR723).

The output of the time-constant circuit is directly connected to the impact-level control (VR716) on the front panel. This, too, is one section of a three-gang pot (the other sections are labelled VR714 and VR712), and it controls the amount of impact-control signal that reaches pin 3 of the high-band VCA. The wiper of the pot connects to the impact-disable circuit (Q703, driven from 1/2-U721), which turns off the impact-control signal at low signal levels. This prevents record-surface noise and other small signals from being raised in volume by the impact-restoration circuitry.

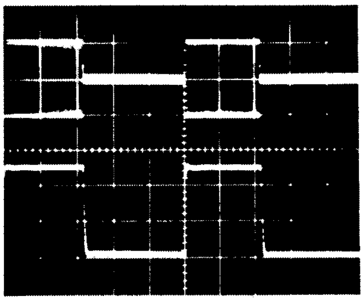
All photos:
All front controls @ maximum;
Rear trim (Impact Release Rate) centred

a & b photos:
300 Hz tone-burst @ 316 mV rms (447 mV peak),
128 cycles on, 172 cycles off, 0.2 s/div

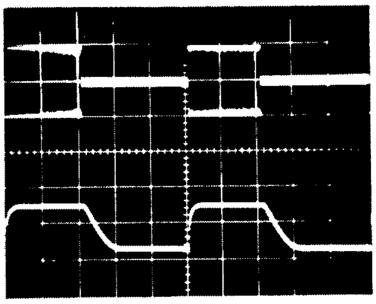
c photos;
3 kHz tone-burst @ 316 mV rms (447 mV peak),
128 cycles on, 172 cycles off, 20 ms/div



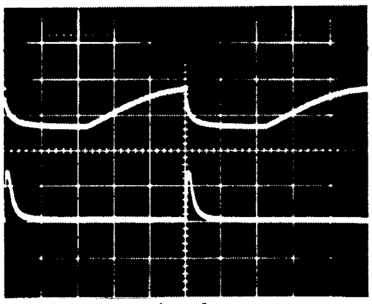
4.a.1
Top: Low-pass filter output, U702L, pin 1, or U702R, pin 7, 0.2 V/div;
Bottom: Low-band rms-detector output, U707, pin 7 (TP9), 0.1 V/div.



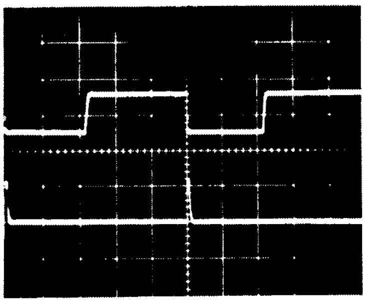
4.b.1
Top: Mid-band summer output, U701L, pin 7, or U701R, pin 1, 0.5 V/div;
Bottom: Mid-band rms-detector output, U708, pin 7 (TP11), 50 mV/div.



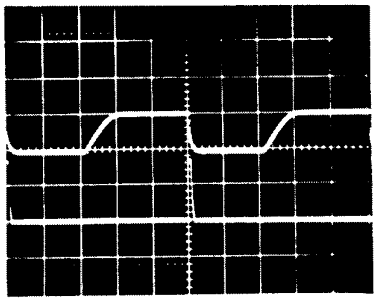
4.c.1
Top: High-pass filter output, U702L, pin 7, or U702R pin 1, 0.2 V/div;
Bottom: High-band rms-detector output, U709, pin 7 (TP13), 0.1 V/div.



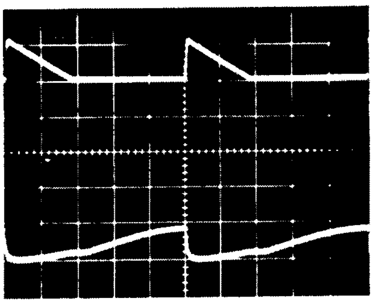
4.a.2
Top: Low-band rms-buffer output, U710, pin 7 (TP10), 1 V/div;
Bottom: Low-band impact-detector output, U713, pin 5, 0.2 V/div.



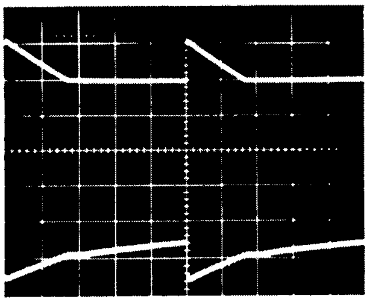
4.b.2
Top: Mid-band rms-buffer output, U711, pin 7 (TP12), 1 V/div;
Bottom: Mid-band impact-detector output, U714, pin 3, 0.5 V/div.



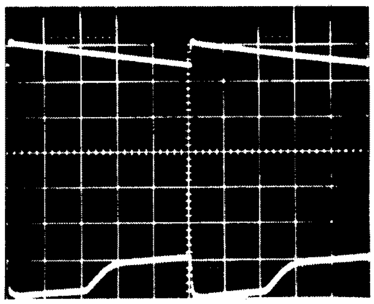
4.c.2
Top: High-band rms-buffer output, U722, pin 7 (TP14), 1 V/div;
Bottom: High-band impact-detector output, U717, pin 5, 0.2 V/div.



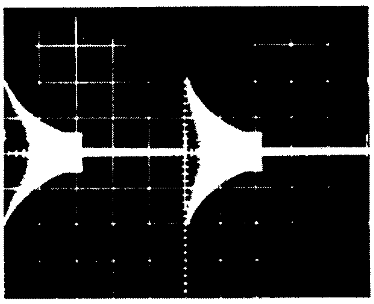
4.a.3
Top: Output, low-band impact time-constants, U713, pin 1, 1 V/div;
Bottom: Low-band VCA control voltage, U706L or R, pin 3 (TP3 or 4), 0.1 V/div.



4.b.3
Top: Output. mid-band impact time-constants, U715, pin 7, 1 V/div;
Bottom: Mid-band VCA control voltage, U705L or R, pin 3 (TP5 or 6), 0.1 V/div.

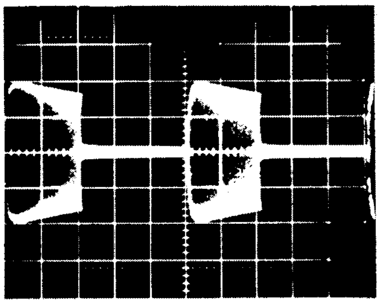


4.c.3
Top: Output, high-band impact time-constants, U717, pin 1, 0.5 V/div;
Bottom: High-band VCA control voltage, U704L or R, pin 3 (TP7 or 8), 0.1 V/div.



4.a & b.4
Left or right output, 5 V/div

Figure 4



4.c.4
Left or right output, 0.5 V/div

Finally, the output of the impact-disable circuit connects to the summer stage (2/2-U719) previously mentioned, where both the expansion and impact-restoration CVs are combined before being sent to the VCA. Trim pots (VR721 and VR722) are provided at the output of this summer to allow the CVs sent to each VCA (left and right channel) to be offset slightly, in order to account for differences in VCA-gain offsets (see Alignment Procedure, section 6, p.13).

Low-Band CV Path (see Fig. 4)

This path is nearly identical to the high-band, except that the time-constants used throughout are generally much longer, as is appropriate for low frequencies. The signal at TP10 (the output of the buffer following the low-band rms output) splits into two paths: one to the expansion control (VR711) and one to the impact detector. The output of the impact detector goes through a circuit to lengthen the decay, and then to the impact-disable circuit. (The impact-disable controller is common to all three bands.) The impact-control signal and the expansion-control signals are combined in 1/2-U718 and then sent to the low-band VCAs. Trim pots VR717 and VR718 are provided to set the VCA gains precisely.

Mid-Band CV Path (again see Fig. 4)

This path also closely resembles the high-band, except for different time-constants (midway between the low- and high-band ones) and the addition of a mid-band expansion time-constant circuit. This circuit is placed between the output of the buffer following the mid-band rms detector (TP12) and the front panel expansion control (VR713). Its purpose is to prevent the mid-band CV from dropping too fast after an input signal goes away (toward lower signal level indication, which at this point is toward positive voltages). This circuit closely resembles the impact time-constant circuit; it performs a similar function but does not provide a user-adjustable release rate.

LED DISPLAYS

Refer to Fig. 5, a block diagram of a typical LED display. The control voltages from each of the three sections of the Impact-Restoration control are summed in 1/2-U719 to produce a signal representative of the average of the impact CVs. This signal is sent to the LED-display section. In addition, the CVs from each of the three sections of the Expansion-Level control (VR711, VR713, and VR715) are sent (separately) there.

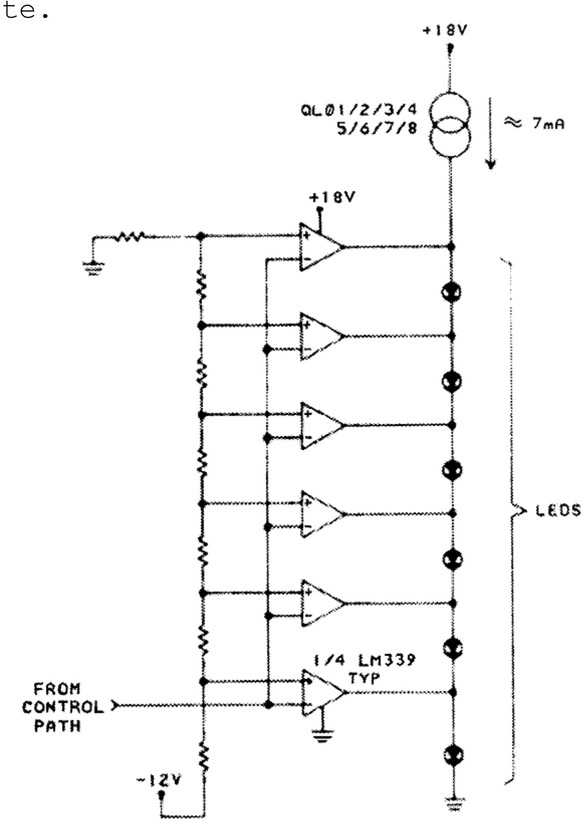


Figure 5, LED Display

In the LED display, current sources (QL01 through QL08) of approximately 7 mA each provide constant currents to each series-connected string of six LEDs regardless of the number of LEDs on at any one time. The LM339 comparator sections (UL01 through UL12) have open collector outputs that shunt the LED supply currents to ground when they are "low" and allow the currents to pass into the LEDs when they are "high." This turns off all the LEDs "below" the last comparator whose output is low. Any LEDs between the current source and the uppermost low comparator will be illuminated.

The comparators compare the CV signals with a set of predetermined voltages set by resistor strings across the supply voltage. For the red LEDs, the comparator goes high and an individual LED turns on when the CV negatively exceeds the fixed voltage at the comparator's other input. For the yellow LEDs, the CV must positively exceed the fixed voltage to turn on an LED. Because of the series connection, if any one LED is open, all LEDs in that string will go out as soon as the comparator at the bad LED goes high. An open in a comparator output will cause its LED to light as soon as the one "above" it is lit; a short in a comparator output will prevent any LEDs from lighting "below" that comparator.

