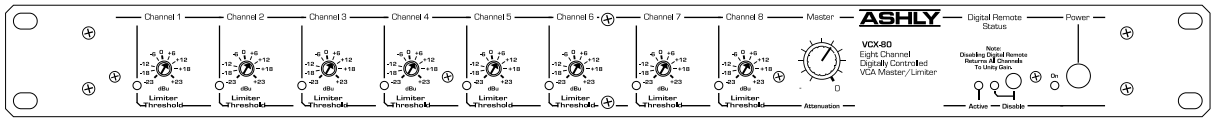
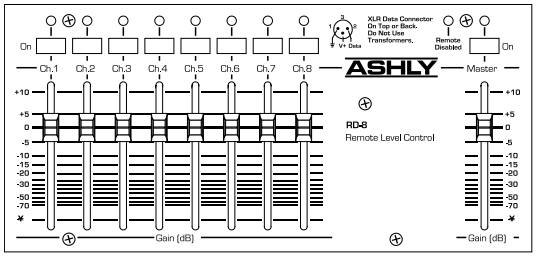
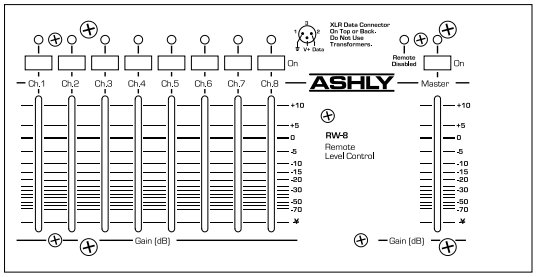
VCX-80
Eight Channel VCA/Limiter
RD-8/RW-8
Digital Remote Controller

Operating Manual







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1. INTRODUCTION

One of the many useful circuits to be developed for audio use is the VCA, or *voltage controlled amplifier*. A VCA circuit allows for accurate, low distortion level control without signal degradations sometimes encountered when using mechanical controls or long signal paths. VCA circuits can be found in compressor/limiter/expanders, noise gates, noise reduction systems, automatic mixers, VCA-Bus consoles, and other places where remote control or fast automatic system response is required. Designers at Ashly felt there was still a need for high quality VCA control which could be incorporated into professional sound systems without unnecessarily high cost or complication.

The Ashly VCX-80 contains eight fully-independent VCA channels in a single unit capable of limiting, remote level control, and mixing. By itself, the VCX-80 functions as a precise eight-channel limiter with recessed threshold adjustments on each channel. When connected to the Ashly RD-8 Remote Controller, DC control, or even computer control, the VCX-80 can control individual channel and master levels with a range of +20dB to -75dB. Each VCA channel comes configured with separate input and output jacks for patching into line-level signal paths, and can be reconfigured to use single jack TRS insertion for easily patching into mixing consoles.

The VCX-80 has a master output jack providing a summed output of all eight channels, allowing the unit to function as a fully-contained eight-channel remote controlled line level mixer. DC control of channel and master level uses a simple potentiometer circuit connected to a dedicated connector on the rear of the unit.

The RD-8 remote controller is a compact slide-fader remote level controller which can be desk-top situated or rack-mounted into two rack spaces (3.5 inches) using the RD8-RM optional mounting bracket. This remote controller is also available as the RW-8 for wall-mounting into a standard 4-gang electrical box. The RD-8 controls the audio levels of the VCX-80 digitally over a standard XLR snake cable or mic cable. The RD-8 is powered entirely by the VCX-80 over the XLR data cable. The RD-8 can communicate to the VCX-80 over a 24 gauge snake cable in excess of 1/4 mile. The RD-8 also pulse-shapes the digital waveform to eliminate digital crosstalk noise into adjacent audio channels.

2. UNPACKING

As a part of our system of quality control, every Ashly product is carefully inspected before leaving the factory to ensure flawless appearance. After unpacking, please inspect for any physical damage. Save the shipping carton and all packing materials , as they were carefully designed to reduce to minimum the possibility of transportation damage should the unit again require packing and shipping. In the event that damage has occurred, immediately notify your dealer so that a written claim to cover the damages can be initiated.

The right to any claim against a public carrier can be forfeited if the carrier is not notified promptly and if the shipping carton and packing materials are not available for inspection by the carrier. Save all packing materials until the claim has been settled.

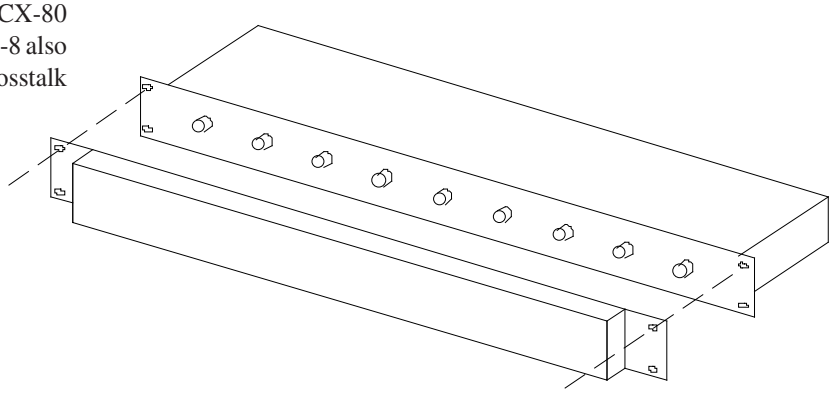
3. AC POWER REQUIREMENTS

A standard IEC-320 AC inlet is provided on the rear panel of the VCX-80 to accept the detachable power cord shipped with the unit. Units distributed within the United States are preselected for 120VAC, 60Hz and should be plugged into a standard NEMA 5-15 3-wire grounded AC receptacle. Most units distributed outside the US are preselected and labeled for 240VAC, 50-60Hz and are shipped with the appropriate power cord.

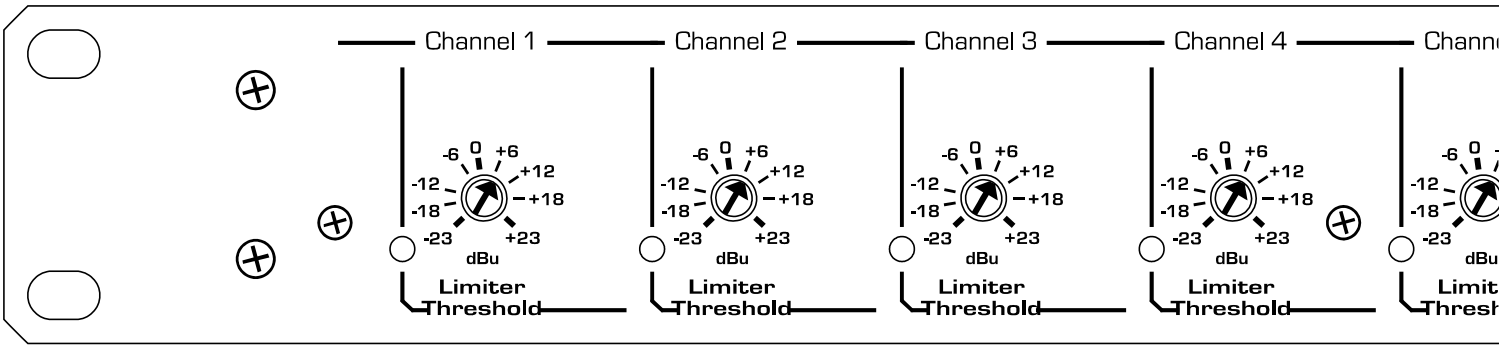
The VCX-80 will perform normally from 98 to 125 volts AC. An internal line fuse is used. In the event of fuse failure, refer to a qualified service technician for servicing. Power consumption of the VCX-80 is 18 watts.

