

Model RP-176

Installation and Setup Manual

by,

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About the RP-176..

Welcome aboard! Your new RP-176 is the first repeater panel ever made that brings you these important new features:

- **DC Coupled discriminator to panel (provides a huge improvement in DCS decoding by maintaining DCS wave shape)**
- **All Adjustments Behind Front Panel Access Cover**
- **176 Tones & Codes (13 more than the nearest competitor !!)**
- **14 CTCSS Tones below 67.0 Hz. Creates some exciting new possibilities.**
- **Huge Front Panel 16 Character LCD.**
- **31,500+ status messages preprogrammed for display on the LCD.**
- **Direct Tone Entry (none of that "nnn" nonsense found in competing panels)**
- **8 Pole Digital Filters (compare to their 4-6 Pole discrete analog filters)**
- **Smallest Panel in existence.. 19 in. Wide x 1.73 in High x <2 in. Deep**
- **and More.**

The RP-176 is the first new repeater panel designed in over a decade. It brings many new features and innovations and its modern technology (e.g. digital filters, DC Coupled discriminator to panel, new decoding algorithms etc.) **give it a huge performance edge.** Modern hardware and software design also provide a huge convenience edge (continuous status info on the LCD, direct tone/code entry when programming, front panel setup adjustments and more).

To put into perspective a comparison of the RP-176 to competing panels, compare a modern XP Windows computer to an old DOS computer !!

Physically, the RP-176 is the smallest repeater rack mount panel ever made at less than 2 inches deep and 1.75 inches high. The RP-176 runs circles around the competition using the Atmel AT89C55WD flash microprocessor for incredible performance! **AND..** all setup adjustments are available from the front !!

Important Setup Recommendation

The RP-176 comes defaulted with 36 EIA CTCSS tones + 112 DCS codes enabled (131.8 and 136.5 are turned off) and user programmable settings that will allow it to play immediately. So there is no reason to begin programming until after you have the unit fully connected, adjusted and running. The COS polarity is DIP switch selectable so once selected the only thing that may not be right is DCS input polarity (may decode and display inverse code, and DCS output polarity (may be transmitting inverse code). These are easily corrected later. We recommend to not mess with the programming until everything else outside of programming is set up and working. Refer to Installation and Setup sections for needed adjustments.

Note: Use of DCS (over CTCSS) is recommended for new installations !! Stated simply.. DCS works better !

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1.0 Installation

Connections

There are eight connections made from the RP-176 to the power supply, receiver and transmitter as follows..

Pin	Name	Description	
8	Signal Ground	Connect all signal shields here.	(shield braid)
7	Rx Disc	Receiver discriminator	(shielded)
6	Rx COS	COS from receiver squelch	(shielded)
5	Tx Key	Transmitter PTT	(shielded)
4	Tx Tone	Transmitter subtone inject at FM modulator	(shielded)
3	Tx Audio	Transmitter audio, inject before IDC.	(shielded)
2	+12 to +15 VDC Power	Coaxial power cable center conductor	(to + of power supply)
1	Power Ground	Coaxial power cable shield	(to - of power supply)

IMPORTANT: The connections above are shown same as physically viewing the RP-176 pluggable connector from the rear. **i.e. connection 8 is at top & connection 1 is at the bottom.** The power connections are reverse polarity protected. **But,** keep in mind that although unlikely an incorrect connection may cause damage.

Connections Description

Power

Run a separate coaxial shielded cable from the power supply to the RP-176 connector. Connect + to center, connect - to the coax shield. Audio problems such as hum will be minimized if a separate dedicated small DC supply (such as a 120 VAC to 12 VDC) wall supply is used to run the RP-176. (a 1/4 amp supply is more than sufficient. Set for 12.5 VDC if it is adjustable). The RP-176 draws about 110 mA.

Rx Signals

Two connections are made to the receiver. Use two separate shielded cables or a single shielded cable with two center conductors. The connection to the FM detector (discriminator) must be made directly to the discriminator output... **BEFORE DE-EMPHASIS !!** The COS connection is made to the receiver squelch circuit. The correct point will change in DC level when the squelch is opened/closed. There may be more than one place to connect that will appear to do the job. However the correct connection will give least squelch tail heard in the mobile due to delays caused by squelch capacitors **AND** not have talk off problems. **The RP-176 is designed to handle either COS polarity or any DC level. More on this under Adjustments.**

Tx Signals

Three connections are made to the transmitter. Use three separate shielded cables or a single shielded cable with three center conductors. Tx Audio (repeat audio) must connect to a suitable point before the IDC (instantaneous deviation control) clipper so that repeat audio cannot overmodulate the repeater causing splatter, adjacent channel interference and talk off heard in the mobile. Tx Tone delivers the CTCSS and/or DCS subcode to the transmitter (IMPORTANT: DO NOT PUT ANY CAPACITORS IN SERIES. The correct size capacitor is already in line inside the RP-176) !! The connection must be made directly to the FM modulator. Tx Key is simply connected to the transmitter PTT line (NPN pull to ground can sink up to 1/4 amp).

