MODEL 9800
MULTI-MODE INTERCONNECT
(FULLY FCC & DOC APPROVED)

Available in desktop (9800D) or rack-mounted (9800R) versions.

MicroPatch provides more user selectable operating modes and high tech features than any other interconnect available today ... regardless of cost!

MULTI-MODE VERSATILITY
Select any of these modes . . .
- Vox Control Station Interconnect
- Vox Enhanced Sampling Interconnect
- Semi-Duplex Interconnect
- Repeater Controller
- Dial Access Remote Base
- Selective Calling/Paging
- Talk Back Paging

HIGH TECH FEATURES
- 90 Phone Number Speed Dialer
- Last Number Redial
- Call Waiting
- Hook Flash
- Built-In Set-Up Keyboard with Digital Display
- Rings like a Telephone
- Use Internal Noise Squelch or COS Input
- Use COS Input for DPL™ or CTCSS Operation

MicroPatch . . . the logical choice!
INTRODUCTION
The all new microcomputer based Model 9800 from CSI represents a quantum leap in interconnect development.

The 9800 is the only product in existence that can be user set to operate as a VOX simplex, Sampling simplex or Semi-duplex interconnect. Not to mention Repeater Controller, Paging Terminal and Telephone-accessed Remote Base station!

Other important features unavailable in other products include a 90 phone number speed dialer, last number redial, user programmable CW ID, automatic disconnect on any dial tone or busy signal, hook flash and many others.

The 9800 is the obvious choice for interfacing any simplex or duplex radio system to the telephone network!

USER SET UP
Customizing the 9800 to your application is accomplished using the built-in twelve button keypad and LED digital display.

Set up proceeds in an orderly line by line process until all parameters pertaining to your application have been selected. Or you can branch direct to any line to change a specific parameter.

Built-in error checking and concise documentation make set up quick and easy.

CONTROL STATION INTERCONNECT MODE
The VOX (Voice Actuated Transmit) simplex mode should be selected when connecting to a slow switching base station radio or when control station operation through a remotely located repeater or trunked system is desired. The VOX mode provides clean, clear audio performance similar to duplex operation. The 9801 EVF option is recommended for this mode.

Sophisticated call progress tone detection (busy signals and dialtone) and a user settable activity timer completely resolves loss of control problems formerly associated with VOX based interconnects.

A user settable pulser (1-9 seconds) makes the 9800 fully compatible with the GE Marc V and other trunked systems. Use of the pulser is not necessary for operation through most other trunked repeater systems such as the E.F. Johnson LTR.

SEMI-DUPLEx INTERCONNECT MODE
When connected to a duplex base station (simultaneously receives and transmits) or to a repeater, the 9800 provides superb semi-duplex performance.

Semi-duplex privacy mode can be enabled if desired. This feature makes it impossible for eavesdroppers to hear the mobile side of the conversation. Occasional beeps are substituted in place of the mobile audio so that other mobiles can tell that the interconnect is in use.

Of course, the mobile is in full control and can break in at any time in the semi-duplex mode.

REPEATER CONTROLLER MODE
The 9800 provides all functions necessary to convert any receiver and transmitter into a high performance repeater. And, of course, the semi-duplex interconnect capability is fully functional when using the 9800 as a repeater controller (Repeater Maker).

Hang time, activity timer and CW ID interval are all user selectable parameters in this mode.

There’s even a user programmable repeater on/off control password to remotely enable and disable the repeater capability when required.

DPL™ / CTCSS OPERATION
All interconnect modes and the repeater controller can be converted to DPL (digital private line) or CTCSS (continuous tone coded squelch system) operation by connecting the COS input to the radio’s built-in DPL or CTCSS decoder.

If the radio does not have built-in CTCSS capability, the optional TSU-32P will convert the 9800 to CTCSS decode/encode.

The 9800 will only respond to mobiles with the correct code or tone when using DPL or CTCSS.

