



Operators Guide

MTP136D-000GN

Mission Transceiver Panel Mount (P25)



Operators Guide

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Anodyne Electronics Manufacturing Corp.
966 Crowley Ave Unit #100
Kelowna, BC, Canada.
V1Y 0L1

Telephone: +1-250-763-1088
Toll Free: +1-888-763-1088

Website: www.aem-corp.com

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Section 1.0 Description

1.1 Introduction

This document provides basic operating instructions for the MTP136D-000GN P25 Phase 1 Conventional Mission Transceiver Panel, herein subsequently referred to as the MTP136D.

The MTP136D is highly configurable with a large set of options for both the Operator and the Administrator. Many of these options are outside the scope of this guide. For advanced configuration and operation see AEM's website, www.aem-corp.com, or contact AEM Technical Support at support@aem-corp.com.

This guide supports firmware version 1.01.

1.2 Description

The MTP136D is a stand-alone APCO P25 compatible VHF FM transceiver that is equipped with a main and guard radio. The MTP136D is capable of semi-duplex communication and features three operating modes: narrowband analog, wideband analog, and digital P25 Phase I.

The MTP136D transmit and receive frequency range is the 136 – 174 MHz VHF band with high (10W) or low (1W) transmit output power selectable from the front panel interface.

Continuous Tone Code Squelch System (CTCSS) and Continuous Digital Coded Squelch System (CDCSS) encoding/decoding are selectable in analog mode. Network Access Codes (NAC) and Talk Group IDs (TGID) are available in P25 digital mode.

The MTP136D is compliant to applicable equipment performance standards TIA-603-E, TIA-102 and DO-160G environmental standards.



Figure 1: MTP136D-000GN

1.3 General Statements

1.3.1 Warnings

WARNING
High volume settings can cause hearing damage. Set the headset volume control to the minimum volume setting prior to conducting tests, and slowly increase the headset volume to a comfortable listening level.

1.3.2 Controlling Your Exposure to RF Energy

RF is a form of electromagnetic energy (as is sunlight), and there are recommended levels of maximum RF exposure. To control your exposure to RF and comply with the maximum exposure limits for occupational/controlled environments, follow these guidelines:

1. Do not talk (transmit) on the radio more than the rated transmit duty cycle. This is important because the radio radiates more energy when it is transmitting than when it is receiving.
2. While you are transmitting (talking or sending data) on the radio, you must ensure that there is always a distance of 45.3 inches (1.15 m) between people and the antenna. This is the minimum safe distance.
3. Use the radio only with approved antennas and attachments and make only authorized modifications to the antenna otherwise you could damage the radio and violate FCC regulations.

For more information on what RF energy is and how to control your exposure to it, visit the FCC website at www.fcc.gov/oet/rfsafety/rf-faqs.html.

1.3.3 Regulatory and Compliance Statements

Reference the MTP136D Installation Manual for additional ISED and FCC regulatory and compliance statements.

1.3.4 Warranty

Please refer to the standard product warranty conditions available on our website, www.aem-corp.com.

1.4 Limitations

Front Panel USB is for maintenance activities only and is not intended for use during flight. USB port door is to be closed.

1.5 Part Number Nomenclature

The product part number is defined as follows:

M	T	P	1	3	6	D	-	0	0	0	G	N
1			2			3		4	5	6	7	

Item	Name	Description
1	Product Family	MTP: Mission Transceiver Panel Mount
2	Start Frequency (in MHz)	136: 136 MHz 138: 138 MHz
3	Feature Character	D: Digital capable Blank: Analog only
4	Major Derivative Identifier [0-9]	0: Base product
5	Minor Derivative Identifier [0-99]	00: Base product (P25 phase 1 conventional main and guard)
6	Feature Character	G: Guard receiver installed Blank: No guard
7	Feature Character	N: NVIS compliant lighting Blank: Non-NVIS lighting

Table 1 :Unit Nomenclature

End of Section 1.0 Description

Section 2.0 Operation

2.1 Introduction

The MTP136D is controlled using the front panel mounted keypad, knobs, and switches. The display is navigated using the front panel controls to select from menus.