POWER SUPPLY and MUTE GENERATOR

Refer to Fig. 6, a block diagram of the power supply. The secondary of the power transformer produces approximately 37 Vac rms (the normal range is 31 to 43 V), which is full-wave rectified by the bridge rectifier (D801-D804) and smoothed by electrolytic capacitors (C801-C804) to produce approximately +18 Vdc (the normal range is 17 to 24 V). Three-terminal regulators reduce this voltage to a constant +12 Vdc, which is used to supply most of the circuitry. The unregulated +18 Vdc is used to supply current to the LED strings.

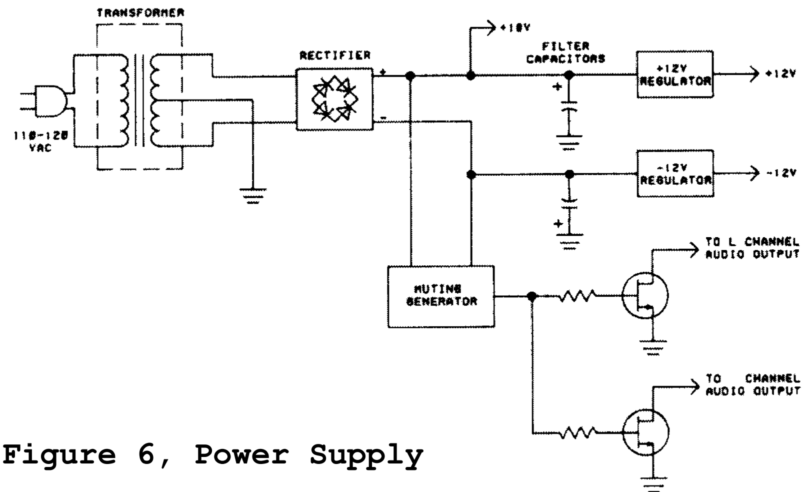
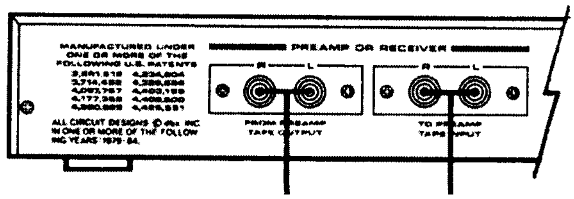


Figure 6, Power Supply

Also in the power-supply section is the muting generator (Q803, etc.). Refer to the main schematic for details. The output of this circuit (the collector of Q803) is normally -18 V. However, it produces a short positive pulse when power is first applied or removed. The pulse on turn-on lasts longer than the time required for the supplies to stabilize, and the pulse after turn-off lasts longer than the time required for the supplies to collapse. These pulses turn on the muting FETs (Q801 and Q802), shorting the audio output to ground during the On and Off transients.

ALIGNMENT PROCEDURE



INPUTS **OUTPUTS**

1. INSTRUMENTS REQUIRED

Audio-frequency sine-wave oscillator with 50 ohm output impedance (Kron-Hite 4200A or equivalent)
10 MHz oscilloscope capable of 2 mV/div sensitivity (Philips PM 3233 or equivalent)
DC voltmeter capable of accurately measuring 1 mV (digital preferred, Fluke 8060A or equivalent)
RMS-responding AC voltmeter (Fluke 8060A or equivalent)
Tone-burst generator (GenRad 1396A or equivalent)

2. INSPECTION and WARMUP

2.1 Inspect the unit to be tested and verify that all internal interconnect cables are properly installed.

2.2 Confirm that the voltage-selector switch is in the proper position.

2.3 Connect the unit to a source of rated AC voltage, turn it on, and let it warm up for 10 minutes.

3. POWER-SUPPLY TESTS

3.1 Verify the following power-supply conditions:

	Probe location	Test Condition	Tolerance
3.1.1	U801, pin 3	+12 Vdc	+600 mV
3.1.2	U802, pin 3	-12 Vdc	+600 mV
3.1.3	Plus(+) end of C803	+18 Vdc	+6 V/-1 V
3.1.4	Power indicator	illuminated	

If these conditions are not met, troubleshoot and correct the problem before attempting calibration.

4. CONTROL-CIRCUITRY TESTS

4.1 Low-band rms calibration

4.1.1 Set the controls as follows:

Expansion	Maximum
Impact Restoration	Minimum
Transition Level	Minimum
Pre/Post	Pre
Source/Tape	Source
Bypass	Out (i.e., not set)

4.1.2 Connect the sine-wave oscillator to both inputs of the unit under test. Set it to 20 Hz and an output level of +10 dBV (3.16 V). Connect the scope to the output of the low-band rms-detector buffer at TP10 (U710, pin 7) and set it to 2 mV/div (AC-coupled) and 10 ms/div.

4.1.3 Adjust VR704 for best rms symmetry, as shown in Fig. 7a.

4.1.4 Reset the oscillator to 100 Hz, +10 dBV (3.16 V).

4.1.5 Also connect a digital voltmeter to TP10.

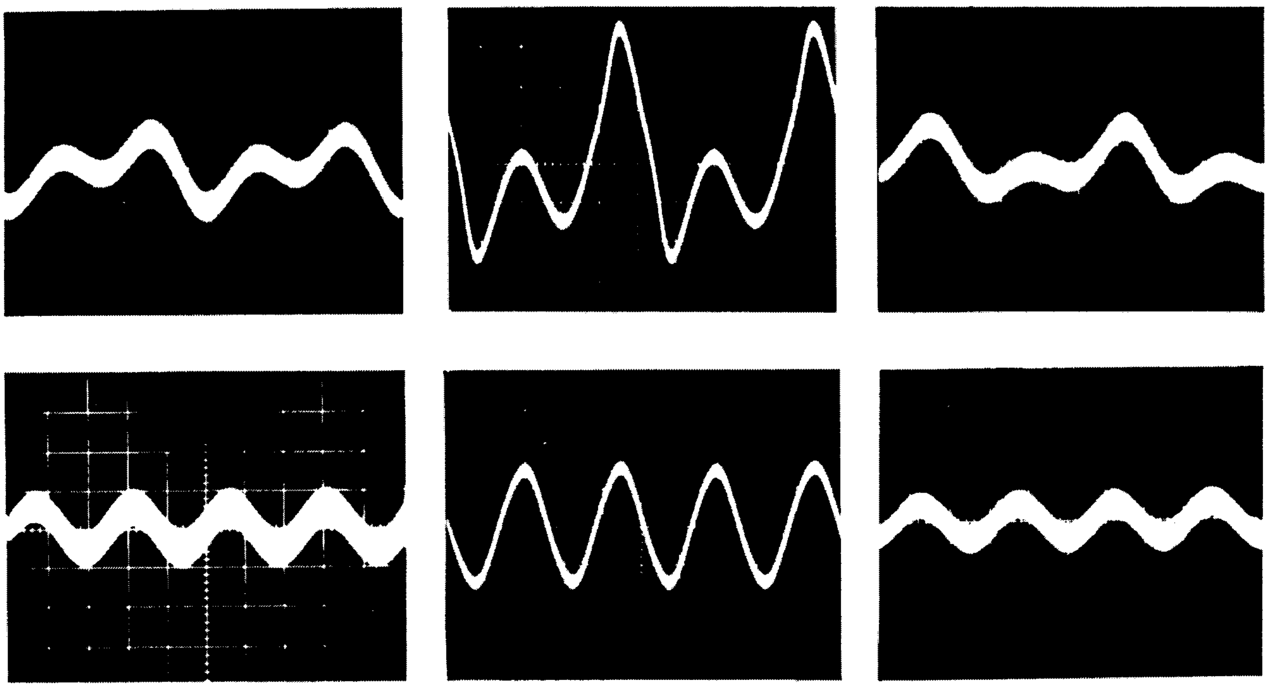
4.1.6 Adjust VR705 for 0.00 Vdc ±10 mV. Verify that no more than one LED in the low-band gain-change display is lit.

4.1.7 Reduce the oscillator's output level in 10 dB steps and verify that the voltage at TP10 changes as follows:

Input Level	TP10 Voltage	Tolerance
+10 dBV	000 mV dc	±10 mV
0 dBV	+541 mV dc	±50 mV
-10 dBV	+1080 mV dc	±100 mV
-20 dBV	+1620 mV dc	±150 mV

Wrong:

Right:



Figures 7a 7b 7c

4.2 Mid-band rms calibration

4.2.1 Set the controls as in 4.1.1.

4.2.2 Connect the sine-wave oscillator to both inputs. Set it to 100 Hz, +10 dBV (3.16 V). Connect the scope to the output of the mid-band rms-detector buffer at TP12 (U711 pin 7) and set it to 5 mV/div (AC-coupled) and 2 ms/div.

4.2.3 Adjust VR706 for best rms symmetry, again as shown in Fig. 7b.

4.2.4 Reset the oscillator to 1 kHz, +15 dBV (5.62 V).

4.2.5 Also connect a digital voltmeter to TP12.

4.2.6 Adjust VR707 for 0.00 Vdc ±10 mV. Verify that no more than one LED in the mid-band gain-change display is lit.

4.2.7 Reduce the oscillator’s output level in 10 dB steps and verify that the voltage at TP12 changes as follows:

Input Level	TP12 Voltage	Tolerance
+15 dBV	000 mV dc	±10 mV
+5 dBV	+541 mV dc	±50 mV
-5 dBV	+1080 mV dc	±100 mV
-15 dBV	+1620 mV dc	±150 mV

4.3 High-band rms calibration

4.3.1 Set the controls as in 4.1.1.

4.3.2 Connect the sine-wave oscillator to both inputs. Set it to 1 kHz, +10 dBV (3.16 V). Connect the scope to the output of the high-band rms-detector buffer at TP14 (U722 pin 7). Set the scope to 2 mV/div (AC-coupled) and 0.2 ms/div.

