DZMx Plus Installation Manual

Product Rev 1.3

Section 1: Manual Revisions and Approvals

Revision	Effective Date	Approved By	Reasons for Change
1.1	28 Jun 2021	James Mace Richard Benfield	New issue

TABLE OF CONTENTS

Section 2: Introduction

This manual provides information on the installation and configuration of the DZP_07-xxx-xxxx Flightcell DZMx Plus.

Section 3: DZMx Equipment

The DZMx Plus should be inspected when unpacked to check for any visible damage or missing components.

Connectors

Connector kits are supplied with the DZMx Plus Transceiver DZP_07-xxx-xxxx and the DZMx Plus Control Head DZP_05-002 including Bluetooth and WiFi antennas. The content of the connector kits depends on the version of the DZMx Plus. Optional extras based on the unit dash number and customer requirements will be at additional cost.

Details of the connector kit contents are provided in Appendix 1.

Section 4: DZMx Plus Specifications

Variants and Part Numbers

The DZMx Plus can be built with a range of hardware options.

The DZMx part number is DZP_07. The 3 - 7 digit dash number immediately following DZP_07-xxx-xxxx designates the variant of the DZMx Plus.

The available variants may change from time to time. The options available to build up the different variants are:

- Installed modems (see "Modem Configuration" on page 24 for a list of supported mode ms)
- Additional circuit cards
- Second ethernet
- ARINC 429
- Input expansion card

Dimensions

Dimension	DZMx Plus	DZMx Plus Control Head DZUS mount
Faceplate Width	N/A	146mm
Extrusion Width	N/A	126mm
Faceplate Height	N/A	57mm
Extrusion Height	N/A	54mm
Depth	N/A	23mm
Weight	1.6kg (depending on configuration)	200 grams
Length	240mm	N/A
Width	58mm	146mm
Height	188mm	57mm

Electrical

DZMx PLUS MAIN TRANSCEIVER MODULE		
Part/Item	**Parameter**	**Value**
Power	Input Voltage	12-32VDC
	Power Supply Current	Up to 1.5A @28VDC
ICS to DZM Audio	Input Levels	20mVrms to 1.15Vrms, adjustable
		775mVrms to 1.15RMS nominal
	Input Impedance	600Ω
Microphone bias voltage		12V via 2.2kΩ
DZM to ICS Audio	Output levels	Up to 5Vrms, adjustable
		775mVRMS nominal
	Output Impedance	150Ω
GPS	Antenna bias voltage	5V
	Antenna current	Up to 100mA
	Sensitivity	-162dBm (with Flightcell Antenna)
	Time to first fix	26s
WiFi	Tx power (dBm)	17.3
	Antenna gain (dBi)	2.6
	Total power (dBm)	19.9
	Total power (mW)	97.7
Bluetooth	Tx power (dBm)	10
	Antenna gain (dBi)	2.6
	Total power (dBm)	12.6
	Total power (mW)	18.2
Satellite Iridium	RF Frequency Range	1616 MHz to 1625.5 MHz
	Tx power (max)	7W
	Antenna gain (dBi)	3
	RF RX Sensitivity	-118 dBm
	Max Cable Loss	3 dB
	Antenna impedance	50 Ω
USER INTERFACE		
Power switch	Momentary action switch PWR on/off with backlight	
LEDs	Transceiver Status Indicator x3	

CONTROL HEAD SPECIFICATION		
Part/Item	**Parameter**	**Value**
Power	Input Voltage	12-32VDC
	Supply Current	Up to 1A @ 28VDC
Data connection	RS485 full duplex	Serial data interface between Control Head and DZMx Plus
Backlighting	Input Control	User-configurable fixed level or controlled from an external lighting dimmer. 0-28VDC or user-configurable response
	Colour	Green 540nm. Designed for NVIS B compliance
USER INTERFACE		
Keypad	16 Button Keypad	
LCD Display	LCD backlit monochrome	

Environmental/EMI Qualifications

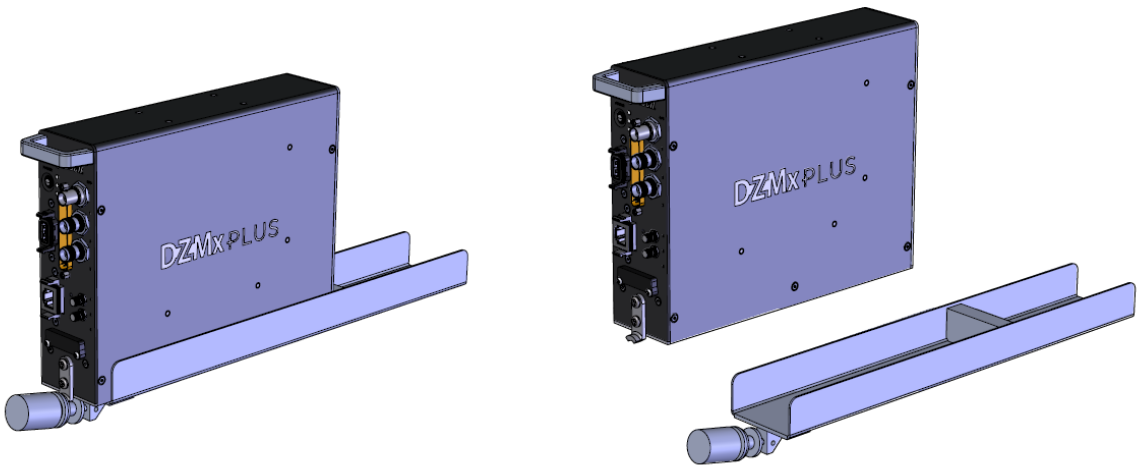
The DZMx Plus is designed against RTCA DO-160G. Test results are pending.

