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Model TP-163

Shared Repeater Tone Panel

USER'S INSTRUCTION MANUAL

Version 1.01

Made in U.S.A.

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TABLES and SCHEMATIC DIAGRAMS

NOTE

CSI reserves the right to make product improvements from time to time but assumes no responsibility to add improvements into previously sold products. Upgrades will be available at a nominal charge.

In the event a software upgrade results from fixing a defect, (as opposed to a product improvement), we will load new software into your existing CPU chip at no charge during the first year of ownership. (Your 40 pin CPU chip must be returned postpaid and received in reusable condition or you will be charged for a new part).

INSTALLATION

INTERFACE CONNECTIONS

Two connections must be made to the receiver and three to the transmitter. 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:

+12 VDC: Connect to a source of clean 12-14 VDC. Connect the DC return lead to GND. The TP-163 is reverse polarity protected, so a polarity mistake will not damage your TP-163 unless the voltage is excessive.

TX AUDIO: Connect to the transmitter audio input or Mic high line. NOTE: The repeater local mic line may not be active unless the mic PTT is pressed.

PTT: Connect to the transmitter PTT line.

If using LTR overlay, connect the TP-163 PTT and X Busy to the LT-4200 TX KEY and SENSE 1 input then to the repeater PTT.

RX AUDIO: The audio input terminal must be connected directly to the receiver discriminator (de-modulator) output. Do not connect past any capacitors or resistors.

SUBTONE: The SUBTONE output is used to inject DCS and CTCSS into the transmitter. The injection point must be after the IDC clipper circuit, and preferably directly to the reactance control component of the modulator. For CTCSS only operation you may use either a phase or frequency modulated transmitter. If using a PM transmitter that requires a -6db/octave characteristic, install strap JP-1, see page 6.

RX COS: Connect to a point that has good voltage swing when the squelch is opened/closed. The best point to connect is the collector of the transistor that controls the busy light (if the receiver has one). Otherwise, you may connect to the squelch gate control voltage. Your last choice would be to connect to output of the noise rectifier.

When the COS threshold control P1 has been properly adjusted (see page 5), and JP-3 properly strapped (see page 6), the front panel REC LED will illuminate only when a signal is received. If the REC led goes out when a signal is received, move the COS polarity reverse strap JP-3 to the opposite end. Correct COS polarity must be achieved or the TP-163 will not operate.

NOTE: The squelch control in the receiver must be set for quiet (squelched) receive. Set the squelch as you would any squelch, but remember if you set it too tight receive sensitivity may suffer. We recommend testing the COS sensitivity by noting the RF signal level required to turn on the REC LED. If the receiver squelch opens before the REC LED illuminates, you may want to locate a better COS takeoff point. Your TP-163 sensitivity is determined principally by the COS connection.

VERY IMPORTANT NOTE: DCS cannot be used with a PM (phase modulated) transmitter. Only an FM transmitter can handle DCS. Strap JP-1 must be open if using DCS.

X BUSY: Busies out the TP-163 if using an LT-4200 and TP-163 in LTR overlay operation and the LT-4200 is in use.

If using LTR overlay, connect the TP-163 PTT and X Busy to the LT-4200 TX KEY and SENSE 1 input then to the repeater PTT.

VALID: The Tone Valid open collector NPN output turns on in response to certain tones which have been user programmed for Tone Valid output operation. The Tone Valid output is used for customer defined uses.

WARNING

A power supply sensing circuit continuously monitors the input supply voltage. A drop below approximately 11 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.

IMPORTANT

The TP-163 is factory set (default value) with the 38 EIA CTCSS tones plus 63.0 Hz enabled and all 112 DCS codes enabled. Therefore user programming is not needed to initially test your TP-163. Once jumpers are set and levels adjusted, your TP-163 will operate upon receiving any standard CTCSS or DCS code.

Recommendation: Do not attempt any reprogramming until you have your TP-163 up and running. Otherwise you may inadvertantly cause a problem that precludes operation. It's better for you to see the panel operating before you make programming changes.

ADJUSTMENTS

Adjustment Function

P1 COS: The COS control sets the COS input DC threshold (compare)
             level. Measure the voltage at TP-2 with no signal. Then
             measure the voltage again with a signal applied. Adjust the
             COS control until the voltage reading at TP-1 is
             approximately midway between the two readings previously
             obtained at TP-2. (TP-1 and TP-2 are near IC U5).

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

             IMPORTANT: If the COS polarity select strap JP-3 is set
             correctly and the COS control is properly adjusted, the
             RECEIVE LED will illuminate when there's a signal, and will
             go out when the signal is removed.

P2 CTCSS: The CTCSS control sets the modulation level of analog CTCSS.

P3 DCS: The DCS control sets the modulation level of digital DCS.

P4 DTMF: The DTMF control adjusts the deviation of the outgoing DTMF
             transponds and regenerated DTMF. Set for about 2.5 KHz.
             deviation.

P5 CW ID: Courtesy beeps & CW ID level: Adjust for desired modulation
             level of the courtesy beep and CW ID.

P6 RPT: The REPEAT AUDIO control sets the level of the repeat voice
             audio. Set so that 3 khz. input deviation causes 3 khz.
             output deviation. This will cause a linear input/output
             relationship.

             NOTE: The RPT AUDIO control should only be adjusted <u>after</u>
             the PREAMP control has been properly adjusted.

P7 PREAMP: The PREAMP control is used to match the audio level from
             your receiver to the TP-163. To adjust, apply a signal to
             the receiver with CTCSS or DCS set for 700 Hz deviation.
             Using an oscilloscope, adjust P7 until a subcode level of
             1.0 V P-P is observed at TP-3. (TP-3 is located between IC's
             U3 and U7). If an oscilloscope is not available, apply a
             signal with a CTCSS tone (DCS requires a scope) and adjust
             the PREAMP control for a reading of 350 mV RMS using a VOM.
             Future adjustment should only be required if the TP-163 is
             connected to a different receiver.

JUMPER STRAP OPTIONS

JP-1   Phase Modulation strap. (Located just above IC U2). This strap gives the CTCSS output a -6db/octave rolloff for compatibility in driving some PM transmitters. JP1 MUST NOT BE STRAPPED IF USING DCS!

   IMPORTANT NOTE: PM transmitters can only be used for CTCSS. A true Frequency Modulation (FM) transmitter must be used if you wish to use DCS.

JP-2   Output level strap. (Located to the right of IC U6). The audio output is selectable in two ranges. With the strap installed, the audio out is 0-1 volt. With the strap removed, the output range is 0-5 volts. The strap should only be removed if greater than 1 volt drive is required.

JP-3   COS Polarity Select. (Located between IC's U9 and U10). This strap has three pins and the center pin must be connected to one end or the other. Each end allows selection of opposite COS polarity. Select the end that causes the REC LED to illuminate when a signal is received and go out when the signal is removed.

   NOTE: The REC LED cannot give you an indication that JP3 is correctly strapped unless the COS input is properly connected to the receiver AND the COS threshold adjustment P1 has been properly set.

JP-4   Not used.

JP-5   Not used.

JP-6   Reset Factory Settings. (Located to the left of microprocessor U11). If you wish to return the programming back to factory default settings, simply install JP-6 and turn the power on. The PROG LED will come on to let you know that initializing is taking place. The process requires about ten seconds. Remove JP6 when through.

   NOTE: The TP-163 can also be returned to factory settings using DTMF or computer programming. If you have lost or forgotten the programming mode access code you will have to use JP6 to get back to a known (default) access code so you can start over again. (There are no back doors, if you lose the code JP6 is the only way to recover).

JP-7   LED Power. (Located near the POWER led). Removal disables the front panel LEDs that can draw continuous current. Remove to save power in low power applications such as solar powered installations.

   NOTE: PTT, PROG and XMT leds will continue to operate after JP-7 is removed.

