

# **CONNECT SYSTEMS INCORPORATED**

1802 Eastman Ave. Suite 116  
Ventura, Ca. 93003

Phone (805) 642-7184

Fax (805) 642-7271

## **Model CS-900 & Model CS-900-EXP**

## **CONTROL STATION INTERCONNECT**

### **USER'S INSTRUCTION MANUAL**

(Version 3.0)

**TABLE OF CONTENTS**

Description ..... 2  
 Installation and Adjustments ..... 3  
 Programming Procedure ..... 8  
 Operating Mode Programming ..... 9  
 CW ID Programming ..... 18  
 Speed Dialer Programming ..... 19  
 Toll Override Programming ..... 21  
 Remote programming ..... 23  
 Operation ..... 27  
 Glossary ..... 34  
 Warrantee ..... 35  
 FCC Notice to Users ..... 36  
 Schematic Diagrams ..... 38 - 40  
 Board Layout ..... 41

**OPTIONS:**

Export Version (Option CS-900-EXP) ... 2, 17, 27, 32  
 Auxiliary Relay (Option 901) ..... 33

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**GENERAL DESCRIPTION**

Congratulations on your choice of our Model CS-900 Control Station Interconnect. The CS-900 is the only low cost Control Station Interconnect that delivers important standard features such as Electronic Voice Delay (EVD), fully regenerated DTMF dialing, Speed-dialing, Last number redial, Call progress tone detection and more. Additionally, The CS-900 delivers many other essential features such as the built-in programming keyboard and digital display which are not available in any other interconnect on the market today!

\*\*\*\*\* CS-900-EXP ONLY ----->  
 Segments of this manual which are only applicable to the EXP version are clearly marked similar to this example. Please ignore if you have a standard CS-900.

The CS-900-EXP (option) has special software to accommodate foreign telephone systems such as those in eastern Europe. The CS-900-EXP permits dialing using second (or even third) dialtones, proper recognition of Euro dialtones / busy signals permitting automatic disconnect and mobile selective calling from a rotary dial pulse telephone. The latter feature is sometimes known as dial click detection and is included in the CS-900-EXP version.

<----- CS-900-EXP ONLY \*\*\*\*\*

Designed and built with pride in the U.S.A.

## INSTALLATION AND ADJUSTMENTS

**Internal Connections vs External Connections:** The CS-900 can be connected either internally or externally to the base station radio. Internal connections are essential if the radio is also to be used for dispatch operation. External connections to the Mic and speaker jacks are acceptable for dedicated or amateur installations. Some features such as Busy Channel Ringout Inhibit cannot function if the external hook-up method is chosen. This is because there is no COS connection.

Both internal and external connection methods are presented. Functions that will not operate and forced programming choices that must be adhered to if the external connection method is used are noted throughout this manual.

### **INTERNAL CONNECTION METHOD** (Preferred)

Use shielded wires with the shields at each end connected to chassis ground. (The rear panel barrier strip terminals labeled "GND" are chassis ground). We recommend using spade type crimp-on connectors for ease and reliability. Connect the center wires as follows:

**AUDIO IN:** The receiver audio takeoff point can be anywhere from the discriminator to the high side of the volume control (we recommend connecting to the high side of the volume control in most applications). Be sure to install the de-emphasis strap JP-5 if connecting to the discriminator. Remove JP-5 if connecting beyond the De-emphasis filter. If JP-5 is not properly selected, you may experience difficulty with DTMF decoding plus poor mobile to land audio quality.

**COS:** The COS input can be connected to the noise squelch for carrier operation, or to the DPL/CTCSS squelch if you want the radios' built-in decoder to provide private operation.

Noise Squelch Connection: Connect to a point that has considerable voltage swing when the squelch is opened/closed. The best point to connect is to the collector of the transistor that controls the busy light (if the radio has one). Otherwise, connect to the squelch gate control voltage.

DPL or CTCSS Squelch: The receiver's DPL or CTCSS decoder will have a logic point that goes high or low when a properly encoded signal is received. Connect this point to the COS input.

If the point selected goes more positive (voltage increases) when a signal is received, strap JP-6 center to the + side. If the point goes to a lower voltage, strap JP-6 from center to the - side.

When the COS threshold control P11 has been properly adjusted (described below), and JP-6 properly strapped, the front panel REC LED will illuminate when a signal is received and go out when the signal goes away. This condition must be achieved for proper operation of the interconnect.

**AUDIO OUT:** Connect to the Mic high line. If Mic loading occurs install a resistor in series with the Audio Out lead, and cut JP-3. The resistor should be large enough to prevent Mic loading but small enough to achieve adequate level to mobile audio. Try 100K as a first cut.

**PTT:** Connect to the base station PTT line.

NOTE: Some radios will need the Aux. Relay connected to the hookswitch before the transmitter can be activated. Others may require positive keying. See 'Auxiliary Relay' page 33 for details.

**POWER:** Connect to a source of 12-14 VDC that can supply up to 100 MA. The CS-900-EXP is reverse polarity protected, so a polarity mistake will not damage your CS-900.

#### **EXTERNAL CONNECTION METHOD (For amateur use only)**

Use shielded wires with the shields at each end connected to chassis ground. (The rear panel barrier strip terminals labeled "GND" are chassis ground). We recommend using spade type crimp-on connectors for ease and reliability. Connect the center wires as follows:

NOTE: Since a COS (Carrier Operated Squelch) connection is not made when using the External Connection Method several features which are not of great importance to Amateur users will not function. These features and certain programming steps which must be set as specified are annotated with a special note labeled... **"EXTERNAL CONNECTION NOTE:"**

**AUDIO IN:** You must obtain a plug that mates with your radios speaker jack. Connect the center wire to the center pin in the speaker jack. Connect the shield to the ground lug of the speaker jack. Be sure that de-emphasis strap JP-5 is removed or DTMF will not decode properly.

**COS:** This terminal must be connected to a GND terminal when using the external connection method.

Also you must rotate the COS threshold control P11 to mid rotation and put the COS polarity select strap JP-6 in the - position (center pin to - pin). **The REC LED must be constantly illuminated for the external connection method to operate.**

**AUDIO OUT:** You must obtain a microphone plug that will mate with your radios microphone jack. You will need to identify which pins are used for Mic audio, PTT and Ground. Connect the center wire from the AUDIO OUT to the Mic Audio pin. Connect the center wire from the PTT pin to the PTT pin in the Mic plug. Connect the shields of the two wires to the ground pin in the Mic plug.

WARNING: The PTT switching transistor Q12 can be damaged if you allow the PTT lead to come into contact with a hard voltage source such as 12 VDC. Most Mic jacks have a 12 VDC pin which supplies voltage to the DTMF pad in the microphone. You must be cautious to not incorrectly connect the PTT to the wrong pin or to accidentally let the PTT line come in momentary contact with the 12 VDC pin. Transistor Q12 is specifically not covered by warranty. Please read WARRANTY on page 34 for details.

**POWER:** Connect to a source of 12-14 VDC that can supply up to 100 MA. The CS-900 is reverse polarity protected, so a polarity mistake will not damage your CS-900.

##### **WARNING** #####

The CS-900 contains a power supply sensing circuit that continuously monitors the input supply voltage. An instantaneous drop below 10 VDC will cause a microcomputer reset. If the power supply has poor regulation, erratic operation may result.

The purpose of the input voltage sensor is to protect the non volatile EE memory during power up and power down.

If erratic operation such as losing calls occurs, be suspicious of poor regulation from the power supply.

#####



## ADJUSTMENTS

**Initial settings:** Set P1 fully counterclockwise.  
Set P4, P5, P9, P10 and P11 to mid rotation.  
Set P8 fully clockwise.

### POT PCB Name

### Function

- P1 M->L:** **Mobile to land level:** Initially adjust until mobile DTMF decodes as indicated on front panel DTMF LED. Later, adjust for proper mobile level as heard on telephone.
- Note: DTMF will not decode unless the REC LED is illuminated indicating that a signal is being received.
- P4 DTMF:** **Patch to mobile DTMF level:** Sets the DTMF transmitter modulation level of land to mobile selective calling and Ringout DTMF sequence.
- Note: P4 has no effect on DTMF dialing level sent to the phone line.
- P5 BEEPS/CW ID:** **Status beeps & CW ID level:** Adjust for desired modulation level of status beeps or CW ID.
- P8 RX VOX:** **Receiver VOX sensitivity:** Sets RX audio triggering sensitivity. Should be fully CW in VOX simplex applications. Reduce setting when used through repeaters or trunked systems if land line cannot respond to mobile during hangtime due to noise or CTCSS on the repeaters' carrier.
- P9 TEL VOX:** **Telephone VOX sensitivity:** Sets telephone VOX sensitivity for voice, call progress tone detection and dial click detection. Adjust to suit. Mid rotation is about right for most applications.
- P10 L->M** **Land to mobile level:** Press the C/D (Connect/Disconnect) switch so that a dialtone is heard. Adjust P10 until the dialtone produces about 3 Khz. of modulation deviation. Cut JP-3 if required.
- P11 COS** **COS Threshold level:** Measure the voltage at TP-1 with no signal. Then measure the voltage again with a signal applied. Adjust P-11 until the voltage reading at TP-2 is approximately midway between the two readings previously obtained at TP-1.

For example: If TP-1 reads 2 volts with no signal, and 4 volts with a signal applied to the receiver, TP-2 should be set to read 3 volts.

Important: If JP-6 is properly strapped and P11 properly adjusted, the REC LED will be illuminated when a signal is received and should be out when there's no signal.

