

**BEFORE PROCEEDING WITH COMPLETE UNPACKING AND SETUP
PLEASE READ THE SECTION ON UNPACKING AND INSPECTION**



**UREI
ELECTRONIC
PRODUCTS**

**model 7510B
AUTOMATIC MICROPHONE MIXER**

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Section One Introduction

1.1 Preface

Thank you for purchasing this JBL/UREI product. We have prepared this instruction manual to enable you to achieve optimum utility and performance from your new Automatic Microphone Mixer. We encourage you to read and to make use of the material contained in this manual. We welcome your suggestions and comments on our products and on this manual.

This manual is dedicated to all the people who are interested in learning about the capabilities and limitations of our products in order to best use them. Learn, Enjoy and Share.

1.2 Unpacking and Inspection

Your new JBL/UREI Automatic Microphone Mixer was carefully packed at the factory, and the container was designed to protect the unit during shipment. Nevertheless, we recommend careful examination of the shipping carton and its contents for any sign of physical damage which may have occurred in transit.

If damage is evident, do not destroy any of the packing material or the carton, and immediately notify the carrier of a possible claim for damage. Damage claims must be made by you.

The shipping carton should contain:

The JBL/UREI Model 7510B Automatic Microphone Mixer

This Instruction Manual

An envelope containing Rack Mounting Hardware

If you have purchased extra 7510-03 Input Expander Assemblies, they are separately packed.

1.3 About this Manual

The diagrams and information on the following two pages provide an overview of the controls, indicators and connectors of the Model 7510B Automatic Microphone Mixer. Additional detailed information follows in the Installation, Operating Instructions, and Theory of Operation sections.

Note: In this manual, unless otherwise specified, 0 dBu is equivalent to 0.775 volts and 0 dBm is one milliwatt in a circuit with a load impedance of 600 ohms.

1.4 Front Panel

A. Input Gain Control

Adjust to compensate for different volume level from different talkers, microphones and source-to-microphone distances.

B. Release

Screwdriver adjust trimpot. Adjusts the time delay before an active channel is turned OFF. Fastest release is full CCW. Turn the control CW to avoid channel turn-off between words.

C. Threshold

Screwdriver adjust trimpot. Sets the level of signal required to turn ON the input in Automatic or Priority modes. The most sensitive position is with the control set full CW. Turn the control CCW to reduce the sensitivity (increase the threshold level) of the channel. Note that the threshold is also affected by the input gain control which should be set first for mix balance.

D. Channel On LED

Turns on whenever the channel is active. An excellent tool for checking for marginal settings of threshold and release controls.

E. Mode Switch

Select ON to defeat the Auto Mix function. The channel will always be live.

Select AUTO to choose the Auto Mix function. A channel will turn ON when its input exceeds the threshold level.

Select PRIORITY to choose Priority function. The channel will turn ON under the same conditions as in AUTO mode, but will simultaneously turn OFF all inputs which are live and in the AUTO mode. No other inputs which are in the AUTO mode may turn ON while a PRIORITY input is live. Do not select more than one or two inputs to be in PRIORITY mode. PRIORITY mode allows one input to take control of the mixer. Too many PRIORITY channels defeats this purpose. PRIORITY mode does not affect channels which have been placed in the ON mode.

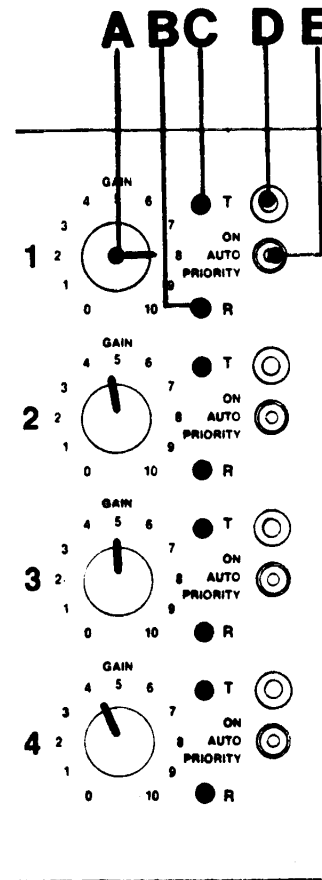


Figure 1 The Front Panel-Input Section

F. Master Gain

This is the normal Master mix control. It controls output level from the Main Output.

G. Background Threshold Control

At full CCW click position the threshold for turning ON an individual channel is fixed, and is set only by the threshold circuit of that individual channel. In any other position of the Background Threshold control, the threshold varies according to the amount of signal sensed from all of the microphones in the system. As the "background" level rises, so does the threshold for turning ON a channel. CW rotation of the control increases the amount by which an individual channel input level must exceed the "background" before it will turn ON.

H. Output Meter

0 VU is calibrated to +4 dBm at the Main Output.

L. Power LED**J. Voltage Test Point**

For adjustment of background preset voltage and offset. See Section 2.4.4.

K. RT1-Background Preset trimpot.

See Section 2.4.4.

L. RT2-Background Offset trimpot.

See Section 2.4.4.

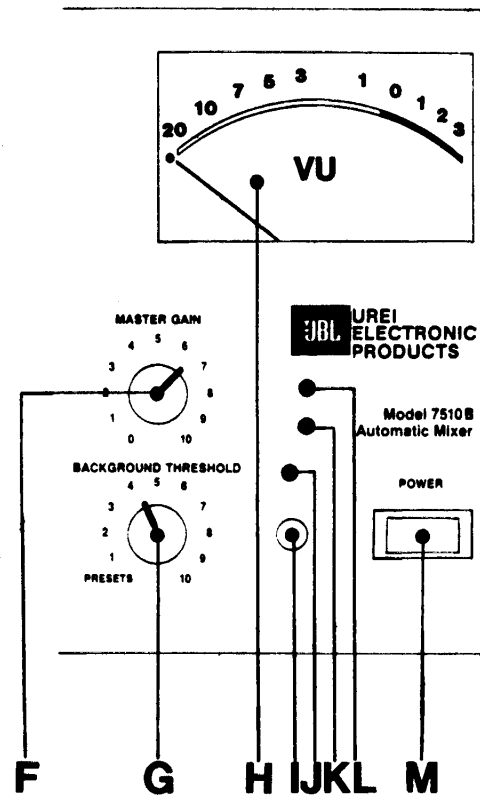
M. Power Switch

Figure 2 The Front Panel - Output Section

1.5 Rear Panel

A. Main Output

Three pin XL style connector. Pin 1 is ground, pin 3 is "+" and pin 2 is "-" side of the floating output. The signal level from this connector is controlled by the front panel Master Gain control.

B. Auxiliary Input

A 10 kohm input on a 3-conductor phone jack may be wired either of two ways. Shield is ground. An input wired to the tip contact returns signal to a summing amplifier under control of the NOM circuit. Level, therefore, varies with the number of active inputs. An input wired to the ring contact brings signal to another summing amplifier just prior to the Master Gain control. The level does not vary with the number of active inputs.

C. Auxiliary Output

This is a low impedance output prior to the Master Gain control. Minimum load impedance is 2 kohm.

D. Interface Connector

This 15 pin connector is for interconnecting two 7510B mainframes. See Page 10

E. Phantom Power Switch

Turn the switch ON to supply +48 VDC Phantom Power to all inputs.

F. Voltage Change Switch And AC Cord

You can choose the "115" position of the AC switch, and connect the cord to a 120 VAC, 60 Hz, grounded power source, or you may choose the "230" position of the AC switch, and connect the cord to a 240 VAC, 50/60 Hz, grounded power source.

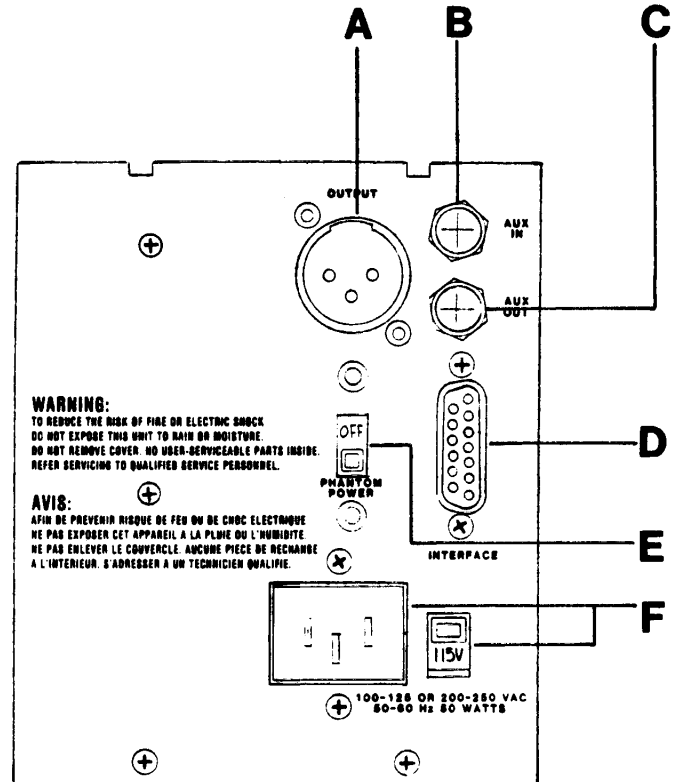


Figure 3 - The Rear Panel - Output Section

G. Input Connector

This is a 12 pin connector which serves all four inputs on a 7510-03 Input Assembly. Strip the wires, insert into the holes as indicated by the rear panel silkscreen and tighten the screws. The connector is a two-piece style which may be disconnected from the Input Assembly for ease of wiring. See Input Connections on Page 6.

H. Direct Output/Patch Point

A 600 ohm nominal +4 dBu output is on the tip of the 3-conductor phone jack, return to the summing buss of the 7510B is on the ring and ground is on the sleeve. The output follows the circuit that turns the channel ON. See Direct Outputs on Page 9.

I. Remote Control Connector

The gain of each of the input preamplifiers may be changed by replacing the wire jumpers in the 15 pin connector with resistors as discussed in Preamp Gain Adjust on Page 7. A switch closure to ground upon activation of any input is also available to drive external logic circuitry. See Wiring of Logic Circuits on Page 7.