What is LTR Overlay? Overlay is a CSI invention that allows you to phase into LTR trunking by using your existing conventional repeaters also as LTR repeaters. This is accomplished by connecting Model LT-4200 LTR dispatch controllers in parallel with your existing conventional repeater controllers.

Although LTR overlay will work with any conventional controller, the TP-163 by Connect Systems Inc. has a X BUSY (meaning cross busy) input which busies out the TP-163 (makes unavailable) if LTR is currently using the channel. (The LTR conversation will trunk to another channel at the first break if a conventional user is attempting access). If you intend to use LTR overlay, we recommend replacing older controllers with TP-163's to gain the X BUSY feature (also programming by computer, pre-paid airtime, CTCSS Trak performance etc). The X BUSY feature also allows using all DCS codes on channels running LTR.

Connecting the System for Overlay operation: On each repeater used for overlay operation, the conventional controller and the LT-4200 are essentially wired in parallel. Each is connected as though it were the only controller connected to the repeater with the following exception...

The PTT from the repeater must connect to the TP-163 PTT and X BUSY input and also to the LT-4200 TX KEY and SENSE 1. Use shielded wire with shields connected to chassis GND at each end of the shielded wires. (Things work better if one tries to keep RF away from amplifier and control electronics).

Programming the TP-163 for Overlay: The CROSS BUSY ENABLE parameter must be set to enable. The CROSS BUSY DELAY and the CROSS BUSY HOLD TIME may be set to other values, but their 10 mS and .1 Second default values are probably OK to start.

Please see LT-4200 and CSIBASE manuals for details about setting up the LT-4200's for overlay.

Overlay Home Repeater: The channels used as overlay channels (shared with conventional) should not be used as home LTR channels. The home LTR channels have to be ready to send digital data to user radios at any instant and would interfere with conventional users on the same channel. LTR users should be homed on a channel which is used for LTR only. You may have up to 20 repeaters on an LTR system and all users can be homed on one of them. (Home channels are also used as trunked talk channels).

PROGRAMMING THE TP-163

The TP-163 can be operator programmed three different ways...

1. Locally using a computer connected to the front panel RS-232 port. See, **PROGRAMMING BY COMPUTER.**

2. Remotely by computer using dial-up lines and an external modem connected to the rear panel RS-232 port. See, **DIAL-UP PROGRAMMING.**

3. Remotely using DTMF over the air. DTMF programming may be your only method for remote programming if your site is not serviced with phone lines. See, **DTMF PROGRAMMING.**

TP163MGR INSTALLATION:

TP163MGR is compatible with most IBM PC compatible computers running DOS version 5.0 or greater or running Windows 3.1. It is not tested on Windows 95.

NOTE: If you have difficulty running TP163MGR, try the ANSI version found in the TPANSI directory on the distribution floppy disk.

To install TP163MGR do the following steps:

1.   Create a directory for your TP-163 programs:
      Type; MKDIR C:\TP163MGR

2.   Do this step only if using the ANSI version. Insert the
      distribution disk and...
      If using drive A: type; CD A:\TPANSI
      If using drive B: type; CD B:\TPANSI

3.   Copy the files from the floppy to your TP163MGR directory. Insert
      the distribution disk and...

      If using drive A: type; COPY A:*.* C:\TP163MGR
      If using drive B: type; COPY B:*.* C:\TP163MGR

4.   Make C: the current directory:
      Type; CD \TP163MGR

5.   Your communications port defaults to COM1. To change to COM2,
      use a file editor to edit the file TP163MGR.INI and change the
      line: PORT 1   to read...
            PORT 2

      Save the file when editing is completed.

RUNNING TP163MGR

You can now run TP163MGR by simply typing; TP163MGR

The first time you run TP163MGR, it will ask you the name of your site. You are limited to 8 characters because the site name is the same as the name of a file created by TP163MGR. The extension of the file is .TPD (for Tone Panel Data). The TPD file is binary and cannot be edited. The data may only be viewed and edited with TP163MGR.

You may run TP163MGR while the computer is connected to a modem, connected to the TP-163 directly, or while not connected at all.

PROGRAMMING BY COMPUTER (Direct connection)

The TP-163 is connected to your PC with a standard PC/Modem cable and the connection should be made to the front connector of the TP-163.

If connected to the TP-163 directly, then log on to the TP-163 by either of two methods.

Method 1: From the main menu, select "Connect Menu" and press ENTER. From the CONNECT MENU, select "Logon/Logoff" and press ENTER.

Method 2: Type; ^L   (control L)

If login is successful, the top of the screen will read "Logged in." If not successful, a blank screen with the message "Login failed" will appear. In this case, you should check the following:

1)   That the connection to the TP-163 is correct. The cable should be a standard PC to Modem cable and the connection should be made to the front connector of the TP-163.

2)   Make sure that the port is correctly selected. If using COM1, the file TP163MGR.INI should contain the line "PORT 1." If using COM2, the file should contain the line "PORT 2." TP163MGR cannot work with COM3 or COM4.

DIAL-UP PROGRAMMING (Modem connection)

We suggest you connect the TP-163 to a modem only after you have properly connected directly to the TP-163. If the modem connection does not work it may be due to programming of the Remote Modem init String. If you cannot make connection via modem, this string may only be programmed with a direct connection or by DTMF.

The modem at the TP-163 should be connected to the rear connector with a standard "straight through" cable. (This is not the same cable as you use with a LT-4200, which is a null modem cable.). Connect the modem to power, connect the remote phone line, and apply power to the TP-163. There is no power up sequence requirement. Wait at least 1 minute after the TP-163 is started. This allows the TP-163 initialization sequence to be sent to the modem. At this point, the modem should be in auto-answer mode. Check that the modem will answer the phone when called.

Another modem must be connected to your PC. The modem may be internal or external but the modem port must be COM1 or COM2. Set the modem port in the TP163MGR.INI file.

Start TP163MGR. Select "Connect Menu" and press ENTER.

Set the Site Phone Number by selecting "Set Site Phone Number" and press ENTER.

Type the site phone number and press ENTER to accept the phone number typed. (You may usually enter a comma (,) to create a pause while dialing, for example "9,17777777").

Select "Set Modem Init String" and press ENTER. This string allows configuration of your local modem prior to dialing. The default "ATZ" will normally reset the modem to the saved parameters. You may enter any string your modem requires to allow it communicate.

Both modems must be set to ignore DTR, and to do no hand shaking to operate properly.

After entering your modem string, press ENTER to accept the new string.

Next set the modem dial type. Select "Set Modem Dial Type" and press ENTER. This string is a prefix for the phone number. Unless you have pulse dialing, this should be left as ATDT, press ESC. If you must do pulse dialing, then change this string to ATDP and press ENTER.

Now select "Logon/Logoff" and press ENTER. You will see the modem progress on the screen. If successful, you will see the CONNECT MENU with "Logged in" at the top. Otherwise, you will see a helpful error message. If there is an error, then check the following:

1) You have the correct PORT selected in TP163MGR.INI.
2) The modem is connected to the PC.
3) The modem is connected to a phone line.
4) The remote modem is properly connected.

If you think all of these are correct, try calling the TP-163 manually with a terminal program such as PROCOMM. Set PROCOMM to the modem PORT, COM1 or COM2 and set the baud rate to 2400. Type your initialization string manually, (e.g. ATZ). You should see an "OK" response. Then type the dial string and the phone number (e.g. ATDT7777777). The TP-163 modem should answer and remain on line. If you type *123456# and ENTER, you should see "Logged in" as the response from the TP-163 (assuming your password is the default 123456). Type #### and ENTER and you should see the message "Logged out". Type "+++" and wait 2 seconds, you should see "OK" then type "ATH0" followed by ENTER. If this sequence is ok but TP163MGR does not connect, contact CSI. If this sequence is not ok, you do not have the connections correct in some respect. Review the connections as specified above.

