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MicroPatch

Multi-Mode Interconnect

Model 9800

USER'S INSTRUCTION MANUAL

Made in U.S.A.

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rev. C

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GENERAL DESCRIPTION

The Model 9800 'MicroPatch' by Connect Systems Inc. is a fully automatic Multi-Mode radiotelephone interconnect terminal. A built-in keyboard and digital display allow the user to obtain the maximum power from the on board microprocessor. All features are user programmable and/or selectable. Additionally, there are eight modes of operation to choose from...

1. Simplex Sampling Interconnect

Sampling Simplex with VOX enhancement.

2. VOX Control Station Interconnect

For operation through repeaters, or straight simplex.

3. Duplex Base Station Interconnect

Adds semi-duplex interconnect to any duplex base station.

4. Duplex Repeater Interconnect

Adds semi-duplex interconnect to any existing repeater system.

5. Repeater Controller with Duplex Interconnect

Converts any receiver and transmitter into a full featured repeater.

6. Dial Access Remote Base

Dispatch and have full use of your radio system from any telephone. Operates with any mode selected above.

7. Dial Access Paging Terminal

Beep Pagers and/or selectively call mobiles with or without two way voice from any telephone.

8. Talk-Back Paging Terminal

Beep pagers or mobiles followed with a one way voice message from any telephone.

And, powerful built-in standard features such as... 90 number speed dialer, last number redial, remote hook-flash, remotely controllable relay, automatic disconnect on busy signals and dialtone, fully regenerated tone or pulse dialing, etc. make the

9800 the most versatile and powerful interconnect product on the market today!

Made and designed in the U.S.A.

PHONE LINE CONNECTION

The 9800 is equipped with a standard RJ-11 modular phone jack and may be connected to standard ring-tip loopstart CO lines. The following information must be given to the telephone company prior to connecting:

RINGER EQUIVALANCE: 0.3B

In U.S.A.

FCC REG. NUMBER : 2CAUSA - 65809 - OT - T

In Canada

DOC REG. NUMBER : 1755 4559 A

This equipment may not be connected to coin or party lines. Be sure to notify the phone company when discontinuing use. The line in use feature may not be enabled on lines requiring FCC part 68 or DOC registered apparatus. Please see Appendix A at the back of this manual for additional information.

INSTALLATION AND ADJUSTMENTS

The 9800 contains both a noise squelch and COS circuits with COS input. This gives the 9800 a great deal of interface flexibility. The audio takeoff point can be anywhere from the discriminator (pre-emphasized audio) to the volume control (de-emphasized or flat audio). If connection is made to the discriminator, only three connections are required to most radios. When connecting past the discriminator, a fourth COS connection must be made. Use shielded wires with the shields at both ends connected to chassis ground. (The rear panel barrier strip terminals labelled "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 audio input terminal may be connected directly to the discriminator output, or to the high end of the volume control.

If connecting to the discriminator...

1. A COS connection to the receiver is not required.
2. The de-emphasis strap JP-5 must not be cut.
3. The COS polarity strap JP-6 must not be strapped.
4. The noise control P2 must be adjusted to illuminate the front panel noise LED. See "P2 NOISE" below for further explanation.

If connecting to the volume control high side...

1. A COS connection must be made.
2. Cut JP-5 to eliminate built-in de-emphasis.
3. JP-6 must be strapped for the appropriate COS polarity.
4. The noise control must be set at minimum. (fully CCW).
5. The COS threshold control P11 must be set to match the level of the COS takeoff point.

See the appropriate sections below for detailed directions.

Note: Connection must be made to the discriminator if you wish to use the Sampling Simplex mode. A COS interface is not quick enough.

COS: Note: The COS input is normally not connected if the AUDIO IN is connected directly to the discriminator.

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 output of the noise rectifier.

DPL or CTCSS Squelch: The receiver's DPL or CTCSS decoder will have a logic output 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 noise LED will go out when a signal is received. 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 land 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 32 for details.

TONE

The TONE outout is used to inject signaling tones separately from voice audio and is normally only connected if options TSU-32P or 9803 are installed. However options 9802 and 9804 can also use this output if desired. Connect the TONE output past the instantaneous deviation control (IDC) circuit in the transmitter. Preferably directly to the modulator.

