

## TABLE OF CONTENTS

General Description	Section One
Installation	Section Two
Operation	Section Three
Troubleshooting	Section Four
Theory of Operation	Section Five
Schematic Diagrams:	
Mainframe Schematic	3000R-105/1
Unattended Answering Device	3137A-1/1
Dual Tone Decoder	3185A/1
Transformer Coupler	3191-1/1
Power Supply	3212C/1
Relay Board	3292-4A/1

SECTION ONE  
GENERAL DESCRIPTION

A. General

The Monroe Electronics, Inc. Model 3000R-105 Dual Tone Receiver decodes standard CATV audio cue tones to relay contact outputs to permit unattended switching of CATV headend equipment.

The 3000R-105 mainframe is wired to accept up to thirteen plug-in cue tone decoders each capable of decoding standard four digit Touch-ToneR code bursts transmitted by satellite program sources using Monroe Electronics, Inc. Cue Tone Encoders.

An integral FCC registered telephone answering device in the Model 3000R-105 also permits control of the plug-in cue tone decoders from a standard dial-up telephone.

Typical applications of the Model 3000R-105 include unattended switching of cable modulator inputs between two or more satellite program receivers, automatic insertion of character generator messages and remote dial-up telephone control of headend equipment.

B. Unpacking and Inspection

While unpacking the Model 3000R-105 Dual Tone Receiver, inspect the unit for shipping damage. If a claim for damage is to be made, save the packing material and shipping carton to substantiate the claim. File the claim with the carrier and notify Monroe Electronics, Inc. immediately.

Check the packing list included with the shipment to be certain that all items listed have been located. Check the packing material for any small items that may have been packaged separately from the mainframe.

The accessories that are normally supplied with the Model 3000R-105 include:

- 1 Telephone Connector Cable Assembly
- 1 Instruction Manual

NOTE: The telephone cable connector assembly is not supplied with the Model 3000R-105X Expansion Mainframe.

Model 3185A Dual Tone Decoder cards ordered with the Model 3000R-105 are normally shipped plugged into the mainframe. All plug-in circuit cards are listed by model and serial number on the packing slip.

## SECTION TWO

### INSTALLATION

#### A. General

Installation of the Monroe Electronics, Inc. Model 3000R-105 requires the following steps:

- (1) installation of the Model 3185A Dual Tone Decoders

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#### DECODER ADJUSTMENT NOTE

The Model 3185A Dual Tone Decoders are normally factory preset for the customer requested cue tone codes. NO ADJUSTMENT OF THE 3185A DECODERS SHOULD BE NECESSARY. The factory preset cue tone code is engraved on the top (component side) of the circuit card in the area marked "code." If it becomes necessary to change the factory programmed code, refer to the Model 3185A Adjustment Procedure in this manual for instructions.

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- (2) connection of the program audio outputs from the satellite receivers to the rear panel barrier strip terminals on the 3000R-105
- (3) connection of the Model 3185A Dual Tone Decoder relay outputs at the rear panel terminals to the video switcher, switchable modulator, external relays or other devices to be controlled by the 3000R-105
- (4) connection of the telephone line to the barrier strip terminals 70, 71 and 72.

The Model 3000R-105 Dual Tone Receiver contains a Model 3137A Unattended Telephone Answering Device. The following interconnection data must be supplied to your telephone company prior to installation of the receiver:

FCC registration number	AAK-99W-67353-VP-N
Ringer equivalence number	0.0B
USOC jack number	RJ11C

#### B. Installation of the Model 3185A Dual Tone Decoders

The Model 3000R-105 Dual Tone Receiver will accept up to thirteen plug-in Model 3185A Dual Tone Decoders. A Model 3000R-105X Mainframe is available if more than thirteen decoders or more than eight receiver audio inputs are required. Installation of the Model 3000R-105X is described in Part G of this section.