Details of the DO-160G compliance will be provided in the DZMx Plus Declaration of Design and Performance (DDP) document which is pending.

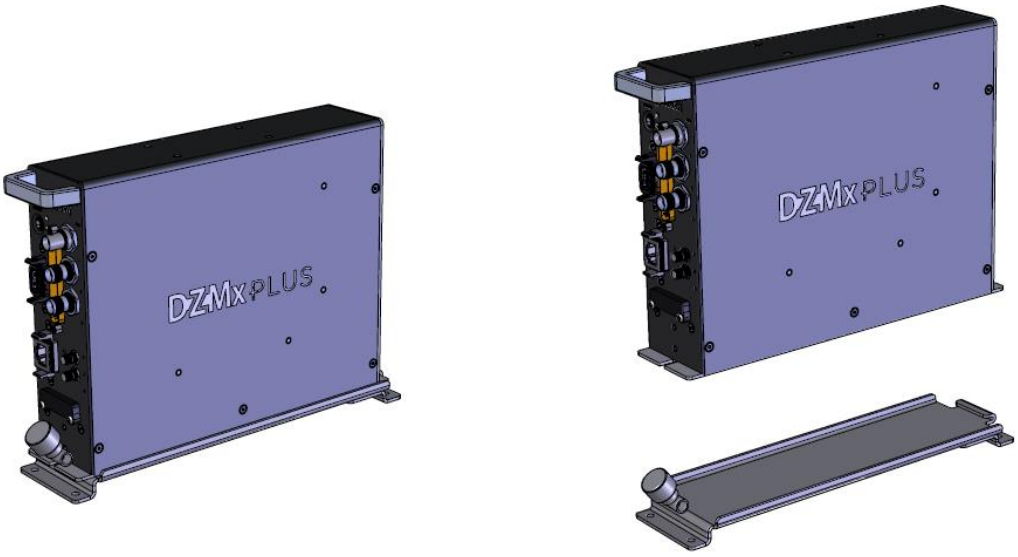
DO-160G test reports shall also be available on request from tech@flightcell.com.

Section 5: Installation

DZMx Plus Mechanical Assembly ARINC 600 Tray



DZMx Plus Mechanical Assembly Standard Tray



Mounting the DZMx

The DZMx Plus Control Head should be mounted where the flight crew or radio operator have a clear view of the display and can easily use the keypad.

If the DZMx Plus Control Head is installed in the pedestal, for ease of use, it is preferable to install it as near to the front of the pedestal as possible.

The DZMx Plus LCD is designed for optimum readability when viewed at angles between 60° above the display to 20° below. Avoid mounting the unit where the display will be viewed at an oblique angle, as it may not be clearly readable. It is preferable to mount the DZMx Plus to minimise sunlight shining on the display.

Mechanical drawings showing dimensions and mounting details are available on the Flightcell website www.flightcell.com/resources

CAD solid model files are available on request from Flightcell International. Contact tech@flightcell.com for more information.

DZMx Plus Wiring Guide

Wiring diagrams for the Flightcell DZMx Plus Transceiver and Control Head are available on the Flightcell website www.flightcell.com/resources

Necessary Installations

The following are essential parts of the DZMx Plus installation:

- Power Supply
- DZMx Antennas
- SIM Cards

Power Supply

The DZMx Plus unit and other components require aircraft DC power. Operating range is 12-32VDC. It is recommended that the DZMx Plus be connected to the emergency (primary) power bus on the aircraft. This is to ensure successful operation of tracking (including engine start/stop data) and emergency calls.

When operating on a nominal 28V supply circuit breakers or fuses of the following rating should be used between DZMx Plus system components and the power supply:

- A 4-amp circuit breaker/fuse is recommended to protect the DZMx Plus system
- A 1-amp circuit breaker/fuse is recommended to protect an external modem (Iridium or cellular) module, if installed
- A 1-amp circuit breaker/fuse is recommended to protect a Flightcell Iridium phone cradle, if installed
- A 1-amp circuit breaker/fuse is recommended to protect the DZMx Plus Control Head

If combining two or more circuits on a single circuit breaker a 4-amp circuit breaker/fuse is recommended.

Fabricating Wiring Harnesses

All wiring should be carried out with aviation specification fireproof cable.

Screened cable should be used where indicated in the wiring diagrams. Where cable screen connections are not explicitly shown, they should be left unterminated.

The following minimum wiring specification is recommended:

- **Power supply** - 22 AWG stranded (0.325mm^2)
- **Other cabling** - 24 AWG stranded (0.205mm^2).

It is recommended that enough slack be left in the main cable to enable the DZMx Plus to be partially removed from the aircraft panel for service or to exchange the Iridium and/or cellular SIM card.

Grounding and Shielding Terminations

The DZMx Plus Transceiver chassis ground connection is on the main unit's primary connector. It does not have a DZUS connection.