4. SECURITY COVERS

For installations where it is desirable to protect the front panel controls from tampering or accidental misadjustment, use the Ashly security cover, which is available in both single and double rack space sizes. Installation is simple and does not require removal of the equipment from your rack. See your Ashly dealer for details.



Ashly Security Cover



5. CONTROLS - VCX-80

5.1 Limiter Threshold

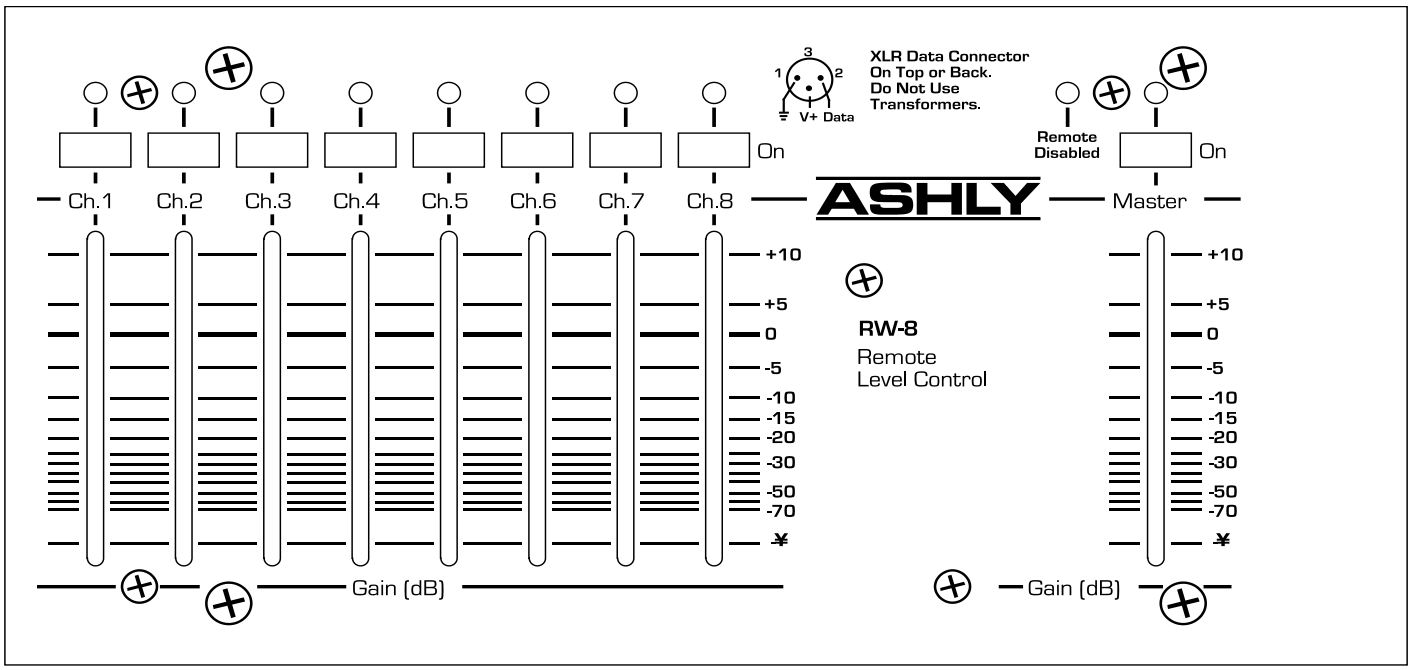
This recessed trimpot adjusts the signal threshold above which the limiter will become active. The units of this threshold dial are dBu where 0dBu = 0.775Vrms. The limiter is a peak-detecting true VCA-type limiter with very low distortion. The input to output ratio of the limiter is approximately 10 to 1 with a relatively fast attack and moderate release time behavior. The adjacent yellow threshold LED indicates when the limiter circuit has been activated by an audio signal above the threshold level. To disable the limiter on any given channel, simply rotate its threshold adjustment fully clockwise to +23dBu, which is the maximum input signal of the unit.

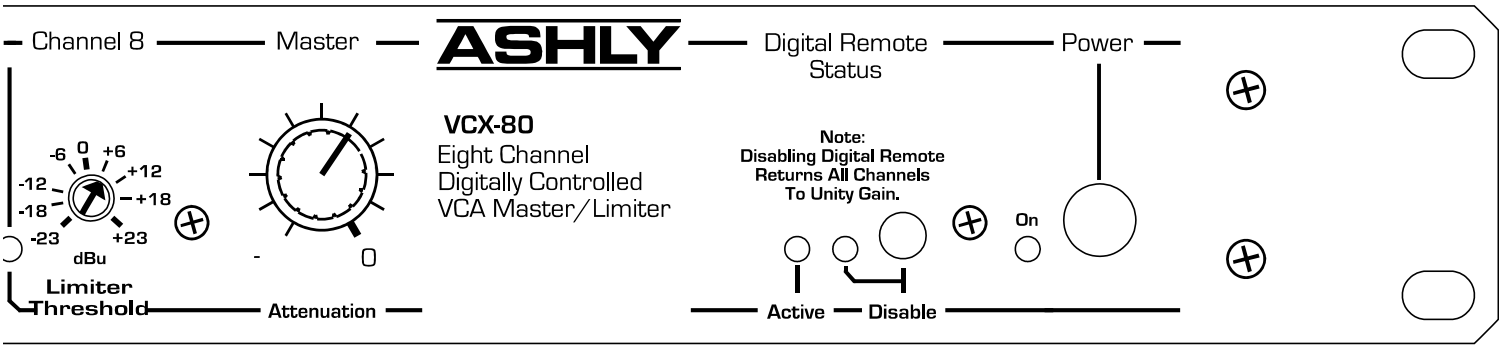
5.2 Master Attenuation

This control attenuates all eight channels uniformly. This control was designed as a simple means of turning-down all eight audio channels at the VCX-80 location in the event of feedback or other sound system problems. *Normally this control should be set fully clockwise at 0dB attenuation.*

5.3 Remote Active Indicator

This green LED indicates when the VCX-80 is receiving data from the RD-8 or RW-8. If this light goes out, it means the VCX-80 is no longer receiving data, due to a disconnection of the control data signal. In the event of remote control data interruption, the VCA channel levels will "remember" their settings just before the data reception stopped and continue to operate as if





there were no changes happening. Reconnecting the remote data signal with the VCX-80 still operating will silently but instantly change the channel level settings to wherever the controller is currently set. If the VCX-80 AC power is switched on with no data reception, all eight channels and the master level will be set to unity gain (0dB).