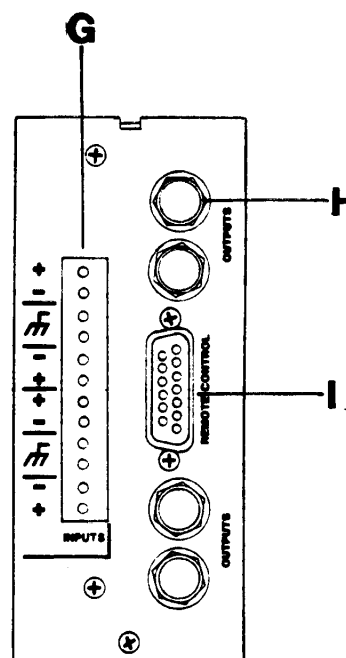


Figure 4 The Rear Panel - Input Section

Section Two Installation

2.1 General

The following section contains installation and setup information. It is written in a step-by-step procedure with minimal reference to other areas of the manual. Supplemental Information which may be of use to you in the Installation and Setup phase follows immediately thereafter.

IMPORTANT--If you have never installed, set up or operated a Model 7510, 7510A or 7510B Automatic Mixer, please read the short section on the Theory of Operation before continuing. Most installation and operating problems arise because of an incomplete or incorrect understanding of how this product works. This understanding is very important to your ability to obtain the best performance from this Automatic Mic Mixer.

WARNING: In many cases, installation of the 7510B Automatic Microphone Mixer involves opening the unit to gain access to internal circuit components. Since dangerous AC voltages may exist inside the unit, caution must be exercised. These instructions are intended for use by qualified personnel only.

2.2 Installation

2.2.1. Check that the AC Line Voltage at your installation is correct for the Mixer. Look at the position of the Voltage Change Switch on the rear panel and a tag on the AC power cord which identify the AC mains voltage for which your unit is wired. The 7510B can be powered from either 100 to 120 VAC or 200 to

240 VAC, 50 or 60 Hz mains. The Supply Voltage Select Switch on the rear panel converts the unit from one operating range to the other.

As shipped, the unit is set for 100 to 120 VAC operation, and the line cord provided is suitable for use in the U.S. or Canada. To convert the unit for operation with other mains voltages or outlet types, use the following procedure:

1. Be sure the 7510B is not connected to any power source.
2. Slide the Supply Voltage Select Switch to the appropriate range.
3. Install a suitable plug or adaptor to mate the existing line cord with the power receptacle. The 7510B line cord uses a standard IEC 320 style AC Power Connector on the chassis. A matching cordset with a NEMA 5-15P plug is supplied. Cordsets to match other AC Mains outlets are available worldwide.

Note: Any line cord or adaptor used for 200-240 Volt operation in the U.S. or Canada must be U.L. Listed or C.S.A. Certified. For 240 VAC, 50/60 Hz operation in other countries, select a line cord or adaptor based on governing local regulations.

Caution: This unit may be damaged if operated with the Supply Voltage Select Switch set incorrectly for the line voltage applied. Also, verify that the mains are AC since, in some countries as well as certain areas within the U.S., DC mains exist.

WARNING: A SIGNIFICANT FIRE AND SHOCK HAZARD MAY EXIST IF THE MIXER IS CONNECTED TO AN AC POWER SOURCE OTHER THAN THAT FOR WHICH IT IS RATED AND LABELLED.

2.2.2. If you have additional 7510-03 Input Expansion Assemblies to install, to increase the number of inputs above four, do it now. Follow the instructions enclosed with the 7510-03, or refer to Sections 2.4.3 and 2.4.4 of this manual.

2.2.3. Rack mount your Mixer with the enclosed rack mounting hardware. The Model 7510B Automatic Microphone Mixer will operate satisfactorily over a range of ambient temperatures from 0° C to +50° C (+32° F to +122° F), and up to 80% non-condensing relative humidity.

If the unit is installed in an equipment rack, console or other area along with high heat producing equipment (such as power amplifiers), adequate ventilation should be provided to assure longest component life. Also, while internal circuitry susceptible to hum pickup is sufficiently shielded from moderate electromagnetic fields, avoid mounting the unit immediately adjacent to large power transformers, motors etc.

Caution: The 7510B AC power cord should not be connected to the power receptacle until all wiring is completed. Also, any power amplifiers to which the Automatic Microphone Mixer may be connected should be turned OFF until all wiring and setup procedures have been completed.

2.2.4. Connect audio input and output wiring. The following discussions include a description of the whys, wherefores and how-to's of wiring the connectors.

Input Connections

The Input Connector is a 12 pin connector which serves all four inputs on a 7510-03 Input Assembly. It is quick and easy to wire, needing only wire strippers and a small screwdriver, and it is a reliable connector with gold contact material to eliminate oxidation or corrosion of the contact surfaces in long term fixed installations. If you have not seen this connector before, take a moment to examine it. You will notice that it is a two-piece connector which may be disconnected from the Input Assembly for ease of wiring. It is polarized, and the

latching mechanism is designed to make it easier to connect the two halves of the connector than to disconnect them. The wires are held in a device called a cage-clamp which does not require that the wires be tinned, although you may do that if you feel the need. The cage-clamp will accommodate a wire range of #14-#22 AWG. Strip the wires 1/4 inch, insert into the holes as indicated by the rear panel silkscreen, and tighten the screws.

The Model 7510B Automatic Mixer provides +48 volt DC Phantom Power for condenser microphones. Phantom Power gets its name from the fact that the DC voltage is invisible to any BALANCED microphone not specifically designed to use it. This includes most dynamic and ribbon microphones.. The Phantom Power may be turned ON by the Phantom Power Switch on the Output Assembly. Turning this switch ON supplies Phantom Power to all inputs except the auxiliary input located on the Output Assembly. Because of the nature of the phantom circuitry it is not possible to use unbalanced connections with the Phantom Power ON. **DO NOT ATTEMPT TO USE AN UNBALANCED SOURCE WHEN THE PHANTOM POWER SWITCH IS ON. SEVERE DAMAGE MAY OCCUR TO THE MICROPHONE (OR OTHER SOURCE) OR TO THE MIXER WHICH WILL NOT BE COVERED BY ANY MANUFACTURER'S WARRANTY.** Most microphones designed for Phantom Powering will operate from +48 volts, but if you have any doubts about the use of a specific microphone with the 7510B Mixer, consult the operating instructions for the microphone or, if necessary, its manufacturer.

If none of your inputs require Phantom Power make sure that the Phantom Power Switch on the Output Assembly is turned OFF.

If you wish to connect a Line level source to one of the inputs, but also need to supply Phantom Power to condenser microphones, make sure that the source will not be damaged by application of +48 volt DC. If the source is transformer balanced, that is fine. Otherwise you may need to install a DC blocking capacitor in series with the input line. The capacitor should have its positive lead connected to the input terminal of the 7510B and its negative lead connected to the source. A capacitor of 10 μ F/50V minimum rating should be used to avoid low frequency rolloff.

Pre-amp Gain Adjust

The Input Preamp gain may be externally adjusted for optimum signal-to-noise and headroom. As shipped from the factory the 15 pin connector on the rear panel of the Input Assembly includes four wire jumpers, one for each of the four input channels. These jumpers, which set the gain of the input preamp at 49 dB, may be removed and a resistor may be inserted in their place according to the values in Table 1 on the next page. Use only a good quality 1/8 or 1/4 watt carbon film or metal film resistor for best noise performance. Pin numbers for the connectors are shown in Figure 5.

Wiring of Logic Circuits from Remote Control Connector

Figure 5 shows the pin configuration for the Remote Control Connector on the rear panel of the Input Assembly. In addition to the Preamp Gain adjustments described in the previous section, the 7510B also provides a contact closure to ground when an input is activated. This contact closure, made through a CMOS gate can switch ± 5 volts with a maximum current of 10 milliamperes. Note that this is not a voltage source, just a contact closure for an external source.

Figure 6 shows several examples of circuits which could be used with this contact closure to activate relays, drive Series 7400 TTL logic, LEDs, switch loudspeakers OFF to provide additional Acoustic Gain, switch television cameras in a teleconferencing system etc.

Table 1

<u>Gain</u>	<u>Resistor</u>	<u>Gain</u>	<u>Resistor</u>
unity	open	28dB	220 ohm
4dB	10 kohm	29dB	200 ohm
7dB	4.7 kohm	31dB	150 ohm
9dB	3.3 kohm	34dB	100 ohm
10dB	2.7 kohm	37dB	62 ohm
13dB	1.6kohm	39dB	47 ohm
14dB	1.5 kohm	40dB	39 ohm
16dB	1.1 kohm	43dB	20 ohm
19dB	750 ohm	44dB	16 ohm
22dB	470 ohm	46dB	10 ohm
24dB	360 ohm	49dB	Jumper
25dB	330 ohm		

Figure 5 Remote Control Connector

Pin Number

- 1. Channel C (3) Audio Gain
- 2. Channel C (3) Logic Switch
- 3. Channel A (1) Logic Switch
- 4. Channel D (4) Logic Switch
- 5. Channel C (3) Logic Switch
- 6. Channel B (2) Logic Switch
- 7. Channel B (2) Audio Gain
- 8. Channel D (4) Audio Gain
- 9. Channel D (4) Audio Gain
- 10. Channel D (4) Audio Gain
- 11. Channel D (4) Audio Gain
- 12. Ground
- 13. Channel D (4) Audio Gain
- 14. Channel D (4) Audio Gain
- 15. Channel A (1) Audio Gain

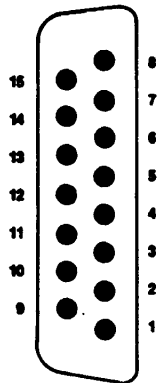
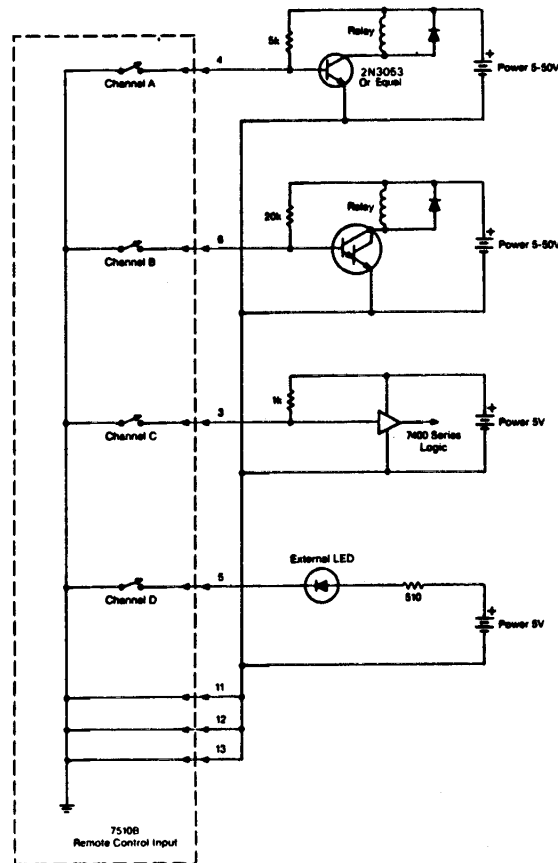


Figure 6 Logic Circuits



Direct Outputs

A direct output from each input channel is provided on a 1/4 inch phone jack located on the rear panel of the Input Assembly. An unbalanced 600 ohm source impedance, nominal +4 dBu (1.23 volt) signal is available between tip and sleeve of the three-conductor jack. The ring connection provides a 10 kohm input impedance return to the summing bus. The direct output follows the channel ON switching circuitry.