The 9800 can send the signalling tones from options 9802, 9803 or 9804 out the AUDIO OUT port or out the TONE port. We recommend sending CTCSS audio from the 9803 out the TONE port, and signalling audio from the 9802 or 9804 out the AUDIO OUT port.

If you want signalling tones (from 9802, 9803 or, 9804) to go out the AUDIO OUT port, remove resistor R-105.

If you prefer to inject these tones directly into the modulator via the TONE port, remove resistor R-48 instead.

If the TSU-32P option is not installed and you want your signalling tones to come out the AUDIO OUT port, there is no need to remove R-48 or R-105.

R-48 is near the Beeps/CW ID pot. R-105 is near IC U-14.

POWER: Connect to a source of 12-14 VDC that can supply up to 300 MA. The 9800 is reverse polarity protected, so a polarity mistake will not damage your 9800.

WARNING

The 9800 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, P2 and P11, fully counterclockwise.
Set P3, P4, P5, P6, P9, and P10 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 noise LED is out indicating that a signal is being received.

P2 NOISE: Noise (squelch) control: This control must be set to minimum (fully CCW) if a COS connection is made. If the audio input was connected to the discriminator, advance clockwise to a

point just beyond where the front panel noise LED lights without any sign of flickering.

Note: If the noise light will not come on when the noise control is advanced, you are not connected to the discriminator. Only the direct discriminator output has sufficient noise bandwidth to operate the internal noise squelch and noise light.

P3 RPT: Repeat audio level: Set for correct repeat audio level if repeater controller mode is selected. (0.9.) Note: The repeat audio level must be reset if the M->L control has been adjusted.

P4 DTMF: Patch to mobile DTMF level: Sets the DTMF transmitter modulation level of land to mobile DTMF and Semi-Duplex privacy beeps.

P5 BEEPS/CW ID: Status beeps & CW ID level: Adjust for desired modulation level of status beeps or CW ID.

P6 TONE SIGNALLING: Tone signalling level to mobile: Adjusts the Line In Use busy signal modulation and the modulation level of optional signalling tones. (Not functional unless option 9802, 9803 or 9804 has been installed).

P8 RX VOX: Receiver VOX sensitivity: Used in VOX simplex mode only. 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 tone on the repeater's carrier.

When operating through a repeater as a control station patch it is best to connect the AUDIO IN to the volume control and make a COS connection to the receiver.

P9 TEL VOX: Telephone VOX sensitivity: Sets telephone VOX sensitivity for VOX mode, VOX enhancement for sampling mode and call progress tone 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:** This control is only adjusted if you are using the COS input and JP-6 has been strapped. 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 read 2 volts with no signal, and 4 volts with a signal applied to the receiver, TP-2 would be set to read 3 volts.

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

JUMPER STRAP OPTIONS

JP-1 Factory Installed. Cut only if the Electronic Voice Delay (Option 9801) is installed. (JP-1 is near U18)

JP-2 Factory installed. Should only be cut if option 9802, 9803, or 9804 has been installed. (JP-2 is near U7)

JP-3 Audio output range strap. Strap in = low level (0-1 V). Strap cut = high level (0-5 V). Strap factory installed. (JP-3 is near U5)

JP-4 Factory installed. Should only be cut if CTCSS option TSU-32P is installed. (JP-4 is near C9)

JP-5 Factory installed. Removal eliminates the built-in de-emphasis network. Cut only if receiver audio is taken past de-emphasis. (e.g. from the volume control). (JP-5 near C36)

JP-6 This strap should not be connected if Audio In has been connected to the discriminator. Strapping JP-6 enables COS operation and selects the required COS polarity. 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 noise LED will be illuminated when there's no signal, and go out when a signal is received.

NOTE: A plastic push-on connector will be found on the center pin. Simply remove and re-install over the two desired pins.

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. It may be necessary to remove the rear panel to make this modification. (JP-7 is near the Aux. Relay K2).

JP-9 JP-9 and JP-10 are used to enable / disable line in use & detection. These straps are mutually exclusive. That is to **JP-10** say that one or the other must be strapped. The 9800 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.