4.3.3 Adjust VR708 for best rms symmetry, Fig. 7c.

4.3.4 Reset the oscillator to 10 kHz, -2 dBV (794 mV).

4.3.5 Also connect a digital voltmeter to TP14.

4.3.6 Adjust VR709 for 0.00 Vdc ±10 mV. Verify that no more than one LED in the high-band gain-change display is lit.

4.3.7 Reduce the oscillator’s output level in 10 dB steps and verify that the voltage at TP14 changes as follows:

Level	TP14 Voltage	Tolerance
-2 dBV	000 mV dc	±10 mV
-12 dBV	+541 mV dc	±50 mV
-22 dBV	+1080 mV dc	±100 mV
-32 dBV	+1620 mV dc	±150 mV

4.4 Impact-display adjustment

4.4.1 Set controls as follows:

Expansion	Maximum
Impact Restoration	Middle
Transition Level	Minimum
Pre/Post	Pre
Source/Tape	Source
Bypass	Out (i.e., not set)

4.4.2 Connect a clip lead from the junction of R704, R705, and D727 to ground. Short the inputs to ground.

4.4.3 Adjust VR724 so the first impact-restoration LED is just off. Remove the clip lead.

4.5 Impact-release-rate control (initial adjustment)

4.5.1 Connect the dc voltmeter to the wiper of VR723 (the impact release-rate control, on the rear panel).

4.5.2 Set VR723 so that the voltage measures -6.75 Vdc.

5. VCA-SYMMETRY ADJUSTMENTS **(Fig. 8, below)**

5.1 VCA-Symmetry Adjustment, Low Band, Left Channel

5.1.1 Set the controls as follows:

Expansion	Minimum
Impact Restoration	Maximum
Transition Level	Maximum
Pre/Post	Pre
Source/Tape	Source
Bypass	Out (i.e., not set)

5.1.2 Short the main inputs to ground and connect a sine-wave oscillator to TP3 (U706L, pin 3). Set the oscillator for 100 Hz, 100 mV rms.

5.1.3 Connect the scope to the 3BX III left-channel output. Set the vertical sensitivity to 20 mV/div and the horizontal to 2 ms/div.

5.1.4 Adjust VR701L for minimum signal feed-through; see Fig. 8.

Wrong **Figure 8** **Right**

5.2 VCA-Symmetry Adjustment, Mid-Band, Left Channel

Follow the procedure in 5.1 but go to TP5 and VR702L.

5.3 VCA-Symmetry Adjustment, High Band, Left Channel

Again follow the procedure in 5.1 but go to TP7 and VR703L.

5.4 VCA-Symmetry Adjustment, Low band, Right Channel

Follow the procedure in 5.1 but go to TP4 and VR701R and change outputs (left to right).

5.5 VCA-Symmetry Adjustment, Mid-Band, Right Channel

Follow the procedure in 5.4 but go to TP6 and VR702R.

5.6 VCA-Symmetry Adjustment, High Band, Right Channel

Follow the procedure in 5.4 but go to TP8 and VR703R.

6. VCA-GAIN ADJUSTMENTS

6.1 Set the controls as in 5.1.1

6.2 Connect the sine-wave oscillator to the left and right inputs of the 3BX III.

6.3 Left-Channel Adjustment

6.3.1 Set the oscillator for 100 Hz at 0 dBV (1 V rms) ±0.1 dB.

6.3.2 Connect the left-channel output of the 3BX III to an AC voltmeter.

6.3.3 Adjust VR717 for unity gain, i.e., an output of 0 dBV (1 V rms) ±0.1 dB.

6.3.4 Set the oscillator for 1 kHz at 0 dBV (1 V rms) ±0.1 dB.

6.3.5 Adjust VR719 for unity gain.

6.3.6 Set the oscillator for 10 kHz at 0 dBV (1 V rms) ±0.1 dB.

6.3.7 Adjust VR721 for unity gain.

6.4 Right-Channel Adjustment

Repeat 6.3 above, but observe the right-channel output and make the unity-gain adjustments at VR718 (at 100 Hz), VR720 (at 1 kHz), and VR722 (at 10 kHz).

6.5 Verify that the gains have been set correctly by sweeping the oscillator from 20 Hz to 20 kHz and observing the output amplitude vs. frequency of both channels. It should be ±0.5 dB.

7. PERFORMANCE TESTS

7.1 Impact-Restoration Magnitude and Timing

7.1.1 Set the controls as follows:

Expansion	Minimum
Impact Restoration	Maximum
Transition Level	Maximum
Pre/Post Select	Pre
Source/Tape	Source
Bypass	out (i.e., not set)

7.1.2 Connect the sine-wave oscillator to the tone-burst oscillator, and connect the tone-burst oscillator output to the left and right inputs of the 3BX III.

7.1.3 Connect the oscilloscope to the output of one channel of the 3BX III. Connect the scope sweep-trigger input to the gate or trigger output on the tone-burst oscillator.

7.1.4 Low-Band Test

7.1.4.1 Set the oscillator to 100 Hz at 0 dBV (1 V rms) and the tone-burst oscillator to produce approximately an 80 ms burst (8 cycles) followed by approximately 500 ms (50 cycles) of at least 20 dB attenuation. Set the scope to 2 V/div and 20 ms/div.

7.1.4.2 Observe the output on the scope. Verify that the wave shape is substantially as shown in Figure 9a. Then verify for the other channel.

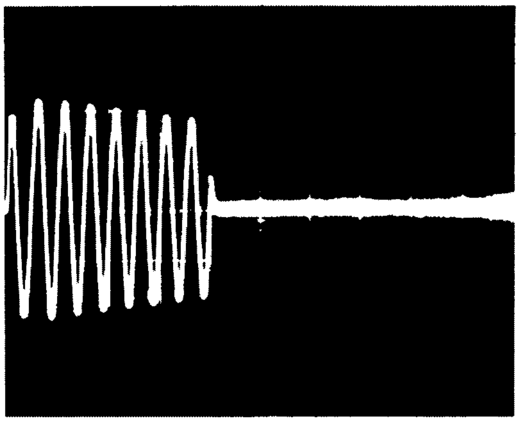


Figure 9a

7.1.4.3 Observe that the Impact display lights at least 10 out of the 12 LEDs.

7.1.5 Mid-Band Test

7.1.5.1 Set the oscillator to 1 kHz at 0 dBV (1 V rms) and the tone-burst oscillator to produce approximately an 8 ms burst (8 cycles) followed by approximately 100 ms (100 cycles) of at least 20 dB attenuation. Set the scope for 2 V/div and 2 ms/div.

7.1.5.2 Observe the output on the scope. Verify that the wave shape is substantially as shown in Fig. 9b, and confirm for the other channel.

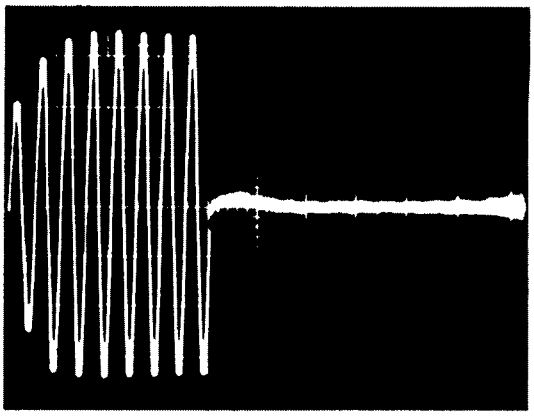


Figure 9b

7.1.5.3 Observe that the Impact display lights at least 10 out of the 12 LEDs.

7.1.6 High-Band Test

7.1.6.1 Set the oscillator to 10 kHz at 0 dBV and the tone-burst oscillator to produce approximately a 3.2 ms burst (32 cycles) followed by approximately 100 ms (1000 cycles) of at least 20 dB attenuation. Set the scope for 2 V/div and 0.5 ms/div.

7.1.6.2 Observe the output on the scope. Verify that the wave shape is substantially as shown in Fig. 9c; confirm for the other channel.

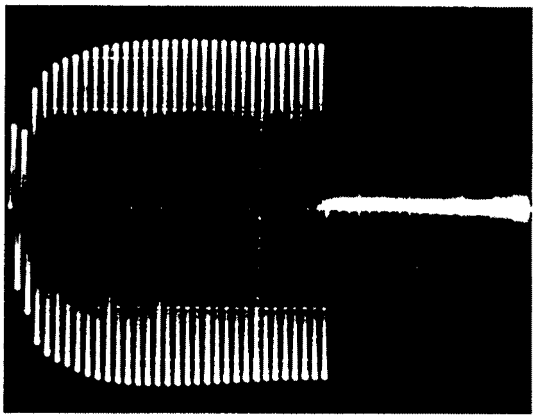


Figure 9c

7.1.6.3 Observe that the Impact display lights at least 10 out of the 12 LEDs.

7.2 Expansion Magnitude and Timing

7.2.1 Set the unit as follows:

Expansion	Maximum
Impact Restoration	Minimum
Transition Level	Middle
Pre/Post	Pre
Source/Tape	Source
Bypass	Out (i.e., not set)

7.2.2 Connect the oscillator and tone-burst generator as in 7.1.2 and 7.1.3 above.

7.2.3 Low-Band Test

7.2.3.1 Set the sine-wave oscillator and the tone-burst generator as in 7.1.4.1. (In this test, the 20 dB attenuation figure is critical to achieving results consistent with the pictures presented here.) Set the scope for 1 V/div and 50 ms/div.

7.2.3.2 Observe the output on the scope. Verify that the shape is substantially as shown in Fig. 10a; confirm for the other channel.

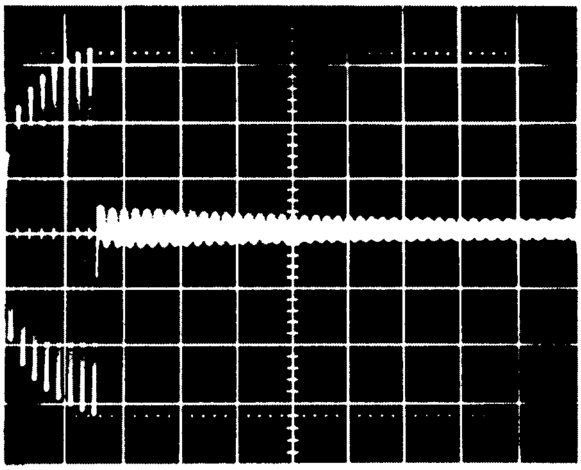


Figure 10a

7.2.3.3 Observe that the Low-Band display lights at least to the 4th red LED during the burst and returns to the 2nd yellow LED between bursts.

7.2.4 Mid-Band Test

7.2.4.1 Set the sine-wave oscillator and the tone-burst generator as in 7.1.5.1 except for 32 cycles on instead of 8. As before, the 20 dB figure is critical to achieving results consistent with the pictures presented here. Set the scope to 1 V/div and 10 ms/div.

7.2.4.2 Observe the output on the scope. Verify that the wave shape is substantially as shown in Fig. 10b, next page, and then verify for the other channel.

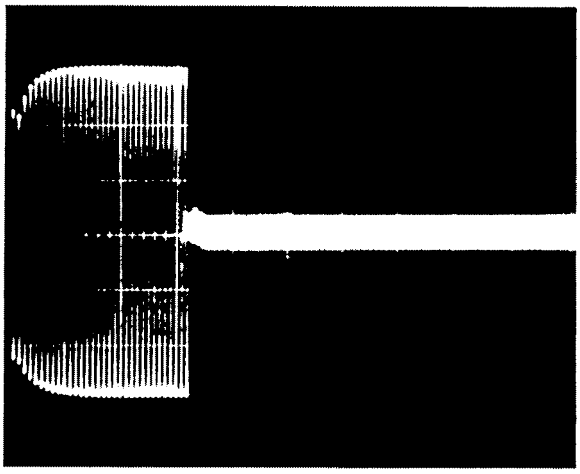


Figure 10b

7.2.4.3 Observe that the mid-band display lights at least to the 4th red LED during the burst and returns to the 1st red LED between bursts.