2.2 Front Panel



Figure 2: Front Panel

Item	Name	Description
1	Main Volume Knob (MAIN VOL)	Adjusts the volume of the main radio. Detent turns the MTP136D OFF.
2	Monitor (MON)	Bypasses Squelch Threshold and Channel Signaling allowing all transmissions to be heard.
3	Channel Recall (RCL)	Returns to the previous channel.
4	Radio Select (MAIN GUARD)	Changes the Focused Radio.
5	Transmit Power (HI LO)	Changes transmit power.
6	Guard Volume Knob (GUARD VOL)	Adjusts the volume of the guard radio.
7	Rotary Selector (PUSH ENTER)	Changes channel, navigates, and modifies options.
8	Keypad and MENU	Shows/hides the Menu. Changes channel, navigates, and modifies options.
9	Data Port (DATA)	USB Type-C port used for Profile Import/Export, Error Log Export, and Firmware Updates.

Table 2: Front Panel Controls

2.3 J1 System Interface Connector

See the Installation Manual for more information.

Input	Functionality
PANEL LIGHTING	Panel and display dimming.
CHAN/SELECT +	Equivalent to rotary selector clockwise. Changes channel, navigates, and modifies options. Commonly installed on the airframe's cyclic stick
CHAN/SELECT -	Equivalent to rotary selector counterclockwise. Changes channel, navigates, and modifies options. Commonly installed on the airframe's cyclic stick.
MIC KEY IN	PTT (Push To Talk).

Table 3: System Interface Connector Inputs

2.4 Power On

To power on, rotate MAIN VOL clockwise past the detent. The display will briefly show a splash screen including the AEM logo, the firmware version, and the model number. Once initialization is complete, the display will show the Home Screen.

2.5 Home Screen

The Home Screen shows each radio's indicators, Active Channel, and Active Zone. One radio is Focused (expanded) while all others are Unfocused (collapsed).

All navigation within this guide begins from the Home Screen.



Figure 3: Main Radio Focused

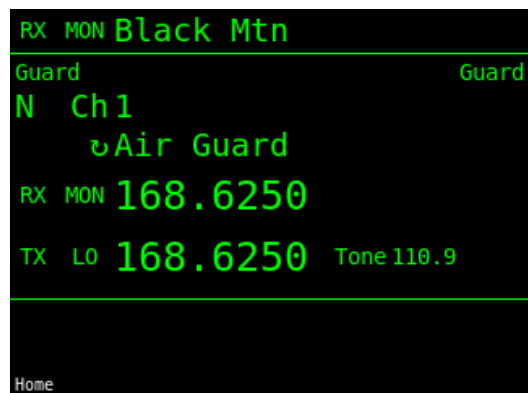


Figure 4: Guard Radio Focused

2.5.1 Focused Radio

Transmit, receive, and channel changes occur on the Focused Radio.

