



# **Model 935A**

## **Dual Tone Sender**

### **INSTRUCTION MANUAL**

Monroe Electronics  
100 Housel Ave | Lyndonville | NY | 14098  
800-821-6001 | 585-765-2254 | fax 585-765-9330  
[monroe-electronics.com](http://monroe-electronics.com)

Printed in USA | Copyright© | Monroe Electronics, Inc.  
Specifications subject to change without notice

P/N 1340020  
7/20/04

# TABLE OF CONTENTS

Warranty	Page 3
General Description	Page 4
Installation	Page 5
Theory of Operation	Page 6
Operation and Adjustment	Page 7
Figure 1 – Barrier strip	Page 8
Figure 2 – 935A Block Diagram	Page 9
Figure 3 – Cover/Push buttons	Page 10
Figure 4 – 3223B-2	Page 11

## **WARRANTY**

Monroe Electronics, Inc. warrants to the owners, each instrument and sub-assembly manufactured by them to be free from defects in material and workmanship for a period of one year after shipment from factory. This warranty is applicable to the original purchaser only.

Liability under this warranty is limited to service, adjustment or replacement of defective parts (other than fuses or batteries) on any instrument or sub-assembly returned to the factory for this purpose, transportation charges prepaid.

This warranty does not apply to instruments or sub-assemblies subjected to abuse, abnormal operating conditions, or unauthorized repair or modification.

Since Monroe Electronics, Inc. has no control over conditions of use, no warranty is made, or implied as to the suitability of our product for the customer's intended use.

THE WARRANTY SET FORTH IN THIS ARTICLE IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES AND REPRESENTATIONS, EXPRESS, IMPLIED OR STATUTORY INCLUDING, BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS. Except for obligations expressly undertaken by Monroe Electronics, in this warranty, Owner hereby waives and releases all rights, claims and remedies with respect to any and all warranties, express, implied or statutory (including without limitation, the implied warranties of merchantability and fitness), and including but without being limited to any obligation of Monroe Electronics with respect to incidental or consequential damages, or damages for loss of use. No agreement or understanding varying or extending the warranty will be binding upon Monroe Electronics unless in writing signed by a duly authorized representative of Monroe Electronics.

In the event of a breach of the foregoing warranty, the liability of Monroe Electronics shall be limited to repairing or replacing the non-conforming goods and/or defective work, and in accordance with the foregoing, Monroe Electronics shall not be liable for any other damages, either direct or consequential.

## **RETURN POLICY TO FACTORY**

Materials returned to Monroe must have a Return Material Authorization number. To obtain a RMA number, contact our A/V Switching & Control Customer Service at 585-765-2254 or fax 585-765-9330. Customers have 30 days to determine that the product ordered fills their need and performs as described in Monroe's literature. Units returned for approved repair or credit, must be in the original packaging including all parts and paperwork plus be in very good physical condition. If not, the customer is billed the cost to refurbish the unit and for missing accessories and merchandise. No products may be returned for exchange or credit after 12 months of the shipment date. Monroe reserves the right to repair or replace units under warranty.

# GENERAL DESCRIPTION

## **Purpose of Equipment:**

The model 935A Dual Tone Sender is a preprogrammed dual tone (Touch-Tone) encoder. It is intended to generate cue tone sequences to be transmitted with satellite CATV audio to provide automated control of various receiver and switching functions at CATV receiver sites.

## **Description of Equipment:**

The Model 935A is supplied in a wall mount enclosure measuring approximately 6 1/4 inches long, 3 3/4 inches wide and 2 1/4 inches deep. A wall mount transformer / power supply is furnished with the 935A.

Four pushbutton switches are provided to select the proper code sequence to be transmitted.

An eight-terminal barrier strip, accessible by removing the enclosure cover, provides terminal connections for the power supply, audio output and remote selection of tones.

Up to two four-digit "on-off" code sequences can be provided. The code sequences may be altered by changing the plug-in memory in the Model 935A.

# INSTALLATION

## General:

An eight-terminal barrier strip is provided for making the necessary connections to the Model 935A, refer to Figure 1 on page 8.

## Installation:

1. Remove the two screws holding the cover on the 935A enclosure. Refer to figure 3 on page 10.
2. Carefully remove the cover; the four pushbutton switches on the cover are attached to the terminal strip by an eight-inch wire harness allowing the cover to be placed to one side of the base for access to the terminals.
3. Connect a two-wire audio cable of required length across terminals 7 and 8 and attach the other end to the input of your mixer or other appropriate input to allow the 935A output to place the cue tone audio on your program audio.