NOTE: There is no JP-8

PROGRAMMING THE 9800

The 9800 has three easily-accessed programming areas: Operating Parameters, CW ID and Auto-Dial Phone Numbers. 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 Auto-Dial Phone Numbers) 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 and Auto-Dial Phone Number programming, the next line will be the next numeric line number. In Operating Parameters programming the next line 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).

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 (eg. 87 on line 0.2.) pressing 'P' will not cause an advance to the next program line. This prevents you from accidentally entering an unuseable 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.] indicates 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.

OPERATING MODE SELECTION

[Branch to]

0.1. Operating Mode

0 = Sampling Simplex [0.2.]
1 = VOX Simplex [0.5.]
2 = Duplex / Repeater Controller [0.8.]
DEFAULT: 0 = Sampling Simplex

Note: The discriminator connection method is required for the Sampling Simplex mode! (A COS connection would be too slow)

SAMPLING MODE PARAMETERS

0.2. Sample Width

Select 1-85 (3-255 ms)
3 ms increments per step
DEFAULT: 85 = 255 ms (milliseconds)

Select the smallest sample width compatible with your radio. Start with a large value (255 ms) and reduce a little at a time until the mobile can no longer acquire control by pressing the Mic button. From there, increase the sample width until reliable operation is obtained. The sample width in ms is equal to three times the number you enter.

0.3. Sample Rate

Select 1-9 (.25-2.25 seconds)
.25 sec increments per step
DEFAULT: 3 = .75 sec

Select a sample rate to suit your preference. One sample each .75 second is a good starting point. The sample rate in seconds is equal to .25 seconds times the number you enter.

0.4. VOX Variable Sampling Factor

Select 1-9 [1.4.]
DEFAULT: 9 = 9:1

The VOX enhancement ratio can be varied from 1 to 9. One is equivalent to no enhancement. Nine is maximum enhancement. Pick the enhancement ratio that slows the sample rate the desired amount while the telephone party is speaking.

VOX MODE PARAMETERS

0.5. RxVOX or Carrier Control

1 = RxVOX
0 = Carrier
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.

0.6. Pulser

0 = Disable [1.4.]
Select 1-99 (.1-9.9 seconds) [1.4.]
.1 sec increments per step
DEFAULT: 0 = Disable

The pulser 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
0 = Disconnect
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.)

DUPLEX MODE PARAMETERS

0.8. Semi-Duplex Privacy Mode

1 = Enable
0 = Disable
DEFAULT: 0 = Disable

In privacy mode, the mobile side of the conversation is not re-transmitted. Thus eavesdroppers only hear one half of the conversation. Thus providing a good measure of security.

0.9. Repeater Controller

1 = Enable [1.0.]
0 = Disable [1.4.]
DEFAULT: 0 = Disable

1 - Selects Duplex Patch with Repeater controller.
0 - Selects Duplex Patch without Repeater controller.

1.0. Repeater On/Off Control Code

Enter any three digits: xxx
protocol: #xxx = ON
 ##xxx = OFF
DEFAULT: 456

Select any three digits as an over the air repeater on/off control code. Press # plus the three digits to turn on the repeater. Press ## plus the three digits to turn off the repeater.

1.1. Repeater Mode CW ID Interval

0 = Disable

Select 1-99 (.1-9.9 minutes)
.1 min increments per step
DEFAULT: 30 = 3 minutes

Choose the CW ID interval that you prefer for repeater mode.
Or, disable repeater mode CW ID by entering 0. The CW ID interval is equal to .1 minutes times the number entered.

1.2. Repeater Hang Time

Select 0-99 (0-9.9 seconds)
.1 sec increments per step
DEFAULT: 30 = 3.0 seconds

Selects the time in seconds that the repeater remains on the air after the input signal drops. The time is equal to .1 second times the number entered.

1.3. Repeater Activity Timer

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

Any single continuous mobile transmission exceeding the repeater activity timer limit puts the repeater off the air. The activity time in seconds is equal to the number entered. Entering 0 disables the activity timer.

GENERAL PHONE PATCH OPERATING PARAMETERS

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.

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 a rate of approximately one push per second) will automatically dial the phone number stored in speed dialer memory location No.1. Five subsequent presses will cause a disconnect in VOX and Duplex modes only.

1.8. Dialing Mode

1 = Tone
0 = Pulse
DEFAULT: 1 = Tone

Select how the 9800 will dial your phone calls. Note that tone is much faster if you are in a touchtone telephone exchange.