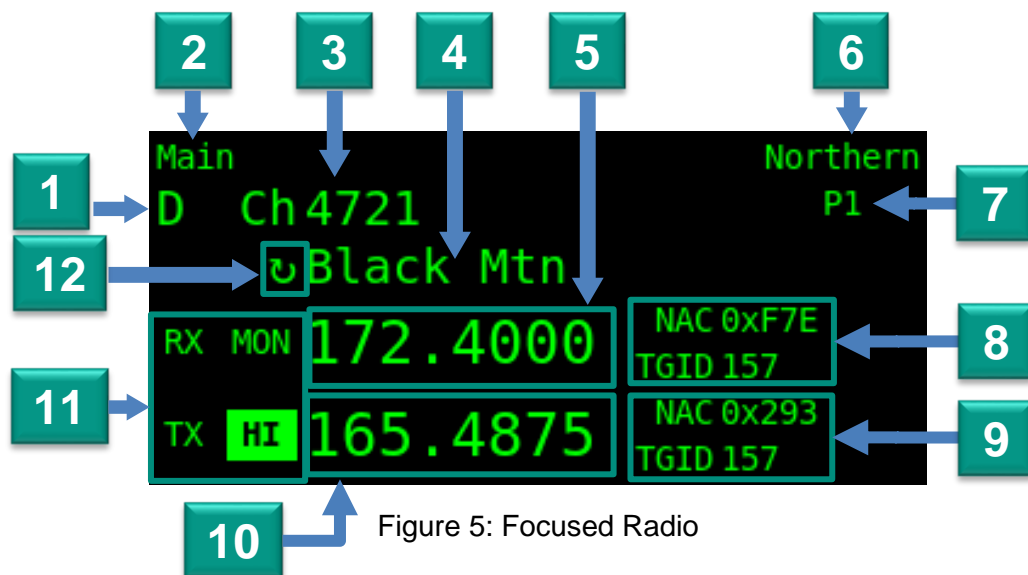


Figure 5: Focused Radio

Item	Description
1	Channel modulation. N: Narrowband Analog, 12.5kHz bandwidth. W: Wideband Analog, 25kHz bandwidth. Requires Wideband Key installed. D: P25 Phase 1 Digital.
2	Radio name.
3	Channel number.
4	Channel name.
5	Receive frequency.
6	Zone name.
7	Scan priority enrolment. Configured per zone. Scanned under P, L+P, and Z+P scan algorithms.
8	Receive Channel Signaling. CTCSS, CDCSS, NAC, or TGID.
9	Transmit Channel Signaling. CTCSS, CDCSS, NAC, or TGID
10	Transmit frequency.
11	Indicators.
12	Scan list enrolment. Scanned under L and L+P scan algorithms.

Table 4: Focused Radio Elements

2.5.2 Unfocused Radio

Unfocused radios can receive but cannot transmit.

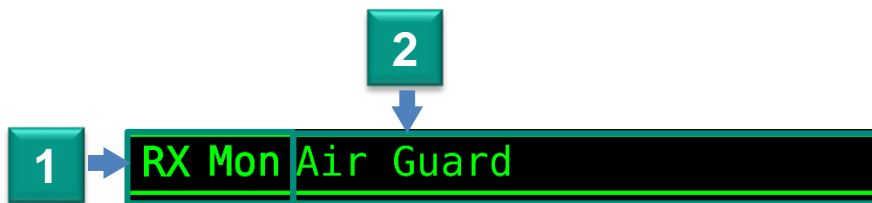


Figure 6: Unfocused Radio

Item	Description
1	Indicators.
2	Channel name.

Table 5: Unfocused Radio Elements

2.5.3 Indicators

Indicators show the receive and transmit status of each radio.

Inactive	Active	Description
RX	RX	Activates when a carrier is detected on the receive frequency.
Mon	Mon	Activates when Squelch Threshold and Channel Signaling has been met allowing audio to be delivered to the headset.
TX	TX	Activates when transmitting.
Lo	Hi	Activates when transmit power is set to High.

Table 6: Home Screen Indicators

2.5.4 Simplex

When TX channel options match the RX channel options, the TX options may be hidden by Auto Simplex (Figure 7). This can be changed on the User Options Screen.

1. MENU> More > Options
2. Choose Auto Simplex
 - On: TX information hidden when same as RX.
 - Off: TX information always shown.



Figure 7: Auto Simplex Hiding TX Options

2.6 Menu

The menu provides access to navigation and common actions. It can be opened at any time by pressing the MENU button. When open, it is overlaid on the right side of the display. The content depends on the options and screens available to the current screen.

An action is triggered by pressing the associated number on the keypad.

Some actions have consistent numbering across all screens such as Bright (0), Save (7), Back (7), and Cancel (8).