## Remote Installation:

The Model 935A may be operated by external equipment providing relay closures controlled by timers or remote switchers.

Terminals 1 through 4 on the barrier strip provide connections to duplicate the functions of the four pushbutton switches.

The following connections will be required:

To Control Switch Number:	Connect Normally Open Relay Contact Across:
1	1 and 5
2	2 and 5
3	3 and 5
4	4 and 5

The remote equipment will now control the operation of the 935A. The pushbutton switches can still be used for local control if required.

# THEORY OF OPERATION

## General:

The Model 935A Dual Tone Sender contains a Model 3223B Encoder Controller and a Model 3171B Dual Tone Encoder both powered by the wall mount power supply provided with the instrument.

A block diagram of the 935A is provided in Figure 2 on page 9.

## Theory Of Operation:

A contact closure at one of the four pushbutton switches on the 935A causes the Model 3223B-2 Encoder Controller to provide the programmable memory in the Model 3171B with a binary input sequence. Any one of the four sequences is selected upon the pressing of the specific push button.

Upon receiving the proper BCD input sequence, the memory supplies the digital tone generator in the 3171B with a logic low for a row and a column for each of the four digits in the programmed sequence.

The output of the digital tone generator, a series of four dual tone digits, is amplified and connected to the 935A output terminals through the output transformer.

# OPERATION AND ADJUSTMENT

## General:

The Model 935A provides an audio output consisting of four dual tone digits transmitted in a rapid burst. The code to be transmitted is selected by pressing one of the four push buttons as indicated by the labels on the cover.

## Operation:

The push buttons, illustrated in Figure 3 on page 10, control the tone sequence as listed below:

<u>Switch</u>	<u>Function</u>
S1 (Red)	Sequence A "OFF" Code
S2 (Black)	Sequence A "ON" Code
S3 (Red)	Sequence B "OFF" Code
S4 (Black)	Sequence B "ON" Code

The desired tone sequence will automatically be sent when the proper push button is pressed and released or when the controlling relay opens after being closed if remote operation is being used.

## Testing:

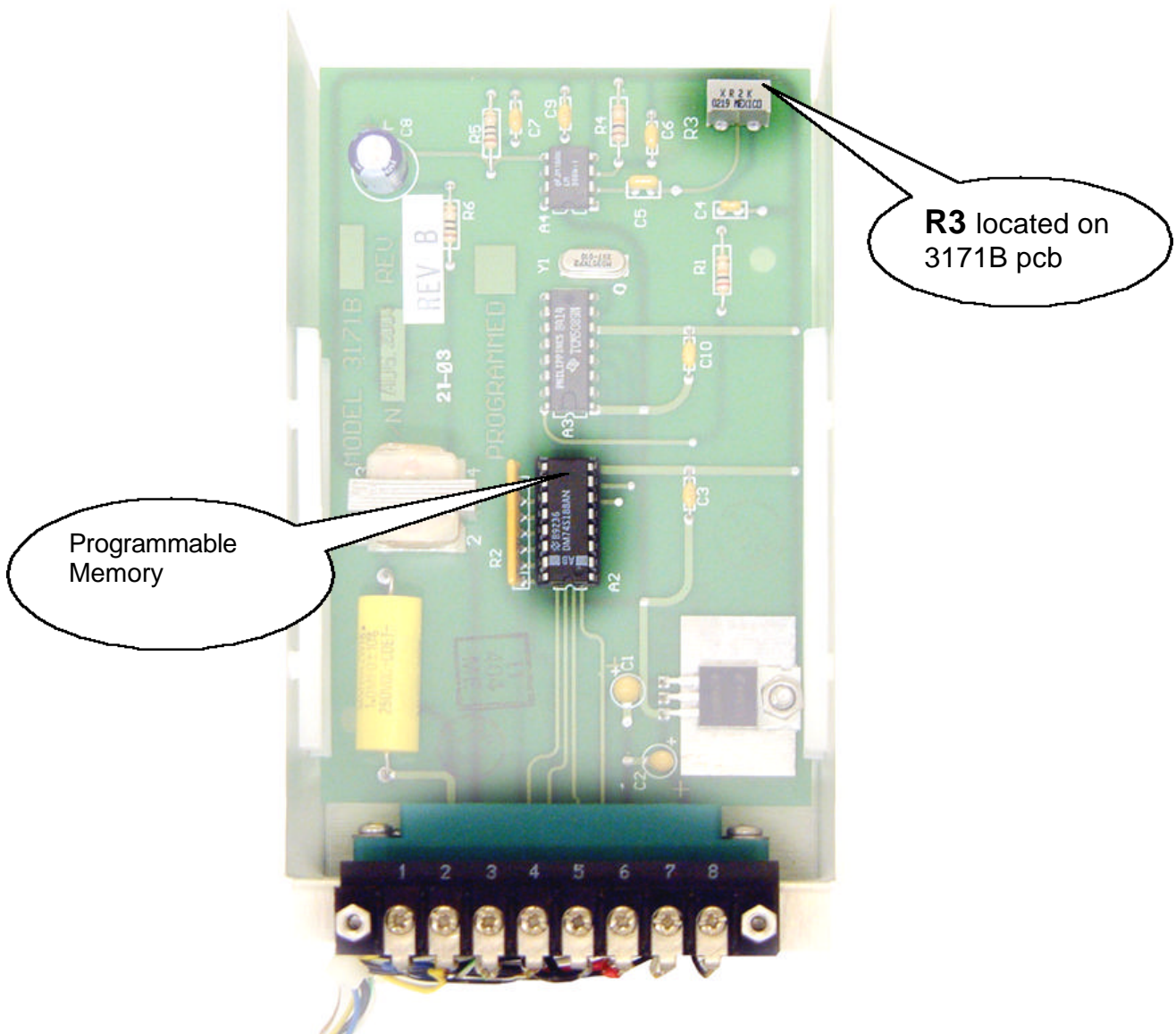
The 935A can be tested for proper installation by listening for the burst of audio tones on the program audio when the proper button is pressed.

