INSTRUCTION MANUAL

MODEL 210-01 CATV RECEIVER

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MODEL 210-01 CATV DEMODULATOR

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MODEL 210-01 CATV AUDIO/DATA DEMODULATOR

SECTION 1 GENERAL

1.1 Equipment Description - The Series 210-01 operates with standard CATV cable systems to provide a paging system by receiving the paging audio signal and a data control signal which determines if the paging message is intended for the location it is programmed for. Detected data is decoded to determine if the audio is intended for this location as determined by the location code selected by two BCD switches on the front panel. When the data matches the location code of this unit, it switches audio from an external audio source to the paging audio. A "Carrier Presence" LED , "Data Activity" LED, and "Power" LED indicates the operating status of the Series 210-01 . Connectors are RCA Phono plug for external audio in and switched audio out (unbalanced), F connector for CATV in, and 2.1mm power connector. Power is provided by a wall mount power supply.
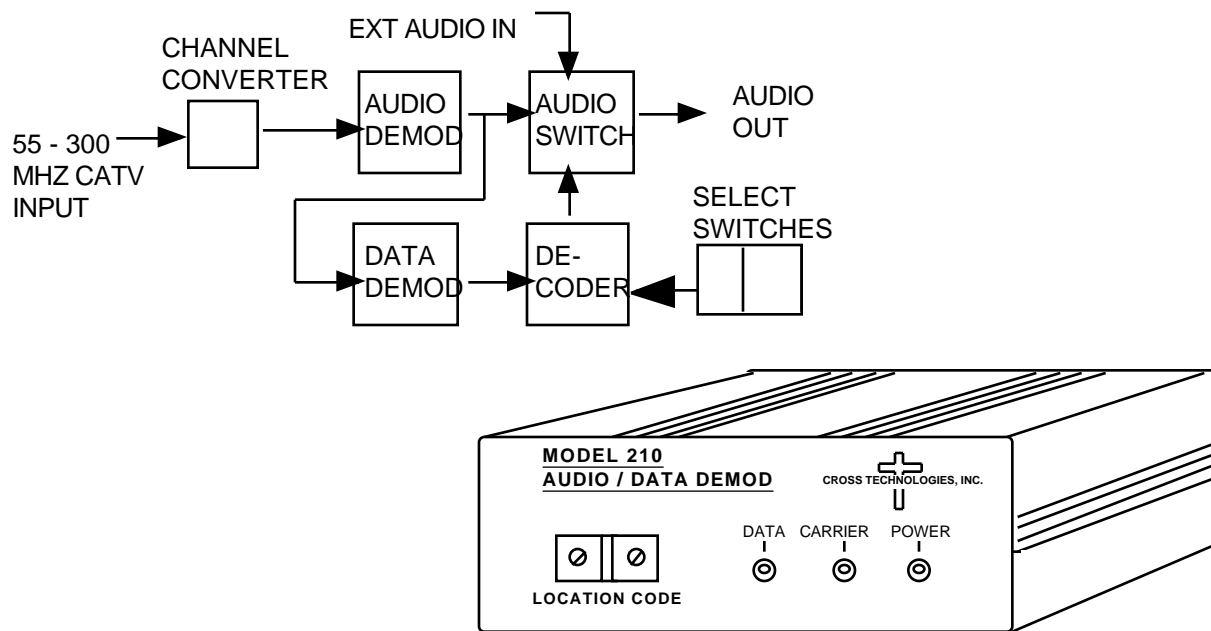

FIGURE 1.1 210-01 Block Diagram and Chassis

1.2 Technical Characteristics

TABLE 1.0 210-01 CATV AUDIO/DATA DEMODULATOR *

Input Characteristics
Input Impedance/RL	75 /12 db
Frequency Range	55 to 200 MHz (factory set, 177MHz for -01)
Input Level	-70 TO -30 dBm

RF Channel Characteristics
Bandwidth	300 kHz total
Spacing, audio, data	1 MHZ
Spurious Response	< -37 dBmV (-86 dBm)