NOTE: Accidentally connecting the Tx Key to a supply voltage **WILL DESTROY THE PTT TRANSISTOR IN THE RP-176.** This failure **is not covered** under warranty !!

IMPORTANT..

PM (Phase Modulated) transmitters cannot be used for DCS. Use a PM transmitter with CTCSS only. PM transmitters have insufficient low frequency response for DCS operation.

FM (Frequency Modulated) transmitters can be used with either CTCSS and/or DCS signalling..

2.0 Hardware Set Up

Dip Switches Start out by setting the dip switches for your application. You will most likely have to return here when the real setting requirements become more clear. The switches are numbered 1 - 8 (left to right) as viewed from the front. Generally "ON" will be switch in up position. But they can also be ON switch down. Look on the actual switch for ON/OFF direction indicators. The DIP switch may or may not have individually numbered switches. (We will attempt to provide a switch that is ON up and properly numbered)

SW No	Function Controlled	What it does
1*	Input DC/AC Coupled	SW ON = DC Coupled Input DC Coupled is recommended unless the receiver runs on more than 15 VDC. Comment: The RP-176 is the only repeater panel ever offered with DC coupling from receiver discriminator to repeater panel. DC coupling preserves DCS waveform geometry far better than AC coupled panels. However the RP-176 also gives you the choice of AC coupling. If the receiver is powered with more than 15 VDC, the AC coupling choice may be required.
2*	Rx De-emphasis	Sw ON = De-emphasis on De-emphasis must be ON if connected to the FM detector. (Highly recommended) Comment: A repeater panel must be connected to the FM detector (discriminator) for DCS operation. And it is highly recommended for CTCSS operation as well. However it is possible (but not recommended) to operate CTCSS only at a down stream audio takeoff point. e.g. the high side of the receiver volume control). The switch must be ON if the takeoff is at the discriminator. If taken downstream the switch must be OFF if the take off point is beyond the receivers built in de-emphasis circuit. Our strong recommendation is direct connection to the FM detector.
3*	Rx Gain Lo / Hi	Sw ON = Lo Gain Leave in Lo Gain (SW ON) unless higher Rx gain is needed (unlikely). Comment: Provides two levels of Rx gain so that the Rx Sub control pot can have finer resolution. Operate at low setting if possible.
4	RPT Gain Lo / Hi	Sw ON = Hi Gain Leave in Lo Gain (SW OFF) unless higher RPT audio gain is needed Comment: Provides two levels of Repeat audio gain so that the RPT Gain control can have finer resolution. Operate at low setting if possible.
5	COS Pullup	Sw ON = 100K Pullup connected to + input voltage COS pullup not normally required. (SW OFF) Use if source is open collector or needs help pulling up. May speed up repeat squelch tail. Comment: Occasionally the COS take off point requires a pullup resistor. Leave OFF unless necessary. There are occasions when COS switching is improved with a pullup resulting in less squelch tail heard in the mobile.
6	COS Polarity	Sw ON = Polarity A COS Polarity. Adjust so that Display says "Squelch CLOSED" when squelch is closed or no signal. Comment: When you connect to a receiver there is a 50/50 chance the COS will be inverted and require correction by putting the COS Polarity switch in the opposite (Polarity B) setting.

7* Local Access Code Sw ON = No Password Required when programming locally

If you prefer no password for local programming then set to SW7 ON.

If you prefer that a password is req'd for local programming then set SW7 OFF.

Comment: This switch has no effect on remote (over the air) programming. It only determines whether a password is required when programming locally using a phone as a keypad. A four digit password is required to enter Setup Mode from remote and optional for local programming.

8 Factory Reset & Mem Test Sw ON = EEPROM memory test and Reset to Defaults

Comment: Normally leave SW8 OFF. To perform EEPROM memory test & reset to factory settings, turn SW8 ON before applying power, then apply power. Runs EE Prom memory test followed with outcome report on LCD. If test is OK then resets all programming to factory settings. A message on the LCD reminds you to turn off SW8 before it will proceed to repeater mode.

CAUTION - THIS PROCEDURE WILL ERASE ALL YOUR PREVIOUS SETUP PROGRAMMING INCLUDING PASSWORD AND RESET TO DEFAULT SETTINGS!!

NOTE: This setting must be used to initialize a new or upgraded CPU !!

IMPORTANT: For initial set up switches indicated with a * should be ON, All others should be OFF.

Adjustments

With the dip switches set to the recommended start up settings lets proceed with making your panel operate! Please begin the setup in CTCSS mode as described even if you don't plan on using CTCSS. (tone deviation is easier to set and DCS polarity ambiguity is eliminated)

Set your service monitor RF to transmit on the receiver input frequency. Set one of the 38 EIA CTCSS tones to a mid frequency value eg 114.8 Hz. Set the service monitor CTCSS deviation to the value you use in your systems (usually 700-900 Hz. Higher works better than lower). We'll begin with LCD contrast and COS setup because nothing else will work until they are set up properly.