### Cue Tone Level:

An oscilloscope may be connected across terminals 7 and 8 if off-the-air testing is required. The audio burst will be detected by the oscilloscope each time a button is pressed. The amplitude should be approximately -12 dB ( $\approx 0.5V_{p-p}$ ;  $\approx 200mV_{rms}$ ). Adjust R3 on 3171B for this amplitude. Refer to Figure 1 on page 8.

### Cue Tone Transmission Rate:

The Cue Tone transmission rate may be adjusted for other than the factory setting of 10Hz (50mSec first pulse width). The Model 3223B-2 (refer to Figure 4 on page 11) has an on board adjustment, R11. Turning R11 clockwise will increase the transmission rate; 12.5Hz = 40mSec, 14.3Hz. = 35mSec first pulse width.

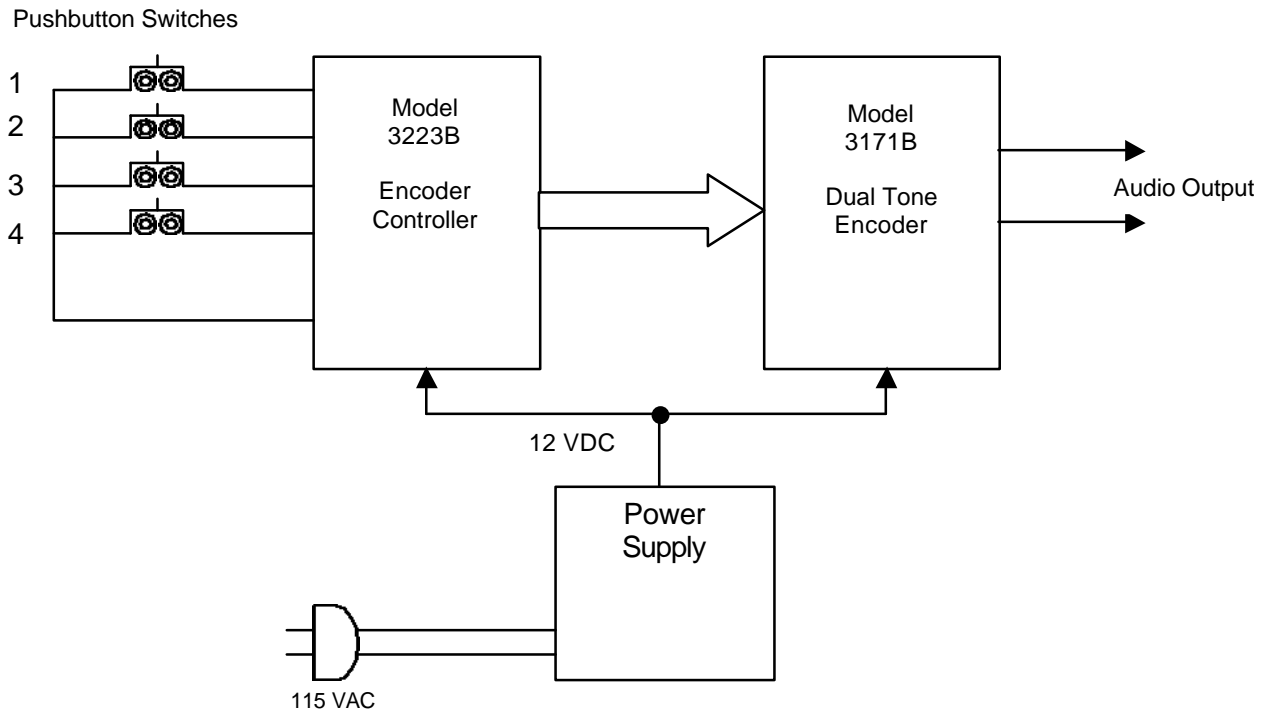


Terminal	Function
1	Switch 1
2	Switch 2
3	Switch 3
4	Switch 4
5	Common
6	+12 VDC IN
7	Output
8	Audio

**Barrier Strip**  
as viewed from top of unit with cover removed

Figure 1





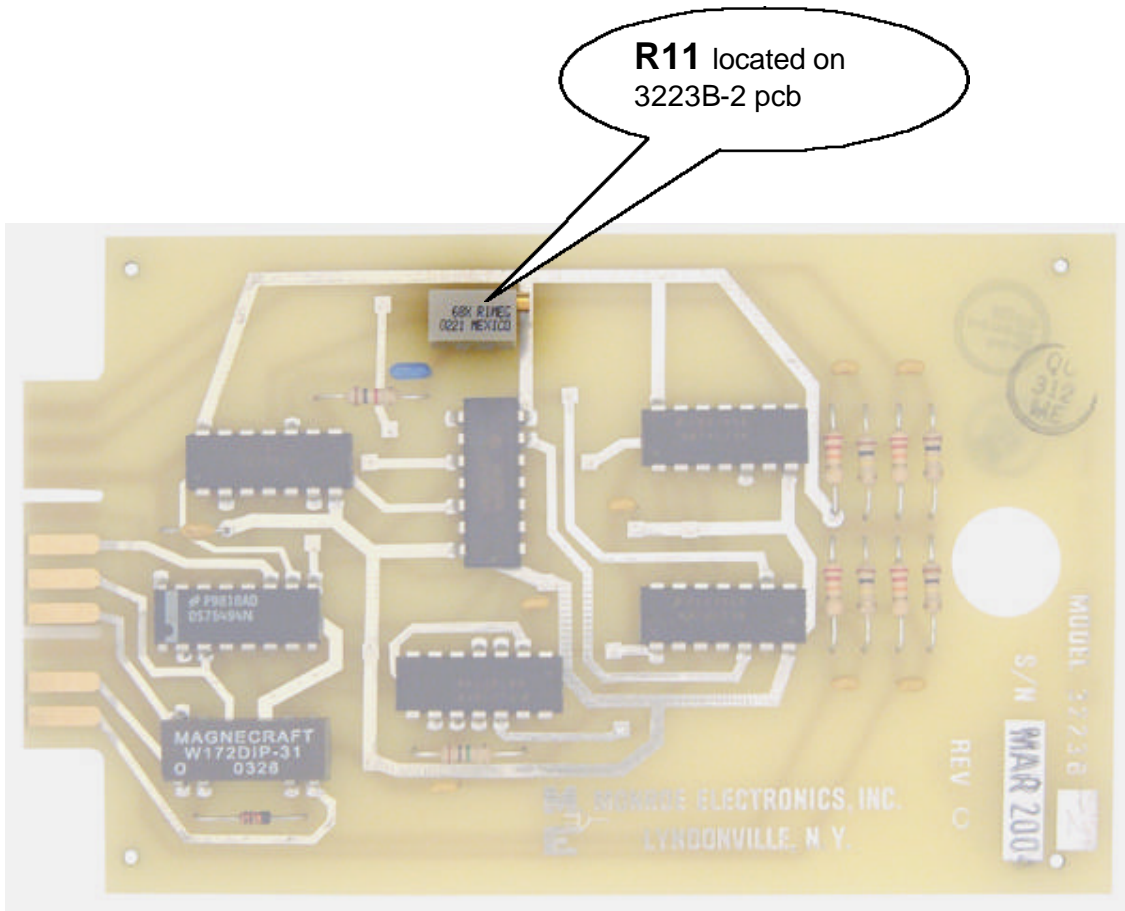
Model 935A Dual Tone Sender  
Block Diagram

Figure 2



Model 935A Dual Tone Sender  
Cover Picture

Figure 3



**R11** located on  
3223B-2 pcb

3223B-2 Encoder Controller

Figure 4