7.2.5 High-Band Test

7.2.5.1 Set the sine-wave oscillator and the tone-burst generator as in 7.1.6.1. As in the low-band test, the 20 dB figure is critical to achieving results consistent with the pictures presented here. Set the scope to 2 V/div and 2 ms/div.

7.2.5.2 Observe the output on the scope. Verify that the wave shape is substantially as shown in Fig. 10c, and then confirm for the other channel.

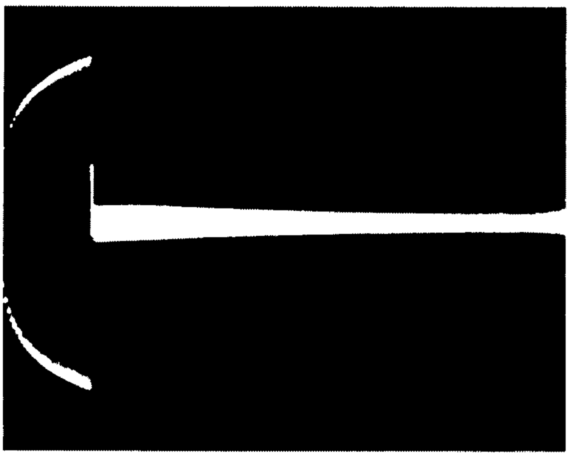


Figure 10c

7.2.5.3 Observe that the high-band display lights at least to the 5th red LED during the burst and returns to the 1st red LED between bursts.

7.3 Expansion Tracking

7.3.1 Set the unit as in 7.2.1

7.3.2 Connect the sine-wave oscillator to the left and right inputs of the unit.

7.3.3 Connect the output of one channel to an AC voltmeter.

7.3.4 Low-Band Tests

7.3.4.1 Set the oscillator to 100 Hz at 0 dBV (1 V rms).

7.3.4.2 Adjust the Transition-Level control for 0 dBV at the 3BX III output.

7.3.4.3 Reduce the oscillator output to –10 dBV (316 mV rms).

7.3.4.4 Verify that the 3BX III output level decreases to -15 dBV (178 mV rms) ±1 dB.

7.3.4.5 Reduce the oscillator output to –20 dBV (100 mV rms).

7.3.4.6 Verify that the 3BX III output level decreases to -30 dBV (31.6 mV rms) ±2 dB.

7.3.4.7 Repeat for the other channel.

7.3.5. Mid-Band and High-Band Tests

Repeat the steps in 7.3.4, but use 1 kHz for the mid-band and 10 kHz for the high-band.

7.4 Distortion

7.4.1 Set the unit as follows:

Expansion	Minimum
Impact Restoration	Minimum
Transition Level	Mid-Point
Pre/Post	Pre
Source/Tape	Source
Bypass	Out (not set)

7.4.2 Connect the sine-wave oscillator to the unit's left and right inputs.

7.4.3 Connect the output of one channel of the 3BX III to a distortion analyser or THD meter.

7.4.4 Low-Band Distortion

7.4.4.1 Set the oscillator to 100 Hz at 0 dBV (1 V rms).

7.4.4.2 Verify that the THD is less than 0.15%.

7.4.4.3 Repeat for the other channel.

7.4.4.4 Now set the Expansion and Impact-Restoration controls to their maximum positions.

7.4.4.5 Adjust the Transition-Level control for 0 dBV at the 3BX III output.

7.4.4.6 Verify that the THD is less than 0.25%.

7.4.4.7 Repeat for the other channel.

7.4.5 Mid-Band Distortion

Repeat the steps in 7.4.4 using 1 kHz. The first (minimum-position) THD reading should be 0.15%, and the second 0.2%. Don't forget to do the second channel.

7.4.6 High-Band Distortion

Repeat the steps in 7.4.5 using 10 kHz at −10 dBV (316 mV rms).

7.5 Noise

7.5.1 Set the unit as in 7.4.1

7.5.2 Disconnect all sources from the 3BX III and connect 1 k-ohm resistors from the input terminals to the input ground (RCA, or phono [pin], plugs with 1 k resistor terminations are ideal).

7.5.3 Connect one channel output of the 3BX III to the input of the rms-responding AC voltmeter.

7.5.4 Verify that the noise level is less than −85 dBV unweighted or −90 dBV A-weighted. (0 dBV is 1 V rms.)

7.6 Muting Check

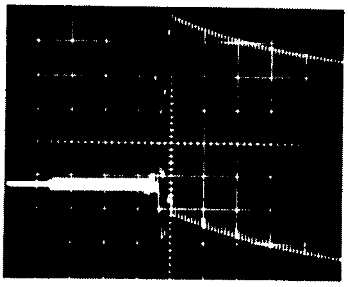
7.6.1 Set the unit as in 7.4.1

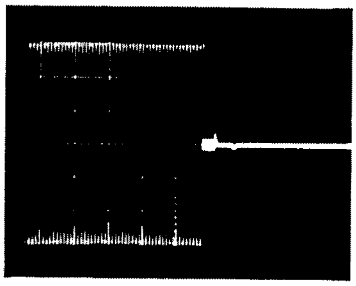
7.6.2 Connect the sine-wave oscillator, set to 100 Hz at 0 dBV (1 V rms), to both inputs of the unit.

7.6.3 Connect the oscilloscope to the output of one channel of the unit, with its front controls turned down. Set scope to 0.5 V/div and 100 ms/div.

7.6.4 Power the unit up and down a few times to confirm that the output-mute circuitry is working, as shown in Fig. 11.

7.6.5 Check the other channel, too.





Power on **Figure 11** **Power off**

MODEL 3BX III PRINTED CIRCUIT BOARD ASSEMBLY

REFERENCE DESIGNATION	DESCRIPTION	PRODUCT CODE	DBX P/N	QTY.
	LED CONNECTOR CORD ASSEMBLY, M" LEADS	510ACCNL31ULA	310472	5
	POWER LED CONNECTOR CORD ASSEMBLY	SIOACC9L7SULA	320215	1
	CONNECTOR RED, ASSEMBLY	510ACZZ243CFA	320216	1
	HEX NUT M3 x N-P S-ZMC	510BN11CL30NSZ	310626	2
	PAN READ RIVET 43 x 4.5 QCK NYLON-B	SIOBRP3045QNB	310467	2
	PAN HEAD SCREW M3 x 8 S-ZMC	510BSPP3008NZ	310628	3
	CND WASHER M3 x 6 x .2T BS-NI	510BWT30602BN	310660	1
C701L, 701R	CERAMIC CAP. 100pF RAD DC 50V, 10% NPO OR S2L	510CCGB101JOT	121258	2
C709L, 709R, 777, 778	CERAMIC CAP. 33pF RAD DC 50V, 10%, NPO	51OCCGB330JOT	121174	4
CBOI-804	ELECT CAP 470uF RAD 35V, +50/-10%	SIOCKAF471ALX	127490	4
C719, 728, 738, 805, 806, 808	ELECT CAP 10uF RAD 25V. +50/-10%	510CEVE100ALX	127203	6
C720	ELECT CAP 22uF RAD 25V, 10% (MAY BE NP)	510CEVE220ALX	127264	1
C729	ELECT CAP 3.3uF RAD 25V, 10%	51OCEVE3R3ALX	127100	1
C776L, 776R	ELECT CAP 4.7uF RAD NP, 25V, 20%	510CEVE4R7RAN	127161	2
C710-15, 721, 722, 730, 732, 739, 740, 742, 747-751, 753, 755-757, 760-767, 769, 770, 775, 807	ELECT CAP 1uF 50V, 20%	510CEVGOIOALX	127084	34
C706L, 706R, 707L, 707R	ELECT CAP 1uF RAD NP 50V, 10%	510CEVCO1ONAN	127087	4
C774	ELECT CAP 1.5uF RAD 50V, 20%	510CEVG1R5ZMN	177088	1
C717, 718, 726, 727, 736, 737	CERAMIC CAP 1000pF 50V 10% Y5E	51OCKGB102KBT	121432	6
C733, 735, 745, 746, 752	FILM CAP 1uF RAD 50V, 5%	510CQVB104JTW	123149	5
C754, 758	FILM CAP .047uF RAD 50V, 5%	510CQV8473JTN	123095	2
C702L, 702R	FILM CAP .068uF RAD 50V, 5%	510CQV8683JTN	123123	2
C708L, 708R, 716, 723, 725. 731, 741, 768	FILM CAP .33uF RAD, 50V, 5%	510CQ48334JEH	123213	8
C734, 759	FILM CAP .01uF RAD 50V, 5%	510CQ8B103JTN	123025	2
C704L, 704R, 705L, 705R, 744	FILM CAP 3300pF RAD 50V, 5%	510CQ85332JTN	123350	5
C703L, 703R, 724, 743	FILM CAP .033uF RAD 50V, 5%	SIOCQ8R333JTN	123075	4
C771	FILM CAP 5600pF RAD 50V, 5%	SIOCQ88682JTN	123098	1
	HEAT SINK 2335389 R81071-004	SIONS736ADOOI	310629	1
	TERMINAL	SIONW20155001	310630	20
	SHORT JUMPER 10 mm	SIOMW4OICX006	110085	183
	BUSHING ASSEMBLY 2666116 TB-30012675136 R80010-019	51OWBR2666116	310679	4 PR
		SIONIRR2675136		