NOTE: The legends for the pots (P1, P2 etc) are labeled on the board below the pots. The functional name (RxSub, TxSub etc) is labeled on the board above the pots.

P5 LCD

Rotate the setting for optimum contrast on the LCD. This occurs when the characters are well defined and the background dark noise just disappears. This setting may need touch up seasonally (due to extreme uncontrolled temperatures found in many radio rooms). The RP-176 was shipped with the LCD contrast in an acceptable setting so will likely be quite close when you make this adjustment.

P4 COS

Monitor TP-1 (located between P4 & P2 top test point) with a high impedance voltmeter or DC coupled scope. Rotate the squelch open/closed on the input receiver and note the high and low voltage readings at TP-1. Now move your voltmeter or scope to TP-2 (below TP-1). Rotate P4 COS to obtain a reading mid way between the two readings previously obtained. Now open and close the squelch on the input receiver. The LCD should say "Squelch OPEN" and "Squelch CLOSED". Now toggle SW6 COS Polarity if necessary to make what the LCD says agree with what the receiver is actually doing.. i.e. if the squelch is closed the LCD should indicate "Squelch CLOSED". (Further adjustment of COS should be unnecessary).

P1 Rx Subtone

Note: Be sure the receiver is hearing your service monitor with correct CTCSS tone and correct tone deviation. Begin at fully CCW. Advance CW slowly until you see the green LED begin to illuminate (to left of P1). Continue advancing CW until the red LED (above the green LED just begins to flicker then back off to green only. (Remember green go, red stop). If your input level is very low, you may need to set SW3 Rx Gain to OFF to put the input amplifier into high gain range. (a small amount of red led flickering is ok).

You have just set the input gain to produce a subtone level of 3V p-p as measured at TP-3. (TP-3 is between P1 & P5, bottom TP). You may also verify the amplitude and waveform at TP-3 with a scope. (Further adjustment of P1 Rx Subtone should be unnecessary unless you change receivers).

Note 1: The green and red led's are a built in voltmeter allowing you to set Rx Subtone to 3 V p-p without a meter or scope. Once you get the feel for this and verify with a scope a few times you won't bother with using an instrument in the future.

Note 2: Since the panel is shipped with 36 CTCSS tones enabled (131.8 and 136.5 Hz are defaulted off), you should now see the tone you are using for test displayed on the LCD !! If you see no tone or incorrect tone be sure you are transmitting one of the 38 EIA tones. (see tone table next section)

P3 RPT

Set your service monitor to send a tone of about 1 kHz and its deviation to 2.5 kHz. (of course there will need to be an accompanying CTCSS or DCS subtone or the RP-176 won't repeat). Now adjust the P3 RPT potentiometer so that the repeater output deviation is the same as the input deviation from the service monitor. In most repeater situations there should be a 1:1 relationship between input and output deviation. Likely RPT will need no further adjustment.

P2 Tx Sub

with same setup as above, transmit a signal with subtone into the repeater. The RP-176 will decode the tone on the input and regenerate on the output. Set P2 Tx Sub for the desired repeater output subtone deviation. Likely Tx Sub will need no further adjustment. It is normal to set the regenerated repeater output deviation to the same input deviation value that mobiles transmit.

P7 Courtesy Beep

Each time the input signal unkeys the repeater responds with a courtesy beep. Repeatedly key/unkey and adjust P7 Courtesy Beep pot until the desired audible level is achieved. (Later we will be setting the delay and duration parameters to suit your taste in user setup programming. **Note:** Courtesy beeps are disabled while in SetUp Mode.

P6 CW ID

Since CW ID only occurs every 2 - 99 minutes it would be difficult to set the level without using a special CW ID initiate command we'll cover next in user programming. So set a placeholder here and return to finish this adjustment during setup mode.

Important Note

Please Read Before Continuing

Two of the CTCSS tones (131.8 and 136.5 Hz) are subject to being falsed by DCS which has a baud rate of 134.4 Hz. The RP-176 comes out of the box in 38 EIA tone mode with 36 CTCSS tones enabled and all 112 DCS codes enabled. 131.8 and 136.5 are defaulted to OFF to avoid confusion due to possible false decoding DCS. These two tones can also be enabled if desired by entering *13181318 and *13651365.

If you wish to use DCS or if there is DCS on the input channel from co-channel users, it is recommended to avoid using 131.8 and/or 136.5 CTCSS to prevent unwanted key up.