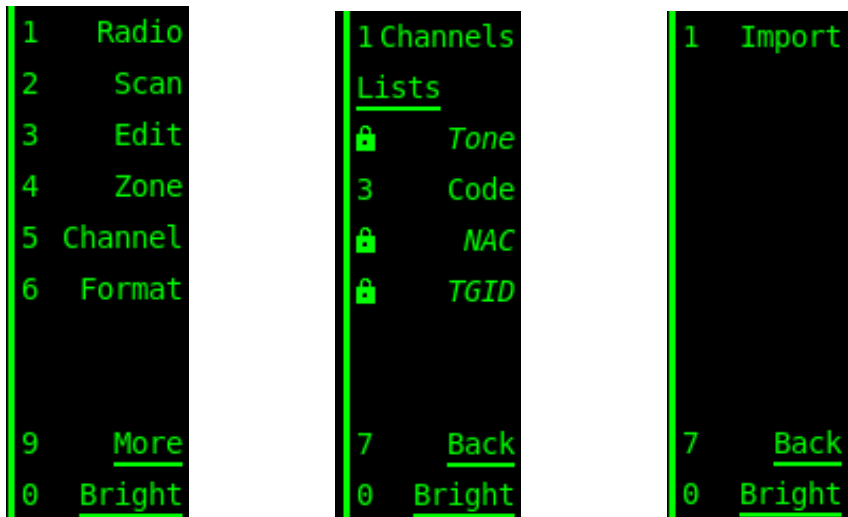


Figure 8: Example Menus

2.7 Active Channel

Radios use one channel at a time known as the Active Channel. The Active Channel dictates receive and transmit behavior of the radio. The Active Channel on the Focused Radio can be changed on the Home Screen by turning the rotary selector or by entering a number using the keypad.

2.8 Active Zone

Radios use one zone at a time known as the Active Zone. The Active Zone dictates available channels to the radio and modifies behavior according to the contained options (priority scan channels, active signal lists, and permissions). The Active Zone can be changed on the Home Screen.

1. MENU > Zone.
2. Choose a zone.

Changing the Active Zone may be locked by an Administrator on a per-radio basis.

2.9 Transmit

Transmit will begin on the Active Channel of the Focused Radio when PTT is active. Receive is not possible when transmitting. Transmit can occur with two power levels, Low (1W) and High (10W), and can be changed using the HI/LO button.

Transmit may timeout after a period defined by an Administrator. This is indicated by an exclamation mark on the transmit indicator (TX!) and can be cleared by re-transmitting.

2.10 Transmit DTMF Tones

DTMF tones can only be sent while transmitting on an Analog channel. 0-9 is sent from the keypad and A-D, *, # from the Menu (Figure 9).

Transmitting DTMF tones may be disabled by an Administrator.

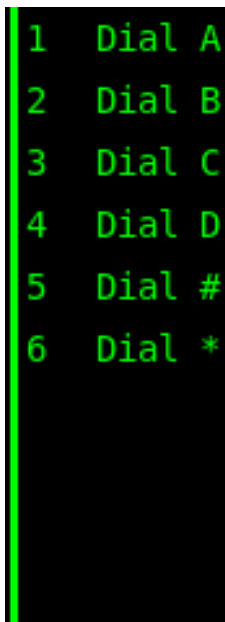


Figure 9: DTMF Tone Menu

2.11 Channel Signaling Display Format

The numerical display format for Tones (CTCSS), NAC, and TGID Channel Signaling can be changed using the Format Menu. This menu will only show the format options for Channel Signaling currently visible on screen. The Format Menu is accessible on the Home Screen.

1. MENU > Format.

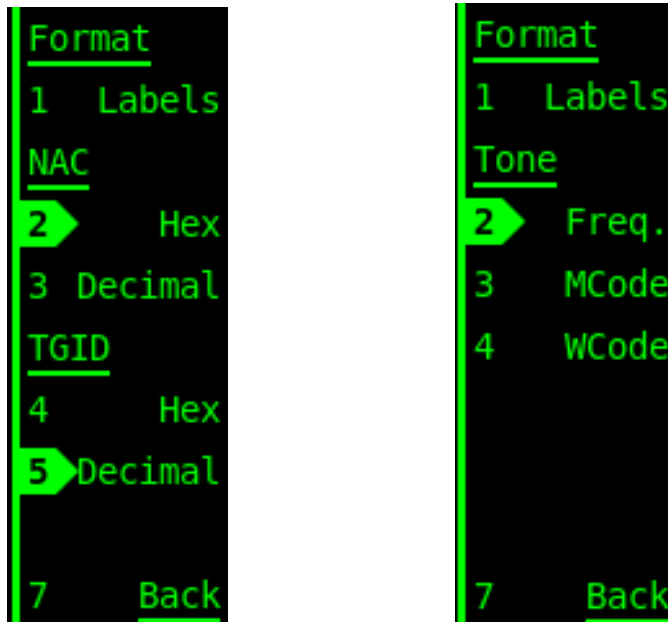


Figure 10: Example Format Menus

2.12 Display Brightness

The display brightness can be changed on the Brightness Screen accessible from most screens.