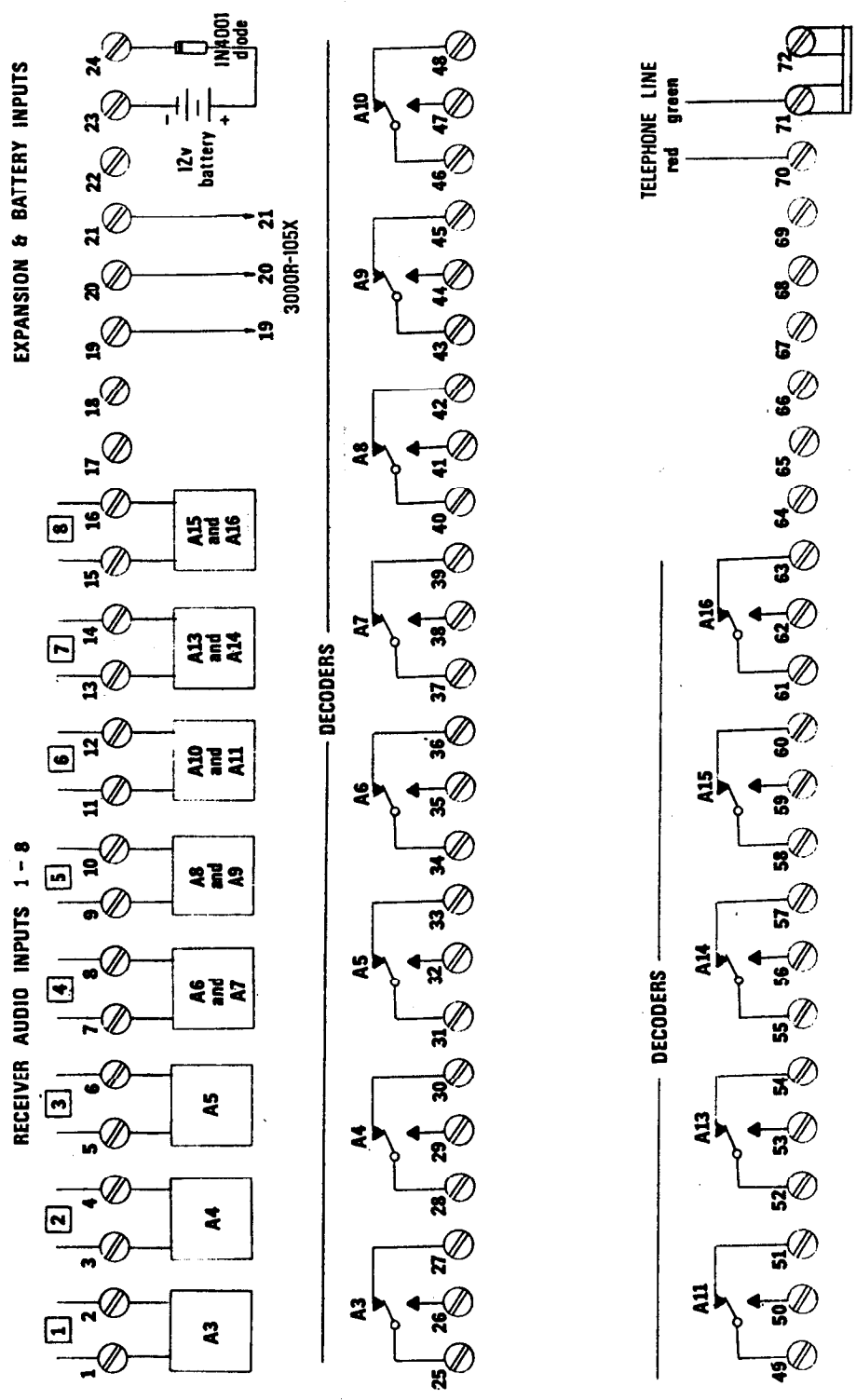


FIGURE 2-1

3000R-105/9-83/KJM

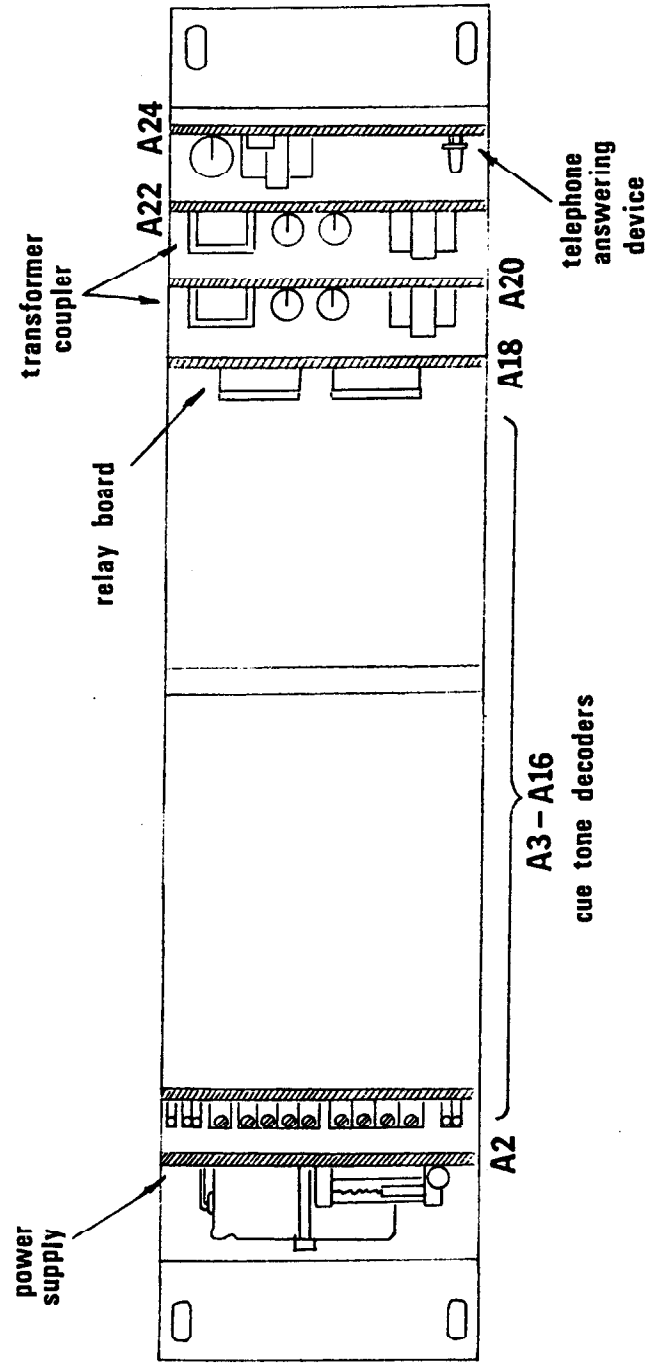


FIGURE 2-2

3000R-105/9-83/KJM

The 3000R-105 is normally shipped with any optional Model 3185A Dual Tone Decoders plugged into the mainframe. For most efficient use of the Dual Tone Receiver, the decoders in mainframe positions A3 through A16 (see figure 2-2) should be grouped as described below.

Remove the Model 3185A Dual Tone Decoders in mainframe positions A3 through A16. DO NOT REMOVE ANY OTHER CIRCUIT CARDS. Refer to figure 2-1 for the location of the 3185A Dual Tone Decoders. Refer to the "Cue Tone Code List," in this manual or any current listing of the CATV cue tone codes.

Each 3185A Dual Tone Decoder is factory programmed to respond to a specific cue tone code sequence; this code is engraved on the top (component side) of the card. Match this code with the transponder shown on the cue tone code list.

Group the Model 3185A Decoders by transponder, i.e., if the codes 186\*/#, 576\*/#, 753\*/# and 679\*/# are all transmitted on the same transponder these four decoders should be plugged into adjacent slots in the 3000R-105.

NOTE: The audio inputs to the 3185A Dual Tone Decoders are arranged with one audio input for two decoders in slots A6 through A16 and with one audio input for one decoder in slots A3 through A5. For most efficient use of the 3000R-105 install any decoders used for program sources having only one code per transponder in slots A3, A4 or A5.

#### C. Program Audio Connection

Rear panel terminals 1 through 16 provide the input connections for the program audio to the Model 3185A Dual Tone Decoder audio inputs. Table 2-1 lists the inputs for each decoder.