Audio Channel Characteristics
Frequency Response	±2 dB, 50 Hz to 12 kHz
Level	+8 dBm PPL (adjustable)
Impedance out	100 ohms, unbalanced
S/N	> 50 dB

Data Channel Characteristics
Type	AFSK
Rate / BER	9600 baud / >10^{-6}

Controls
Location Code	Two BCD switches

Indicators
Carrier; Data; DC Power;	Red/Green, Green, Green LEDs

Other
Connectors RF, Audio, DC	F, female, RCA Phono, 2.1mm
Size, Bench Top	4.7" wide X 1.75" high X 8.0" deep
Power	115 ± 10% VAC, 60 Hz, 10 watts max, wall PS (+12 VDC, 500 ma, unregulated)

*+10 to +40 degrees C; Specifications subject to change without notice

2.0 Installation

2.1 Mechanical - The 210-01 is packaged in an aluminum extrusion. The **-R option** is mounted on a 1 3/4" X 19" panel that can be mounted to a rack using the 4 holes at the ends. It derives +DC from the wall power supply (+12V unregulated). See Figure 2.1.

WALL POWER SUPPLY

REAR SCREWS (4EA)

BACKPLANE

EXTRUSION

FRONT PANEL

PCB ASSEMBLY

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2004 TEST UPCONVERTER

-25 -45 -65

1. 3 8 3

UP DOWN

IF LVL REM GAIN ALARM   FREQUENCY (GHZ)   TUNE

FRONT SCREWS (4EA)

RACK MOUNT PANEL (FOR -R MODELS ONLY)

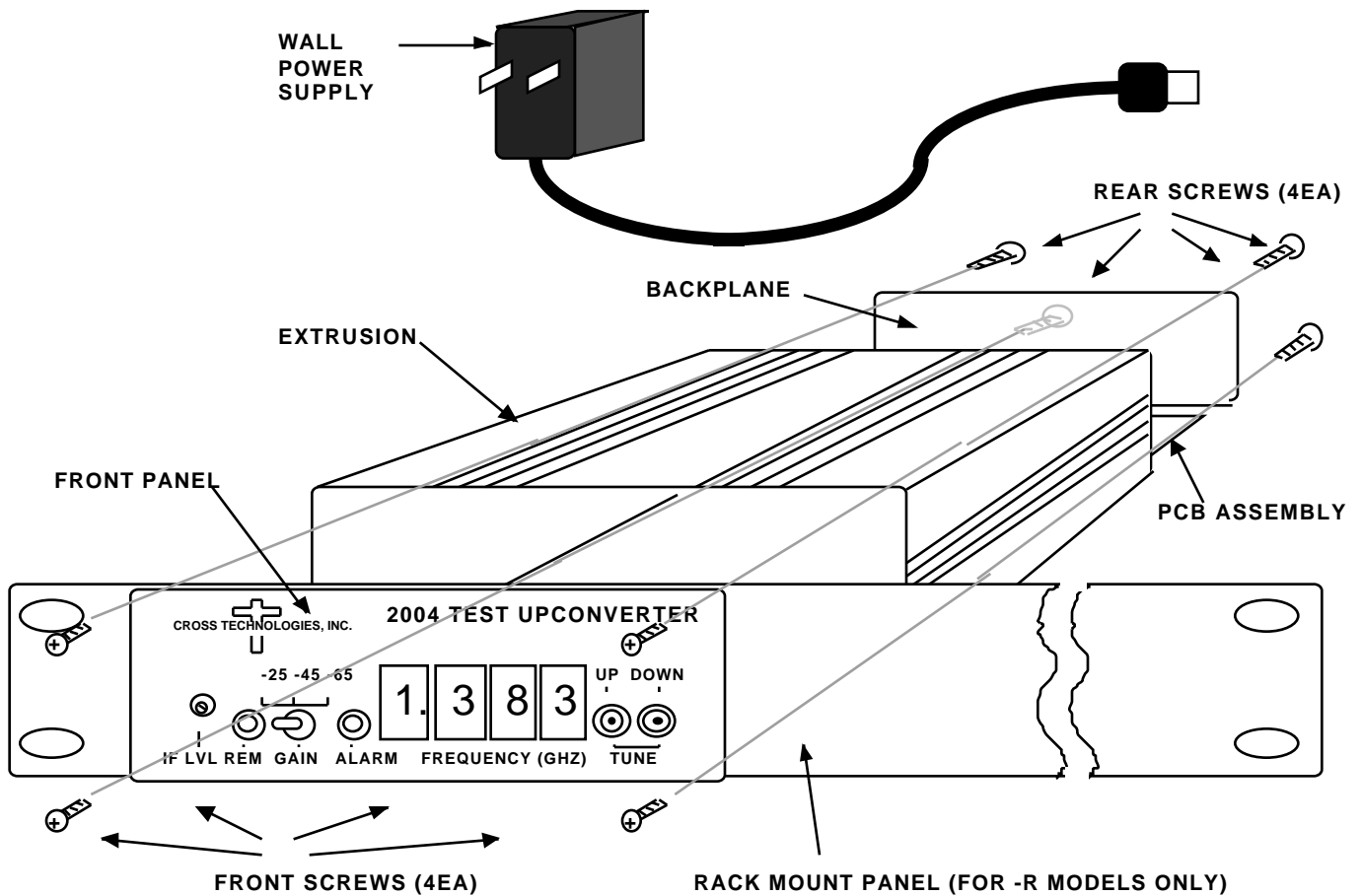**FIGURE 2.1 SERIES 2000 ASSEMBLY DRAWING**