5.4 Remote Disable Switch

This switch disables the RD-8 remote controller and returns all eight channels to unity gain. The adjacent red LED indicates when this switch is depressed. The nearby green Remote Active indicator will go off when the remote is disabled because the RD-8 does not send any data when it is disabled. After releasing the remote disable switch, all channels return to their respective levels set by the RD-8 remote controller.

5.5 Power Switch

This front-panel push-button switches the AC power to the unit. The adjacent green LED indicates when the unit is powered on. If the green LED does not light, check to see if the unit is plugged into a live outlet. If there is still no light, refer the unit to a qualified service technician for possible fuse replacement.

6. CONTROLS - RD-8

The RD-8 and RW-8 are functionally the same. The difference is that the RW-8 is designed to mount as a wall plate using a standard 4-gang electrical box.

6.1 Channel or Master On Switch

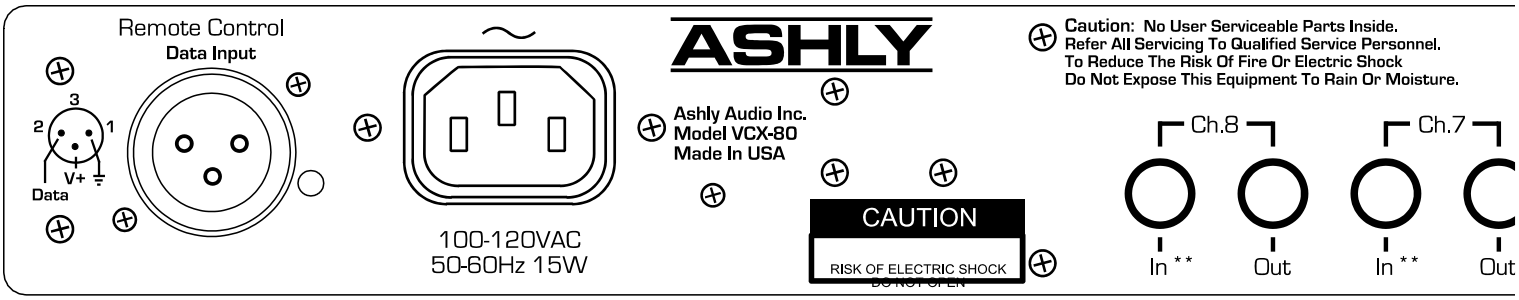
These push-buttons switch the respective VCX-80 channel on or off. When switched on, the channel gain is controlled by the setting of the respective channel fader on the RD-8. When switched off, the respective VCX-80 channel is muted to approximately -75dB by the internal VCA circuit. The adjacent green LED is lit when the channel is switched on.

6.2 Channel or Master Fader

These slide faders control the gain (volume) in dB of their respective channel in the VCX-80. The Master fader controls the gain of all eight channels together. That is to say, the master fader can raise or lower all eight channels uniformly without affecting the "mix" just like the master fader on a mixing console.

6.3 Remote Disable Indicator

This red LED illuminates when the RD-8 has been disabled by the Remote Disable Switch on the VCX-80. When the Remote Disable LED goes off, the RD-8 remote controller will resume normal operation. Avoid dramatically changing the level settings of the controller when disabling it or disconnecting the data line, as the VCX-80 master will immediately respond to any changes made to the controller upon re-connecting



7. CONNECTIONS AND CABLES

7.1 Balanced vs. Unbalanced Audio Connections

Balanced signal connections are preferred in pro audio applications because of their improved immunity to induced hum and noise. A properly shielded and wired balanced input stage on any product will by design reject most unwanted noise picked up by the cable as well as minimize ground loop problems. Therefore it is always advantageous to use balanced connections when running signal more than ten or fifteen feet, although particularly noisy environments (high RFI, EMI, etc.) may require that even short cabling be balanced. Ashly TRS (tip-ring-sleeve) balanced connections use the tip as (+) and the ring as (-) signal, with sleeve used for ground. Ashly XLR connectors use pin 2 (+) and pin 3 (-) with pin 1 ground.

Unbalanced connections are used mostly for short distance, high level signals (0dBu nominal). Most external EMI noise pick-up will be masked under the noise floor of the signal, assuming there is little or no gain following the unbalanced signal. If a gain stage does follow a signal, or if externally sourced noise persists, use balanced connectors. The main advantage of unbalanced connectors is cost, as an unbalanced (tip-sleeve) plug costs less and is easier to wire than a balanced (TRS) plug.

The VCX-80 is factory configured for separate input and output 1/4 inch tip-ring-sleeve (TRS) jacks. Used this way, inputs and outputs can be wired balanced or unbalanced. An internally selected single jack TRS insert is also available (see section 9.1).

7.2 Inputs

The inputs are 20K ohm active balanced or 10K ohm unbalanced on 1/4 inch TRS jacks.

If the single jack TRS insert mode is selected internally (see section 9.1), the **In** jack serves as the single TRS insert point. In this case, the VCX-80 input is on the tip and the output is on the ring of the In jack. This convention is compatible with most mixing consoles equipped with single TRS insert jacks, but check your mixer specifications before assuming this to be true.

7.3 Channel Outputs

The outputs are 200 ohm pseudo-balanced (balanced impedance but signal drive on tip only) on 1/4 TRS jacks.

If the single TRS insert jack mode is selected internally (see section 9.1), the output signal is taken from the ring of the In jack and the Out jack must not be used.

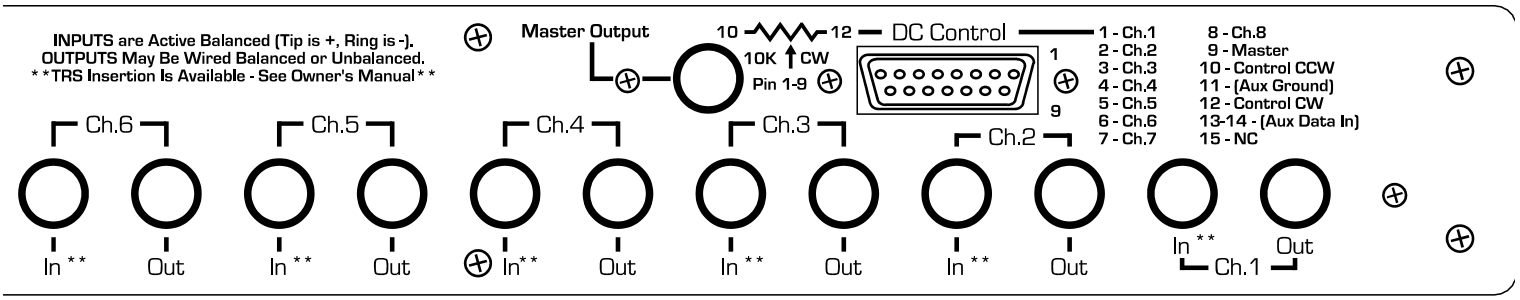
7.4 Master Output

This 1/4 inch TRS jack provides a 200 ohm pseudo-balanced output which is a summed mix of all eight channel outputs. The gain from any one input channel to Master Output is -6dB so that a mix of several audio channels will have approximately the same volume as one of the input channels.