TABLE 2-1

Mainframe Slot	Audio Input Terminals
A3	1 and 2
A4	3 and 4
A5	5 and 6
A6 and A7	7 and 8
A8 and A9	9 and 10
A10 and A11	11 and 12
A13 and A14	13 and 14
A15 and A16	15 and 16

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CAUTION

The audio input levels at the rear panel terminals listed above must be greater than 25 millivolts (rms) and less than one volt (rms) or between minus 30 VU and zero VU. The Model 3185A Dual Tone Decoders will not function reliably with excessive audio levels at the input.

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Where it is necessary to supply the same receiver audio to more than two cue tone decoders, two or more audio inputs on the rear panel of the 3000R-105 may be wired together.

D. Relay Output Connection

The Model 3185A Dual Tone Decoder output relays are accessible at terminals 25 through 63 on the rear panel of the Model 3000R-105. Refer to Table 2-2 for the terminal numbers of the common, normally open and normally closed relay contacts for each plug-in decoder in the mainframe.

TABLE 2-2

Mainframe Slot	Relay Output		
	COM.	N.O.	N.C
A3	25	26	27
A4	28	29	30
A5	31	32	33
A6	34	35	35
A7	37	38	39
A8	40	41	42
A9	43	44	45
A10	46	47	48
A11	49	50	51
A13	52	53	54
A14	55	56	57
A15	58	59	60
A16	61	62	63

The relay outputs are rated at 1/4 ampere, 30 volts DC, non-inductive. The contacts should be protected with a 1N4148, 1N914 or equivalent silicon diode across an inductive load.

Terminal 23 provides a +24 volt DC output to operate external relays if required. Terminal 24 provides access to circuit common. The chassis on the 3000R-105 is isolated from circuit common.

#### E. Telephone Line Connection

Terminal strip TB1 on the rear panel of the Model 3000R-105 is provided for connection of the telephone line to permit telephone override operation, if desired.

The telephone cable assembly provided with the Model 3000R-105 plugs directly into a standard modular telephone jack. The three color coded spade lugs on the other end of the cable assembly must be wired to the rear panel barrier strip:

Red to terminal 70  
Green to terminal 71

The yellow terminal will not be used in most installations, do not connect this terminal unless the 3000R-105 will not respond to an incoming call without the yellow terminal connected. The metal shorting bar connecting rear panel terminals 71 and 72 must remain in place for proper operation. The Model 3000R-105 will not "answer" an incoming call on a normal telephone line without this jumper connected.

#### Battery Connection

The plug-in Cue Tone Decoders will automatically return to the OFF state when operating power is removed momentarily. To prevent this change in switch status during a momentary power failure, a 12 volt battery can be installed across rear panel terminals as illustrated in figure 2-1. The positive side of the battery is connected to terminal 24 through a 1N4001 or equivalent diode and the negative side of the battery directly to terminal 23.

#### G. Installation of the Model 3000R-105X Expansion Unit

The Model 3000R-105X doubles the receiver and decoder capacity of the Model 3000R-105 adding eight more receiver inputs and thirteen more Dual Tone Decoder slots to the system.

The Model 3000R-105X contains its own power supply.

The 3000R-105X contains no telephone answering device; the answering device in the 3000R-105 is used for both units.

The two units must be interconnected at rear panel terminals 19, 20 and 21 to permit telephone access to the 3000R-105X.

In all other respects the 3000R-105 and 3000R-105X are identical. The terminal connections in figure 2-1 can be used to locate the proper audio inputs and relay outputs as described in this section.



## SECTION THREE

### OPERATION

#### A. General

The Model 3000R-105 Dual Tone Receiver is designed to permit unattended switching of CATV head-end equipment. Once this receiver has been properly installed it should require no operator attention other than that required for the dial-up telephone control function.

#### B. Telephone Operation

The telephone override feature is provided to permit remote control of the Model 3000R-105 relay outputs via telephone when it is necessary to switch outputs independently of the program source cue tones or where the 3000R-105 is being used to permit remote control of other head end equipment.