After setup you'll want to disable all tones then selectively enable only the desired tones. First, select the 38 EIA tone set or the full 64 tone set. Then turn all tones and codes off by entering *90# which is the **ALL OFF** command. Example: Then if you want 79.7 Hz, 107.2 Hz, 146.2 Hz and 311 DCS enabled, enter this sequence.. *07970797 *10721072 *14621462 *03110311

3.0 Programming Setup

General

Parameter programming is accomplished using DTMF either locally with a telephone plugged into the front panel (used only as a keypad) or remotely over the air from a radio or service monitor..

Remote Reset

We have provided a method of rebooting the RP-176 remotely.. simply press and hold any DTMF digit transmitting on the input channel for at least 10 seconds. This feature could save you a trip to the site! Lightning or other events could occasionally necessitate a reboot. **Note:** Remote reboot Will not work if you have left a phone plugged into the RP-176 front panel phone jack.

Local Programming

Plug almost any DTMF telephone into the front panel RJ-11 jack and hit some digits other than * (star). You should see the string you send appearing on the left side of the LCD. You can set whether an access code is required or not to program locally. This choice is accomplished with dip switch SW-7 (see dip switch settings above). If set so an access code is required the LCD will respond with " In SetUp Mode " in response to a correct password code. if set for password not required the unit will automatically go into SetUp Mode when you send a command. Either way you enter SetUp Mode you can exit at any time by sending *93#. The LCD will then show "Exit SetUp Mode". Not to worry, if you forget to exit setup mode a software timer will automatically exit four minutes after the last DTMF command.

Note: The RP-176 is designed to **NOT respond** to over the air DTMF when a phone is plugged into the front panel. This was done to preclude on air DTMF interfering with local programming.

REMEMBER.. IF YOU FORGET AND LEAVE THE SITE WITH THE PROGRAMMING PHONE PLUGGED IN, YOU WILL NOT BE ABLE TO ENTER SETUP MODE OR PERFORM A REMOTE RESET OVER THE AIR !!

Over the Air Programming

You can send commands to alter programming selections over the air from a DTMF equipped mobile or from a DTMF equipped service monitor. Your preprogrammed password code is always required when programming remotely. After sending your password code, the RP-176 keeps you aware three separate ways that you are in SetUp Mode (and also during local) programming:

- a) The courtesy beeps are eliminated during setup mode to avoid beep confusion.
- b) A short beep is sent every 12 seconds while in setup mode.
- c) The transmitter is held keyed during the entire setup mode.

You can doubly confirm you are in setup mode by sending *99# which will cause your chosen CW ID message to be sent. When programming remotely you have no LCD to look at to give you feedback, so we have provided go no-go beeps to help. A command that is accepted will be followed by a long one-second beep. A command that produces an error message on the LCD will be followed by five short beeps to indicate 'error'. Both types of beeps are delayed 3 seconds so that you have time to unkey your radio and hear the resulting beep message. We recommend that you perform more adventurous programming at site while viewing the LCD and try to limit remote programming to adding/deleting users etc. You can exit Setup Mode at any time by sending *93#. The LCD will say "Exit Setup Mode".

IMPORTANT: In SetUp Mode the repeater runs continuously and status beeps replace the Courtesy Beeps. These operational changes may confuse you if testing a changed parameter while in setup mode. Therefore after making a programming change send *93# to exit setup mode before testing your changes. Repeater operation is however disabled during a user listout (command *95#)

Important Commands

The 9x Commands: (must be in setup mode to respond)

- *aaaa** Access Setup Mode. Where aaaa is your four digit password.
Note: Access password is not appended with a # like most other commands are.
- *90#** Sets all 176 User Codes (64 CTCSS + 112 DCS) to OFF.
- *91#** If 64 CTCSS tone operation is selected then 62 CTCSS tones + all 112 DCS codes are set to ON (with output code same as input code). Note that 131.8 and 136.5 remain off.

If 38 CTCSS tone operation is selected then 36 EIA tones + all 112 DCS codes are set to ON (with output code same as input code). Note that 131.8 and 136.5 remain off. The remaining 26 non EIA CTCSS codes are also set to off.
- *93#** To exit Setup Mode.
- *95#** Lists all enabled input codes (and their output tones), sequentially on the LCD.
Note 1: If you wish to abort the listout before completion, simply press * at any time.
Note 2: This command is designed to only be accessible from local programming.
Note 3: The repeat function is disabled during a listout.
- *97#** Reset all parameters to factory defaults.
Note: If you would also like an EE Prom memory test performed, use the dip switch reset to factory settings feature.

WARNING.. THIS COMMAND WILL ERASE YOUR CURRENT SETTINGS INCLUDING YOUR PASSWORD !!
- *99#** Sends the currently programmed CW ID message whenever you like from within SetUp Mode. LCD responds with.. "CWID level test". Repeat as many times as you need to set CW ID transmit level .