7.5 Digital Connection - VCX-80

The Female XLR jack on the rear of the VCX-80 accepts the digital control signal from the RD-8 or RW-8 remote controller. The data signal can be sent through one channel of a standard audio snake without affecting adjacent audio channels, but *do not use an isolation transformer in the data line.*

The details of the digital format are given in the specifications. Pin 2 is used for the data input signal to the VCX-80. Pin 3 is used as a +26VDC power supply signal for powering the RD-8 remote controller. Pin 1 is ground. If any



of the three pin connections are shorted or opened, the VCX-80 will continue to operate without any clicks or jumps in signal levels - the channel levels simply remain at their level settings before the fault occurred.

The VCX-80 may also be controlled by a personal computer or touch-panel controller via RS-232 or RS-422. Data input is accomplished on either the XLR jack (pin 2) or on the DC Control Voltage Connector (pins 13 or 14). Ashly and third-party developers are currently working to expand methods of control and integration of this product into existing control systems. Details will become available as such systems are developed.

The VCX-80 may also be internally addressed to one of 32 banks, allowing for control of up to 256 channels from a single data line. Contact a factory Technical Service Representative (1-800-828-6308 ext.125) for details.

7.6 Digital Connection - RD-8

The male XLR jacks on the side and bottom of the RD-8 are wired in parallel so that an XLR plug may be inserted into the side for desktop operation or into the bottom for rack-mount operation. Pin 2 is the data output, pin 3 is the positive DC voltage input, and pin 1 is ground. This XLR data output may be “split” with an XLR Y-cable to feed two VCX-80 units to give stereo 8-channel capability. Also, by installing factory customized firmware into the device ROM, the RD-8 slide faders can be assigned to any (or several) arbitrary VCX-80 channels. Contact a factory Technical Service Representative for details.

7.7 DC Control Voltage Connection

This DB 15-pin female connector allows for direct DC voltage control of the internal VCA circuits, as well as the master level control. Direct DC control of the VCX-80 meets the remote control objectives with minimal hardware requirements and allows for custom "low-tech" hardware interfaces. Two wires are used to supply positive and negative DC voltage to ordinary 10K ohm linear-taper potentiometers, and a wire is used to return the wiper of each control to its respective channel (see pinout below). Telephone wire with eleven conductors or more is a good choice for this application, and since only DC voltage is used, control line distance is not a major concern.

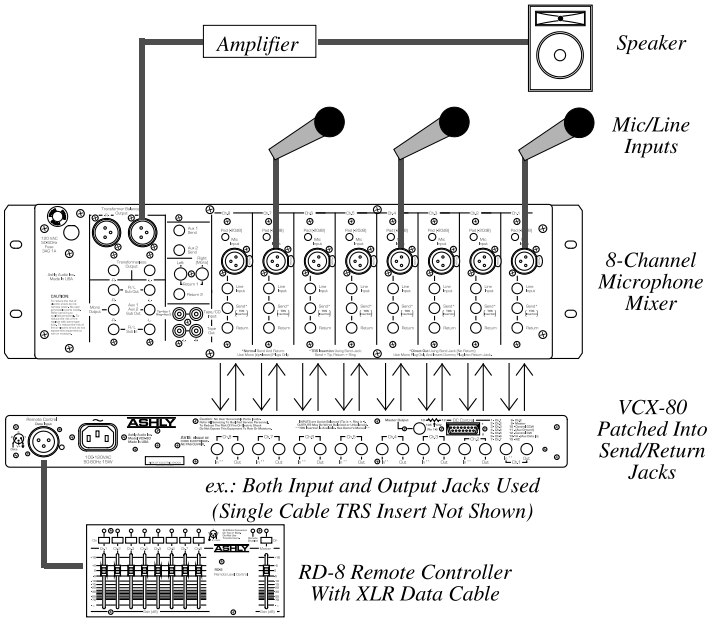
Pin 1	Channel 1 DC control input
Pin 2	Channel 2 DC control input
Pin 3	Channel 3 DC control input
Pin 4	Channel 4 DC control input
Pin 5	Channel 5 DC control input
Pin 6	Channel 6 DC control input
Pin 7	Channel 7 DC control input
Pin 8	Channel 8 DC control input
Pin 9	Master DC control input
Pin 10	+15VDC - Connect to pot CCW
Pin 11	(Ground for data input)
Pin 12	-4VDC - Connect to pot CW
Pin 13	(Digital data input - same as XLR pin 2)
Pin 14	(Digital data input - same as XLR pin 2)

8. APPLICATIONS

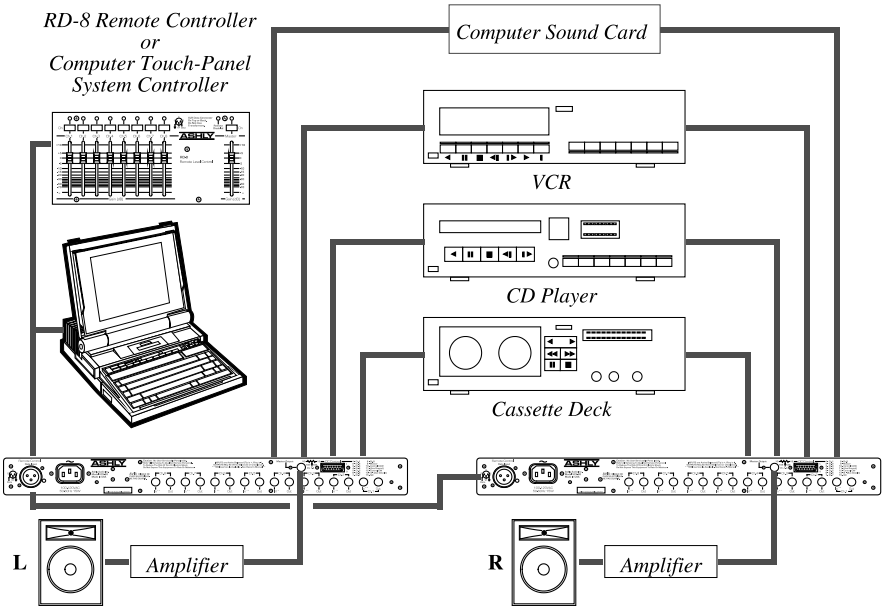
The VCX-80 was designed with open architecture to take full advantage of the creative minds of Ashly customers. Highlighted here are a few common applications, although the possibilities extend beyond the scope of this manual. In some instances there is a form of computer control shown. To obtain information regarding implementation and availability of software, call a Technical Service Representative toll free at 1-800-828-6308 ext.125.