CALL PROGRESS TONE DETECTION
Mathematical algorithms operating in software are constantly analyzing the phone line audio for the presence of dialtones and busy signals, etc.

Upon detection, the 9800 will automatically disconnect. This feature prevents loss of control in the VOX simplex mode and loss of control when you forget to send the disconnect code prior to hanging up the initiating telephone in remote base operation.

Automatic disconnect on dialtones and busy signals is also a welcome convenience in the sampling and duplex modes.

SIMPLEX SAMPLING INTERCONNECT MODE
When using the simplex sampling mode, the mobile can interrupt the land party at any time. Even during heavy background noise. Therefore, sampling mode should be the choice of users who need to call noisy locations such as machine shops, etc.

The 9800 employs VOX variable (enhanced) sampling. This process slows the sampling rate while the land party is actually speaking. And tends to place samples between words and eliminate word loss.

The sample rate can be set from .25-.25 seconds. The sample width from 3-255 milliseconds. The VOX enhancement factor can be set from 1-9. For example: a VOX enhancement factor of 3 would reduce a one sample per second rate to one sample every 1-3 seconds while the land party is speaking to you.
MOBILE DIALOUT
The mobile can dial any telephone number manually or by using the built-in 90 phone number speed dialer or last number redial features.

Additionally, the 9800 can be set to dial any preselected number by pressing the mobile MIC button five times. Five quick subsequent presses causes disconnect.

Powerful toll protection prevents manually dialing any restricted first and/or second digits, or up to four restricted prefixes. A separate user programmable “secret” toll override code disarms all toll protection features when desired. Re-arm is automatic.

The 9800 permits calls to all toll free 1-800 numbers even if toll restrict is enabled.

CALL WAITING
If a mobile call is attempted and the line is in use, a beep lets those using the line know that a mobile would like to make a call. At the same time, a busy signal informs the mobile that the line is in use. Later on, an alert tone notifies the mobile when the line becomes available to use.

If desired, the mobile can cut in on the call by using the secret toll override access code.

RINGOUT/SELECTIVE CALLING
The 9800 can be set to provide ringout, auto-answer or both.

Ringout mode can be set to send a ring-tone alert (sounds like a telephone ringing) and if desired, a programmable DTMF sequence useful for operating horn honkers, etc. The alert sequence can be set to start on the first through ninth incoming ring, and set to alert only once or on alternate incoming rings.

The mobile must respond with his usual access code to answer the incoming telephone call.

Auto-answer mode allows the calling party to initiate remote base operation, or to selectively call a particular mobile using the built-in regenerated DTMF signalling (or one of the tone signalling options). Auto-answer can be set to occur on the first through ninth ring.

It is possible to have both ringout and auto-answer simultaneously functional by setting ringout to occur earlier in the ring cycle than auto-answer. For example: If ringout is set for the first ring, and auto-answer to the fifth ring, the 9800 will be in ringout mode until ring number five. Thus permitting receiving ordinary phone calls and then allowing remote base operation and/or selecting calling after the fifth ring.

NOTE: Selective calling can also be accomplished from dial pulse phones by installing the optional 9807 dial-click detector.

MOBILE TO MOBILE SIGNALLING
The 9800 will cross a mobile initiated DTMF sequence into any selected optional tone signalling format. For example: DTMF to CTCSS. This capability allows mobiles to initiate selective communications to other mobiles and/or portables.

TELEPHONE REMOTE BASE
The 9800 extends full control and use of your base station radio or repeater to any telephone. This capability permits dispatching from any in-plant or outside touchphone. Simply press * (or up to a five-digit security code) after the auto answer beep and you are on the air.

Or, the 9800 can be set to provide immediate automatic voice path after auto-answer (no touch tones required). This mode provides faster access to your radio system.

The built-in call progress tone detection scheme will automatically disconnect the 9800 if the # isn’t sent prior to hanging up the initiating telephone.

The 9800 can also be set to automatically dial a preselected phone number when a mobile presses the Mic button five times. This feature allows non DTMF equipped mobiles to dial one specific number.