This is a patch point which can serve a variety of functions, depending on the job. A signal processing device, such as a compressor or equalizer could be inserted here. An isolated output to another mixer would allow the automatic turn on of individual channels, but allow the separate mixer to adjust gain, equalization etc.

It is possible to both feed the summing bus of the 7510B and take an isolated feed. This is done by connecting the tip and ring contacts of the plug together.

Auxiliary Input

The Auxiliary Input jack, located on the rear panel of the Output Assembly, is a three conductor phone jack which offers two methods of wiring a line level input into the 7510B which are not under control of the Automatic Mixing function. Wiring signal to tip of the connector and ground to the sleeve inserts the auxiliary input into the signal path at the same amplifier used for summing all other inputs. This is the amplifier under control of the Number of Open Microphones (NOM) circuit, and therefore the gain will change as different numbers of microphones are turned ON. At least one input must be turned ON for this signal to appear at the output of the mixer. Alternatively, the input may be wired signal to ring of the connector and ground to the

sleeve to insert the signal after the NOM gain change circuit. Both inputs are 10 kohm unbalanced input impedance.

Output Connections

The main output of the 7510B Automatic Mixer is on a three pin XL connector. Pin 1 is ground, pin 3 is (+) and pin 2 is the (-) side of the transformer balanced output. Because the output stage incorporates a transformer, it is important to remember that connection must be made to both (+) and (-) terminals of the output. The output will drive any load of 600 ohms or greater and does not normally require a termination resistor. If the 7510B is driving a long line (in excess of 30 meters [100 feet]) a 620 ohm termination resistor at the other end of the line from the 7510B, in combination with the use of balanced lines, will reduce the possibility of noise pickup in those lines.

An unbalanced low impedance auxiliary output is available at a 1/4 inch phone jack. Tip is signal and sleeve is ground. The auxiliary output is full mixed signal, controlled by the NOM circuit, but unaffected by the Master Gain control. It is primarily intended to feed a tape recorder without the need to " Y " the Main Output connection.

Linking Two Mainframes

Two 7510B Mainframes may be connected together to allow a maximum of 48 inputs to act as a single Automatic Mixer with common control of NOM, Priority, Background Threshold and audio. A cable must be constructed to link the two mainframes together at the Interface connectors on the Output Assemblies. This connection is not designed to be routed through long cable runs and relay contacts. The two mainframes which are connected together should remain connected together at all times. Both mixers operate as Masters, controlling all audio to their individual outputs except for the auxiliary input on the ring/sleeve connection which will only appear on the mixer to which it is wired. This may be useful in some installations. If you want this signal on both mixers, you must connect them individually. System audio may be taken from the output of either mixer, or the mixer outputs may be used to feed different areas of a facility with convenient front panel control of level to the two different areas. Note that the NOM circuit stops counting after 24 microphones and 13.8 dB of gain compensation. This should present no problems as the additional decrease required for 48 microphones would be only 3 dB additional, and it is extremely unlikely that more than 24 microphones would actually be ON at one time. Such a situation is referred to as pandemonium.

The mating connector is a 15 pin D-subminiature plug. Typical mating connectors would be TRW Cinch # DA15-P plug with DA-20961 Shell, Mouser ME152-5015 plug with ME152-4015 Hood or AMP 745207-3 plug with 206471-1 Cable clamp. The connectors in the 7510B are held in place with 4-40 screws. These may be replaced with jackscrews to allow a positive lock on the mating connector.

Table 2 gives the wiring connection for the interconnect cable. Note that the wiring is symmetrical, and that either connector may be plugged into either mixer. The cable should be constructed to be as short as reasonable to connect the two mixers.

Table 2
Mainframe Interconnect Cable Pinout

<u>Connector #1</u>		<u>Connector #2</u>		<u>Connector #1</u>		<u>Connector #2</u>
Pin 1	to	Pin 2		Pin 2	to	Pin 1
Pin 3	to	Pin 4		Pin 4	to	Pin 3
Pin 5	to	Pin 6		Pin 6	to	Pin 5
Pin 7	to	Pin 8		Pin 8	to	Pin 7
Pin 9	to	Pin 9		Pin 10	to	Pin 10
Pin 11	to	Pin 11		Pin 12	to	Pin 13
Pin 13	to	Pin 12		Pin 14	to	Pin 15
Pin 15	to	Pin 14				

In addition to the cable, the Background Threshold circuits must be adjusted to operate correctly with the additional inputs. This consists of adjusting the Background Threshold trimpots according to Section 2.4.4 with the two mixers linked together. The actual circuits operate independently, so it is important to align them exactly alike so that the two mixers act the same. When setting the Background Threshold control according to Section 2.3.4, you may find that the control runs out of range. This is due to the increased loading effects from additional modules. If this is found, resistor R63 on the Output Assembly may be changed from 300 ohms to 150 ohms. This will probably require removal of the Output Assembly. R63 is located at the front bottom of the printed circuit board assembly just in front of the Background Threshold control. If you wish, a second 300 ohm resistor may be tacked on in parallel with R63 instead of removing the original part. Following the adjustment of the Background Threshold control, the DC voltage at the Test Jack should be measured on both units, and the Background Threshold controls adjusted to make the voltages equal on both units.

System Mute

In some circumstances it may be necessary to Mute the entire system. A switch contact closure between pins 9 and 10 of the interface connector will cause the mixer to go into PRIORITY mode, turning OFF all inputs set to AUTO mode. Inputs in ON mode will remain ON and PRIORITY inputs will retain their ability to turn ON. This feature enables the individual in the PRIORITY position to shut off other microphones without having to continue talking to maintain PRIORITY mode. The installer may use either a momentary or maintained action switch as the installation dictates. We highly recommend that if such a switch is installed in the system, that it be very clearly labelled as to function, and that it have a very clear visual indicator of its actual position.

In some circumstances it may be necessary to completely mute all audio, as in a private conversation by attorneys and judge during a court session which is not for the record, or in a teleconference call where one location wishes to have a few moments for private discussion. It must be remembered in this context that the 7510B does not completely turn OFF any audio input. It turns it down 25 dB. This may be insufficient for the level of privacy required in some situations. The mute in this case would have to be handled by a circuit external to the 7510B.

2.3 Initial Turn-on and Trim adjustments

When all wiring has been completed the system may be turned on. Please be very careful during initial turn-on. Remember that the signal level will suddenly increase when a microphone channel is gated ON, and if you don't take care, that may lead to some nasty feedback.

If you have a mixer with more than four microphone inputs, and have not previously adjusted the Background Threshold trimpots, do it now following the procedure in Section 2.4.4.

Initially set all threshold trimpots to their full CW position. Set all release pots at full CCW rotation. Set the Background Threshold control to the full CCW clicked preset position. Set all input gain controls to minimum. Initially set the Master Gain control to #7. The individual channel mode switches should be turned to the ON position one at a time and the individual channel gain controls turned up as signal from each microphone is checked. The front panel LEDs indicate that a channel is ON. Check for signal from all inputs to all outputs. Do not initially concern yourself with the automatic functions of the mixer. Make sure that good quality audio is hapnin'.

If you have connected external circuitry to the logic lines, the circuitry may be checked by turning ON the channels with the MODE switch.

2.3.1 Gain setting

The optimum front panel gain setting on a 7510B would have all input gain controls at approximately the same setting. But, due to the use of different microphones, different talker volumes and different source-to-microphone distances, this goal is an ideal which will rarely be achieved. The purpose of the Input Gain controls is to adjust for exactly these differences, and to enable the audio mix to be balanced, with all inputs having similar signal level at the wiper of the mix control. Some variation in position of these controls will naturally occur as you adjust the system. Gross differences in actual setting should be compensated for by changing the gain of the input preamplifier. This will likely occur when mixing dynamic and condenser microphones in a system.

Many condenser microphones have a nominal output as much as 20 dB higher than dynamics. The input gain of the preamplifiers handling the condenser microphones should be turned down to so that the front panel Gain control settings roughly match those of the dynamic microphones (in any event the preamp gain should be adjusted for any input which has a control setting lower than #5). This accomplishes two things: it improves the input headroom of the condenser microphones, which they need, and it more closely matches the source levels for the Background Threshold circuit (more about that in the next section). The method of adjusting the gain of the channels is discussed in Preamp Gain Adjust on Page 7.

2.3.2 Threshold Adjust

Each channel has an individual screwdriver-adjust control to set threshold for that channel. Full clockwise rotation of the control is the most sensitive position. Turning the control counterclockwise makes the channel increasingly less sensitive and requires a louder sound at the input to cause channel turn-on. The starting point for adjustment is with the Gain control set to its operating point and the threshold trimmer set full clockwise rotation. Turn the control counterclockwise only so far as to prevent false triggering by sounds that are low level and should not turn the channel ON. Avoid turning the control too far as this may prevent the channel from turning ON as soon as it should. Note: if the control is turned fully counterclockwise the channel will be completely prevented from turning on. Watch the individual channel ON LED to see the actual turn-on/off. The 7510B should not have any noticeable "click" or "pop" at channel turn-on or turn-off.