If the DZMx Plus Control Head is mounted in a DZUS rack, the housing is grounded to the DZUS rails via the DZUS connectors and contact between the front panel metalwork and the DZUS rails.

Installing Data Ports

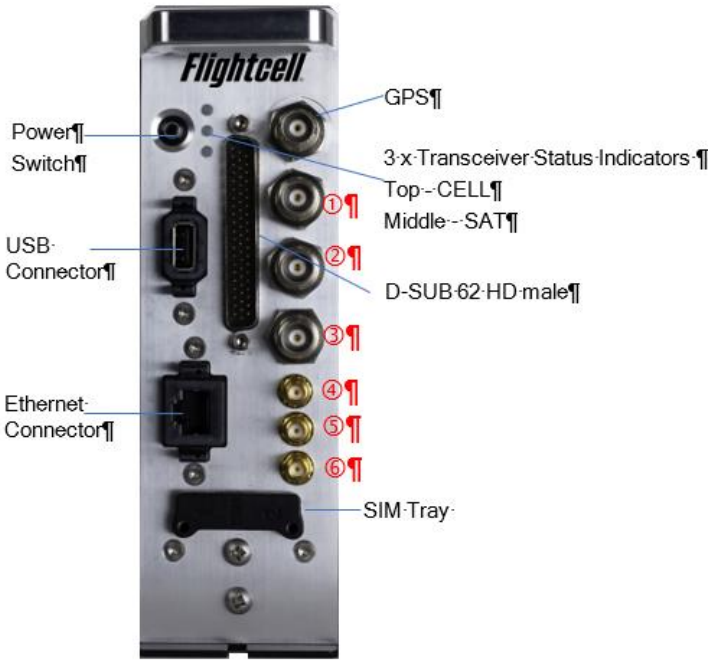
The DZMx Plus has several data connections wired off the main connector:

- RS232 – available for serial data connections to legacy devices and as a debug port.
- RS422/RS485 – used for serial data connections, and connection to one or more DZMx Plus Control Heads.
- Two additional data connections are available as options, and these are wired off the main connector.
- ARINC429 – used to send and receive over the aircraft ARINC429 data bus.
- Second Ethernet – used to provide a second ethernet connection.

Connector Pinouts

Wiring diagrams for the Flightcell DZMx Plus Transceiver and DZMx Plus Control Head are available on the Flightcell website www.flightcell.com/resources

Refer to the figure below for the layout of the DZMx Plus Transceiver front plate.



CONNECTORS	
Main Connector:	D-SUB 62 HD male
	Ethernet
	USB
Antenna Connectors:	GPS: BNC
	① SAT: TNC
	② CELL:TNC
	③ SAT:TNC
	④ WiFi: SMA
	⑤ Bluetooth: SMA
	⑥ ADS-B: SMA
OTHER	
Power switch	Momentary Action PWR On/Off
LEDs	Transceiver Status Indicator x3
	GREEN - Good Signal
	AMBER - Medium Signal
	RED - Bad Signal
	OFF - No Signal
SIM TRAY	Transceivers 1 and 2

DZMx Plus Main Connector D-SUB62			
Pin No	**Connector**	**Direction**	**Notes**
1	POWER GROUND	Ground	
2	AUDIO FROM DZM2 HI	Output	HI audio output to ICS 2
3	AUDIO FROM DZM2 LO	Output	LO audio output to ICS 2
4	AUDIO FROM DZM1 HI	Output	HI audio output to ICS 1
5	AUDIO FROM DZM1 LO	Output	LO audio output to ICS 1
6	NC		
7	RS485 Rx+	Input	
8	USB ID OTG	I/O	
9	AUX DATA GND	Ground	
10	GND	Ground	
11	GND	Ground	
12	RH_KEY	Input	
13	SPARE SHIELD	Ground	

DZMx Plus Main Connector D-SUB62			
Pin No	Connector	Direction	Notes
14	POWER GROUND	Ground	
15	OUTPUT 1A	Output	Isolated output 1 Terminal A
16	OUTPUT 1B	Output	Isolated output 1 Terminal B
17	OUTPUT 2A	Output	Isolated output 2 Terminal A
18	OUTPUT 2B	Output	Isolated output 2 Terminal B
19	NC		
20	GENERAL PURPOSE INPUT 1	Input	
21	DC SUPPLY POSITIVE	Power	
22	POWER GROUND	Ground	
23	USB GND OTG	Ground	
24	USB D+ OTG	I/O	
25	USB VBUS OTG	Power	
26	AUDIO TO AUX TXCVR HI	Output	
27	AUDIO TO AUX TXCVR LO	Output	
28	NC		
29	RS485 Rx-	Input	
30	SPARE SHIELD	Ground	
31	POWER GROUND	Ground	
32	SPARE SHIELD	Ground	
33	GPIO1	I/O	Reserved for Optional Capabilities
34	GPIO2	I/O	Reserved for Optional Capabilities
35	POWER GROUND	Ground	
36	POWER GROUND	Ground	
37	AUX DATA RX	Output	
38	MIC TO DZMx 2 HI	Input	Unbiased/biased (configurable)
39	MIC TO DZMx 2 LO	Input	Return for audio input from ICS 2
40	GPIO5	I/O	Reserved for Optional Capabilities
41	GPIO6	I/O	Reserved for Optional Capabilities
42	DC SUPPLY POSITIVE	Power	
43	CHASSIS GND	Ground	Internally connected to DZMx Chassis
44	USB D- OTG	I/O	
45	AUDIO FROM AUX TXCVR HI	Input	
46	AUDIO FROM AUX TXCVR LO	Input	
47	MIC TO DZMx 1 HI	Input	Unbiased/biased (configurable)