By utilizing dial access remote base and five press autodial, the 9800 can act like a DC or tone remote, but using inexpensive dial up lines rather than costly leased lines.

NOTE: All selective call and remote base features are available from dial pulse phones if the 9807 dial-click detector option is installed.

DIAL ACCESS PAGING
The 9800 can be set to provide dial access paging with or without talk cycle. The talk cycle (voice message) can be set up to 27 seconds. Thus allowing paging and/or voice messaging from any touch phone, or from dial-pulse phones if option 9807 is installed.

Tone signalling options include: Two-Tone Sequential, 5/6 Tone and CTCSS. Please see the Options list.

EASY INSTALLATION

Only four connections are required to most radios:
1. PTT (to PTT line)
2. Audio-out (to Mic amp)
3. Audio-in (from volume control)
4. COS (from busy line or noise rectifier). Or, may be connected to the radio’s DPL or CTCSS decoder for DPL/CTCSS operation if desired.

If the Audio-In is connected to the discriminator, a COS connection is not required.

The contacts of the optional 9805 auxiliary relay are brought out to the rear panel barrier strip. These contacts can be used for custom installations as required.

OPTIONS

9801.25 ELECTRONIC VOICE DELAY (EVD)
OR 9801.5
For use in the VOX mode only. Electronically delayed telephone audio eliminates word clipping caused by system delays. Recommended when used through repeaters or trunked systems. Available in .25 second or .5 second voice delay versions.

9802 TWO TONE SIGNALLING
1000 calls. Covers ten Motorola and GE groups.

9803 CTCSS SIGNALLING
38 calls.

9804 5/6 TONE SIGNALLING
1000 calls. Covers EIA, ZVEII, COIR/EEA, CCIT and EURO formats.

9805 AUXILIARY RELAY
Single pole double throw. Contacts are brought out to rear panel barrier strip. Four user selectable modes are available to control the relay.

9807 DIAL CLICK DETECTOR
Allows tone selective calling from dial pulse telephones.

TSU-32P DIP SWITCH PROGRAMMABLE CTCSS BOARD
A plug-in decoder/encoder board that converts interconnect modes and repeater modes to CTCSS (private) operation. 32 CTCSS tones are selectable.
STANDARD FEATURES

- **MULTI-MODE CAPABILITY**
  - VOX control station interconnect
  - VOX enhanced sampling interconnect
  - Semi-duplex interconnect
  - Semi-duplex with privacy
  - Repeater controller
  - Telephone remote base
  - Selective calling/paging
  - Talkback paging
  Please see text for more details.

- **USER PROGRAMMABLE MORSE STATION ID**
- **90 PHONE NUMBER SPEED DIALER**
- **LAST NUMBER REDIAL**
- **FIVE MIC PRESS SPEED DIAL**
  Quickly dials any preselected phone number by quickly pressing the MIC button five times.

- **CALL PROGRESS TONE DETECTION**
  Automatic disconnect on busy signals and unwanted dialtones. Defeatable.

- **1-800 DIALING**
  Toll free numbers can be dialed even if one plus toll restrict has been enabled.

- **CALL WAITING**
  Transmits a busy signal to mobile if line is in use when a call is attempted. Beeps let those using the phone know that a mobile would like to use the line. An alert informs the mobile when the line becomes available.

- **TOLL RESTRICT**
  - First and second digit lockout
  - Up to four restricted prefixes 976, 411, 911, etc.
  - Digit counting

- **CONNECT CODE**
  Select * or # plus 1-4 digit code

- **DISCONNECT CODE**
  Select * or # plus connect code digits

- **SECRET TOLL OVERRIDE CODE**
  Select * plus 1-4 digit code

- **USER SETTABLE TIMERS**
  - Activity timer — 10-99 seconds
  - Timeout timer — .5-49.5 minutes
  The timers are defeatable. Beeps warn of impending timeout.