1.9. Access Delay

Select 1-9 (1-9 seconds)
1 sec increments per step
DEFAULT: 2 = 2 secs

Access delay is a user selectable delay to compensate for DTMF-PTT delay built into your mobile microphone. 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. eg. 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.

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 9805 (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 controlled while in connect.

INCOMING CALLS

3.3. Busy Channel Monitor

1 = Enable
0 = Disable
DEFAULT: 0 = Disable

Determines whether the 9800 will ringout or auto-answer if the channel is busy (Enter 0). Or only when the channel is clear (Enter 1).

3.4. Ringout on Ring Number

0 = Disable [3.8.]
Select 1-9 (1-9 ring) [3.5.]
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-xxxxxxx = 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 [A.A.]

Select 1-9 (1-9 ring) [3.9.]

DEFAULT: 0 = Disable

Selects which incoming ring initiates auto-answer. Enter 1-9 or enter 0 to disable. If auto-answer is set to a greater number of rings than ringout (3.4.) you can have 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 or talk back paging 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.

4.0. Selective Calling or Talk-Back Paging

1 = Selective Call Mode [4.2.]

0 = Talk back Page Mode [4.1.]

DEFAULT: 1 = Selective Call Mode

If talk back paging is selected the 9800 will only deliver a one way voice message to a pager.

4.1. Talk Back Time

Select 1-9 (3-27 seconds)

DEFAULT: 8 = 24 secs

Sets the talk time for talk back paging. Talk time is equal to three seconds times the number entered.

NOTE: If CTCSS is used as a talk-back paging tone, resistor R8 must be removed. Simply lift one end.

- 4.2. Mobile to Mobile Signalling** Note: DTMF signalling does not
1 = Enable operate if one of the optional
0 = Disable tone formats has been
DEFAULT: 0 = Disable installed.

When enabled, the 9800 can convert a mobile initiated DTMF sequence into any of the optional tone formats. For example: DTMF to Two Tone signalling. Mobile to mobile signaling is only functional if option 9802, 9803 or 9804 is installed. see page 28 for details.

Branching:

DTMF to: [A.A.] if no tone option is installed.
CTCSS to: [4.3.] if option 9803 is installed.
TWO TONE to: [4.4.] if option 9802 is installed.
5/6 TONE to: [4.5.] if option 9804 is installed.

4.3. CTCSS Beep Alert (Option 9803 required)

Select 3-9 (3-9 beeps)

DEFAULT: 6 = 6 Beeps

Select the number of alerting beeps that accompany the selected CTCSS tone for selective calling. See Table 2 for CTCSS selective call codes.

4.4. Two Tone Group Call or Diagonal Tone (Option 9802 required)

1 = Group Call [A.A.]

0 = Diagonal [A.A.]

DEFAULT: 1 = Group Call

NOTE: See Table 3 for Two Tone selective call codes.

4.5. Five Tone Preamble (Option 9804 required)

1 = Enable [4.6.]

0 = Disable [4.7.]

DEFAULT: 0 = Disable

Select the selective call code and all appropriate 5/6 tone parameters from Table 4.

4.6. Preamble Tone

Select tone 0-9

DEFAULT: 0 = Tone 0

4.7. First Tone Select

Select tone 0-9

DEFAULT: 0 = Tone 0

4.8. Second Tone Select

Select tone 0-9

DEFAULT: 0 = Tone 0

4.9. Repeat Sequence

Select 1-9 (Repeat the tone sequence 1-9 times)

DEFAULT: 1 = Once

5.0. Duration of Tones

Select 1-99 (1-99 ms)

DEFAULT: 33 = 33 ms

5.1. Tone Group Select

1 = EIA [A.A.]

2 = ZVEI1 [A.A.]

3 = CCIR/EEA [A.A.]

4 = CCIT [A.A.]

5 = EURO [A.A.]

DEFAULT: 1 = EIA (See Table 4)

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 unuseable 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 9800 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.** thru 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.

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.

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 currently selected phone number for the displayed speed dial location. 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 location, or, enter a new phone number and press 'P' to advance to the next location. Any memory can be erased by entering three zeros. (000P).

NOTE: If there is no number at the current location, pressing 'C' will flash the current location 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.

