



ASM-MTP136D-000GN

MTP136D-000GN

**Mission Transceiver
Panel Mount (P25)**



INSTALLATION AND OPERATION MANUAL

REV 1.00 March 21, 2024

**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

**© 2023 Anodyne Electronics Manufacturing Corp. (AEM)
All Rights Reserved**

COPYRIGHT STATEMENT

© 2023 Anodyne Electronics Manufacturing Corp. (AEM), All Rights Reserved

This publication is the property of AEM and is protected by Canadian copyright laws.
No part of this document may be reproduced or transmitted in any form or by any means including electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of AEM.

INTELLECTUAL PROPERTY RIGHTS

This product may be protected by one or more patents or designs of Tait Electronics Limited together with their international equivalents, pending patents, or design applications and registered Trade Marks: NZ409837, NZ409838, NZ508806, NZ508807, NZ509242, NZ509640, NZ509959, NZ510496, NZ511155, NZ511421, NZ516280, NZ519742, NZ520650, NZ537902, NZ521450, NZ522236, NZ524369, NZ524378, NZ524509, NZ524537, NZ524630, NZ530819, NZ534475, NZ534692, NZ535471, NZ537434, NZ546295, NZ547713, NZ569985, AU2003281447, AU2004216984, AU2005207405, AU2005267973, AO200811677, CA2554213, CA2574670, CN200830113833.4, EU1,532,866, EU1,599,792, EU0574655.9, EU000915475, GB23865476, GB23860110, GB2413249, GB2413445, US11/232716, US10/597339, US10/520827, US5,745,840, US10/547653, US10/546696, US10/546697, US10/520827, US10/547964, US10/523952, US11/572700, US29/306491.

This product may also be made under license under one or more of the following U.S. Patents: 4,590,473, 4,636,791, 4,716,407, 4,972,460, 5,146,497, 5,148,482, 5,164,986, 5,185,795, 5,185,796, 5,271,017, 5,377,229, and 5,502,767.

The IMBE™ voice decoding Technology embodied in this product is protected by Intellectual Property Rights including patent rights, copyrights, and trade secrets of Digital Voice Systems, Inc. This voice coding Technology is licensed solely for use within this Communication Equipment. The user of this Technology is explicitly prohibited from attempting to decompile, reverse engineer, or disassemble the Object Code, or in any other way convert the Object Code into a human-readable form. Protected by U.S. Patents 5,870,405, 5,826,222, 5,754,974, 5,701,390, 5,715,365, 5,649,050, 5,630,011, 5,581,656, 5,517,511, 5,491,772, 5,247,579, 5,226,084, and 5,195,166.

Firmware Copyrights: The title to and ownership of copyrights for firmware embedded in this product and memories are reserved for Anodyne Electronics Manufacturing Corp and other respective owners.

Table of Contents

SECTION 1.0 DESCRIPTION.....	1
1.1 Introduction	1
1.2 Product Description.....	2
1.3 Design Features	3
1.4 Specifications.....	4
1.5 Product Approval/Certification.....	4
1.6 Product Limitations	4
1.7 Regulatory Statements.....	5
1.7.1 ISED General Statements	5
1.7.2 ISED Additional Statement for Detachable Antenna	5
1.7.3 FCC Statements for Class A Digital Device	6
1.7.4 Radio Frequency Exposure Information.....	6
1.7.5 Health Canada Warning Statement	7
1.7.6 FCC Narrowbanding Regulations	8
1.8 Unit Nomenclature	9
SECTION 2.0 INSTALLATION	10
2.1 Introduction	10
2.2 Unpacking and Inspection	10
2.3 Warranty	10
2.4 Accessories Required but Not Supplied	10
2.5 Installation Procedure	11
2.5.1 Warnings	11
2.5.2 Cautions	11
2.5.3 Antennas	11
2.5.4 Cabling and Wiring	12
2.5.5 Bonding	12
2.5.6 Adjustments and Connections	12
2.5.7 Pre-Installation Checks.....	13
2.5.8 Installation Configuration	14
2.5.9 Post-Installation Checks	19
2.6 Airworthiness Approval	20
2.6.1 Instructions for Continued Airworthiness.....	20
2.7 Installation Drawings.....	22
SECTION 3.0 OPERATION	23
3.1 Introduction	23
3.2 Navigating the MTP136D	23
3.2.1 Front Panel Controls.....	24
3.2.2 Screen Navigation	26
3.2.3 On screen indicators.....	28
3.3 Screen Overview.....	32
3.3.1 Home Screen	33
3.3.2 Menu	34
3.4 Basic Operations.....	54
3.4.1 Changing the Focused Radio	54

3.4.2	Channels	54
3.4.3	Transmitting.....	60
3.4.4	Receiving	61
3.4.5	Zones	66
3.4.6	Channel Signaling	69
3.4.7	Lists.....	75
3.4.8	MTP136D Brightness	79
3.4.9	DTMF Signaling.....	81
3.4.10	Sidetone	81
3.4.11	Auto Simplex	81
3.4.12	Go Home Function	82
3.4.13	Errors	82
3.5	Emergency Operation	84
3.6	Advanced Features.....	85
3.6.1	Keys	85
3.6.2	Agile Edit	85
3.6.3	Permissions.....	85
3.6.4	Firmware Update	87
3.6.5	Importing/Exporting Profiles.....	87
3.6.6	Configuring a Guard Radio	89
3.6.7	Change Radio Names	89
3.6.8	Microphone Bias.....	90
3.6.9	Power Up Channel and Zone.....	90
3.6.10	Hash.....	91
3.6.11	Cyclic Redundancy Check (CRC).....	91
3.6.12	Reset to Defaults	91
3.7	Troubleshooting	93

List of Figures

Figure 1: MTP136D-000GN	2
Figure 2: On screen keypad selection numbers	27
Figure 3: Quick Selection Window for a Channel Selection	27
Figure 4: Quick Selection Window for a Screen Item.....	28
Figure 5: General Screen Overview	32
Figure 6: Focused Radio	33
Figure 7: Unfocused Radio.....	34
Figure 8: Home Screen Menu	34
Figure 9: Radio Options Screen	35
Figure 10: Scan.....	37
Figure 11: Edit Menu.....	37
Figure 12: Edit Menu - Locked Name	38
Figure 13: Selecting Zone for Active Radio	38
Figure 14: Selecting Channel for Focused Radio	39
Figure 15: Format Menu.....	40
Figure 16: Program Radio Screen.....	51
Figure 17: Keys Screen.....	52
Figure 18: Brightness Screen.....	53
Figure 19: Channel Attributes.....	55
Figure 20: Home Screen Menu – Edit Selected.....	57
Figure 21: Edit Active Chanel on Focused Radio	58
Figure 22: Channel Edit Screen	59
Figure 23: High Power Overtemperature Transmit Lockout Active	61
Figure 24: Guard Radio Locked to a Zone (indicated by italic text).....	69
Figure 25: Format Display Menu	73
Figure 26: List and List Member Edit Screens	75
Figure 27: Channel Select Screen Menu.....	78
Figure 28: Brightness Screen.....	79
Figure 29: Simplex Channel	82
Figure 30: Error View Screen	83
Figure 31: Error View Screen Description	83
Figure 32: Login Screen.....	86
Figure 33: Home Screen with Admin Login Level.....	86
Figure 34: Import Screen	87
Figure 35: Radio Options Screen with Custom Names.....	90
Figure 36: Reset to Defaults.....	92

List of Tables

Table 1 : Approved Antenna Types	Error! Bookmark not defined.
Table 2 :Unit Nomenclature.....	9
Table 3: Accesories Required but not Supplied.....	10
Table 4: Pre-Installation Checks	13
Table 5: Installation Configuration Procedure When a Configuration File Is Provided.	15
Table 6: Instal. Config. Procedure When a Configuration File is Not Provided.	18
Table 7: Post Installation Checks	19
Table 8: Continued Airworthiness.....	22
Table 9: Installation Drawings	22
Table 10: Front Panel Controls	26
Table 11: Screen Indictors	31
Table 12: Home Screen Menu	35
Table 13: Radio Options Screen – Radio Dependent Options.....	36
Table 14: Radio Options Screen – Radio Independent Options	36
Table 15: Edit Submenu Items	38
Table 16: More Submenu Items	40
Table 17: User Options Screen – Radio Dependent Options.....	41
Table 18: User Options Screen – Radio Independent Options	43
Table 19: Admin Options Screen – Radio Dependent Options	44
Table 20: Admin Options Screen – Radio Independent Options.....	46
Table 21: List Menu Options	46
Table 22: Data Menu Options	47
Table 23: System Menu Options	47
Table 24: Info Screen – Radio Dependent Options	47
Table 25: Info Screen – Radio Independent Options	48
Table 26: Error Menu Options	48
Table 27: Test Screen – Radio Dependent Options	49
Table 28: Test Screen – Radio Independent Options.....	50
Table 29: PRGM Menu Options	51
Table 30: Keys Menu Options	52
Table 31: Channel Atributes.....	57
Table 32: Home Screen Edit Submenu Options.....	58
Table 33: Channel Edit Screen Options	60
Table 34: Squelch Threshold Options	62
Table 35: Available Scanning Algorithms	63
Table 36: Channel Attributes Displayed while Main Radio is Scanning	65
Table 37: Scanning Menu Options While Locked on a Chanel.....	66
Table 38: Scanning Menu Options While Not Locked on a Chanel.....	66
Table 39: Zone Options.....	67
Table 40: Lists applied to Zone	67
Table 41: Zone Specific Permissions	68
Table 42: Zone Edit Screen Menu Options.....	69
Table 43: Tones (CTCSS).....	71
Table 44: Codes (CDCSS).....	72
Table 45: Special NAC Codes.....	72
Table 46: Channel Signaling Display Formats.....	73
Table 47: Quantity of Lists and List Members	75
Table 48: List Select Menu Options.....	76

Table 49: List Edit Screen Options	76
Table 50: List Member Select Menu.....	77
Table 51: List Member Select Screen Options	78
Table 52: Brightness Screen Items	80
Table 53: Day and Night Transition Voltage	80
Table 54: Luminance During Day and Night Mode	80
Table 55: Error Code Menu Options.....	84
Table 56: Affects of Agile Edit Feature Disabled	85
Table 57: On Screen Import Error Messages	88
Table 58: Import Errors messages in import log file	89
Table 59 : On Screen Export Error Messages	89

ABBREVIATIONS and ACRONYMS

Abbreviation	Definition
AEM	Anodyne Electronics Manufacturing Corp.
BNC	Bayonet Neill Concelman
CDCSS	Continuous Digital Code Squelch System
CRC	Cyclic Redundancy Check
CTCSS	Continuous Tone Code Squelch System
EIRP	Isotopically Radiated Power
ELT	Emergency Locator Transmitter
FAA	Federal Aviation Administration
FCC	Federal Communication Committee
FM	Frequency Modulation
GND	Ground
ICA	Instructions for Continued Airworthiness
ICNIRP	International Commission on Non-Ionizing Radiation Protection
ID	Identification
IEEE	Institute of Electrical and Electronics Engineers
IKC	Installation Kit Crimp
ISED	Innovation, Science and Economic Development Canada
MIC	Microphone
Mon	Monitor
MTP	Mission Transceiver Panel Mount
NAC	Network Access Code
NVG	Night Vision Goggle
NVIS	Night Vision
P25	Project 25
PTT	Push To Talk
RF	Radio Frequency
RFI	Radio Frequency Interference
RSS	Radio Standards Specifications
RX	Receive
STC	Supplemental Type Certificate
TC	Type Certificate
TGID	Talk Group Identifier
TIA	Telecommunications Industry Association
TX	Transmit
USB	Universal Serial Bus
VHF	Very High Frequency
VSWR	Voltage Standing Wave Ratio

GLOSSARY of TERMS

Term	Definition
Active Channel	The channel that is displayed by the focused radio.
Active Zone	The zone that is displayed for the active channel.
Agile Edit	Agile edit allows for edits to be made to Lists (zones, channels, tones, codes, NAC, TGID) during flight.
Channel Attributes	Settings that are applicable to a channel. This includes items such as the channel name, Tx frequency, channel signaling etc.
Channel Signal	A channel signal is any specific tone, code, TGID or NAC.
Channel Signaling	Channel signaling provides different methods to allow multiple users to communicate on the same frequency without receiving messages from unwanted users. This is achieved by using tones, codes, NAC, TGID.
Codes	This term is synonymous with Continuous Digital Code Squelch System (CDCSS). This manual will refer to CDCSS as Codes.
Compatible	In the context of NVIS functionality: An interpretation of the NVIS requirements that states the device will “mostly” work with other night vision equipment.
Compliant	In the context of NVIS functionality: A stricter adherence to the MIL-STD-3009 standard that means the device must strictly meet the requirements in the standard.
CRC	Automated procedure used to identify data corruption or errors in data.
Digital Channel	A digital channel as defined by the P25 standard.
Discrete Input	Also known as a digital input. A hardware pin input that can only accept two states, ON or OFF.
DTMF	Also known by the trademark Touch-Tone. This provides a different audible tone for each Keypad button as well as the ability to enter numbers and letters using a single keypad button.
Duplex	The radio will use independent channel attributes for transmit and receive operation. This will allow the radio to transmit and receive on different frequencies.
Focused Radio	Defined as the radio that shows all channel attributes on the home screen. This can be selected by pressing the radio selector button.
Half-Duplex	Allows for either transmit or receive functionality to be used at a time.
Hash	A unique alphanumeric string that is calculated based on the active configuration.
Key	A password that is unique to each MTP136D and allows for the enabling of extended feature sets.
Keyed	Activating the transmit feature of the MTP136D by activating pin 13 MIC KEY IN.
Label	A user defined name that can be assigned to a specific Tone, Code, NAC or TGID. This name can be displayed instead of the predefined code.
Latch	A feature held in an on state.
List	A grouping of list members that have the same attributes. The different lists supported by the MTP136D are Tone, Code, NAC, TGID, Zones.
List member	A unique item within a list. This can be a Tone, Code, NAC, TGID or channel.
MCODE	A tone set standard created by Motorola. This is frequently referred to as Private Line (PL) code.

Term	Definition
Network Access Code	A 12-bit code that is added at the beginning of each transmission that allows for semi-private communication. This is the P25 equivalent of tones or codes.
Power Cycle	Also known as a system restarting the MTP136D. This is done by turning the MTP136D OFF and ON using the main volume knob.
Quick Selection Window	The quick selection window allows for keypad selection of screen items that have an item number above 9. Reference §3.2.2.2.1 Quick Selection Window for more information.
Scanning	Automated procedure where a defined list of channels is monitored for incoming radio transmissions.
Sidetone	Microphone audio that is fed into the operator's headphone. This provides the ability for the operator to hear themselves talk while transmitting.
Simplex	The MTP136D will only use a channel's receive channel attributes for any transmit operation. This will cause the MTP136D to transmit and receive on the same frequency.
Talkgroup	Logically grouped users used to subdivide channel traffic within a radio system.
Tones	This term is synonymous with Continuous Tone Code Squelch System (CTCSS). This manual will refer to CTCSS as Tones.
Unfocused Radio	Defined as the radio that shows only minimal channel attributes on the home screen. This can be selected by pressing the radio selector button.
WCODE	A CTCSS tone set that follows the Wolfsburg standard.
Zone	A list of channels. Each zone has editable properties and permissions that are not associated with channel attributes.

Section 1.0 Description

1.1 Introduction

Information in this section consists of product description, design features, specifications and regulatory statements for the MTP136D-000GN P25 Phase 1 Conventional Mission Transceiver Panel, herein subsequently referred to as the MTP136D.

The MTP138-000GN is an analog only derivative version of the MTP136D-000GN with a starting frequency of 138MHz. Any references to digital (P25) modulation operation are not applicable to the MTP138-000GN within this manual. All other MTP138-000GN functionality remains unchanged with respect to the MTP136D.

All subsequent derivative product information will be contained in the applicable manual supplement, which may be obtained from AEM as required.

Review all notes, warnings, and cautions.

1.2 Product Description

The MTP136D Mission Transceiver Panel Mount Radio is a stand-alone APCO P25 compatible VHF FM transceiver that is equipped with a main and guard radio. The programable guard radio has full feature equivalence to the main 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) are available in P25 digital mode. The panel mount radio is controlled using its front panel mounted number pad, knobs, and switches. Radio channel information and functions are displayed on a NVIS high-resolution screen.

The MTP136D is compliant to applicable equipment performance standards TIA-603-E, Project 25, TIA-102 and DO-160G environmental standards. Reference §2.7 Installation Drawings.

IMPORTANT: The following **features are disabled** by default.
Contact AEM prior to purchase to enable these features:

- Agile Edit (Allows for inflight channel, and zone edits).
- Wideband (25 kHz channel bandwidth) operation.



Figure 1: MTP136D-000GN

1.3 Design Features

The MTP136D is capable of half-duplex communication. This allows the MTP136D to receive simultaneously on both the main and guard radio or transmit on one radio. The MTP136D is designed for high temperature operating environments allowing industry leading high power transmit durations.

The MTP136D is factory configured to have a main radio and a dedicated guard radio. If desired, an administrator can alter the guard radio configuration to allow all main radio functions on the guard radio. Regardless of configuration, the main and guard radios will always operate independently from one another.

The MTP136D supports the use of 5000 channels that can be arbitrarily assigned to 40 different zones. To accommodate changing mission requirements each channel and zone can be edited in flight using the agile edit feature without requiring a power cycle. Each zone can contain a mixture of analog and digital channels with each channel having fully independent and customizable parameters.

To ensure the operator has quick access to the most commonly used channel signaling items (Tone, Code, NAC, TGID) while editing a channel, lists can be configured. Lists are fully customizable and allow the operator to only navigate through channel signaling items that are relevant to the mission. Lists do not limit the operator from accessing all available signaling items, they are only a quick selection method.

The comprehensive set of MTP136D permissions allows the administrator to restrict agile edit functionality of specific channel attributes on a per zone basis. If it is undesirable to allow the operator to utilize agile edit, the feature can be disabled entirely.

To monitor multiple channels at once, two priority channels and 5 scanning algorithms are supported: List, Priority, List + Priority, Zone, Zone + Priority. The scanning feature allows for the automatic monitoring of multiple channels and the opportunity for the operator to respond once a transmission is received.

Fleet operation can be quickly configured and maintained by inserting a USB-C thumb drive into the MTP136D Data port. The data port allows importing and exporting of all channel and system configurations within several minutes.

To quickly verify all MTP136D units are identically configured, several unique hash numbers can be viewed on screen. Hashes are unique numbers that are calculated using the current configuration of the MTP136D. This allows fleet managers to ensure correct configuration between units by comparing the hash numbers.

The MTP136D panel backlighting is hardware and software dimmable to match the brightness level of other equipment in the cockpit. The hardware dimming is achieved through a single input that can be software configured to accept a 0-5V, 0-14V or a 0-28V input range.

The MTP136D is easily integrated into tactical systems, upgrades, and is a plug-and-play replacement for existing and legacy radios. The MTP136D is intended for single user operation and features one MIC Key input which functions as a Push To Talk (PTT). Different headset configurations are supported though a 12V configurable microphone bias.

1.4 Specifications

All requirements and specifications relating to mechanical, electrical, or environmental performance can be found in the Declaration of Design and Performance document listed in §2.7 Installation Drawings

1.5 Product Approval/Certification

Declaration of Design and Performance to RTCA/DO-160G, TIA-EI-603-E, and TIA-102-CAAB FCC/ISED Certification Rule 47, Part 22 & Part 90.

FCC ID: ZC7-MTPB1GN

ISED certification number: **IC: 9601A-MTPB1GN**

HVIN: MTPB1GN

Models (PMNs): MTP136D-000GN, MTP138-000GN

FCC/ISED Emission Designators will be:

11K0F3E	Analog Voice	Analog FM	NB Voice
16K0F3E	Analog Voice	Analog FM	WB Voice
8K10F1E	P25 Phase 1	CF4M	Digital Voice
8K10F1D	P25 Phase 1	C4FM	Data/Control Channel
8K10F7W	P25 Phase 1	C4FM	Data/Control Channel

1.6 Product Limitations

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

1.7 Regulatory Statements

1.7.1 ISED General Statements

1.7.1.1 ISED non-interference disclaimer

This device contains licensed transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licensed RSS(s). Operation is subject to the following two conditions:

- a) This device may not cause interference.
- b) This device must accept any interference, including interference that may cause undesired operation of the device.

This device complies with the Canadian ICES-003 Class A specifications. CAN ICES-003(A) / NMB-003 (A).

L'émetteur/récepteur autorisée contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio autorisée. L'exploitation est autorisée aux deux conditions suivantes:

- a) L'appareil ne doit pas produire de brouillage.
- b) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Cet appareil numérique de la Canadian ICES-003. Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

1.7.2 ISED Additional Statement for Detachable Antenna

1.7.2.1 RSS-Gen Transmit Antenna Statement

This radio transmitter IC: 9601A-MTPB1GN has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Le présent émetteur radio IC: 9601A-MTPB1GN a été approuvé par Innovation, Sciences et Développement économique Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué pour tout type figurant sur la liste, sont strictement interdits pour l'exploitation de l'émetteur.

Under Innovation, Science and Economic Development regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by ISED. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropic radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Conformément à la réglementation d'Innovation, Sciences et Développement économique Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Innovation, Sciences et Développement économique Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

Approved Antenna Types:

	Comant CI-177-1	Comant CI-177-13	RAMI AV-14
Maximum gain:	3 dBi	3 dBi	3 dBi
Antenna type:	Whip	Whip	Wire
Radiation pattern:	Omni-Directional	Omni-Directional	Omni-Directional
Impedance:	50 Ohm	50 Ohm	50 Ohm
Connector type:	BNC-Female	BNC-Female	BNC-Female

Note: Alternate Antennas with an equal or lesser gain may be substituted.