Programming Syntax

- *aa#** Use to check the current setting of any programmed parameter (as viewed on LCD) without any risk of altering the current setting.
Where aa is the address of the parameter you are checking. (see table below)
e.g. send *03# to view the current setting of RPTR Hangtime1.
- *ddaa#** Use to change the value of any dd (data) setting at any aa address.
Where dd is the parameter you want to change at address aa (see table below)
e.g. send *2003# to change the setting of RPTR Hangtime1 to 2.0 seconds

PASSWORD CODE: Before you proceed with any other programming first choose and set a new password code **and test that it works before proceeding!!** Example: Lets assume you wish to set 6830 as your new password code. The password code is programmed in two steps. The first two (high) digits in this case 68 are programmed into address 12 thusly:

***6812#**

The second two (low) digits (in this example 30) are programmed into address 11 thusly:

***3011#**

In each step you will see "Error" on the LCD if your input has not been accepted. If accepted you will see Rd: 68 and Rd: 30 in the first and second steps respectively. (Rd means the value shown was actually read back from memory giving 100% assurance of programming success).

The protocol for entering Setup Mode access code requires sending * first. So to enter Setup Mode send *2580 if using the factory default password code. To use the password code set in the example above send *6830 . Please verify that your new password works before proceeding.. turn the power off then back on. Then send your new password code. If OK, you will see "In Setup Mode" displayed on the LCD for a few seconds. (in addition, courtesy beeps will be absent and a short setup mode reminder beep is heard every 12 seconds).

Note: The four digit password code must be preceded by * but has no # at the end.

THE PROGRAMMABLE PARAMETERS AT A GLANCE..

Operating Parameter	aa Adr	dd Min	Fcty RST	dd Max	Comment
DCS decode polarity	00	00	00	01	Normal/Invert
DCS encode polarity	01	00	01	01	Normal/Invert
COS Hangtime	02	02	02	99	1 milliseconds/Step
Rptr_hangtime1	03	05	20	40	.1 Second/Step
Rptr_hangtime2	04	05	20	99	.1 Second/Step
CTCSS_sensitivity	05	02	04	08	See Text
Barge_in_timer	06	00	00	99	.1 Second/Step
Rptr_hangtime3	07	05	10	99	.1 Second/Step
Courtesy tone delay	08	05	50	99	10 milliseconds/Step
Courtesy tone duration	09	00	35	99	10 milliseconds/Step
Stuck mic timeout	10	05	30	99	.1 minute/Step
Setup Mode access code L	11	00	80	99	Low 2 digits
Setup Mode access code H	12	00	25	99	High 2 digits
64 or 38 CTCSS Tones	13	00	00	01	01=64, 00=EIA38
CW ID interval	14	02	30	99	Sets CWID Interval in minutes
CW ID speed	15	25	30	40	Sets CW code speed
CW ID Char 1	16	00	36	46	Char Space
CW ID Char 2	17	00	27	46	R (see CWID Table below)
CW ID Char 3	18	00	25	46	p
CW ID Char 4	19	00	41	46	-
CW ID Char 5	20	00	01	46	1
CW ID Char 6	21	00	07	46	7
CW ID Char 7	22	00	06	46	6
CW ID Char 8	23	00	46	46	EOM (End of Message)
CW ID Char 9	24	00	46	46	EOM (End of Message)
CW ID Char 10	25	00	46	46	EOM (End of Message)
CW ID Char 11	26	00	46	46	EOM (End of Message)
CW ID Char 12	27	00	46	46	EOM (End of Message)
CW ID Char 13	28	00	46	46	EOM (End of Message)
CW ID Char 14	29	00	46	46	EOM (End of Message)
CW ID Char 15	30	00	46	46	EOM (End of Message)
CW ID Char 16	31	00	46	46	EOM (End of Message)
CW ID Char 17	32	00	46	46	EOM (End of Message)
CW ID Char 18	33	00	46	46	EOM (End of Message)
CW ID Char 19	34	00	46	46	EOM (End of Message)
CW ID Char 20	35	00	46	46	EOM (End of Message)
CW ID Char 21	36	00	46	46	EOM (End of Message)
CW ID Char 22	37	00	46	46	EOM (End of Message)
CW ID Char 23	38	00	46	46	EOM (End of Message)
CW ID Char 24	39	00	46	46	EOM (End of Message)
CW ID Char 25	40	00	46	46	EOM (End of Message)
CW ID Char 26	41	00	46	46	EOM (End of Message)
CW ID Char 27	42	00	46	46	EOM (End of Message)
Penalty Reset Pause Time	43	02	05	60	1 Second/Step
Penalty Time	44	00	07	60	4 Seconds/Step
Allowed Talk Time	45	05	30	60	4 Seconds/Step

THE PROGRAMMABLE PARAMETERS and PROGRAMMING DETAILS..

Parameter	dd range	aa Adr	Factory Reset Value
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Note: dd is the desired two digit parameter data with allowed range indicated.
aa is the two digit address of the parameter to be programmed.
FR is the as shipped Factory Reset value.