Phone Number Length Checking

A maximum of 16 digits may be entered in speed dial locations 1 through 16. A maximum of 8 digits may be entered in auto-dial locations 17 through 90. 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 auto-dial location by holding down 'C' for several seconds until A.A. shows on the display. Now enter the speed dial location 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!

OPERATION

The 9800 will display all DTMF digits on the internal display as they are decoded. This is a useful feature to make sure the Audio In connection is made properly.

NOTE: The DTMF digits * and # are shown on the internal display as a '| ' and '||' respectively (same as 'p' and 'c' on the internal keypad). This is because the displays used can not display the * and # symbols.

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. In VOX or sampling modes wait until the dialtone drops off before you start to dial. In duplex mode you may begin dialing as soon as you hear the dial tone.

After dialing, the next thing heard will either be ringing or a busy signal. The 9800 will automatically disconnect if the number that was called is busy. (2.9.)

1-800 DIALING: The 9800 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 CS9800 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 was in use, MicroPatch 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.

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.

You can program a *, pause or # as part of an 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.

Note: Memory locations 1-16 can store phone number sequences of up to sixteen digits. This is where you will store your long distance numbers that include area codes. Locations 17-90 are limited to eight digits and should be used for your local numbers.

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, thats all there is to it!

NOTE: If you attempt to speed dial from a memory location that has not been previously loaded, MicroPatch will send an error

message consisting of a string of eight beeps, and then return to the stand-by condition.

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 9800 has built-in hook flash logic to operate certain phone company provided features. To flash, simply press * three times (***) .

Note: 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.

Sampling and Duplex Modes: The activity timer is constantly reset while the mobile is transmitting, and starts timing when the mobile stops transmitting. Upon hearing timeout warning beeps, a brief press of the mobile Mic button (must be long enough for acquisition in sampling mode) resets the activity timer. Failure to reset will result in a disconnect.

Note: The Vox variable sampling parameter (0.4.) is automatically set to 1 while the activity timer or the timeout timer is beeping. This results in a faster sampling rate making it easier and quicker for the mobile to reset the timer(s).

Vox Mode: 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 9800 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 9800 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 *.

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.

If you press too fast or too slow the 9800 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.

Note: Disconnecting with five presses of the Mic button operates in the Vox and Duplex modes only.

INCOMING CALLS

RINGOUT: Lines 3.3. through 3.7. allow you to customize ringout for your application. Ringout is how the 9800 alerts you to the presence of an incoming call.

When a call comes in, the 9800 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 9800 must be set to automatically answer (3.8.) incoming calls if you wish to use the Remote Base, Selective Call or Talk Back Paging 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 selective calling or talk back paging.

Enter 1 if you would like to access your radio system from any phone without the need to enter the system access code. Or, if you wish to dispatch from dial pulse phones.

Enter 2 if you would like the additional security of having to enter the system access code (1.4.) after the auto-answer beep.

You can call any mobile or portable on the system. Whether they are equipped with DTMF or not.

When your 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 keep the 9800 in control. Fully automatically!

SELECTIVE CALLING / TALK BACK PAGING: The 9800 can be set to provide either selective calling or Talk Back paging (4.0.)

Note: Selective signalling can be used from dial pulse telephones if the optional 9807 Dial Click Detector has been installed.

SIGNALLING TONES AVAILABLE:

TYPE OF TONE	NO. OF CALLS	COMMENT
DTMF (standard)	Infinite	Fully Regenerated.
* CTCSS	38	See table 2
* Two Tone Sequential	1000	See table 3
* 5/6 Tone Sequential	1000	See table 4

* These tone formats are optional and must be installed at the factory.

TALK BACK PAGING: A 3-27 second (4.1.) one way voice message can be delivered to any pager or mobile from any touchphone. After the auto-answer beep, enter the appropriate selective call digits followed by *.

For example: DTMF XXXXX* (x's any length, any sequence), CTCSS XX* (x's from table 2), Two Tone XXX* (X's from table 3) and 5/6 tone XXX* (X's from table 4)

SELECTIVE CALLING: Any mobile or portable radio equipped with an appropriate tone decoder can be selectively called (4.0.) from any touchphone. After the auto-answer beep, enter the appropriate selective call digits followed by *.