1. MENU > Bright.

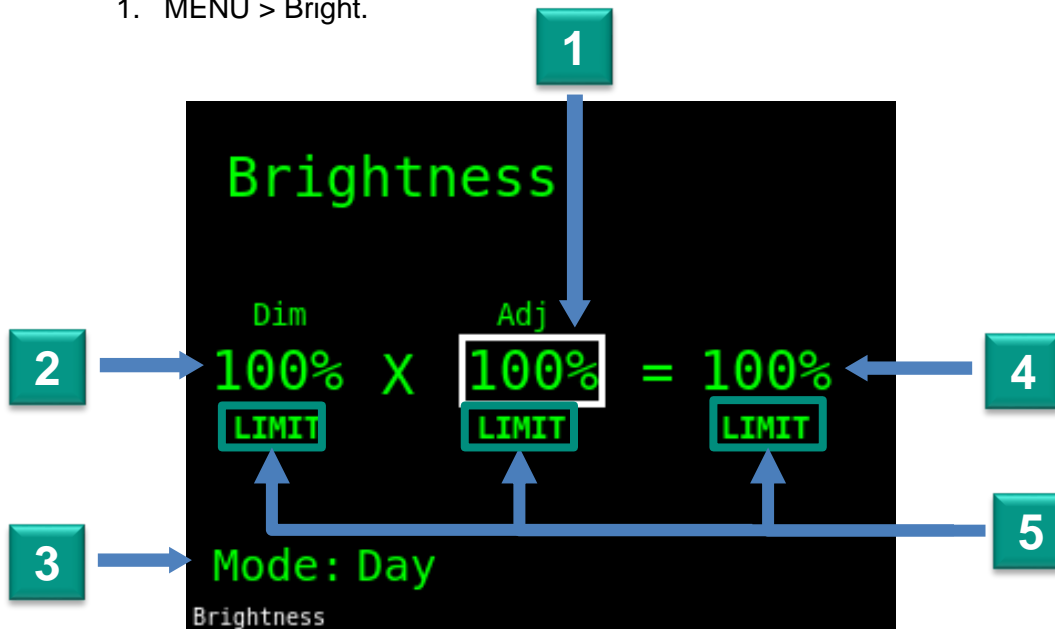


Figure 11: Brightness Screen

Item	Description
1	Brightness adjustment (User input).
2	Dimming Bus (Panel Lighting input voltage).
3	Lighting mode. Day or Night depending on the Dimming Bus (Panel Lighting input voltage). See the Installation Manual for transition voltage ranges.
4	Combined display brightness.
5	Limit. Displayed when a value has reached it's minimum or maximum value.

Table 7: Brightness Screen Elements

2.13 Microphone Sidetone Volume

Microphone sidetone volume can be changed on the Radio Options Screen.

1. MENU > Radio.
2. Scroll to Audio section.
3. Choose Sidetone Vol.

2.14 DTMF Sidetone Volume

DTMF sidetone volume can be changed independently of the microphone sidetone volume on the Radio Options Screen.

1. MENU > Radio.
2. Scroll to Audio section.
3. Choose DTMF Sidetone Vol.

2.15 Squelch Threshold

Squelch threshold defines the required signal strength above noise to break squelch. Can be changed per radio on the Radio Options Screen.

1. MENU > Radio.
2. Scroll to desired radio section (Main or Guard).
3. Choose Sq. Threshold.
 - Low: Low strength signals will break squelch. Recommended when operating across large distances, or where RF activity is minimal.
 - Medium: Medium strength signals will break squelch. Recommended setting for urban and semi-urban environments where moderate RF activity is expected.
 - High: High strength signals are required to break squelch. Recommended in environments where high RF activity is expected.

2.16 Digital Monitor

Digital monitor defines the monitor behavior on all digital channels. It can be changed on the User Options Screen.

1. MENU > More > Options.
2. Choose Digital Monitor.
 - All: Monitors all NACs and TGIDs.
 - TGID: Monitors all NACs within the current TGID. Indicated on Home Screen by overlaying current NAC with 0xF7E (All) while monitoring.