To gain telephone access to the cue tone decoders:

1. Dial the telephone number of the 3000R-105 site.
2. The normal telephone ring signal will be heard.
3. After one or two rings, the telephone ring signal will stop indicating the the 3000R-105 has answered.
4. Now send the required ON or OFF code for the desired switching function.

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#### CAUTION

The cue tone decoders will respond to the four digit Touch-ToneR command only if all four digits are transmitted in the proper sequence with no incorrect digits or other audio between digits. There must be no delay greater than three seconds between digits of the code.

5. Any number of ON or OFF codes can be entered as long as the 3000R-105 remains on the line. When more than one four digit code is entered, there should be a delay of approximately five seconds between codes (not between digits of a code).
6. The 3000R-105 will automatically disconnect from the telephone line approximately 45 seconds after it answers. This should normally provide enough time to send all required codes. If additional time is required the 3000R-105 may be accessed again by repeating steps 1, 2 and 3 above.

During the time period that the 3000R-105 is being accessed by telephone all receiver audio inputs are removed from the internal cue tone decoders and switched to the telephone line audio input. The 3000R-105 will not respond to program source cues while being accessed by telephone. Program source audio will be restored immediately after the 3000R-105 disconnects from the telephone line.

### C. Local Operation

The Model 3000R-105 can also be controlled locally to provide on-site switching for local control or testing purposes.

On-site control can be accomplished by using a Model CES-340J or equivalent Touch-Tone<sup>R</sup> encoder.

The Touch-Tone<sup>R</sup> encoder can be attached directly across any one of the rear panel audio inputs listed in Table 2-1 for access to the Model 3185A in the corresponding mainframe slot.

All mainframe slots may be accessed simultaneously by connecting the audio output of the Touch-Tone<sup>R</sup> encoder across rear panel terminals 20 (common) and 21 (audio). An external normally open switch must be wired across rear panel terminals 19 and 20; this switch must be closed during local control and open at all other times.

SECTION FOUR  
TROUBLESHOOTING

A. General

The Model 3000R-105 Dual Tone Receiver should require little maintenance once installed and operational. Most difficulties are encountered during installation and may be solved by referring to the following troubleshooting suggestions.

B. Troubleshooting

<u>Problem</u>	<u>Possible Cause, Solution</u>
Will not respond to any codes from receivers or from the telephone line.	No AC power; check connection to the AC line.  Fuse blown; check any external wiring to terminals 23 or 24 for errors or for short circuit between 23 and 24. Check for proper fuse, replace with 1/2 A. Slo-Blo fuse.  Power Supply circuit card (A2) or Relay Board (A18) not properly plugged into connector; press card far enough into connector to permit installation of the front cover.
Will not answer an incoming telephone call.	Rear panel terminals 71 and 72 not connected by metal jumper; reinstall jumper.  Wrong telephone wires connected; color codes may vary; check telephone wires; a DC voltmeter should show approximately 45 volts across the telephone wire with the receiver "on-hook" and approximately 6 volts DC with the receiver "off-hook." An AC voltmeter should show approximately 80 volts AC with an incoming ring signal.

Problem	Possible Cause: Solution
Answers but will not respond to codes from the telephone. Responds to codes at rear panel audio inputs.	Other audio in addition to the Touch-Tones <sup>R</sup> present on the telephone line; the telephone line should be free of other audio while the Touch-Tones <sup>R</sup> are being transmitted.  Telephone audio is distorted; the telephone line audio should be clear enough for normal voice communications.
Responds to telephone sent codes, but will not respond to codes from receivers.	Touch-Tone <sup>R</sup> encoder at the calling location not functional. Touch-Tones <sup>R</sup> should be audible to the caller; if the tones are not audible use an acoustically coupled encoder or have the telephone company install "polarity guard."  Audio level from the receiver too low or too high; measure the audio level from receivers; this level should be between 24 millivolts (rms) and one volt (rms); increase or decrease as required.
One decoder will not respond to code; others function normally.	Relays K1 and K2 are activated; allow 45 seconds after incoming call for the 3137A-1 (A24) to time out. The red indicator on A24 should go out at the end of 45 seconds.  Wrong code being sent; check the code engraved on the circuit card, does it correspond to the code being used?  Circuit card not pressed into connector; locate card corresponding to code and push card into connector.