2.3.3 Release Time Adjust

Each channel has an individual screwdriver-adjust control to set release time for that channel. Full counterclockwise rotation of the control is the fastest release. Turning the control clockwise increases the length of time that a channel will stay ON after the input signal level drops below threshold. Longer release

times prevent the channel from turning off between words in a sentence, or between musical notes. Release time adjustment is one of the more sensitive adjustments, partly because it depends to such a great extent on the type of program material and the environment. No hard and fast rules can be given for determining the correct adjustment. Your ears, and the ears of the end users will largely judge the "correctness" of the setting. Use of the channel ON LEDs will again aid in the setting of these controls, as you will be able to see the actual turn-off visually.

Ideally, the correct setting will be short enough to cut off fairly quickly after the signal stops, but not so quickly that it chops off the ends of words or musical notes. Typically systems used for music presentations will need longer release times, because musical notes fade away much more gradually than speech. Short release times are therefore more disturbing. That is not to say that all microphones in a given installation want the same release time. In a church the release time for pulpit and lectern microphones, which typically amplify speech, could easily be set to shorter release times than the microphones serving the choir which, in a reverberant church, might want to be set at several seconds.

Generally, error on the side of longer, rather than shorter, release time is the better choice. One possible exception to that rule is on a microphone which is in the priority mode, and is used to shut off a number of other microphones to establish order in a legislative body. If the release time is set too long it may be annoying to the participants who will not be able to have their microphones turn back on for several seconds after the person in the Priority mode has finished speaking.

2.3.4 Background Threshold Adjust

The last adjustment is for Background Threshold, and while it is a very good circuit (when correctly adjusted), it is not as straightforward a setup as those which have gone before. In fact, it may require some level of readjustment as you see exactly how the circuit responds in each system environment.

The Background Threshold circuit allows the Automatic Microphone Mixer to respond dynamically, in real time, to changes in the amount of sound that exists in the room. This response is to allow the turn-on threshold to "float" and to depend not just on what you as an installer have decided is the correct threshold, but to adjust the threshold up or down as the "noise" in the room changes. This is done by taking a sample of the audio signal from all microphones, turned on or not, amplifying it and using that varying level to set the comparator threshold for channel turn-on. This allows you to set the individual channel threshold controls to a sensitive position, knowing that a channel will not be false triggered by sounds which are picked up by multiple microphones. When the environment is quiet, a low level signal will cause channel turn-on. But when the environment becomes noisier, a higher level will be required to activate the channels. The Background Threshold control sets the ratio of background noise to the input threshold.

Ideally, the Background Threshold control should be set high enough that no microphones turn ON in the presence of the loudest expected background sound. However, the control should not be set higher than necessary as this will decrease the sensitivity of the inputs for program sound.

If you have a moment, and want to see the effect of this for yourself, perform the following experiment. Set up two similar microphones about three feet apart and set their gains to the same point. With the Background Threshold control in the preset, clicked position, talk into first one microphone, then the other while watching the channel LEDs on the 7510B. You can stand in front of one microphone and turn it ON by speaking. You can stand in front of the second microphone and turn it ON. And if you stand in the middle you can turn both ON (assuming you talk loud enough). Now, turn the Background Threshold control clockwise until no channel LEDs are lit. As you continue to advance the control, you will reach a point where you can get each microphone to turn ON when you speak into it individually, but, try as you may, you will not be able to get them both to turn ON together when you stand in the middle. Walk toward one microphone while speaking, and at some point it will turn ON. The distance will depend on the setting of the Background Threshold control. The circuit has decided that the signal which it sees in common is "noise," and that the input should not be turned on.

The actual adjustment of the Background Threshold control will involve some trial and error. Initially, it must be set at least far enough CW that all channel ON LEDs are extinguished. After that, using your knowledge of how the 7510B works, and your expectations of how the system should work, set up all of the microphones and see how the system works. Pay special attention to how the individual inputs trigger ON, and to how they respond when background noise is present in the room. If the threshold appears too sensitive, turn the Background Threshold control CW, if it is too insensitive, turn it CCW.

There are, of course, installations where the threshold of individual channels should not "float". An example is where the 7510B is being used in a situation where signal levels common to multiple microphones should activate the individual channels. The use of the 7510B to gate on footlight microphones in theatrical performance is one such application.

The Background Threshold circuitry, by its nature, does not like multiple microphones on the same source. Use of two microphones on a lectern for a single talker does not work unless the mics are premixed and then both presented to the 7510B as a single source. Similarly, wireless and lavalier microphones may require more care in the adjustment of the Background Threshold Control. Any situation in which multiple microphones can pick up the same program material should be very carefully checked. It is possible to fool the circuit. This would result in the microphones having an artificially high threshold, and possibly failing to turn ON. Choirs should be picked up by one microphone only, if possible. If channel triggering is being inhibited by the Background Threshold circuit there are several methods for resolving the problem: 1. Turn off the circuit by rotating the control to its CCW clicked position, 2. Desensitize the circuit by turning the control CCW from the current position, 3. Put the one important channel in Priority mode, 4. Re-adjust thresholds. Or a combination of these methods.

2.3.5 Priority Set

All inputs normally should be set to AUTO mode. In meeting rooms it is sometimes necessary for the chairperson to take control of the meeting to establish order. It is also frequently the case that the chairperson does not wish to be interrupted while he/she is speaking. That is the purpose of the Priority mode. Switch the mode switch for the chairpersons microphone to PRIORITY and all microphones in the AUTO mode will shut OFF when the person in the Priority position speaks.

It is sometimes necessary in larger systems to have more than one input switched to Priority mode, because more than one person needs to be able to establish order. Any number or all of the inputs on the 7510B may be switched to PRIORITY, and no single Priority input has control over other Priority inputs. All may be on simultaneously. For this reason it is very important not to establish too many microphones in the Priority mode. And, if there is more than one input switched into Priority, the participants must agree on the method by which order will be established.

2.4 Supplemental Installation Information

The following sections contain supplemental information to that previously presented which may be of aid to the installer.

2.4.1 Impedance and Termination for 600 Ohm Lines

In the USA the early history of the audio industry is very closely tied to the history and technology of the telephone industry. Much of the early equipment used for public address systems, recording, broadcast and reproduction of sound was either designed by or heavily influenced by the scientists and engineers at Bell Telephone Laboratories. The technology that they and others developed has had a lasting influence on the design and specification of all types of audio products. Among their contributions was the 600 ohm transmission line.

The 600 ohm line was developed because of a need for a standardized impedance for long distance transmission lines. Transmission and reception equipment using vacuum tubes, transformers, and passive

equalization and mixing networks require known source and load impedances to achieve predictable results. Because much of the early professional audio equipment was designed by telephone company people, or used similar types of equipment, it is not surprising that the 600 ohm line became a standard in the professional audio industry.

Correct use of the 600 ohm transmission line requires a signal source with an exact 600 ohm source impedance, and a receiving device which also has a 600 ohm input impedance. If a device does not have the correct impedance, it must be modified until it does. In the case of a device with a lower than required source impedance this would require addition of a series buildout resistor (or two in the case of a balanced line). In the case of a higher impedance input a resistor across the input will suffice. Other variations require either a resistive network or transformer to match impedances.

The actual output source impedance of the 7510B is approximately 40 ohms. Therefore, if the 7510B is to be used in a 600 ohm system, build out the output impedance with a 560 ohm resistor in series with the output (or one 270 ohm resistor in each leg of a balanced system.)

Most modern audio systems do not require the use of 600 ohm transmission line practices. This is for two reasons. First most audio systems are relatively small (especially as compared to a telephone network) and the cabling between parts of the system is under more careful control, and second, modern audio electronic products are no longer designed to require the use of 600 ohm line. Matching of input and output impedances is no longer necessary because the output impedance of a device may be made very low and the input impedance very high. Multiple inputs may thus be connected in parallel to the same source with ease and no loss of signal level.

2.4.2 Grounding

For safe operation the 7510B must be connected to a good mechanical ground. This provides a current path for any voltage which might appear on the chassis due to a severe electrical fault in the mixer. Without this path the unit might be a shock hazard. In addition, a good quality ground on the chassis provides shielding from external fields and minimizes radiation of internal fields to the outside world. To comply with safety regulations in many localities, and to protect our customers, we provide this product with a ground connection through a three-wire power cord.

In many situations this will present no problem. But there are instances where a hum or buzz will be introduced due to a phenomenon known as a ground loop. This results when there is a significant potential between the audio ground of the previous piece of equipment and the mechanical ground to which the 7510B has been connected.

In some instances the voltage difference between the grounds will be so great that a direct connection to mechanical ground is not possible without hum in the output. Use of an isolation transformer in the input signal line may allow the signal to be connected while maintaining ground isolation. Check for this using a 3 prong to 2 prong AC adaptor between the power cord and the power outlet, temporarily ungrounding the unit. Determine which connection works best. Remember that for safety you must still have a connection to chassis ground. This is normally made through a properly grounded third pin connection.

2.4.3 Installation of 7510-03 Input Expansion Assemblies

CAUTION: When removing or installing an Input or Output Assembly, make sure the AC Power is turned OFF and the AC power cord is unplugged from the AC mains.

1. Unscrew the three #6-32 machine screws from each side of the 7510B top cover and lift the cover off of the unit. On early versions of the 7510B a single screw through the center top of the front panel will also need to be removed. It will be necessary to remove the plastic Cover Plate at this location to gain full screwdriver access to the screw. Insert your fingernail between the top of the Cover Plate and the Front Panel and gently lift the Cover away from the Front Panel. Do not use a sharp tool as you may scratch the Front Panel.