USING TP163MGR

Using TP163MGR is straight forward and adequate help should be provided for you at each step. You should remember these key points:

1) When you are not logged in to the TP-163, the changes you make on the PC do not affect the TP-163 until you are logged in and you update the information on the panel.

2) When updating information on the PC whether logged in or not, the database on the disk is not updated until you save. You save either by selecting "Save Data File" or by selecting "Save Data File As" and pressing ENTER. If you selected "Save File As", you will be requested to select a site name for the file you save.

Reminders are provided when you attempt to exit from TP163MGR.

DTMF PROGRAMMING (over the air)

Synopsis:
The TP-163 can be programmed over the air from any DTMF equipped
radio. The procedure is straight forward but you should read and
understand this section thoroughly before you attempt DTMF
programming. You start by sending an access code to enter programming
mode. Then you send the commands to accomplish your tasks and finally
exit programming mode so repeater operation can resume.

To Enter and Exit DTMF Programming Mode: To enter the DTMF programming
mode, enter * followed by the six digit programming mode access code
followed by #. The syntax is *mmmmmm#. The factory default programming
access code is 123456 (note that this code is always six digits in
length). Therefore, the code required to get into programming mode is
*123456#. This code will be valid unless you change the Programming
Mode Access Code in the GLOBAL programming area using DTMF or computer
programming.

When programming is completed, send ### to exit the programming mode.
(If you forget, the TP-163 is designed to self exit three minutes
after the last DTMF command).

While in DTMF programming mode, the PROG led blinks, the transmitter
remains keyed and a beep will be heard about every five seconds to
remind you that the TP-163 is in Program Mode.

Types of commands:

1. **Per Subscriber Programming:** Allows you to make programming
    selections on a per user basis. Choices made in this category
    affect only the intended subscriber file.

2. **GANG PROGRAMMING:** This is a powerful programming tool that allows
    you to simultaneously program any per subscriber parameter into
    all 163 subscriber program files at once.

    EXAMPLE: You wish to set the Squelch Tail Length for all
    subscribers to 20 milliseconds. The hard way would be to
    individually program each subscriber file using the command...
    *pnnn#21#20#. If you had 30 subscribers, you would have to send
    the command 30 times! The easy way would be to use Gang
    Programming which will set all 163 subscriber files at once
    (including the subscriber files you are not currently using). The
    gang command to set all subscribers to a 20 millisecond squelch
    tail is... *9999#21#20#.

3. **GLOBAL PROGRAMMING:** Parameters in this category are not
    individually programmable per subscriber. Global selections
    affect the programmable parameters of all 163 tones and codes at
    once.

Command Syntax: When programming, you will enter programming sequences such as *pnnn#09#mm#. (This particular command programs the first character of a subscribers CW ID). Or, *pnnn#01#J# which enables or disables a users courtesy beep. pnnn or pmmm define a subscriber tone or code. p is used to distinguish whether the entry is a CTCSS (p=2) or DCS (p=3) user. nnn is the integer portion of a CTCSS code, or the three digits of a DCS code. (A leading zero must be used for CTCSS tones less than 100 Hz. Examples:

Code	Type	pnnn	pmmm
67.0	CTCSS	2067	2067
91.5	CTCSS	2091	2091
131.8	CTCSS	2131	2131
023	DCS	3023	3023
356	DCS	3356	3356
754	DCS	3754	3754

Some data fields are designated with J. The J is always replaced with a 1 or 0 usually meaning enabled or disabled.

Other data fields are of the form m, mm, mmm, mmmm, mmmmmm. You must supply precisely as many digits as you see m's. Below are some examples of acceptable ranges:

Variable	Allowed Range
m	0 – 9
mm	00 – 99
mmmm	0000 – 9999

Data fields such as mm require that you enter precisely the number of digits specified. If your choice for an mm field is 9, then you must enter it as 09.

De-limiters (separators) are used to segregate data fields. Each programming command begins with *, the internal delimiters are the # symbol. Commands ending with # enter new data. Comamnds ending with * read existing data to display on a CD-1 or CD-2 Decoder Unit (option).

Validating your commands: The TP-163 can be set to transpond either a DTMF or Morse code validation in response to each valid command. Select Morse if you are good at CW. Otherwise select DTMF which can be used as audible feedback, or you can view the DTMF packet on a CD-1 or CD-2 Communications Decoder Unit (option). Each valid command will result in a packet containing the parameter number and the new data value. This gives the best possible assurance of successful programming if you are not using a computer.

An invalid command will have either no response, or respond with error beeps.

Understanding the programming data: Below is a typical programming parameter with supplementary information:

Example:
```
-----------------------------------------------------------------------
                                     TO PROGRAM       TO DISPLAY

STUCK MIKE ACTIVITY TIMER             *0000#34#mm#       *0000#34*
mm 01-99 00 to disable (10-990 Secs - 10 sec/step) [mm=18=180 Secs]
-----------------------------------------------------------------------
```

The bold parameter line identifies the item you may wish to program followed by the complete programming syntax followed by the display syntax used to view the current programming data on your CD-1 or CD-2.

The subline tells you everything you need to know to program this particular parameter. The first information lets you know the allowable range for mm and whether entering zero(s) will disable this parameter altogether. In parenthesis the actual range of adjustment is indicated. If you multiply the value you enter (mm) by the step size you will have the resultant time. The information in brackets [mm = 18 = 180 Secs] is the default value. The unit is shipped with all programming set to the default condition.

Resetting your position: If you are distracted or have a lapse and forget where you are in the middle of a command sequence, simply send * three times (***) and start the command sequence over again. Example: You have just entered *0000#3 and suddenly you forget where you are. Simply send *** and begin inputting the command over again.

If you input a command and do not receive a transpond response, pause at least three seconds (will cause a timer reset) and re-enter the program sequence.

Viewing programmed data: If you will be doing much DTMF programming, you should consider purchasing oneof our CD-2 Communications Decoders. The CD-2 is normally used as shop test equipment to decode and display CTCSS, DCS and DTMF. We use the DTMF decode mode to display the DTMF response packets from your TP-163 which occur after each valid programming command and in response to a display data command.

Use the display data commands (Example: *0000#34*) to display data you wish to view or verify without actually sending new data.

Be organized. We recommend thinking through what you want to program and then writing down the entire sequence of codes you must send including programming mode access code at the beginning and exit code (###) at the end.

```
CTCSS TONES     DCS CODES
-----------     --------------------------------------
63.0  *         006        252              662
67.0            007        255              664
69.4  *         015        261              703
71.9            017        263              712
74.4            021        265              723
77.0            023        266              731
79.7            025        271              732
82.5            026        274              734
85.4            031        306              743
88.5            032        311              754
91.5            036        315
94.8            043        325
97.4            047        331
100.0           050        332
103.5           051        343
107.2           053        346
110.9           054        351
114.8           065        356
118.8           071        364
123.0           072        365
127.3           073        371
131.8           074        411
136.5           114        412
141.3           115        413
146.2           116        423
151.4           122        431
156.7           125        432
159.8 *         131        445
162.2           132        446
165.5 *         134        452
167.9           141        454
171.3 *         143        455
173.8           145        462
177.3 *         152        464
179.9           155        465
183.5 *         156        466
186.2           162        503
189.9 *         165        506
192.8           172        516
196.6 *         174        523
199.5 *         205        526
203.5           212        532
206.5 *         214        546
210.7           223        565
218.1           225        606
225.7           226        612
229.1 *         243        624     TABLE 1
233.6           244        627     Tones and Codes
241.8           245        631     supported by the TP-163
250.3           246        632
254.1 *         251        654     * = non standard tones
```