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### JUMPER STRAP OPTIONS

- JP-3** Audio output range strap. Strap in = low level (0-1 V). Strap removed = high level (0-5 V). Strap factory installed. (JP-3 is in front of the Aux. Relay K2)
- JP-5** Factory installed. Removal eliminates the built-in de-emphasis network. Remove only if receiver audio is taken past de-emphasis. (e.g. from the volume control or the speaker jack). (JP-5 is just to the right of transformer T1).
- JP-6** Selects the proper COS polarity to match your radio. If the selected COS takeoff point goes high when a signal is received, connect the center pad to the + pad. If the COS input goes low when a signal is received, connect the center pad to the - pad. When P11 (COS threshold) is properly adjusted, the REC LED will be illuminated when a signal is received and will be out when there's no signal. (JP-6 is just behind IC U23).
- JP-7** Selects whether the Aux. Relay output is normally open (NO) or, normally closed (NC). JP-7 is factory strapped for NO. For NC operation, connect the center pad to the NC pad. (JP-7 is near the RJ-11 phone jack).
- JP-9** JP-9 and JP-10 are used to enable / disable line in use & detection. These straps are mutually exclusive. That is to say that one or the other must be strapped (but not both at the same time). The CS-900-EXP is delivered with line in use detection disabled (JP-9 strapped). To enable line in use detection remove the plastic push-on clip from JP-9 and re-install on JP-10. (JP-9 is three centimeters to the right of aux. relay K2. JP-10 is adjacent to the phone jack).

**NOTE:** There is no JP-1, JP-2, JP-4 or JP-8



## PROGRAMMING THE CS-900

The CS-900 has four easily-accessed programming areas: Operating Parameters, CW ID, Speed-Dial Phone Numbers and Toll Override Selections. To enter one of the programming areas, turn the power off, press and hold the corresponding programming area button (No. 1 for Operating Parameters, No. 2 for CW ID or No. 3 for Speed-Dial Phone Numbers, No. 4 for Toll Override Selections) and simultaneously turn on the power. The display will show **0.x.**, where x is the number of the programming button that is being pressed. Release the button, and programming may begin.

Each programming area has the following features in common:

- 1) Programming line numbers are displayed with the dots illuminated on the displays. e.g. **0.1.**, **4.5.** etc.
- 2) Data values are displayed without the dots illuminated. e.g. **00**, **30**, etc.
- 3) Data is entered at a line number by pressing the desired digits followed by the '**P**' key. Consider the '**P**' key as the enter key.
- 4) The GOTO **Any Address** line is displayed as **A.A.** This line is used to branch to any line number in the current programming area. For example, the current line is **A.A.** and you wish to goto line 30. Enter 3 0 P on the keypad and the display will read **3.0.**
- 5) Pressing only **P** at the **A.A.** line will advance the line to **0.1.** Pressing only **P** at any other line will advance to the next available programming line.

**Note:** In CW ID, Speed-Dialer and Toll Override Selections the next line will be the next numeric line number. In Operating Parameters programming, the next line is often determined by selections made at the current line and is not necessarily the next numeric line (see the 'Programming the Operating Mode and Parameters' section).

- 6) To view the data at a given line number, briefly press **C** on the keypad and then release it. The display will then show the data for a few seconds and then re-display the current line number. Consider '**C**' the data 'see' key.
- 7) At any point during programming, you may return to the **A.A.** line by holding down the **C** key until **A.A.** appears on the display (approximately three seconds).

### MASTER RESET COMMAND

All user programmable selections in Programming Areas No. 1, 2, 3 and 4 can be simultaneously reinitialized to the factory default settings by simultaneously pressing the 3 and 7 keys on the internal keyboard while powering up the CS-900 with the front panel power switch.

**TO REITERATE**, all user programming including Operating Parameters, CW ID, Speed-dial phone numbers and Toll Override Selections will be lost if a 3+7 reset is performed!

## PROGRAMMING THE OPERATING MODE AND PARAMETERS

(Programming Area No. 1)

To enter the parameter programming mode, press and hold button No. 1 on the internal keypad and then simultaneously turn on the power switch. At this point, the display will read 0.1. When you release the No. 1 button, you will see **A.A.**

### **A.A. (GOTO Any Address)**

Press 'P' to start at line 0.1., or enter the line number you wish to go to and then press 'P'. All line numbers and their associated parameters are listed below starting with OPERATING MODE SELECTION.

### **Viewing or Changing Parameter Values**

A quick tap on 'C' will reveal (for a moment) the currently selected parameter of the displayed program line. If the parameter is acceptable, press 'P' to advance to the next program line, or, enter a new parameter and press 'P' to advance to the next program line.

### **Parameter Checking**

If an out of range parameter is entered (e.g. 87 on line 0.2.) pressing 'P' will not cause an advance to the next program line. This prevents you from accidentally entering an unusable choice.

### **Returning to A.A.**

Programming is finished when you arrive back at A.A. If necessary, you can return to a previously programmed line by holding down 'C' for several seconds. This will return you to A.A. Now enter the line number you wish to return to and press 'P'. Line sequential programming will always flow forward from the current line.

Line numbers shown in braces e.g. [1.4.], indicate where programming will continue after a selection.

When you finish programming, simply turn the power off, and then back on to return to the operate mode.

**IMPORTANT:** The following four programming lines are not used in the CS-900. Please be sure to leave these lines set with the default data values shown or erratic operation to no operation may result.

0.1. = 1  
0.2. = 85  
0.3. = 3  
0.4. = 9

**0.5. RxVOX or Carrier Control**

1 = RxVOX [0.6.]  
0 = Carrier [0.7.]  
DEFAULT: 1 = RxVOX

Select RxVOX for operation through remotely located repeaters or simplex. Select CARRIER for simplex operation only. In CARRIER, the telephone party cannot key the base transmitter while the mobile is talking.

**EXTERNAL CONNECTION NOTE:** Must be set for 1 = RxVOX if using the external connection method.

**0.6. Refresh** (Also known as Pulser)

0 = Disable  
Select 1-99 (.1-9.9 seconds)  
.1 sec increments per step  
DEFAULT: 0 = Disable

The refresh is normally only used for compatibility with some trunked systems such as the GE MARC V. Select 0 (disable) if not required. Otherwise select a pulse interval just shorter than the repeater hang time. The pulse interval is equal to .1 second times the number entered. A setting of 40 (4 seconds) is about right for the GE MARK V.

**Note:** This parameter has nothing to do with pulse dialing.

**0.7. Activity Timer Mode**

1 = Standby [1.4.]  
0 = Disconnect [1.4.]  
DEFAULT: 1 = Standby

Choose how the activity timer operates in VOX mode. In "Standby", landline activity exceeding the timer limit drops the patch into stand-by (off the air). Pressing \* in the mobile restores normal operation. Select "Disconnect" if you prefer the patch to disconnect upon exceeding the activity limit. (The activity time is set at line 2.6.)

**IMPORTANT:** The following six programming lines are not used in the CS-900. Please be sure to leave these lines set with the default data values shown or erratic operation to no operation may result.

0.8. = 0  
0.9. = 0  
1.0. = 456  
1.1. = 30  
1.2. = 30  
1.3. = 30

## OUTGOING CALLS

### 1.4. Connect Code

0 = \* Up  
x - xxxx = Multi Digit Access  
Protocol: \*xxxx  
DEFAULT: 0 = \* up

Selects the phone patch access code. Enter 0 for \* up operation. Otherwise enter a one to four digit code. To access the patch press \* plus the selected code. (e.g. You want the access code to be \*387. Simply enter 387 P on the keyboard).

### 1.5. Secret Toll Override Code

x - xxxx = Multi Digit Override  
Protocol: \*xxxx  
DEFAULT: 1234

This is a separate secret code that overrides the programmed toll protection selected on lines 2.0. through 2.5. The access code (1.4.), and the secret toll override code cannot start with the same sequence. e.g. An access code of \*2 would not be compatible with a secret code of \*2567. Select codes that are distinctly different, such as Access Code = \*56 and Secret Code = \*3927.

**Note:** The secret Toll Override Code is inoperable if \* up is selected on 1.4. At least one additional digit must be programmed, such as \*7, \*1 etc.

### 1.6. Disconnect Code

0 = # Down  
1 = # Plus Connect Code  
DEFAULT: 0 = # Down

Choose the patch disconnect code. Enter 0 to select # down in most applications. Or enter 1 to select # plus the connect code digits that were selected on line 1.4.

### 1.7. Five PTT Autodial

1 = Enable  
0 = Disable  
DEFAULT: 0 = Disable

If enabled, five presses of the mobile Mic button (at about one press second) will automatically dial the phone number stored in speed dialer memory location No.1. Five subsequent presses will cause a disconnect.

**EXTERNAL CONNECTION NOTE:** This feature can not operate without an internal COS connection to the receiver.

### 1.8. Dialing Mode

1 = Tone  
0 = Pulse  
DEFAULT: 1 = Tone

Select how the CS-900 will dial your phone calls. Note that tone is much faster if you are in a touch-tone telephone exchange. (The DTMF tone is fully regenerated).

### 1.9. Access Delay

Select 1-9 (1-9 seconds)  
1 sec increments per step  
DEFAULT: 3 = 3 secs

Access delay is a user selectable delay to compensate for PTT hang after pressing a DTMF key on mobile and portable radios. Select a value that allows you to hear all of the CW ID and/or dialtone without clipping.

### 2.0. Manual Dialing

1 = Enable [2.1.]  
0 = Disable [2.6.]  
DEFAULT: 1 = Enable

Select disable if dialing should only be allowed from the speed dialer memory.

### 2.1. Toll Restrict Digit Counting

1 = Enable  
0 = Disable  
DEFAULT: 0 = Disable

Enables/disables toll restrict digit counting. If enabled, a number exceeding ten digits cannot be dialed.

### 2.2. Prefix Restrict A

0000 = None (display reads ' - ')  
x - xxxx = Multi Digit Prefix Restriction  
DEFAULT: 1 = 'One' Digit Prefix Restriction (Long Distance)

A 'one' may only be set on this line in order for toll override  
1-800 dialing to operate.