Table 1 : Approved Antenna Types

1.7.3 FCC Statements for Class A Digital Device

1.7.3.1 FCC Compliance Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- a) This device may not cause harmful interference, and
- b) This device must accept any interference received, including interference that may cause undesired operation. Please note that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

1.7.4 Radio Frequency Exposure Information

1.7.4.1 ISED/FCC RF Exposure Statement

This equipment complies with FCC and ISED RSS-102 radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or

operating in conjunction with any other antenna or transmitter. In order to avoid the possibility of exceeding the FCC and ISED RSS-10 radio frequency exposure limits, this equipment should be installed and operated with minimum distance of 45.3 inches (1.15 m) between the antenna and your body during normal operation. Users must follow the specific operating instructions for satisfying RF exposure compliance.

Cet équipement est conforme aux limites d'exposition aux rayonnements FCC et ISED CNR-102 établies pour un environnement non contrôlé. Cet émetteur ne doit pas être installé ou utilisé en conjonction avec une autre antenne ou un autre émetteur. Afin d'éviter la possibilité de dépasser les limites d'exposition aux radiofréquences FCC et ISED, cet équipement doit être installé et utilisé avec une distance minimale de 45.3 inches (1.15 m) entre l'antenne et votre corps pendant le fonctionnement normal. Les utilisateurs doivent suivre les instructions spécifiques d'utilisation pour respecter la conformité à l'exposition aux RF.

Enclosures with metal parts may change the RF performance of the device, including its compliance with RF exposure guidelines, in a manner that not been tested or certified.

Les étuis dotes de pièces métalliques peuvent modifier les performances des radiofréquences de l'appareil, y compris sa conformité aux directives d'exposition aux radiofréquences, d'une façon qui n'a pas été testée ou certifiée.

1.7.4.2 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:

- a) 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.
- b) 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.
- c) 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-fags.html.

1.7.5 Health Canada Warning Statement

The installer of this radio equipment must ensure that the antenna is located or pointed such that it does not emit an RF field in excess of Health Canada limits for the general population; consult Safety Code 6, obtainable from the Health Canada's website <http://www.hc-sc.gc.ca>.

1.7.5.1 Compliance with RF Energy Exposure Standards

This two-way radio complies with these RF energy exposure standards and guidelines:

- a) United States Federal Communications Commission, Code of Federal Regulations; 47 CFR § 1.1307, 1.1310, and 2.1091.
- b) American National Standards Institute (ANSI) / Institute of Electrical and Electronic Engineers (IEEE) C95.1-1992.
- c) Institute of Electrical and Electronic Engineers (IEEE) C95.1-1999 Edition.
- d) European Directive 2004/40/EC on minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (electromagnetic fields).

This radio complies with the IEEE and ICNIRP exposure limits for occupational/controlled RF exposure environments at operating duty factors of up to 50% talk to 50% listen.

1.7.5.2 Conformité Aux Normes D'exposition à L'énergie RF

Cette radio émetteur-récepteur se conforme aux normes et aux règlements d'exposition à l'énergie RF :

- a) La Commission fédérale de la communication des Etats-Unis, Code de règlements fédéraux (CFR) Titre 47 Sections 1.1307, 1.1310 et 2.1091 (radios mobiles) ou 2.1093 (radios portatives).
- b) American National Standards Institute (ANSI) / Institute of Electrical and Electronic Engineers (IEEE) C95. 1-1992.12 For your safety
- c) Institute of Electrical and Electronic Engineers (IEEE) C95.1-1999 Edition.
- d) La directive européenne 2004/40/EC concernant les prescriptions minimales de sécurité et de santé relatives à l'exposition des travailleurs aux risques dus aux agents physiques (champs électromagnétiques).

Cette radio se conforme aux limites d'exposition de l'IEEE (FCC) et ICNIRP pour les environnements d'exposition au rayonnement RF professionnel et contrôlé aux cycles de marche de 50% en mode transmission et 50% en mode réception.

1.7.6 FCC Narrowbanding Regulations

The following information applies to all radios, not just to those sold in countries where FCC regulations apply.

From 1 January 2013 it is an FCC requirement that land mobile radio systems must not operate channels with a bandwidth greater than 12.5kHz in the 150–174MHz frequency band. From this date all radios will be supplied with firmware that requires a software feature license to operate a wide bandwidth channel in this frequency band.

The 25kHz Unrestricted Wideband feature license is available to any customer who is not subject to the relevant FCC regulations, or who has an FCC waiver.

1.8 Unit 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	Description
1	Product Family	MTP: Mission Transceiver Panel
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 & guard)
6	Feature Character	G: Guard receiver installed Blank: No guard
7	Feature Character	N: NVIS compliant lighting Blank: Non-NVIS lighting

Table 2 :Unit Nomenclature

End of Section 1.0 Description

Section 2.0 Installation

2.1 Introduction

Information in this section consists of unpacking and inspection procedures, installation procedures, pre and post-installation checks, configuration procedures, and installation drawings.

2.2 Unpacking and Inspection

Unpack the equipment carefully. Inspect the unit visually for damage due to shipping and report all such claims immediately to the carrier involved. Note that each unit should have the following:

- a) MTP136D-000GN
- b) Acceptance Test Report
- c) Certificate of Conformity

Verify that all items are present before proceeding and report any shortage immediately to your supplier.

2.3 Warranty

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

2.4 Accessories Required but Not Supplied

Installation kit MTP136D-IKC (crimp) is required to complete the installation. The kit consists of the following:

Qty	Description	Manufacturer	Mfr Part #	AEM Part #
1	D-Sub, Female Socket, 15 Crimp Housing (Pins Included)	Amphenol	M24308/2-2F	120-21-008
1	Field Serviceable BNC Coax Connector	Amphenol	31-202	120-51-001
1	D-Sub Backshell, Size 2 (15/26 Position) w/Jackscrews (Cable Clamp Included)	Amphenol	D15000GE0	120-28-013

Table 3: Accesories Required but not Supplied

2.5 Installation Procedure

2.5.1 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.

2.5.2 Cautions

CAUTION

Verify all airframe connections are checked against the Interconnect drawing listed in §2.7 Installation Drawings

2.5.3 Antennas

WARNING

To limit exposure to radio frequency fields that exceed exposure limits for people occupying the aircraft, install the antenna such that it is mounted **EITHER** on a ground plane that is between the antenna and the occupants of the aircraft, **OR** further than 45.3 inches (1.15 m) from the occupants of the aircraft.

Reference the Declaration of Design and Performance document listed §2.7 Installation Drawings for information regarding approved antennas to be used with the MTP136D.

Proper antenna installation is vital to ensure reliable operation of the MTP136D and the aircraft. For best results the following should be taken into consideration where applicable:

- a) The aircraft manufacturers installation instructions are followed.
- b) The antennas are as widely separated as practically possible and clear of large aircraft obstructions.
- c) The antenna is mounted a minimum of 3 ft (0.9 m) or more from any navigation receiver antennas.
- d) The antenna is mounted a minimum of 4 ft (1.2 m) or more from communication and ELT antennas.
- e) The antenna is not mounted at distances from the communication, navigation or ELT antennas that are $\frac{1}{4}$, $\frac{1}{2}$ or whole number multiples of the navigation or communications system wavelengths.
- f) Antennas of like frequencies are not in proximity.
- g) As much as practically possible, the antenna is not mounted near areas where contaminants such as fuel, dirt, oil, or water are likely to be present.

Best in-flight performance can be expected when the antenna is bottom mounted. This reduces signal degradation caused by the masking effects of the fuselage and stabilizers. Poor performance during ground testing may be observed for bottom mounted antennas. If desired, the antenna may be roof mounted when located near the rotor blades.

If undesired interferences are expected such as rotor modulation, coupling with audio systems, or fluctuation in instruments, it is required to provide a ground plane surface, for any blade or whip antennas, which has a minimum radius that is equal to the height of the antenna. Inadequate grounding can cause severe reflected power and high levels of Radio Frequency Interference (RFI) on the entire airframe.

2.5.4 Cabling and Wiring

All wire shall be selected in accordance with the original aircraft manufacturer's Maintenance Instructions or AC43.13-1B Change 1, Paragraphs 11-76 through 11-78. Unshielded wire types shall qualify to MIL-W-22759 as specified in AC43.13-1B Change 1, Paragraphs 11-85, 11-86, and listed in Table 11-11. For shielded wire applications, use Tefzel MIL-C-27500 shielded wire with solder sleeves (for shield terminations) to make the most compact and easily terminated interconnect. Follow the Interconnect drawing in §2.7 Installation Drawings as required.

Allow 3" from the end of the shielded wiring to the shield termination to allow the connector hood to be easily installed. Refer to the Interconnect drawing in §2.7 Installation Drawings for shield termination details. Note that the hood is a "clamshell" hood and is installed after the wiring is complete. Aircraft harnessing shall permit the unit to be removed for easy access to all adjustments.

Maintain wire segregation and route wiring in accordance with the original aircraft manufacturers maintenance instructions.

Unless otherwise noted, all wiring shall be a minimum of 22 AWG, except power and ground lines, which shall be a minimum of 20 AWG. Reference the Interconnect drawing for additional specifications. Check that the ground connection is clean and well secured, and that it shares no path with any electrically noisy aircraft accessories such as blowers, turn and bank instruments or similar loads. Power to this unit must be supplied from a separate circuit breaker or fuse (fast blow), and not attached to any other circuit breaker without additional protection. Verify that the selected circuit breaker size and wire gauge are adequate for the installation using the techniques specified in AC43.13-1B Change 1, Paragraphs 11-47 through 11-51 and 11-66 through 11-69.

2.5.5 Bonding

Bonding is achieved through the Dzus mounting points during installation of the product. Dzus mounting points shall be bonded to the airframe ground.

The use of a milli-ohmmeter is recommended to verify bonding. Reference AC 43.13-1B Change 1, Section 15 for additional information.

2.5.6 Adjustments and Connections

The MTP136D is shipped from the factory with all internal adjustments set to the normal test levels. No internal adjustments are necessary.

2.5.7 Pre-Installation Checks

Do not connect the MTP136D-000N to the wiring harness until the checks in Table 4 are completed.

Referencing the Interconnect drawing in §2.7 Installation Drawings, check the following:

#	Check	Passed
1	Check P1 pin 3 or specific lighting bus voltage relative to power ground P1 pins 8, 15.	
2	Check P1 pins 7 and 14 for +28 Vdc relative to power ground P1 pins 8, 15.	
3	Check P1 pins 10 for continuity to ground (less than 0.5Ω).	
4	Check P1 pins 4 and 5 for connection to ground when the Chan/Select +/- switch is installed and set to the intended switch positions.	
5	Check all other connections to ensure that there are no unintended shorts or opens.	
6	Check the antenna feedline at the MTP136D with a through-line wattmeter and suitable frequency elements to ensure correct antenna matching. Reflected power should be less than 10%. Anything higher should be investigated carefully, or RFI and system interference as well as possible radio damage may result. A Voltage Standing Wave Ratio (VSWR) measurement over 3.0:1 represents a significant loss in signal power to the antenna. Check that forward power meets specifications over the frequency band of the radio.	
6	Connect the MTP136D to the wiring harness. Ensure all connectors are tight, and the mechanical installation is sound.	
General Notes <hr/> <hr/> <hr/>		

Table 4: Pre-Installation Checks

2.5.8 Installation Configuration

Once all installations checks are completed the initial installation configuration can begin. Performing the following steps requires administrator permissions to be active. Follow the steps in §3.6.9 to login with administrator permissions.

If a configuration file exists for the MTP136D for the specific aircraft installation follow Table 5: Installation Configuration Procedure When a Configuration File Is Provided. If a configuration dose not exist, follow the steps in Table 6: Instal. Config. Procedure When a Configuration File is Not Provided.

Follow the procedure below when a configuration file has been provided for the specific aircraft installation.

#	Question	Completed
1	Is a firmware upgrade required? Reference the SW Ver. For the main and guard radio and the Software Version of the MTP136D in §3.3.2.7.4.1 Info to identify the current firmware versions. Contact AEM for the latest firmware version number. New products are always shipped with the latest firmware.	
	Yes Reference §3.6.3 Permissions for steps required to upgrade the firmware.	
	No No action Required.	
2	Import the configuration file. Reference §3.6.3.1 Accessing Admin Permission Level for steps required to import the MTP136D configuration file. It is recommended to perform this step with the admin login level. Reference §3.6.3 Permissions for more information.	
3	Do any keys have to be added? (Commonly used for agile edit and wideband enable). Reference §3.6.1 Keys for more information.	
	Yes Manually add all keys through the keys screen. Keys cannot be added by using the import feature. If desired record all keys used below: _____ _____	
	No No action required.	
4	Does the screen brightness of the MTP136D match the brightness of other cockpit equipment in day and night mode?	
	Yes No adjustment required.	

#	Question	Completed
	No Adjust the screen brightness to match cockpit illumination. Reference §3.4.8 MTP136D Brightness to adjust the brightness level until the MTP136D matches the illumination level of other cockpit equipment.	
5	Verify the error log is empty. If errors exist perform all necessary action to resolve the errors. Reference §3.4.13 Errors for more information regarding runtime errors and §3.6.5 Importing/Exporting for import and export faults. Were any errors noted in the error log? Log all errors in the general notes section in this checklist.	
6	Record the hash values, if not done previously. Store these values in a safe location or in this manual for future reference. Reference §3.6.10 Hash for more information. Admin: _____ Factory: _____ Channels: _____ ID Lists: _____ Hash Storage location: _____	
7	Verify the MTP136D_ImportLog.json file has no errors. The import log is automatically saved to the connected storage device, states if the file import was successful and no faults occurred. Reference §3.6.5.3 Import Error for more information. If the import was unsuccessful, correct the import file and repeat the procedure listed in this table.	
General Notes _____ _____ _____		

Table 5: Installation Configuration Procedure When a Configuration File Is Provided.

Follow the procedure below when a configuration file has **NOT** been provided for the specific aircraft installation.

#	Question	Completed
1	Is a firmware upgrade required? Reference the SW Ver. in §3.3.2.7.4.5 PRGM to identify the current firmware version. Contact AEM for the latest firmware version number. New products are always shipped with the latest firmware.	
	Yes Reference §3.6.4 Firmware Update for steps required to upgrade the firmware.	
	No No action Required.	
2	Has the MTP136D been installed previously?	
	Yes It is advised to reset the MTP136D to factory settings. See §3.6.12 Reset to Defaults for the required steps.	
	No No action required.	
3	Do any keys have to be added? (Commonly used for agile edit and wideband enable). Reference §3.6.1 Keys for more information.	
	Yes Manually add all keys through the keys screen. Keys cannot be added by using the import feature. If Desired record all keys used below: <hr/> <hr/> <hr/>	
	No No action required.	
4	Configure all items listed in the Admin Options screen. Reference §3.3.2.7.1.2 Admin Options for more information	
5	Configure all items listed in the User Options screen. Reference §3.3.2.7.1.1 User Options for more information.	
6	Configure all items listed in the Radio screen. Reference §3.3.2.1 Radio for more information.	
7	Configure all required channel signaling lists. Reference §3.4.6 Channel Signaling and §3.4.7 Lists for more information.	

#	Question	Completed
8	<p>Configure all zones and channels.</p> <p>For more information reference §3.4.5 Zones.</p> <p>Ensure the following for each zone:</p> <p>Required zone permission are applied. Reference §3.4.5.4 Zone Permissions for more information.</p> <p>Channel signaling lists are applied. Reference §3.4.6 Channel Signaling for more information.</p> <p>All channels are configured correctly. Reference §3.4.2 Channels for more information.</p> <p>Scanning priority channels are assigned. Reference §3.4.4.3 Scanning for more information.</p>	
9	<p>Is a dedicated guard radio required?</p> <p>Yes Perform all steps listed in §3.6.6 Configuring a Guard Radio.</p> <p>No No action required,</p>	
10	<p>Does the screen brightness of the MTP136D match the brightness of other cockpit equipment in day and night mode? (Test best performed in a dark environment)</p> <p>Yes No adjustment required.</p> <p>No Adjust the screen brightness to match cockpit illumination. Reference §3.4.8 MTP136D Brightness to adjust the brightness level to match the illumination level of other cockpit equipment.</p>	
11	<p>Verify the error log is empty.</p> <p>If errors exist perform all necessary action to resolve the errors. Reference §3.4.13 Errors for more information regarding runtime errors and §3.6.5 Importing/Exporting for import and export faults.</p> <p>Were any errors noted in the error log? Log all errors in the general notes section in this checklist.</p>	
12	<p>Export the configuration file.</p> <p>If a configuration file has not been created previously, export the current configuration file for future use. Reference §3.6.5.3 Import Error for more information.</p>	

#	Question	Completed
	Name of the exported file: _____ Location of the exported file: _____ _____	
20	Record the hash values, if not done previously. Store these values in a safe location or in this manual for future reference. Reference §3.6.10 Hash for more information. Admin: _____ Factory: _____ Channels: _____ ID Lists: _____ Hash Storage location: _____	
General Notes _____ _____ _____ _____ _____		

Table 6: Instal. Config. Procedure When a Configuration File is Not Provided.

2.5.9 Post-Installation Checks

Power up the aircraft's systems and confirm normal operation of all functions of the MTP136D. Refer to Section 3.0 Operation for specific operational details.

#	Test	Passed
1	Confirm all radio functions. Verify all receive and transmit operations. Check yoke (or cyclic) switch action. Check radio audio inputs and selection of same.	
2	Verify audio quality. Unusual buzzes, hums or other background audio are symptomatic of multiple grounds, or noisy external systems such as blowers or pumps sharing wiring with the audio system. Failure to key or correctly modulate a transmitter is often the result of forgetting to connect all required grounds to the radio or external audio system.	
4	Complete Installation Approval Test Procedure Perform all steps required in the Installation Approval Test Procedure document listed in §2.7 Installation Drawings.	
5	Reset the MTP136D. If any settings or channels were altered during the post installation checks reupload the configuration file.	
6	Complete documentation. Upon satisfactory completion of all performance checks, make all required logbook entries, electrical load, weight and balance amendments and other documentation as required by your local regulatory agency before releasing the aircraft for service.	
General Notes <hr/> <hr/> <hr/> <hr/> <hr/>		

Table 7: Post Installation Checks

Notes: If receive audio cannot be heard, ensure the correct channel signaling is applied. Press the monitor button to temporarily ignore all channel signaling requirement. Reference §3.4.4.1 Monitor.

2.6 Airworthiness Approval

Airworthiness approval of the MTP136D may require completion of a TCCA Major Modification Report per CAR STD (AWM) 571 Appendix L, or a FAA Form 337. The sample wording for a description of the work is provided to assist the Installing Agency in preparing Instructions for Continued Airworthiness (ICA) when installing an Anodyne Electronics Manufacturing Corp MTP136D Mission Transceiver Panel Mount. This sample may be modified appropriately for new installations. It is the installer's responsibility to determine the applicability of the method used. Installations performed outside Canada must follow the applicable aviation authority's regulations.

Sample Wording:

Installing an Anodyne Electronics Manufacturing Corp MTP136D-000GN Mission Transceiver Panel in [aircraft location].

Installed in accordance with this MTP136D-000GN Operation and Installation Manual, Revision [], and AC 43.13-2, Chapters 2, and 3.

The MTP136D-000GN interfaces with existing aircraft systems per the instructions in this Installation and Operation Manual.

This MTP136D-000GN Installation and Operation Manual provides detailed installation instructions and wiring diagrams in Section 2.0 Installation.

Power is supplied to the MTP136D-000GN through an []-Amp circuit breaker.

Aircraft equipment list, weights and balance amended. Compass compensation checked and found to conform to applicable regulations.

2.6.1 Instructions for Continued Airworthiness

Maintenance of the MTP136D is 'on condition' only. Periodic maintenance of this product is not required. The following sample Instructions for Continued Airworthiness (ICA) provides assistance in preparing ICA for the Anodyne Electronics Manufacturing Corp MTP136D-000GN unit installation as part of a Type Certificate (TC) or Supplemental Type Certificate (STC) project to comply with CAR STD (AWM) 523/527/525/529.1529 or FAR 23/25/27/29.1529 "Instructions for Continued Airworthiness". Items that may vary by aircraft make and model are shown in brackets ("[]") and should be filled in as appropriate. Some of the checklist items do not apply, in which case they should be marked "N/A" (Not Applicable).

Section	Item	Description
1	Introduction	<p>[Aircraft that has been altered: Registration number, Make, Model and Serial Number]</p> <p><u>Content, Scope, Purpose and Arrangement:</u> This document identifies the Instructions for Continued Airworthiness for an Anodyne Electronics Manufacturing Corp MTP136D-000GN installed in an [aircraft make and model].</p> <p><u>Applicability:</u> Applies to an Anodyne Electronics Manufacturing Corp MTP136D-000GN installed in an [aircraft make and model].</p> <p><u>Definitions/Abbreviations:</u> None, N/A.</p> <p><u>Precautions:</u> None, N/A.</p> <p><u>Units of Measurement:</u> None, N/A.</p> <p><u>Referenced Publications:</u> MTP136D-000GN Installation and Operating Manual STC/TC # [applicable STC/TC number for the specific aircraft installation]</p> <p><u>Distribution:</u> This document should be a permanent aircraft record.</p>
2	Description of the System/ Alteration	Anodyne Electronics Manufacturing Corp MTP136D-000GN Mission Transceiver Panel Mount which adds a transceiver panel connection to an existing avionics system [include equipment/systems as appropriate]. Refer to §2.7 Installation Drawings of this manual for interconnect information. Refer to aircraft manufacturer approved interconnect for actual installation.
3	Control, Operation Information	Refer to Section 3.0 of this manual.
4	Servicing Information	N/A.
5	Maintenance Instructions	Maintenance of the MTP136D-000GN is 'on condition' only. Periodic maintenance is not required.
6	Troubleshooting Information	Refer to §3.7 Troubleshooting of this manual for more information.
7	Removal and Replacement Information	Refer to Section 2.0 of this manual - the MTP136D-000GN Installation and Operating Manual. If the unit is removed and reinstalled, a functional check of the equipment should be conducted.
8	Diagrams	Refer to Section §2.7 Installation Drawings of this manual for installation drawings and interconnect examples.