2. Remove the single #6-32 machine screw that holds the bottom of the rear filler plate at the location where the new Input Assembly (ies) is (are) to be installed. The filler plate may be discarded unless future removal of the Input Assembly is contemplated. Save the screw.
3. Remove the Front Panel Cover Plate(s) at the location(s) for the new Input Assembly (ies). Note that the Front Panel of the 7510B has already been labelled to accommodate the additional inputs. The Cover Plate may be discarded.
4. Place all of the Mode switches on the new 7510-03 Input Assembly into the center position, make sure you are holding it top up and insert the new Input Assembly into the mainframe, sliding it forward so that the gain controls, switches and LEDs go into their holes on the Front Panel. Install the #6-32 machine screw removed at Step 2 to hold the Input Assembly into the chassis.
5. Attach the flat ribbon cable to the connector on the top of the new Input Assembly.
6. Install the four knobs on the Gain pots. Make sure that the index line is correctly oriented to indicate the position of the control. The knob is a push-on type. If it is very hard to push the knob onto the shaft, the shaft may be squeezed slightly shut with a pair of pliers. Conversely, if the knob is very loose the shaft may be expanded slightly by a small screwdriver.
7. Reinstall the top cover. The cover slides over the top rear of the mainframe and the tabs on the Input and Output Assemblies slide into the slots on the top cover. The front end of the cover then pivots down. Reinstall the six screws holding the cover (and the seventh screw through the Front Panel, if necessary. Reinstall the Cover Plate that was lifted off to gain access to the Front Panel screw).

2.4.4 Adjustment of Background Threshold Trim Controls

The low level Background Threshold Trim Control and the Background Threshold Preset Trim Control must be readjusted whenever the 7510B input capacity is increased by adding one or more 7510-03 Input Expansion Assemblies, or when an existing Input or Output Assembly is changed. This is done with the unit in the rack and completely wired.

Note: While they affect the same circuitry, these trim controls serve different functions than the Front Panel control with knob labelled Background Threshold. Resetting of the Front Panel knob is not a substitute for this adjustment.

1. Set all input Mode Switches to AUTO.
2. Set all input channel Gain controls to "10" (maximum CW rotation). No microphones should be connected at this time.
3. Set all Release controls to fastest response (maximum CCW rotation).
4. Set all Threshold controls to most sensitive position (maximum CW rotation).
5. Set the Front Panel Background Threshold Control to its switched preset position (maximum CCW rotation).
6. Connect the negative lead of a high impedance digital voltmeter to Chassis Ground (pin 1 of XL Output, bushing of phone jack). Connect the positive lead to the test jack through the front panel immediately above the green POWER LED. Adjust trimpot RT-1 for a reading of 0.30 volts positive DC. Trimpot RT-1 is through the unlabeled hole in the front panel just above the test jack.
7. Turn the Front Panel Background Threshold control to "1".

8. Turn trimpot RT-2 fully counter-clockwise. Trimpot RT-2 is just above RT-1 on the front panel. Several of the Channel ON LEDs will light.
9. Rotate RT-2 clockwise until all LEDs are off.
10. Rotate the front panel Background Threshold control through its full range. If any LEDs come ON, stop and retrim RT-2 until they go OFF. Repeat until no LEDs light throughout the range of the control.
Note: On 7510Bs with only one or two Input Assemblies the LEDs may turn ON at the extreme clockwise rotation of the Background Threshold control. This is acceptable.

2.4.5 Security Cover

In some installations it may be necessary to safeguard the 7510B control settings from deliberate or accidental mis-adjustment. In some environments the controls may benefit from additional protection against entry of dirt and dust.

The Model SC-7 Security Cover offers protection for all operating controls of the JBL/UREI model 7510B Automatic Microphone Mixer. The Security Cover is a five-sided box of smoked-gray plexiglass. It attaches to the front panel of the unit with four 4-40 x 1-3/4 inch Phillips head machine screws. Control positions and display status may be viewed through the cover after installation.

Installation of the Security Cover is simply a matter of placing it against the front panel of the unit, pushing the screws through the holes in the cover and screwing them into the holes provided on the front panel. Take care not to scratch the front panel with the screws. Some installations may need tamperproof screws due to the excess curiosity of some people. The type and style of such screws is left to the installer, the only requirement being the 4-40 thread.

The Security Cover may be cleaned with any mild, non-abrasive cleaner and a clean cloth.

Section Three Theory of Operation

IMPORTANT NOTE

The following descriptions of the circuitry used in the mixer are presented here in order that the professional user may have a general understanding of how the mixer works. They are not intended as a guide for service. Service on this product should be performed only by qualified technicians. **THERE ARE NO USER SERVICEABLE PARTS INSIDE.** Reference to the block diagram of the audio and control circuitry, at the rear of this manual, will assist your understanding of the following sections.

3.1 Input Amplifier

The input amplifier is a hybrid design using low noise transistors and operational amplifiers to amplify the low level microphone signal. The gain of the amplifier may be reduced from 49 dB to unity by addition of an external resistor on the Remote Control connector at the rear panel to optimize signal-to-noise and headroom for microphones of different nominal output levels. +48 volt Phantom Voltage is available for powering of condenser microphones.

The Input Gain control is located following the first stage of amplification. Following the Input Gain control is another operational amplifier, the gain of which is varied from unity to + 25 dB when the channel is turned ON. The output of this amplifier, through a 600 ohm buildout resistor is routed through the normalling contacts of the patch point Output jack and to the audio summing buss.

3.2 Summing Amplifier and NOM Circuit

The Audio signal from all inputs is combined in an amplifier on the Output Assembly. The gain of this amplifier is under control of the NOM circuit. The NOM circuit counts the number of active inputs, calculates the appropriate gain for that number of inputs and increments the gain of the summing amplifier accordingly to prevent system feedback and give the maximum system gain for the actual number of live microphones. The following table gives the exact gain increments of the NOM circuit.

Table 3 NOM Gain

Number of Microphones	Gain	Number of Microphones	Gain	Number of Microphones	Gain
1	0 dB	9	-9.5 dB	17	-12.3 dB
2	-3 dB	10	-10 dB	18	-12.6 dB
3	-4.8 dB	11	-10.4 dB	19	-12.8 dB
4	-6 dB	12	-10.8 dB	20	-13 dB
5	-7 dB	13	-11.1 dB	21	-13.2 dB
6	-7.8 dB	14	-11.5 dB	22	-13.4 dB
7	-8.5 dB	15	-11.8 dB	23	-13.6 dB
8	-9 dB	16	-12 dB	24	-13.8 dB

3.3 Threshold and Background Threshold

The audio signal on any channel, taken from the wiper of the channel gain control, is converted to a DC voltage which drives a comparator. If the voltage exceeds the comparator threshold the channel is gated ON. A zero crossing detector circuit restricts the channel from turning ON until the audio signal crosses through zero volts, thereby eliminating any turn-on pop due to waveform truncation. A threshold trimpot allows adjustment of the DC voltage level required for threshold, and a release trimpot allows adjustment of the time that the comparator is held ON. The circuit drives a switch that changes the gain of an operational amplifier in the audio chain. The gain change is 25 dB. The circuit also drives another switch which turns on a front panel LED to indicate that the channel is ON and a third switch which provides a contact closure to ground on the rear panel remote control connector for external switching.

The comparator threshold may be either fixed, or may vary with the sum of the audio signal from all channels. In the fixed, preset position of the Background Threshold control a fixed DC voltage is set with trimpot RT-1 and feeds establishes the threshold level for all channels. When the control is turned out of its detented position, a rectified DC voltage representative of each input signal is summed and establishes the threshold for channel turn-on. The Background Threshold contro changes the gain of an amplifier to adjust the ratio between the level of signal provided by an individual channel to that provided by the sum of all channels.

3.4 Output Amplifier

Following the output Gain control, an operational amplifier driving a complementary pair of transistors drives the output transformer which gives the unit a fully floating output at the XL connector. A second operational amplifier takes signal before the output Gain control and feeds the Auxiliary Output jack.

3.5 Power Supply

AC mains power to the mixer is converted to DC in the power supply. The supply is a straightforward linear style. Stepdown transformer T1 supplies low voltage AC to a bridge rectifier BR1. The full wave rectified DC is filtered by capacitors C18 and C19 and regulated by Integrated Circuit Voltage Regulators Q1 for +5 VDC, Q2 for +8 VDC, Q3 for -8 VDC, Q4 for +15 VDC and Q5 for -15 VDC. The power supply is protected by an internal 1.5 A, 8AG fuse (Littlefuse 36101.5) mounted next to the AC Voltage Change switch.

The Phantom Power supply is configured as a module on the main output PC board. It is a voltage tripler circuit, providing low noise regulated +48 Volts for phantom microphones. The supply is overcurrent protected.

Section Four Maintenance

4.1 General

The Model 7510B is all solid state, ruggedly constructed and uses the finest components. As such it will provide years of trouble free use with normal care. All parts are conservatively rated for their application.

NO SPECIAL PREVENTIVE MAINTENANCE IS REQUIRED, AND THERE ARE NO INTERNAL SERVICE ADJUSTMENTS.

The metal and plastic surfaces of the Automatic Microphone Mixer may be cleaned with a damp cloth. In case of heavy dirt, a non-abrasive household cleaner such as Formula 409 or Fantastik may be used. **DO NOT SPRAY THE CLEANER DIRECTLY ONTO THE FRONT OF THE UNIT AS IT MAY DESTROY THE LUBRICANTS USED IN THE SWITCHES AND CONTROLS!** Spray onto a cloth and then use the cloth to clean the unit.

4.2 Repairs and Warranty

This product is warranted by the manufacturer to the original purchaser against defects in material and workmanship for a period of two years from the date of purchase. We suggest that you retain a copy of your dated sales receipt for proof of warranty status should that be necessary.

If it can be determined that the defect is associated with one of the plug in Input or Output Assemblies by substitution or otherwise, it is only necessary to return the assembly.

If you wish to return the unit directly to the factory, please call or write to the Customer Service Department at the Service address listed on the title page of this manual for a Return Authorization Number. All products returned to the factory must be accompanied by a Return Authorization Number, and must be shipped prepaid. COD shipments will not be accepted.