### 2.3. Prefix Restrict B

0000 = None (display reads ' - ')  
x - xxxx = Multi Digit Prefix Restriction  
DEFAULT: 0 = 'Zero' Digit Prefix Restriction (Operator)

### 2.4. Prefix Restrict C

0000 = None (display reads ' - ')  
x - xxxx = Multi Digit Prefix Restriction (e.g. 976)  
DEFAULT: - = None

### 2.5. Prefix Restrict D

0000 = None  
x - xxxx = Multi Digit Prefix Restriction (e.g. 411)  
DEFAULT: - = None

Lines 2.2., 2.3., 2.4., and 2.5. allow selecting any four single digit or multi-digit sequences as restricted. Four digits in sequence maximum. e.g. to restrict 0 (operator), 1 (long distance), 976 and 411 enter 0 on line 2.2., enter 1 on line 2.3., enter 976 on line 2.4. and enter 411 on line 2.5.

**NOTE:** In programming area No. 4 you may create up to ten Toll Override Selections which allow you to have the protection of toll restriction, but allow you to dial specific area codes, portions of an area code or specific phone numbers. See page 21.

### 2.6. Activity Timer

0 = Defeat  
Select 10-99 (10-99 seconds)  
1 sec increments per step  
DEFAULT: 30 = 30 secs

Enter the patch activity timer time directly in seconds or enter 0 to defeat. The activity timer is reset by pressing the Mic button in sampling or duplex mode. Or by pressing \* in VOX mode but only if you entered a 1 on line 0.7.

### 2.7. Timeout Timer

0 = Defeat  
Select 1-99 (.5-49.5 minutes)  
.5 minute increments per step  
DEFAULT: 6 = 3 minutes

Select the maximum call limit time. The time is equal to .5 minutes (30 seconds) times the number you enter.

### 2.8. CW ID

1 = CW ID at connect and disconnect.  
0 = CW ID at disconnect only.  
DEFAULT: 0 = At disconnect only.

After accessing, manual dialing and auto-dialing are delayed until the CW ID is finished if you enter 1.

### 2.9. Automatic Busy Signal Disconnect

1 = Enable  
0 = Disable  
DEFAULT: 1 = Enable

### 3.0. Automatic Dialtone Disconnect

1 = Enable  
0 = Disable  
DEFAULT: 1 = Enable

### 3.1. Aux. Relay

0 = Connect [3.3.]  
1 = Monitor [3.3.]  
2 = Key [3.3.]  
3 = Remote Function [3.2.]  
DEFAULT: 0 = Connect

0. In connect mode, the relay is on whenever the patch is in connect.
1. In monitor mode, the relay can only be functioned when using Remote Base mode from a touchphone. Pressing 0 turns on the relay. Pressing \* turns it back off. The relay returns to off automatically when Remote base operation is completed. This function is normally used to remotely disable CTCSS so the channel can be monitored prior to initiating dispatch from a phone.
2. In key mode, the relay is on whenever the PTT is activated.
3. Remote Function provides a remotely controllable contact closure/opening which can be used for any purpose.

**Note:** Option 901 (Aux. Relay) is required for the above.

### 3.2. Remote Function Access Code

xxx = Any three digits  
Protocol: #xxx relay ON  
          ##xxx relay OFF  
DEFAULT: 789

Sets the control code for the Aux. Relay Remote Function. Enter any three digits. To turn on the relay press #xxx. To turn off the relay press ##xxx. This functions only if you entered 3 on line 3.1.

**Note:** The remote function can not be operated while in connect.



## INCOMING CALLS

### 3.3. Busy Channel Monitor

1 = Enable  
0 = Disable  
DEFAULT: 0 = Disable

Determines whether the CS-900 will ringout or auto-answer if the channel is busy (Enter 0). Or only when the channel is clear (Enter 1).

**EXTERNAL CONNECTION NOTE:** This feature can not operate without an internal COS connection to the receiver. Set to 0 = Disable.

### 3.4. Ringout on Ring Number

0 = Disable [3.8.]  
Select 1-9 (1-9 ring)  
DEFAULT: 1 = First Ring

Selects which incoming ring starts the ringout alert. Enter 1-9 or enter 0 to disable ringout.

### 3.5. Ringout Alert

1 = Ring Tone  
0 = CW ID  
DEFAULT: 1 = Ring Tone

Select whether the ringout alert will consist of a Ring Tone or CW ID. The Ring Tone is similar to a telephone ring. You may also include a DTMF sequence by programming line 3.6.

### 3.6. Ringout DTMF Sequence

000000 = None (display reads ' - ')  
x-xxxxxx = DTMF Sequence  
DEFAULT: - = None

Enter a 1-6 digit DTMF sequence to be sent during the ringout alert interval. For no DTMF sequence enter 000000.

### 3.7. Ringout Once or on Alternate Rings

1 = Once  
0 = Alternate  
DEFAULT: 1 = Once

Only a single ringout alert is allowed in most business radio applications.

### 3.8. Auto-Answer Ring Number

0 = Disable [4.2.]  
Select 1-9 (1-9 ring)  
DEFAULT: 0 = Disable

Selects which incoming ring initiates auto-answer. Auto-answer must be set to a greater number of rings than ringout (3.4.) which allows having ordinary ringout alerts until auto-answer

occurs. After auto-answer, remote base, selective calling or talk back paging can be initiated from any telephone.

### 3.9. Telephone Remote Base

0 = Disable [4.0.] **Note:** Must be set  
1 = Automatic on Auto-answer [4.2.] to 0 for selective  
2 = Access Code Required [4.2.] call operation.  
DEFAULT: 0 = Disable

Enter 0 if remote base operation is not desired or if selective calling is to be used. Enter 1 if remote base operation should automatically occur after auto answer. Enter 2 if the access code selected on line 1.4. should be required from the initiating phone after the auto-answer beep.

**Note:** Only a DTMF telephone can perform a positive disconnect by sending # in choice 1. Otherwise disconnect will occur from activity or timeout timer timeout.

**Note:** Choice 2 will only function from DTMF telephones.

**IMPORTANT:** The following thirteen programming lines are not used in the CS-900. Please be sure to leave these lines set with the default data values shown or erratic operation to no operation may result.

4.0. = 1  
4.1. = 8  
4.2. = 0  
4.3. = 0  
4.4. = 6  
4.5. = 1  
4.6. = 0  
4.7. = 0  
4.8. = 0  
4.9. = 0  
5.0. = 1  
5.1. = 33  
5.2. = 1

### 5.3. Remote Programming Enable

0 = Disable  
1 = Enable  
DEFAULT: 1 = Enable

### 5.4. Remote Programming Access Code

(See page 23)

x - xxxx = Multi Digit Access Code  
DEFAULT: 2345

\*\*\*\*\* CS-900-EXP ONLY ----->

The EXP version has two user programmable lines 5.5. and 5.9. which allow customizing the CS-900 for local phone conditions:

#### 5.5. Ability to Dial a Second Dialtone

1 = Enabled  
0 = Disabled  
DEFAULT: 1 = Enabled

When enabled, dialing a second dialtone is possible. The procedure used is different depending upon whether pulse or tone dialing (1.8.) is selected. See "MANUAL DIALING WHEN SECOND DIALTONE IS REQUIRED" page 27 for further details about dialing second dialtones.

**IMPORTANT:** The following three programming lines are not used in the CS-900. Please be sure to leave these lines set with the default data values shown or erratic operation to no operation may result.

5.6. = 6  
5.7. = 33  
5.8. = 24

#### 5.9. Call Progress, Tone Fill

Select 5 - 90 (10 - 180 Milliseconds)  
2 Millisecond increments per step  
**Or,** Select 91-99 (200-1000 Milliseconds)  
100 Millisecond per step (91 = 200 mS, 92 = 300 mS, etc.)  
DEFAULT: 10 = 20 Milliseconds

This parameter should normally not be changed. However if local busy signal or dialtones have short gaps the Tone Fill parameter can be used to fill them in. If either dialtone or busy signal disconnect fail to operate, increasing the Tone Fill time may be indicated. Do not add more fill than is needed to restore proper operation.

<----- CS-900-EXP ONLY \*\*\*\*\*

**Note:** If you are attempting to use this Ver 3.0 manual to program an earlier version, lines 0.1. - 4.2. are unchanged. To program lines 4.3. and up it is essential to obtain the correct manual. Or, upgrade your older unit to version 3.0. Call CSI for details.

**PROGRAMMING THE CW ID**  
(Programming Area No. 2)

To enter the CW ID programming mode, press and hold button No. 2 on the internal keypad and then simultaneously turn on the power switch. At this point, the display will read 0.2. When you release the No. 2 button, you will see **A.A.**

**A.A. (GOTO Any Address)**

Press 'P' to start at character position 0.1., or enter the character position number you wish to go to and then press 'P'.

**Viewing or Changing Character Codes**

A quick tap on 'C' will reveal (for a moment) the currently selected character code for the displayed character position. If the character code is acceptable, press 'P' to advance to the next character position, or, enter a new character code and press 'P' to advance to the next character position.

**Character Code Range Checking**

If a number greater than 38 is entered, pressing 'P' will not cause an advance to the next character position. This prevents you from accidentally entering an unusable choice.

**Returning to A.A.**

If desired, you can return to a previously programmed character position by holding down 'C' for several seconds. This will return you to A.A. Now enter the character position (line number) you wish to return to and press 'P'.

**PROGRAMMING**

The CW ID message sent from the CS-900 may consist of up to 15 characters. To program the message, enter the desired character codes (from Table 1) starting at character position **0.1.** through the length of the string. If the message is less than 15 characters, it must be terminated with code 38 (Message End). For example, to program the CW ID message 'CSI':

- 0) Enter CW ID Programming Mode as explained above  
(Hold down key No. 2 and switch on the power)
- 1) From the **A.A.** line hit 'P'
- 2) From **0.1.** enter: ' 2 P' for the character "C"
- 3) From **0.2.** enter: '18 P' for the character "S"
- 4) From **0.3.** enter: ' 8 P' for the character "I"
- 5) From **0.4.** enter: '38 P' to end the message.
- 6) Turn off the power, and then back on, to return to operate mode with the newly programmed CW ID message.