REFERENCE DESIGNATION	DESCRIPTION	PRODUCT CODE	DBX P/N	QTY.
D701-727, 807	SILICON DIODE MA150, OR 1N4148	510QDSMA150XN	140031	28
D805, 806	SILICON DIODE SR1K-4LF OR 1N4003	510QDSSR1K4AP	140022	2
D801,	SILICON DIODE W02M	510QDSW02MXXG	140008	1
U712, 720	IC, OP-AMP, LM301AN	510QQM00301AL	146003	2
ULOI-12	IC, QUAD COMPARATOR, LM339K	510QQM00339A&	146271	12
U701L, 701R, 702L, U702R, 703	IC, OP-AMP, LP353N	510QQM00353NL	146241	5
V721	IC, DUAL COMPARATOR, LM393N	510QQM00393A&	146273	1
U704L, 704R, 705L, 705R, 706L, 706R	IC, VOLTAGE CONTROLLED AMPLIFIER, UPC125282	510QQM01252AA	146732	6
111707-709	IC, RMS LEVEL DETECTOR, UPC1253H2	510QQM01253AA	146742	3
U710, 711, 713-719, 722	IC, DUAL OP-AMP, 4558P	510QQM04558A&	146061	10
U801	IC, VOLTAGE REGULATOR, +12V, UA7812	510QQM07812CJ	146361	1
V802	IC, VOLTAGE REGULATOR, -12V, UA7912	510QQM07912BJ	146362	1
Q803	PNP TRANSISTOR 2SA1015 Y	510QTA1015XAT	142162	1
QL01-LO8	PNP TRANSISTOR 2SA1020 Y	SIOQTA102OXAT	142171	8
Q701-703	NPN TRANSISTOR 2SC1815 Y	510QTC1815XAT	142172	3
Q801, 802	PET TRANSISTOR 2SKI70	510QTX0170XAT	142173	2
R746, 760, 774	RESISTOR, CARBON FILM 1/4W 1K ohm 5%	51ORD25PJIO2X	054102	3
R701L, 701R, 727L, 727R, 728L, 728R, 729L, 729R, 779, 780, 786. 787, 796, 797, 801, 805	RESISTOR, CARBON FILM 1/4W 10K ohm 5%	SIORD2SPJIO3X	054103	16
R7B1L, 7B1R, 7E4-7E6, R702L. 702R, 733L. 733R, 790	RESISTOR, CARBON FILM 1/4W 100K ohm 5%	SIORD25PJ104X	054104	10
R7F7, 747, 773, 803, 804, 806	RESISTOR, CARBON FILM 1/4W 1M ohm 5%	51ORD2SPJIOSX	054105	6
RL01, L13, L23, L35, L45, L57, L67, L76	RESISTOR, CARBON FILM 1/4W 120 ohm 5%	510RD25PJ121X	054121	8
R7F4	RESISTOR, CARBON FILM 1/4W 1.2M ohm 5%	51ORD2SPJI2SX	054125	1
R777	RESISTOR, CARBON FILM 1/4W 130K ohm 5%	SIORD25PJ134X	054134	1
RL06, L07. L28, L29, L51, L50, L51, L70, L71, L85, L7D4, L7D5	RESISTOR, CARBON FILM 1/4W 1.5K ohm 5%	51ORD25PJ152X	054152	11
R7A9, 7C2, 798	RESISTOR. CARBON FILM 1/4W 15K ohm 5%	510RD25PJ153X	054153	3
R7A3, 7A4, 7B5, 7B6, 7C7, 7C8, 721L, 721R, 722L, 722R, 723L, 723R	RESISTOR, CARBON FILM 1/4W 150K ohm 5%	51ORD2SPJ154X	054154	12

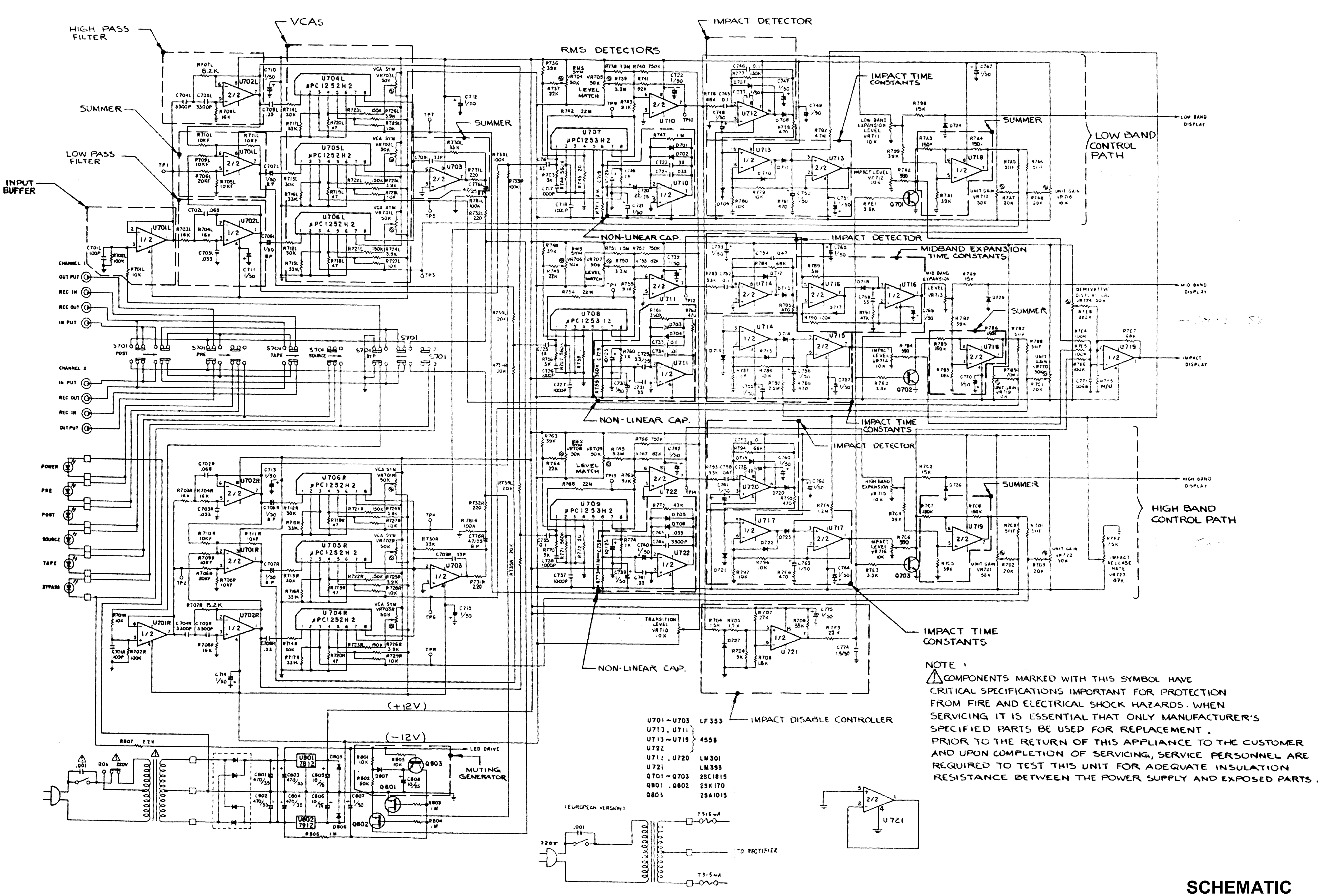
REFERENCE DESIGNATION	DESCRIPTION	PRODUCT CODE	DBX P/N	QTY.
R751	RESISTOR, CARBON FILM 1/4W 1.5M ohm 5%	51ORD2SPJISSX	054155	1
RL02, L14, L24, L36, L46, L58, L68, L77	RESISTOR, CARBON FILM 1/4W 1.6K ohm 5%	51ORD25PJ162X	054162	8
R703L, 703R, 704L, 704R, 708L, 708R	RESISTOR, CARBON FILM 1/4W 16K ohm 5%	SIORD2SPJ163X	054163	6
RL75	RESISTOR, CARBON FILM 1/4W 160K ohm 5%	21ORD25PJ164X	054164	1
R7D8	RESISTOR, CARBON FILM 1/4W 1.8K ohm 5%	51ORD25PJ182X	054182	1
RL03, L15, L25, L37, L47, L59, L69, L78	RESISTOR, CARBON FILM 1/4W 18K ohm 5%	51ORD25PJ183X	054183	8
R745, 758, 772	RESISTOR, CARBON FILM 1/4W 20 ohm 5%	51ORD25PJ200X	054200	3
RL08, L18, L30, L40, L52, L62	RESISTOR, CARBON FILM 1/4W 2K ohm 5%	51ORD2SPJ202X	054202	6
R7A7, 7A8, 7B9, 7C1, 7D2, 7D3, 734L, 734R, 735L, 735R	RESISTOR, CARBON FILM 1/4W 20K ohm 5%	SIORD2SPJ203X	054203	10
R7F1	RESISTOR, CARBON FILM 1/4W 2M ohm 5%	51ORD2SPJ205X	054205	1
R731L, 731R, 732L, 732R	RESISTOR, CARBON FILM 1/4W 220 ohm 5%	51ORD25PJ221X	054221	4
R807	RESISTOR, CARBON FILM 1/4W 2.2K ohm 5%	51ORD25PJ222X	054222	1
R7F3, 737. 749, 764	RESISTOR, CARBON FILE 1/4W 22K ohm 5%	SIORD25PJ223X	054223	4
R7E8	RESISTOR, CARBON FILM 1/4W 220K ohm 5%	51ORD25PJ224X	054224	1
R792	RESISTOR, CARBON FILM 1/4W 2.2M ohm 5%	51ORD25PJ225X	054225	1
R7D7	RESISTOR, CARBON FILM 1/4W 27K ohm 5%	51ORD2SPJ273X	054273	1
RL09, L19, L20. L31. L41, L42, L53, L63, L64, L72, L73. L74, 7C3, 7D6, 756, 770	RESISTOR, CARBON FILM 1/4W 3K ohm 5%	51ORD25PJ302X	054302	16
R712L, 712R, 713L, 713R, 714L, 714R, 802	RESISTOR, CARBON FILM 1/4W 30K ohm 5%	SIORD25PJ303X	054303	7
RL04, L16, L26, L38, L48, L60	RESISTOR, CARBON FILM 1/4W 330 ohm 5%	SIORD2SPJ331X	054331	6
R7E1-7E3	RESISTOR, CARBON FILM 1/4W 3.3K ohm 5%	51ORD25PJ332X	054332	3
R7D9, 730L, 730R, 783, 793	RESISTOR, CARBON FILM 1/4W 33K ohm 5%	51ORD2SPJ333X	054333	5
R759	RESISTOR, CARBON FILM 1/4W 360K ohm 5%	51ORD25PJ364X	054361	1
R7A2, 7B4, 7C6	RESISTOR, CARBON FILM 1/4W 390 ohm 5%	51ORD2SPJ391X	054391	3
R724L, 724R, 725L, 725R, 726L, 726R	RESISTOR, CARBON FILM 1/4W 3.9K ohm 5%	51ORD25PJ392X	054392	6
R7A1, 7B2, 7B3, 7C4, 7C5, 736, 748, 763, 799	RESISTOR, CARBON FILM 1/4W 39K ohm 5%	51ORD2SPJ393X	054393	9

