

**2XL TWO LINE
FREQUENCY EXTENDER
AUTO LEVELER
OPERATING & TECHNICAL
MANUAL**

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DESCRIPTION

The 2XL Two Line Auto Leveler is designed to work in conjunction with either the 2XR Two Line Frequency Extender Decoder or the older Model RTLX. It allows "unmanned" operation of the receive site on a two line frequency extended feed. The 2XL is an option to the 2X system, and the system can work without it.

The 2XL will automatically answer two incoming telephone calls. It will then wait for test tone to be sent on both of the phone lines. Next it will adjust the gain of its internal amplifiers and send an audio output from each line at the proper level to feed a Comrex two line decoder. The 2XL will drop the line on a calling party disconnect signal and reset to answer the next call. The 2XL may also be used in manual mode, allowing calls to be initiated from the receive site.

PHYSICAL

Controls and Indicators:

POWER

This indicates that AC power is connected to the 2XL

LINE 1 & 2 INDICATORS

This will light when the 2XL has answered the line. It will go out when the 2XL has released (hung up) the telephone line.

Rear Panel Connections:

BARRIER STRIP POSITIONS 1 - 10

These terminals provide connections from the 2XL output to the input of your two line decoder. Also included are manual control connections. Pin connections are as follows:

Pins 1 & 2 - Line 1 audio out
(active balanced)

Pin 3 - Line 1 ground

Pins 4 & 5 - Line 2 audio out
(active balanced)

Pin 6 - Line 2 ground

Pins 7 & 8 - Line 1 manual seize control

Pins 9 & 10 - Line 2 manual seize control

LINE 1 & 2 IN

6 Pos RJ-11 type jacks.

TELSET IN LINES 1 & 2

6 Pos RJ-11 type jacks.

AC POWER

This is a three terminal power connector.

OPERATION

Connection to Dial Telephone Lines:

Simply connect the telephone lines to the 2XR via two modular type cords to the jacks labeled "Line 1 in" and "Line 2 in".

If you plan to sometimes initiate the calls from the 2XL, plug a telephone set into either "Telset" jack.

Note: Each telephone line carries different audio. Be sure the remote site knows which phone number is line 1 and which is line 2.

Connection to the 2XR:

Fig 1 shows the proper connection between the 2XL and the 2XR.

Connection to the RTLX:

If using the older model RTLX, refer to Fig 2 for the proper connections. Note: The input connections to the RTLX are different than the 2XR.

Setup of the Two Line Automatic System:

1) Have someone dial your receive telephone lines from a 2XP or STLX or an older PTLX two line encoder. You should see that both green lights on the front of the 2XL come on, indicating that each line has picked up.

2) Have the transmit end send the test tone built into the two line transmitter. Wait about ten seconds for the 2XL to set its levels.

3) With the tone still on, adjust the front panel controls on your two line receiver to the correct level.

Your automatic system is now set up. Whenever a call is completed and a test tone is sent, the 2XL will set the gain to the proper level. Take care that the input gain to the 2XR stays set at the same place. Remove the knobs or place the unit in an area it is not likely to be accidentally "bumped".

Placing calls from the 2XL to the remote site:

In some applications, you may wish to initiate your calls from the receive end. This requires an external telephone set and addition of 2 momentary switches to the rear barrier strip of the 2XL. Connect a normally open momentary switch between pins 7 & 8 on the barrier strip. Connect another between 9 & 10. Plug the telephone set into the "line 1 telset" jack. To initiate the call, do the following:

- 1) Pick up the telephone set and dial the remote end's line #1 phone number.
- 2) When they answer, have them engage their "transfer" button.
- 3) Press the momentary line 1 "seize" switch (the one between pins 7 & 8)
- 4) While holding the switch down, hang up the telephone set.
- 5) Release the switch and see that line 1 is still engaged.
- 6) Move the telephone set to the "line 2 telset" jack and repeat the procedure, using the switch between pins 9 & 10.

NOTE: The telephone set cannot be "off the hook" on either line while setup tones are being sent. To be safe, completely disconnect the telephone from the 2XL before sending setup tones.

TECHNICAL DESCRIPTION

The two telephone lines are coupled to the rest of the circuitry via 2 TCB-3 voice couplers. A ring signal on the phone line is detected by the TCB-3 and a logic "low" is present on pin 11 of the coupler connector. The ring signal is timed and if long enough, it flips the flip-flop in I.C. "Y" to a "set" position. This engages the open drain output of a NAND gate and pulls in optocouplers on the TCB-3 which seize the line.