9	Special Inspection Requirements	N/A.
10	Application of Protective Treatments	N/A.
11	Data: Relative to Structural Fasteners	MTP136D-000GN and appropriate mounting hardware installation, removal and replacement should be in accordance with applicable provisions of AC 43.13-1B.
12	Special Tools	N/A.
13	For Commuter Category Aircraft Only	A. Electrical loads: Refer to Section 1.0 of this manual – the MTP136D-000GN Installation and Operating Manual B. Methods of balancing flight controls: N/A. C. Identification of primary & secondary structures: N/A. D. Special repair methods applicable to the airplane: N/A.
14	Overhaul Period	No additional overhaul time limitations.
15	Airworthiness Limitation Section	N/A.
16	Revision	To be determined by installer.

Table 8: Continued Airworthiness

2.7 Installation Drawings

DOCUMENT	REV	DESCRIPTION	TYPE	SERIAL#
MTP136D-000GN-403-0	1.00	Mission Transceiver Panel	Interconnect Drawing	096671+
MTP136D-000GN-405-0	1.00	Mission Transceiver Panel	Connector Map	096671+
MTP136D-000GN-618-0	1.00	Mission Transceiver Panel	Declaration of Design and Performance	096671+
MTP136D-000GN-922-0	1.00	Mission Transceiver Panel	Mechanical Installation	096671+
MTP136D-000GN-634-0	1.00	Mission Transceiver Panel	Installation Approval Test Procedure	096671+

Table 9: Installation Drawings

Section 2.0 Ends Following Above Documents

Section 3.0 Operation

3.1 Introduction

Information in this section consists of information to navigate the MTP136D, basic screen overview, basic operation, emergency operation, advanced features and troubleshooting information.

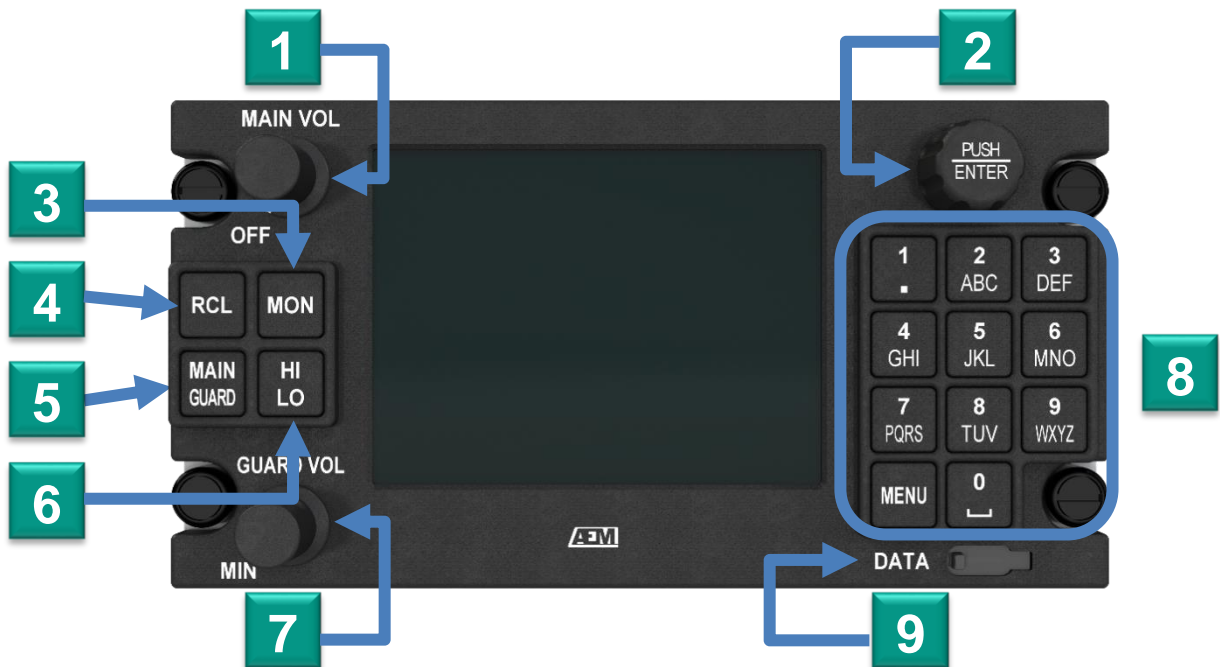
Some sections of this manual may not be applicable to every derivative product. For example, the MTP138-000GN is an analog only derivative version of the MTP136D-000GN with a starting frequency of 138MHz. Any references to digital (P25) modulation operation or a starting frequency lower than 138 MHz are not applicable to the MTP138-000GN within this manual. All other MTP138-000GN functionality remains unchanged with respect to the MTP136D.

All subsequent derivative product information will be contained in the applicable manual supplement, which may be obtained from AEM as required.

3.2 Navigating the MTP136D

The MTP136D can be navigated using three methods: rotary selector, keypad, or the CHAN/SELECT + and CHAN/SELECT – pins that are commonly installed as buttons on the aircrafts cyclic stick. Each of these methods can be used interchangeably at any time. This manual uses the rotary selector as the primary means of navigation.

3.2.1 Front Panel Controls



Item	Button Name	Description
1	Main Volume Control Knob (MAIN VOL)	<p>The Main Volume control knob is used to turn on the MTP136D and adjust the volume of the main radio. The MTP136D is turned on by rotating the volume knob clockwise, past the “detent” position. An audible “click” can be heard when the detent position is passed. Continuing to rotate clockwise will increase the volume of the main radio from 0 to 100%.</p> <p>Reference the min volume setting §3.3.2.7.1.2 Admin Options to set the minimum main radio volume.</p>
2	Rotary Selector (Push Enter)	<p>The Rotary Select is the primary method to navigate the MTP. The Rotary selector can be rotated to navigate through screen items and pressed to select screen items. The selector can be configured to navigate through the menu as clockwise or counterclockwise.</p> <p>Reference the scroll down setting in §3.3.2.7.1.1 User Options for more information</p>

Item	Button Name	Description
3	Monitor (MON)	<p>Pressing the monitor button will activate the monitor feature which allows all audio, regardless of RF signal level or channel signaling, to be heard. The monitor feature can be activated on any MTP136D screen.</p> <p>The monitor function can be latched on by pressing and holding the MON button. See §3.4.4.1 Monitor for more information.</p>
4	Channel Recall (RCL)	<p>Pressing the channel recall button will toggle between the current channel and the previous channel of the focused radio. The channel recall feature can be activated on any MTP136D screen. This feature can be altered to switch between the main and guard radio.</p> <p>Reference the primary input setting in §3.3.2.7.1.1 User Options and the Recall Scope setting in 3.3.2.7.1.2 Admin Options for more information.</p>
5	Radio Selector (MAIN GUARD)	<p>Pressing the radio selector button will switch the focused radio between the main and guard radio. The focused radio can be switched on any MTP136D screen.</p>
6	Transmit Power (HI LO)	<p>Pressing the transmit power button will toggle the transmit power of the MTP136D between 1W and 10W. The transmit power can be switched on any MTP136D screen.</p> <p>The functionality can be altered to affect all channels or only the active channel. Reference §3.4.3.1 Transmit Power for more information.</p>
7	Guard Volume Control Knob (GUARD VOL)	<p>The guard volume control knob is used to adjust the volume of GUARD radio. Turning the knob clockwise will increase the volume of the guard radio. The guard volume control knob has a “detent” position like the main volume control knob, but it has no functionality.</p> <p>Reference the min volume setting §3.3.2.7.1.2 Admin Options to set the minimum guard radio volume.</p>
8	Keypad	<p>The keypad is used for both navigation and entering information. The keypad supports the use of entering letters and numbers by pressing the same key repeatedly.</p> <p>Reference §3.2.2.2 Navigation Using the Keypad for more information.</p>



Item	Button Name	Description
	MENU Button	<p>The MENU button is part of the keypad and provides access to different screens. The Menu can be latched open by pressing and holding the Menu button.</p> <p>Reference the menu latch setting in §3.3.2.7.1.1 User Options for more information.</p>
	Data Port & Cover (DATA)	<p>The Data port is USB Type-C and provides access for updating all software components and channel configurations in the MTP136D.</p> <p>Reference §3.6.5 Importing/Exporting for channel imports/exports.</p> <p>Reference §3.6.4 Firmware Update for information regarding firmware updates.</p>

Table 10: Front Panel Controls

3.2.2 Screen Navigation

The MTP136D screen can be navigated using three methods: the rotary selector, keypad, or discrete inputs. Each method can be used interchangeably at any time. This manual uses the rotary selector as the primary navigation method.

3.2.2.1 Navigation using the Rotary Selector

When on the home screen, rotating the rotary selector will change the channel of the radio. When editing an item or navigating through a screen or menu, rotating the rotary selector will sequentially go through the menu items or its options.

Pressing the rotary selector will cause the screen item to be selected for editing. Reference §3.2.3 On screen indicators for visual reference for when an item is selected for editing.

The behaviour associated with rotating the rotary selector clockwise or counterclockwise can be changed. Reference the scroll down setting in §3.3.2.7.1.1 User Options for more information.

The functionality of rotating the rotary selector on the home screen can be changed from selecting the active channel, to selecting the focused radio. Reference the primary input setting in §3.3.2.7.1.1 User Options for more information.

3.2.2.2 Navigation Using the Keypad

The keypad can be used to navigate through all menu items and most on screen selections. Pressing a keypad button will automatically select the item with the corresponding number. Entering the same number again as the currently selected item will select the item for editing.

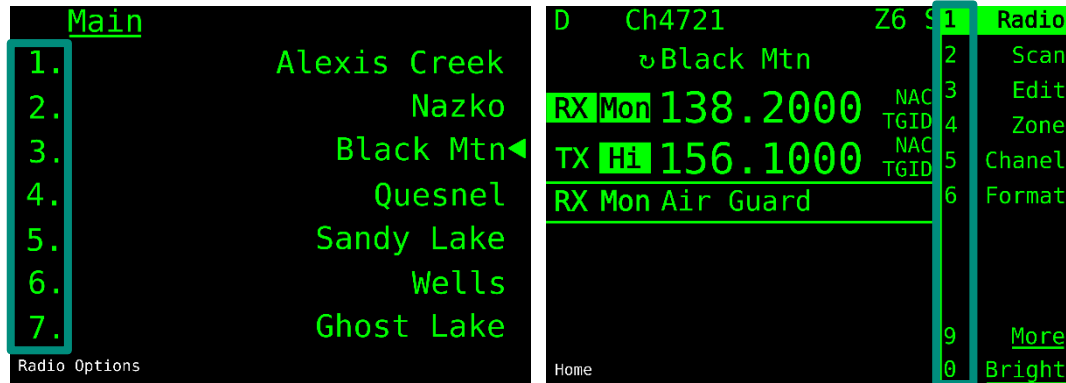


Figure 2: On screen keypad selection numbers

3.2.2.2.1 Quick Selection Window

When the user wants to use the keypad to select a channel or an onscreen item that has 10 or more selectable items, the quick selection window will appear in the top left of the screen.

To use the quick selection window to select a channel from the home screen, enter they channel number and press the rotary selector.

To use the quick selection window to select a screen item, enter the screen item using the keypad and press the rotary selector. If the screen item is selected, entering the screen item number again and pressing the rotary selector will select the item for editing.



Figure 3: Quick Selection Window for a Channel Selection

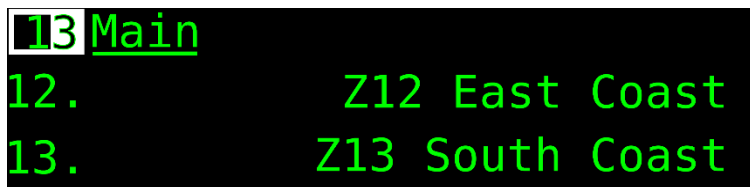


Figure 4: Quick Selection Window for a Screen Item

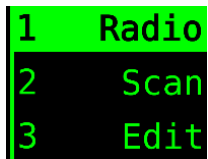


3.2.2.3 Navigation Using the Discrete Inputs

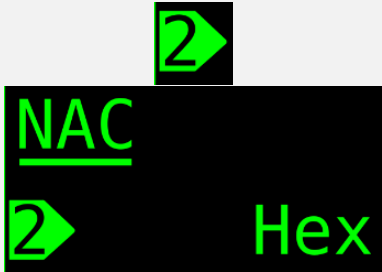





The MTP136D provides two discrete input pins on the main transceiver DB15 connector, CHAN/SELECT + and CHAN/SELECT –. When these inputs are wired within the aircraft, they can be used to change the active channel as well as navigate through screen items.

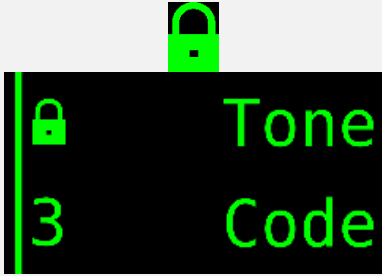
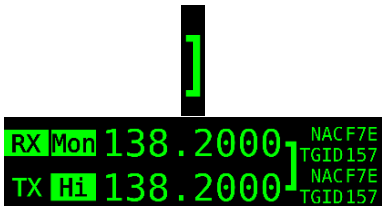
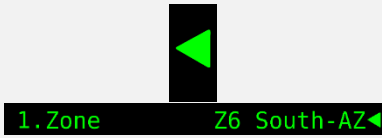

The discrete inputs have the same functionality as rotating the rotary selector. The CHAN/SELECT + pin has the same functionality as rotating the rotary selector clockwise. The CHAN/SELECT – pin has the same functionality as rotating the rotary selector counterclockwise.

3.2.3 On screen indicators

Several onscreen indicators exist to aid in navigating the MTP136D and identify what and how a setting can be manipulated.

Screen Indicator	Description
Selected for navigation 	The item is currently selected. A selected item is marked with a green box.
Selected for Editing 	The item is selected and can be edited.
Character selected for editing 	A single character in a multicharacter item is selected for editing. The character will be highlighted in a green block, and the screen item will have a white border. Frequently seen while editing a channels frequency or the name/label of a list/list member.

Screen Indicator	Description
Menu Item Active 	Menu item is currently active. Commonly seen while changing the channel signaling display format or enabling the scanning mode for a radio.
Italic text 	Setting is locked from editing. The setting may require Administrator login level to perform edits, or it is non-configurable regardless of permission level. Reference §3.6.3 Permissions for more information.
Monitor Indicator 	The monitor (mon) indicator is highlighted when a RF carrier signal is detected, or the monitor function is activated. This indicator is highlighted even when the carrier signal is not strong enough to break squelch or when nonmatching channel signaling is received.
Receive Indicator 	The Mon indicator is highlighted when a carrier signal of sufficient strength is detected, and the signal is received with matching channel signaling. Audio will be routed to the headset when this indicator is highlighted.
Transmit Indicator 	Transmit indicator. The MTP136D is actively transmitting on the focused radio when this indicator is highlighted.
Tx Power Indicator 	<p>Tx power indicator. Reference §3.4.3.1 Transmit Power for more information.</p> <p>HI: All transmissions will be in high power (10W). The indicator will be highlighted when high power is selected.</p> <p>LO: All transmissions will be in low power (1W).</p>

Screen Indicator	Description
<p>Locked</p> 	<p>The menu item is not available for edit. This is due to insufficient permission level, or the zone does not have list assigned to the current zone.</p> <p>Reference §3.6.5 Importing/Exporting for information regarding permissions.</p> <p>Reference §3.4.5 Zones for more information regarding unassigned lists.</p>
<p>Simplex Linked</p> 	<p>The channel is simplex linked. This bar is only shown while agile editing a channel. Reference §3.4.10 Sidetone for more information.</p>
<p>Dropdown List</p> 	<p>A setting has multiple options that will be displayed in a dropdown list format.</p>
<p>Open submenu/screen</p> 	<p>When a menu item is underlined a different set of menu items will be shown or a different screen will be opened.</p>


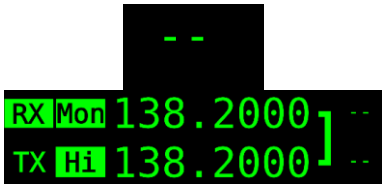
Screen Indicator	Description
<p>Feature Restricted</p> 	<p>Occurs when the wideband modulation is restricted, Transmit Timeout or the high power overtemperature transmit lockout feature is active.</p> <p>Reference §3.6.1 Keys for more information regarding wideband modulation restrictions.</p> <p>Reference §3.4.3.2 Transmit Timeout for more information.</p> <p>Reference §3.4.3.3 High Power Overtemperature Transmit Lockout for more information.</p>
<p>Attribute/Setting not set</p> 	<p>A setting or channel attribute has not been set and is available for editing. This is only visible while actively editing a channel on the home screen. Reference §3.4.2.3 Edit Active Channel.</p>

Table 11: Screen Indicators

3.3 Screen Overview

This section details how the different screens in the MTP136D are organized as well as the settings that are available on each screen.

Reference Figure 5: General Screen Overview to see how the primary screens in the MTP136D are organized. Items that are duplicated in Figure 5, such as the Radio screen, under the Menu and Scan Menu will bring the user to the same screen.

The document headings in this section have been organized to match the organizational structure shown in Figure 5, e.g. §3.3.2.2 Scan of the manual is a subheading under 3.3.2 Menu to match the structure shown in Figure 5.

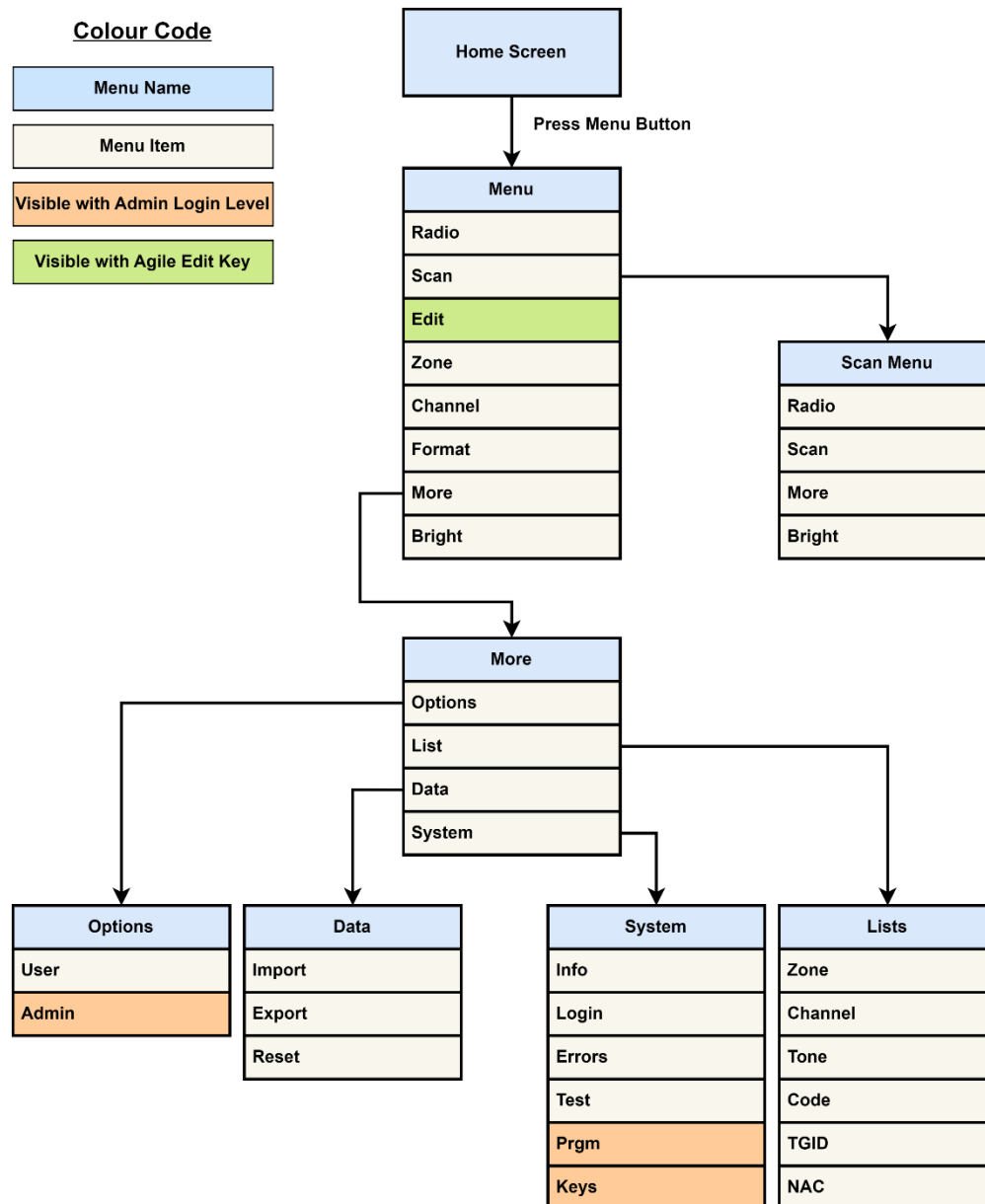
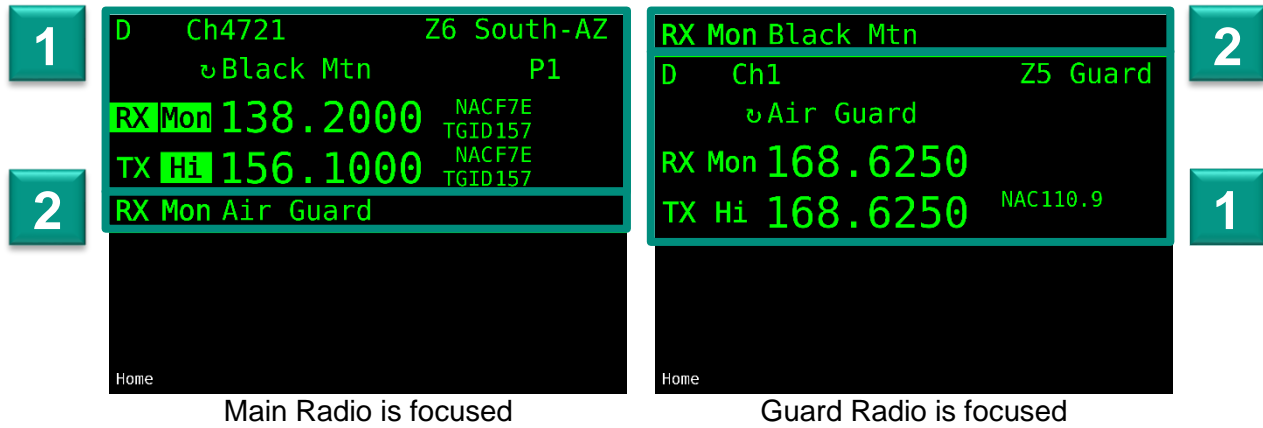


Figure 5: General Screen Overview

3.3.1 Home Screen

The home screen provides channel and status information for the main and guard radio. The radio that shows all channel attributes is referred to as the focused radio **1**. The channel displayed by the focused radio will always be used for any transmit operations. The focused radio can be switched by pressing the radio selector button.