TABLE 1 CW ID CHARACTER CODES						
A = 0	G = 6	M = 12	S = 18	Y = 24	5 = 30	WORD
B = 1	H = 7	N = 13	T = 19	Z = 25	6 = 31	SPACE= 36
C = 2	I = 8	O = 14	U = 20	1 = 26	7 = 32	
D = 3	J = 9	P = 15	V = 21	2 = 27	8 = 33	SLANT
E = 4	K = 10	Q = 16	W = 22	3 = 28	9 = 34	BAR = 37
F = 5	L = 11	R = 17	X = 23	4 = 29	0 = 35	MESSAGE STOP= 38

e.g. CW ID message desired is 'CSI' Enter 2, 18, 8, 38

-----

**SPEED DIAL PHONE NUMBER PROGRAMMING**  
(Programming Area No.3)

To enter the speed dial phone number programming mode, press and hold button No. 3 on the internal keypad and then simultaneously turn on the power switch. At this point, the display will read 0.3. When you release the No. 3 button, you will see A.A. There are 90 speed dial locations numbered from 0.1. to 9.0. Each location may hold from 1 to 16 digits.

**A.A. (GOTO Any Address)**

Press 'P' to start at speed dial location 0.1., or enter the speed dial location you wish to go to and then press 'P'.

**Viewing or Changing Phone Numbers**

A quick tap on 'C' will reveal the phone number stored at the displayed line number. The phone number is displayed digit by digit until all digits in the number have been shown. If the phone number is acceptable, press 'P' to advance to the next line number or, enter a new phone number and press 'P' to advance to the next line number. The phone number stored at any line number can be erased by entering three zeros. (000P).

**Note:** If there is no phone number stored at the present line number, pressing 'C' will flash the current line number number once instead of showing a phone number.

### **Programming \*, Pause or #**

The No. 1, 2 and 3 keys on the keypad are used as dual input keys. To program a phone number which contains any of these digits, briefly press the key and continue with the number, as you would with any other digit. To program a \*, press the No. 1 key until a single bar '| ' is added to the display (approx. 3 seconds) then release the key. To program a pause, press the No. 2 key until a dash ' - ' is added to the display. To program a #, hold down the No. 3 key until a double bar '||' is added to the display.

**Note:** A single bar '| ' will look like the digit one '|', except that the single bar is shifted to the left a little.

**Note:** The setting of line 5.5. determines whether the \* means to dial a \* or wait for a second dialtone.

### **Phone Number Length Checking**

A maximum of 16 digits may be entered in any speed dial location. If too many digits are entered, the display will revert back to showing the current location number. At this point, re-enter a shorter phone number.

### **Returning to A.A.**

If desired, you can return to a previously programmed speed-dial memory by holding down 'C' for several seconds until A.A. shows on the display. Now enter the speed dial line number you wish to return to and press 'P'.

### **Returning to Operate**

To return to normal operation, switch off the power and then back on. You can now use your newly programmed speed dial numbers!



## TOLL OVERRIDE PROGRAMMING

(Programming Area No. 4)

To enter the TOLL OVERRIDE programming area, press and hold button No. 4 on the internal keypad and then simultaneously turn on the power switch. At this point, the display will read 0.4. When you release the No. 4 button, you will see A.A.

### A.A. (GOTO Any Address)

Press 'P' to begin entering TOLL OVERRIDE selections into memory line 0.1., or enter the TOLL OVERRIDE line number you wish to go to and then press 'P'.

### Viewing or changing TOLL OVERRIDE codes

A quick tap on 'C' will reveal the user programmed TOLL OVERRIDE code at the current line number. The TOLL OVERRIDE code is displayed digit by digit until all digits in the code have been shown. If the TOLL OVERRIDE code is acceptable, press 'P' to advance to the next programming line and enter the next override code etc. Any memory line number can be erased by entering three zeros followed by P (000P).

**Note:** If there is no TOLL OVERRIDE code programmed at the current line number, pressing 'C' will flash the current line number once instead of showing a programmed TOLL OVERRIDE code.

### Programming a Wildcard (\*)

The No. 1, key on the keypad is used as a dual input key. A brief press enters a 1. If the 1 button is held down for three or more seconds it becomes a \* entry. The display will show '| ' which indicates a \* has been entered.

**Note:** A single bar '| ' will look like the digit one '1', except that the single bar is shifted to the left a little.

### Returning to A.A.

If desired, you can return to a previously programmed TOLL OVERRIDE location by holding down 'C' for several seconds until A.A. shows on the display. Now enter the TOLL OVERRIDE line number you wish to return to and press 'P'.

### Returning to Operate

To return to normal operation, switch off the power and then back on. Your newly programmed TOLL OVERRIDE codes are now active.

## HOW TO CREATE TOLL OVERRIDE CODES

Programming area No. 4 allows you to create up to ten "exceptions" to Toll Restricts which have been programmed in Programming Area No. 1 lines 2.2. - 2.5. Toll Override selections may be up to 16 digits in length.

Suppose you wish to be toll call protected, but at the same time, you would like to be able to call select area codes, exchanges within select area codes or specific phone numbers within select area codes. First, make sure you have 1+ dialing restricted by programming a 1 on line 2.2. and operator restrict by programming a 0 on line 2.3., both in Programming Area No. 1. Then using the examples below as a guide, program up to ten TOLL OVERRIDE selections on lines 0.1. - 1.0 in Programming area No 4.

LINE NUMBER	TOLL OVERRIDE	DESCRIPTION
0.1.	1818	Allows dialing to all numbers within area code 818.
0.2.	13106	Allows dialing to all phone numbers beginning with a 6 within area code 310.
0.3.	1213784	Allows dialing phone numbers beginning with 784 within area code 213.
0.4.	19	Allows dialing to all area codes beginning with a 9.
0.5.	12*7	The wildcard * means 'any number' in the position occupied. This example allows dialing to all area codes that begin with 2 and end with 7. Specifically 207, 217, 227, 237, 247, 257, 267, 277, 287, and 297.
0.6.	00	Allows dialing the 00 operator.
0.7.	0115234	Allows dialing all numbers within city code 34 of country code 52.
0.8.	01152675551212	Allows dialing only to phone number 555 1212 within city code 67 of country 52.

## REMOTE PROGRAMMING

In addition to the built-in programming method which has been thoroughly described on preceding pages, your CS-900 can also be programmed over the air from a mobile or portable radio using DTMF (Touch-tone) commands, or from any DTMF telephone (must be on a separate phone line) using the telephone's DTMF keypad.

We recommend that you do not proceed with remote programming until you thoroughly understand and have mastered the built-in programming method using the internal keypad.

**NOTE:** The methods for remote programming from a radio vary somewhat from those used for remote programming from a telephone. Please note the differences.

### DTMF or BEEP FEEDBACK

Your CS-900 has been designed to provide either DTMF transpond feedback or audible beep feedback during remote programming. Feedback lets you verify the status of each command you send.

**Beep Feedback:** Beep feedback generates a single beep in response to your command if new data has been entered. If the data you are entering is unchanged (same) there will be a two beep response. The latter is useful to verify that data has been correctly programmed by repeating the entry sequence until the double beep is heard.

Beep feedback can be used in either over the air or over the phone remote programming.

**DTMF Transpond:** Used only if you have either a Connect Systems CD-1 or CD-2 Communications Decoder connected to the radio you will be using to perform the remote programming. DTMF transponds let you 'see' the programming line number and the corresponding data value on the front panel display after each programming command has been sent.

DTMF transpond cannot be used when programming from a telephone because CD-1/CD-2's are not designed to be connected to phone lines.

### REMOTE PROGRAMMING ACCESS CODE

Before programming can begin, you must know the remote programming access code. This code can be verified or user programmed using the built in keyboard. The remote programming access code is located in programming area No. 1 on line 5.4. The default access code is: 2345.

## SELECTING THE DESIRED PROGRAMMING AREA AND FEEDBACK

The type of feedback (beep or DTMF transpond) desired as well as the programming area (1-4) you wish to program are selected by appending the access code with a digit from the Table below.

In over the air programming, you have a choice of either beep response or DTMF transpond. Therefore select 1-8.

When programming from a telephone, you are limited to beep response feedback. Therefore select 1-4 only.

- 1 = Programming area No. 1 with beep response.
- 2 = Programming area No. 2 with beep response.
- 3 = Programming area No. 3 with beep response.
- 4 = Programming area No. 4 with beep response.
- 5 = Programming area No. 1 with DTMF transpond.
- 6 = Programming area No. 2 with DTMF transpond.
- 7 = Programming area No. 3 with DTMF transpond.
- 8 = Programming area No. 4 with DTMF transpond.

## SIGNIFICANCE OF THE \* AND # KEYS

The \* and # keys on a DTMF pad are in the same physical position as the C and P keys on the built-in keyboard. When in remote programming, the \* and # serve similar functions. It's important to understand how these keys operate in remote programming mode:

1. The # key acts similar to the P key in most respects:
  - a) When new data has been typed at the current programming line, the # serves as an enter key. The programming line number does **NOT** advance if data has been entered.
  - b) If data has not been entered since last using the # as an enter key, the # then advances the programming line to the next sequential line number (not the next logical line number as when programming with the built-in keyboard).
2. The \* key acts similar to the C key in most respects:
  - a) Hold down at any time for more than one second to return to A.A.
  - b) Enter 0\* at any time to return to A.A.
  - c) Move to any desired line number by entering the line number followed by \*. For example 14\* would position you at line 1.4.
  - d) A quick tap (less than one second) of the \* will cause the CS-900 to transpond the data at the current line number if using DTMF transpond mode. A quick tap of the \* has no effect if using beep feedback mode.
3. When needed, A long press is one second rather than three seconds when entering a \*, pause or # in the speed dialer area (Programming Area No. 3).