2.2 Controls and Indicators - See Figure 2.2 .

2.3 Input / Output Signals - See Figure 2.3.

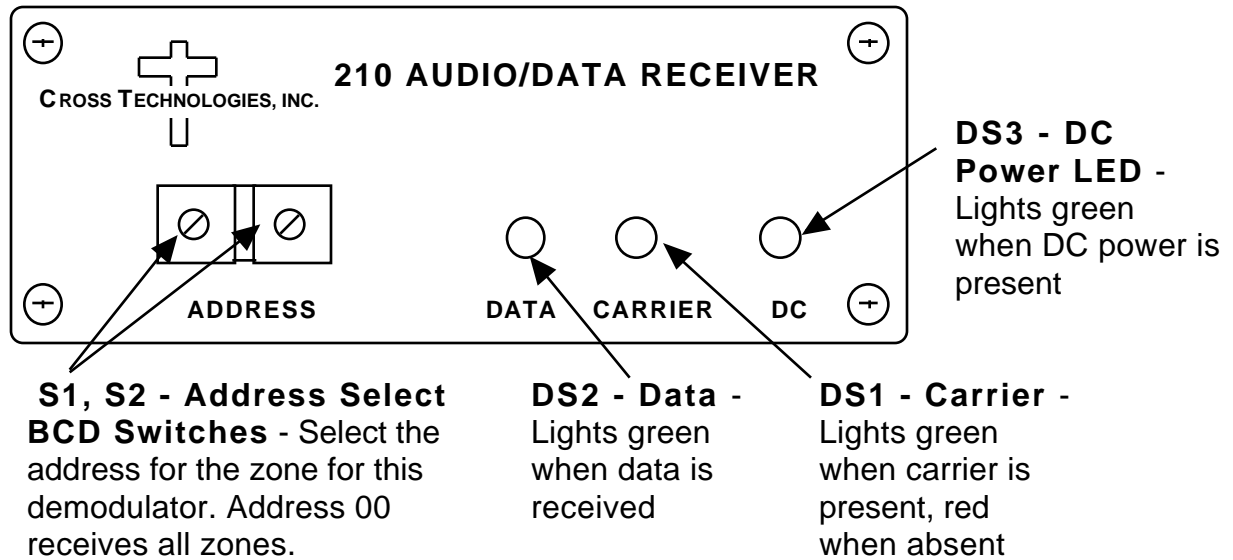**210 AUDIO/DATA RECEIVER**

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DS3 - DC Power LED - Lights green when DC power is present

ADDRESS   DATA   CARRIER   DC

S1, S2 - Address Select BCD Switches - Select the address for the zone for this demodulator. Address 00 receives all zones.