For prompt service, ship the unit to the factory with the RA number marked on the shipping label. Be sure that it is well packed in a sturdy carton, with shock absorbing material such as styrofoam pellets or "bubble-pack" surrounding the unit. Pay particular attention to protecting the controls and switches and make sure that the unit cannot drift around in the shipping box. Shipping damage caused by inadequate packing is not covered by the JBL/UREI warranty. Tape a note to the top of the unit describing the problem, include your name and a phone number where we may contact you if necessary, and give us instructions for returning the product. We will pay return shipping costs on any repair covered under the terms of this warranty.

Field repairs are not normally authorized during the warranty period, and repair attempts by unqualified personnel may invalidate the warranty.

Customers outside the USA should contact their local JBL/UREI Professional Products dealer for warranty assistance. Do not return products to the factory for repair unless you have been given specific instructions to do so.

Section Five Specifications**ELECTRICAL:**

Input:	Differential amplifier. May be used balanced or unbalanced, bridging.
Input Impedance:	6.8 kohm balanced, 3.4 kohm unbalanced.
Gain:	(One Channel ON, Input and Output Gain controls full CW), ± 1 dB.
Input to Direct Output:	Adjustable 19 to 64 dB (600 ohm load). Adjustable 25 to 70 dB (10 kohm load).
Input to Aux Output:	70 dB max.
Input to Main Output:	77 dB max.
Maximum Input Level:	+17 dBu* with minimum input gain, -24 dBu with maximum input gain.
Equivalent Input Noise:	-129 dBu (15.7 kHz Noise Bandwidth, 150 ohm source).
Frequency response:	± 1 dB, 20 Hz - 20 kHz any input to any output.
Main Output:	Floating, transformer-isolated.
Output Impedance/Load:	Approximately 40 ohm source. Designed to drive 600 ohm or higher impedance loads.
Maximum Output Level:	+24 dBm with less than 0.4% THD max. into 600 ohm load (20 Hz - 20 kHz).
Auxiliary Input :	
Input Impedance:	10 kohm unbalanced.
Gain:	+7 dB (input to tip, no other inputs ON, output Gain control full CW). +7 dB (input to ring, output Gain control full CW).
Maximum Input:	+18 dBu (6.15 volts).
Auxiliary Output:	
Output Impedance/Load:	47 ohm unbalanced source. Designed to drive 2 kohm or higher impedance loads.
Maximum Output Level:	+20 dBu, @ less than 0.1 % THD 20Hz - 20 kHz.
Direct Output:	
Output Impedance/Load:	600 ohm unbalanced source. Designed to drive 600 ohm or higher impedance loads.
Maximum Output Level:	+14 dBm, @ less than .1% THD 20 Hz - 20 kHz (600 ohm load). +20 dBu, @ less than .1% THD 20 Hz- 20 kHz (10 kohm load).
Automatic Mix:	
Input Attack Time:	10 ms to 10 μ s (1/2 cycle from 20 Hz to 20 kHz after signal exceeds threshold).
Input Rise Time:	30-60 ns (tolerance for turn-on once attack occurs).

Input Release Time: 100ms to 5 seconds, adjustable.

Channel Attenuation: 25 dB

Feedback Prevention: 3 dB overall gain decrease for each doubling of number of active inputs.

PHYSICAL:

Front Panel: 133 x 483 mm (5-1/4 x 19 in) EIA rack mount.

Depth Behind Panel: 283 mm (11-1/8 in).

Finish: Black Anodized Aluminum Front Panel,
Chassis is plated steel.

Net Weight: 6.4 kg (14 lb.) Mainframe with one Input Assembly
0.6 kg (1 lb. 3oz.) Additional 7510-03 Input Assembly

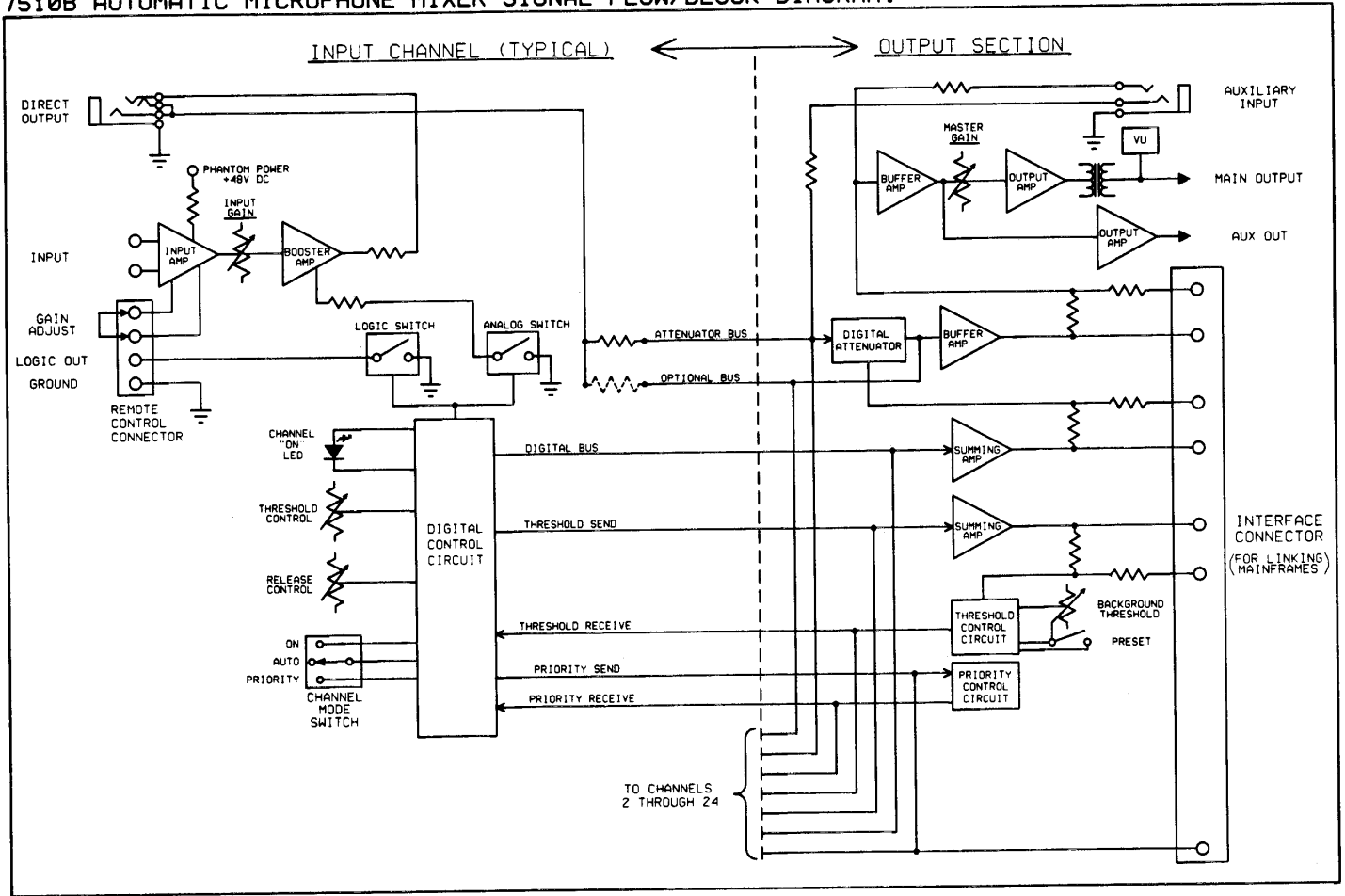
Power Requirements: 105 to 125 VAC or 210-250 VAC switchable, 50-60 Hz, 30 W max.

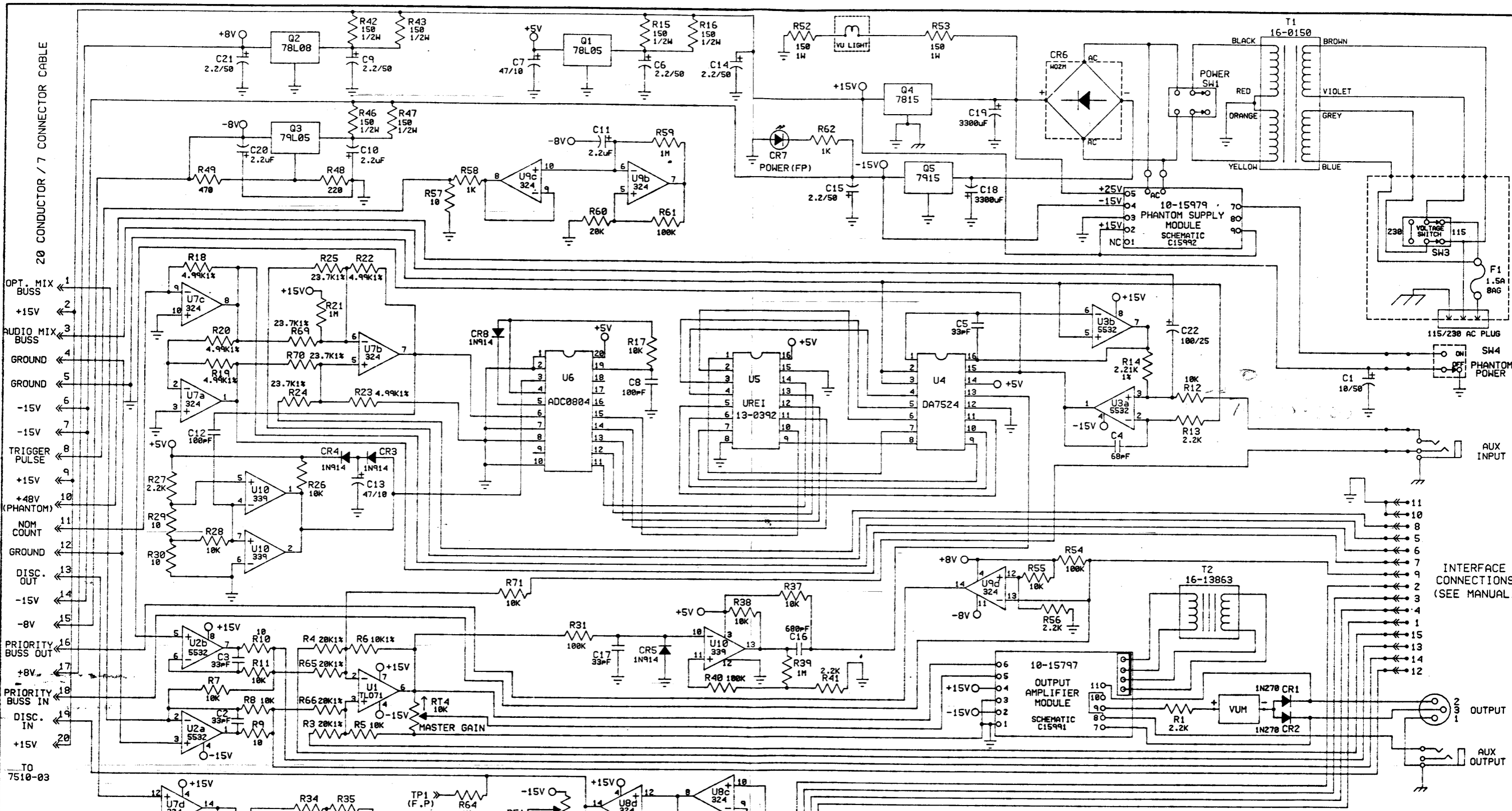
Environment: Operating, 0°C to +50°C.
Storage, -20°C to +60°C.