4. To exit remote programming mode, simply hit 0\* to return to A.A. After hearing the Morse code AA (dit-dah dit-dah) then enter \* for more than one second. The CS-900 will respond with the Morse K (dah-dit-dah) and then return to the operate mode.

**Note:** If there is no DTMF programming activity for 25 seconds, the CS-900 will automatically return to the operate mode.

## **REMOTE PROGRAMMING**

To enter Remote programming mode, simply hold down the # key for four seconds followed by the remote programming access code and finally the appended digit from the Table under SELECTING THE DESIRED PROGRAMMING AREA AND FEEDBACK.

Example: The remote programming access code is 2345 and you wish to change a selection in Program Area No. 1 and also have DTMF transponds to your CD-1 / CD-2 Decoder Unit. Make the following entry on your DTMF pad, be sure to hold the # for four seconds:

#23455

When entering programming area No. 1, No. 3 or No. 4 an AA (dit-dah dit-dah) will be heard. When entering programming area No. 2 the currently programmed CW ID will be heard rather than AA.

Below are examples of changing the interconnect access code to \*825. This is programmed in Programming Area No. 1, on line 1.4.

### **Example of over the air programming:**

You wish to change the access code for the interconnect to \*825 (programmed in Area No.1) and utilize DTMF feedback.

Enter the programming mode access code appended with the 1-8 digit which selects the area to be programmed and the feedback response. Append a 5 for Programming Area No. 1 and DTMF response.

Enter #23455 (Remember, four seconds for the #).

The CS-900 will respond with AA in morse (dit-dah dit-dah).

Now hit 14\* to select line 1.4. Then enter 825#.

The CS-900 will transpond a DTMF code after you release your PTT button. The first display on your CD-1 or CD-2 will be the programming line number; 14--, the next display will be the newly programmed data; 825-.

**Note:** Programming lines that have only two digits of data contain the programming line number (left two digits) and the data (right two digits) in a single display sequence.

Return to A.A. by hitting 0\* you will then hear Morse code AA (dit-dah dit-dah) after you let go of the PTT button.

At this point you could either branch to a new programming line to make additional programming changes, or...

Exit remote programming mode by holding down the \* for more than one second. The CS-900 will respond with the Morse K (dah-dit-dah) and then return to the operate mode.

#### **Example of programming from a telephone:**

Before you begin two points must be made:

1. Remember, when Remote Programming over the air, the access code is preceded with a four second #. When Remote Programming from a telephone a four second \* is used if the CS-900 is set for remote base operation, otherwise use a four second #. If in doubt first try #, if no luck try \*.
2. If line 3.8. has been set to 0 (no auto-answer) and line 5.4. is set to a 1 (Remote Programming enabled), then a default auto-answer will occur on ring number 11. If line 3.8. is not set to 0, then it must be set to a larger number than 3.4. has been set. Auto-answer will occur on the ring number you have set on line 3.8.

You wish to change the access code for the interconnect to \*825 (set on line 1.4. in Programming Area No.1)...

Call the phone number of the line the CS-900 is connected to. Upon auto-answer, enter the \* or # for four seconds followed by 23451 (access code appended with a 1 to enter Programming Area No. 1). Transponds will be beep responses.

The CS-900 will respond with AA in morse (dit-dah dit-dah). Now hit 14\* to select line 1.4. Then enter 825#.

If you hear a single beep in response, you have entered new data. You may now verify your entry by entering 825# a second time. If the current entry matches the previous entry, a double beep will be heard.

Return to A.A. by hitting 0\*, you will then hear Morse code AA (dit-dah dit-dah) which lets you know you are at A.A. You may now program other lines, or...

Exit remote programming mode by holding down the \* for more than one second. The CS-900 will respond with the Morse K (dah-dit-dah) and then return to the operate mode. Hang up the phone as soon as you hear the CS-900 disconnect.

Note: If there is no DTMF programming activity for 25 seconds, the CS-900 will automatically return to the operate mode.

## OPERATION

**Important:** The CS-900 displays all DTMF digits on the internal display as they are decoded. The DTMF digits \* and # are shown as a '| ' and '||'. If the CS-900 is set for pulse dialout (1.8. set to 0) the display shows the phone number currently being outpulsed rather than the incoming DTMF.

### PLACING OUTGOING CALLS

**DIALING A CALL MANUALLY:** From the mobile press \*, then enter the access code (if any) that was selected on line 1.4. or, enter the secret toll override access code that was set on line 1.5. If the access delay on line 1.9. is properly set, you will hear dialtone or CW ID start without clipping or delay. The dialtone will last about 3 seconds and then drop off. Begin dialing your intended phone number within ten seconds after dialtone drops or the CS-900 will assume you have changed your mind and will sign off. After dialing, the next thing heard will either be ringing or a busy signal. If 2.9. is enabled, the CS-900 will automatically disconnect if the number that was called is busy.

\*\*\*\*\* CS-900-EXP ONLY ----->

**MANUAL DIALING WHEN SECOND DIALTONE IS REQUIRED:** Programming line 5.5. must be set to 1 to allow second dialtone dialing. The procedure is a bit different for Tone and Pulse dialing.

**Pulse dial:** If 1.8. is set to 0 (pulse dial) a second dialtone is dialed by preceding the number intended for the second dialtone with \*. This causes the CS-900 to wait until the second dialtone appears and to then automatically continue dialing. Example: You need to call 555 3456 after dialing an 8 for long distance. Simply dial 8 \* 555 3456 as a complete sequence immediately following the drop of first dialtone. The CS-900 will then pulse dial the 8 and wait until the second dialtone is detected and then continue the 555 3456 portion. A beep is heard about every six seconds while waiting for the second dialtone which lets you know the CS-900 is still actively processing your call.

**Tone dial:** If 1.8. is set to 1 (tone dialing) Dial the first portion plus a \* after the first dialtone drops. Wait until the second dialtone is heard and drops and then dial the remaining portion. Example; You need to call 555 3456 after dialing an 8 for long distance. Simply dial 8\* after the first dialtone drops and 555 3456 after the second dialtone drops. A beep is heard about every six seconds while waiting for the second dialtone.

**Note:** Third or more dialtones can also be accommodated by simply adding a \* after each group requiring a wait for another dialtone. Do not append a \* on the final group or you will be forever waiting for another dialtone.

<----- CS-900-EXP ONLY \*\*\*\*\*



**PROGRAMMING THE SPEED DIALER FROM THE MOBILE:** Writing a phone number into the speed dialer memory from the mobile is accomplished with a slight variation on ordinary manual dialing. Before you enter your access code, send 9 followed by the desired memory location number. e.g. You wish to place a call to 277-1463 and simultaneously add the number to speed dial memory location 6. From the mobile, enter 9 6 then the access code. When the dialtone is heard, dial 277-1463 just as you would in ordinary manual dialing. You will never have to manually dial 277-1463 again!

**Note:** The 9 as used above means **WRITE** the phone number to be dialed into the memory location specified immediately following the 9.

**Note:** Phone numbers containing a \* for second dialtone wait cannot be remotely programmed if using tone dialing. These numbers can only be programmed using the internal keyboard.

You can program a \*, pause or # as part of a speed dial sequence if desired. The digits 1,2 and 3 are interpreted as \*, pause and # if held down for 4-5 seconds during the dialing process.

For example: you wish to program; 8 pause 472-8197 into memory location No. 3. Enter in order; 9 3 then your access code. Then after dialtone enter 8, long 2, 472-8197. The number you have dialed is now properly loaded into memory location No. 3. However the long 2 will cause a misdial of the immediate call. When a \*, pause or # has been used, do not let the call go through. Send the disconnect command after the number has been dialed and call back using the speed dialer. The call will now dial properly.

**1-800 DIALING:** The CS-900 will allow dialing to toll free 1-800 numbers even if 1 is set as a restricted first digit. However, if you are going to restrict 1, you must restrict it on line 2.2.

**CALL WAITING:** If line in use detection has been enabled, the CS-900 checks to see if the line is in use when a mobile attempts access. If the line is free the mobile will hear dialtone and can proceed with his call. If the line is in use, the CS-900 will send a special busy signal to the mobile and revert to the stand-by condition. At the same time, Call Waiting beeps let those using the line know that a mobile unit would like to use the line. When the telephone users hang-up, beeps let the mobile know that the line is now free to use.

The mobile can cut-in on the call if desired by using the secret toll override code (1.5.) after hearing the line in use busy signal. A three way conversation can now take place.

**PLACING A CALL WITH THE SPEED DIALER:** Once a phone number has been stored, calling back is a snap! Simply precede the access code with the appropriate memory location number. Soon, your intended number will be ringing. Example: Your access code has been set as \* only. You wish to call a friend whose phone number has been previously stored in location 24. Simply enter 24 \* on your mobile keypad. Another example: Your access code is \*391, and you wish to speed dial the number in memory location No. 7. Enter 7\*391, that's all there is to it!

**Note:** An error message consisting of eight beeps will be heard if you attempt to speed dial an unused memory location.

**LAST NUMBER REDIAL:** The last phone number called is always automatically stored at speed dial memory location NO. 0. To redial the last number called, simply precede the access code (1.4.) with 0. Similar to using the speed dialer. e.g. 0\*, 0\*391 etc.

**HOOK FLASH:** The CS-900 has built-in hook flash logic to operate certain phone company provided features. To flash, simply press \* three times (\*\*\*) . WARNING: The 570 ms. (on-hook) flash can cause a disconnect on some phone lines.

**ACTIVITY TIMER:** Once your number has been dialed, the activity timer starts operating. The activity timer behaves per selections made on program lines, 0.7. and 2.6. A warning beep is heard every two seconds during the second half of the programmed timeout interval. The beeps warn of impending timeout.

The activity timer measures phone line audio activity. Phone line activity causing a single transmission exceeding the time set in 2.6. will cause one of two responses as selected on line 0.7.