DZMx Plus Main Connector D-SUB62			
Pin No	Connector	Direction	Notes
48	RS485 Tx+	Output	
49	MIC TO DZMx 1 LO	Input	Return for audio input from ICS 1
50	RS485 Tx-	Output	
51	AUX DATA TX	Input	
52	NC		
53	GPIO3	I/O	Reserved for Optional Capabilities
54	GPIO4	I/O	Reserved for Optional Capabilities
55	GPIO9	I/O	Reserved for Optional Capabilities
56	GPIO8	I/O	Reserved for Optional Capabilities
57	GPIO7	I/O	Reserved for Optional Capabilities
58	GENERAL PURPOSE INPUT 5	Input	
59	GENERAL PURPOSE INPUT 4	Input	
60	GENERAL PURPOSE INPUT 3	Input	
61	GENERAL PURPOSE INPUT 2	Input	
62	DC SUPPLY POSITIVE	Power	
D62 shell	CHASSIS GND	Ground	

DZMx Keypad References

Most keys on the DZMx Plus Control Head keypad have more than one function. The following table outlines how the DZMx Plus Control Head keys are referenced throughout the Installation Manual.

Icon	Manual Reference	Icon	Manual Reference
	CALL		5, SPD2
	END		6, RIGHT, SPD3
	A		7, MSG
	B		8, DOWN, DIR
	1, MARK		9, MODE
	2, UP, A.R.M., ALERT		0, +, MENU
	3, EMER		*, BACK
	4, LEFT, SPD1		#, ENTER, POWER

Navigating the Menus

The keypad is used to access the menu system:

- Press **MENU**. If the DZMx is on a phone call, press and hold **MENU** to access the menus.
- Use the **UP** and **DOWN** arrow keys to navigate between the menu options.
- Use the **LEFT** and **RIGHT** arrow keys to scroll left or right, to increase, decrease or navigate menus.
- Press ENTER to select the highlighted item or to confirm a setting change.
- Press **BACK** to cancel a setting or to move back a menu level.
- Press **END** to cancel a setting change or to exit the menu and return to the main screen.
- Instructions will be provided throughout the Manual in the format **MENU** > **Forms** >**Form Entry** etc

- The **>** indicates that you will need to scroll to a menu heading using the arrow keys.
- Menu headings are bolded. Select a heading, press the **ENTER** key then scroll to the next menu heading.

Installing a DZMx Plus Control Head

A Flightcell DZMx Plus Control Head is a remotely located control panel for the DZMx Plus, with a display and keypad. One or two Control Heads may be installed to provide other crew or mission specialists with full remote control of the DZMx Plus.

Wiring the Control Head

The Control head connects to the DZMx Plus transceiver using the RS485 serial data connection.

Control Heads require a 12-32VDC power supply. Two additional connections are a ground connection to the chassis, and a lighting input for external lighting control. Backlighting of the Control Heads can be configured individually.

Wiring diagrams for the Flightcell DZMx Plus Transceiver and DZMx Plus Control Head are available on the Flightcell website at www.flightcell.com/resources

Configuring the DZMx Plus for a Control Head

First, the DZMx Plus needs to be configured to recognise the Control Heads:

1. Press **MENU > Hardware Config > Head B Enable**. Select **On** to enable, or **Off** to disable the Control Head.
2. Press **ENTER** to save the setting.

Configuring the Control Head

The Control Head now needs to be allocated a head ID so that the DZMx Plus can identify it.

1. Press and hold the **BACK** key on the Control Head for 2 seconds, then release. Scroll down to **Advanced** press **ENTER.**
2. **Head ID <A>** will be displayed. Use the **RIGHT** and **LEFT** arrow keys to select the correct head ID (Head B), then press the **END** key twice to save and return to the main screen.

DZMx Plus Antennas

The following antennas are not supplied with the DZMx Plus but can be purchased at an extra cost:

- Single Iridium modem: Use a Flightcell dual Iridium/GPS antenna part number: ANP_00043.
- Dual Iridium modems: Use a Flightcell Iridium/GPS antenna, P/N ANP_00043, and a single Iridium antenna, ANP_00045.
- Single cellular modem: Use a Flightcell cellular antenna, P/N ANP_00033.
- Dual cellular modems: Use a Flightcell dual cellular antenna, P/N ANP_00041.

Installation of Iridium and GPS Antennas

Installation drawings for the above antennas are available on the Flightcell website www.flightcell.com/resources.

The Flightcell Iridium/GPS antenna and Iridium antenna should be installed on the top of the aircraft where they will have an unrestricted view of the sky, mounted as close to horizontal as possible. The following should be considered when determining a mounting location:

- Maintain good separation from other antennas. Preferred separation is 750mm from L-band (GPS), TCAS or transponder antennas, but a lesser separation can be applied if there is limited space on the aircraft.
- On a helicopter, the antenna can be installed below the rotor blades, but avoid installing it close to the rotor hub, as the hub and inner rotor can block the antenna's view of the sky.
- Keep coax cable lengths short to minimize attenuation of transmit and receive signals.