8.1 Remotely Controlled 8-Channel Mic Mixer

In this example, the VCX-80 channels are inserted into the channel insert jacks of a compact mic mixer such as the Ashly MX-508. The RD-8 desk-top remote controller (or RW-8 if a wall-plate version is desired) can be located far away from the main audio equipment rack, allowing for stealth sound system operation. A limited number of knobs, lights, and buttons saves the non-technical VIP operator from distraction and potential embarrassment, while giving them a great deal of overall system control. In addition to its simplified interface, each VCX-80 channel has a tamper-proof limiter to place a ceiling on the audio levels. Remember, although the VCX-80 has up to 20dB of gain, it is best to apply any significant gain at the mixer's front end (input preamp).



Remotely Controlled 8-Channel Mic Mixer



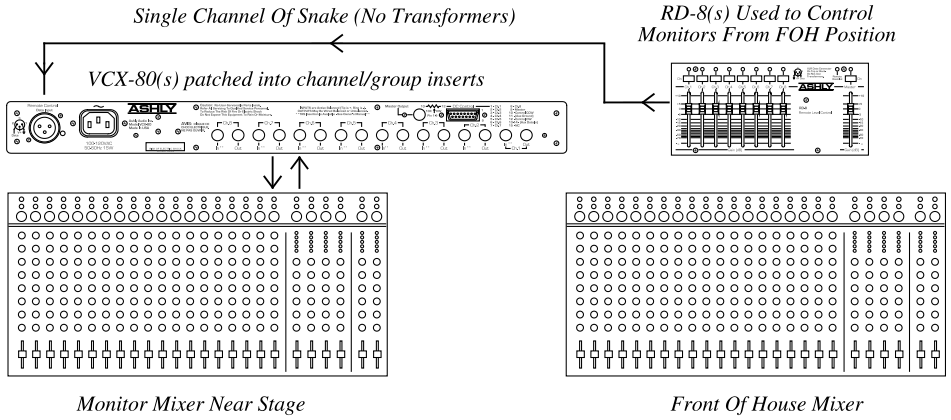
Remote Control Of Stereo Sources

8.2 Remote Control Of Stereo Sources

Here the RD-8 remote controller or a touch panel controller may be used to simultaneously control two VCX-80 units for remote control of stereo audio sources. Since each VCX-80 has a master output, no additional mixer is needed. Contact a factory Technical Service Representative for details on using a touch panel controller.

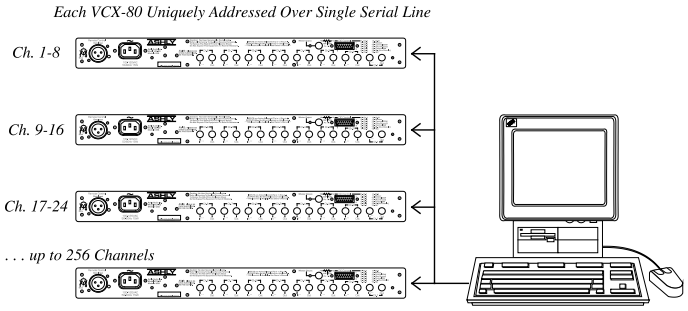
8.3 Remotely Controlled Stage Monitor Mixer

In live sound where a separate stage mixer is used for the monitor system, one or several VCX-80 units can be inserted into the monitor mixer's group or channel insert points to control monitor mix levels from the front-of-house mixing position, eliminating the need for a second sound engineer on stage. Each RD-8 remote controller is connected using an available snake channel (*no transformers*). The RD-8 can be rack mounted using an optional rack mounting bracket allowing one or two RD-8's to mount in two rack spaces (3.5 inches).



Stage Monitor System With Front Of House Control

One or more VCX-80 units can also be used to allow stage musicians to mix their own monitors from where they stand. If there is only a front of house console in the system, direct channel, vocal subgroups, or instrument subgroup outputs can feed into VCX-80 inputs. A separate RD-8 controller is used on stage with a VCX-80 for each monitor zone.



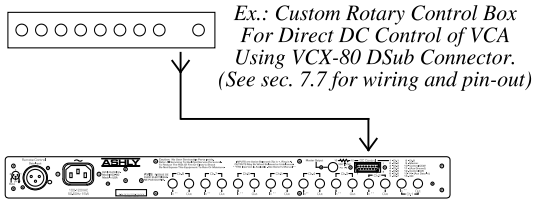
Master Control Of Large/Distibuted Sound System

8.4 Master Control of Distributed Sound System

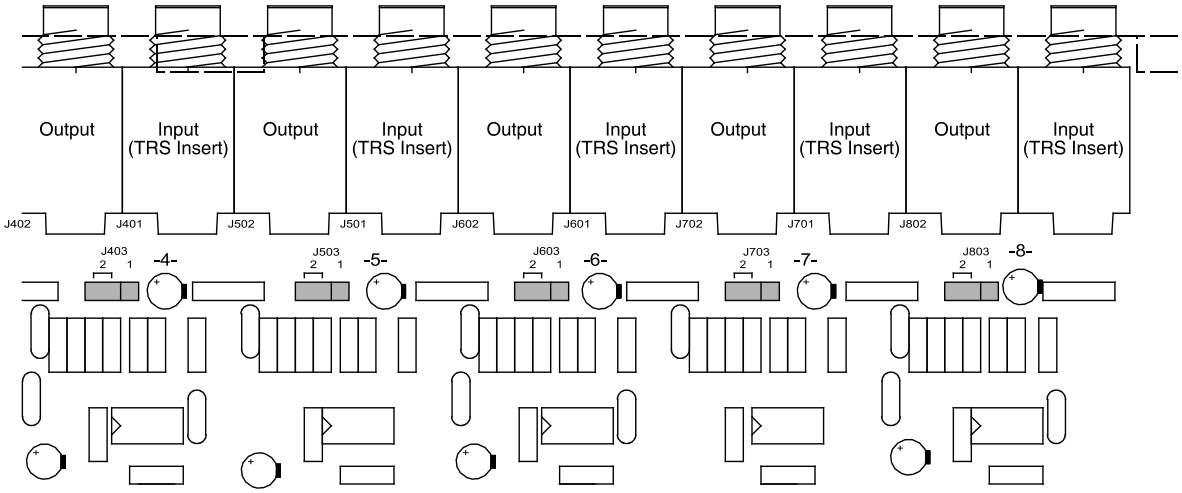
In this example, a personal computer is used to communicate through its standard RS-232 serial port to several VCX-80 units. 256 total channels are addressable by the PC. Each VCX-80 can be internally selected to respond to any of 32 banks of 8 contiguous channels. Contact a Technical Service Representative for information regarding software availability.