The line remains seized via a timing circuit for 1.5 seconds, and after that until a loop disconnect signal is sensed by the TCB-3. A disconnect signal is also timed and if long enough, resets the flip-flop and drops the line.

Audio from the coupler board feeds a low noise preamp with a terminated input. The output of the preamp feeds the level setting circuitry and the 1 KHz tone detector. The input to the detector is filtered and the output is delayed by two seconds to prevent extraneous audio from triggering the level setter.

If the audio is present for more than two seconds, a timing circuit is engaged which does several steps in sequence. First, a feedback loop is closed which consists of a precision RMS to DC converter, two amplification stages, and a voltage controlled amplifier. The DC control voltage from the RMS-DC converter is also fed to the input of the AD7569. When the loop is closed, the unit acts like an AGC and raises its input to a chosen level. For the first four seconds after the test tones are verified, the AGC is allowed to settle to its correct output. After four seconds, the timing sequencer tells the AD7569 to store its DC input voltage. This is an ADC and a DAC combined on one IC and used as an infinite sample and hold. The output of the AD7569 will be exactly what the input control voltage was at the time of the store. Finally, this non-variable control voltage is fed to the voltage controlled amplifier in place of the converter output. This locks the gain of the amplifier until setup tones are detected again.

BASIC TROUBLESHOOTING

The 2XL is designed to operate for long periods of time without adjustments of any kind. If you find the levels to be setting incorrectly, the most likely problem is a telephone set off the hook on either line 1 or line 2 on the transmit or receive end. All telephones across the lines must be hung up during test tones and during program transmissions.

The 2XL requires that the level of your phone call remain constant while in use. Some international calls run on TASI circuits may have slight variations in gain. If this is a problem, try redialing the lines. Also, the two line system should not be run on cellular telephones circuits.

The 2XL relies on standard ring and calling party disconnect signals provided by your phone company. For this reason it may not work on your in house PABX. This is one of the reasons why the 2XL should always be used on the telephone line as it enters your building, not downstream from any other customer owned equipment.

If you are connected directly to central office phone lines, and your 2XL does not release the lines, it could be that your central office is not providing the correct signalling. Call your phone company and request that your lines have a "calling party disconnect" signal installed. This is a momentary battery reversal or open which causes the 2XL to "hang up" the line. If they are unable to comply, we recommend that you install the Dial Tone Detector option as described on the next page. The IC's mentioned can be obtained from Comrex.

OPTIONS

Installing the 2XL Dial Tone Detect Option

1. Power down the 2XL and remove the cover by removing the four phillips head screws on the unit's sides.
2. Install the two supplied IC's into the empty sockets on the board. Take care that the IC is installed in the right direction (the notch on the IC and the socket should line up) and that no pins are bent during installation.
3. Locate the "DTD SENS" control on the board and turn it fully counter clockwise until you hear or feel a light "click." Do this for both channels. You have just set the tone sensitivity to its minimum.
4. Remove the two jumpers across the pins marked "Loop Current Disable." Install these two jumpers across the pins labeled "DTD enable."
5. Plug a phone line into line 1 "Line" jack and dial the number. Note that line 1 on the 2XL answers.
6. You now need to hang up the telephone and wait for the dial tone to be returned. Wait for a flash of the LED located next to the MX-105 IC associated with line 1. (Line 1 circuitry is located to the left while facing the front of the unit.) If you cannot determine when dial tone is present, try timing the interval between hanging up and receiving dial tone on that line. It should be between 10 and 40 seconds.
7. When you are sure that dial tone is present, begin rotating the line 1 sensitivity control counter clockwise until the line drops. Continue turning the control one half turn after the line drops.
8. Repeat steps 5 through 7 for line 2.
9. Your 2XL should now be set to disconnect on dial tones. The sensitivity adjustment is

necessary to prevent the detector from disconnecting on miscellaneous audio.