For example: DTMF XXXXX* (x's any length, any sequence), CTCSS XX* (x's from table 2), Two Tone XXX* (X's from table 3) and 5/6 tone XXX* (X's from table 4)

The 9800 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: 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*.

MOBILE TO MOBILE SIGNALLING: The 9800 will cross mobile DTMF to CTCSS, Two Tone or 5/6 Tone for the purpose of "waking up" another mobile, portable or pager. (Option 9802, 9803 or 9804 required).

If mobile to mobile signalling has been enabled (4.2.) simply send the same mobile selective call code that would be used from a phone. Except that the code must end with # rather than *. If you wish to perform mobile to mobile signalling during a phone call you must end the selective call sequence with a *.

For example:
Patch idle; XX# for CTCSS, XXX# for 5/6 or 2 Tone.

Phone call in progress; XX* for CTCSS, XXX* for 5/6 or 2 Tone.

OPERATION THROUGH REPEATERS OR TRUNKED SYSTEMS

(Only possible in the VOX mode)

Operating the 9800 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 optional 9801 electronic voice delay board (.5 Second version) is highly recommended when using MicroPatch through repeaters to eliminate word clipping or loss.

NOTE: See comments on setting the RX VOX control on page 8.

CALL PROGRESS TONE DETECTION

The 9800 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.

TABLE 2

CTCSS SELECTIVE CALL CODES (option 9803)

The CTCSS selective call code digits (10-47) define all 38 EIA standard CTCSS tones. To find the call code for a specific CTCSS frequency, locate the frequency in Table 2. The two digit call code is found adjacent in the select column.

- NOTES:**
1. 9803 CTCSS is an option and will not function unless factory installed.
 2. The length of CTCSS alerting can be varied by the quantity of beeps selected in (4.3.)
 3. See 'Incoming Calls' in the Operation section to determine the proper use of the selective call codes determined from this table.

Example: The selective call code required to signal 131.8 Hz. is: 29

TABLE 3

TWO TONE SEQUENTIAL CALL CODES
(Option 9802)

A 1000 call two tone sequential sequence consists of three digits. The first digit selects the group. The second and third digits select tone A and tone B from that group.

For example: The selective call code required to generate tone A = 296.5 and tone B = 1006.9 would be: 327.

- NOTES:**
1. 9802 Two tone sequential is an option and will not function unless factory installed.
 2. Select group call or diagonal tone for multiple alerting (4.4.)
 3. Tone duration: Tone A = 1sec, tone B = 3sec.
 4. See 'Incoming Calls' in the Operation section to determine the proper use of the selective call codes determined from this table.

TABLE 4

5/6 TONE SEQUENTIAL CODES
(Option 9804)

Select one of the five tone groups from the table above and enter on (5.1.)

The first two tones of a 1000 call five tone sequence are selected from the appropriate group and entered on (4.7.) and (4.8.) These two tones will automatically be sent with each page.

The third, fourth and fifth tones of the five tone sequence become the selective call code and are selected under the chosen operating group.

Example: A pager sequence of 1023, 1305, 1587, 741 and 1446 HZ is required. Enter 1 (EIA) on line 5.1. Enter 3 on line 4.7. Enter 5 on line 4.8. The three digit selective call code is then = 716.

To increase the probability of successful signalling, the five tones can be automatically repeated up to nine times (4.9.).

A sixth preamble tone can be enabled (4.5.) and selected (4.6.) if required.

The desired tone duration can also be selected (5.0.)

- NOTES:**
1. 9804 5/6 tone signalling is an option and will not function unless factory installed.
 2. See 'Incoming Calls' in the Operation section to determine the proper use of the selective call codes determined from this table.

TYPICAL APPLICATIONS FOR THE AUXILIARY RELAY
(Option 9805)

Remote CTCSS Enable/Disable: When using the 9800 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 9800 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 labelled 'AUX. RELAY' on the rear panel barrier block. The 9800 is supplied with the relay strapped for normally open operation. if normally closed operation is desired, see JP-7 on page 9 for details.

ELECTRONIC VOICE DELAY

Option 9801

In VOX mode, word clipping or word loss is directly proportional to radio T/R speed in simplex systems and repeater pick up time when used through repeaters. The slower the system, the more desirable voice delay becomes. The 9801 is available in .25 Second (9801.25) and .5 Second (9801.5) versions.