- **BUSY CHANNEL MONITOR**
  Will not ringout or selectively call on top of existing communications. Defeatable.

- **RINGOUT**
  Rings just like a telephone when an incoming call is received. See text for more detail.

- **SELECTIVE CALLING**
  MicroPatch provides several modes of selective calling...
  - Land to mobile
  - Land to portable
  - Land to pager
  Selective calling can be accomplished from any touch phone. Also from dial pulse phones if option 9807 is installed. The following tone formats are available.
  1. DTMF — STD
  2. 2 TONE — option 9802
  3. CTCSS — option 9803
  4. 5/6 TONE — option 9804
  Please see text for more details.

- **FULLY REGENERATED DTMF OR PULSE DIALING**
- **PULSER**
  For control station compatibility with GE Marc V trunked repeaters.

- **AUXILIARY RELAY SOFTWARE**
  Four modes of operation are selectable to operate the optional relay.
  1. Remote on/off user selectable code.
  2. On when in connect.
  3. On when in transmit.
  4. Controllable from telephone or remote base mode.
  Useful for changing channels remotely, etc.

- **DPL OR CTCSS OPERATION**
  MicroPatch will provide private DPL or CTCSS operation by connecting the COS input to the radio's built-in decoder. Or, the optional plug-in TSU-321 board will provide CTCSS operation.

- **HOOK FLASH**
  Pressing * three times operates the built-in hook flash feature, allowing the mobile to operate telco features which require precise hook flash timing.

- **MOV LIGHTNING PROTECTION**
  No other protective device offers the proven protection provided by MOVs (metal oxide varistors).

- **FRONT PANEL LEDS**
  Noise, DTMF, Transmit, Connect and Power LEDs (light emitting diodes) reveal at-a-glance the current path status.

- **BUILT-IN KEYBOARD AND DISPLAY**
  A two-digit display keeps you completely on track while programming various patch features. The display shows all on channel DTMF when not being used for programming. Useful for system testing, etc.

- **+12 VDC POWERED**
  The 9800 shares the same power that runs the radio. The entire system may be readily battery backed up.

All features are user programmable/selectable using the built-in keyboard and display.

SPECIFICATIONS:

**ELECTRICAL**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specifications</th>
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</thead>
<tbody>
<tr>
<td>Audio input level:</td>
<td>20 MV to 4 volts</td>
</tr>
<tr>
<td>Audio input impedance:</td>
<td>100K Ohms (DC blocked)</td>
</tr>
<tr>
<td>Audio output level:</td>
<td>0-1V and 0-5V (two selectable ranges)</td>
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<tr>
<td>COS input resistance:</td>
<td>20 Meg Ohms</td>
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<tr>
<td>COS threshold range:</td>
<td>0-10VDC</td>
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<td>DTMF modulation:</td>
<td>1-4Khz, 2.5Khz nominal</td>
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<td>DTMF twist:</td>
<td>± 10 DB max</td>
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<td>DTMF decode rate:</td>
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<td>Noise squelch filter:</td>
<td>5 pole Butterworth</td>
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<td>Microcomputer CPU:</td>
<td>8052B/8752</td>
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<tr>
<td>Input voltage:</td>
<td>10-16 VDC (reverse polarity protected)</td>
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<tr>
<td>Current drawn:</td>
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**MECHANICAL**

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<th>Specifications</th>
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<tr>
<td>Desk Top Version</td>
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<tr>
<td></td>
<td>Height: 2 inches</td>
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<tr>
<td></td>
<td>Depth: 7½ inches</td>
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<tr>
<td></td>
<td>Weight: 4 lbs.</td>
</tr>
<tr>
<td>Rack Mount Version</td>
<td>Width: 19 inches</td>
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<tr>
<td></td>
<td>Height: 1¼ inches</td>
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<tr>
<td></td>
<td>Depth: 7½ inches</td>
</tr>
<tr>
<td></td>
<td>Weight: 4 lbs.</td>
</tr>
</tbody>
</table>

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