1. If a "1" (stand-by) was programmed on line 0.7. the CS-900 will simply go off the air, but will not disconnect your call. Pressing \* from the mobile will restore normal operation. (Assuming you wish to continue listening to the audio that caused the timeout).
2. If a "0" (disconnect) was programmed on line 0.7. the CS-900 will disconnect, and the call in progress will be lost.

**TIMEOUT TIMER:** Calls will automatically disconnect at the end of the time you selected on line 2.7. Two quick beeps heard in succession every two seconds during the final twenty seconds warn that time out is imminent. The timeout timer can be reset by the mobile by pressing \*.

**Note:** The CS-900 can not hear your reset command if it is transmitting to you. Wait until the Cs-900 has returned to receive before you send \* to reset the timeout timer.

**DISCONNECTING WHEN THROUGH:** If a "0" was entered on line 1.6. simply press # to disconnect. If a "1" was entered, press # plus the connect digits that were selected on line 1.4.

**FIVE PRESS AUTO DIAL:** If a "1" was entered on line 1.7., the phone number residing in speed dial memory location No. 1 can be automatically dialed by pressing the mobile Mic button five times in succession. When the call is finished, five more presses will cause disconnect. **WARNING:** If you press too fast or too slow the CS-900 will not respond. The correct rate is about one press per second. This timing is required to keep rapid mobile fading and normal on channel Mic button pressing from falsing the patch on and/or off.

**EXTERNAL CONNECTION NOTE:** This feature can not operate without an internal COS connection to the receiver.

### **INCOMING CALLS**

**RINGOUT:** Lines 3.3. through 3.7. allow you to customize ringout for your application. Ringout is how the CS-900 alerts you to the presence of an incoming call.

When a call comes in, the CS-900 first checks to see if the channel is in use (3.3.). The incoming rings are counted (3.4.) before a mobile alert is sent. The alert can consist of a Ring Tone that sounds like a telephone ringing or a CW ID (3.5.). You may also preface the ringout with a sequential DTMF sequence (3.6.). The user programmable DTMF sequence can be used to operate attention getters such as a horn honker. The type of alert selected can be set to occur only once or on alternate rings (3.7.) of the incoming call.

To answer your call from the mobile, simply enter your access code (1.4.). When you complete your call, send the disconnect code (1.6.).

**AUTO ANSWER:** The CS-900 must be set to automatically answer (3.8.) incoming calls if you wish to use the Remote Base or DTMF Selective Call modes.

**Note:** If ringout is set to occur earlier in the ring cycle (3.4.) than auto answer (3.8.), it is possible to receive ordinary incoming calls plus use the modes which require an auto answer.

**TELEPHONE REMOTE BASE:** You can dispatch and have full use of your system from any telephone by entering a 1 or 2 on (3.9.)...

Enter 0 if you are going to use mobile selective calling.

Enter 1 if you would like to access your radio system (Remote Base) from any phone without the need to enter an access code.

Enter 2 if you prefer that an access code is required to enter remote base mode. Dial as described below after the beep:

**From DTMF Telephones:** Use mobile access code programmed on 1.4.

**From Dial Pulse Phones:** Will only operate if mobile access code is \* (1.4. = 0) and DTMF signalling has been selected. Simply dial 0 from the dial pulse phone.

When your remote base dispatch is finished, send the disconnect code (1.6.) before you hang-up. If you forget, built-in safe-guards such as call progress tone detection will automatically disconnect the CS-900 on most phone systems.

**Note:** A dial pulse phone can not turn off the CS-900 when through. The timeout or activity timer must perform the disconnect. (Or, the mobile can disconnect by sending #).

**SELECTIVE CALLING:** Any mobile or portable radio equipped with a DTMF decoder can be selectively called from either a DTMF or dial pulse telephone...

**From DTMF Telephones:** After the auto-answer beep, enter the desired DTMF selective call sequence followed by \*.

For example: XXXXX\* (x's any length, any sequence).

The CS-900 will hold the auto answered call for thirty seconds giving the mobile time to respond. To answer a call and activate two way voice capability, the mobile must send the connect code (1.4.). When the call is completed, the mobile should send the disconnect code (1.6.).

**From Dial Pulse Phones:** (Dial click detect or EXP option required). After the auto-answer beep, dial 0 followed by the desired selective call sequence.

For example: 0XXXXX (x's any length, any sequence).

The CS-900 will hold the auto answered call for thirty seconds giving the mobile time to respond. To answer a call and activate two way voice capability, the mobile must send the connect code (1.4.). When the call is completed, the mobile should send the disconnect code (1.6.).

**REMOTE BASE WITH SELECTIVE CALLING:** (From DTMF phones only) Remote Base with selective calling can be accessed by entering the connect code (1.4.) after the auto-answer beep. You can then send any selective call code by entering the appropriate digits followed by \*. (Remote base mode 3.9. must be set to 0 if selective calling is to be used).

Example: You've selected \*7 as your access code (1.4.) and you wish to send the selective call code 639. After the auto answer beep enter \*7 639\*.

## OPERATION THROUGH REPEATERS OR TRUNKED SYSTEMS

Operating the CS-900 through a repeater appears to the user as straight simplex operation. It makes no difference if the repeater is DPL/CTCSS or carrier activated, or if the repeater has hang time. Actually, three or four seconds of hang time will improve operation because there will be fewer noises to distract the conversation.

The built-in .5 second electronic voice delay eliminates any possibility of word clipping or loss.

**Note:** See comments on setting the RX VOX control on page 6.

## CALL PROGRESS TONE DETECTION

**CALL PROGRESS TONE DETECTION:** The CS-900 incorporates very sophisticated software algorithms that automatically sense the presence of dialtone and/or busy signals. The method used will function with any tone frequencies. There is nothing to adjust or maintain, it's completely automatic!

**Note:** On lines 2.9. and 3.0. you can selectively enable or disable busy signal disconnect and dialtone disconnect for special applications.

```
***** CS-900-EXP ONLY ----->
Programming line 5.9. allows customizing call progress tone detection
to operate on most any telephone system.
<----- CS-900-EXP ONLY *****
```

**TYPICAL APPLICATIONS FOR THE AUXILIARY RELAY**  
(Option 901)

**Remote CTCSS Enable/Disable:** When using the CS-900 as a Remote Base, it is desirable to monitor the channel for activity prior to dispatching. The auxiliary relay can be used to allow the remote switching of the radio's hook switch. Pressing 0 turns the relay on. Pressing \* turns the relay back off. Thus the radio can be set to carrier receive and back to DPL/CTCSS operation remotely.

Enter 1 (Monitor) on line 3.1. Connect the normally closed relay contacts (W and NC) in series with the radio's hook switch.

**Disabling tone squelch:** Many of the new microprocessor controlled radios will not transmit when the microphone is on hook. The auxiliary relay can be used to fool the radio into thinking the MIC is off-hook.

Enter 0 (Connect) on line 3.1. This will energize the relay whenever the CS-900 is in use. Connect the normally closed contacts (W and NC) in series with the radio's hook switch.

**Relay Switched PTT:** If the radio's unkeyed PTT voltage exceeds 16 VDC or if inverted keying is required (closure to 12V) the auxiliary relay must be used to key the transmitter.

Enter 2 (KEY) on line 3.1. Connect the radio's PTT line to one of the Aux. Relay contacts on the rear barrier strip. Connect the other Aux. Relay contact to 12 VDC for inverted keying or to GND for sink to ground keying. Make sure JP-7 is strapped from the center to the NO position. The PTT connection on the rear barrier strip should not be connected.

**Remote Relay Function:** In some installations it may be desirable to remotely control (switch) something from the mobile. e.g. change channels, change CTCSS tones, change antennas etc.

Enter 3 (REMOTE FUNCTION) on line 3.1. Then select a three digit control code on line 3.2. If the code selected was 789, you would turn on the Remote Relay by sending #789. To turn off the relay send ##789.

**CONNECTING THE RELAY**

Connect the device requiring remote control to the two terminals labeled 'AUX. RELAY' on the rear panel barrier block. The CS-900 is supplied with the relay strapped for normally open operation. if normally closed operation is desired, see JP-7 on page 6 for details.

# GLOSSARY

COS	Carrier Operated Squelch
DCS	Digital Coded Squelch
CTCSS	Continuous Tone Coded Squelch System
JP	Jumper (Schematic designator)
CCW	Counter Clockwise
POT	Potentiometer
PCB	Printed Circuit Board
CW ID	Continuous Wave Identification (International Morse Code)
FCC	Federal Communications Commission (USA)
DOC	Department of Communications (Canada)
CO lines	Central Office Lines (telephone lines from phone company)
ANI	Automatic Number Identification
DTMF	Dual Tone Multi-Frequency (touch tone dialing format)
PTT	Push to Talk (transmitter keying using microphone switch)



## LIMITED WARRANTY

Connect Systems Inc. (CSI) hereby warrants our products to be free from defective workmanship for a period of one year and defective parts for a period of five years from date of sale to the initial end user. This warranty applies only to the original consumer/end user purchaser of each CSI product. During the first year of warranty, CSI will repair any of its products at no charge providing the defective unit is shipped prepaid and service is performed by CSI. During the years 2 -5, there shall be no charge for replacement parts providing that the defective unit is shipped prepaid and service is performed by CSI. Conventional prevailing labor and shipping charges will apply following the end of the first year. CSI, at its sole discretion, will replace defective parts on an exchange basis for the first five years of ownership by the original purchaser. All shipping cost are the responsibility of the customer.