Assume that the .5 Second version has been installed. The 9801 electronically delays audio originating from the telephone by .5 second. This in effect means that the transmitter has been keyed for .5 second before the audio even began! This timing makes word loss virtually impossible.

The 9801 is essential when MicroPatch is used through repeaters. It is also recommended for use in straight VOX simplex mode operation especially when connected to a slow switching base station radio.

INSTALLATION

The 9801 can be field installed in about two minutes:

1. Cut JP-1. (Adjacent to the voice delay connector)
2. Remove two 6-40 5/16 inch machine screws on either side of the voice delay connector. Remove one additional machine screw adjacent to resistor R70.

3. Place a No. 6 3/16 inch spacer over each mounting hole.
4. Drop the 9801 over the connector and down onto the spacers, component side up.
5. Install three 6-40 1/2 inch machine screws and lockwashers to secure the 9801.

CTCSS BOARD (Option TSU-32P)

Sub-audible Continuous Tone Coded Squelch System (CTCSS) tones can be added to the 9800 by simply plugging in a board. This option allows MicroPatch to have CTCSS operation when connected to a radio which is not equipped with a built-in CTCSS decoder.

CTCSS operation allows the 9800 to respond only to those mobiles which are encoding the correct tone frequency. Thus providing discrimination against unwanted signals. CTCSS operation can be mobile to patch only, or if desired, mobile to patch and patch back to mobile. The latter protects the mobile from having to listen to unwanted chatter while monitoring for a call.

The TSU-32P regenerates the selected CTCSS tone for the purpose of providing patch to mobile CTCSS. (Of course, the mobile must be equipped with CTCSS decode). The regenerated CTCSS tone is available on the rear panel barrier strip labelled TONE. If used, the regenerated tone must be injected directly into the transmitter's modulator through a suitable series resistor. (Try 10k-100k). Choose the largest resistor possible that will provide sufficient CTCSS tone modulation deviation. (500-750 Hz.)

CTCSS operation is compatible with VOX mode, Duplex mode, and/or Repeater mode. However, the time required for decoding low frequency tones makes CTCSS operation incompatible with the Sampling mode.

Installation: Remove the 9800 board from the chassis. Install the nine AMP type connectors into the space marked 'TSU-32P' on the board. Solder the AMP connectors from the bottom. Be sure no solder flows into the connectors. Cut jumper strap JP-4 (Just to the right of the TSU-32 mounting position). Plug the TSU-32 board into the newly installed connectors. Set the dip switches to provide the desired CTCSS tone frequency using the table below. If the regenerated CTCSS has been connected, set the CTCSS modulation to the desired level using the potentiometer on the TSU-32P. Note that the 'JU-2' option strap on the TSU-32P board must be cut. See the TSU-32P instruction sheet for details. This strap is already cut if the TSU-32P was factory installed.

WARRANTY

We guarantee the Model 9800 to be free from defects in material and workmanship for one year from purchase. Tampering, misuse or modification shall void this agreement.

Several components in the 9800 are mounted in sockets. We reserve the right to not cover these parts under warranty if failure is traceable to removal/re-insertion.

The quality of components used in the 9800 is excellent. It should give many years of trouble-free service. Should it fail, we shall repair it at our factory, and return it to you within one day if possible.

We reserve the right to not repair units which have been "modified".

This warranty does not cover damage caused by external overloads such as lightning or power source surges. This specifically includes failure of the PTT transistor (Q-19) which can only be made to fail with improper connection or excessive load current. Further, the warranty does not cover damage caused by any acts of nature.

The 9800 provides two phone line fuses (F2 and F3) plus two metal oxide varistors (M1 and M2). These components should protect the 9800 from all but the most severe lightning strikes. However, we reserve the right to not repair a unit which in our opinion is too extensively damaged. Further the warranty of a unit which has been hit by lightning is terminated. This is because of latent damage which can surface at a future date.

Should repair become necessary, please send a copy of your sales invoice together with the interconnect.

Address repairs to: **Connect Systems Inc.**
Service Dept.
1802 Eastman Ave. Suite 116

APPENDIX A

FCC NOTICE TO USERS

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.