DS2 - Data - Lights green when data is received

DS1 - Carrier - Lights green when carrier is present, red when absent

FIGURE 2.2 210-01 Front Panel Controls and Indicators

J1 - DC POWER - The +12 VDC unregulated DC voltage from the wall power supply

External Audio Level Adjustment - Single turn potentiometer adjusts external audio. CAREFULLY adjust with small flat blade screwdriver.

GND — ( ) — +12

J4 - Audio In - External audio input. This is a 10 k impedance, RCA Phono jack input.

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DC POWER   RF IN   AUDIO OUT   AUDIO LEVEL

J1   J3   J2

J3 - RF Input - The 50 to 300 MHz input . This is a 75 , F, female connector at -20 to -70 dBm input level.

J2 - Audio Out - The switched audio output adjustable from +8 to -10 dBm measured into 600 . This is a 100 impedance, RCA Phono jack output.

R47 - Audio Level - Ten turn potentiometer which adjusts switched paging audio output from +8 to -10 dBm measured into 600 .
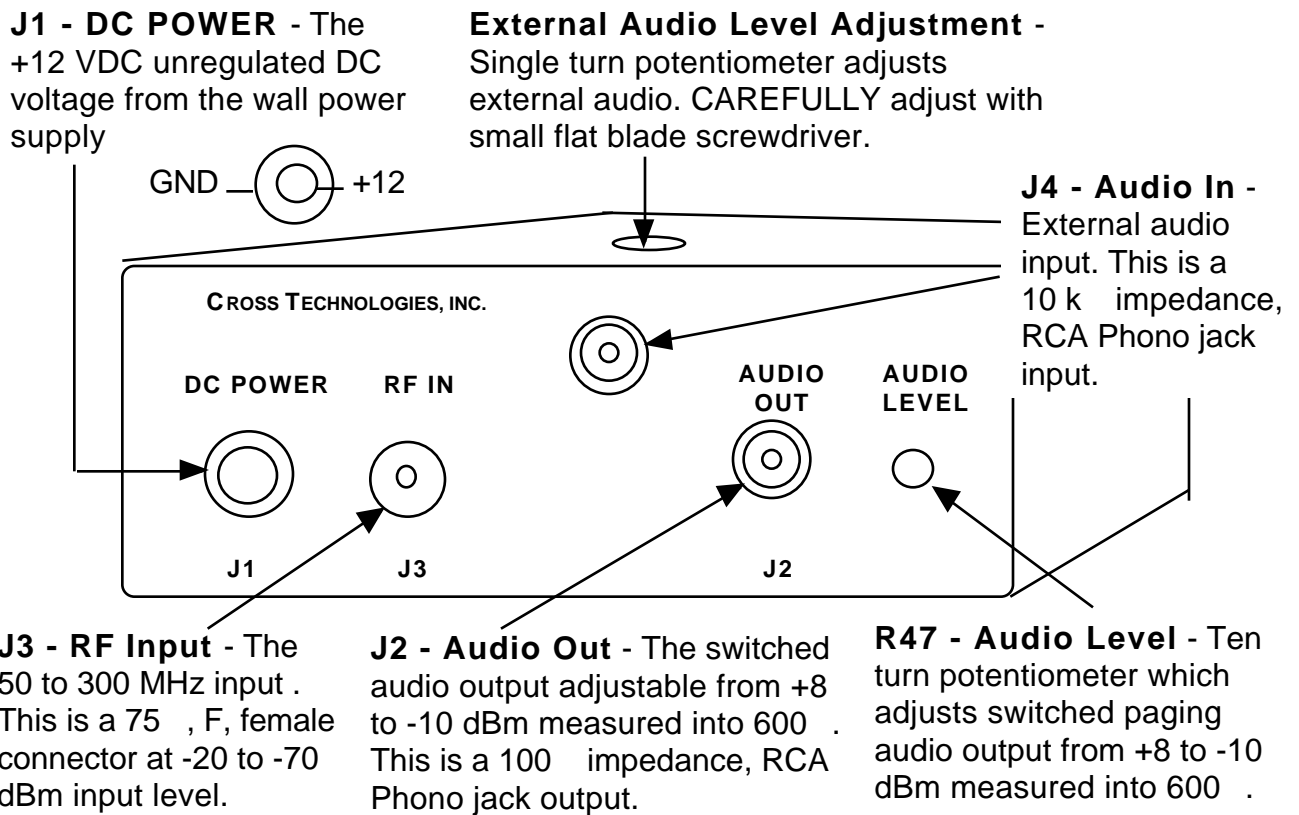
FIGURE 2.3 210-01 Rear panel Inputs, Output, Control