REFERENCE DESIGNATION	DESCRIPTION	PRODUCT CODE	DBX P/N	QTY.
R761	RESISTOR, CARBON FILM 1/4W 390K ohm 5%	51ORD2SPJ394X	054394	1
RL22, L44, L66	RESISTOR, CARBON FILM 1/4W 430K ohm 5%	SIORD25PJ434X	054434	3
718L, 718R, 719L. 719R, 720L, 72OR	RESISTOR, CARBON FILM 1/4W 47 ohm 5%	51ORD2SPJ470X	054470	6
R7F6, 762, 778, 781, 785, 788, 795	RESISTOR, CARBON FILM 1/4W 470 ohm 5%	51ORD2SPJ471X	054471	7
RL11, L12, L33, L34, L55, L56	RESISTOR, CARBON FILM 1/4W 4.7K ohm 5%	51ORD2SPJ472X	054472	6
R707L, 707R, 775, 791	RESISTOR, CARBON FILM 1/4W 47K ohm 5%	51ORD2SPJ473X	054473	4
RL10, L32, L54	RESISTOR, CARBON FILM 1/4W 470K ohm 5%	51ORD2SPJ474X	054474	3
R744, 757, 771	RESISTOR, CARBON FILM 1/4W 560K ohm 5%	51ORD25PJ564X	054564	3
RL21, L43, L65	RESISTOR, CARBON FILM 1/4W 6.2K ohm 5%	51ORD25PJ622X	054622	3
R7E7, 776, 784, 794	RESISTOR, CARBON FILM 1/4W 68K ohm 5%	51ORD25PJ683X	054683	4
RL05, L17, L27, L39, L49, L61, L79-L84	RESISTOR, CARBON FILM 1/4W 750 ohm 5%	51ORD25PJ751X	054751	12
R7F2	RESISTOR, CARBON FILM 1/4W 7.5K ohm 5%	51ORD25PJ752X	054752	1
R740, 752, 766	RESISTOR, CARBON FILM 1/4W 750K ohm 5%	51ORD2SPJ754X	054754	3
R741, 753, 767	RESISTOR, CARBON FILM 1/4W 82K ohm 5%	SIORD25PJ823X	054823	3
R743, 755, 769	RESISTOR, CARBON FILM 1/4W 9.1K ohm 5%	SIORD25PJ912X	054912	3
R742, 754, 768	RESISTOR, METAL OR CARBON FILM 1/4W 22M 5%	SIDRGQANJ226K	054226	3
R789	RESISTOR, METAL OR CARBON FILM 1/4W 3M 5%	510RCQANJ305K	054305	1
R738, 739, 750, 765	RESISTOR, METAL OR CARBON FILM 1/4W 3.3M 5%	SIORGQANJ335K	054335	4
R782	RESISTOR, METAL OR CARBON FILM 1/4W 4.7M 5%	51ORGQANJ475K	054475	1
VR723	TRIM POT 47KB H1022C	51ORPBNB47301	070115	1
VR701L, 701R, 702L, 702R, 703L, 703R, 704-709, 717-722, 724	TRIM POT 50K 1/2W TM8K	51ORPJNB50309	070068	19
R715L, 715R, 716L, 716R, 717L, 717R	RESISTOR, METAL FILM 1/4W 33.0 ohm 1% OR 33.2 ohm 1%	510RQBCF0330X	013329	6
R705L, 705R, 709L, 709R, 710L 710R 711L, 711R	RESISTOR, METAL FILM 1/4W 10.0K 1%	510RQSCF1002X	011002	8
R706L, 706R	RESISTOR, METAL FILM 1/4W 20K 1%	510RQBCF2002X	012002	2
R7A5, 7A6, 7B7, 7B8, 7C9, 7D1	RESISTOR, METAL FILM 1/4W 511 1%	510RQBCFSIIOX	015110	6
VR710	ROTARY POT (FRONT PANEL) SINGLE SELECTION 10K-B 16M/M 1AX-1G	51ORVNA103B31	(170283	1
VR711, 712	ROTARY POT (FRONT PANEL) TRIPLE SELECTION 10K-B 16M/M 1AX-2G K164B0	SIORVSA103B01	070284	2
S701	PUSH BUTTON SWITCH ASSEMBLY	5105POSYFXO2A	250094	1
ZZ704	NYLON SHOULDER WASHER	510VF164DNO03	310443	2

REFERENCE DESIGNATION	DESCRIPTION	PRODUCT CODE	DBX P/N	QTY.
ZZ703	THERMALLY CONDUCTIVE TRANSISTOR INSULATOR	510VS223RH002	310417	2
	WIRE JUMPER, 22 AWG, YELLOW		310184	A/R
	WIRE JUMPER, 22 AWG, GREEN		310183	A/R
	WIRE JUMPER, 22 AWG, BLUE		310185	A/R
	WIRE JUMPER, 22 AWG, GREY		310188	A/R
	WIRE JUMPER, 22 AWG, WHITE		310180	A/R
	WIRE JUMPER, 22 AWG, BLACK		310181	A/R
	WIRE JUMPER, 22 AWG, ORANGE		310187	A/R
	WIRE JUMPER, 22 AWG, RED		310182	A/R
	WIRE JUMPER, 22 AWG, BROWN		310186	A/R
	WIRE JUMPER, 22 AWG, VIOLET		310189	A/R
	SHIELDED WIRE, 2 CONDUCTOR	51OWWX845JXJJ	320121	A/R
CN704	LED WIRING JUNCTION JACK (8 PIN)	SIOYJFOBS028Z	280222	1
CN701-703	LED WIRING JUNCTION JACK (10 PIN)	510YJPIOS044Z	280223	3
CN705-706	LED WIRING JUNCTION JACK (6 PIN)	510YJFO6S035Z	280224	2
J701-704	RCA (PIN) DUAL JACK	510YJP02S026U	280232	4
Y801	CONNECTOR CORD ASSEMBLY	510ACCNL76ULA	320042	1
Y802	CONNECTOR CORD ASSEMBLY	SIOACCNL77ULA	320043	1
Y803	CONNECTOR CORD ASSEMBLY	510ACCNL78ULA	320044	1
Y804	CONNECTOR CORD ASSEMBLY	510ACCNL79ULA	320045	1
Y805	CONNECTOR CORD ASSEMBLY	510ACCNL8OULA	320046	1
Y806	CONNECTOR CORD ASSEMBLY	510ACCNL81ULA	320047	1
	LED LN222RP, RED	510QLBLN222RN	140202	30
	LED LN422YP, YELLOW	510QLBLN422YN	140203	18
	LED CASE	510VB721SW002	210217	4