8.5 DC Remote Control

In this example, the remote control functions of the VCX-80 can be used without a "smart" controller. All you need is the controls, some wire, and a box or panel to mount them in (see sec.7.7 for correct wiring and pin-out). We recommend using 10K ohm linear taper potentiometers to connect directly to the control voltage port of the VCX-80. The dedicated DB 15 pin connector is used to connect your control device to the internal VCA circuits. It is also important to use only the DC voltage supplied by the VCX-80 in order to obtain proper control voltage levels from the potentiometers.



DC Remote Control Using "Homemade" Control Box



Jumper JX03 Is Moved To #1 Position (right) To Convert To TRS Insertion. Output Jack Is Not Used.

9.0 CHANGING FACTORY CONFIGURATIONS

9.1 Changing to Single TRS Insert Jack

The VCX-80 is shipped from the factory configured for separate input and output jacks on each channel. Each channel may be independently configured for a single TRS insert jack where the VCX-80 input is on the tip and the output is on the ring. To make this change, refer the following procedure to a qualified service technician.

Unplug the unit's AC power cord. Remove the top cover which is fastened by 7 - 6/32 screws. Locate a 3-pin header labeled JX03 near the input and output jacks of the corresponding channel X. Remove the shunt bar from the normal position (2) indicated on the circuit board legend and place the shunt on the other position (1) of the 3-pin header. To avoid possible confusion at a later time, indicate somewhere on the VCX-80 back panel that the In/Out configuration has been modified to single jack insertion.

10. TROUBLESHOOTING TIPS

10.1 No Output

Check AC power - is green power LED indicator on? Check input/output connections - are they reversed? Is the Master Attenuator control turned fully up? Are remote controller channels switched on? Are the input/output jacks configured correctly (one jack insert versus two jacks) for the application?

10.2 Very Little Output Signal

Are the yellow Limiter Threshold indicators on often? Rotate the recessed Threshold controls clockwise to allow greater output signals to pass unlimited. Check the Master Attenuator control - normally this control should be fully clockwise at 0dB. Check the RD-8 remote controller -the fader levels should normally be operated around 0dB.

10.3 Distorted Sound

The maximum input signal level is +23dBu = 10.95Vrms. Above this input level, input clipping distortion will occur. Also, if the input signal level plus the gain set by the remote controller goes above +23dBu, output clipping distortion will result.

10.4 Excessive Hum or Noise

Hum and buzz noise is usually caused by a "ground loop" between audio components. Try using balanced input and output connections between the VCX-80 and other components in the system. Also, try to power all components in the system from a single AC branch circuit.

Noise can also be caused by a large amount of gain applied to an insufficiently low input signal. *The VCX-80 is not designed to feed microphones directly into the inputs without a mic preamp first.* The VCX-80 is essentially a line level unity-gain device, meaning it is designed to be fed by a

nominal 0dBu line level signal and its output should typically be 0dBu in level. To ensure proper gain structure in your sound system, press the remote disable switch in and rotate the Master Attenuator control fully clockwise so that all VCX-80 channels are at unity gain. Adjust your signal source which precedes the VCX-80 for nominal 0dBu signal levels, then push the Remote Disable switch out for remote controllability.

If you still have problems, contact your Ashly dealer or call Ashly direct at (800) 828-6308 ext.125. In New York State call (716) 872-0010.

11. WARRANTY INFORMATION

We thank you for expression of confidence in Ashly products. The unit you have just purchased is protected by a limited five year warranty. To establish the warranty, you must first complete and mail the warranty card attached to your product.

Fill out the information below for your records.

Model Number _____

Serial Number_____

Dealer _____

Date of Purchase_____

Dealer's Address_____

_____

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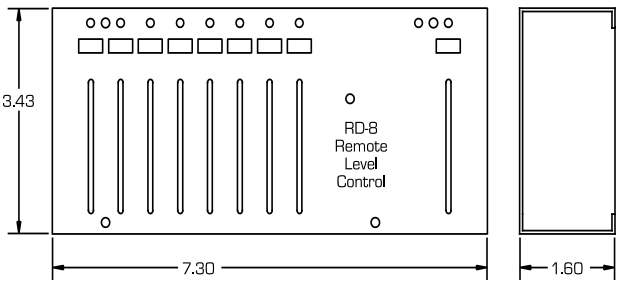
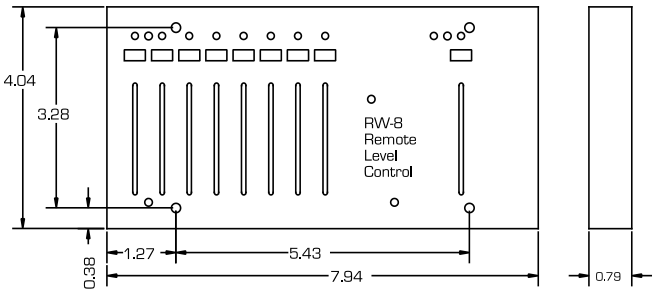
Dealer's Phone _____

Salesperson_____

OTHER INFORMATION:

12. DIMENSIONS





RW-8 Wall-Mount Controller

Rack-Mounting Kit For One Or Two RD-8 Remote Controllers

13. VCX-80 SPECIFICATIONS

13.1 INPUT

Input Type: 1/4" tip-ring-sleeve
Input Impedance:
20K ohm balanced, 10K ohm unbalanced
Max input level: +23dBu
Input jack may be internally selected as a single in/out insert

13.2 OUTPUT

Output Type: 1/4" tip-ring-sleeve
Output Impedance: 200 ohm pseudo-balanced, 100 ohm unbalanced
Max output level: +22dBu

13.3 AUDIO PERFORMANCE

Nominal Gain: 0dB +/-0.5dB
Gain Range: +20dB to -75dB
Frequency Response: +/-0.2dB 20Hz-20KHz
THD: <0.01% at 0dBu and 1KHz
<0.15% at +20dBu, 20Hz-20KHz
Output Hum & Noise:
<-94dBu 20Hz-20KHz unweighted
Crosstalk: <-80dB at 20KHz

13.4 LIMITER

Threshold Range: 23dBu to +22dBu
Compression Ratio: 10:1

13.5 DATA INPUT

Input Type: XLR jack
pin 2=data, pin 3=+V, pin 1=ground
Data Format: 2Vp raised-cosine,
RS-232 or RS-422;
1 start, 9 data, 1 stop bits at 4800 baud

13.6 DC CONTROL INPUTS

Input Type: DB 15-pin female connector
Control Voltage: -4V to +15V provided for external 10K ohm potentiometers

13.7 OVERALL

Size: 19"L x 1.75"H x 6"D
Power Requirements: 98-125VAC, 50-60Hz
18W (240V available)
Shipping weight: 9 lbs.