### **What is not covered by this limited warranty:**

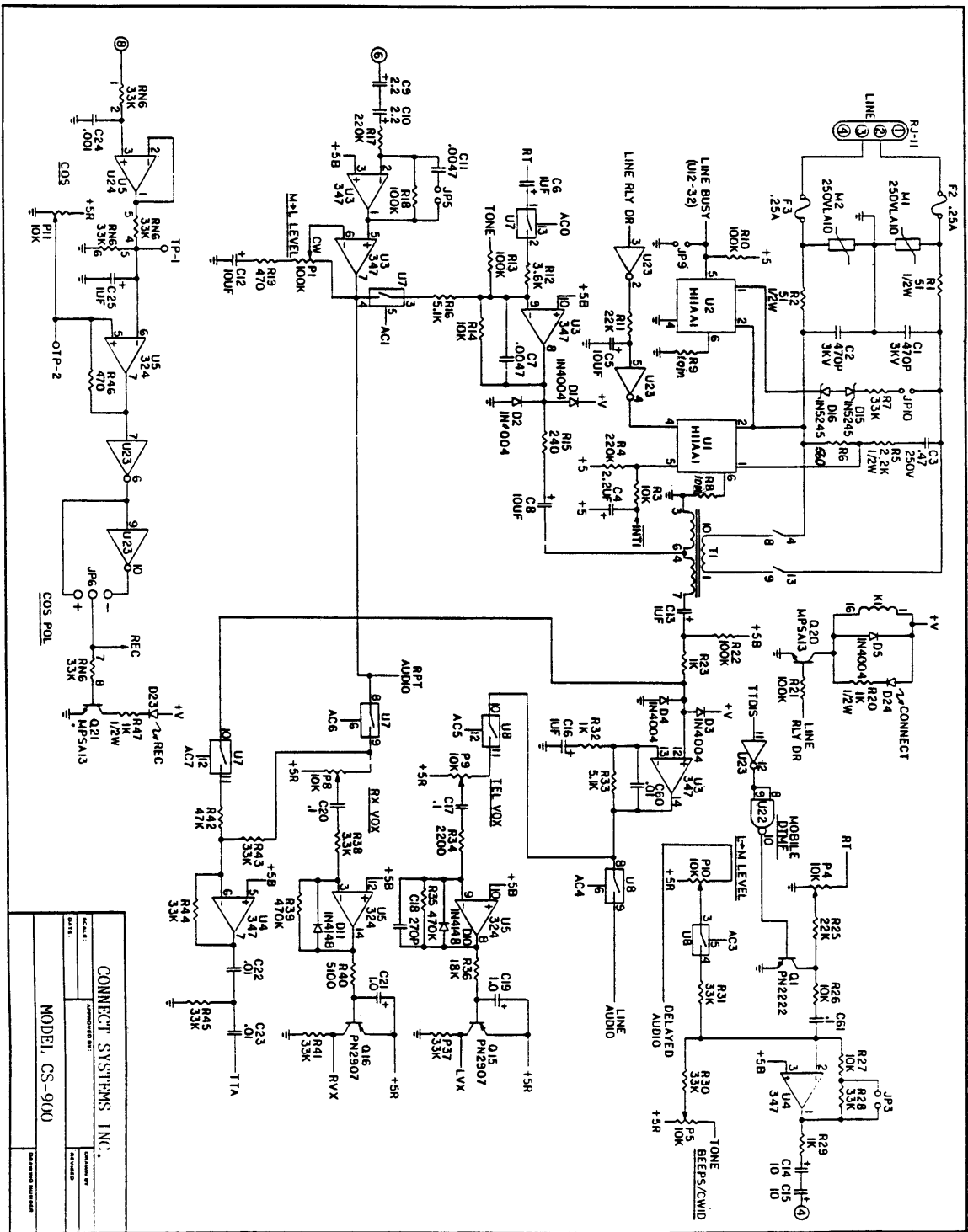
This warranty shall not apply, if, in our judgment the defects are caused by misuse, lightning strikes, customer modification, water damage, negligent use, improper installation, overloads caused by external voltage fluctuations, use of unregulated power supply, damage caused by transit or handling or an abusive treatment not in accordance with ordinary product use or the product serial number has been removed, altered, or defaced. **Specific Exclusion:** This warranty specifically excludes lightning protection devices (MOVs and phone line fuses) and transistors in the PTT (Push to Talk) circuitry. These components can only fail from external abuse.

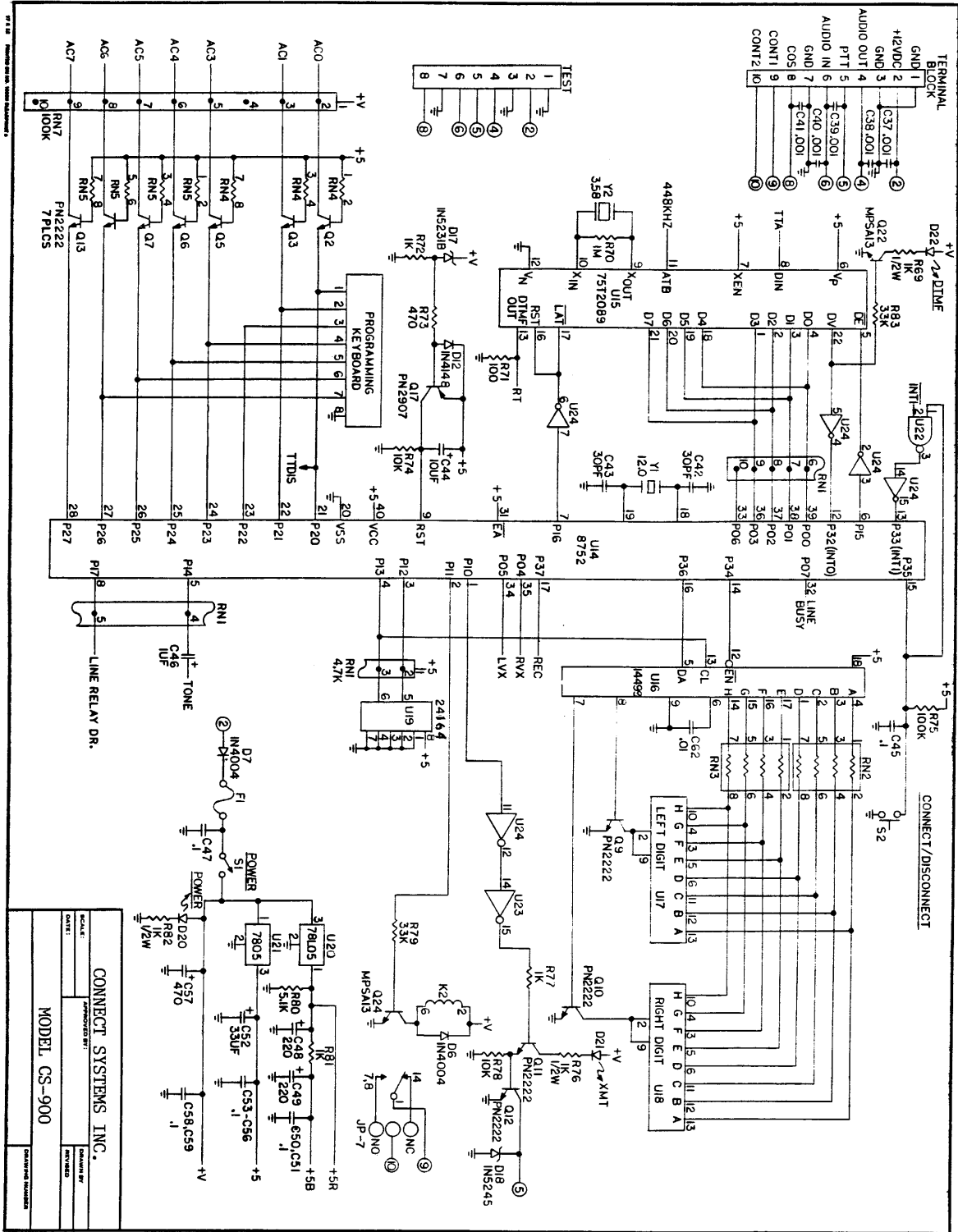
THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, STATEMENTS OR REPRESENTATIONS, AND UNLESS STATED HEREIN, ALL SUCH WARRANTIES, STATEMENTS OR REPRESENTATIONS MADE BY ANY OTHER PERSON OR FIRM ARE VOID. ALL IMPLIED WARRANTIES IN CONNECTION WITH THE SALE OF THIS EQUIPMENT, INCLUDING THE WARRANTY OF MERCHANTABILITY, SHALL BE OF THE SAME DURATION AS THE WARRANTY PERIOD STATED ABOVE. SOME STATES DO NOT ALLOW LIMITATIONS OF HOW LONG AN IMPLIED WARRANTY LAST, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU. IN THE EVENT OF PRODUCT FAILURE WHICH PROVES TO BE CAUSED BY A DEFECT IN WORKMANSHIP OF MATERIALS, YOUR SOLE REMEDY SHALL BE THE REPAIR OF THE DEFECT BY CSI OR ITS APPOINTED REPAIR STATION AS STATION AS STATED IN THIS WARRANTY, AND UNDER NO CIRCUMSTANCES SHALL CSI BE LIABLE FOR ANY LOSS OR DAMAGE, DIRECT, INCIDENTAL, OR CONSEQUENTIAL, ARISING OUT OF THE USE, OR INABILITY TO USE, THIS PRODUCT. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

**If your new CSI product shall ever fail, contact Connect Systems Inc. Customer Service Dept. for repair and warranty information at (805) 642-7184**