DCS DECODE POLARITY	dd: 00-01	aa: 00	FR: 00 (logic zero)
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Use to reverse (correct) received DCS polarity if necessary.
Example, enter *0100# to invert from factory default polarity. Enter *0000# to return to default.

Comment: Various system inversions create a 50/50 chance that a receive correction will be needed.

DCS ENCODE POLARITY	dd: 00-01	aa: 01	FR: 01 (logic one)
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Use to reverse (correct) transmitted DCS polarity if necessary
Example, enter *0001# to invert from factory reset polarity. Enter *0101# to return to default.

Comment: Various system inversions create a 50/50 chance that a Tx correction will be necessary.

COS HANG TIME	dd: 02-99	aa: 02	FR: 02 (2 mS)
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1 mS/Step
Example, enter *9902# for 99 mS

Comment: Just in case the receiver squelch works poorly we have included this software COS hang time timer to prevent word loss. Increasing this time will increase squelch tail heard in the mobile. This setting is defaulted to minimum (2 mS) and most likely you won't need to increase it.

RPTR HANGTIME 1	dd: 05-40	aa: 03	FR: 20 (2 seconds)
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.1 Second/step
Example, enter *2903# for 2.9 Seconds

Comment: RPTR Hangtime1 provides fill time between valid DCS & CTCSS decodes to prevent word loss when a mobile is weak. Generally speaking the setting can be much lower for DCS only operation. The total system hang time is the sum of the settings for RPTR Hangtime1 + RPTR Hangtime2 + RPTR Hangtime3

RPTR HANGTIME 2	dd: 05-99	aa: 04	FR: 20 (2 Seconds)
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.1 Second/step
Example, enter *6704# for 6.7 Seconds

Comment: RPTR Hangtime2 provides CTCSS & DCS subcode hold and regenerate after the mobile unkeys. This keeps the mobile tone decoder active so that the instant the responding mobile keys the only delay is squelch and not squelch + tone decode. The total system hang time is the sum of the settings for RPTR Hangtime1 + RPTR Hangtime2 + RPTR Hangtime3

CTCSS SENSITIVITY	dd: 02-08	aa: 05	FR: 04
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Example, enter *0305# for a sensitivity setting of 3

Comment: This setting allows you to make a tradeoff that is usually made for you and therefore fixed by the panel designer. A higher number increases CTCSS tone selectivity while decreasing sensitivity. While a lower number decreases selectivity and increases sensitivity. Likely the default setting will operate perfectly. If you experiment, do it one step at a time, run it for a while and proceed up or down based on results. we'd like feedback on this.

CW ID Characters..	dd: 00-46 aa: 16-42	FR: (see below)
CW ID Char 1	dd: 00-46 aa: 16	FR: 36 (Space)
CW ID Char 2	dd: 00-46 aa: 17	FR: 27 (R)
CW ID Char 3	dd: 00-46 aa: 18	FR: 25 (P)
CW ID Char 4	dd: 00-46 aa: 19	FR: 41 (-)
CW ID Char 5	dd: 00-46 aa: 20	FR: 01 (1)
CW ID Char 6	dd: 00-46 aa: 21	FR: 07 (7)
CW ID Char 7	dd: 00-46 aa: 22	FR: 06 (6)
CW ID Char 8	dd: 00-46 aa: 23	FR: 46 (end of message)
CW ID Char 9	dd: 00-46 aa: 24	FR: 46 (end of message)
CW ID Char 10	dd: 00-46 aa: 25	FR: 46 (end of message)
CW ID Char 11	dd: 00-46 aa: 26	FR: 46 (end of message)
CW ID Char 12	dd: 00-46 aa: 27	FR: 46 (end of message)
CW ID Char 13	dd: 00-46 aa: 27	FR: 46 (end of message)
CW ID Char 14	dd: 00-46 aa: 29	FR: 46 (end of message)
CW ID Char 15	dd: 00-46 aa: 30	FR: 46 (end of message)
CW ID Char 16	dd: 00-46 aa: 31	FR: 46 (end of message)
CW ID Char 17	dd: 00-46 aa: 32	FR: 46 (end of message)
CW ID Char 18	dd: 00-46 aa: 33	FR: 46 (end of message)
CW ID Char 19	dd: 00-46 aa: 34	FR: 46 (end of message)
CW ID Char 20	dd: 00-46 aa: 35	FR: 46 (end of message)
CW ID Char 21	dd: 00-46 aa: 36	FR: 46 (end of message)
CW ID Char 22	dd: 00-46 aa: 37	FR: 46 (end of message)
CW ID Char 23	dd: 00-46 aa: 38	FR: 46 (end of message)
CW ID Char 24	dd: 00-46 aa: 39	FR: 46 (end of message)
CW ID Char 25	dd: 00-46 aa: 40	FR: 46 (end of message)
CW ID Char 26	dd: 00-46 aa: 41	FR: 46 (end of message)
CW ID Char 27	dd: 00-46 aa: 42	FR: 46 (end of message)

Comment: So that CW ID works "out of the box", we have set "RP-176" as a factory default CW ID message. Therefore until you change it the panel will ID " RP-176" . A leading space was added to create additional keyup to ID delay to allow a bit more time for a receiver squelch to open before the message begins. By way of example, the list below shows the exact programming sequence you would use to manually enter the default message..