2.17 Scanning

Scanning can be started and stopped from the Home Screen.

1. MENU > Scan.

The order of scanned channels is determined by the selected scan algorithm (Table 8) which can be changed by turning the rotary selector while scanning.

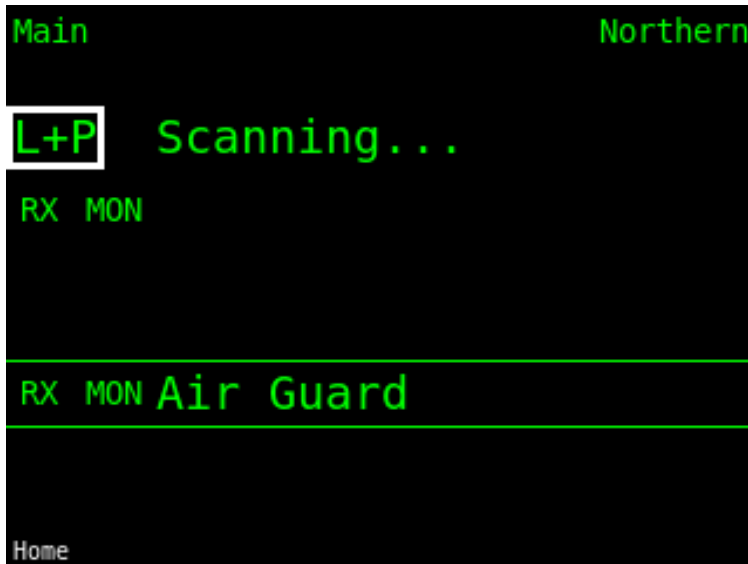


Figure 12: Scanning on the Home Screen

Algorithm	Description	Example
List L	Scans all channels in a zone in numerical order that have Channel Scan (☺) enabled.	Home, 1, 2, 3, Home, 1, 2, ...
Priority P	Scans zone P1, zone P2, and Home in order of priority. When locked, the scanner will periodically check higher priority channels for transmissions.	P1, P2, Home, P1, P2, Home, P1, ...
List + Priority L+P	A combination of List and Priority algorithms where a single, incrementing, list channel is scanned after all Priority algorithm channels are scanned.	P1, P2, Home, 1 , P1, P2, Home, 2 , P1, P2, ...
Zone Z	Scans all channels in the Active Zone.	1, 2, 3, 4, 1, 2, ...
Zone + Priority Z+P	A combination of Zone and Priority algorithms where a single, incrementing zone channel is scanned after all Priority Algorithm channels are scanned.	P1, P2, Home, 1 , P1, P2, Home, 2 , P1, P2, ...

Table 8: Scan Algorithms

2.18 Profiles

Options and lists are stored in a JSON file (.json) called a Profile. Only one Profile is stored and used at a time.

2.18.1 Create a Profile

Profiles can be created using the AEM Radio Profile Editor found on AEM's website: www.aem-corp.com.

2.18.2 Import a Profile

Profiles can be imported from a USB drive connected to the DATA port on the Import Screen.

1. Load a Profile with the name *MTP136D.json* onto the root directory of a USB drive.
2. MENU > More > Import.
3. Connect the USB drive to the DATA port.
4. MENU > Import.
5. Wait until a result is displayed. This may take a few minutes.

If the Profile is invalid, a file named *MTP136D_ImportLog.json* will be created on the USB drive explaining all issues. It can be opened using any text editor. Resolve all issues and reattempt from step 1.

2.18.3 Export a Profile

Profiles can be exported to a USB drive connected to the DATA port on the Export Screen. All exported profiles have the same name, *MTP136D.json*, and will be overwritten if it already exists on the drive.

1. MENU > More > Export.
2. Connect a USB drive to the DATA port.
3. MENU > Export.
4. Wait until a result is displayed. This may take a few minutes.

If the export fails, try again, or try a different drive.

2.19 Wideband Operation (Key Required)

To comply with FCC CFR Part 90.203, transmission of wideband channels (25 kHz) is disabled by default.

To enable this feature contact AEM Technical Support at support@aem-corp.com with the serial number of the unit to acquire a Wideband Key. Key installation steps can be found in the Installation Manual. It is the responsibility of the installer or operator to determine if they meet the regulatory exceptions to operate with this feature enabled.