13.8 RD-8, RW-8 Specifications

Fader Range: +10dB to -75dB
(master fader at 0dB)
Data/Power Connector: Male XLR jack
Max Data Cable Length:
1500 ft. of 24 ga. twisted pair
Data Format: 4800 baud, 2Vp raised cosine
Data crosstalk to audio:
<-120 dB along 1000' of 150 ohm shielded cable

Size: 7.5"L x 3.5"H x 1.75"D
Power Requirements:
Phantom powered by VCX-80
Shipping Weight: 3 lbs.

14. SCHEMATICS

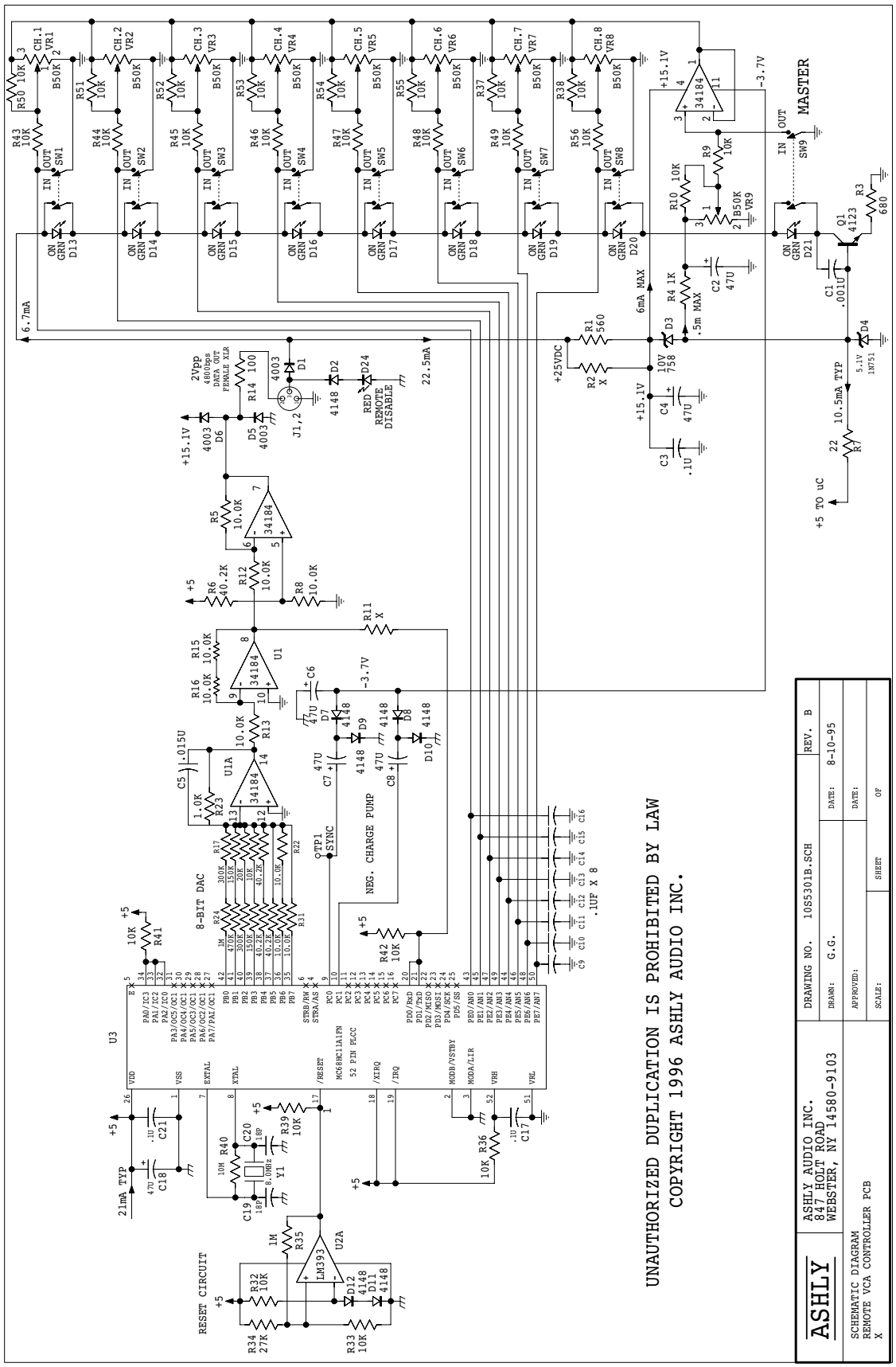


Figure 14.1: RD-8/RW-8 Remote Control Schematic Diagram

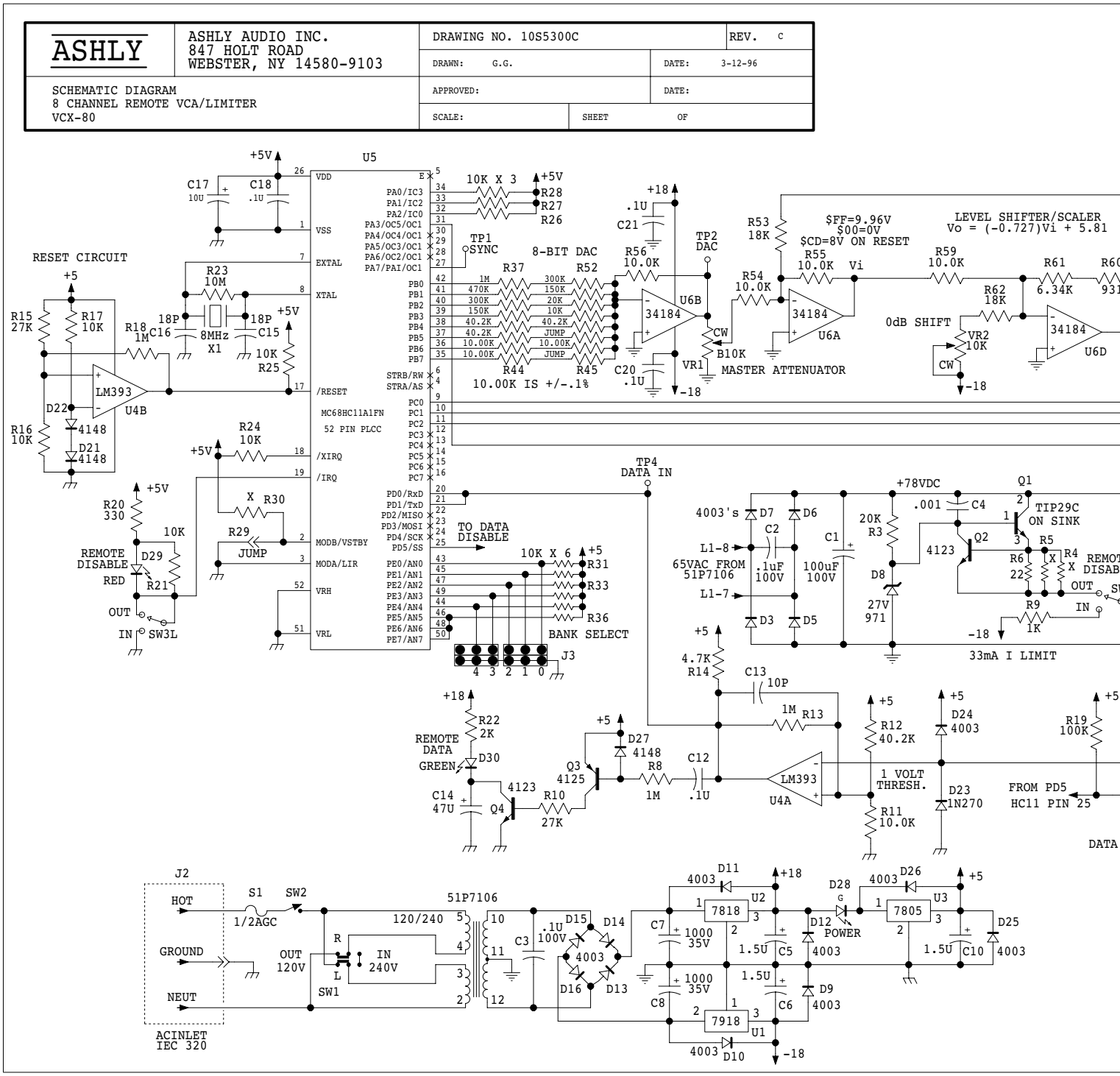
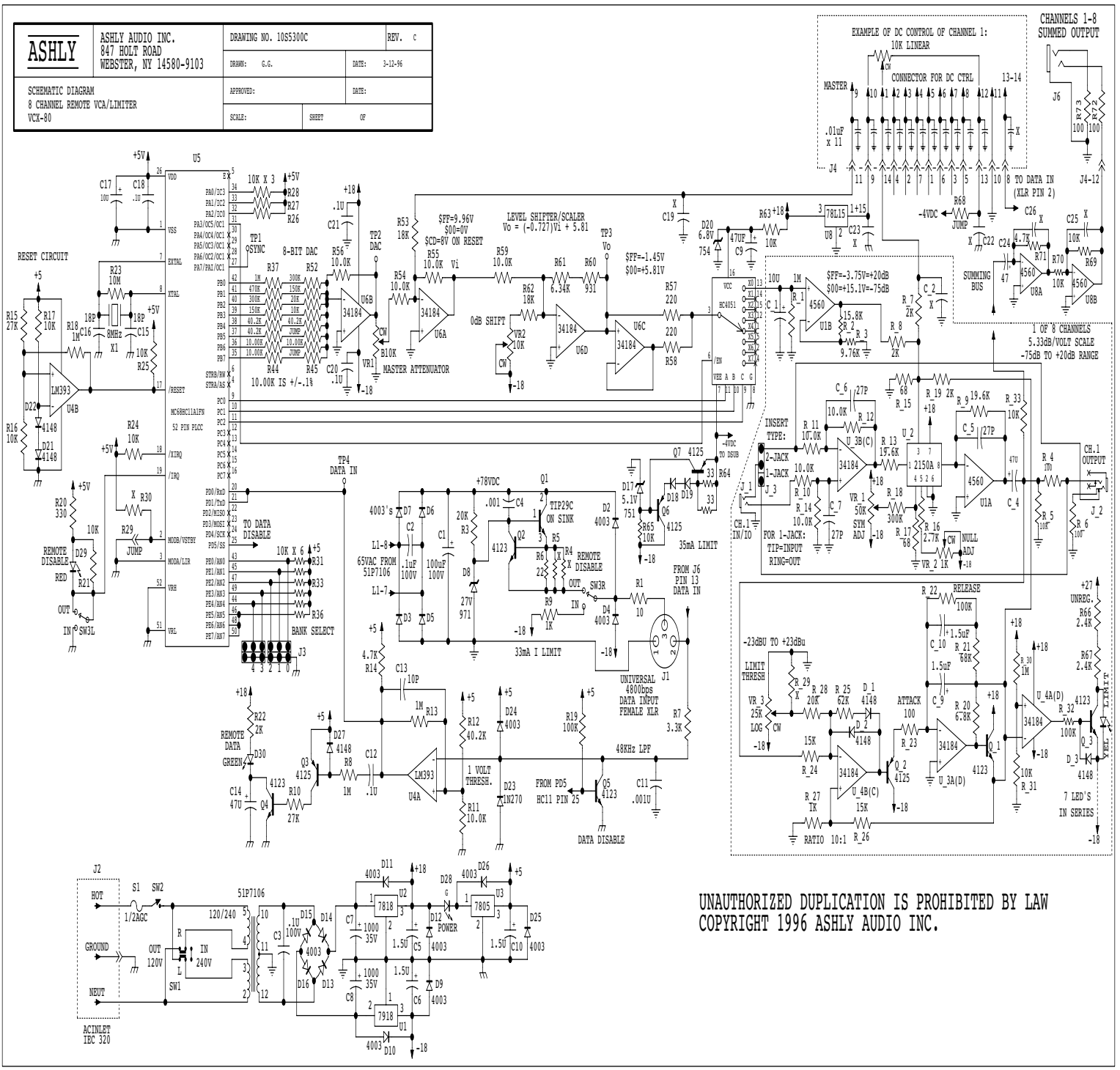


Figure 14.2: VCX-80 Eight Channel VCA Schematic Diagram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DATE: 3-12-96
SCHEMATIC DIAGRAM
8 CHANNEL REMOTE VCA/LIMITER
VCX-80
APPROVED:
DATE:
SCALE:
SHEET OF