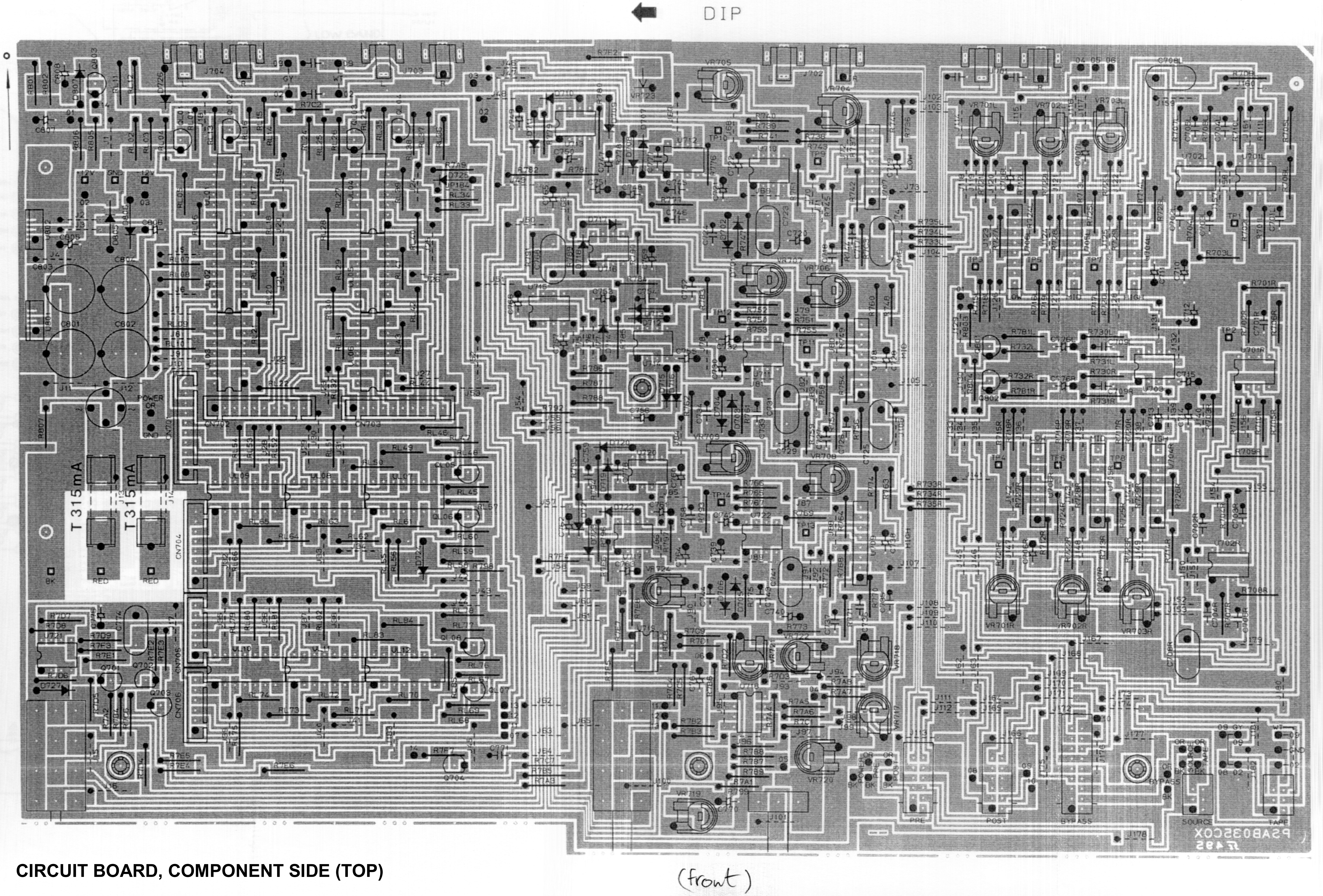
MODEL 3BX III MAIN ASSEMBLY

REFERENCE DESIGNATION	DESCRIPTION	PRODUCT CODE	DBX PM	QTY
1-A	ESCUTCHEON	510ME9SEAA024	290693	1
1-B	BUTTON/LED GUIDE	510VF132SBOO4	210213	6
2, 3, 4	VR KNOB ASSEMBLY	510AVKNOB*175	380211	3
B15	PAN HEAD RIVET M3 x 4.5 QCK NYLON-B	510BRP3045QNB	310467	8
B14	THIN HEAD RIVET M2.4 x 5.5 STD AL	510BRU2455XAJ	310648	2
B2	BIND HEAD SCREW(+) M3 x 12 S-ZMC	510BSPB3012NZ	310649	4
B1	BIND HEAD SCREW(+) M4 x 10 S-BLK	510BSPB401ONB	310650	6
B4-6	BIND T.T. SCREW(+) M3 x 5 S-BLK S-T	510BTPBOO5ONB	310651	7
B7-12	BIND T.T. SCREW(+) M3 x 5 S-ZMC S-T	510BTP83005TZ	310437	13
B3	FLAT T.T. SCREW(+) M3 x 5 S-ZMC S-T	510BTPS3005TZ	310653	2
B16	FLAT L WASHER M3 x 7 x 0.5T S-NI	510BWM30705SN	310654	2
B17	IT LOCK WASHER M3 x 6.5 x 0.5T S-BLK	510BWU30655SB	310655	1
B13	IT WASHER M4 x 8.5 x 0.5T S-BLK	510BWU40855SB	310656	2
6	REAR PANEL	510MB951SE010	290695	1
17	BRACKET SW A	51OML464SLOOI	290696	1
16	BRACKET SWITCH 2255095 RB0010-011	51OML544SDO04	290554	1
19	COVER SWITCH	510MS625AA002	290698	1
5	CHASSIS	510MU984SLOO1	290699	
8	COVER	510MU985SM001	290700	1
20	SERIAL NUMBER PLATE	510MVSSX10**1	290701	1
22	FOOT BASE ONLY	51ONBR9227577	380217	4
22	FOOT CUSHION ONLY	51ONBR2675132	380217	4
12	VOLUME CONTROL BUSHING	510VF177DBOO1	210219	3
15	POWER SWITCH BUTTON EXTENDER	510VK321SBOOI	210097	1
11	PUSH KNOB	510VN220SH004	210221	6
27	SPONGE SPACER	510VS336RF001	210222	3
25	SHEET TRANS	510VS667X8001	310664	1
B18	WASHER A4	510VS704VF002	310659	2
18	LED PCB HOLDER	510VS74ISBOO1	210230	1
AC01	AC CORD ASSEMBLY (UL/CSA AND PX UNITS ONLY)	510ACAC029ULA	320087	1
AC01	AC CORD ASSEMBLY (EUROPEAN UNITS ONLY)	510ACAC171EEA	320133	1
col	CAPACITOR CERAMIC 1000pF RAD AC 125V OR 4700pF UL/CSA	51OCKDU102KBM	121539	1
LD01, LD04	LED LN222RP RED	510QLBLN222RN	140202	2
LD02, 03, 05, 06	LED LN322GP GREEN	510QLBLN322GN	140204	4
SW1	POWER SWITCH (UL/CSA AND PX UNITS ONLY)	510SPO1AAW02A	250072	1
sol	VOLTAGE SELECTOR SWITCH HSW0573-01-310 (UL/CSA AND PX UNITS ONLY)	51OSS010226AJ	250096	1
PT1	POWER TRANSFORMER (110/220V, UL/CSA AND PX UNITS ONLY)	510TPL41U001K	230035	1
ACB1	POWER CORD BUSHING SR3P-4 (UL/CSA AND PX UNITS ONLY)	510VM27ONBOO1	310403	1
ACB1	POWER CORD BUSHING (EUROPEAN UNITS ONLY)	510VM27ONBOO4	310469	1
ZZ1	SOLDERLESS CONNECTOR CE-230 (UL/CSA AND PX UNITS ONLY)	510ZZZ0000154	280089	1
PT1	POWER TRANSFORMER (220V EUROPEAN UNITS ONLY)	510TPL415001K	230036	1
SW1	POWER SWITCH (EUROPEAN UNITS ONLY)	510SPO1AASI7N	250073	1
	POWER SWITCH COVER (EUROPEAN UNITS ONLY)	510VB443SBOOI	210091	1
	RACK MOUNT ADAPTOR	51OML543AA003	290703	2

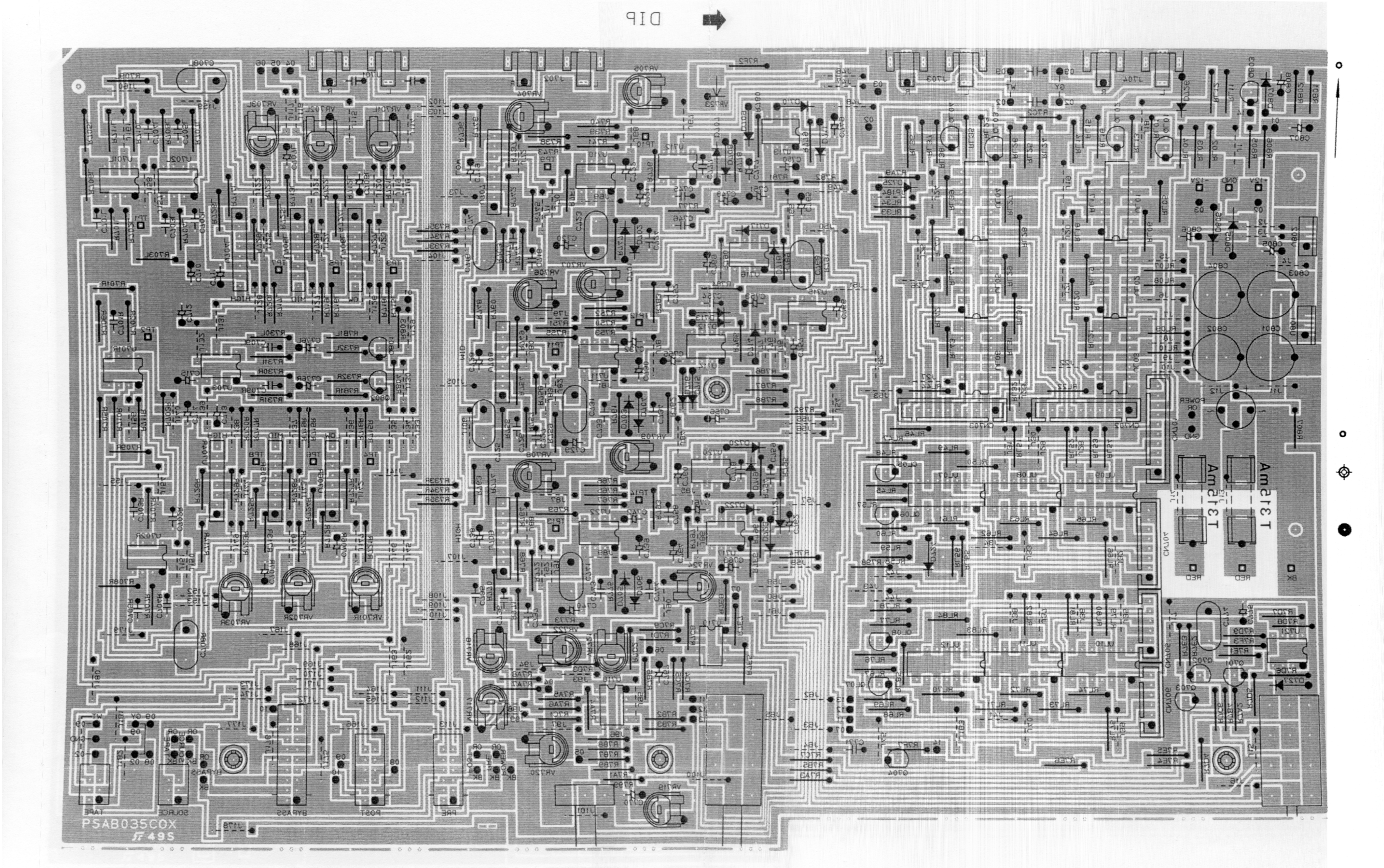


HIGH PASS FILTER
VCAs
IMPACT DETECTOR
RMS DETECTORS
IMPACT TIME CONSTANTS
SUMMER
LOW PASS FILTER
INPUT BUFFER
SUMMER
LOW BAND CONTROL PATH
NON-LINEAR CAP.
IMPACT DETECTOR
MIDBAND EXPANSION TIME CONSTANTS
SUMMER
NON-LINEAR CAP.
IMPACT TIME CONSTANTS
IMPACT DETECTOR
SUMMER
HIGH BAND CONTROL PATH
IMPACT TIME CONSTANTS
NON-LINEAR CAP.
(+12V)
(−12V)
MUTING GENERATOR
IMPACT DISABLE CONTROLLER
U701~U703 LF353
U713, U711
U713~U719 4558
U722
U712, U720 LM301
U721 LM393
Q701~Q703 2SC1815
Q801, Q802 2SK170
Q803 2SA1015
(EUROPEAN VERSION)
TO RECTIFIER
NOTE :
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.