NOTE

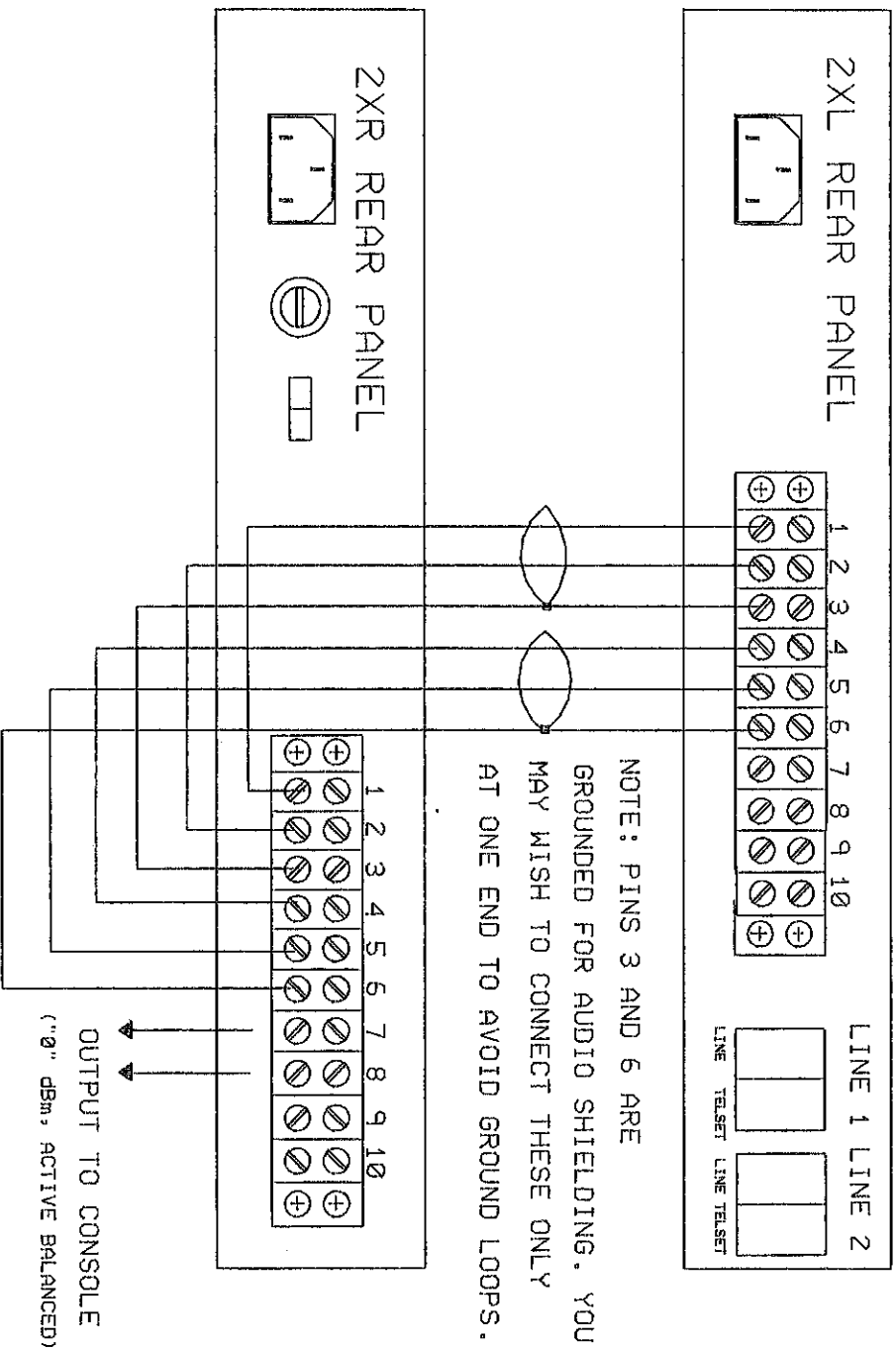
The 2XL DTD feature can be made to trigger on 440 Hz only by pulling up pin 15 on IC "EE" and "FF." These are the IC's which are installed as part of the option (Telton M-981).

When the 2XL is detecting only one tone for disconnect, it is subject to accidental disconnect if program audio contains frequency components of the dial tone frequency for a constant one-half second. Proper adjustment of the sensitivity control will improve performance, but the system is only designed to be 100 percent reliable when detecting the presence of two simultaneous dial tones.

FACTORY SERVICE

If you have a problem, please feel free to call our engineering department at (508) 263-1800. We are usually available between the hours of 0900 & 1800 (US Eastern Time) Monday - Friday of each week. Our FAX number is (508) 635-0401. If, due to time zone problems, you are unable to reach us during the above hours, please notify us by FAX and we will make an engineer available for a call in your time frame or advise you by return FAX.