Problem

Possible Cause: Solution

Response to codes from receiver intermittent; decoders sometimes fail to turn ON or decoders turn OFF at the wrong times. Telephone operation OK.

Audio level from the receiver too low or too high; receiver audio level should be between 24 millivolts (rms) and one volt (rms); increase or decrease as required.

Decoders all reset to OFF without receiving OFF codes.

Momentary power loss; a 12 volt battery may be installed across terminals 23 and 24 as illustrated in Figure 4-1 to prevent loss of switching status during a momentary power failure.

SECTION FIVE  
THEORY OF OPERATION

A. General

Refer to the 3000R-105/1 block diagram at the end of this section for the following discussion.

In the block diagram, blocks A2 through A24 represent individual plug-in circuit cards and each performs a specific function as listed below:

A2	Model 3212C	Power Supply
A3 through A16	Model 3185A	Dual Tone Decoder
A18	Model 3292-4A	Relay Board
A20 and A22	Model 3191-1	Quad Transformer Coupler
A24	Model 3137A-1	Unattended Answering Device

B. Receiver Cue Tone Decoding

All eight receiver audio channels in the 3000R-105 are identical in operation. The following operating theory description for channel one also applies to channels two through eight.

The A3 Decoder, programmed to respond to a specific cue tone code must continuously monitor the program audio of the transponder on which this cue tone will be transmitted.

The satellite receiver audio is coupled to pin 6 of the A3 Decoder through the A20 Transformer Coupler and the normally closed contacts, E and D, of relay K1 on the A18 Relay Board.

The output relay on A3 will remain in its normally closed position connecting terminals 25 and 27 until the ON cue tone is received.

Upon receipt of the ON cue, the A3 output relay will be activated, disconnecting terminal 25 from 27 and connecting terminals 25 and 26.

The A3 output relay will remain latched in this position (unless power is removed from the 3000R-105) until the OFF cue is received. Upon receipt of the OFF cue, the A3 output relay will switch back to its normal deactivated state, disconnecting terminal 24 from 26 and reconnecting 25 to 27.

C. Telephone Operation

An incoming telephone ring signal will be detected by A24; A24 will place a DC load across the telephone line after approximately two rings. The A24 output relay will then ground

pin L, activating relays K1 and K2 on A18. For channel one (a similar sequence occurs on all remaining channels) relay K1 will connect telephone audio from pin 5 of A24 to pin 6 of A3.

The A3 decoder will now respond to the proper four digit Touch-Tone<sup>R</sup> code transmitted from the telephone. The A3 output relay will function as described in section B above.