DCS	INVERSE	DCS	INVERSE	DCS	INVERSE
006	021	172	036	431	723
007	214	174	074	432	516
015	141	205	263	445	043
017	050	212	356	446	255
021	006	214	007	452	053
023	047	223	134	454	266
025	244	225	122	455	332
026	464	226	411	462	252
031	627	243	351	464	026
032	051	244	025	465	331
036	172	245	072	466	662
043	445	246	523	503	162
047	023	251	165	506	073
050	017	252	462	516	432
051	032	255	446	523	246
053	452	261	732	526	325
054	413	263	205	532	343
065	271	265	156	546	132
071	306	266	454	565	703
072	245	271	065	606	631
073	506	274	145	612	346
074	174	306	071	624	632
114	712	311	664	627	031
115	152	315	423	631	606
116	754	325	526	632	624
122	225	331	465	654	743
125	365	332	455	662	466
131	364	343	532	664	311
132	546	346	612	703	565
134	223	351	243	712	114
141	015	356	212	723	431
143	412	364	131	731	155
145	274	365	125	732	261
152	115	371	734	734	371
155	731	411	226	743	654
156	265	412	143	754	116
162	503	413	054		
165	251	423	315		

TABLE 2
Normal / Inverse DCS Codes

Every DCS code has a corresponding inverse code. The DCS input and out polarities must be separately programmed to allow for receiver and transmitter inversions respectively.

Example: If the mobile is transmitting code 023, the TP-163 would think the mobile were transmitting 047 if the input polarity is set wrong. Once the input polarity is correct, the output will need to be reprogrammed if transmitting the inverse code.

DCS Polarity Decode and Encode parameters are found in the Global Programming section.

```
 _____
|                                                               |
|            TABLE 3   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     |
|_____|
```

CW ID characters and corresponding mm values may be obtained from
Table 1. The entry immediately following your message must be 38 which
means "message stop".

Example: To program KYZ2584 the following mm sequence is required in
character positions 1-8: 10 24 25 27 30 33 29 38

```
                    Enter           Resultant
                                    DTMF Character
                    ----------------------------
                      0                 0
                      1                 1
                      2                 2
                      3                 3
                      4                 4
                      5                 5
                      6                 6
                      7                 7
                      8                 8
                      9                 9
                     10                 *
                     11                 #
                     12                 A
                     13                 B
                     14                 C
                     15                 D
                     16           End of message
```

TABLE 4

  mm entry required for desired DTMF ALARM SEQUENCE digits.

DTMF PROGRAMMING COMMANDS

	TO PROGRAM	TO DISPLAY
Per Subscriber Repeater Parameters	|	|
Affects only subscriber pnnn per entry	**V**	**V**

LIST ALL PER USER PROGRAMMING ON DISPLAY OR CD1/2   *pnnn#00*
Downloads entire pnnn user file to a CD-1 or CD-2 Communications
Decoder (optional).

COURTESY TONE   ***pnnn#01#J#**   ***pnnn#01***
J = 0 = Disabled J = 1 = Enabled   [J = 1 = Enabled]

CTCSS/DCS DURING HANG TIME   ***pnnn#02#J#**   ***pnnn#02***
J = 0 = Disabled J = 1 = Enabled   [J = 1 = Enabled]

BARGE IN CONTROL   ***pnnn#03#J#**   ***pnnn#03***
J = 0 = Disabled J = 1 = Enabled   [J = 1 = Enabled]
Controls whether the subscriber you are currently programming can be
barged in on by subscribers with different tone or code.

USER ENABLE   ***pnnn#04#J#**   ***pnnn#04***
J = 0 = Disabled J = 1 = Enabled   [J = 1 = Enabled]
Enables/disables specific tones or codes for repeater use.

RESERVE TONE   ***pnnn#05#J#**   ***pnnn#05***
J = 0 = Disabled J = 1 = Enabled   [J = 0 = Disabled]
If a subscriber is turned off and reserve tone is enabled, the
repeater will come up, but no audio will pass. Beeps indicate
reserve tone is active

HOG PENALTY   ***pnnn#06#J#**   ***pnnn#06***
J = 0 = Disabled J = 1 = Enabled   [J = 0 = Disabled]

USERS HANG TIME   ***pnnn#07#mm#**   ***pnnn#07***
mm 0-99   (0 - 9.9 Sec's - .1 sec/step)   [mm = 30 = 3 Sec's]

CROSS TONE   ***pnnn#08#pmmm#**   ***pnnn#08***
Can cross any DCS/CTCSS code pnnn to any
[pnnn=pmmm]
DCS/CTCSS code pmmm. See Table 2.

CWID SEQUENCE CHARACTER 1   ***pnnn#09#mm#**   ***pnnn#09***
CWID SEQUENCE CHARACTER 2   ***pnnn#10#mm#**   ***pnnn#10***
CWID SEQUENCE CHARACTER 3   ***pnnn#11#mm#**   ***pnnn#11***
CWID SEQUENCE CHARACTER 4   ***pnnn#12#mm#**   ***pnnn#12***
CWID SEQUENCE CHARACTER 5   ***pnnn#13#mm#**   ***pnnn#13***
CWID SEQUENCE CHARACTER 6   ***pnnn#14#mm#**   ***pnnn#14***
CWID SEQUENCE CHARACTER 7   ***pnnn#15#mm#**   ***pnnn#15***
CWID SEQUENCE CHARACTER 8   ***pnnn#16#mm#**   ***pnnn#16***
CWID SEQUENCE CHARACTER 9   ***pnnn#17#mm#**   ***pnnn#17***
CWID SEQUENCE CHARACTER 10   ***pnnn#18#mm#**   ***pnnn#18***
                                  [CHAR 1 - CHAR 10 are defaulted to 38]

PREPAID AIRTIME SUBSCRIBER   ***pnnn#19#J#**   ***pnnn#19***
J = 0 = Not prepaid   J = 1 = Prepaid   [J = 0 = Not prepaid]
Determines subscriber billing category. Be sure to enter prepaid
airtime for users being enabled for prepaid airtime, or the user
tone/code will not operate.

TONE VALID OUTPUT   ***pnnn#20#J#**   ***pnnn#20***
J = 0 = Disabled J = 1 = Enabled   [J= 0 = Disabled]
Turns on NPN open collector Tone Valid Output for enabled subscribers.

SQUELCH TAIL LENGTH   ***pnnn#21#mm#**   ***0000#21***
mm 00-99 (0-99 Ms - 1 Ms/step)   [mm = 0 = 0 Milliseconds]
Normally set to 0 for minimum tail. Or, set for desired tail for
those that like to hear a tail.

Gang Programming (Programs all 163 subscribers at once)

Gang programming allows quickly setting a given parameter for all
163 tones and codes to the same setting. This can be used to
advantage to speed up the programming process.

For example: When the TP-163 is new, or has been reset to defaults,
all 163 tones and codes are enabled. You may only want five tones
enabled. First use gang programming to turn off all subscriber
tone/codes with a single command by entering *9999#04#0#. Then use
Per subscriber programming to individually enable the desired tones
and codes.

```
                                            TO PROGRAM
                                                 |
                                                 V
          COURTESY TONE                      *9999#01#J#
          CTCSS DURING HANG TIME             *9999#02#J#
          BARGE IN CONTROL                   *9999#03#J#
          SUBSCRIBER ENABLE/DISABLE          *9999#04#J#
          RESERVE TONE                       *9999#05#J#
          HOG PENALTY ENABLE/DISABLE         *9999#06#J#
          USERS HANG TIME                    *9999#07#mm#
          CROSS TONE (all to same tone)      *9999#08#pmmm#
          CWID  CHARACTER 1                  *9999#09#mm#
          CWID  CHARACTER 2                  *9999#10#mm#
          CWID  CHARACTER 3                  *9999#11#mm#
          CWID  CHARACTER 4                  *9999#12#mm#
          CWID  CHARACTER 5                  *9999#13#mm#
          CWID  CHARACTER 6                  *9999#14#mm#
          CWID  CHARACTER 7                  *9999#15#mm#
          CWID  CHARACTER 8                  *9999#16#mm#
          CWID  CHARACTER 9                  *9999#17#mm#
          CWID  CHARACTER 10                 *9999#18#mm#
          PREPAID AIRTIME SUBSCRIBER         *9999#19#J#
          TONE VALID OUTPUT                  *9999#20#J#
          SQUELCH TAIL LENGTH                *9999#21mm#
```

Global Repeater Programming Parameters
(affects all users at once)

```
                                             TO PROGRAM            TO DISPLAY
                                                 |                     |
                                                 V                     V
```

LIST ALL GLOBALS ON DISPLAY OR CD-1   *0000#00*
Downloads all global parameters to a CD-1 or CD-2 Communications
Decoder (optional).