The unfocused radio **2** is displayed with a reduced information set and continues to utilize all receive capabilities.



For information regarding the channel attributes displayed reference §3.4.2.2 Channel Attributes.

For information regarding on screen indicators that are not channel attributes reference §3.2.3 On screen indicators.

3.3.1.1 Focused Radio

The focused radio **1** is identified by having all channel attributes displayed. The focused radio has all transmit and receive abilities available for use.



Figure 6: Focused Radio

3.3.1.2 Unfocused radio

The unfocused radio [2](#) shows minimal information about its active channel. Although not all channel attributes is shown, all receive functions are fully operational. This allows received audio from the unfocused radio to be heard when a signal is received. The unfocused radio cannot be used for any transmission functions.



Figure 7: Unfocused Radio

3.3.2 Menu

The MTP136D Menu can be accessed at any time by pressing the Menu button from the Keypad. The Menu provides access to different screens that allow for the editing of channel and zone information as well as MTP136D settings.

The menu will always display different information based on the screen the user is currently on. Reference Figure 5: General Screen Overview to view the different screens that can be selected from the Menu.

The menu can be latched open by holding the Menu button. The latching feature is controlled by the menu latch and hold time setting, reference §3.3.2.7.1.1 User Options. The MTP136D is factory programmed to latch the menu open when the Menu button is pressed and held. The menu is unlatched when the menu is pressed again.



Figure 8: Home Screen Menu

The home screen menu items are given a high-level overview in Table 12. More information is provided in subsequent sections.

Item name	Description
Radio	Allows editing of the operator preferences such as the active zone, active channel, enable scanning and channel signaling formats.
Scan	Enables scanning for the focused radio.
Edit	Change any channel attributes from the active channel.
Zone	Change the zone of the focused radio.
Channel	Change the channel of the focused radio to any channel in the active zone.
Format	Select the selective identifier display format. This menu item is only displayed when the focused radio is using channel signaling.
More	Access additional screens.
Bright	Change screen brightness.

Table 12: Home Screen Menu

3.3.2.1 Radio

The Radio Options screen allows access for adjustments or changes that are frequently required while in flight.

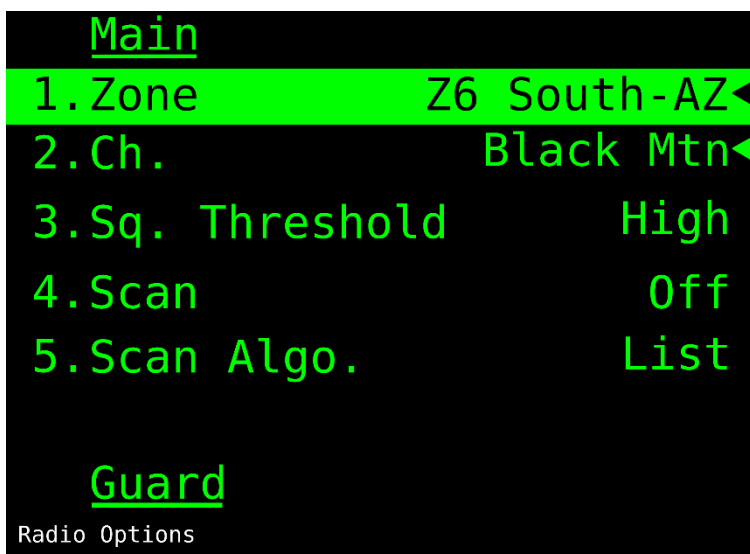


Figure 9: Radio Options Screen

The settings listed in Table 13 are individually configurable for the main and guard radio.

Item name	Description
Zone	Assign any zone to the selected radio. See §3.3.2.4 Zone for more information.
Ch.	Assign the active channel to the radio. The user can select any channel from the active zone.
Squelch Threshold	Change the Rx signal strength threshold for audio to be heard. See §3.4.4.2 Squelch for more information.
Scan	Select if the scan mode is ON or OFF for the radio. Reference §3.4.4.3 Scanning for more information
Scan Algo.	Select the scanning algorithm to be used while scanning. Reference §3.4.4.3 Scanning for more information.

Table 13: Radio Options Screen – Radio Dependent Options

The settings listed in Table 14 change the behaviour of the MTP136D and are not specific to a radio.

Item name	Description
Sidetone	Enable or disable sidetone audio. See §3.4.10 Sidetone for more information.
Sidetone Level	Change the volume level of sidetone audio. See §3.4.10 Sidetone for more information.
DTMF Sidetone Level	Change the volume level of DTMF sidetone audio. See §3.4.10 Sidetone for more information.
Labels	Enable or disable the use of labels for Tones, Codes, NAC, TGID. See §3.4.6.5 Channel Signaling Formats for more information.
Tone Format	Change how tones and codes are displayed. Allows selection between: Frequency, Mcode, and Wcode. See §3.4.6.5 Channel Signaling Formats for more information.
NAC Format	Change how NAC are displayed. Allows selection between a decimal and hex display format. See §3.4.6.5 Channel Signaling Formats for more information.
TGID Format	Change how TGID are displayed. Allows selection between a decimal and hex display format. See §3.4.6.5 Channel Signaling Formats for more information.

Table 14: Radio Options Screen – Radio Independent Options

3.3.2.2 Scan

Selecting this item will enable the scan mode for the focused radio. When the focused radio is scanning, the rotary selector can be used to change the scanning algorithm used. To disable the scan mode, press the Menu button and then press the scan menu option. This option is only available if the scanning mode is enabled by the administrator. Reference §3.4.4.3 Scanning for more information regarding the scanning functionality.

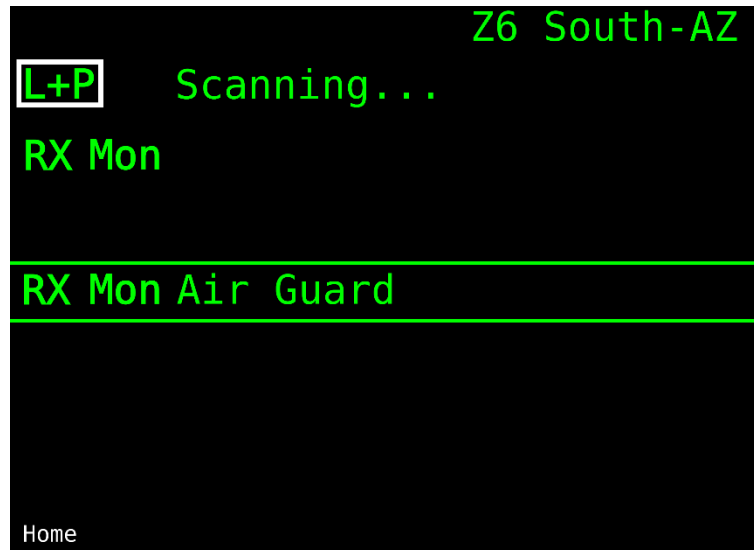


Figure 10: Scan

3.3.2.3 Edit

The Edit submenu allows the user to edit the information of the active channel of the focused radio.



Figure 11: Edit Menu

Item name	Description
All	Edit all information of the active channel.
Name	Edit only the name of the active channel.
RX Freq	Edit only the receive frequency of the active channel.
TX Freq	Edit only the transmit frequency of the active channel.
RX NAC/Tone/Code	Edit only the receive NAC/Tone/Code of the active channel.
TX NAC NAC/Tone/Code	Edit only the transmit NAC/Tone/Code of the active channel.

Table 15: Edit Submenu Items


The Edit menu is only accessible if agile edit is enabled. If the zones edit permissions do not allow the user to edit a channel attribute, the Edit menu item that corresponds with the locked channel attribute will be locked. This is indicated with a  next to the Edit menu item. Reference §3.4.5.4 Zone Permissions for more information.



Figure 12: Edit Menu - Locked Name

3.3.2.4 Zone

Selecting this item allows the user to change the zone of the active radio. For all possible methods to change the zone of a radio reference §3.4.5.1 Changing the Active Zone.

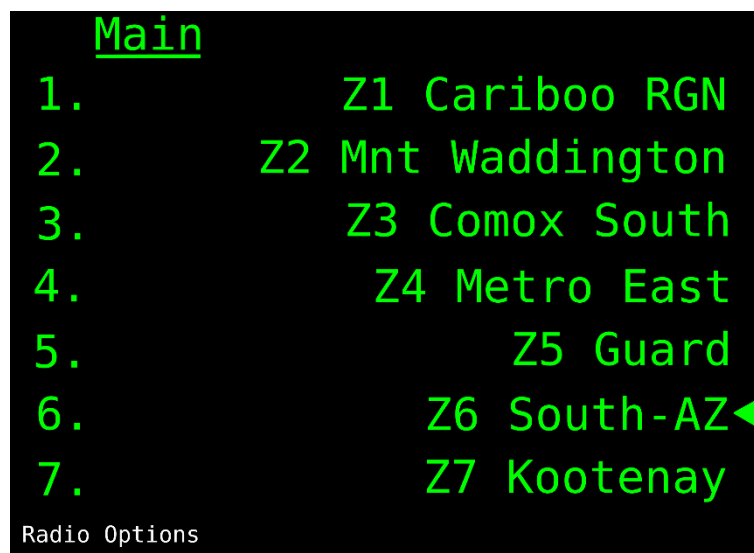


Figure 13: Selecting Zone for Active Radio

This menu item may be locked if a radio has been locked to a specific zone. Reference the Zone Permission setting in §3.3.2.7.1.2 Admin Options for more information regarding radios that are locked to a zone. Reference section 3.4.5 Zones for more information regarding zones.

3.3.2.5 Channel

Selecting this item will allow the user to select any channel in the active zone of the focused radio.

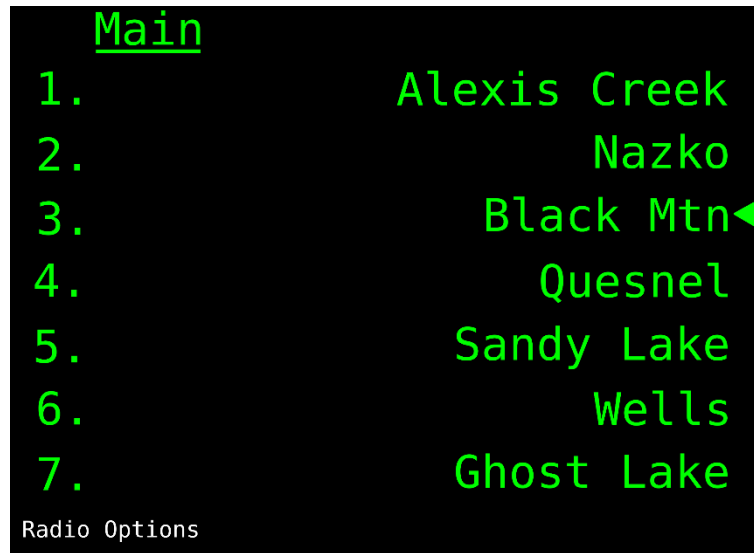


Figure 14: Selecting Channel for Focused Radio

3.3.2.6 Format

Select the display format for the channel signaling used for all radios. See §3.4.6.5 Channel Signaling Formats for more information. This menu will have different channel signaling formats available based on the channel signaling type applied to the active channel. If the active channel is not using any channel signaling this menu item will not be displayed.



Figure 15: Format Menu

3.3.2.7 More

The More menu provides access to further screens that allow for the editing of all channel, zone and system settings.

Item name	Description
Options	Allows access to change the behaviour of MTP136D functions
Lists	Allows access and modification to the list types of Zone, Channel, Tone, Code, TGID, NAC.
Data	Allows for import/export of zone and channel attributes as well as MTP136D factory reset.
System	Allows access to login as administrator, view system information, view and clear errors, and update the firmware.

Table 16: More Submenu Items

3.3.2.7.1 Options

The options menu provides access to settings that control the behaviour of the MTP136D functions. The options submenu has two menu items, user and admin. The user menu item can be accessed and edited by the user login level. The admin menu item can only be accessed with the admin permission level. Reference §3.6.3.1 Accessing Admin Permission Level for more information.

3.3.2.7.1.1 User Options

The User Options screen allows function configurations that are intended for user access. The items in Table 17 can be uniquely set for the Main and Guard radio.

Item name	Description
Priority Scan Rate	Sets the interval of how long the radio can scan nonpriority channels before checking the priority channels for a received signal. This is applicable only for scanning algorithms that support priority channels. Reference §3.4.4.3.3 Priority Channels for more information.
Startup Zone	Select the zone that a radio will be set to when the MTP136D is turned on. Reference §3.6.9 Power Up Channel and Zone for more information. Options include: Shutdown: Start the radio on the same zone that was used when the MTP136D was turned off. Custom: Always start the radio on a specific zone.
Startup Channel	Select the channel that a radio will be set to when the MTP136D is turned on. Reference §3.6.9 Power Up Channel and Zone for more information. Options include: Shutdown: Start the radio on the same channel that was used when the MTP136D was turned off. This option is only available when the Startup zone is set to shutdown. Custom: Always start the radio on a specific channel from the custom startup zone.

Table 17: User Options Screen – Radio Dependent Options

The items in Table 18 are applied across the MTP136D and are not specific to a radio.

Item name	Description
Hold Time	Change how long a button must be pressed for the following functions: a) Latching the Menu Open. b) Latching the Monitor function on. c) Deleting an item that requires a hold time.
Monitor Latch	Changes the monitor latching behaviour. Reference §3.4.4.1 Monitor for more information. Options include: OFF: Monitor function cannot be latched on. HOLD: Monitor function is latched on when the monitor is pressed for the duration of the system hold time. ON: Pressing the MON button will always latch the MON button.

Item name	Description
Menu Latch	<p>Changes the menu latching behaviour.</p> <p>Options include:</p> <p>OFF: Menu screen cannot be latched open.</p> <p>HOLD: Menu screen can be latched open when the MENU button is pressed for the duration of the system hold time.</p> <p>ON: Pressing the MENU button will always latch the menu open.</p>
Auto Simplex	<p>Controls if Auto Simplex mode is enabled for all channels. Reference §3.4.11 Auto Simplex for more information.</p> <p>Options include:</p> <p>Enabled: A channel can be set to use auto simplex.</p> <p>Disabled: A channel cannot be set to use auto simplex.</p>
Screen Names	<p>Changes the visibility of the screen names.</p> <p>Options include:</p> <p>Enabled: White text will show the name of the current screen in the bottom left of the screen.</p> <p>Disabled: The screen name will not be visible.</p>
Go Home	<p>Controls which actions will force the MTP136D to return to the home screen. In progress edits will be saved when the Go Home function is used. Reference §3.4.12 Go Home Function for more information.</p> <p>Options include:</p> <p>PTT: Return to the home screen when the PTT key is pressed.</p> <p>Radio Select: Return to the home screen when the radio selector button is pressed.</p> <p>Both: Return to the home screen when the radio selector button or the PTT is pressed.</p>
Primary Input	<p>Controls the behaviour of the following actions while on the home screen: rotating the rotary selector, pressing the keypad, using the rear Chan/Select pins.</p> <p>Options include:</p> <p>Radio: The focused radio is changed when any of the above actions are performed.</p> <p>Channel: The active channel is changed when any of the above actions are performed.</p>

Item name	Description
Scroll Down	<p>Controls how rotating the rotary selector navigates through menus and screens.</p> <p>Options include:</p> <p>Clockwise: Rotating the rotary selector clockwise causes the screen to navigate down.</p> <p>Counterclockwise: Rotating the rotary selector counterclockwise causes the screen to navigate down.</p>

Table 18: User Options Screen – Radio Independent Options

3.3.2.7.1.2 Admin Options

The Admin Options screen allows function configurations that are intended for admin access. This screen is only displayed when logged in with the admin permission level. Reference §3.6.3.1 Accessing Admin Permission Level for more information. The items in Table 19 can be uniquely set for the Main and Guard radio.

Note: The heading titles Radio 1 and Radio 2 used on the admin options screen are equivalent to Main and Guard respectively.

Item name	Description
Name	Change the name of the radio. These names are only used for display purposes while navigating the Menu and subsequent screens. Reference §3.6.7 Change Radio Names.
Zone Permission	<p>Selects the permission level required to change the following:</p> <ol style="list-style-type: none"> 1. The zone assigned to a radio. 2. The startup channel assigned to a radio. 3. The startup zone assigned to a radio. <p>Options include:</p> <p>User: The user can change the above-mentioned items</p> <p>Admin: Only the admin can change the above-mentioned items.</p>
Min Volume	Set the minimum volume for the radio. This ensures a transmission cannot be missed due to low volume.
Startup Zone	<p>Select the zone that a radio will be set to when the MTP136D is turned on. Reference §3.6.9 Power Up Channel and Zone for more information.</p> <p>Options include:</p> <p>Shutdown: Start the radio on the same zone that was used when the MTP136D was turned off.</p> <p>Custom: Always start the radio on a specific zone.</p>

Item name	Description
Startup Channel	<p>Select the channel that a radio will be set to when the MTP136D is turned on. Reference §3.6.9 Power Up Channel and Zone for more information.</p> <p>Options include:</p> <p>Shutdown: Start the radio on the same channel that was used when the MTP136D was turned off. This option is only available when the Startup zone is set to shutdown.</p> <p>Custom: Always start the radio on a specific channel from the custom startup zone.</p>

Table 19: Admin Options Screen – Radio Dependent Options

The items in Table 20 are applied across the MTP136D and are not specific to a radio.

Item name	Description
PTT Timeout	<p>Change the maximum continuous transmit time for the selected radio. Reference §3.4.3.2 Transmit Timeout for more information.</p> <p>Options include: 30-300s, None</p> <p>Note: The None options allows for unlimited continuous transmit time and is used for test purpose. The None feature is not recommended for regular flight operation as a stuck PTT key would not be automatically unkey.</p>
Attenuation	<p>Controls attenuation level for incoming RF signals. This may be required if nuisance squelch breaks occur due to multiple antennas installed in close proximity.</p> <p>Options include: 0dB, 6dB, 12dB, 20dB</p>
P25 Unit ID	Change the MTP136D unit ID that is provided during digital channel use.
Digital Monitor	TBD
Mic. Bias	<p>Controls the microphone biasing voltage on pin 6 MIC AUDIO HI.</p> <p>Options include: Enabled: Provides 12V output. Disabled: Provides 0V output.</p>
DTMF Signaling	Controls the use enable/disable of DTMF Signaling function. Reference §3.4.9 DTMF Signaling for more information.

Item name	Description
Max Voltage	<p>Select the maximum input voltage that will be applied to pin 3, PANEL LIGHTING. Reference §3.4.8 MTP136D Brightness for more information.</p> <p>Options include:</p> <p>5V: Dimming range will be 0-5VDC.</p> <p>14V: Dimming range will be 0-12VDC.</p> <p>28V: Dimming range will be 0-28VDC.</p>
LCD Dimming	<p>Controls if the LCD dimming level is affected by the voltage applied to pin 3, PANEL LIGHTING. Reference §3.4.8 MTP136D Brightness for more information.</p> <p>Options include:</p> <p>Enabled: The analog dimming voltage from the PANEL LIGHTING pin and the software adjustment value will be used to calculate the LCD dimming level.</p> <p>Disabled: Only the software adjustment value will be used to calculate the LCD dimming level.</p>
Monitor Scope	<p>Controls if the monitor function affects all radios or only the focused radio.</p> <p>Options include:</p> <p>All: All radios will be affected when the monitor button is pressed.</p> <p>Active: Only the focused radio will be affected when the monitor button is pressed.</p>
Recall Scope	<p>Controls the behaviour of the Channel Recall button.</p> <p>Options include:</p> <p>Radio 1 (Main Radio): The channel recall button will only recall the channel last used on radio 1.</p> <p>Radio 2 (Guard Radio): The channel recall button will only recall the channel last used on radio 2.</p> <p>Active: The channel recall button will only recall the last channel used on the focused radio.</p>

Item name	Description
TX Power Scope	<p>Controls which channels are affected when the Transmit Power button is pressed.</p> <p>Options include:</p> <p>All: The transmit power of all channels on both the main and guard radio will be toggled between Lo (1W) and Hi (10W). This setting will override, but not delete, the power level that was initially configured for each channel.</p> <p>Channel: The transmit power of the active channel of the focused radio will be toggled between Lo (1W) and Hi (10W).</p>

Table 20: Admin Options Screen – Radio Independent Options

3.3.2.7.2 Lists

This menu allows the operator to create, edit, or delete any list or list member. Selecting any of the below items will open its respective List select screen i.e., selecting the NAC list will open the NAC List Select screen. See §3.4.7 Lists for more information.

Reference Table 21 for more information for each menu item.

Item name	Description
Zone	See §3.3.2.4 Zone for more information. This menu item is only visible for the user if the Zone Permission setting is set to user. Reference §3.3.2.7.1.2 Admin Options for more information.
Channel	See §3.4.2.2 Channel Attributes for more information.
Tone	See §3.4.6.1 Tone (CTCSS) for more information.
Code	See §3.4.6.2 Code (CDCSS) for more information.
TGID	See §3.4.6.3 TGID for more information.
NAC	See §3.4.6.4 NAC for more information.

