

# EDM5 Tone Panel

The EDM5 is a sheared repeater tone panel for repeater users that make use of analog (CTCSS) and digital (DCS) signaling.

The EDM5 is field programmable, allowing the technician to program the individual subscribers from a laptop computer, or by DTMF signaling from any base station. It has five-digit access code to insure only authorized personnel may re-program the unit

The EDM5 operates from a 12VDC obtained from the repeater system power supply.

Its low power consumption makes suitable for solar system applications.

## Features:

- ◆ 51 CTCSS codes.
- ◆ 106 DCS codes.
- ◆ Repeater CW ID.
- ◆ Programmable CW ID interval for station.
- ◆ Programmable CW ID per subscriber.
- ◆ Programmable CW ID interval per subscriber.
- ◆ Anti-kerchunk
- ◆ Stuck Mic. Timer.
- ◆ DCS input polarity.
- ◆ DCS output polarity.
- ◆ Hog Timer.
- ◆ Programmable courtesy tone per subscriber.
- ◆ Programmable reserve tone.
- ◆ Regeneration tone for (CTCSS, DCS and DTMF)
- ◆ Cross tone operation per subscriber.
- ◆ Remote programming via DTMF.
- ◆ Activity monitor via serial port RS232.
- ◆ Idiom Menu configuration, English / Spanish.

CTCSS					DCS										DTMF	
63.0	94.8	136.5	177.3	218.1	017	053	125	172	251	315	411	462	565	712	0	B
67.0	97.4	141.3	179.9	225.7	023	054	131	174	252	325	412	464	606	723	1	C
69.4	100.0	146.2	183.5	229.1	025	065	132	205	255	331	413	465	612	731	2	D
71.9	103.5	151.4	186.2	233.6	026	071	134	212	261	332	423	466	624	732	3	*
74.4	107.2	156.7	189.9	241.8	031	072	143	223	263	343	431	503	627	734	4	#
77.0	110.9	159.8	192.8	250.3	032	073	145	225	265	346	432	506	631	743	5	
79.7	114.8	162.2	196.6	254.1	036	074	152	226	266	351	445	516	632	754	6	
82.5	118.8	165.5	199.5		043	114	155	243	271	356	446	523	654		7	
85.4	123.0	167.9	203.5		047	115	156	244	274	364	452	526	662		8	
88.5	127.3	171.3	206.5		050	115	162	245	306	365	454	532	664		9	
91.5	131.8	173.8	210.7		051	122	165	246	311	371	455	546	703		A	

## Operation:

The EDM5 can operate as carrier squelch system or as shared repeater tone panel to encode and decode 157 different CTCSS tones and DCS codes. If a repeater user is enable, then the EDM5 key up the transmitter, passing the repeat audio and regenerate a new tone for transmission. If user is not enabled, the EDM5 will decode the user, however, the transmitter will no key.

## Front Panel LED's.

Five front panel LED's show the status of EDM5 as follow:

ON, indicates that unit is ON.

RX, indicates when unit is receiving a carrier signal.

TX, indicates when unit is keying the repeater transmitter.

ENC, indicates when unit is regenerating a CTCSS or DCS subaudible tone.

DEC, indicates when unit decodes a CTCSS tone, DCS code, or DTMF digit.

**Installation:**

Qualified service personnel should do the EDM5 installation.

For any modification, make sure that unit is OFF, to avoid any unit damage, or electrical shock.

The first step in the installation procedure is to configure the internal jumpers for you application

**JP1**, output impedance selector, 600 Ohms (soldering JP1) or 47K Ohms (no solder), refer to transmitter manufacturer manual to match impedance between audio panel output and transmitter audio Mic. Input.

**JP2**, the audio signal from repeater receiver discriminator is normally pre-emphasized, so, shorting the JP2 connector will de-emphasize the discriminator signal resulting in a flat audio response. This audio is then properly processed to be injected into a repeater transmitter.

**JP3**, COR signal selector:

a) Noise or discriminator operation, put the shorting jumper between pins 1 and 2 of JP3 and make sure to select inverted COS polarity during panel setup.

b) Voltage change COS signal, put the shorting jumper between pins 2 and 3 of JP3 and program panel according to this signal polarity during panel setup.