## CUE TONE CODE LIST

SOURCE	SATELLITE/TRANSPONDER	CODE USE	CODE
ABC	WESTAR 5 23	SPARE	015*/#
ABC	WESTAR 5 23	DAYTIME	307*/#
ABC	WESTAR 5 23	COMMERCIAL	491*/#
ABC	WESTAR 5 23	COMMERCIAL	807*/#
ABC	WESTAR 5 23	COMMERCIAL	826*/#
ACSN	SATCOM F3 16	PROGRAM ON/OFF	192*/#
AETN	SATCOM F3 16	PROGRAM ON/OFF	194*/#
AETN	SATCOM F3 16	SPARE	516*/#
BET	WESTAR 5 24	PROGRAM ON/OFF	018*/#
CBN	SATCOM F3 8	COMMERCIAL	414*/#
CBN	SATCOM F3 8	SPARE	715*/#
CHN	SATCOM F3 17	COMMERCIAL	361*/#
CMN	SATCOM F3 16	PROGRAM ON/OFF	043*/#
CMN	SATCOM F3 16	COMMERCIAL	867*/#
CNN	SATCOM F3 14	SPARE	017*/#
CNN	SATCOM F3 14	COMMERCIAL	024*/#
CNN2	SATCOM F3 15	SPARE	541*/#
CNN2	SATCOM F3 15	MAIN	635*/#
CSPAN	SATCOM F3 19	PROGRAM ON/OFF	195*/#
DISNEY CHANNEL	WESTAR 5 10/12	PROGRAM ON/OFF	617*/#
DISNEY CHANNEL	WESTAR 5 10/12	PROGRAM ON/OFF	834*/#
ENTERTAIN. CH.	SATCOM F4 8	PROGRAM ON/OFF	079*/#
ESPN	SATCOM F3 7	COMMERCIAL	048*/#
EWTN	SATCOM F3 18	PROGRAM ON/OFF	762*/#
FNN	SATCOM F4 2	COMMERCIAL	401*/#
FNN	SATCOM F4 2	PROGRAM ON/OFF	738*/#
FNN	SATCOM F4 2	COMMERCIAL	975*/#
HBO	SATCOM F3 13/24	PROGRAM ON/OFF	729*/#
HBO	SATCOM F3 13/24	SCRAMBLE	835*/#
HTN	SATCOM F3 16	PROGRAM ON/OFF	207*/#
MSN	SATCOM F3 22	PROGRAM ON/OFF	243*/#
MSN	SATCOM F3 22	COMMERCIAL	421*/#
NASHVILLE	WESTAR 5 17	COMMERCIAL	674*/#
NASHVILLE	WESTAR 5 17	PROGRAM ON/OFF	866*/#
NCN	SATCOM F4 7	PROGRAM ON/OFF	073*/#
NCN	COMSTAR D2 7	SPARE	108*/#
SELECTV	WESTAR 4 18	ROLL THRU	539*/#
SELECTV	WESTAR 4 18	SPARE	619*/#
SELECTV	WESTAR 4 18	12 HR IN/OUT	721*/#
SELECTV	WESTAR 4 18	ADULT	840*/#
SHOWTIME	SATCOM F3 10/12	SPORTS	186*/#
SHOWTIME	SATCOM F3 10/12	PROGRAM ON/OFF	576*/#
SHOWTIME	SATCOM F3 10/12	ON-LINE	679*/#
SHOWTIME	SATCOM F3 10/12	OFF-LINE	753*/#
SPN	SATCOM F4 3	COMMERCIAL	429*/#
SPN	SATCOM F4 3	SPARE	517*/#



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DEVELOPMENT AND MANUFACTURE OF ELECTRONIC INSTRUMENTS AND SYSTEMS

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## CUE TONE CODE LIST

continued

SOURCE	SATELLITE/TRANSPONDER	CODE USE	CODE
SPN	SATCOM F4 3	SPARE	517*/#
SPANISH INTL	SATCOM F4 1	SPARE	624*/#
SPANISH INTL	SATCOM F4 1	PROGRAM ON/OFF	819*/#
SVN	SATCOM F3 15	COMMERCIAL	533*/#
UPI	SATCOM F3 6	PROGRAM ON/OFF	276*/#
USA	SATCOM F3 9	ENGLISH NET	168*/#
USA	SATCOM F3 22	BLUE NET-ON/OFF	295*/#
USA	SATCOM F3 9	PROGRAM ON/OFF	438*/#
USA	SATCOM F3 9	COMMERCIAL	601*/#
USA	SATCOM F3 9	BASEBALL	706*/#
WARNER-AMEX CAB		COMMERCIAL	265*/#
WARNER-AMEX SAT	SATCOM F3 1	NICK/ARTS-EAST	311*/#
WARNER-AMEX SAT	SATCOM F3 1	NICK/ARTS-WEST	519*/#



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DEVELOPMENT AND MANUFACTURE OF ELECTRONIC INSTRUMENTS AND SYSTEMS

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INSTRUCTION MANUAL

DUAL TONE RECEIVER

MODEL 3000R-105      S/N \_\_\_\_\_

Model 3137A-1                      S/N \_\_\_\_\_

Model 3185A- \_\_\_\_\_      S/N \_\_\_\_\_  
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\_\_\_\_\_

Model 3191-1                      \_\_\_\_\_

Model 3212C                        \_\_\_\_\_

Model 3292-4A                     \_\_\_\_\_