Table 21: List Menu Options

3.3.2.7.3 Data

The Data menu allows for channel, zone, and system settings to be imported, exported or set to factory defaults.

Item name	Description
Import	This screen allows for the import of all channel, zone, and system settings. Reference §3.6.5 Importing/Exporting for more information.
Export	This screen allows for the export of all channels, zones and system settings. Reference §3.6.5 Importing/Exporting for more information.
Reset	Reset the MTP136D to all factory defaults. This will clear/reset all channel, zone, system settings and keys. Reference §3.6.12 Reset to Defaults for more information.

Table 22: Data Menu Options

3.3.2.7.4 System

The system menu provides access to items that are not required during regular use of the MTP136D. This menu provides access to the screens listed in Table 23.

Item name	Description
Info	Provides general software information.
Login	Provides access to login screen.
Errors	Provides access to the error submenu.
Test	Provides access to diagnostic items.
Prgm	Provides access to the firmware submenu.
Keys	Provides the ability to enable extended feature sets.

Table 23: System Menu Options

3.3.2.7.4.1 Info

This screen provides software information about the MTP136D.

The items in Table 24 are unique for the Main and Guard radio. All items are read only.

Item name	Description
Descr.	Description of the radio. This will always display “VHF Radio” for the MTP136D-000GN.
Type	Type of Radio Installed. This will always display “P25” for the MTP136D-000GN.
Mode	Type of Radio Installed. This will always display “Digital” for the MTP136D-000GN.
Serial	The serial number of the installed radio.
SW Ver.	The firmware version of the installed radio.

Table 24: Info Screen – Radio Dependent Options

The items in Table 25 are applicable to the MTP136D and are not specific to a radio. All items are ready only.

Item name	Description
Model	The model number of the MTP136D.
Serial	The serial number of the MTP136D.
Software Version	The software version of the MTP136D.
CRC	The current CRC value. See §3.6.11 Cyclic Redundancy Check (CRC) for more information.
User Hash	Displays the unique hash that is created by calculating all user settings.
Admin Hash	Displays the unique hash that is created by calculating all admin settings.
Factory Hash	Displays the unique hash that is created by calculating all factory settings.
Channels Hash	Displays the unique hash that is created by calculating all channel and zone settings.
ID Lists Hash	Displays the unique hash that is created by calculating all List settings. This is calculated using only the Tones, Codes, TGID, and NAC Lists.

Table 25: Info Screen – Radio Independent Options

3.3.2.7.4.2 Login

This screen allows the user to enter a password to gain access to the admin permission level. See §3.6.3.1 Accessing Admin Permission Level permission for more info.

3.3.2.7.4.3 Errors

The Errors menu provides the user the ability view or export the error log. See §3.4.13 Errors for more information.

Setting Name	Description
View	View all errors that are recorded in the error log.
Export	Export the error log to a connected device.

Table 26: Error Menu Options

3.3.2.7.4.4 Test

This screen provides an overview of general system health and the status of the connected rear IO pins, faceplate buttons and knobs. When this screen is accessed, a white banner will appear at the bottom of the screen stating DIAGNOSTIC on the right side of the banner. This banner can only be cleared by restarting the MTP136D.

All Test screen items can only be viewed, except for the Test Tone and Test Tone Level setting. These settings will automatically be reset to their default settings once the MTP136D is power cycled.

The following items are viewable for each radio:

Item Name	Description
Volume	The volume level of the radio.
Temperature	The temperature of the internal radio module.
Max TX Temp	Maximum temperature at which the radio will transmit. Reference §3.4.3.3 High Power Overtemperature Transmit Lockout for more information.
Overheated	Displays if the radio module is overheated or within normal operating temperature. Reference §3.4.3.3 High Power Overtemperature Transmit Lockout for more information.
TX Power Limited	Displays if the radio is limited to low power transmissions due to overheating. Reference §3.4.3.3 High Power Overtemperature Transmit Lockout for more information.
Serial Port	This setting will always state "Control" for the MTP136D-000GN.

Table 27: Test Screen – Radio Dependent Options

The following items are applicable to the MTP136D and are not specific to a radio:

Item name	Description
Detent 1	Displays if the main volume knob is in the fully counterclockwise position known as "Detent".
Volume 1	Displays the value of the main volume without the minimum volume offset.
Detent 2	Displays if the guard volume knob is in the fully counterclockwise position known as "Detent".
Volume 2	Displays the value of the guard volume without the minimum volume offset.
Last Button	Displays the name of the last button that was pressed.
PTT	Displays if the PTT key is activated.
PTT Timeout	Displays the maximum time the radio can continuously transmit. Reference §3.4.3.2 Transmit Timeout for more information.
PTT Timeout	Displayed if the radio has exceeded its maximum continuous transmit time. Reference §3.4.3.2 Transmit Timeout for more information.
Increment	Displays if the rear pin 4 CHAN/SELECT + pin is asserted.
Decrement	Displays if the rear pin 5 CHAN/SELECT - pin is asserted.
Panel Dimming	Displays the input voltage applied to pin 3 PANEL LIGHTING as a percentage. The percentage is scaled based on the Max Voltage setting in §3.3.2.7.1.2 Admin Options.
Test Tone	When enabled this will play a 1 kHz test tone. This item is only accessible with admin login. Options include: Left: The tone will be routed to the connected headset. Right: The tone will be transmitted on the active channel of the focused radio when the user keys the radio.

Item name	Description
Test Tone Level	Controls the tone level of the test tone. This item is only accessible with admin login.
Mode	<p>The current mode of the USB-C Port.</p> <p>Options include:</p> <p>Device: Will always be displayed when no USB device is detected, or an import/export is in progress.</p> <p>Host: This is displayed when the MTP136D is being controlled by a connected device. This occurs during software updates.</p>
Memory Life	Displays the remaining lifespan of the internal memory module.
MCU Temp.	Displays the internal microcontroller temperature.
Supply Temp.	Displays the temperature of the internal power supply.
3.3V Supply	Displays the voltage supplied to the internal microcontroller.
3.9V Supply	Displays the voltage from the internal 3.9V power supply.
5V Supply	Displays the voltage from the internal 5V power supply.
12V Supply	Displays the voltage from the internal 12V power supply.
13.9V Supply	Displays the voltage from the internal 13.9V power supply.

Table 28: Test Screen – Radio Independent Options

Button Test

The button test allows the user to quickly diagnose if a button is damaged. The test allows all buttons to be pressed without the MTP136D responding. To access the button test, navigate to the screen item Last Button on the Test screen and press the menu button. From the menu select Button Test. Any button that is pressed will be displayed by the Last button item on the test screen. To exit the Button test, press the menu button.

Note: When testing the discrete inputs CHAN/SELECT + and CHAN/SELECT – the screen item last button will display Encoder + and Encoder - respectively. Reference the screen items increment and decrement to view the state of the CHAN/SELECT + and CHAN/SELECT – pins.

Screen Test

The screen test allows the user to diagnose if any LCD pixel has become damaged by showing several different blocks of colours on screen. This test can be accessed by pressing the menu button on the Test screen and selecting the Screen test. The onscreen colour can be changed by rotating the rotary selector. The screen test is automatically exited once all screen colours have been displayed. The displayed colours blocks are: Black, Red, Green, Blue, White.

3.3.2.7.4.5 PRGM

The Program (PRGM) menu allows for firmware updates to the MTP136D and the main and guard radios. The PRGM menu is only selectable when the admin login level has been applied. Reference §3.6.3.1 Accessing Admin Permission Level for more information.

The programming operation is started by selecting the device to be programmed from the PRGM menu, reference Table 29. Once the screen is opened and a USB device is inserted, press PRGM from the menu. Reference §3.6.4 Firmware Update for more information. Firmware updates and update instructions must be acquired from AEM directly.

Note: Do Not Power Cycle the MTP136D While Programing.

Setting Name	Description
Main	Update the firmware of the main radio.
Guard	Update the firmware of the guard radio.
System	Update the firmware of the MTP136D.

Table 29: PRGM Menu Options

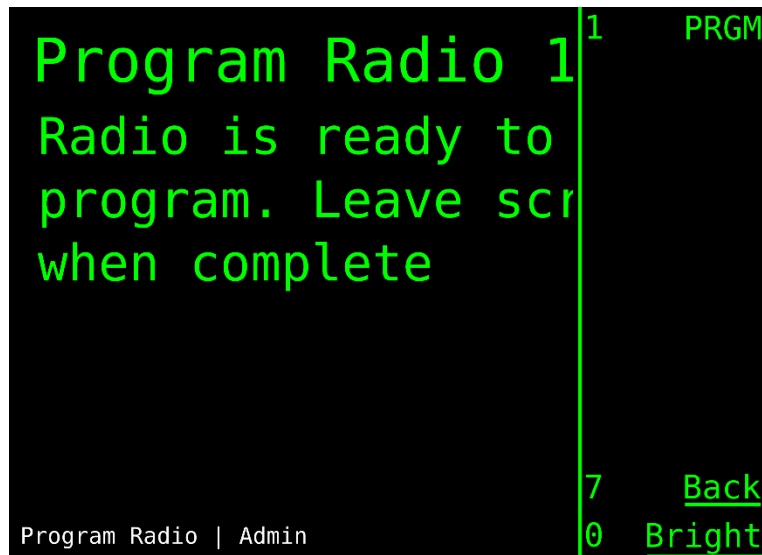


Figure 16: Program Radio Screen

3.3.2.7.4.6 Keys

The keys screen allows the entering of keys. Keys are used to unlock extended functionality such as Agile Edit and Wideband modulation. Keys can be added or deleted by pressing the Menu button and selecting the desired option.

Note: Keys cannot be transferred through the import/export functionality. Keys must be manually entered through the Keys screen.

When adding keys, the entered key can be validated by pressing the rotary selector or pressing add from the menu. Reference §3.6.1 Keys for more information.



Figure 17: Keys Screen

When entering a key, pressing the menu provides the options listed in Table 30.

Setting Name	Description
Delete	Delete the character currently selected by the blinking cursor.
Clear	Clear the entire key that has been entered.
Add	Validate and enter the key.

Table 30: Keys Menu Options

3.3.2.8 Bright

The brightness screen allows for software adjustment of the LCD dimming. The Bright screen also allows the user to view the dimming adjustment provided by the hardware dimming bus and determine if the MTP136D is in day or night mode. The brightness screen can be accessed from multiple menu locations. Reference §3.4.8 MTP136D Brightness for details.

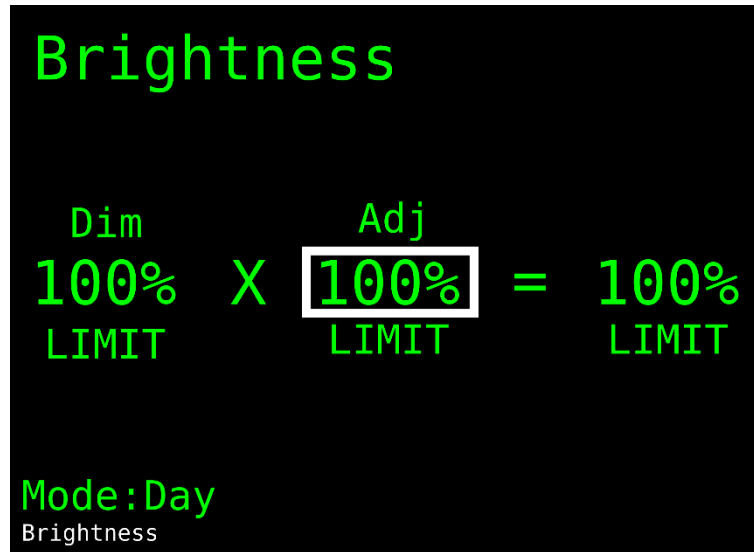


Figure 18: Brightness Screen

3.4 Basic Operations

3.4.1 Changing the Focused Radio

The default configuration allows the focused radio to only be changed by pressing the radio selector. The focused radio can be switched on any MTP136D screen by pressing the radio selector.

This behaviour can be changed by setting the primary input setting to radio. Reference §3.3.2.7.1.1 User Options for more information. When the primary input setting is set to radio the following methods can be used to change the focused radio.

- a) Pressing the radio selector.
- b) Rotating the rotary selector.
- c) Using the discrete CHAN/SELECT + and CHAN/SELECT - inputs.
- d) Entering the radio number (1 for main or 2 for guard) using the keypad and then pressing the rotary selector.

3.4.2 Channels

The MTP136D supports the use of 5000 channels and a minimum of 1 channel. A channel is always assigned to a zone and can only be used within the assigned zone. It is not possible to move a channel between zones.

3.4.2.1 Changing the Active Channel

The radio options screen allows for the active channel of the unfocused and focused radio to be changed. Reference §3.3.2.1 Radio for more information.

To change the channel of the focused radio the user must be on the home screen with the menu closed. When the primary input setting is set to Channel (default) the active channel can be changed using the methods listed below. See §3.3.2.7.1.1 User Options for more information.

- a) Rotating the rotary selector.
- b) Using the discrete CHAN/SELECT + and CHAN/SELECT - inputs.
- c) Entering the channel number using the keypad and then pressing the rotary selector.
- d) Pressing the channel recall button. This will toggle between the current and the last selected channel used on the focused radio.

If the primary input setting is set to Radio, the above methods are still valid; however, the user must press the rotary selector before using the above methods.

3.4.2.2 Channel Attributes

Each channel has the following modifiable attributes. These attributes can only be changed by the user if the administrator has granted the appropriate zone-specific permissions. See §3.4.5.4 Zone Permissions for more information.

Note: Channel attributes cannot be edited unless the agile edit key has been entered. Reference §3.6.2 Agile Edit for more information.

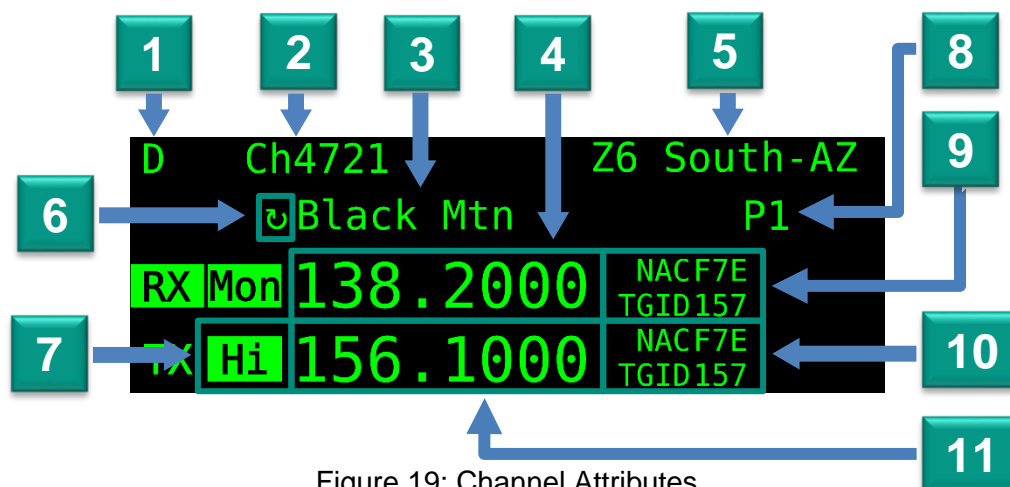






Figure 19: Channel Attributes

#	Item	Description
1	Modulation type 	The modulation type used on the channel. Options include: N: Narrowband W: Wideband D: Digital
2	Channel number 	The channel number range is between 1-5000. The channel number can only be edited by going to the Channel Select screen and moving the position of the channel in the list. Reference §3.4.7.2 Creating and Managing Lists Members for more information.
3	Channel name 	The name of the channel allows for 18 ASCII Characters.

#	Item	Description
4	Receive Frequency 138.2000	The frequency that will be used for all receive operations. The range allows for 136.0000-173.9975 MHz.
5	Zone Name Z6 South-AZ	This can only be changed from the Zone Edit screen. This field allows for 18 ASCII Characters. Reference §3.4.5.2 Edit a Zone for more information.
6	In Scan List 	The channel is included in the scanning list when the symbol is visible. Reference §3.4.4.3.5 Scanning List for more information.
7	TX Power Indicator Lo Hi	<p>Tx power indicator. Reference §3.4.3.1 Transmit Power for more information.</p> <p>Options include:</p> <p>HI: All transmissions will be in high power (10W). The indicator will be highlighted when high power is selected.</p> <p>LO: All transmissions will be in low power (1W).</p>
8	Priority Scanning Indicators P1 P2	The channel is assigned as either the P1 or P2 channel when one of these symbols is visible. This is used for scanning algorithms that support priority channels. Reference §3.4.4.3.4 Set Priority Channels to set the channel as a priority channel.
9	Receive Channel Signaling NACF7E TGID157	The receive channel signaling applied to the current channel. This can be set to use Tones, Codes, NAC, TGID. Reference §3.4.6 Channel Signaling for more information.

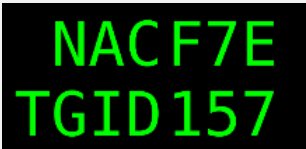

#	Item	Description
10	Transmit Channel Signaling 	The transmit channel signaling applied to the current channel. This can be set to use Tones, Codes, NAC, TGID. Reference §3.4.6 Channel Signaling for more information.
11	Transmit Frequency 	The frequency that will be used for all transmit operations. The range allows for 136.0000-173.9975 MHz.

Table 31: Channel Attributes

3.4.2.3 Edit Active Channel

To quickly edit the active channel of the focused radio, press the Edit option from the home screen menu.

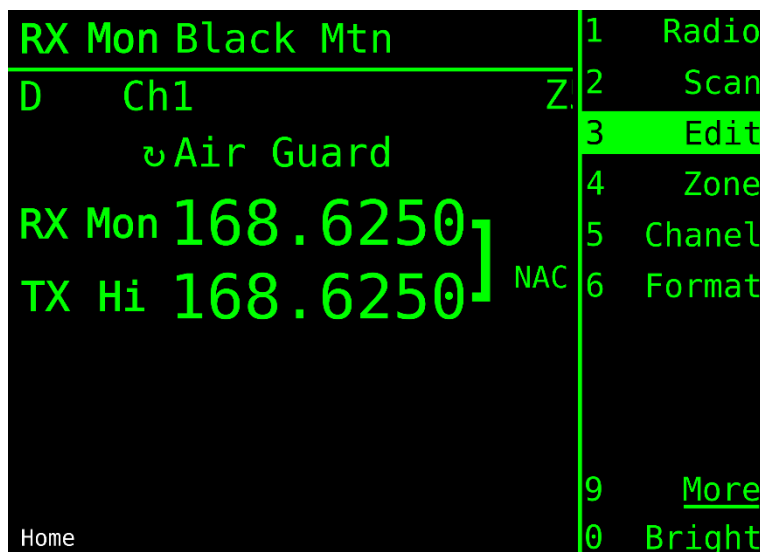



Figure 20: Home Screen Menu – Edit Selected

The Edit Menu provides the ability to edit all or only specific channel attributes. Reference Table 32 for the available options. If any of the options listed in Table 32 are marked with the  icon, the user cannot edit the channel attribute due to administrator restrictions. Reference §3.4.5.4 Zone Permissions for more information.

Item name	Description
All	Edit all information of the active channel.
Name	Edit only the name of the active channel.
RX Freq	Edit only the receive frequency of the active channel.
TX Freq	Edit only the transmit frequency of the active channel.
RX NAC/Tone/Code	Edit only the receive NAC/Tone/Code of the active channel. The user can only select a channel signal from the channels currently selected channel signaling type.
TX NAC/Tone/Code	Edit only the transmit NAC/Tone/Code of the active channel.

Table 32: Home Screen Edit Submenu Options

Once an item from Table 32 has been selected the user will be able to change the selected channel parameter as shown in Figure 21.

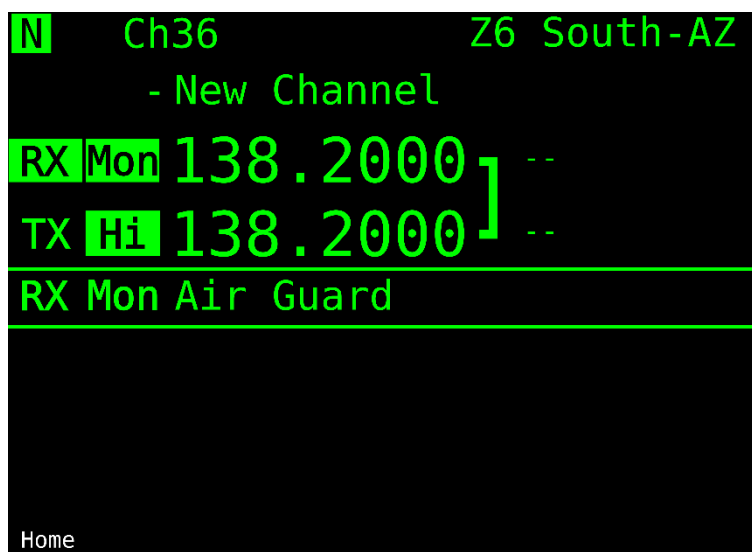


Figure 21: Edit Active Channel on Focused Radio

Note: The - - symbols in Figure 21 indicate that the channel parameter has not been set.

3.4.2.4 Edit All Channels in Active Zone

To edit any channel in the active zone of the focused radio, access the Channel Select screen from the List Menu, and select channel to be edited. This opens the Channel Edit screen which provides the options listed in Table 33 for to edit the channel. Reference §3.4.7 Lists and §3.4.5 Zones for more information.