**JP4**, for factory use only.

**JP5**, Idiom selector, to select English for programming jumper JP5 and open it for Spanish.

**Radio connection.**

**DB15 connector**

PIN	FUNCTION
1,2	+12 Volts input
3	No connection
4	CTCSS/ DCS output
5	TX repeat audio output
6	COS input
7	PTT
8	Audio in
9,10,11,12,13,14,15	GND

**Computer programming:**

To program the EDM5 by a computer, connect an RS-232 cable from your computer's serial port to DB9 connector on the back plate of the EDM5 and configure your communication software (procomm, windows hyperterminal, etc) to 9600 baud, 8 data bit, 1 Stop bit and No parity.

Once programming setup is ready, power up the EDM5 and press the carriage return key. The EDM5 will respond with a request password (**default password = 12345**). Enter the five digit password and press carriage return key.

The main menu will appear. Complete programming instructions and assistance for programming the EDM5 are provided in the "on-line help" selection in each menu.

```

*****
*   Shared Repeater Tone Panel EDM-5   *
*           Main Menu           V2.0   *
*****
A) User Menu
B) Global User Menu
C) System Parameters A
D) System Parameters B
E) Level Adjustments
O) Help
S) Quit...Terminate Programming Session

```

User menu, This menu is used for setting up parameters of each individual CTCSS or DCS repeater user. All CTCSS tones and DCS codes programmed in the tone panel can be associated with a user group on the repeater. The CTCSS tones and DCS codes are referred to as USERS.

Global user menu, This menu will set the operational parameters of all CTCSS and DCS repeater users on a global basis. It is used normally only during initial setup to enable or disable parameters for all users. For example, if you wish the Busy Channel Lockout feature.

System parameters A/B, These menus set the primary operational characteristics and features of the repeater system. All of these parameters operate on a global basis, and will affect all repeater users.

Level adjustments, This menu is used for repeater set up like transmit audio deviation and other level settings.

Quit, This menu item will exit the programming mode, and return the panel to normal repeater operation.

```
*****
*      User Menu      *
*****
A) Select User .....254.1
B) User Status .....off
C) Reserve Tone .....Off
D) Busy Channel Lockout .....On
E) Hold TX Encode Tone .....On
F) Courtesy Tone .....Off
G) Air Time Hog Penalty .....Off
H) TX Carrier Hold Time .....3.0 seconds
I) Cross Tone/DCS Code .....
J) User CW Callsign .....
K) View CTCSS User Table
L) View DCS User Table
M) View Active Users Table
O) On-line Help
S) Quit...Return to Main Menu
```

Select user. Use this menu for displaying the parameters of a specific user. Enter a CTCSS tone or DCS code. If you are not sure about the correct tone or code to enter, view the user tables for a listing of all valid tones and codes.

User status. This identifies the status of a user as ON or OFF. If a user is ON, the user will have access to the repeater and the repeater TX will key. If the user is OFF the user will be denied access to the repeater. All users on your repeater must be set to the ON condition.

Reserve Tone. A user set for reserve tone status will key the repeater, but repeat audio will not be passed. A beep tone is generated when user try to access the system. A user set for reserve tone must also have the user status set to ON.

Busy Channel Lockout. Once the repeater is in use by one of the users, any other repeater users, on a different tone, will be locked out from accessing the repeater as long as the repeater is transmitting.

Hold TX Encode Tone. If this feature is ON, the transmitted tone will continue until the repeater stops transmitting. If this feature is OFF, the repeater encode tone will drop as soon as the user stops transmitting.

Courtesy Tone. This feature generates a BEEP tone after a user stop transmitting.

Hog Penalty. The Hog Penalty feature limits the amount of continuous time a user may use the repeater.

TX Carrier Hold Time. After a repeater user unkeys, the repeater will continue to transmit for this programmed time.

Cross Tone/DCS Code. This is the CTCSS tone or DCS code that is generated by the repeater for a particular user. If no entry is entered, the tone or code generated by the repeater is the same as the decoded tone or code.

User CW Callsign. A morse code callsign may be generated for each user on the repeater. The callsign is transmitted after the end of the users first transmission. Up to 8 characters may be entered for the callsign.