Installation of Cellular Antennas

A Flightcell cellular antenna should preferably be installed on the underside of the aircraft to provide best connection to the cellular network. Typical location is below the cockpit to minimise antenna cable length. The minimum recommended separation between the cell antenna and other antennas is 600mm.

Guidelines for Antenna Cables

Iridium antenna cables must be selected to keep signal loss within accepted levels. Total signal loss on the Iridium connection between the DZMx Plus or Iridium phone cradle and the antenna should not exceed 3dB at 1645MHz.

The maximum recommended length for different common antenna cable types is:

Cable Length	Cable Specification
Up to 3m	RG58C/U or RG400
Up to 6.5m	LMR200 or RG142A/U-
Up to 8m	RG213
Up to 17m	LMR400
Up to 26m	LMR600

Antenna connectors on the DZMx Plus and Flightcell antennas (as well as the supplied mating connectors) are colour coded to reduce installation errors, as follows:

Antenna Type	Colour
Iridium	Red
Cellular	Green
GPS	Blue

Section 6: Configuration

Accessing Installation and Configuration Settings

Many of the DZMx Plus configuration settings are hidden during normal operation. To access these settings, the Installer Menu needs to be activated. The Installer Menu will remain active until the DZMx Plus is next powered off. If a menu item mentioned in this manual cannot be found ensure that the Installer Menu has been activated.

Configuring the DZMx Plus

The DZMx Plus can be configured using the DZMx Plus Control Head (keypad and display) or using DZMx Connect. Most settings are available on both interfaces.

Use the DZMx Plus Control Head when real-time feedback on the configuration is preferred:

- Adjusting audio settings
- Configuring the general-purpose Inputs.

However, it is recommended that DZMx Connect is used to configure and to change settings as it is faster and provides a more intuitive interface than the DZMx Plus Control Head front panel.

Configuring using DZMx Connect

DZMx Connect can be used to configure, change settings, edit the DZMx Plus phonebook and message library. The DZMx Connect is available as an iOS and Android application (available from the respective app stores), or as a browser application on a PC.

There are three ways to use DZMx Connect:

Hardwired Computer Connection

1. Connect a computer to the DZMx Ethernet port.
2. Power up the DZMx Plus and wait for it to fully initialise.
3. Open a web browser, type in 192.168.4.1 in the address bar and press enter. The home screen of DZMx Connect will open in the browser.
4. If the DZMx Plus has been allocated a fixed IP address, or the DZMx Plus is set up as a DHCP client, then it is necessary to enter this address (this could be, for example, 192.168.4.100). This IP address can be determined by selecting the **MENU** key. Scroll down to **Diagnostics Menu > About DZMx** > press **ENTER** then select the **END** key to return to the main screen.

Wireless Laptop or Personal Computer (PC) Connection

With the DZMx running.

1. Check that WiFi is enabled. Look for a WiFi icon located at the top right-hand side of the DZMx Plus Control Head display. If the WiFi icon is not present it can be checked and enabled in one of three ways:
   a. Press and hold the **MODE** key until **"Enabling WiFi and Bluetooth"** is displayed on the screen. WiFi can also be disabled by pressing the **MODE** key.

b. Using the Control Head keypad, select **MENU,** scroll down to **Hardware Config > Wireless and Networks >** press **ENTER** and when WiFi Enable is displayed press **ENTER** then **Yes** or **No**. Select **END** to return to the main screen.

c. Connect a PC or laptop to the DZMx Plus via an Ethernet cable. Type 192.168.4.1 into a web browser and navigate to **Connectivity > WiFi** and toggle the switch to **ON.**

2. To connect via Wi-Fi,

   a. Open the Wi-Fi control panel on the laptop, select the Wi-Fi address for the DZMx Plus, then enter the password (the default password is *flightcell*).

   b. Open a web browser on the laptop and type in 192.168.2.1 then press **ENTER**; the home screen of DZMx Connect will open within the browser.

Click here to watch a short video explaining the DZMx Connect capabilities (demonstrated on the app version).

Smart Device Connection

1. In the smart device settings connect to the DZMx Plus Wi-Fi using default SSID *DZMx Plus Wi-Fi*, default password: *flightcell* (all lower case).
2. Open DZMx Connect. The initial screen is a discovery screen and the DZMx Plus should be discovered automatically. The **DISCOVER** button is only required if the process needs to be repeated.
3. If the DZMx IP address has been manually configured, it will be necessary to enter this IP address in the browser address bar. After the first use of a custom IP address, the app will remember the address in the **Stored Devices** list.
4. Click on the **discovered DZMx** Plus unit to open navigation and settings options.

Permission levels

Permission levels allow users to have control over how the DZMx is configured. Three levels or roles with individually configurable passwords are available within DZMx Connect.

To access Permissions:

1. Select **LOGIN** at the top of the screen. The login screen will open.
2. Select **Installer** or **Administrator** from the dropdown list to the right of Authenticate as:
3. Enter the related **PIN** number from the list below.

Role	PIN number	Responsibility
Installer	2468	The installer can edit all settings and hardware options.
Administrator	2580	Access to all application features and configuration, unable to access hardware configurations.