REPEATER ENABLE/DISABLE   *0000#23#J#   *0000#23*
J = 0 = Disabled   J = 1 = Enabled   [J = 1 = Enabled]
When set to Disable, all use of the repeater is turned off.

ANTI-KERCHUNKING TIME   *0000#24#mm#   *0000#24*
mm =01-99 0to disable .1 sec/step   [mm = 0 = Disable]
If enabled, repeater will not hang unless user keys down at least as
long as the time set. Does not affect pick up speed.

CTCSS/DCS HOLD DELAY   *0000#25#mm#   *0000#25*
mm 03-99 (.3-9.9 Sec's - .1 sec/step)
[mm = 30 = 3 Sec's]
Use the lowest setting possible without introducing talk off.

STUCK MIKE ACTIVITY TIMER   *0000#26#mm#   *0000#26*
mm 01-99 0=disable   10 sec/step
[mm=18=180 Sec's]

DCS ENCODE POLARITY   *0000#27#J#   *0000#27*
0 = Normal 1 = Inverted
[mm = 0 = Normal]
Corrects transmitted DCS polarity.

DCS DECODE POLARITY   *0000#28#J#   *0000#28*
0 = Normal 1 = Inverted
[mm = 0 = Normal]
Corrects received DCS polarity.

HOG PENALTY TIME   *0000#29#mm#   *0000#29*
mm 06-99 (60-990 Sec's - 10 sec/step)   [mm = 18 = 180 Sec's]

HOG IDLE TIME   *0000#30#mm#   *0000#30*
mm 02-99 (20-990 Sec's - 10 sec/step)   [mm = 06 = 60 Sec's]

HOG MONITOR   *0000#31#mm#   *0000#31*
mm 06-99 (60-990 Sec's - 10 sec/step)   [mm = 18 = 180 Sec's]

Note: Hog penalties are discussed at length in the Definition of
Terms section of this manual.

COR OR DCS/CTCSS OPERATE   *0000#32#J#   *0000#32*
J: 0 = DCS/CTCSS   1 = COR   [J = 0 = DCS/CTCSS]
NOTE: If set for COR operation and a received signal has no CTCSS or
DCS, the operating parameters are taken from the 63.0 Hz user file
(pnnn = 2063). If a received signal has a CTCSS or DCS code, the
operating parameters are taken from the appropriate pnnn per
subscriber programming.

RESPONSE DELAY TO CD-1 or CD-2 ***0000#33#mm#**   ***0000#33***
mm 00-99 (0-9.9 Sec's - .1 sec/step)   [mm = 10 = 1 Sec.]
Delays the data transpond to give your base radio time to return to
receive after transmitting a command.

PROGRAMMING MODE ACCESS CODE ***0000#34#mmmmmm#** ***0000#34***
Code must be precisely six digits.   [mmmmmm = 123456]
This code is always used to enter programming mode locally, over the
air or by dial up.

COURTESY TONE DELAY   ***0000#35#mm#**   ***0000#35***
mm 01-99 (.01-.99 Sec's - 10 Ms/step)   [mm = 10 = 100 Ms]
Delays courtesy beep after mobile drops input carrier.

39 OR 51 CTCSS TONES   ***0000#36#J#**   ***0000#36***
0 = 39 Tones 1 = 51 Tones   [J = 0 = 39 CTCSS Tones]
Note: Choice 0 gives you the standard 38 EIA tones plus 63.0 Hz.
Choice 1 adds 12 additional non standard tones, 51 total.

Normally select 39 tones. Only select 51 tones if you really need
additional tones, or if your repeater is improperly responding to in
range mobiles using a co-channel repeater that is using the non
standard tones.

SYSTEM CW ID INTERVAL   ***0000#37#mm#**   ***0000#37***
mm 01-99 00=disable (1-99 Min's - 1 Min/step) [mm=00=Disable]
Determines how often the system will send its callsign when the
system is not in use.

CTCSS/DCS DURING SYSTEM CW ID ***0000#38#pnnn*** ***0000#38***
Select pnnn, or 0000 = disable   [pnnn = 0000 = Disable]
Allows choice of any CTCSS code, DCS code or no code accompanying
system CW ID.

USER CW ID INTERVAL   ***0000#39#mm#**   ***0000#39***
mm 01-99, 0=disable (10 Sec/step)   [mm=0=Disable]
Subscribers callsigns are sent five seconds after picking up the
system and then every "CW ID Interval" thereafter.

CW ID SPEED   ***0000#40#mm#**   ***0000#40***
mm 04-10 (Increase mm for slower code speed) [mm=05=20 WPM]

CWID SEQUENCE CHARACTER 1   ***0000#41#mm#**   ***0000#41***
CWID SEQUENCE CHARACTER 2   ***0000#42#mm#**   ***0000#42***
CWID SEQUENCE CHARACTER 3   ***0000#43#mm#**   ***0000#43***
CWID SEQUENCE CHARACTER 4   ***0000#44#mm#**   ***0000#44***
CWID SEQUENCE CHARACTER 5   ***0000#45#mm#**   ***0000#45***
CWID SEQUENCE CHARACTER 6   ***0000#46#mm#**   ***0000#46***
CWID SEQUENCE CHARACTER 7   ***0000#47#mm#**   ***0000#47***
CWID SEQUENCE CHARACTER 8   ***0000#48#mm#**   ***0000#48***
CWID SEQUENCE CHARACTER 9   ***0000#49#mm#**   ***0000#49***
CWID SEQUENCE CHARACTER 10   ***0000#50#mm#**   ***0000#50***
          [CHAR 1 - CHAR 10 are defaulted to 38]

CW ID characters and corresponding mm values may be obtained from Table 3. The entry immediately following the callsign must be 38 which means "message stop".

Example: To program KYZ 2584 the following mm sequence is required in character positions 1-8: 10 24 25 27 30 33 29 38.

CARRIER DROP DELAY   ***0000#51#mm#**   ***0000#51***
mm = 00-99, (0 - .99 Sec's 10 Ms./step)   [mm = 99 = .99 Sec's]

This feature is intended for radios that are not equipped with reverse burst or turn off code detection. Adjusts how long the repeater carrier remains on after CTCSS/DCS drops at end of hangtime. Keeping the carrier on quiets the mobile while the mobile CTCSS/DCS decoder is dropping and allows the repeater to go off without a squelch tail heard. The default value is .99 seconds and probably will not need to be changed.

Note: The carrier drop delay is additive to hangtime and in effect increases the total beyond the value set for hangtime.

CROSS BUSY ENABLE   ***0000#52#J#**   ***0000#52***
J = 1 = Enabled   J = 0 = Disabled   [J = 0 = Disabled]
The Cross Busy input can be used either as a Cross Busy input or as an Alarm input but not both. Use this selection if you want it to function as a Cross Busy input. Note: Cross Busy and Alarm Input may not both be enabled at once.

CROSS BUSY DELAY   ***0000#53#mm#**   ***0000#53***
mm 01-99   (10 mS - 990 mS   10 mS/step)   [mm = 01 = 10 mS]
Determines how long the Cross Busy input must be present before it is recognized.