Sequence	Result
*3616#	Space (inserted as a start up delay)
*2717#	R
*2518#	P
*4119#	-
*0120#	1
*0721#	7
*0622#	6
*4623#	End of Message
'	End of Message
'	End of Message
'	End of Message
*4642#	End of Message

Important: All messages must end with 46 (End of Message). It's a good idea to fill the remaining (unused) CW ID characters with 46. Create any message you want using the CW ID Character to dd code from the table below. If CW ID is not desired then simply program a end of message character, 46 on each CWID character line 16-42.

CW ID CHARACTER TABLE..

Char	dd	Char	dd
0	0	O	24
1	1	P	25
2	2	Q	26
3	3	R	27
4	4	S	28
5	5	T	29
6	6	U	30
7	7	V	31
8	8	W	32
9	9	X	33
A	10	Y	34
B	11	Z	35
C	12	Char Space	36
D	13	Fwd Slash	37
E	14	Comma	38
F	15	Period	39
G	16	Question Mark	40
H	17	Hyphen	41
I	18	KN	42
J	19	AR	43
K	20	SK	44
L	21	HI	45
M	22	End Of Msg	46
N	23		

Penalty Programming

The RP-176 provides an airtime monitoring scheme that allows the system operator to set a maximum allowed talk time and a penalty time for exceeding the maximum talk time. A Penalty makes the repeater inaccessible to the offending user that acquired the penalty. During an offenders penalty the repeater is free for others to use. And incidentally while it's penalizing last user it is monitoring the next users talk time for potential penalty. Unkeys between talk exchanges do not reset the allowed talk time unless the pause between communications is greater than the penalty reset pause time setting. The penalty feature is easy to use and with a little tuning you can optimize it for the users on your system.

PENALTY RESET PAUSE TIME **dd: 02-60** **aa: 43** **FR: 05** (5 Seconds)

1 Second/step

Example, enter *1043# for 10 seconds

Comment: The controller accumulates the current users talk time which continues to aggregate until either the current user pauses long enough for the penalty reset pause timer to timeout, or if a new user makes a call. Either of these events resets the allowed talk time timer.

Example: The allowed talk time is set to 60 seconds and the penalty reset pause time is set for 15 seconds. Mobile A (67.0) talks for 30 seconds. Mobile b (67.0) waits for 10 seconds to reply then talks for 25 seconds. The penalty reset pause time was not allowed to time out (so a talk time reset did not occur) thus the talk time total is 30+10+25 = 65 seconds which caused a penalty to occur at 60 seconds. As a result user tone 67.0 is penalized for whatever time the penalty time has been set to. The allowed talk time accumulator is automatically reset in preparation for a new user while last user is locked out. The Penalty Reset Pause Time can be set from 2 - 60 seconds.

Settings beyond 15 seconds may be awkward for the users.

PENALTY TIME **dd: 00-60** **aa: 44** **FR: 00** (Penalty feature Disabled)

4 Seconds / step

(four minutes maximum)

Example, enter *1544# for one minute

Note: To disable the penalty feature altogether, set dd = 00 (enter: *0044#)

Comment: As the name implies this is the amount of time that an offending user is locked out of the repeater for exceeding the allowed talk time. During the penalty time all other users will still be able to use the repeater. The maximum penalty time setting is 240 seconds (four minutes).

ALLOWED TALK TIME **dd: 05-60** **aa: 45** **FR: 30** (4x30 = 120 Seconds)

4 Seconds / step

Example, enter *6045# for four minutes

Comment: This is the maximum allowed talk time setting. A single user tone talking longer than this setting will earn the offender a penalty. Users denied access by the offender will now have free access to the repeater during offenders penalty time. The maximum Talk time setting is 240 seconds (four minutes).

IMPORTANT: In SetUp Mode the repeater runs continuously and status beeps replace the Courtesy Beeps. These operational changes may confuse you if testing a changed parameter while in setup mode. Therefore after making a programming change send *93# to exit setup mode before testing your changes.

NOTE: Repeater operation is disabled during a user listout (command *95#)

PROGRAMMING USER TONES & CODES:

Note: The RP-176 is shipped in a factory reset condition with 36 EIA Tones & 112 DCS Codes enabled. This is so that any tone or code you use during initial setup will work. When you are ready to setup your selected tones and codes begin by entering *90# which will turn off all tones and codes (must be in setup mode to function). You are now ready to enable your selected tones/codes. (You can turn all tones/codes back on by entering *91# if desired).