EXAMPLE OF DC CONTROL OF CHANNEL 1:
10K LINEAR
CONNECTOR FOR DC CTRL
MASTER
CHANNELS 1-8
SUMMED OUTPUT
TO DATA IN
(XLR PIN 2)
RESET CIRCUIT
8-BIT DAC
MASTER ATTENUATOR
LEVEL SHIFTER/SCALER
Vo = (-0.727)Vi + 5.81
0dB SHIFT
SUMMING BUS
1 OF 8 CHANNELS
5.33dB/VOLT SCALE
-75dB TO +20dB RANGE
INSERT TYPE:
2-JACK
1-JACK
FOR 1-JACK:
TIP=INPUT
RING=OUT
CH.1 OUTPUT
CH.1 IN/IO
TO DATA DISABLE
REMOTE DISABLE
REMOTE DATA
BANK SELECT
65VAC FROM 51P7106
35mA LIMIT
33mA I LIMIT
UNIVERSAL 4800bps DATA INPUT FEMALE XLR
FROM J6 PIN 13 DATA IN
FROM PD5 HC11 PIN 25
DATA DISABLE
TIP29C ON SINK
REMOTE DISABLE
1 VOLT THRESH.
40KHz LPF
LIMIT THRESH
ATTACK
RELEASE
RATIO 10:1
7 LED'S IN SERIES
LED LIMIT
ACINLET IEC 320
51P7106
120/240
120V
240V
1/2AGC
HOT
GROUND
NEUT
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