CROSS BUSY HOLD TIME   ***0000#54#mm#**   ***0000#54***
mm 01-99 (.1 - 9.9 Seconds - .1 Sec/step)   [mm = 01 = .1 Sec]
Determines how long Cross Busy stays true in software after the Cross Busy input returns high. (Active when low).

REPEATER NUMBER   ***0000#55#mm#**   ***0000#55***
mm 00-99   [mm = 00]
Allows assigning a unique ID number to each repeater so TP163MGR will not mix up site programming files.

DTMF REGENERATION   ***0000#56J#**   ***0000#56***
0 = Disable 1 = Enabled   [J = 1 = Enabled]
If enabled, all incoming DTMF is replaced with regenerated DTMF.

TEST MODE reserved for future use   ***0000#57#m#**   ***0000#57***
0 = Disable 1 = Enabled   [J = 0 = Disabled]

CW ID MODE reserved for future use   ***0000#58#m#**   ***0000#58***

CW ID TONE PITCH   ***0000#59#J#**   ***0000#59***
J = 0 = 537 Hz.   J = 1 = 1075 Hz.   [J
= 0 = 537 Hz.]
Determines the audio tone pitch of all CW ID messages.

AIRTIME ROUNDING   ***0000#60#J#**   ***0000#60***
J = 0 = Round Down   J = 1 = Round Up   [J = 0 = Round Down]
The per subscriber airtime accumulators count time in ten second
increments. This choice lets transmit time begin counting from zero
(round down) or beginning at ten seconds (round up). The advantage
of the later is short calls will have ten second minimum billing.

ALARM INPUT ENABLE   ***0000#61#J#**   ***0000#61***
J = 1 = Enabled   J = 0 = Disabled   [J = 0 = Disabled]
The Cross Busy input can be used either as a Cross Busy input or as
an Alarm input but not both. Use this selection if you want it to
function as an alarm input. Note: Cross Busy and Alarm Input may not
both be enabled at once.

ALARM 1st DTMF DIGIT   ***0000#62#mm#**   ***0000#62***
If mm = 16 is entered on this line, alarm beeps will be sent rather
than a DTMF sequence.

ALARM 2nd DTMF DIGIT   ***0000#63#mm#**   ***0000#63***
ALARM 3rd DTMF DIGIT   ***0000#64#mm#**   ***0000#64***
ALARM 4th DTMF DIGIT   ***0000#65#mm#**   ***0000#65***
ALARM 5th DTMF DIGIT   ***0000#66#mm#**   ***0000#66***
ALARM 6th DTMF DIGIT   ***0000#67#mm#**   ***0000#67***
See Table 4 for desired DTMF digit vs mm entry.

ALARM CTCSS/DCS CODE   ***0000#68#pnnn#**   ***0000#68***
Selects which CTCSS or DCS code should accompany the Alarm DTMF
Sequence or beeps.

ALARM DELAY   ***0000#69#mm#**   ***0000#69***
mm 01-99 (.1 - 9.9 Seconds - .1 Sec/step)   [mm = 01 = .1 Sec]
Determines how long the Alarm input must be present before it is
recognized and transmits the alarm DTMF sequence.

ALARM RETRANSMIT INTERVAL   ***0000#70#mm#**   ***0000#70***
mm 00-99 (0 - 99 Minutes - 1 Minute/step)   [mm = 00]
Determines how often the DTMF alarm sequence is retransmitted if the
alarm input remains low (remember, this is active low).

DTMF OR MORSE RESPONSE   ***0000#71#J#**   ***0000#71***
J = 0 = DTMF   J = 1 = Morse code   [J = 0 = DTMF]
The TP-163 responds to each valid DTMF programming command with the
parameter number and the new data value which gives you feedback
that your command was carried out as desired. The response can be
sent in DTMF or Morse code.

Airtime, Hits and Prepaid Airtime Programming

Viewing Airtime and Hit accumulations (without a computer) will require a CD-1 or CD2 Communications Decoder Unit or other DTMF reader connected to a receiver or scanner monitoring the repeater output. No viewer is necessary to program PrePaid Airtime.

The DTMF commands used to program Time, Hits and PrePaid Airtime use the now familiar pnnn and pmmm format to describe a user tone/code. The commands that contain pnnn and pmmm allow you to define a range of tones/codes you wish to reset, read data from etc. For example if you wish to read hits for all 163 tones/codes the range would be from 63.0 Hz (pnnn = 2063) to DCS 754 (pmmm = 3754). If you wanted to use a narrower range say 100 Hz to 131.8 Hz, then pnnn = 2100 and pmmm = 2131.

Hits:

pnnn#pmmm#1   Recovers hits for all enabled tones/codes within user range specified.

pnnn#pmmm#2   Recovers hits for all disabled tones/codes within user range specified. See NOTE below.

The maximum number of hits which can be accumulated for any tone is 65,536. Counting will start over after this number is reached.

*pnnn#pmmm#7#   Resets all hit accumulations to zero within the user range specified.

Time:

pnnn#pmmm#3   Recovers airtime for all enabled codes within user range specified.

pnnn#pmmm#4   Recovers airtime for all disabled codes within user range specified. See NOTE below.

The maximum number of airtime minutes which can be accumulated for any tone is 10,922. Counting will start over after this number is reached.

*pnnn#pmmm#8#   Resets all time accumulations to zero within the user range specified.

Note: The ability to store and subsequently view time and hits of disabled tones/codes will help you to select unused tones/codes for new subscribers.

PrePaid Airtime:

Prepaid airtime works well for the system operator because he is paid before the service is rendered. It works like this... A customer pays you for say five hours (300 minutes) of airtime on your repeater. Using either computer programming, or DTMF programming (syntax is below) enter 0300 minutes for this subscriber. The TP-163 decrements the users remaining airtime as it is used. During the final 25 minutes a beep sounds every four seconds to warn that remaining airtime is running out. When additional airtime is entered, it will be automatically added to the customers existing airtime if the correct entry format is used as described below.

*pnnn#98#tttt#   Programs prepaid airtime for user pnnn. This command will overwrite any existing airtime in memory for pnnn user specified. tttt must be entered in total minutes. For example, 4 hours 22 minutes would be entered as 0262 minutes.

The largest number of minutes you can enter is 9,999.

*pnnn#99#tttt#   Adds new airtime to existing airtime. Use this command when a subscriber has airtime remaining, but wishes to add to it. tttt must be entered in total minutes. For example, 1 hours 45 minutes would be entered as 0105 minutes. If this hypothetical subscriber had an existing prepaid time of 0060 minutes, the new total would be the sum, 0165.

The largest number of minutes you can enter for any tone/code is 9,999 however the sum of new airtime and existing airtime may not exceed 10,922 minutes per user tone/code.

pnnn#pmmm#5   Recovers remaining prepaid airtime for enabled users using prepaid airtime within user range specified.

Total prepaid airtime must not exceed 10,922 minutes per user tone/code.

*pnnn#pmmm#9#   Resets all prepaid airtime accumulations to zero within the user range specified.

WARNING: Be careful, this command will destroy all remaining prepaid airtime accumulations and disable all users setup for pre-paid airtime in the specified range.

(Users will be disabled because you just made their remaining airtime zero and they are still programmed for prepaid airtime)

USING THE REPEATER...

The TP-163 will respond to any combination of CTCSS or DCS codes shown in Table 1 that have been enabled, up to 163. Each enabled tone/code will exhibit the per subscriber and globally programmable characteristics that have been left at factory default or changed to user programmed settings. The programming choices have annotations which briefly explain how each choice affects operation. Some choices are self evident and further explanation is unnecessary.

The TP-163 offers two very powerful DTMF commandable features for repeater users...