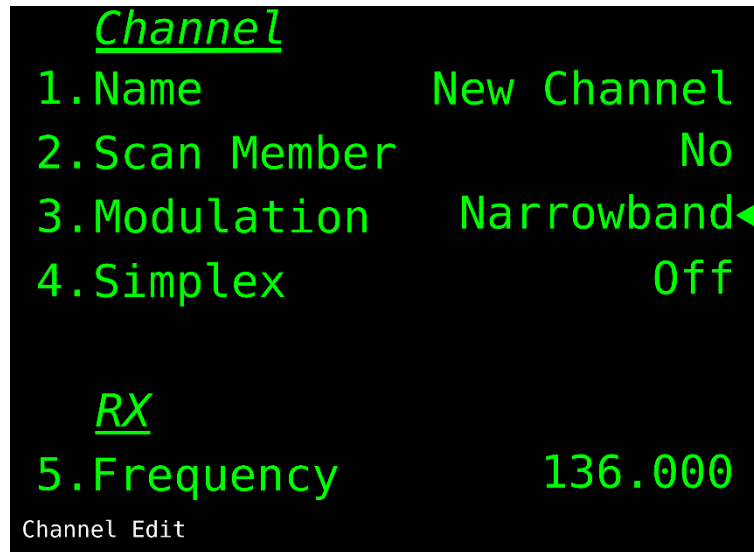


Figure 22: Channel Edit Screen

Item name	Description
Enabled	No idea
Name	Change the name of the channel.
Scan	Controls if the channel is included in the scan list. Reference §3.4.4.3.5 Scanning List for more information. Options include: Yes: The channel is in the scan list. This channel will be scanned in all List scanning algorithms. No: The channel is not in the scan list. This channel will not be scanned in any List scanning algorithms.
Modulation	Change the modulation type of the channel. Options include: Options include: Digital Wideband Narrowband
Tx Power	
Rx/Tx Frequency	Set the frequency that will be used.

Item name	Description
Rx/Tx Tone Type	Select the channel signaling type that will be used. Reference §3.4.6 Channel Signaling for more information. Options Include: Tone Code NAC
Rx/Tx Tone Type	

Table 33: Channel Edit Screen Options

3.4.2.5 Edit All Channels in Any Zone

To edit all channels in any zone, select the zone to be edited from the zone select screen. Reference §3.4.7 Lists for more information. From the zone select screen use the Channels screen item to open the channel select screen. Reference §3.4.5.2 Edit a Zone for more information. When the channel select screen is open all information presented in §3.4.2.4 Edit All Channels in Active Zone is applicable.

3.4.3 Transmitting

The main and guard radios are capable of transmitting in the 136-174 MHz range. The MTP136D is only half-duplex capable which does not allow for transmit and receive functionality at the same time, or to transmit simultaneously on the main and guard radio.

The MTP136D will transmit when the PTT switch is keyed (Pin 13 MIC KEY). Keying the PTT will begin a transmission on the active channel of the focused radio. It is not possible to transmit using the unfocused radio.

3.4.3.1 Transmit Power

Transmission can occur with two power levels HI (10W) and LO (1W). The power level is changed between HI and LO by pressing the transmit power button.

The transmit power button can be configured to change the power level of the active channel on the focused radio, or to affect all channels on both the main and guard radio. Reference the TX Power Scop in Table 20: Admin Options Screen – Radio Independent Options for more information.

3.4.3.2 Transmit Timeout

To ensure the operator does not inadvertently transmit for an extended period, a customizable transmit timeout timer is implemented. This timer automatically stops any active transmission after the time set by the PTT Timeout in §3.3.2.7.1.2 Admin Options is exceeded.

To resume transmitting the operator must unkey and then rekey the PTT. There is no time delay required to be able to rekey the PTT. Under special circumstances the administrator can disable the transmit timeout timer using the PTT Timeout setting. This is not recommended as the operator could inadvertently transmit indefinitely.

3.4.3.3 High Power Overtemperature Transmit Lockout

The high power overtemperature transmit lockout forcefully stops all high-power transmissions when the MTP136D internal temperature limit of 100°C is reached. When the temperature limit is reached, the MTP136D will automatically force any active transmissions into the Low transmit power mode and continue the transmission. The user is notified of the high power overtemperature transmit lockout by 3 blinks of the transmit power indicator and the transmit power indicator indicating as LO! The overtemperature lockout is automatically removed once the MTP136D is below the internal temperature limit.

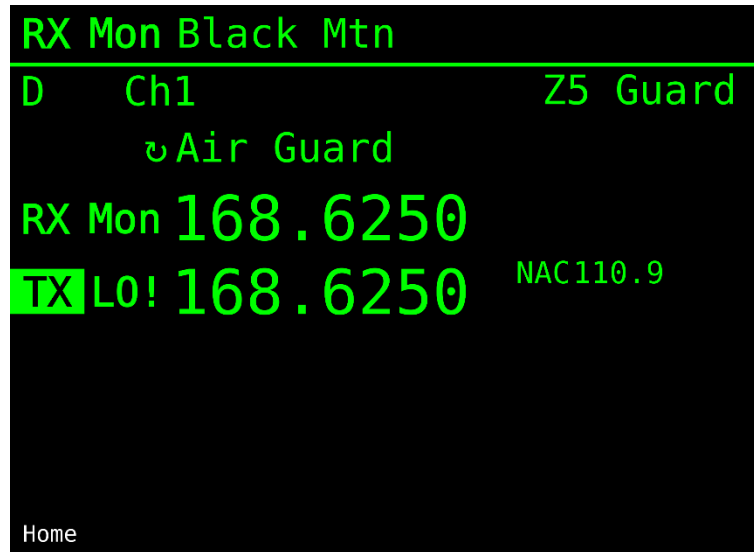


Figure 23: High Power Overtemperature Transmit Lockout Active

The MTP136D will never limit low power transmissions or receive functionality due to overtemperature limitations.

The temperature and overheated menu items on the Test screen can be used to identify the MTP136D internal temperatures and provide indication if a radio has overheated. Reference §3.3.2.7.4.4 Test for more information.

3.4.4 Receiving

Both the main and guard radio are capable of receiving in the 136-174 MHz range. The MTP136D is only half-duplex capable which does not allow the MTP136D to transmit and receive at the same time. The main and guard radios can receive audio simultaneously. This allows received audio from both radios to be heard in the operator's headset at the same time. Received audio will always be routed to the headset regardless of the radio being focused or unfocused.

If the user suspects that communication is not being heard due to a low RF signal level or nonmatching signaling tones, the monitor function can be activated, or the squelch threshold can be decreased. Reference §3.4.4.1 Monitor and §3.4.4.2 Squelch Threshold for more information. This scenario can be identified when the MON indicator is highlighted, but the RX indicator is not.

3.4.4.1 Monitor

The monitor function allows the operator to bypass and defeat any channel signaling and receive signal strength requirements. When the monitor function is activated, the operator will be able to hear all noise, weak signals, and communications regardless of any channel signaling requirements.

The monitor function can be turned on temporarily by pressing the monitor button or can be latched on by pressing and holding the monitor button for a duration set by the hold time setting. The MTP136D is factory programmed to latch the monitor function when the monitor button is pressed and held. The Monitor function is unlatched when the monitor button is pressed again.

The latching feature is controlled by the monitor latch and hold time setting, reference §3.3.2.7.1.1 User Options. Reference the monitor scope setting in §3.3.2.7.1.2 Admin Options to select if pressing the monitor button will override squelch the focused radio or both radios.

While digital monitor is enabled; activating the monitor function while having an active digital channel will set the applied NAC to the listen to all NAC F7E.

When enabled the digital monitor allows only signals within the current TGID to be heard. When disabled the user will hear all communication in and out of the set TGID. Reference the digital monitor setting in §3.3.2.7.1.1 User Options.

3.4.4.2 Squelch Threshold

The squelch threshold controls how strong a received signal must be in order to hear audio in the headset. This allows for noise and undesired strong signals to be rejected. The squelch threshold can be uniquely set for each installed radio. To change the Squelch threshold, reference the Squelch Threshold setting in §3.3.2.1 Radio.

The three supported squelch thresholds are detailed in Table 34.

Squelch Threshold	Description
Low	This will allow weak signals to be heard by the operator. This is recommended when operating across large distances, or where RF traffic is minimal.
Medium	This will allow most communication signals to be heard by the operator. This is recommended setting for urban and semi urban environments where medium RF activity is expected.
High	This will allow only strong communication signals to be heard by the operator. This is recommended in environments where high RF activity is expected.

Table 34: Squelch Threshold Options

3.4.4.3 Scanning

The scanning feature allows for the automatic detection of signals across a predefined list of channels. Once a signal is detected the radio will temporarily

remain on the channel (locked) where the signal was received and provide the user an opportunity to reply on that channel.

The scanning feature can be used individually for the main and guard radio, or simultaneously. The scanning feature must be enabled by the administrator for each zone. Reference the scan setting in §3.4.5.4 Zone Permissions for details.

Scanning can be enabled or disabled on a per radio basis using the following methods:

- a) Focus on the desired radio and press Scan from the home screen menu.
 - b) Edit the Scan setting from the Radio Options screen.
- Reference §3.3.2.1 Radio for more information.

The scan algorithm can be changed on a per radio basis using the following methods:

- a) Rotating the rotary selector while actively scanning on the focused radio.
 - b) Edit the Scan Algo. Setting from the Radio Options screen.
- Reference §3.3.2.1 Radio for more information.






Symbol	Scanning Algo.	Scanned Channels
	List	Only channels in the scan list are scanned.
	Priority	Only P1, P2, and the Home channels are scanned.
	List + Priority	All priority, Home, and list channels are scanned.
	Zone	Only channels in the active zone are scanned.
	Zone + Priority	All priority, Home, and zone channels are scanned.

Table 35: Available Scanning Algorithms

3.4.4.3.1 General Scanning Behaviour

All scanning algorithms operate using the same general rules. The only difference between the scanning algorithms are the channels that are scanned. The following is true for all scanning algorithms:

- a) The MTP136D will remain actively scanning unless the user chooses to exit the scanning mode.
- b) The MTP136D will assign the home channel to be the active channel when the scanning algorithm is entered.
- c) The MTP136D will always scan the scan list in the numerical order of the scan list.
- d) Priority channels are scanned in the order of P1, P2, Home.
- e) When a radio signal lock is lost, the MTP136D will stay on that channel for three seconds before scanning other channels.
- f) After transmitting on a signal locked channel, the MTP136D will stay on that channel for three seconds before scanning other channels.

- g) All channels in the scan list, except P1, P2, Home, can be temporarily deleted from the scan list by pressing delete from the menu. The deleted channel will automatically be reinserted into the scan list once the scanning is exited.

3.4.4.3.2 Home Channel

The Home channel is automatically set to be the active channel when the scanning mode is entered. The Home channel is a priority channel and is assigned the lowest priority. The following is always true for the home channel.

- a) The home channel is always the active channel when the scanning mode is entered.
- b) The home channel is included in every scanning algorithm.
- c) The home channel will be used to transmit if the radio is not locked on a channel.
- d) The home channel cannot be deleted from the scanning list.

3.4.4.3.3 Priority Channels

The MTP136D supports the use of two priority channels for each configured zone. These are named P1 and P2. When the selected scanning type supports the use of Priority channels, the priority and home channels will be scanned at a higher scanning interval than all other channels. These channels will be scanned in the sequence of P1, P2, Home followed by as many scan list channels that can be scanned within the timeframe set by the priority scan rate. Reference for §3.3.2.7.1.1 User Options more information regarding the Priority scan rate.

When priority channels are supported by the scanning type the following will always be true:

- a) When a signal is received on P1, the MTP136D will remain on P1 until the signal is lost.
- b) When a signal is received on P2, the MTP136D will periodically scan P1 and check for a radio signal. If a signal is present on P1 the MTP136D will lock onto P1. The MTP136D will perform this check at an interval specified by the priority scan rate.
- c) When a signal is received on Home, the MTP136D will scan P1 and P2 to check for a radio signal. If a signal is present on P1 or P2 it will lock onto that channel. The MTP136D will perform this check at an interval specified by the priority scan rate.
- d) A priority channel cannot be deleted from the scanning list.


Note: A priority channel can still be assigned as a regular scan list channel.

3.4.4.3.4 Set Priority Channels

The priority channels can be set using the following methods:

- a) Using the P1 and P2 settings described in §3.4.5.2 Edit a Zone.
- b) Using the Scan menu setting referenced in §3.4.7.2 Creating and Managing Lists Members.

3.4.4.3.5 Scanning List

The scanning list is a list of channels that are used during the scanning algorithms List and List + Priority scanning. This list identifies which channels will be continuously scanned during the previously listed scanning algorithms. A channel marked with the  symbol is included in the scanning list. To add or remove a channel in the scan list reference §3.4.2 Channels.

3.4.4.3.6 Set Scanning List

A channel can be added into the zones scan list by following the methods listed in §3.4.2 Channels and editing the In Scan List status shown in Table 31: Channel Attributes.

3.4.4.3.7 Home Screen while Scanning

While a radio is scanning it will display different information based on the radio being focused and if has locked onto a channel. Reference Table 36 and the sections below for more information regarding what the MTP136D displays for each radio status. In all images in Table 36 the main radio is in the scanning mode while the guard radio is not.

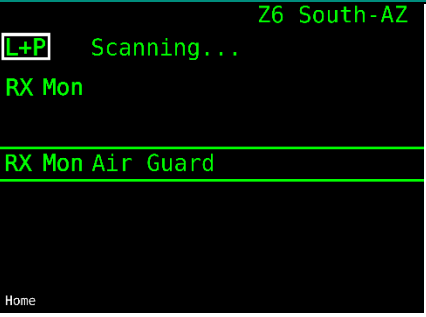
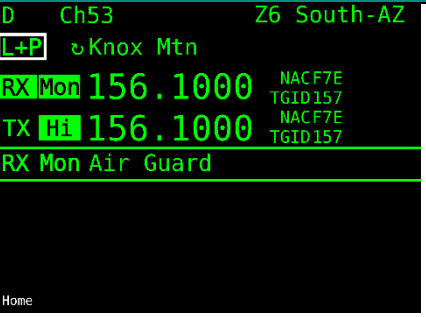
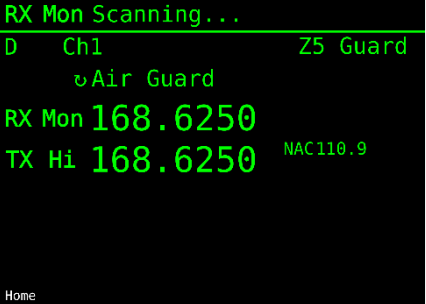
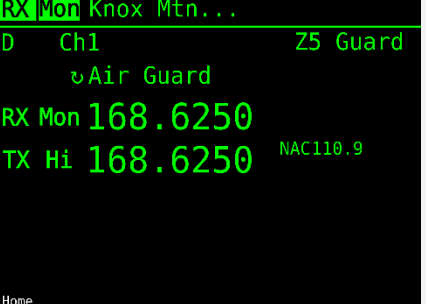
	Not Locked on a Channel	Locked on a Channel
Focused Radio		
Unfocused Radio		

Table 36: Channel Attributes Displayed while Main Radio is Scanning

When a radio is focused and locked on a channel the following items are available from the menu.

Setting Name	Description
Scan	Exit scanning mode.
Next	Remove channel lock and continue scanning.
Stay	Stay on current channel and exit scanning for the focused radio.
Delete	Temporarily remove the locked channel from the scan list.

Settings	Open the settings menu.
Bright	Open the Brightness screen.

Table 37: Scanning Menu Options While Locked on a Chanel

When a radio is focused and not locked on a channel the following items are available from the menu.

Item name	Description
Radio	Opens the Radio screen.
Scan	Exits the scanning mode for the focused radio.
More	Opens the More Menu.

Table 38: Scanning Menu Options While Not Locked on a Chanel

3.4.5 Zones

A Zone is a list of channels and permissions. The MTP136D supports the use of 40 zones which are accessible to both the main and guard radio. There is no limit as to how many channels can be added per zone, providing the total number of channels across all zones does not exceed 5000. Zones are categorized as lists and follow the same menu structure as all lists. Channels are considered list members when in reference to zones. For steps required to create, edit, or delete a zone, or a channel reference §3.4.7 Lists. Each zone has the ability to apply one channel signaling list for each channel signaling type (Tones, Codes, TAC, TGID).

A zone can only be edited by the user if the administrator has granted the appropriate zone specific permissions. See §3.4.5.4 Zone Permissions for more information.

Note: Zones cannot be edited unless the agile edit key has been entered.
Reference §3.6.1 Keys for more information.

3.4.5.1 Changing the Active Zone

The active zone for a radio can be changed from the following locations:

- The active zone for any radio can be changed from the radio options menu. Reference the zone option in §3.3.2.1 Radio for more information.
- The zone of the active radio can be changed from the zone option from the home screen menu. Reference zone in Table 12: Home Screen Menu for more information.

3.4.5.2 Edit a Zone

To manage all zones or create a new zone reference §3.4.7.1 Creating and Managing Lists. The Zone select screen provides the ability to edit all information for every zone in the MTP136D. Once a zone has been selected for editing the Zone edit screen will open. The settings listed in Table 39 are individually configurable for each zone.

Setting Name	Description
Name	Change the name of the zone.
Channels	Edit a channel in the zone. See §3.4.2 Channels for more information.
P1	Select the main priority channel that will be used in the scanning algorithms that support priority channels.
P2	Select the secondary priority channel that will be used in the scanning algorithms that support priority channels.

Table 39: Zone Options

3.4.5.3 Applying a Channel Signaling List to a Zone

Every zone supports the simultaneous use of all four channel signaling list types. A channel signaling list can be applied from the zone edit screen. Reference Table 40 for the settings available on the zone edit screen that allow for the assignment of channel signaling lists to a zone.

Setting Name	Description
Tone	Apply a Tone list to the zone. If none is selected, then all tones can be selected.
Code	Apply a Code list to the zone. If none is selected, then all codes can be selected.
NAC	Apply a NAC list to the zone. If none is selected, then all NAC items can be selected.
TGID	Apply a TGID list to the zone. If none is selected, then all TGID items can be selected.

Table 40: Lists applied to Zone

3.4.5.4 Zone Permissions

The following permission settings control zone specific access of various agile edit functionality. All permissions are unique to each zone. These permissions, except for the protected screen item, can only be viewed with the admin login level.



Setting	Description
Protected	An indicator that is viewable by the admin and user. This indicator will state “Yes” when one or more items in this table are set to the admin permission setting. If no items in this table is set to admin, the indicator will state “No”.

Write	Controls the ability for the user to change the settings listed in Table 39: Zone Options. This setting will limit the user's ability to create or delete a channel in the zone and stop the user from deleting the zone. It will not limit the user's ability to edit an existing channel. This setting will also automatically set all settings in this table to either user or admin, as selected. The admin can still overwrite each setting in this table manually as required.
Name	Controls the ability for the user to change the name of a channel.
Scan	Controls the ability for the user to enable scanning for the selected zone.
Modulation	Controls the ability for the user to change the modulation type for channels.
Rx Frequency	Controls the ability for the user to change the channels receive frequency.
Rx Tone Type	Controls the ability for the user to change a between tones or codes for receive.
Rx Tone/Code	Controls the ability for the user to change the applied tone or code for receive.
Rx NAC	Controls the ability for the user to change a channels NAC for receive.
Rx TGID	Controls the ability for the user to change a channels TGID for receive.
Tx Frequency	Controls the ability for the user to change the channels transmit frequency.
Tx Tone Type	Controls the ability for the user to change a between tones or codes for transmit.
Tx Tone/Code	Controls the ability for the user to change the applied tone or code for transmit.
Tx NAC	Controls the ability for the user to change a channels NAC for receive.
Tx TGID	Controls the ability for the user to change a channels TGID for transmit.

Table 41: Zone Specific Permissions

3.4.5.5 Zone Edit Screen Menu

Pressing the menu button while on the Zone edit screen will show the options in Table 42.

Setting Name	Description
Channel	Opens the channel select screen. If all settings in Table 41, except write, are set to admin, the user cannot use this setting and will be marked with the  symbol.
Tone	Opens the tone list edit screen. If no tone list has been assigned to the zone the  symbol is shown, and this setting cannot be used.




Code	Opens the Code list edit screen. If no code list has been assigned to the zone the  symbol is shown, and this setting cannot be used.
NAC	Opens the NAC list edit screen. If no NAC list has been assigned to the zone the  symbol is shown, and this setting cannot be used.
TGID	Opens the TGID list edit screen. If no TGID list has been assigned to the zone the  symbol is shown, and this setting cannot be used.

Table 42: Zone Edit Screen Menu Options

3.4.5.6 Locking a Radio to a Zone

The main and guard radio can be locked to a specific zone by the administrator. A radio is locked to a zone by setting the Zone Permissions setting to admin and then selecting the active zone for the desired radio. When a radio is locked to a zone the user cannot use any methods to change the zone for the locked radio. Reference §3.3.2.7.1.2 Admin Options for more information regarding the Zone Permissions setting.

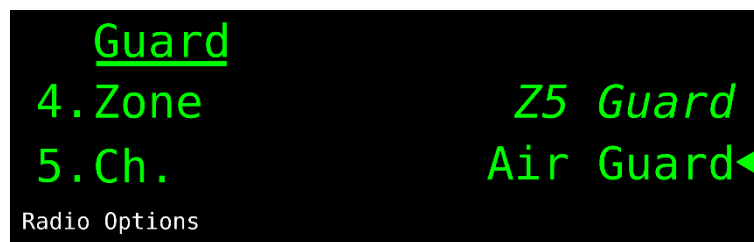


Figure 24: Guard Radio Locked to a Zone (indicated by italic text)

This feature is primarily intended to support the configuration of a dedicated guard radio. Reference §3.6.6 Configuring a Guard Radio for the required steps to setup a radio as a dedicated guard radio.

3.4.6 Channel Signaling

Channel signaling provides different methods to allow multiple users to communicate on the same frequency without receiving messages from unwanted users. Standard industry usage of these methods is beyond the scope of this manual and will not be covered.