View User Tables. These items allow you to view the status of all tones and codes programmed in the tone panel. Press any key to stop the listing at any time.

```
*****
*   Global User Menu   *
*****
A) User Status
B) Reserve Tone
C) Busy Channel Lockout
D) Hold TX Encode Tone
E) Courtesy Tone
F) Air Time Hog Penalty
G) Global TX Carrier Hold Time
H) View CTCSS User Table
I) View DCS User Table
J) Initialize User Memory
O) On-line Help
S) Quit...Return to Main Menu
```

See the User Menu for details on most of these menu items.

Initialize User Memory. This menu item will re-program the entire user memory to the factory default. Any data that you have programmed will be lost. The tone panel comes from the factory in this condition

```
*****
*   System Parameters A   *
*****
A) Transmit Time-Out-Timer .....0180 seconds
B) Change Password .....12345
C) System CW Station ID .....
D) System CW ID Interval .....0900 seconds
E) User CW ID Interval .....0180 seconds
F) Program Signon Message ..... MENSAJE DE ENTRADA
G) Anti-Kerchunk Time .....0.0 seconds
H) Hog Time Limit .....0300 seconds
I) Hog Idle Time .....0010 seconds
J) Hog Penalty Time .....0300 seconds
O) On-line Help
S) Quit...Return to Main Menu
```

Transmit Time Out Timer. Once the repeater is keyed up by a user, it will automatically unkey if a users signal remains on the repeater channel for a duration that exceeds the time programmed in this timer. Warning beeps are generated 20 seconds prior to a user transmit time out.

Change Password. To change password, enter the 5 digit numbers DO NOT LOOSE THE PASSWORD to access to the repeater panel programming will be impossible.

System CW Station ID. This option allows you to program up to 8 characters that can be used for a main system station ID. Up The callsign is transmitted at 25 WPM in Morse code

System CW ID Interval This interval determines how often the repeater will generate a Morse station ID for the system. The ID is only sent if the time interval has expired, and the repeater transmitter is active.

User CW ID Interval. This interval determines how often the repeater will generate a Morse ID for an individual user. The ID is only sent when a user is active on the repeater, and if the time interval has expired.

Signon Message. When the tone panel requests the programming access password, a signon message is displayed at the top of the screen. This message is used to identify the repeater station by a name, frequency or other criteria.

Anti-Kerchunk Time. If a mobile keys for a duration that is shorter than the programmed anti-kerchunk time, the repeater transmitter will not stay keyed for the duration of the users TX Carrier Delay Time, but will unkey immediately.

Hog Time Limit. This is the maximum time allowed for a single user to tie up the repeater in a single communication exchange. Warning beeps are generated 20 seconds prior to a hog time out.

Hog Idle Time. This is the amount of time required for a user to be inactive on the repeater before the Hog Time Limit is reset.

Hog Penalty Time. If a user exceeds the Hog Time Limit, the user will be placed in the Reserve Tone mode for the duration of the time programmed in the Hog Penalty Timer.

```
*****
*   System Parameters B   *
*****
A) Real-Time Display .....On
B) COS Signal Polarity .....Inverted
C) DCS Encode Polarity .....Normal
D) DCS Decode Polarity .....Normal
E) Stuck Mic Identification ....Off
F) User DTMF Regeneration .....Off
G) Carrier Only Operation .....Off
H) Load Default Parameters
O) On-line Help
S) Quit...Return to Main Menu
```

Real-Time Display. The Real Time Display will show decoded CTCSS tones, DCS codes and DTMF tones on the computer serial port as they are decoded by the repeater panel.

COS Polarity. This item sets the logic level that indicates a receive carrier is present. Normally, a high level voltage indicates a carrier is present, while a low level voltage, or ground indicates no signal is present. Set this item so that the carrier LED light up when a carrier signal is present at the receiver.

DCS Encode/Decode Polarity. This item will invert the data polarity of the encoded and decoded DCS signal. The DCS data polarity is normally determined by trial and error in your repeater system.

Stuck MIC ID. If a users transmission exceeds the duration of the TX Time Out Timer, this feature will transmit the users CTCSS or DCS code using DTMF just before the transmitter unkeys.

User DTMF Regeneration. DTMF characters transmitted by users that are received, can be regenerated to provide a lower distortion during re-transmission.