2.20 Agile Operation (Key Required)

To comply with FCC CFR Part 90.203 and ISED RSS 119, modification of zones, channels, and signal lists from the front panel is disabled by default.

To enable this feature contact AEM Technical Support at support@aem-corp.com with the serial number of the unit to acquire an Agile Edit Key. Key installation steps can be found in the Installation Manual. It is the responsibility of the installer or operator to determine if they meet the regulatory exceptions to operate with this feature enabled.

2.20.1 Edit the Active Channel

The Active Channel of the Focused Radio can be edited without leaving the Home Screen.

1. MENU > Edit.
 - All: Choose which channel option to edit.
 - Name: Edit channel name.
 - Freq: Edit channel frequency.
 - NAC: Edit channel NAC.
 - TGID: Edit channel TGID.
 - Tone: Edit channel tone.
 - Code: Edit channel code.

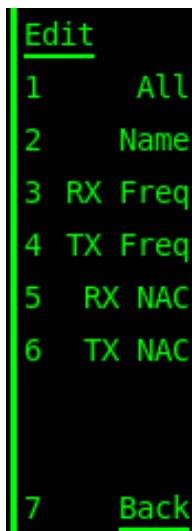


Figure 13: Edit Menu

2.20.2 Edit a Zone

Zones can be edited on the Zone Edit Screen.

1. MENU > More > Lists > Zone.
2. Choose a zone.
3. Choose an option.

2.20.3 Add a Channel to a Zone

Channels can be added on the Channel Select Screen.

1. MENU > More > Lists > Zone.
2. Choose a zone.
3. MENU > Channels.
4. MENU > Insert.
5. Choose the destination.

2.20.4 Edit a Channel in a Zone

Channels can be edited on the Channel Edit Screen.

1. MENU > More > Lists > Zone.
2. Choose a zone.
3. MENU > Channels.
4. Choose a channel.
5. Choose an option.

2.20.5 Edit a Signal List

Signal lists can be edited on the Tone, Code, NAC, or TGID List Edit Screen.

1. MENU > More > Lists > Tone, Code, NAC or TGID.
2. Choose a signal list.
3. Choose an option.

2.20.6 Edit a Signal in a Signal List

Signals can be edited on the Tone, Code, NAC, or TGID Edit Screen.

1. MENU > More > Lists > Tone, Code, NAC or TGID.
2. Choose a signal list.
3. MENU > Tones, Codes, NACs or TGIDs.
4. Choose a signal.
5. Choose an option.

2.20.7 Edit with Auto Simplex

When TX channel options match the RX channel options any changes to RX options will be also applied to the TX options. This is indicated by a bar on the Home Screen while editing the Active Channel (Figure 14). Modifying any of the TX options unlinks the RX and TX options. This can be changed on the User Options Screen.

1. MENU > More > Options
2. Choose Auto Simplex
 - On: Changes to RX options applies to TX options when they are the same.
 - Off: Changes to RX options do not modify TX options.