The Tones, Codes, NAC, and TGID can be applied individually for transmit and receive operations on a per channel basis. Reference §3.3.2.5 Channel Methods to apply channel signaling is covered in the channels section. When applying channel signaling to a channel, the following must be noted:

- When a zone has an applicable list applied, rotating the rotary selector will only show the channel signaling available in the applied list for the specified channel modulation. signaling
- When a zone does not have an applicable list applied, rotating rotary selector will show all possible channel signaling for the specified channel modulation.

- c) The keypad can be used to enter any channel signaling item, using the active display format, regardless of the list that is applied to the zone.

Lists provide the user a custom selection of frequently used channel signaling Tone, Code, NAC and TGID values for quick access. Lists allow the operator to only scroll through frequently used channel signals by using the rotary selector. Lists are a shortcut method to access frequently used channel signals, but do not limit the user from accessing any available channel signals. Any channel signals can be applied by entering the selective identifier with the keypad, even when a list has been applied to a zone.

Each zone supports having one channel signaling list applied for each list type (Tone, Code, NAC, TGID). A list can be assigned to as many zones as desired. See §3.4.5.3 Applying a Channel Signaling List to a Zone for the required steps.

For more information regarding lists reference §3.4.7 Lists.

For information regarding the display format reference §3.4.6.5 Channel Signaling Formats.

3.4.6.1 Tone (CTCSS)

The MTP136D supports the use of the extended 50 CTCSS subaudible tone set. CTCSS codes can be used for wideband and narrowband channels. All supported CTCSS tones are listed below by their applicable display format.

FREQ	MCODE	WCODE	FREQ	MCODE	WCODE	FREQ	MCODE	WCODE
67.0	XZ	1	118.8	2B	21	183.5	183.5 ²	56
69.3	WZ	51	123.0	3Z	22	186.2	7Z	36
71.9	XA	2	127.3	3A	23	189.9	189.9 ²	57
74.4	WA	3	131.8	3B	24	192.8	7A	37
77.0	XB	4	136.5	4Z	25	196.6	196.6 ²	58
79.7	WB ¹	5	141.3	4A	26	199.5	199.5 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	159.8 ²	52	218.1	M3	42
94.8	ZA	12	162.2	5B	32	225.7	M4	43
97.4	ZB	13	165.5	165.5 ²	53	229.1	9Z	47
100.0	1Z	14	167.9	6Z	33	233.6	M5	44
103.5	1A	15	171.3	171.3 ²	54	241.8	M6	45
107.2	1B	16	173.8	6A	34	250.3	M7	46
110.9	2Z	17	177.3	177.3 ²	55	254.1	0Z	63
114.8	2A	18	179.9	6B	35			

Table 43: Tones (CTCSS)

¹ Also known as SP.

² No Motorola Code assigned to this CTCSS frequency. Tone will remain displayed in Frequency format when format is set to MCODE.

3.4.6.2 Code (CDCSS)

The MTP136D supports the use 106 CDCSS codes. CDCSS codes can be applied for narrowband and wideband channels. The following CDCSS codes are supported.

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 44: Codes (CDCSS)

3.4.6.3 TGID

The radios support the use of talkgroups in the range of \$0001 and \$FFFF. Talkgroups are a group of users within a trunked radio system. The talkgroup \$0000 is not supported by the MTP136D.

3.4.6.4 NAC

The radios support the use of all NAC codes in the range of \$000 – \$FFF. NAC codes can only be used for digital channels. Frequently used special P25 NAC codes are shown below:

Code	Description
\$293	This is the default NAC code and commonly used on interoperability channels and ham radio equipment.
\$F7E	This code will cause the MTP136D to ignore all receive NAC codes. This is the equivalent of having no signaling selected in analog channel modulation.
0xF7F	The MTP136D will allow all incoming NAC codes and will transmit using the received NAC code.

Table 45: Special NAC Codes

3.4.6.5 Channel Signaling Formats

The MTP136D supports displaying channel signaling using different display formats. This allows the operator to view and enter a channel signaling in the format they are most familiar with. The selected display format is the only format that can be used to edit a channel's signal using the keypad. The selected display format will be applied to the main and guard radio.

In addition to industry standard display formats, custom labels can be applied to channel signals. See §3.4.7.2 Creating and Managing Lists Members to edit a list members label. When the label display format is enabled, it will take priority over all other display formats. The user cannot select a channel signal by entering its label using the keypad.

Note: Do not set a channel signal to have more than one label e.g. CTCSS tone 67.0 should not have an assigned label of Tone 1 and Tone 2.

The options listed in Table 46 show the supported display formats for each channel signaling type.

Channel Signaling Type	Display Formats
Tone	Label, Frequency, Mcode (Motorola code), Wcode (Wolfsburg code)
Code	Label, Code
NAC	Label, Hex, Decimal
TGID	Label, Hex, Decimal

Table 46: Channel Signaling Display Formats

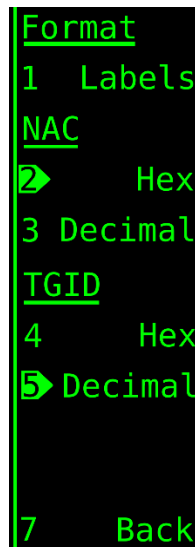


Figure 25: Format Display Menu

The display format can be changed in the following locations:

- The Format option from the Home Screen Menu. Reference §3.3.2 Menu for more information.
- The Radio Options Screen. Reference §3.3.2.1 Radio for more information.

- c) The format option from the agile edit screens menu. Reference §3.3.2.3 Edit for more information.
- d) The format option from the menu of the channel edit screen. Reference §3.4.7.2 Creating and Managing Lists Members for more information.

3.4.7 Lists

Lists are a collection of similar items, such as channels, zones, tone, codes, NAC, TGID. The items in these lists are called list members. Lists and list members can be copied, inserted, moved, or deleted. Due to the complexity of features available to zones and channels, additional information is detailed in §3.3.2.4 Zone and §3.4.2 Channels. All selection and edit screens will only allow for edits if the agile edit key is entered. Reference §3.6.1 Keys for more information.

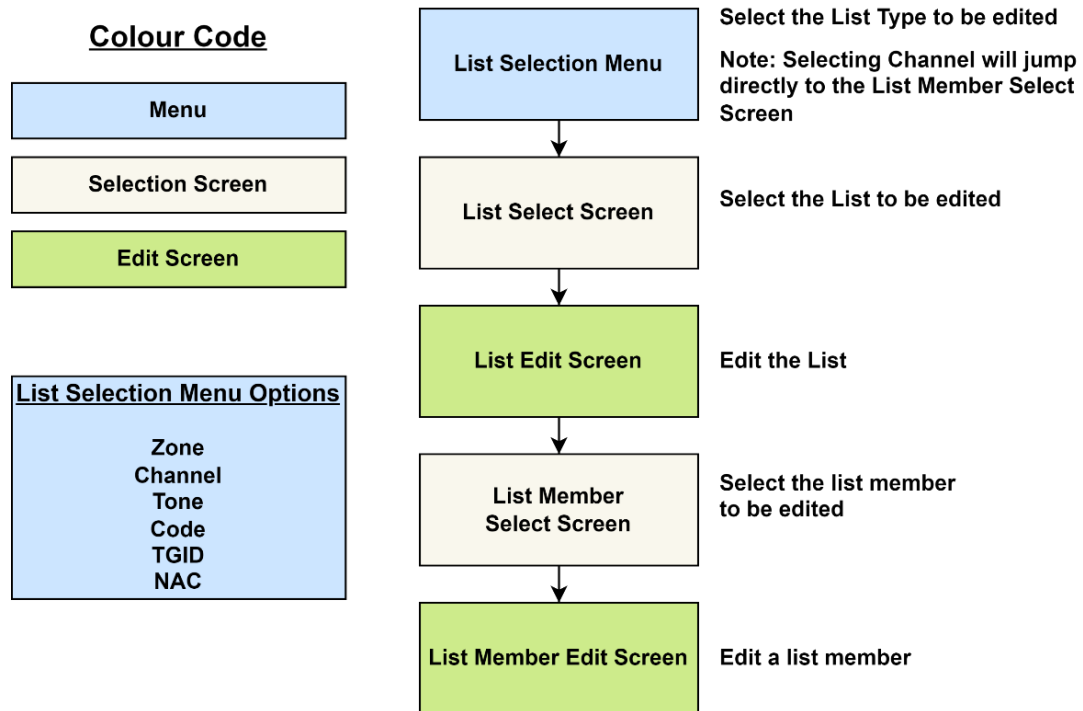


Figure 26: List and List Member Edit Screens

List	QTY of Lists	QTY of Members
Zone	40	5000 (see note)
Channel	N/A	5000 (see note)
Tone	8	96
Code	8	96
TGID	8	96
NAC	8	96

Table 47: Quantity of Lists and List Members

Note: The MTP136D supports a total of 5000 channels that can be divided across a maximum of 40 zones. There is no limit as to how many channels can be added per zone, providing the total number of channels across all zones does not exceed 5000. This allows the MTP136D to be configured to utilize only one zone, which has the ability to hold all 5000 channels.

3.4.7.1 Creating and Managing Lists

The menu structure for creating, copying, moving and deleting a list is identical for all list types. From the list select screen the user can either select a list for editing or press the menu button for more options.

Pressing the menu button on the list select screen will show the options in Table 48.

Setting	Description
Edit	Edit the currently selected list. This opens the list edit screen.
Insert	Create a new list. Once pressed the user must select in what position the list is to be placed in the list select screen using the rotary selector. Once the list is in the desired position the rotary selector must be pressed to save the lists position as well as the list itself.
Copy	Create a new list by copying all properties of the selected list. Once pressed the user must select in what position the list is to be placed in the list select screen using the rotary selector. Once the list is in the desired position the rotary selector must be pressed to save the lists position as well as the list itself.
Move	Move the selected list to a different position in the list select screen. The list is moved by rotating the rotary selector. Moving a list does not change any information in the list. Once the list is in the desired position the rotary selector must be pressed to save the lists position.
Delete	Delete the selected list.

Table 48: List Select Menu Options

When editing a channel signaling list (Tone, Code, NAC, TGID), the options in Table 49 are available.

Setting	Description
Name	Change the name of the list.
Tones/Codes/NACS/TGID	The name of the screen item will change based on the list type selected. Selecting this item will open the corresponding list member select screen.
Write Access	Controls what permission level is required to edit the list. This option is only visible when logged in as Admin. When set to admin the user cannot edit any items in the list member select screen.

Table 49: List Edit Screen Options

3.4.7.2 Creating and Managing Lists Members

List members are any Channel, Tone, Code, NAC, TGID that are used in a list. A list member can be created, copied, edited, moved, or deleted by opening the menu of the list member select screen. From the list member select screen the user can either select a list member for editing or press the menu button for more options.

Pressing the menu button on the list member select screen will open the options shown in Table 51.

Setting	Description
Edit	Edit the currently selected list member. This opens the list member edit screen.
Insert	Create a new list member. Once pressed the user must select in what position the list member is to be placed in the list member select screen using the rotary selector. Once the list member is in the desired position the rotary selector must be pressed to save the lists members position as well as the list member itself.
Copy	Create a new list member by copying all properties of the selected list member. Once pressed the user must select in what position the list member is to be placed in the list select member screen using the rotary selector. Once the list member is in the desired position the rotary selector must be pressed to save the list members position as well as the list member itself.
Move	Move the selected list member to a different position in the list member select screen. The list is moved by rotating the rotary selector. Moving a list does not change any information in the list. Once the list is in the desired position the rotary selector must be pressed to save the lists position.
Delete	Delete the selected list.
Scan	Only available on the channel select screen. This allows for the assignment of P1, P2, or scan list enrolment for the currently selected channel. The screen indicators for P1, P2 and U will be displayed when selected for the channel. Reference Figure 27 for visual reference.

Table 50: List Member Select Menu

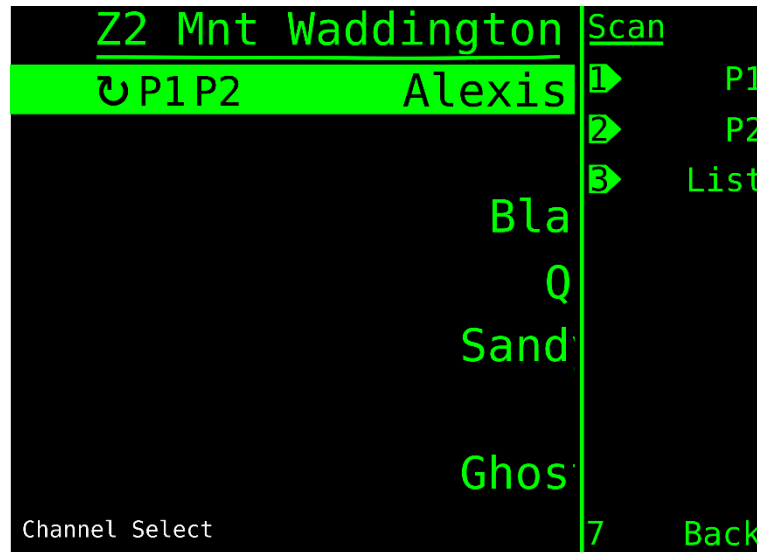


Figure 27: Channel Select Screen Menu

A list member can be selected for editing by pushing the rotary selector on the desired list member or by selecting edit from the list member select menu. When editing a channel signaling list member (tone, code, NAC, TGID), the options in Table 51 are available. For options available when editing a channel, reference §3.4.2.4 Edit All Channels in Active Zone.

Setting	Description
Label	Change the label that will be used for the label display format. The label is unique to the list member in which the list member is created. This allows different lists to have a unique label for each channel signaling value.
Tones/Codes/NACS/TGID	Change the applicable channel signaling value.
Write Access	Controls what permission level is required to edit the channel signaling list member. This setting is only displayed when logged in with the admin permission level. The available options are as follows: Admin: Admin login level is required to edit the channel signaling list member. User: User login level is required to edit the channel signaling list member.

Table 51: List Member Select Screen Options

3.4.8 MTP136D Brightness

The MTP136D allows for individual control of the brightness of the faceplate (all buttons and knobs) and the screen. The screen and faceplate support day and nighttime brightness modes which is selectable by the hardware dimming bus.

3.4.8.1 Screen Brightness

The screen brightness can be viewed and controlled from the brightness screen. This brightness screen is accessible from several menus including the home screen menu.

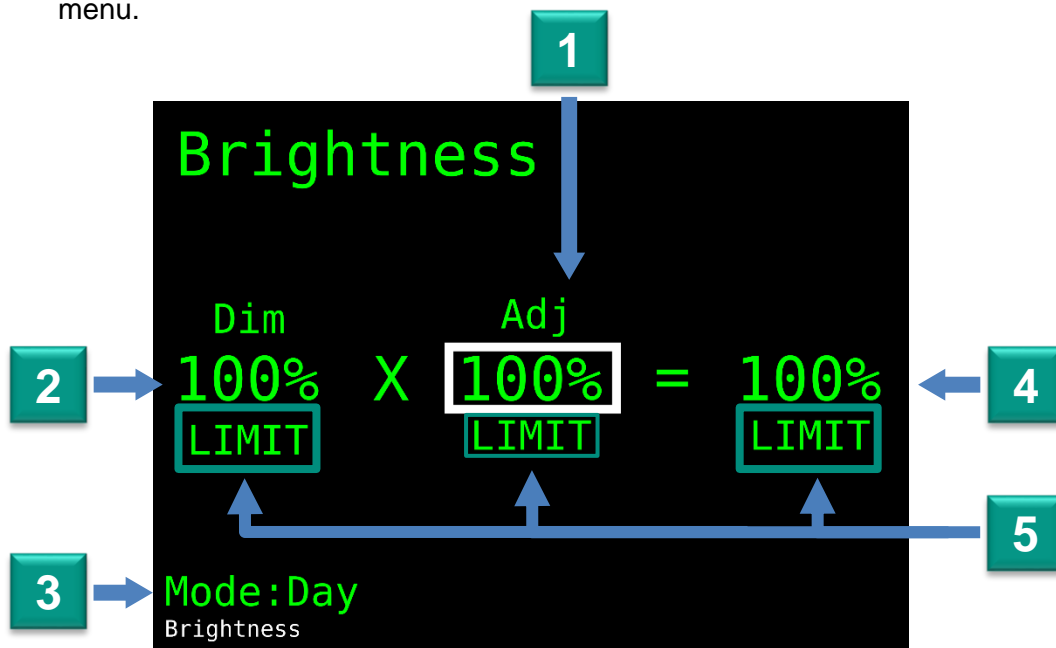


Figure 28: Brightness Screen

Item	Item name	Description
1	Adj	A software adjustment value that allows the operator to closely match the dimming level of other cockpit equipment. This can be adjusted at any time using the rotary selector.
2	Dim	The dimming value that is provided by the hardware dimming bus. This item is only visible when the LCD dimming setting is enabled. Reference §3.3.2.7.1.2 Admin Options for more information.
3	Mode	Shows the brightness mode used for both the faceplate and the screen dimming level. The mode can be set as either day or night.
4	Screen Brightness	The screen brightness level that is currently used. This level is achieved by multiplying the brightness level of the dimming bus (dim) and the software adjustment (adj) level.

5	Limit	When an adjustment level has reached the maximum or minimum dimming level, the Limit indicator will be displayed. The Adj, Dim and screen brightness all have individual limit indicators. All values on the Brightness screen have a value range of 0-100%.
---	-------	--

Table 52: Brightness Screen Items

If desired, the LCD brightness level can be configured to be unaffected by the dimming bus. This will cause the screen brightness to be controlled entirely by the Adj from the brightness screen; however, the dimming bus will continue to determine the screen mode: day or night.

The LCD screen brightness can be linked to the dimming bus by enabling the LCD Dimming setting (default). Reference §3.3.2.7.1.2 Admin Options for more information.

3.4.8.2 Panel Brightness

The faceplate brightness is always directly linked to the voltage supplied by the dimming bus (pin 3 PANEL LIGHTING) and cannot be adjusted using software.

3.4.8.3 Day and Night Mode

The MTP136D brightness can be placed in two modes, Day and Night. The Day brightness mode provides maximum brightness while Night dimming mode allows for low light operating conditions.

The brightness mode is entirely selected by the input voltage provided by the dimming bus (pin 3 PANEL LIGHTING). When the dimming bus voltage is below the transition voltage listed in Table 53, the brightness will be in DAY mode. Any value above the transition voltage will set the brightness to Night mode.

Panel Lighting Voltage (Vdc)	Night to Day Mode Transition Voltage (Vdc)	Day to Night Mode Transition Voltage (Vdc)
0 – 5	1.0 ± 0.1	1.25 ± 0.1
0 – 14	2.8 ± 0.3	3.5 ± 0.3
0 – 28	5.6 ± 0.6	7.0 ± 0.6

Table 53: Day and Night Transition Voltage

Reference Table 54 for the maximum screen luminance level during Day and Night mode.

Specification	Day Mode	Night Mode
Luminance (fL)	>150	5 ± 2.5

Table 54: Luminance During Day and Night Mode

3.4.8.4 Dimming Bus Input Voltage Range

The pin 3 PANEL LIGHTING input supports three airframe dimming bus voltage ranges (+5V, +14V and +28V) to facilitate the installation in various aircraft systems. Reference §3.3.2.7.1.2 Admin Options to edit the Max Voltage setting to change the lighting bus voltage range.

The 0-100% scaled input value of the dimming bus can be viewed using the Panel Dimming setting. Reference §3.3.2.7.4.4 Test for more information.

3.4.9 DTMF Signaling

The MTP136D supports the full range of 16 DTMF tones 0-9, A-D, *, #. This feature allows the operator to call landlines, open repeaters etc. when communicating with compatible equipment. To enable DTMF Signaling reference the DTMF Signaling setting in §3.3.2.7.1.2 Admin Options.

DTMF tones can be used at any time while transmitting. The tones 0-9, are accessible by pressing the corresponding keypad button. The tones A-D, *, # are accessible by pressing the menu button while transmitting. If it is desired to enter multiple A-D, *, # tones sequentially, it is recommended to latch the menu open to make it easier to enter multiple tones.

The sidetone DTMF volume can be changed using the DTMF sidetone level setting. Reference §3.3.2.1 Radio for more information.

3.4.10 Sidetone

Sidetone allows the operator to hear their own voice while transmitting. This is done by routing the microphone audio into the headphone audio stream. Sidetone is enabled by default to allow operation in a cabin management or audio management system that requires sidetone from the MTP136D. The Sidetone can be disabled entirely for integration where sidetone is provided by the audio management controller. Reference the sidetone setting in §3.3.2.1 Radio.

The Sidetone output level can be adjusted to match system installation requirements. Reference the sidetone level setting in §3.3.2.1 Radio.

3.4.11 Auto Simplex

Auto simplex allows the user to edit a channel's receive frequency and applicable channel signaling and have the MTP136D automatically update the channels transmit frequency and channel signaling to match. A channel is auto simplex linked when both the transmit and receive frequency and channel signaling are identical. An auto simplex linked channel is marked by a simplex auto link bar.



Figure 29: Simplex Channel

To unlink a channel from auto simplex the user must change the channel's transmit frequency or channel signaling. Reference the Auto Simplex setting in §3.3.2.7.1.1 User Options to Enabled/Disable the Auto Simplex function.

3.4.12 Go Home Function

The Go Home function allows the user to immediately return to the home screen regardless of what screen is open or if an item is being edited. When this function is used any item that is actively edited will be automatically saved.

This feature can be activated by keying the PTT or by pressing the radio selector button. Reference §3.3.2.7.1.1 User Options to edit the Go Home setting. This function is disabled by default.

3.4.13 Errors

If a fault occurs during runtime operation, the MTP136D will automatically attempt to recover from the fault. If the MTP136D is not able to recover from the fault the error will be logged in the error log and displayed to the operator.