2.4 Installation / Operation -

2.4.1 Installing and Operating the 210-01(Figures 2.1 to 2.3) -

1.) Place the 210-01 where desired. (Attach four rubber feet if desired.)
2.) For the -R rack mount option mount the 1 3/4" panel to a rack using the four end screws on the rack panel.
3.) Connect the wall power supply to 115 VAC, 60 Hz and the power supply 2.1 mm DC connector to the 210-01 (Figure 2.1)
4.) Observe that green power LED (DS1) is illuminated.
5.) Connect RF In, J3 of the 210-01 to the cable TV connector using a 75 cable.
6.) Observe that the green Carrier and Data LEDs are illuminated.
7.) Connect the external External Audio In to J4
8.) Connect the Audio Out, J3 to the external audio amplifier
9.) Set the Address BCD switches to the desired number
10.) Set rear panel Audio Level pot, R47 to the desired paging volume.
11.) Using a small flat blade screwdriver, CAREFULLY adjust the external audio level through the hole on the top back of the chassis.
12.) Note the proper pages reach this location and check address setting if there are any problems.
13.) ADDRESS TEST POSITION SETTINGS. The following Address BCD Switch settings may be helpful for troubleshooting.

> 00 -Audio will be switched ON if a valid packet is received.
>   Note, the packet need not be addressed to the particular decoder.
> 98- Audio page forced OFF (switched to external audio)
> 99- Audio page forced ON (switched to paging audio)

2.4.2 Setting the Front Panel BCD Switch - The address for any particular 210-01 is assigned via two front panel rotary BCD switches. These switches provide a possibility of 100 settings, displaying 00-99. These settings are assigned as follows:

> 00   Special function Audio will be switched ON if a valid packet is received.

Note, the packet need not be addressed to the particular decoder.

    01-96   Address assignment for 210-01, address 01 96 respectively
    97   Undefined
    98   Audio page forced OFF (switched to external audio)
    99   Audio page forced ON (switched to paging audio)

The microprocessor reads the front panel switches every 1 second , and stores the address or applies the special function described above. When a serial stream is received, the microcontroller sets the output audio switch to the state indicated by it's corresponding bit.

2.4.3 - RF Frequency Changes (Replace U10) - The RF frequency is programmed by the internal controller and the frequency programmed is indicated on the rear panel. Figure 2.4 shows the location of the controller. To remove U10 and replace it with a new controller at a different frequency:

    1.) **Remove DC Power**.
    2.) Remove four (4) **rear panel screws** (see Figure 2.1).
    3.) **Gently** pull the backplane and PCB assembly completely out of the extrusion.
    4.) With the **wall power supply disconnected**, and **TAKING PROPER ESD PRECAUTIONS** Replace U10 and install new controller. **CAUTION! BE SURE PIN I OF U10 IS AS SHOWN** (Figure 2.4).
    5.) **Remove adhesive from the supplied LO frequency label and place over existing label**
    6.) **Always be sure power is removed** when installing the PCB in to the extrusion. Make sure the shield goes in the lower channel and the PCB in the next channel above that in the extrusion.
    7.) **Gently** push the backplane and PCB assembly completely in to the extrusion so the front panel controls go through the front panel.
    8.) Install four (4) **rear panel screws**.
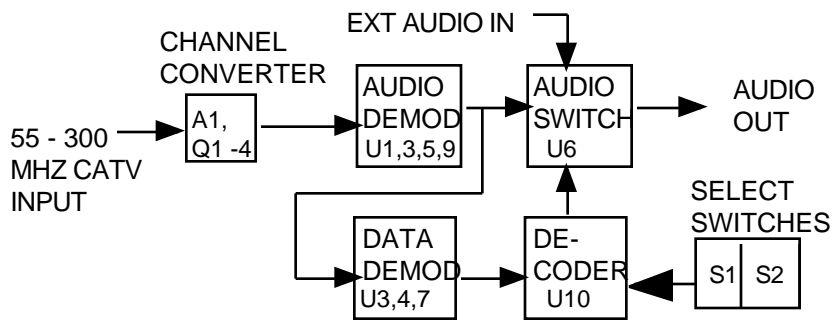   9.) Connect RF to 210-01 and note that all LEDs are green.