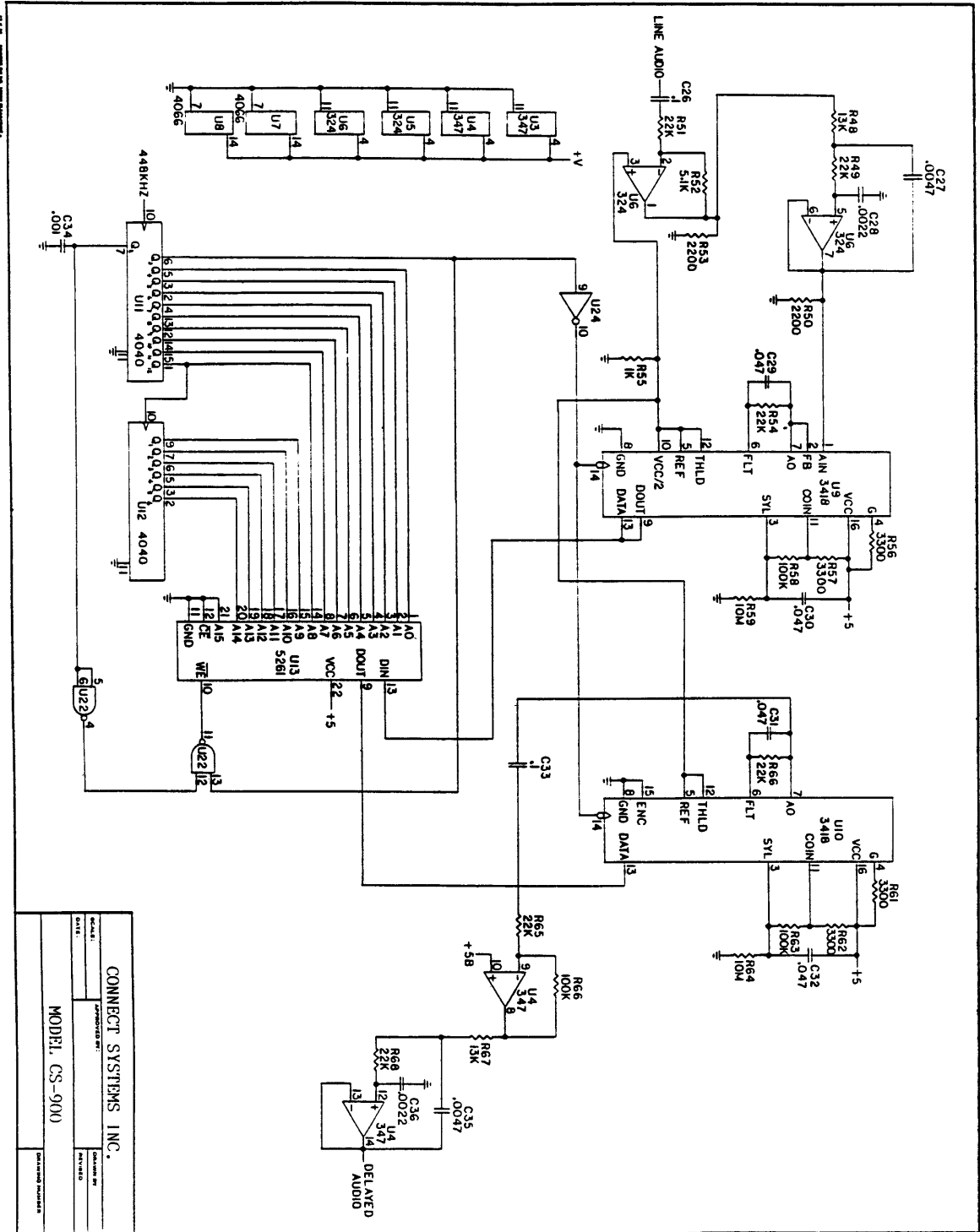
**Note: Connect Systems Inc. reserves the right to render a modest service charge when returned units are found to be free of parts or workmanship defect(s) (i.e. operating to factory specification) within the first year of warranty. Such units will be returned**

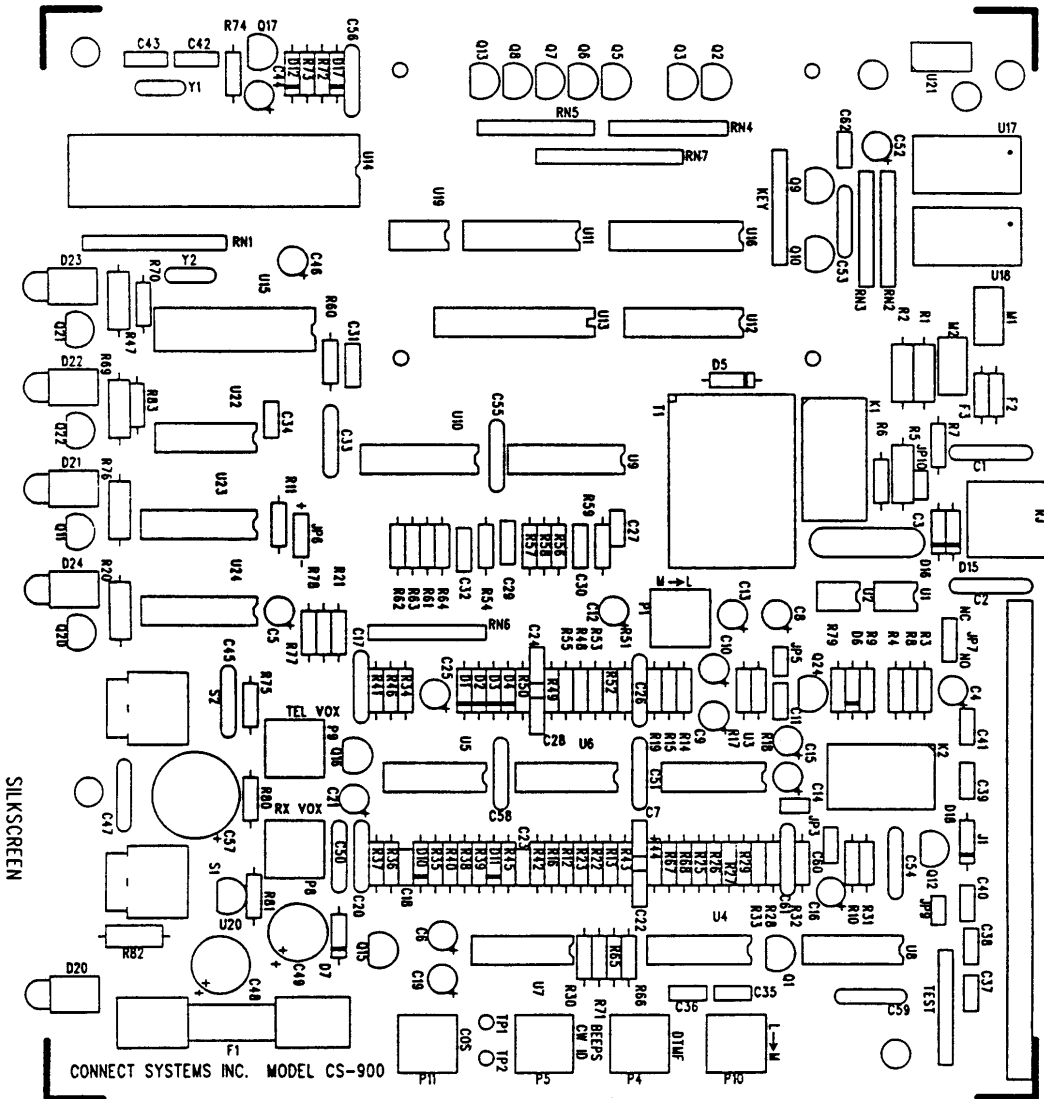
freight collect to the sender, including the appropriate service charge.





CONNECT SYSTEMS INC.  
 MODEL CS-900  
 DRAWING NO. CS-900-01  
 REVISED  
 DATE





## APPENDIX A

### FCC NOTICE TO USERS

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1. This equipment complies with part 68 of the FCC rules. On the bottom of this equipment is a label that contains, among other information, the FCC registration number and ringer equivalence number (REN) for this equipment. If requested, this information must be provided to the telephone company.
2. The REN is used to determine the quantity of devices which may be connected to the telephone line. Excessive REN's on the telephone line may result in the device not ringing in response to an incoming call. In most, but not all areas, the sum of the REN's should not exceed five (5.0). To be certain of the number of devices that may be attached to the line, as determined by the total REN's contact the telephone company to determine the maximum REN for the area.
3. If this product causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe necessary.
4. The telephone company may make changes in it's facilities, equipment, operations, or procedures that could affect the operation of the equipment. If this should happen, the telephone company will provide advance notice in order for you to make the necessary modifications in order to maintain uninterrupted service.
5. If trouble is experienced with this product, please contact Connect Systems Incorporated at (805) 642-7184 for repair and warranty information. If the trouble is causing harm to the telephone network, the telephone company may request you remove the equipment from the network until the problem is resolved.
6. There are no repairs that can be accomplished by the user. In the event of operation problems, disconnect your unit by removing the modular plug from the telephone company modular jack. If your regular telephone still works correctly, your unit has a problem and should be returned for repairs (in or out of warranty). If upon disconnection of your unit there is still a problem on your line, notify the telephone company that they have a problem and request prompt repair service. The unit may be returned to Connect Systems Incorporated, 2259 Portola Rd. Ventura, CA 93003.
7. This interconnect product cannot be used on a public coin service provided by the telephone company. Connect to Party Line Service is subject to state tariffs. Contact the state public utility

commission, public service commission or corporation commission for information.

8. This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference which may cause undesirable operation.
9. This equipment generates and uses radio frequency energy and if not installed and used properly, i.e. in strict accordance with the service manual, may cause interference to radio or television reception. It has been tested and found to comply with the limits for a Class B computing device pursuant to Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when operated in a residential installation.
- 10 If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
  - a. Reorient the receiving antenna.
  - b. Relocate the equipment with respect to the receiver.
  - c. Move the equipment away from the receiver.
  - d. Plug the equipment into a different outlet so that equipment and receiver are on different branch circuits.
  - e. Ensure that card mounting screws, attachment connector screws, and ground wires are tightly secured.
  - f. If cables not offered by this company are used with this equipment, it is suggested that you use shielded, grounded cables with in line filters, if necessary.
  - g. If necessary consult your dealer service representative for additional suggestions.
- 11 The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. It is the responsibility of the user to correct such interference.