Unlike competing repeater panels, the RP-176 is programmed using the actual tone or code directly rather than a looked up substituted "nnn" number which are meaningless to the user. The sequence entered to setup a tone is *iiiioooo where iiii is the input code and oooo is the output code. The syntax always begins with * followed by four input digits and concluded with four output digits. A leading "0" (zero) must be added to tones having only three digits. Decimal points are ignored. Some examples will make this clear..

(First, be sure you are in Setup Mode)

***13181318** Enables 131.8 Hz input code and sets 131.8 Hz as the output code
***13181000** Enables 131.8 Hz input code and sets 100.0 Hz as the output code
***13180315** Enables 131.8 Hz input code and sets 315 DCS as the output code
***03151318** Enables 315 DCS input code and sets 131.8 Hz as the output code
***13180000** Disables 131.8 as an input code (0000 disables named input code)
***13181111** Puts input tone 131.8 into reserve tone mode (1111 invokes reserve tone mode)

As the sequence is entered the DTMF digits appear on the left side of the LCD. If you enter a code incorrectly "Error: appears on the right side of the LCD. If your input is accepted the input and output codes are displayed as in this example: **Rx 1318 Tx 315d** (the lower case "d" means DCS)

NOTE: The RP-176 will not accept the 26 non EIA tones if set for 38 EIA Tone operation.

176 SUPPORTED TONES/CODES...

64 CTCSS TONES:

33.0	35.4	36.6	37.9	39.6	44.4	47.5	49.2
51.2	53.0	54.9	56.8	58.8	63.0	67.0*	69.4
71.9*	74.4*	77.0*	79.7*	82.5*	85.4*	88.5*	91.5*
94.8*	97.4*	100.0*	103.5*	107.2*	110.9*	114.8*	118.8*
123.0*	127.3*	131.8*	136.5*	141.3*	146.2*	151.4*	156.7*
159.8	162.2*	165.5	167.9*	171.3	173.8*	177.3	179.9*
183.5	186.2*	189.9	192.8*	196.6	199.5	203.5*	206.5
210.7*	218.1*	225.7*	229.1	233.6*	241.8*	250.3*	254.1

Note: The bold tones annotated with a * above are the 38 EIA tone set and are the only functional tones if 38 tone operation is selected.

112 DCS CODES:

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

4.0 Warranty and Service

What is Covered

Your RP-176 is guaranteed against defects in material and workmanship for six months from date of purchase. Any failure occurring without outside help while the unit is properly installed **is covered** under warranty.

What is not covered

Failures resulting with help from the outside the unit are expressly not covered. These include but are not limited to the following:

- a) Damage occurring during shipping. Units are shipped insured.
- b) Overvoltage surge: e.g. applying incorrect voltage, power supply failure, lightning etc.
- c) Damage caused by the customer (e.g. rotating pots past their stops, attempted repairs, soldering or modifications, PC Board damage, etc).
- d) Transmitter keying (PTT) transistor (Q6) and its associated transzorb protection diode D3.
- e) Damage resulting from any act of God, Nature or War.

Notes:

1. Failures resulting from external stimuli leave a forensic trail and are easy to identify. For example; an overvoltage failure generally results in multiple component failures. Lightning damage often causes multiple semiconductor failures and sometimes physical damage to the board etc. Lightning damage shall be cause to terminate the product warranty because of overstress to all components that obviously cannot be the continuing responsibility of Idylltek, Inc.
2. The Transmitter keying (PTT) transistor (Q6) and its associated transzorb protection diode D3 are expressly not covered by the warranty. Only external electrical connections made to pin 5 of the connections jack (Tx Key) can be responsible for failure of these parts because they do not connect to any circuits internally. An accidental connection to supply voltage will most likely cause failure of the keying transistor. We made the pads and holes for these parts extra large to allow easier replacement.
3. Damage resulting from any act of God or War is expressly not covered. This includes but is not limited to: lightning damage, overvoltage surge (for any reason), moisture/water damage, insect damage etc.

This warranty is a factory warranty which means that it is the responsibility of the customer to bring it in and pick it up, or cover shipping costs if shipped.

Prior to shipping please call or email for a RMA number. The ship to address for repairs is

Idylltek, Inc.
25491 Franklin Dr.
Idyllwild, CA 92549

Phone: 951.659.6125
email: info@idylltek.com
web: www.idylltek.com

5.0 Legal

The RP-176 has been designed by professionals and is professionally manufactured using quality components. (Please keep in mind that none of these components are manufactured by Idylltek). Everyone knows that an electronic product can fail at any time. Possibly at an inopportune time. Idylltek, Inc. cannot and will not assume any responsibility or liability for damages (incidental or consequential) of any kind resulting from the use of this totally innocuous product. By choosing to use this product the customer therefore waives any and all damage claims arising out of its use. Please return for refund if this is not acceptable.