Carrier Only Operation. This feature allows the repeater to operate as a conventional repeater. Only carrier is required to access and use the repeater.

Load Default Parameters. This item will reset all System Parameters to the factory default values. Any parameters that you have programmed will be lost. Like COS polarity, ENC/DEC polarity, etc. Use these as a reference.

```
*****
*   Level Adjustments   *
*****
A) Key Transmitter
B) Unkey Transmitter
C) Set RX Input Gain Level [R14]
D) Set TX Voice Modulation [R53]
E) Set DTMF Encode Modulation [R58]
F) Set CTCSS Tone Modulation [R54]
G) Test DTMF decoder
O) On-line Help
S) Quit...Return to Main Menu
```

Key Transmitter. This will close the PTT to key up Transmitter

Unkey Transmitter. This item will unkey the transmitter.

Set RX input Gain. This item is used for setting the proper RX signal level to the repeater panel. Set a service monitor to generate a full quieting signal on the repeater input frequency. Then modulate the carrier with a CTCSS tone of 100.0 Hz, and a deviation level of only 100 Hz. Now adjust R4 until the DEC LED light up on the front panel.

Always set this adjustment first.

Set TX Voice MOD. This will key the transmitter, and open the RX to TX audio path. Generate a modulated signal on the repeater input with the appropriate deviation, and then monitor the TX output channel with a deviation scope, adjust R53 for the proper deviation for your system.

Always set this adjustment after the RX Input Gain.

Set DTMF Encode MOD. This will key the transmitter, and generate a DTMF digit on the TX output channel. Monitor the TX output channel with a deviation scope and adjust R58 for the maximum undistorted deviation level for your system. Always set this adjustment after the TX Voice Mod.

Set CTCSS MOD. This will key the transmitter, and generates a CTCSS or DCS code on the TX output channel. First, enter the code you wish to generate, then monitor the TX output channel with a deviation scope and adjust R54 to get a subaudible deviation level of 500 Hz to 1000 Hz for 25khz bandwidth radios. Refer to manufacturing radio manual for proper adjust

Test DTMF Decoder. This item will display DTMF digits as they are received on the repeater input channel.

### **DTMF Programming**

The first step in programming the EDM5 is to enter the programming access code by DTMF signaling on the repeater input channel. To enter the programming mode, transmit the five digits access code followed by the "#" key on the repeater channel using a mobile or hand held radio with DTMF key pad. Please note that the Default Access Code is 12345.

As soon as the proper code is received, the EDM5 will key up and transmit a double beep. Signal received by the EDM5 will not be repeated while in the programming mode.

When you have finished programming, revert the EDM5 back to normal repeater operation by pressing the "#" key, and hold it down for at least 20 seconds or use the "20#" command to exit. If the EDM5 is left in the programming mode with no activity for 5 minutes, the EDM5 will automatically revert back to normal repeater operation.

### **DTMF Command for 2.00 or later software version**

Command	Function	Default
10#	User enable/disable	OFF
11#	User enable/disable Reserve Tone	OFF
12#	User enable/disable Busy channel lockout	ON
13#	User enable/disable Hold TX encode tone	ON
14#	User enable/disable Courtesy Tone	OFF
15#	User enable/disable Hog penalty	OFF
16#	User TX Carrier delay time	3.0 sec
17#	Cross Tone Encode	NO
18#	User station ID	NO
20#	Exit	
21#	COR Type 0/1 normal / inverted	Inverted
22#	Encoder Polarity 0/1 normal / inverted	Normal
23#	Decoder Polarity 0/1 normal / inverted	Normal
24# 0#	Memory Initialization ( Erase Memory )	
24# 1#	Data backup, crete memory image	
24# 2#	Restore Data (recovers Data and configuration)	
26#	Operation Mode 0/1 Tone Panel / Carrier	Tone Panel

Program Codes 10 thru 15 use the following format:

DD# + UUUU# + A#

Where:

- ◆ DD is the DTMF command (see table).
- ◆ UUUU User CTCSS/DCS code.
- ◆ A = 1 enable A=0 disable.

Example:

To enable a CTCSS User 131.8 transmit the following DTMF tones:

10# 131\*8# 1#

To disable a DCS User 025 transmit the following DTMF tones:

10# 025# 0#

Programming Code 16# User Transmit Carrier Delay Time.