Note: Passwords can be changed by the Installer and the Administrator in “Settings”. An Administrator or Installer can revert to the original Operator status.
The default password 1234 cannot be configured.

To access Permissions using DZMx Plus keypad:

Select **MENU > Hardware Config > Installer Menu Enable >** press **ENTER**

Enter the PIN number and press **ENTER**.

Changing the Installer Password

The installer password can be changed as required:

1. On the DZMx Plus Control Head, select **MENU > Hardware Config > press ENTER > Change Installer Passwd >** press **ENTER > Enter Pin**. Enter a new 4-digit number. Select **END** to save and return to the main screen.
2. Using DZMx Connect, go to **Settings > Preferences > Access Management**. Enter the new PIN number and select **DONE**.

Note: It is important to record the password. If the password is forgotten, it will be necessary to reset the DZMx to the factory settings before the password protected function can be used again.

Audio Installation and Configuration

The DZMx Plus supports the following audio services:

- Telephony over the Iridium and cellular networks (depending on the modems installed in the DZMx).
- Iridium PTT, a Push-to-Talk service using the Iridium network to provide one-to-many PTT calling.
- Telephony over a mobile phone connected to the DZMx Bluetooth service.

Connection to the Aircraft Audio System

Audio from the above services is connected into the aircraft audio system or incident command system (ICS) to enable aircrew, mission crew or passengers to use these connections.

The DZMx Plus can be connected to the aircraft audio system or ICS in several ways, depending on the aircraft configuration and type of operation.

It is recommended that audio from the DZMx Plus is connected to spare radio positions on the ICS if possible.

Modem connections to the ICS are configured using DZMx Connect. Go to **Settings > Audio > Modems**.

Single or Dual ICS Connections

The DZMx Plus supports one or two connections to the audio panel/ICS, ICS1 and ICS2.

The dual ICS connections may be used to allow the DZMx Plus to be connected to two different audio panels on the aircraft, or to allow different audio connections to be used simultaneously.

Mirroring Audio on Dual ICS Connections

If the DZMx Plus has connections to two audio panels but it is desirable to have the same audio mirrored to both, select **Mirror Audio to ICS2**. Toggle slider to activate and select DONE

Providing for Modems to be Connected to Separate ICS Connections

The two ICS connections may be used to allow the DZMx Plus modems or connected Bluetooth device to connect to separate ICS channels, allowing separate calls to occur on the separate respective ICS channels.

Typically, this is used where ICS1 and ICS2 are connected to different audio positions on the ICS.

Each of the modems and Bluetooth device may be allocated to either ICS1 or ICS2.

Simultaneous Calls

DZMx installations with more than one modem can make two calls simultaneously. Making and receiving the first call works the same way as described above. However, to make the second call, a long press is required to use the speed dial, phonebook, or menu keys.

Note: While on two calls, both parties can hear you, but they are unable to hear each other.

Call Priority

A modem which has been given priority will automatically mute all other calls when it makes or receives a call. When a priority call has ended, it automatically unmutes any other call. This can be particularly useful if a call on a modem is vital to vehicle aircraft operations. By default, call priority is off, however it can be enabled using the "Call Priority" setting for each modem in DZMx Connect. Go to **Settings > Audio > Modems**. This option can be found in the settings under the audio section. This setting is particularly useful for simultaneous calls on a single ICS channel.

Audio from the DZMx to the ICS

Audio from the DZMx Plus is connected direct to the ICS input, and its levels adjusted using the DZMx Plus audio menu.

Audio from the ICS to the DZMx Plus (microphone installation)

The DZMx Plus can be installed in aircraft systems with either high impedance or low impedance microphones. Most (but not all) civil aircraft operate high impedance (electret) microphone systems. Refer to www.flightcell.com/resources for wiring diagrams for the microphone connections.

Low Impedance Microphones

When installing the DZMx Plus with an ICS that uses low impedance mics, the DZMx Plus must be connected to a line level Radio/Comms port. If a line-level port is not available and the DZMx Plus is to be connected direct to the mic line, then a tactical radio adaptor will be needed to match impedances. Options include the NAT AA34-300, Jupiter JA34-001 or PS Engineering 200-002-0002.

High Impedance Microphones

There are several options for connecting the DZMx Plus into an audio panel/ICS with high impedance microphones. The way in which the DZMx Plus is connected will depend on your system configuration and operational requirements.

As the Iridium satellite phone and cell phone are both full duplex, it is preferable to use the DZMx Plus on a hot mic connection, rather than PTT (keyed).

The DZMx Plus will typically be installed in one of the following ways:

1. Connecting Directly to a Headset Microphone Line

   The MIC lines are spliced to one or more headset microphone inputs on the audio panel. As these microphone inputs have mic bias provided by the audio panel, the DZMx Plus should have mic bias disabled.

   The way this is configured will depend on how many headsets are to have access to the DZMx Plus:

» If only the pilot is to use the DZMx Plus, its MIC TO DZMx 1 HI/LO lines are connected only to the pilot's microphone line.

» If both pilot and co-pilot are to use the DZMx Plus, the MIC lines are connected to the pilot microphone line and the MIC lines are connected to the co-pilot microphone line.

» If more than two microphones need to have access to the DZMx Plus, an external switch is required to select the active microphone input.

2. Connecting to a Cell Phone Port on the Audio Panel

   The DZMx Plus MIC line can be connected to the cell phone port on the audio panel.