* 0 dBu = 0.775 V RMS 0 dBm = 1 mW in 600 ohms.

Accessories: 7510-03 Input Expansion Assembly
SC7 Security Cover

7510B AUTOMATIC MICROPHONE MIXER SIGNAL FLOW/BLOCK DIAGRAM.





20 CONDUCTOR / 7 CONNECTOR CABLE

OPT. MIX BUSS
+15V
AUDIO MIX BUSS
GROUND
GROUND
-15V
-15V
TRIGGER PULSE
+15V
+48V (PHANTOM)
NOM COUNT
GROUND
DISC. OUT
-15V
-8V
PRIORITY BUSS OUT
+8V
PRIORITY BUSS IN
DISC. IN
+15V
TO 7510-03

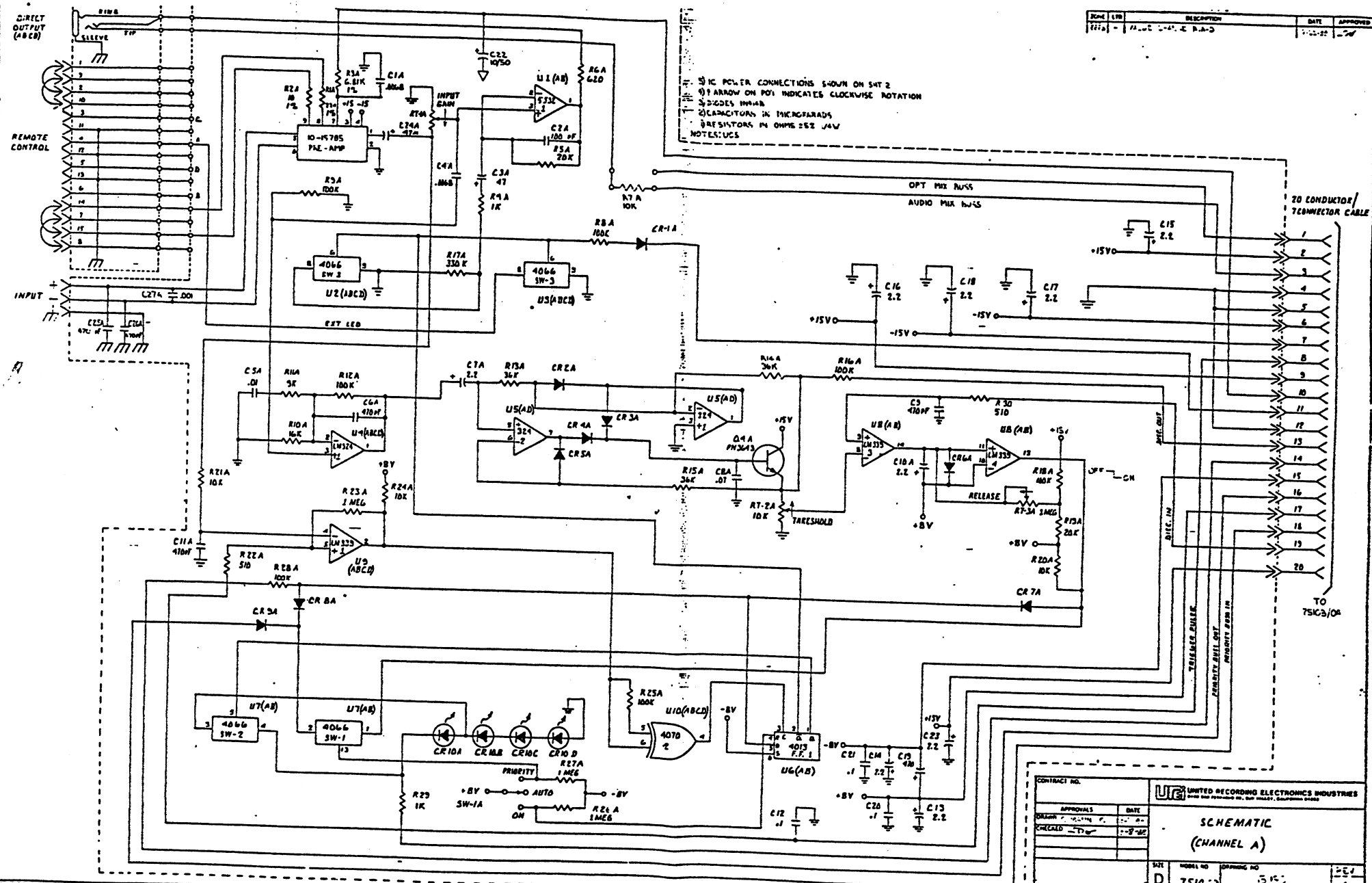
INTERFACE CONNECTIONS (SEE MANUAL)

OUTPUT
AUX OUTPUT

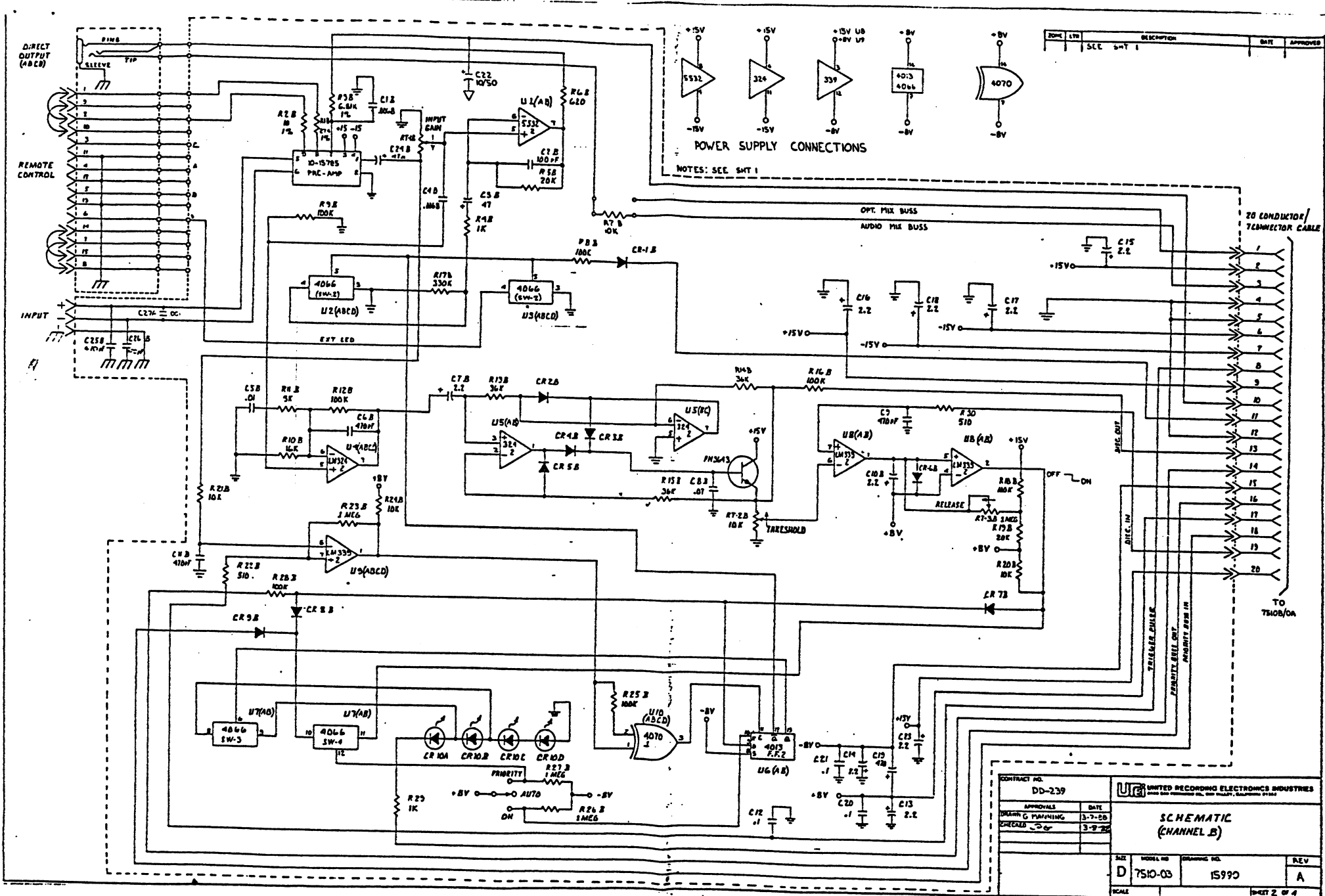
- NOTES: (UNLESS OTHERWISE SPECIFIED)
- INDICATES CIRCUIT GROUND
 - INDICATES CHASSIS GROUND
 - POWER SWITCH SHOWN IN OFF POSITION. RT-3 SHOWN IN NON-DETENT POSITION
 - CAPACITORS IN MICROFARADS. CAPACITORS LABELLED XX/YY ARE ELECTROLITIC. XX IS VALUE. YY IS VOLTAGE RATING
 - RESISTORS IN OHMS $\pm 5\%$ 1/4 WATT.