Temporary cross tone: A subscriber can initiate a call to any other user group on the system by sending a DTMF command which will cross the current subscribers tone or code to any other tone or code. Yes, you can even cross CTCSS to DCS or DCS to CTCSS! To initiate temporary cross tone, simply use the following format...

<div align="center">

pnnn#0

</div>

Where pnnn is the subscriber code you wish to cross to. For example, to temporarily change your repeater output code to 100.0 Hz. CTCSS simply enter 2100#0.

The temporary code will automatically revert back to your normal code when hang time expires. Or, you can change your code back to normal at any time by sending...

<div align="center">

######

</div>

CW ID: The TP-163 provides two separate types of Morse station identification...

Subscriber CW ID: The TP-163 can store up to a ten character callsign for each of up to 163 subscribers using the system. The callsign is automatically sent five seconds after a subscriber begins using the system and then every User CW ID Interval thereafter. The User CW ID Interval is globally programmable in ten second steps from 10 seconds to 990 seconds.

System CW ID: The TP-163 can also store the callsign of the repeater. The callsign is entered as a globally programmable parameter and an ID interval from 1-99 minutes must also be entered. You can also select any CTCSS or DCS code to accompany the system CW ID. The callsign is transmitted on a non interfering basis. The TP-163 first checks to make sure the channel is clear. If so, the callsign is sent at the first opportunity after each interval elapses. The TP-163 will not recognize a subscriber during the 4-6 seconds it takes to complete the ID. This should not pose a tangible problem because CWID will probably be set to occur at about 30 minute intervals and CWID will not occur if the system is already in use.

1. Remote Re-booting: A variety of conditions can occur (e.g. lightning) that will occasionally lock up a microprocessor. The only solution is to reboot the processor.

Your TP-163 is equipped with hardware to allow remote rebooting using DTMF. If a malfunction occurs try re-booting by pressing any DTMF digit for ten or more seconds. (Re-booting will have no effect on user programming).

Space reserved for future test modes

ANI: Automatic Number (user) Identification

Barge in: An attempt by a different CTCSS/DCS user to cut in on or displace the current CTCSS/DCS user group. Enable 'Barge In' to allow cut in. Disable 'Barge In' to not allow another CTCSS/DCS to take over the channel.

COS: Carrier Operated Switch.

Courtesy beep: A brief tone at the end of a users transmission that lets the party you are speaking with know that it is their turn to reply.

Cross tone: Converts a user's input DCS or CTCSS to a different output DCS or CTCSS as desired.

CTCSS: Continuous Tone Coded Squelch System

CTCSS/DCS hold delay: A software timer that fills in momentary DCS or CTCSS loss when a signal is weak. When the hold delay is set to at least three seconds talk off should be nearly impossible. If there is another signal present when the mobile unkeys, the TP-163 will immediately detect the new CTCSS or DCS code as incorrect and shut off the repeat audio immediately. Thus background chatter is not heard in the mobile.

Note: CTCSS Trak and CTCSS Hold delay are exclusive CSI software inventions available only in CSI panels.

CW ID: Automatic identification of call sign in Morse Code.

DCS: Digital Coded Squelch.

DCS polarity: Characteristics of receivers and transmitters can invert DCS. The TP-163 has independently programmable receive and transmit invert to accommodate varying radios.

DTMF: Dual Tone Multi Frequency (Touch tone).

Hangtime: The amount of time the repeater transmitter remains on the air after a user stops transmitting.

Hog: A user or user group that monopolizes airtime.

Hog Penalty: This feature is designed to give the system manager some control over airtime hogs which may drive other customers away.

In order to use the Hog Penalty feature it is necessary to understand how it works. There are three timers which can be individually set in the global programming. These are ...

HOG MONITOR: This timer sets the maximum talk time a subscriber may use without incurring a no talk penalty. Warning beeps during the final thirty seconds indicate that a penalty is forthcoming if use is not quickly terminated. If the subscriber ignores the warning beeps for the full thirty seconds he is penalized by not being able to use the system for the "penalty time" duration.

IDLE TIMER: The "hog monitor timer" is reset if the user does not use the system for the "idle time" this gives the user a clean slate. It must be noted that the "hog timer" time is cumulative, if the idle time criteria is not met.

PENALTY TIME: If the subscriber exceeds the cumulative "hog timer" time he receives a hog penalty.

The TP-163 can track the most recent five users for hog penalty. If the system operator (or any other user) enters "######", all hog timers will be cleared, allowing the penalized Hog(s) to use the system before their penalty time has expired

JP: Jumper (wire or plug) used for making a hardware selection.

Kerchunking: A kerchunker is a user that briefly hits his PTT switch to see if he can raise the repeater. Many find this practice annoying. The Anti-Kerchunking feature in the TP-163 is designed to stop users who like to kerchunk. The Anti-Kerchunking filter does not affect pick-up time or repeat capability, however if a transmission is shorter than the Anti-Kerchunk time there will be no hangtime when the user unkeys.

PTT: Push To Talk. (The line that keys the transmitter).

Reserve tone: A tone in "reserve tone" status will bring up the repeater but audio will not pass.

Response delay to CD-1 or CD-2: The amount of time from a download request until the TP-163 begins outputting a DTMF download to your CD-1 or CD-2 Communications Decoder Unit. This time is required if you are programming from a half duplex radio.

Stuck Mic. activity timer: Sets the maximum continuous (uninterrupted) talk time. If a user talks past the activity timer time, the repeater merely stops transmitting until the input drops and is picked up anew.

User Enable/Disable: Ability to turn a subscriber off for non payment and back on in response to payment. Sometimes it may be desirable to put a subscriber into reserve tone status rather than use the deadbeat disable. That way he will realize that he is picking up the repeater but can't talk. This may give the user a clue that they need to write a check.

CIRCUIT DESCRIPTION

The incoming audio is buffered, de-emphasized and amplified to the amount set by the PREAMP control by input op amps U4A, U4B. The audio then proceeds to a six pole low pass filter and a six pole high pass filter. The low pass filter UU4C, U4D, U7A removes voice audio and extracts the DCS/CTCSS signal for detection at the adaptive differential comparator U7C. The comparator output is fed to the microcomputer U11 pin 12 for software DCS/CTCSS detection. The six pole high pass filter U7D, U6A, U6B removes CTCSS and DCS from the incoming audio to avoid retransmission of CTCSS or DCS. The audio from the high pass filter continues through the squelch switch U3B and on to the audio output amplifier U6C.

The COS input is buffered U1A and compared to a reference voltage U1B, which is set by the COS threshold pot. The output then proceeds to the polarity select strap JP-3 and then to the microcomputer U11 pin 32.

DTMF is decoded and regenerated by U12 with some assistance from the microcomputer U11.

DCS is generated directly by the microcomputer U11 and output on pin 15. The DCS is then passed through a four pole low pass filter U2C, U2B to remove unwanted harmonics. CTCSS is generated by waveform generator U5 and passes though the reverse burst controller U2D, U3A. DCS and CTCSS are then summed in U2A and sent to the SUBTONE OUTPUT.

The PTT signal originates at the CPU U11 pin 33 and drives Q9 which in turn drives Q2 whose collector connects to the PTT output.

A power on reset circuit consisting of Q6 and associated components monitors the input voltage and quickly halts the microcomputer if the applied input voltage is too low. The power on reset circuit provides proper computer start up after power is applied and protects the EE memories U10 from data loss on power up and down.

Remote rebooting occurs when any DTMF is heard for ten seconds. The DV from U12 enables oscillator U15A sending clock pulses to counter U14. When 2048 counts occur the CPU is reset because Q7 enables the reset circuit.

The CPU U11 communicates with external computers via the RS-232 interface U16 using the front or rear DB9 connectors.