3.0 Circuit Description

FIGURE 3.1 210-01 Block Diagram

3.1 Block Diagram Description - 210-01 (Figure 3.1) - The 50 to 300 MHz input (J1) signal first goes to the CATV tuner A1 which converts the desired input frequency to a 45 MHz IF. Commands to select the tuner frequency are provided serially from microcontroller U10. The 45 MHz signal then goes to the bandpass filter consisting of Q1 - Q4 and associated circuitry. This signal next goes to FM demodulator consisting of U1,U9 and associated circuitry. U3B and U5A provide a 12 kHz lowpass filter for the audio signal and U5B is the output audio amplifier.

The demodulated FM signal from U1, U9 also goes to 21 - 31 kHz bandpass filter which selects the AFSK data carrier which is sent to the AFSK demodulator U7. This 9600 b/s ASYNC data goes to microcontroller U10 which decodes the incoming 9600 kB/s ASYNC data stream, detects the desired state of the output audio switch U6 and provides the switch command signal to audio switch U6 based on the position of the BCD address switches S1, S2. Crystal Y1 determines the 3.6864 MHz clock frequency for the microcontroller U10. VR1 and VR2 provide regulated +5 and +9.5 voltages and U8 provides -9.5 VDC. Unregulated +12 VDC is connected to J1. LEDs DS1, DS2, and DS3 provide indications of carrier presence, data activity, and DC power, respectively.

3.2 Command Code Description - The 210-01 demodulates a multiplexed audio channel and data channel. The audio channel delivers a voice paging. The data channel provides addressable control information. The 210-01 utilizes a Microchip 16C63 processor to receive and process control data, and to control the audio switch.

3.2.1 Command Stream - The command stream is provided as an Asynchronous RS232 data channel, running at 9600 baud, with NO parity, 8 bits/character, and 1 stop bit. This data stream contains packets of control data, and is transmitted to the 210-01 continuously. The structure of the command stream consists of the following bytes:

H1 | H2 | H3 | H4 | A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 | A9 | A10 | A11 | A12 | CHECKSUM

H1 - H4 - The reception of fixed header bytes, H1 H2, H3, H4 indicates that the next 12 bytes contain the bit assigned address of each 210-01 which is to enable and provide paging audio.

A1 A12 -These twelve address bytes, select 96 bit assigned addresses, for control of the audio for each address.

CHECKSUM - This byte contains the CHECKSUM for error detection.

3.2.2 Front Panel BCD Switch - The address for any particular 210-01 is assigned via two front panel rotary BCD switches. These switches provide a possibility of 100 settings, displaying 00-99. These settings are assigned as follows:

    00   Special function Audio is be switched ON if a valid packet is received.
           Note, the packet need not be addressed to the particular decoder.
    01 96 Address assignment for 210-01, address 01 96 respectively
    97   Undefined
    98   Audio page forced OFF (switched to external audio)
    99   Audio page forced ON (switched to paging audio)

The microprocessor reads the front panel switches every 1 second , and stores the address or applies the special function described above.

3.2.3 Tuner Load - The microprocessor programs the tuner, A1. The microprocessor refreshes the tuner approximately every 30 seconds.

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