CONTRACT NO.		UNITED RECORDING ELECTRONICS INDUSTRIES 8450 SAN FERNANDO RD., SAN VALLEY, CALIFORNIA 91382	
APPROVALS	DATE	<h1>7510B/0A</h1> <h2>SCHEMATIC</h2>	
DRAWN: J.E.S.	5-18-88		
CHECKED: J.P.	5-19-88		
SIZE	MODEL NO.	DRAWING NO.	16030
D			
SCALE		SHEET	OF

REV	DATE	DESCRIPTION	DATE	APPROVED
1	11-22-52	11-22-52		



CONTRACT NO.		DATE	
DESIGNER		DATE	
CHECKED		DATE	
SCHEMATIC (CHANNEL A)			
DATE	MODEL NO.	DRAWING NO.	REV.
D	7510-22	3100	1
SCALE		SHEET 1 OF 4	



ZONE	LTN	DESCRIPTION	DATE	APPROVED
		S.C.C. SMT 1		

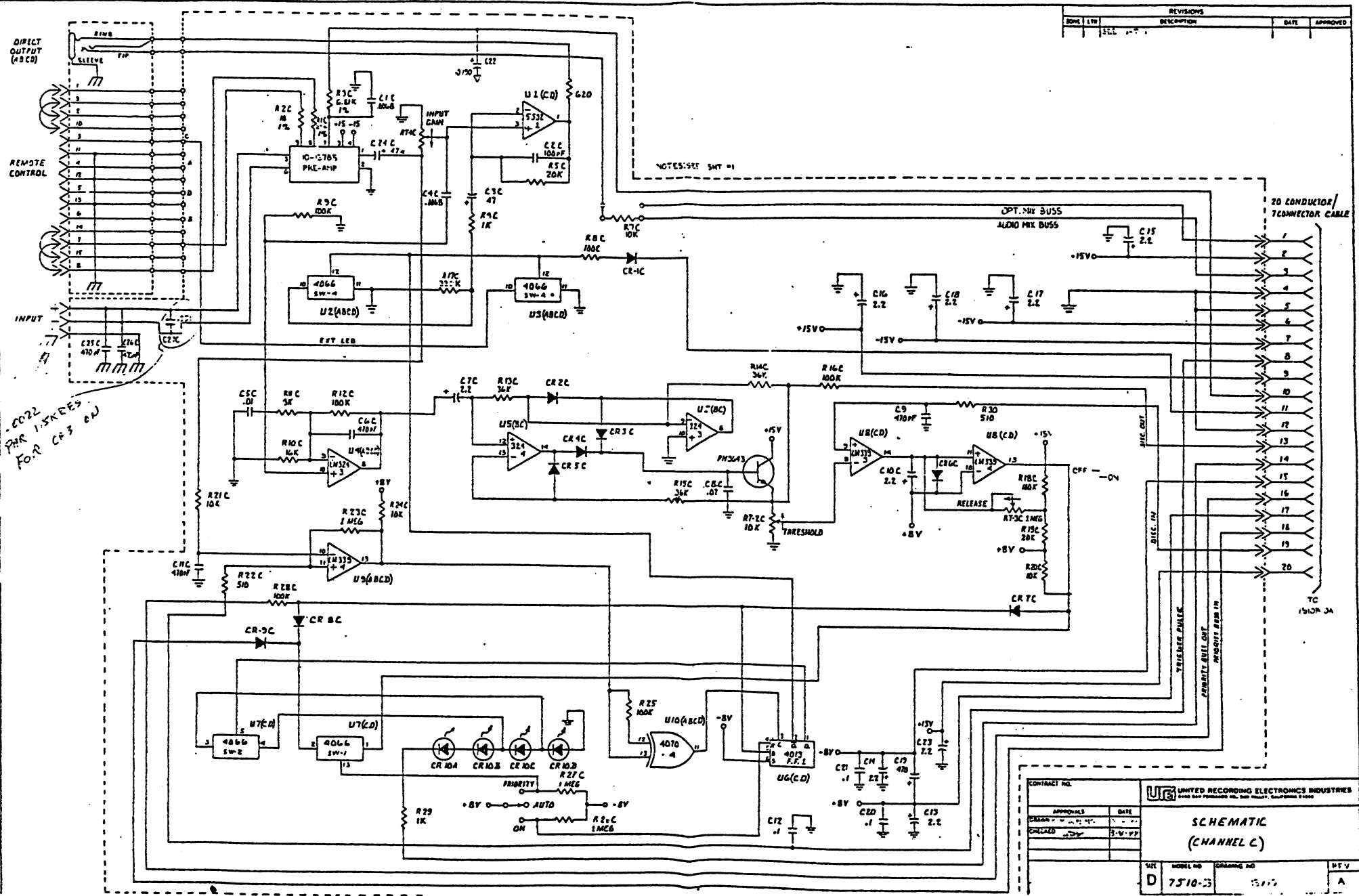
POWER SUPPLY CONNECTIONS

NOTES: SEE SMT 1

20 CONDUCTOR/
TELEMETRY CABLE

TO T810B/OA

CONTRACT NO. DD-239			
APPROVALS	DATE	SCHEMATIC (CHANNEL B)	
DRAWN G. PLANNING	3-7-58		
CHECKED	3-9-58		
SIZE	MODEL NO.	DRAWING NO.	REV.
D	7510-03	15990	A
SCALE			SHEET 2 OF 4

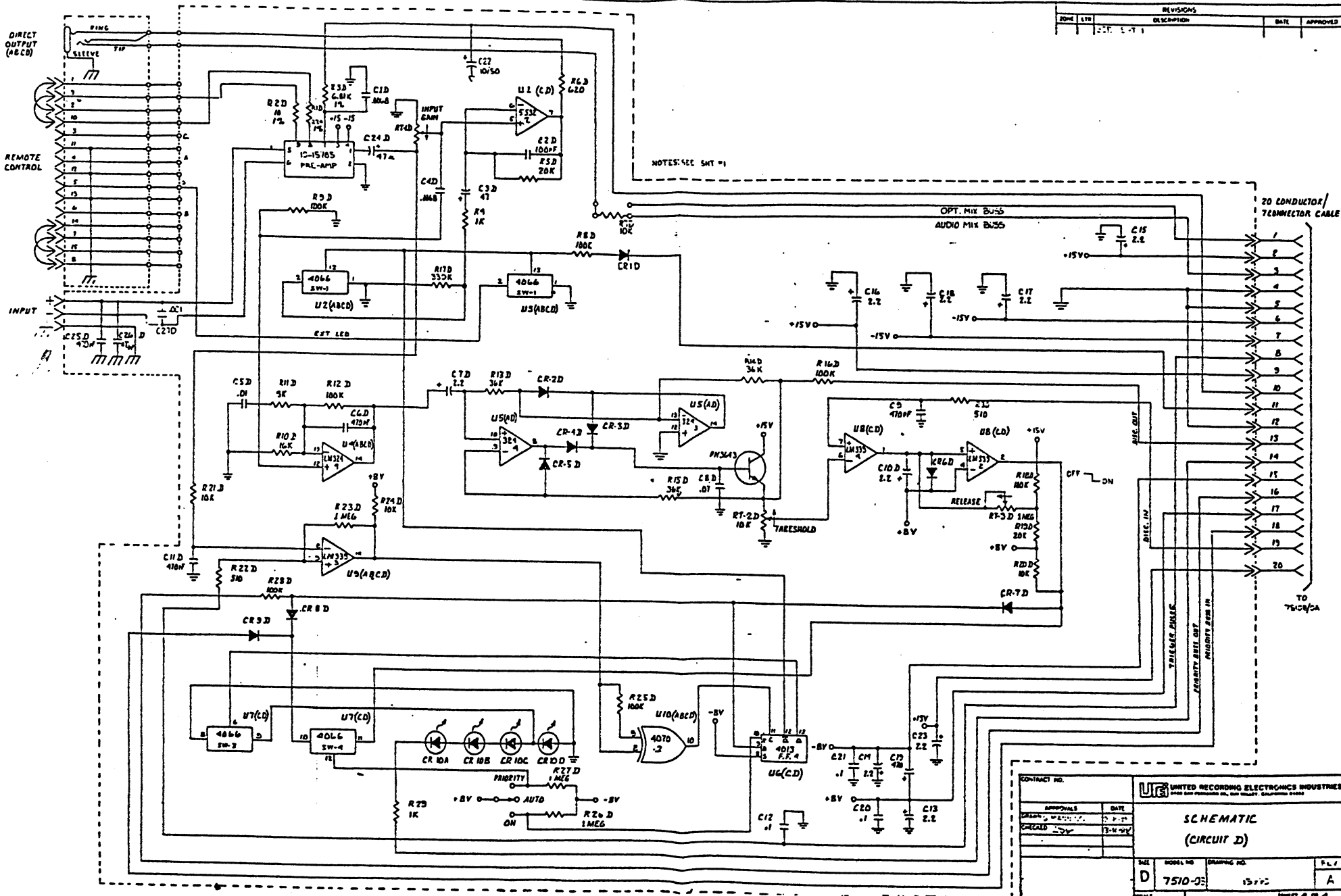


REVISIONS			
REV#	DATE	DESCRIPTION	APPROVED
1	11-1-77		

NOTES: SEE SMT #1

-0022
FOR 1.5K RES
FOR C63 & U

CONTRACT NO.		UNITED RECORDING ELECTRONICS INDUSTRIES <small>4000 East 10th Avenue, Denver, Colorado 80231</small>	
APPROVALS	DATE	SCHEMATIC (CHANNEL C)	
CHECKED	BY		
SER	MODEL NO	DRAWING NO	REV
D	7510-33	1577	A



REVISIONS			
ZONE	REV	DESCRIPTION	DATE
	1	1-7-1	

NOTES: SEE SMT #1

CONTRACT NO.		UNITED RECORDING ELECTRONICS INDUSTRIES <small>DATA AND PROGRAMS ARE NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM.</small>	
APPROVALS	DATE	SCHEMATIC (CIRCUIT D)	
DESIGNED BY	3-14-74		
CHECKED BY		SIZE	MODEL NO.
		D	7510-03
			DRAWING NO.
			1572
			PLT
			A