Incoming power is fed through reverse polarity protect diode D4 and then fuse F1. From there the +V voltage feeds a +5 volt regulator U17 used by the digital components. Another smaller +5 volt regulator U13 is used to supply bias and reference voltage to the analog op-amps etc.

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 bee removed, altered, or defaced. **Specific Exclusion:** This warranty specifically excludes transistors in the PTT (Push to Talk) circuitry (Q2 & Q9). 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 WARRATIES 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 INABILTY TO USE, THIS PRODUCT. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.
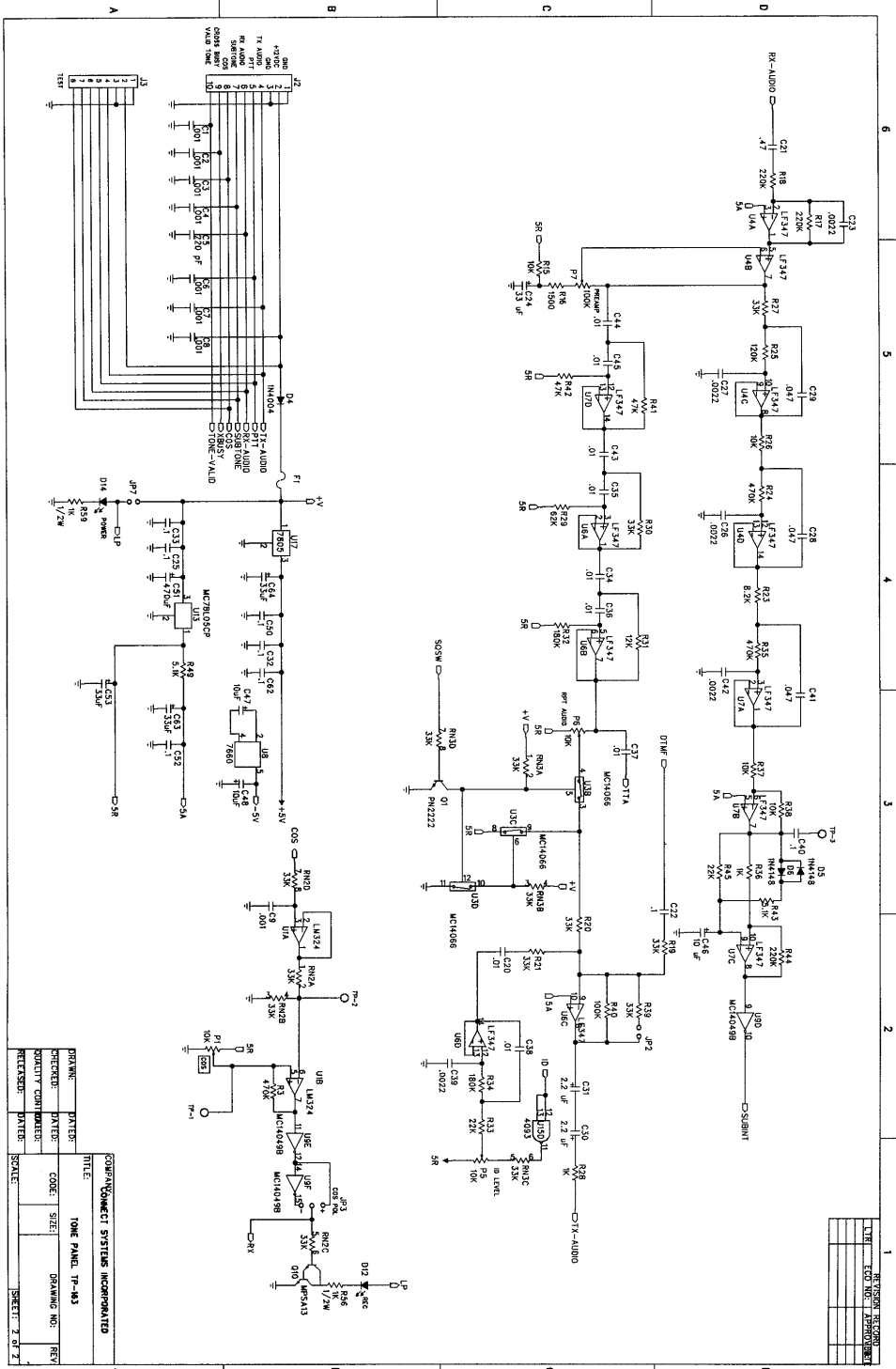
If your new CSI product shall ever fail, contact Connect Systems Inc. Customer Service Dept. for repair and warranty information at (805) 642-7184

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.
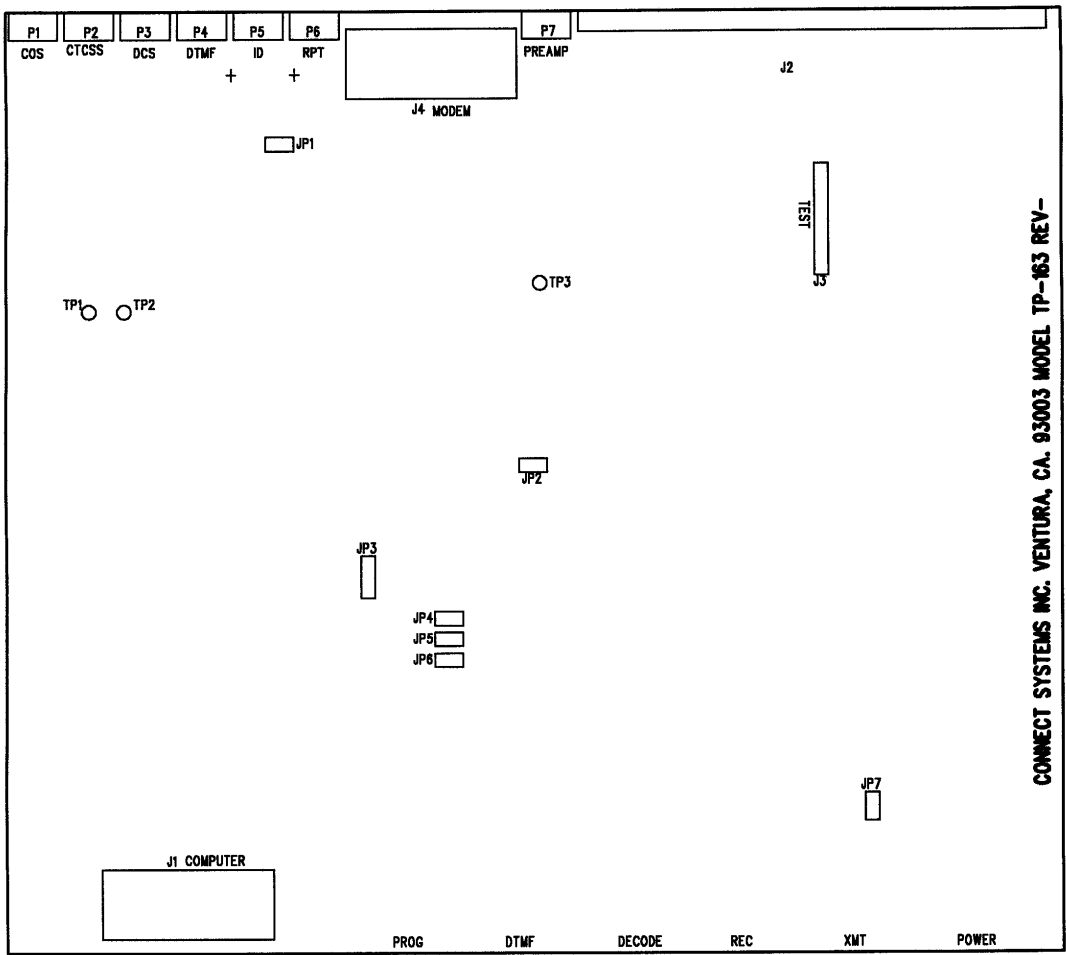
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