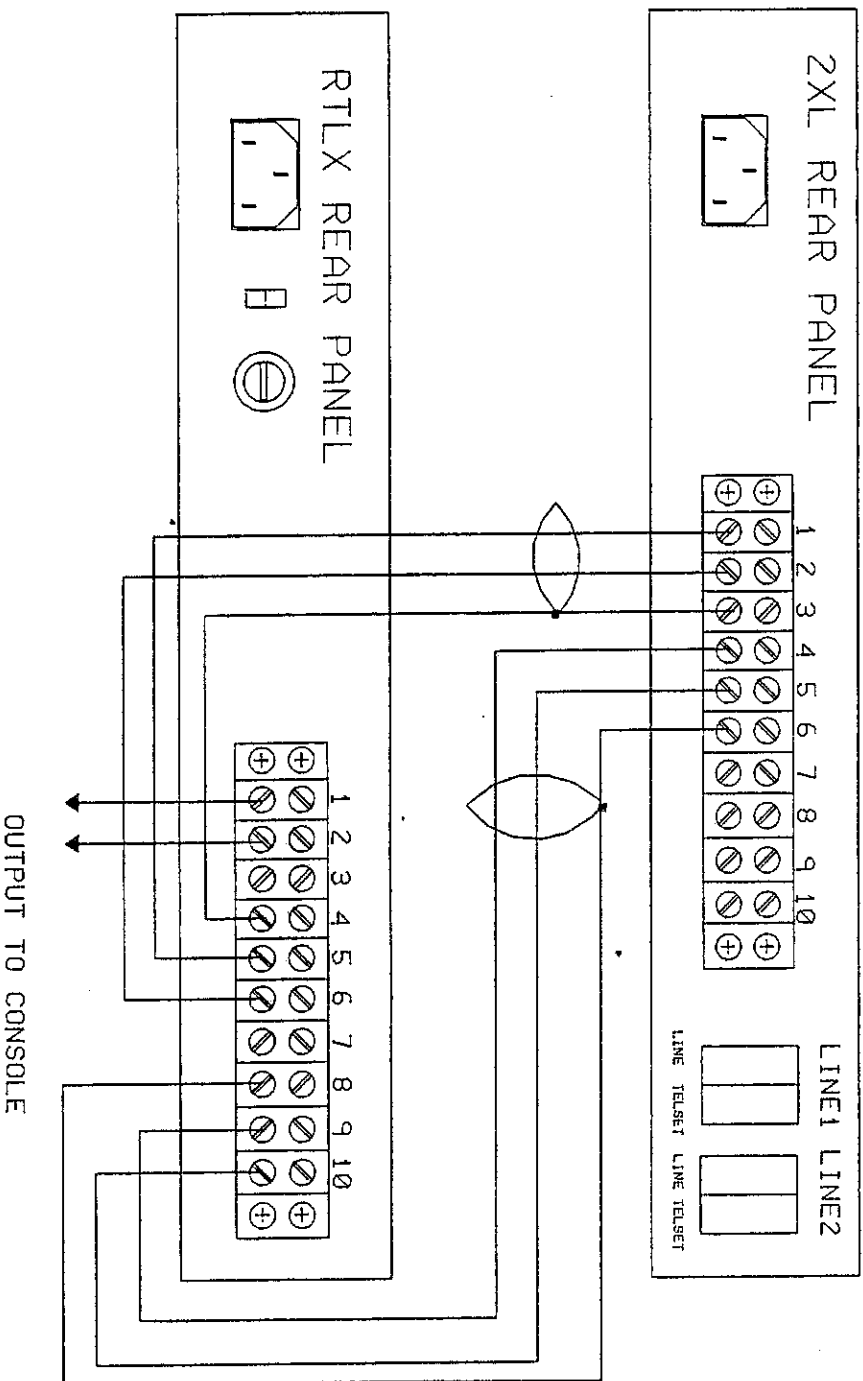
Our factory service is always available and express shipping services are able to provide next day service from most parts of the United States and many other parts of the world.



NOTE: PINS 3 AND 6 ARE GROUNDED FOR AUDIO SHIELDING. YOU MAY WISH TO CONNECT THESE ONLY AT ONE END TO AVOID GROUND LOOPS.

OUTPUT TO CONSOLE ("0" DBm, ACTIVE BALANCED)

COMREX CORP. [®]	
ACTON, MA 01720 U.S.A. (617)268-1988	
TITLE ZXL TO ZXR AUDIO CONNECTIONS- FIG 1	
DATE 13 JULY 1988	DWG. NO.



NOTE: PINS 3 AND 6 ON THE ZXL ARE GROUNDED FOR SHIELDING. YOU MAY WISH TO CONNECT THEM ON ONE END ONLY TO AVOID GROUND LOOPS

COMREX CORP.	
ACTON, MA 01720 U.S.A. (617) 263-1820	
TITLE ZXL TO RTLX CONN.	
FIG 2	
DATE 13 JULY 1998	DWG. NO.