3. Connecting to a Spare Radio Position on the Audio Panel

   On aircraft with separate audio control panels at each crew position, this option enables crew to use the DZMx Plus and connected phones individually on demand. In this case it may be necessary to provide mic bias.

Configuring Microphone Bias

In some aircraft with high impedance headsets, where the mic line is connected direct to the DZMx Plus, it is necessary to provide bias power to energise the headset microphone.

To activate mic bias power to the MIC line:

» Activate using the DZMx Plus Control Head. Select **MENU > Audio >** press **ENTER > ICS >** press **ENTER > Mic Bias** > press **ENTER >**select **Off** or **On.** Select **END** to return to the main screen.

» Activate using DZMx Connect. Go to **Settings > Audio > ICS1** or **ICS2.** Select **DONE** when completed.

Configuring Side Tone

Side tone is normally provided by the aircraft audio panel or ICS, but in some installations may not be available. Side tone can be supplied by the DZMx Plus if required.

This can be configured using the:

» DZMx Plus Control Head. Select **MENU > Audio >** press **ENTER > ICS >** press **ENTER -`> Mic Bias >** press **ENTER >** select **Off** or **On.** Select **END** to return to the main screen.

» DZMx Connect app. Go to Settings > Audio > ICS1 or ICS2. Toggle on Side Tone.

» Select **Off** to disable, **When on Call** to enable only during a call, or **Always On** to leave active all the time. Select **OK** once you have selected then select **DONE.**

Configuring Notification Tones

Notification tones are used to notify the crew of specific events. Notification tones can be enabled or disabled in the audio menu. Notification tones include:

» Keypad tones.

» Message queue full, which sounds when the tracking message queue is full.

» Warnings, which notify when there is an issue; in this case a popup will show the details of the issue.

» Incoming or outgoing Bluetooth call.

Adjusting Audio Volume

Audio levels can be adjusted using DZMx Connect or the DZMx Plus Control Head menu, however as there is a short lag when using the DZMx Connect, it is recommended that audio levels are adjusted using the DZMx Plus Control Head menu.

1. To adjust audio volumes to the ICS (EAR):

   » Set up a call to another party over the satellite or cellular link as appropriate using Select **MENU > Audio > ICS > Ear> press ENTER**. Use the **LEFT** and **RIGHT** keys to adjust the audio volume to the preferred level. Select **END** to save and return to the main screen.

2. To adjust audio volumes from the ICS to the DZMx Plus (MIC):

   » Set up a call to another party over the satellite or cellular link as appropriate.

   » Select **MENU > Audio > ICS > Mic** and use the **LEFT** and **RIGHT** keys to adjust the audio volume to the preferred level. Select **END** to save and return to the main screen.

Iridium Push-To-Talk (PTT)

Iridium PTT is a licensed feature. If you wish to use Iridium PTT, you must subscribe to the PTT service through your Iridium Service Provider and purchase a licence from Flightcell by contacting orders@flightcell.com.

- To enable and configure your DZMx Plus for PTT using DZMx Connect. Go to **Settings > Modem > Internal Sat modems**.
- If you wish to have the DZMx Plus start up in PTT mode, activate **Start PTT on Boot.** Select **DONE** when finished.
- If the PTT talkgroups are changed by your Iridium Service Provider, it is recommended to update talk groups using the DZMx Plus Control Head. Select **MENU > PTT Talk Groups > Refresh Talk Groups.**

Configuring the PTT Input

PTT calls can be triggered from the DZMx Plus keypad, but it is preferable to use a PTT switch connected to a DZMx Plus Input.

Note: The Call Priority setting can be useful for automatically muting a PTT call when making a call on another modem.

Modem Configuration

The DZMx Plus can be configured with up to three internal modems and one external modem or satellite phone.

Cellular Modems

The following cellular modems may be installed in the DZMx Plus:

- A 4G (LTE) modem
- A 450 MHz modem.

Different countries or geographic areas use different cellular bands, due to international and national radio frequency licensing agreements.

In Revision 3 DZMx, the cell modem supports most of the bands to for all countries in the world.

In Revision 4 DZMx, four different modem versions are used for different geographic regions. The four modem options are:

- Europe
- Asia/Pacific and South America (APAC)
- Americas and Band 14 (North America, including the US Public Safety Band, band 14)
- Japan.

Note: There is considerable overlap in the bands offered by the different modem versions, so some modems can be used in more than one geographic area, with some reduction in the bands available.

When ordering the DZMx Plus, it is essential that the version with the correct regional modem is ordered. Please contact tech@flightcell.com for more information on the appropriate modem for your operational area.

Iridium Modems

The following satellite modems may be installed in the DZMx Plus:

- One or two internal Flightcell Iridium 9523 modems.
- An Iridium 9603 modem (used for Short Burst Data only).

External Modems and Phones

One external modem or satellite phone can be connected to the DZMx Plus via its RS232 serial port:

- A Flightcell Iridium Modem.
- An Iridium handset installed in a Flightcell Iridium Phone Cradle; these may be:
  - Iridium 9555.
  - Iridium Extreme.

The modem and the phone handsets provide the same functions (except for Iridium PTT) as the internal Iridium modem, providing phone calling, messaging, and data. These functions are all controlled by the DZMx Plus, so it is not necessary to use the phone keypad.