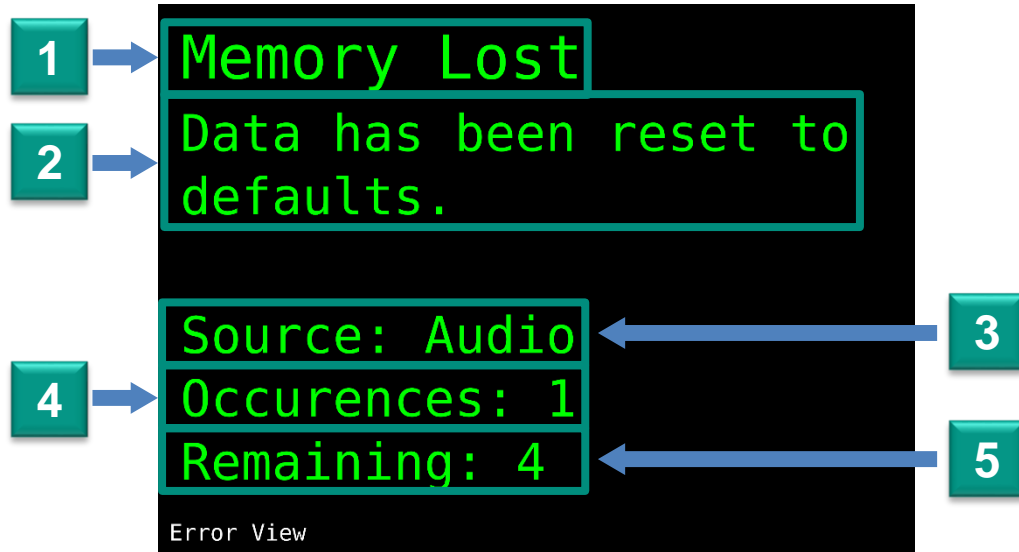


Figure 30: Error View Screen

#	Item Name	Description
1	Error Name	The name of the error that occurred.
2	Error Description	Description of the error.
3	Error Source	Shows the software category from which the error came. This is not related to the severity of the error.
4	Error Occurrences	Lists how many times this error has occurred.
5	Errors Remaining	Lists how many errors have not been viewed

Figure 31: Error View Screen Description

When a fault occurs, all available information is displayed. Contact AEM with the exported error log for more detailed information. To close the displayed fault, the rotary selector must be pressed.

Reference Table 55 for the options available when pressing the menu button on the Error View Screen.

Item Name	Description
Clear	The error will be logged in the error log and future occurrences of the same fault will be displayed.
Suppress	The error screen will not be displayed for all future occurrences of the same error code until the MTP136D is power cycled. The error occurrence will be logged in the error log.
Suppress All	The MTP136D will not show the error screen for any faults until the MTP136D is power cycled. All faults will be recorded in the error log.

Table 55: Error Code Menu Options

In case of an unrecoverable fault the operation of the MTP136D cannot be guaranteed. If the error persists or inhibits safe operation, contact AEM for servicing.

3.4.13.1 View Error Log

Reference §3.3.2.7.4.3 Errors for the required steps to view the error log. The information provided in the section above is applicable while viewing the error log.

3.4.13.2 Export Fault Log

The MTP136D supports exporting the error log. To export the error log, navigate to the errors menu, see §3.3.2.7.4.3 Errors, and select the Export menu item. With the export screen open, insert the USB stick. The exported file will be named MTP136D_Errors.json.

Note: The USB stick must be formatted to FAT 32 and should only contain files related to the MTP136D.

3.5 Emergency Operation

The MTP136D is a supplemental communication radio and is not intended to be used as the primary communication radio. Supported emergency operating voltages can be found in the Declaration of Design and Performance in §2.7 Installation Drawings. In case of Emergency operation, or MTP136D failure, the MTP136D will not adversely affect other avionics equipment.

3.6 Advanced Features

3.6.1 Keys

Special function keys are unique to each MTP136D that allow for the enabling of extended feature sets. These features involve the agile edit and the wideband modulation features. Keys can be added or removed as required. Reference §3.3.2.7.4.6 Keys for more information.

Keys are persistent through the reset to default function. Reference §3.6.12 Reset to Defaults for more information. Reference §3.6.2 Agile Edit for more information regarding the feature set enabled by agile edit.

Note: Keys must be acquired directly from AEM.

3.6.2 Agile Edit

Agile edit allows for edits to be made to Lists (zones, channels, tones, codes, NAC, TGID) during flight. When agile edit is disabled, changes can only be made using the import feature. To enable agile edit the agile edit key which can be obtained from AEM. Reference §3.6.1 Keys for more information. Reference Table 56 for the features that are allowed or blocked when the agile edit key is removed.

Allowed Features	Blocked Features
All MTP136D parameters can still be imported/exported as required. Reference §	Lists and list members cannot be edited, moved, copied, created or deleted. This includes all channels and zones.
Settings that are not related to lists (Zone, Channels, Tones, Codes, NAC, TGID) are not affected by the Agile Edit key.	All selection and edit screens in §3.4.7 Lists will not accept any edits.
A channel's transmit power can be changed.	The Edit screen cannot be accessed

Table 56: Affects of Agile Edit Feature Disabled

3.6.3 Permissions

The MTP136D supports a comprehensive set of permissions that allow for highly customizable access to channel, zone and system configurations. This allows for easy fleet management and regulatory compliance requirements.

Two access levels are supported, user and administrator. The user login level is always the startup login level and has no ability to modify any administrator permissions. The user can only view/edit settings as allowed by the administrator. If a setting is displayed in *Italic* text, then it is locked from editing for the current login level. Reference §3.2.3 On screen indicators for more info regarding italic text and other onscreen indicators.

The administrator level can restrict the users ability to change zone permissions, see §3.4.5.4 Zone Permissions, and has access to the admin options screen, see §3.3.2.7.1.2 Admin Options.

Permission levels are always upheld regardless how the setting is accessed. This ensures the user cannot change an administrator setting/configuration by using the USB import function, a connected controlling device or the user interface.

3.6.3.1 Accessing Admin Permission Level

Navigate to the login screen and sign in as the administrator. This is done by entering the password: “iac”. This access level is maintained until the MTP136D is restarted.

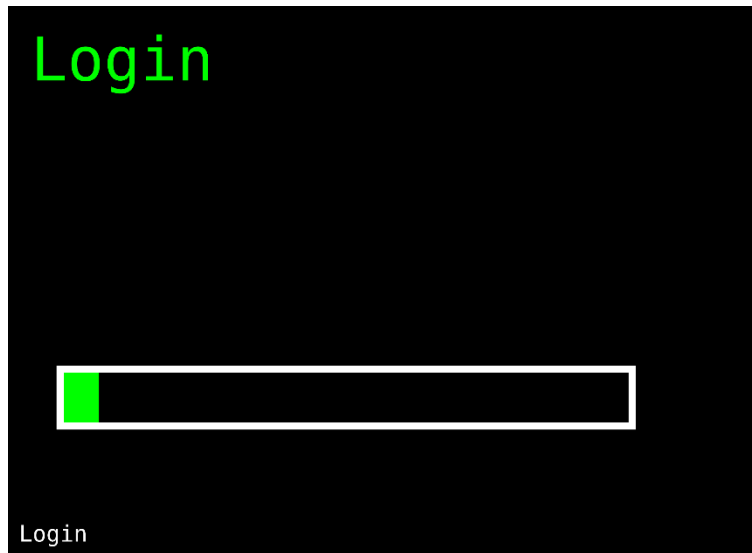


Figure 32: Login Screen

Once logged in the MTP136D will display the admin login level at the bottom left of the screen.



Figure 33: Home Screen with Admin Login Level

3.6.4 Firmware Update

All firmware in the MTP136D can be updated using the USB-C port. This allows the internal radio modules and the system firmware to be updated by the administrator. To identify the current firmware version, reference the SW Ver. in §3.3.2.7.4.5 PRGM. Firmware updates and update procedures can be obtained directly from AEM. Firmware updates can only be performed at the administrator login level.

Note: Do not turn off the MTP136D during software and firmware updates.

3.6.5 Importing/Exporting Profiles

3.6.5.1 Importing Profiles

The MTP136D supports the import of profiles containing channel and system settings. To import a profile, select the Import from the menu as shown in §3.3.2.7.3 Data, and insert the USB drive.

Both the user and the admin can import and export profiles. The user will be able to import and export all channel and user system settings. The admin will be able to import/export all channel, user and admin system settings.

- Note:**
- a) The USB stick must be formatted to FAT 32.
 - b) The import/export file must be named MTP136D.json.
 - c) The channel/system file is a human readable text file in the JavaScript Object Notation (JSON) format.
 - d) It is not required for the MTP136D to be restarted after a failed or successful import or export.

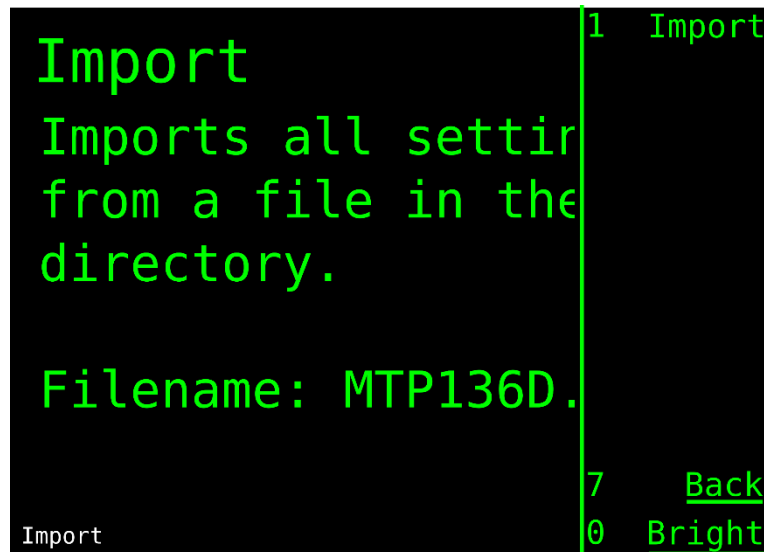


Figure 34: Import Screen

With the USB stick inserted, press the menu button, and then select the Import or Export menu item. The import file can contain as much or as little information as

required. This allows for the import of channel and system settings, only system or channel settings, partial channel, or partial system settings.

If a channel or setting does not match the current login permission the entire import will be cancelled and will revert to the information previously stored in the MTP136D. It is recommended to only perform the import with admin login level as this will ensure the import will not fail due to lacking permissions.

3.6.5.2 Creating a Channel/System Configuration File

The channel/system profile can be created using three methods.

- Using the online MTP136D radio profile tool. This tool allows for easy creation of channels, zones, and system settings. Contact AEM to obtain a link to the MTP136D profile editor tool.
- Manually configure a MTP136D through the user interface to have all desired channel and system settings. Once the MTP136D has been appropriately configured, navigate to the export screen, as shown in §3.3.2.7.3 Data.
- Manually edit an existing channel/system file using a JSON editor. This is not the recommended option as syntax errors can easily be introduced, causing a failed import.

3.6.5.3 Import Error

If an error occurs during the import of the MTP136D.json file, the screen will indicate the failed import. All import errors will automatically be saved in an Import log on the connected USB Device. The import log will contain all information regarding the import including if the import was successful. The import log will always be named MTP136D_ImportLog.json.

Onscreen messages that are shown because of an import error are listed in Table 57.

On Screen Message	Explanation
File does not exist	File "MTP136D.json" was not found, ensure the name matches exactly.
File invalid. See MTP136D_ImportLog.json for details	The profile file contains errors. Review generated import log for all details and correct all errors.
Disk error	The USB drive was prematurely removed or is not compatible. Try again or try a different device.

Table 57: On Screen Import Error Messages

The error messages that are recorded in the import log are listed in Table 58.

Import Errors	Explanation
Invalid Type	Data type on the indicated line is of the incorrect type.
Invalid Value	Value on the indicated line is invalid for the given field.
List Full	The list this field belongs to is full and cannot accept any more members.
File Empty	Profile file is empty.

Import Errors	Explanation
Multiple Root Objects	Only one root object is allowed.
Missing Key	They required key has not been entered.
Missing Colon	Import file is missing a colon.
Missing Comma or Curly Bracket	Import file is missing a comma or curly bracket.
Missing Comma or Bracket	Import file is missing a comma or bracket.
Missing Quotation Mark	Import file is missing a quotation mark.
Number Too Large	An entered number is numerically too large.
Missing Fraction	A fractional part of a number is missing e.g. a number was entered as "10" instead of "10.0".
Missing Exponent	Missing exponent of an exponential notation number e.g. "1e" should be "1e0".
Invalid String	String contains unsupported characters.
Syntax Error	Unknown syntax error.

Table 58: Import Errors messages in import log file

3.6.5.4 Export Errors

If an error occurs during an export the screen messages listed in Table 59 will be shown.

On Screen Message	Explanation
Disk error	USB drive was prematurely removed or is not compatible. Try again or try a different device.

Table 59 : On Screen Export Error Messages

3.6.6 Configuring a Guard Radio

The MTP136D allows either the main or guard radio to be configured as a dedicated guard radio. To configure a radio as a guard radio, the following steps must be performed:

- Create a zone that only contains dedicated guard channel(s).
- Lock the guard zone to the desired radio as shown in §3.4.5.6 Locking a Radio to a Zone.
- Set all permissions listed in Table 41: Zone Specific Permissions, to admin. This will remove the user's ability to change the channel attributes for all channels in the guard zone.
- Set the minimum volume level of the guard radio to ensure communications cannot be missed due to low volume. Reference the Min Volume setting in §3.3.2.7.1.2 Admin Options.

3.6.7 Change Radio Names

The MTP136D supports changing the name of each installed radio. By default, the main radio (Radio 1) is named Main while the guard radio (Radio 2) is named

Guard. The name of the radios can be changed to any 18-character name. Reference the name setting in §3.3.2.7.1.2 Admin Options to change the name for a radio.

The name of the Radio is displayed in several locations including the Radio Options screen. Reference Figure 35 to see the custom radio names being used.

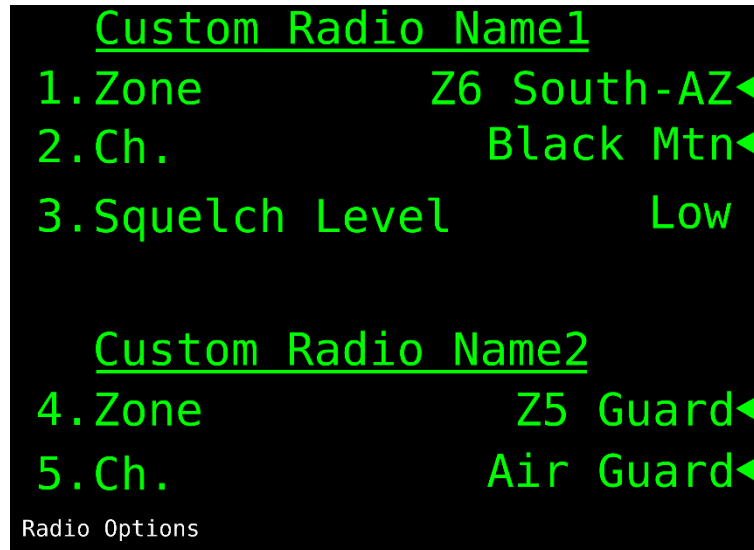


Figure 35: Radio Options Screen with Custom Names

3.6.8 Microphone Bias

The MTP136D can be configured to provide a bias to the microphone of a connected headset. When enabled a +12VDC microphone biasing voltage will be present on the MIC AUDIO HI (PIN 6) input of the system interface connector. The biasing voltage is not provided by default. Verify with the aircraft and headset manufacturer to identify if a microphone biasing voltage is supplied from another source or is required for microphone operation. Reference the Microphone Bias item in §3.3.2.7.1.2 Admin Options to enable or disable the microphone bias.

3.6.9 Power Up Channel and Zone

Each radio in the MTP136D can be configured to start on a specific channel and zone. This configuration can be individually set for each radio by the user or the administrator.

The user will be able to choose the startup channel and zone when the Zone Permission setting in §3.3.2.7.1.2 Admin Options is set to user. The channel and zone can be selected by the user from the Startup Zone and Startup Channel settings shown in §3.3.2.7.1.1 User Options.

The administrator will be able to choose the startup channel and zone when the Zone Permission setting in §3.3.2.7.1.2 Admin Options is set to admin. The channel and zone can be selected by the admin from the Startup Zone and Startup Channel settings shown in §3.3.2.7.1.2 Admin Options.

3.6.10 Hash

To provide easy overview of fleet configuration, the MTP136D utilizes a series of hashes to quickly confirm the system configuration, lists and channel configuration.

A hash is a unique number that is continuously updated as settings, and values are changed. A Hash cannot be directly edited, only viewed. When the value of a hash from one MTP136D matches the value of another MTP136D it is can easily be confirmed that all settings are identical between units.

If a difference in the hash numbers is identified between two MTP136D units, it is recommended to perform a file export for both MTP136D units. The exported files can then be analyzed using several free online tools that allow for file comparisons or “diff” functions. These tools will allow for automatic line by line comparisons between the exported files.

Reference the hashes listed in §3.3.2.7.4.1. Info for more information.

3.6.11 Cyclic Redundancy Check (CRC)

The Cyclic Redundancy Check (CRC) is an automated test for errors in software. This test is automatically performed by the MTP136D at power on and during runtime. Reference the CRC item in §3.3.2.7.4.1 Info for more information.

If the CRC fails, proper MTP136D operation is not guaranteed. If the fault persists after a power cycle, contact AEM for further instructions.

3.6.12 Reset to Defaults

The MTP136D can be reset to the default factory conditions when required. This function can be accessed at the user and admin level. When performing a reset to default as a user, no administrator settings will be reset. When performing a reset to default at the admin level all settings will be reset

When performing a reset to defaults, it is recommended to first export the MTP136D system configuration file. This ensures no accidental information loss can occur. Once the reset to defaults function is completed the instructions in §2.5.8 Installation Configuration should be repeated to ensure the installation specific configurations are restored.

To reset the MTP136D reference the reset to default setting in §3.3.2.7.3 Data. Once on the reset screen, open the menu and press Reset.

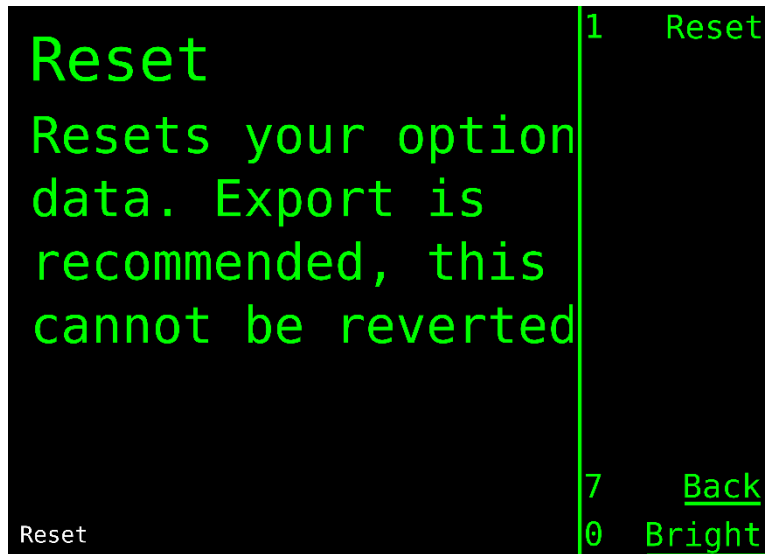


Figure 36: Reset to Defaults

3.7 Troubleshooting

Reference the table below for common issues. If a problem persists or a serious problem occurs, discontinue using the MTP136D and contact AEM for servicing and further troubleshooting information.

Problem	Solution
Radio continuously states "Radio Initializing"	A radio is unable to initialize successfully. Contact AEM for servicing.
Unable to edit a list or its list members (Zone, Channel, Tone, Code, NAC, TGID)	Agile Edit may not be enabled. Reference §3.6.2 Agile Edit for more information. Administrator has restricted the edit ability for the user. Reference §3.6.3 Permissions for more information.
Cannot hear sidetone	Increase the sidetone volume using the sidetone setting listed in §3.3.2.1 Radio.
Poor audio quality	Ensure the MTP136D was correctly installed as listed in §2.5 Installation Procedure. Contact AEM for further guidance.
Channel signaling lists are not working	Apply the desired channel signaling list to the desired zone. Reference §3.4.5.3 Applying a Channel Signaling List to a Zone for more information.
Unable to transmit	The TX timeout limit was reached. The PTT must be rekeyed. Reference §3.4.3.2 Transmit Timeout for more information. The high power overtemperature transmit lockout is activated. Reference §3.4.3.3 High Power Overtemperature Transmit Lockout for more information. Channel attribute is not valid?
Frequently Overheating	The MTP136D is designed for high temperature operating environments and should not overheat during normal use. If frequent overheating occurs ensure the MTP136D is installed correctly and is not near high heat emitting equipment. If issues persist, contact AEM for further troubleshooting steps or replacement.
Hearing static or adjacent channel communication	Increase the receive sensitivity to avoid noise squelch breaks. Reference §3.4.4.2 Squelch Threshold for more information.

Problem	Solution
Unable to hear a received signal	<p>Ensure the volume is sufficiently high to hear the audio. Adjust the volume knob of the radio.</p> <p>Ensure the squelch sensitivity is not set to high and that the correct channel signaling is applied. This is indicated when the Mon indicator is highlighted but the RX indicator is not. Reference §3.4.4.2 Squelch Threshold and §3.4.6 Channel Signaling for more information.</p> <p>To quickly test if the squelch sensitivity or incorrect channel signaling is the cause of the problem, press the Mon button. This will remove all squelch level and channel signaling requirements.</p>
File import failed	Reference the Import log for all failed imports and exports. Reference §3.6.5.3 Import Error for more information.
Unable to use wideband modulation	The wideband key has not been entered. Reference §3.6.1 Keys for more information.
Button press is not working	If a button is not functioning mechanically, perform the button test as described in section §3.3.2.7.4.4 Test.
Suspected damaged screen pixels	<p>To verify a pixel is damaged on the screen perform the screen test as stated in §3.3.2.7.4.4 Test.</p> <p>If the damage exists, contact AEM for servicing.</p>

End of Section 3.0 Operation