SCHEMATIC

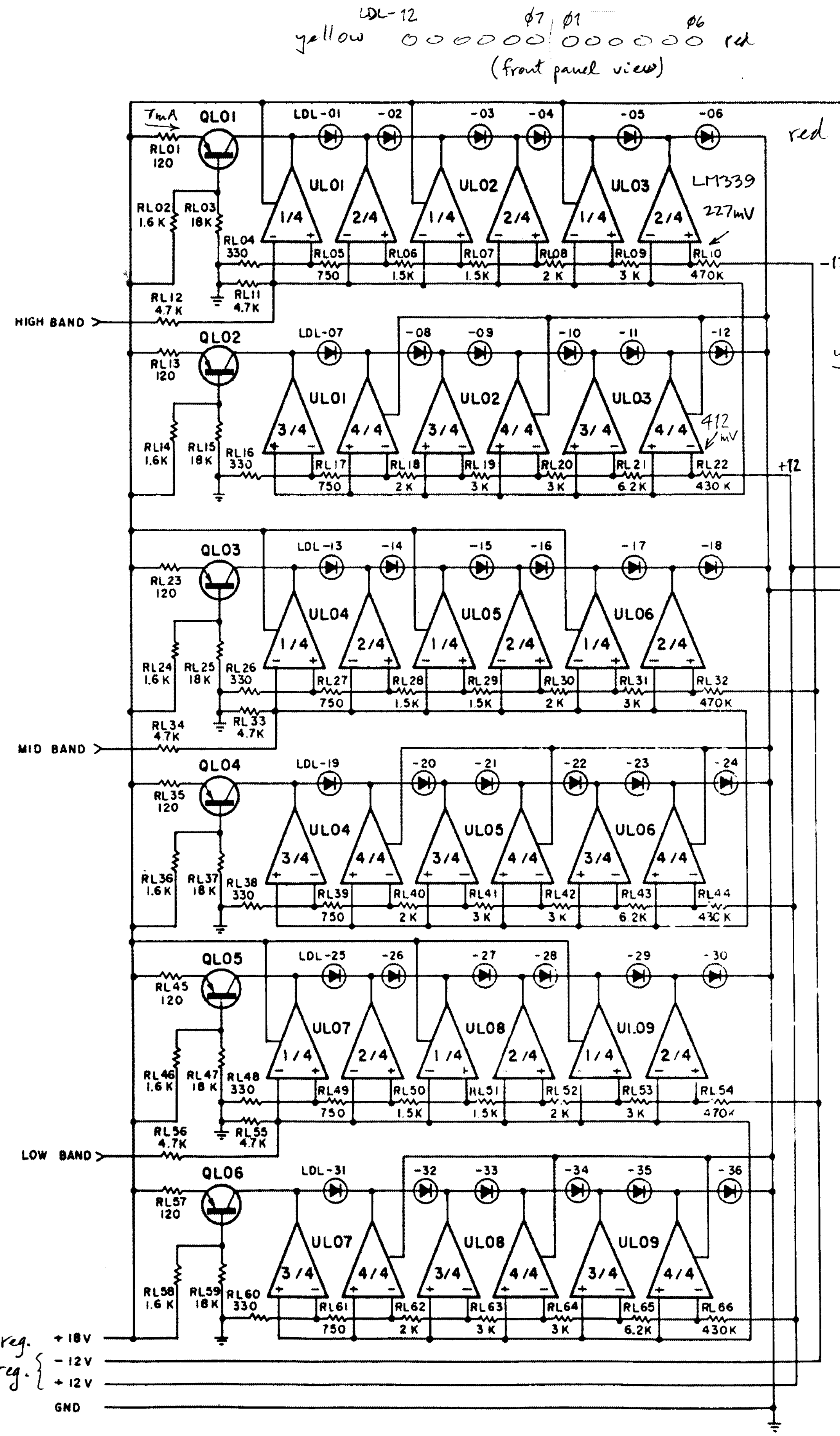


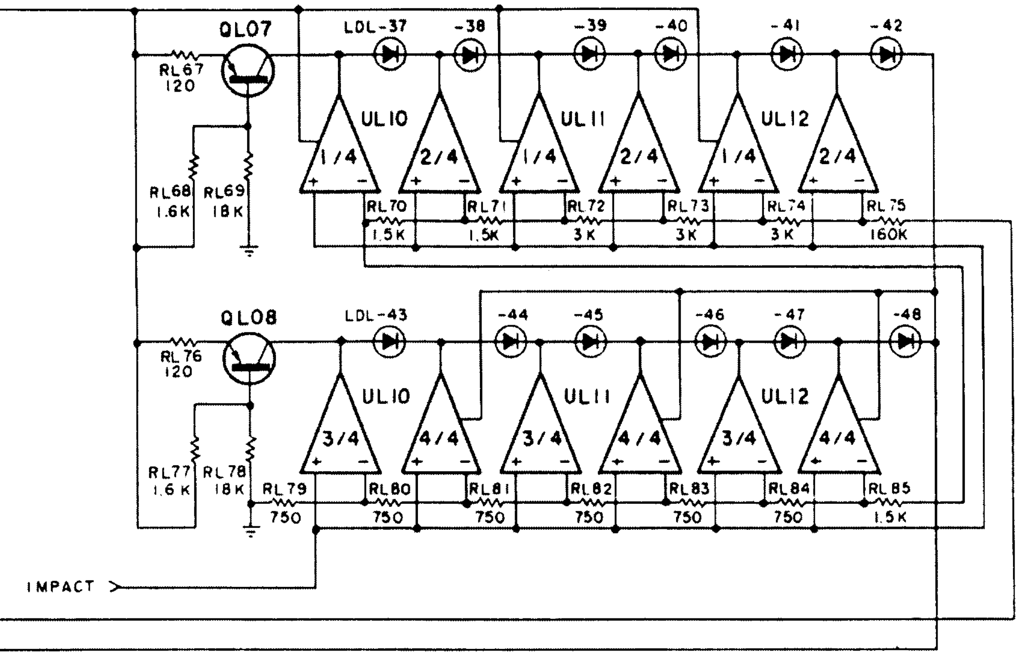
CIRCUIT BOARD, COMPONENT SIDE (TOP)



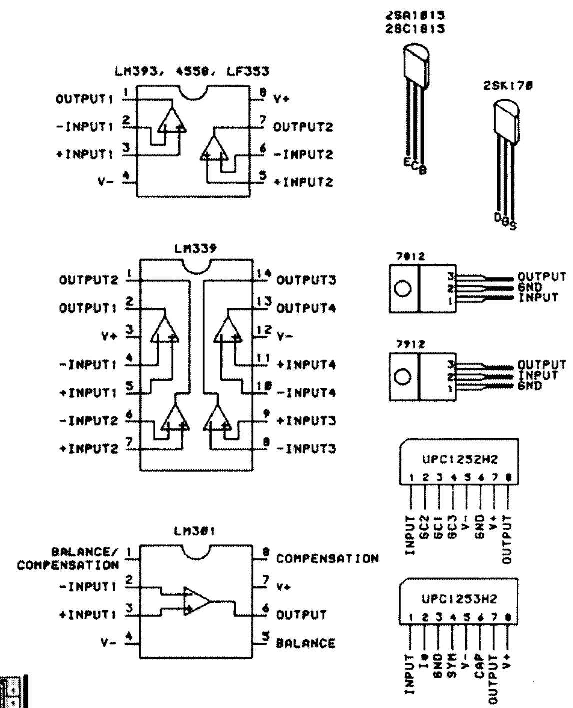
CIRCUIT BOARD, NON-COMPONENT SIDE (BOTTOM)

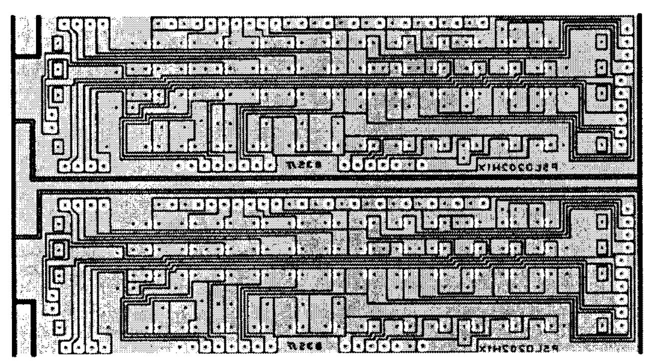
LED SCHEMATIC, PCB, PINOUTS



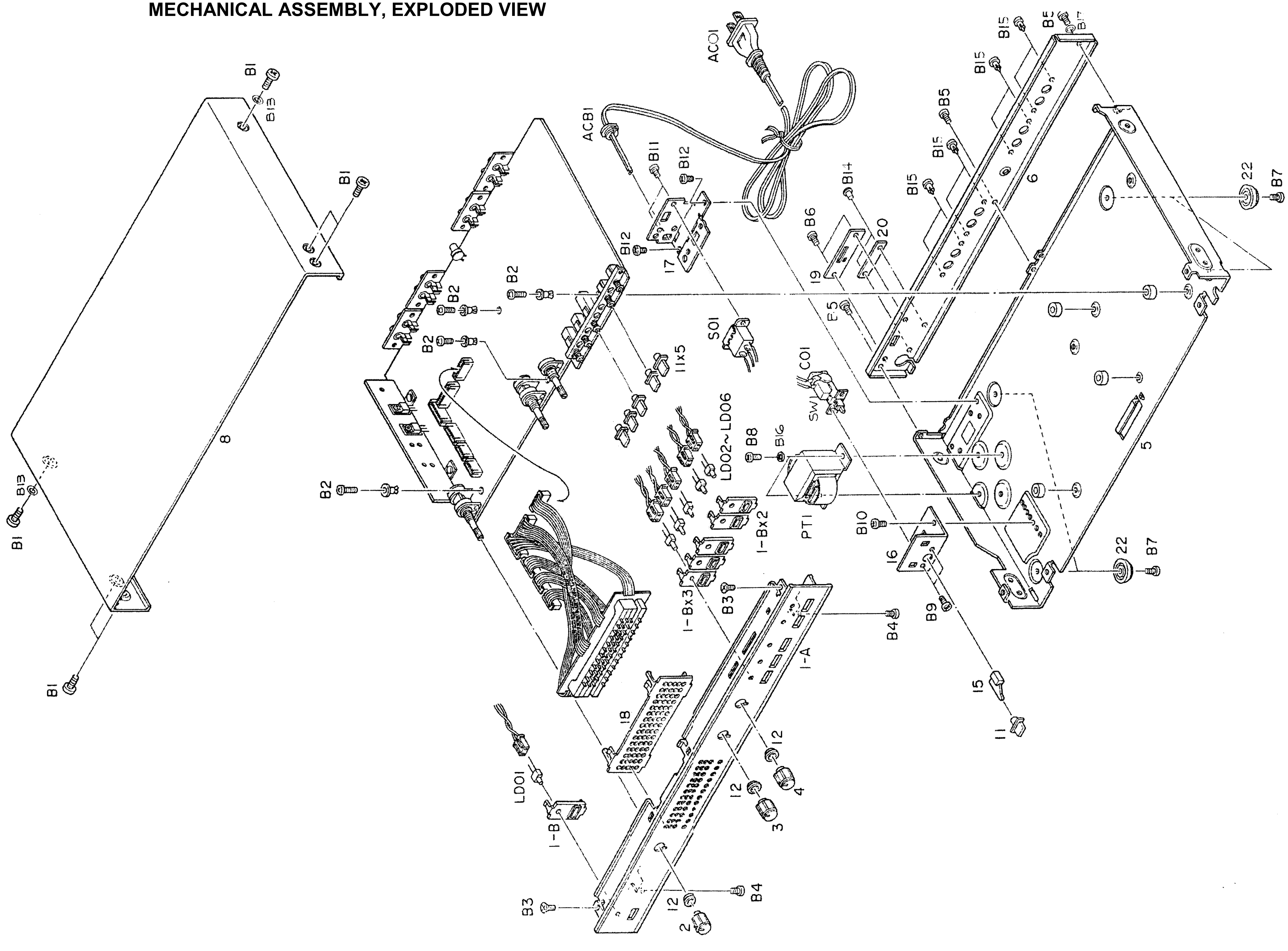


UL01 ~ UL12	LM339
QL01 ~ QL08	2SA1020
LDL01 ~ LDL12	HIGH BAND LED
LDL13 ~ LDL24	MID BAND LED
LDL25 ~ LDL36	LOW BAND LED
LDL37 ~ LDL48	IMPACT LED





MECHANICAL ASSEMBLY, EXPLODED VIEW



NOTES

Miscellaneous notes on servicing the dbx 3bx III Audio Expander
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Removing the control knobs

Remove the case top.
Unplug the 5 LED connectors from the right hand side of the front panel.
Using a 1.5mm hex ball driver, untighten the Allen screws holding each knob to the shafts.
(Note: for the right-most knob, you’ll need to align the grub screw with the hole in the metal shield surrounding the pot shaft.)
Pull the knobs out from the front panel, taking care not to lose the plastic ‘grommet’.

Audible hum

If the unit produces audible hum in the output, it’s likely that some of the power supply filter capacitors have dried out or leaked. It is recommended you replace all 4 capacitors, even if some seem OK, since they’re all of a similar age and likely to go the same way if not already. You’ll need 4 capacitors 470uF/35V with radial leads on 5mm pitch. If any of the capacitors have leaked electrolyte, take care to clean all traces of corrosion from the PCB and its components. A mild ammonia solution will assist in dissolving copper sulphate (blueish) residues, followed by distilled water washing and thorough drying.

Daniel Ford
15 January 2006

NOTES

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Printed in USA