This delay is the amount of time that the repeater transmitter will stay on the air after the input carrier disappears. Range is from 0.0 to 9.9 seconds in 0.1 seconds steps.  
 Example to set the TX delay for user 131.8 to 5.0 seconds, transmit the following DTMF tones.  
 16# 131\*8# 5\*0 #

Programming Code 17# User Cross Tone Encode.

This command allows to the EDM5 to regenerate a different CTCSS/DCS than the one currently being received on the input channel of the repeater.  
 A user cross tone is programmed is programmed by entering the programming code 17#, followed by the CTCSS/DCS tone followed by the "#" key, and then the CTCSS/DCS tone to encode. Terminate with the "#" key.  
 Example to set User 131.8 (RX) for a cross tone of 203.5, transmit the following DTMF tones:  
 17# 131\*8# 203\*5# #

Programming Code 18# User Station ID.

This command programs in the Morse code station call sign for a user. A maximum of 8 characters may be programmed. The call sign is sent at 25 word per minute after the end of a user first transmission, and again at the user station ID programmed interval  
 At the completion of the call sign entry, fill up the remaining locations with "00#"  
 Use the following conversion table to get your call sign.

**Conversion Table**

Character	Number	Character	Number	Character	Number
0	48	C	67	O	79
1	49	D	68	P	80
2	50	E	69	Q	81
3	51	F	70	R	82
4	52	G	71	S	83
5	53	H	72	T	84
6	54	I	73	U	85
7	55	J	74	V	86
8	56	K	75	W	87
9	57	L	76	X	88
A	65	M	77	Y	89
B	66	N	78	Z	90

Example: program the XE1ABC call sign for user 131.8

Command User C1 C2 C3 C4 C5 C6 C7 C8 C1 C2 C3 C4 C5 C6 C7 C8  
 18# 131\*8# 00# 00# 88# 69# 49# 65# 66# 67# or 88# 69# 49# 65# 66# 67# 00# 00#  
 X E 1 A B C X E 1 A B C

To clear out the call sign for user 131.8, enter the following sequence:

Command User C1 C2 C3 C4 C5 C6 C7 C8  
 18# 131\*8# 00# 00# 00# 00# 00# 00# 00# 00#

Programming Code 21# COR type selection.

COR normal 21# 0#  
 COR inverted 21# 1#

Programming Code 22# Encoder Polarity.

Use this command to program the encoder polarity for Digital tones (see your system configuration notes)  
 DSC Tone TX normal 22# 0#  
 DSC Tone TX inverted 22# 1#

Programming Code 23# Decoder Polarity.

Use this command to program the Dencoder polarity for Digital tones (see your system configuration notes)

Tono DSC RX normal 23# 0#

Tono DSC RX invertido 23# 1#

Programming Code 24# 0# Memory Initialization. This menu item will re-program the entire user memory to the factory default. Any data that you have programmed will be lost.

While in programming mode send the following DTMF comand 24# 0#, and wait for about 30 sec for the OK confirmation (doble beep). After this you will have to do all set up againg manually (COR, Encoder, Decoder polarity, etc)

Programming Code 24# 1# Data Memory Bacup. this comand creates a memory backup (Data and configuration), it takes about 30 seconds and at the end send a double beep as OK confirmation.

Programming Code 24# 2# Restore Memory Data. this command is used to recover remotly the whole data in memory in case of any disaster or data corruption. It takes about 30 seconds and at the end send a double beep as OK confirmation.

**NOTE:** it is higly recommended that you make a memory backup every time that you make any change to your repeater system ( enable/disable users, ID, etc) otherwise you will be able to recover the data stored in you last backup only

Programming Code 26# Carrier Operation Mode. this command allows your repeter system to operate as Tone panel or carrier squelch.

Tone Panel 26# 0#

Carrier Squelch 26# 1#

**NOTE:** this remotly programming commands are available just for Version 2.00 or later, you can see your EDM5 software version when you are in programming menu via RS232

```
*****
*   Shared Repeater Tone Panel EDM-5   *
*           Main Menu           V2.0   *
*****
A) User Menu
B) Global User Menu
C) System Parameters A
D) System Parameters B
E) Level Adjustments
O) Help
S) Quit...Terminate Programming Session
```