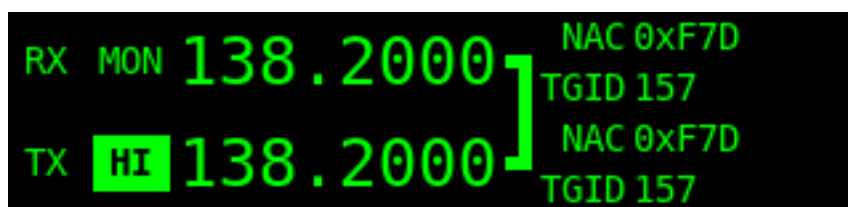


Figure 14: Auto Simplex Link Bar

2.21 Supported Channel Signaling (CTCSS, CDCSS, NAC, TGID)

FREQ	MCODE	WCODE	FREQ	MCODE	WCODE	FREQ	MCODE	WCODE
67.0	XZ	1	118.8	2B	21	183.5	N/A ²	56
69.3	WZ	51	123.0	3Z	22	186.2	7Z	36
71.9	XA	2	127.3	3A	23	189.9	N/A ²	57
74.4	WA	3	131.8	3B	24	192.8	7A	37
77.0	XB	4	136.5	4Z	25	196.6	N/A ²	58
79.7	WB ¹	5	141.3	4A	26	199.5	N/A ²	61
82.5	YZ	6	146.2	4B	27	203.5	M1	38
85.4	YA	7	151.4	5Z	28	206.5	8Z	62
88.5	YB	8	156.7	5A	31	210.7	M2	41
91.5	ZZ	11	159.8	N/A ²	52	218.1	M3	42
94.8	ZA	12	162.2	5B	32	225.7	M4	43
97.4	ZB	13	165.5	N/A ²	53	229.1	9Z	47
100.0	1Z	14	167.9	6Z	33	233.6	M5	44
103.5	1A	15	171.3	N/A ²	54	241.8	M6	45
107.2	1B	16	173.8	6A	34	250.3	M7	46
110.9	2Z	17	177.3	N/A ²	55	254.1	0Z	63
114.8	2A	18	179.9	6B	35			

Table 9: Supported CTCSS Tones

¹ Alternative MCODE SP not supported.

² No MCODE assigned to this CTCSS tone. Will remain displayed in frequency format when format is set to MCODE.

CDCSS Codes							
0nn	1nn	2nn	3nn	4nn	5nn	6nn	7nn
017	114	205	306	411	503	606	703
023	115	212	311	412	506	612	712
025	116	223	315	413	516	624	723
026	122	225	325	423	523	627	731
031	125	226	331	431	526	631	732
032	131	243	332	432	532	632	734
036	132	244	343	445	546	654	743
043	134	245	346	446	565	662	754
047	143	246	351	452		664	
050	145	251	356	454			
051	152	252	364	455			
053	155	255	365	462			
054	156	261	371	464			
065	162	263		465			
071	165	265		466			
072	172	266					
073	174	271					
074		274					

Table 10: Supported CDCSS Codes

NAC	Description
0x000 to 0xFFF	General purpose.
0x293	Default NAC commonly used on interoperability channels and ham radio equipment.
0xF7E	Receive all. RX only, not supported on TX.
0xF7F	Not supported. Reserved by P25 standard.

Table 11: Supported NACs

TGID	Description
0x0001 to 0xFFFE	General purpose. Enables P25 Selective mode.
--	Receive all. RX only, not supported on TX. Enables P25 Normal mode.
0xFFFF	Transmit all. Will bypass any TGID setting on any other receiver on the same frequency and NAC.

Table 12: Supported TGIDs

2.22 Troubleshooting

If a problem persists or a serious problem occurs, discontinue use, and contact AEM Technical Support at support@aem-corp.com.

Problem	Solution
Unable to edit channels, zones, signal lists, or signals.	Administrator has restricted the ability to make changes using permissions or the Agile Edit Key. Contact Administrator or AEM.
Cannot hear sidetone.	Ensure Sidetone is enabled, and Sidetone Volume is sufficiently high (Radio Options Screen).
Poor audio quality.	Refer to the Installation Manual to verify installation. If issue persists, contact AEM.
Unable to transmit.	<ul style="list-style-type: none">• Transmit timeout may have been reached (indicated by TX!). Re-key PTT.• Ensure Active Channel is not disabled.
Transmit power overridden to low (LO!).	Radio is overheating. Refer to the Installation Manual to verify installation. Ensure it is not installed close to high heat emitting equipment. If issue persists, contact AEM.
Hearing static or adjacent channel communication.	<ul style="list-style-type: none">• Increase Squelch Threshold.• Confirm channel modulation is correctly configured.
Unable to hear a received signal.	<ul style="list-style-type: none">• Increase volume.• Use Monitor to test whether squelch sensitivity or incorrect Channel Signaling is the cause of the problem.• Reduce Squelch Threshold.
Disk Error during import or export.	<ul style="list-style-type: none">• Reformat USB drive to FAT, FAT32, or exFAT.• Try a different drive.
Unable to use wideband modulation.	Wideband Key not installed. Contact Administrator or AEM.
Radio Fault.	Contact AEM.
CRC failure.	Contact AEM.
Unexpected restart.	Contact AEM.

End of Section 2.0 Operation