The external Iridium devices do not support Iridium PTT; this can only be provided by an internal Iridium 9523 modem.

Activating Modems

- Your DZMx Plus will normally be configured for the installed internal modems prior to shipment.
- You may need to configure the DZMx Plus for an external device such as an Iridium modem or Iridium phone and cradle, if installed.
- The DZMx Plus can be configured for the installed and external modem options using DZMx Connect. Go to **Settings > Hardware**.
- You will need to check the detailed configuration for each modem and external device to ensure they are correctly configured for your operation.

SIM Cards

A SIM card is required for a DZMx Plus cellular modem.

SIM cards must be installed in the DZMx Plus for an internal Iridium 9523 if it is to be used for phone calling and SMS messaging. A SIM card is not required for the Iridium 9523 modem if it is to be used only for Iridium PTT or for Iridium SBD.

A SIM card is not required for an Iridium 9603 (SBD only) modem.

The DZMx uses standard SIM cards, rather than the micro and nano versions.

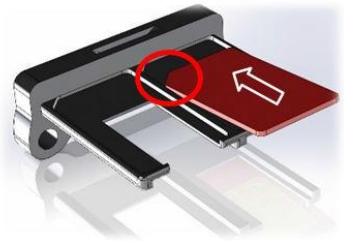
SIM Slot Designation

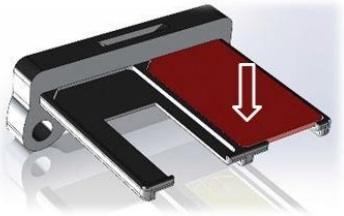
Where the DZMx has an Iridium modem and cell modem installed.

- SIM 1 is allocated to the Satellite Iridium modem
- SIM 2 is allocated to the Cellular modem.

Note: Iridium and cellular cards can be used in both slots depending on the unit configuration purchased.

Installing SIM cards





SIM cards are installed in the SIM card tray inserted in the front of the DZMx Plus. To install SIM cards:

1. Undo the screws securing the SIM card tray and remove the tray.
2. Preferably place the tray on the edge of a hard surface such as a table or book.
3. Position the SIM card with the bevelled corner (circled in drawing) forward and contacts downward, then slide the front edge into the recess in the front of the tray.
4. Tilt the card downward until it clicks into the groove in the tray.
5. Insert the tray into the slot on the front of the DZMx Plus and secure in place with the two cap screws.

Note: Ensure that the SIM cards are in the correct slots, as they may be permanent damaged if incorrectly installed.

AT&T SIM Cards

Not all AT&T SIM cards are compatible with non-AT&T devices. For troubleshooting with AT&T SIM cards, visit the AT&T troubleshooting website https://troubleshoot.att.com/devicetroubleshoot.

Iridium SIM cards supplied with your DZMx

DZMx Plus with Iridium modems are shipped with an unregistered Iridium SIM installed, unless otherwise requested. This can be registered to your Iridium Service Provider's account when you are ready to activate your Iridium service.

To transfer the SIM card to your ISP, please contact Flightcell International at orders@flightcell.com, advising the serial number of your DZMx Plus and the name of your ISP.

Configuring Modems

The DZMx Plus is configured prior to shipment with default settings for the installed modems. However, you may need to check and modify these settings.

This is done using DZMx Connect. Go to **Settings > Modems**.

Configure which modems are used to transmit tracking data

By default, tracking messages are enabled for all modems. If more than one Iridium device or more than one cell modem is installed, only one of each should be activated for tracking.

If the internal Iridium 9523 modem is used for Iridium PTT, then the other Iridium modem (9523 or 9603) or external Iridium device should be configured for tracking.

Configure Iridium or cellular voice calling capability

By default, voice calling is enabled for all modems, except for the Iridium 9603 modem, which is used for SBD messaging only, and the 450 MHz cellular modem, which is for data only.

Configure Iridium SBD Transmission

If your Iridium modem has been provisioned to send SBD messages to your chosen tracking provider, then ensure SBD transmission is enabled for your Iridium device. If you do not wish your device to send SBD messages, then disable SBD transmission.

Configure the Iridium Service Centre

Most Iridium accounts use the standard Iridium Service Centre for handling Short Message Network (SMS) messages. However, some Iridium Service Providers use different Secure Server Networks (SSNs) e.g. Telstra and Pivotel in Australia.

If **(No SMS)** is displayed next to the Iridium modem's status message on the DZMx Plus display, the service centre number is incorrectly set. The service centre number can be selected:

- Use DZMx Connect. Go to **Settings > Modem**. Select **Modem settings 1** and insert the Call Forward Number and toggle **Call Forwarding Enable on**. Select DONE.
- Use the DZMx Plus control head. Go to **MENU > Hardware Config > Modem Config** > **Iridium Modem 1 > Service Centre Number** > and select the correct option.

Configure the cellular APN

It is necessary to set the Access Point Name (APN) for the cellular modems to allow the modem to use cellular data services. You will need to determine the APN for your cellular provider. This is often but not always "**Internet"**.

Enable or disable data

Use this setting to enable or disable data services for the selected modem.

Data Roaming

If a cell modem is operated outside its home country, it is usually necessary to activate data roaming to allow use of local cellular services.

Disabling Cell Modems

In some cases, it may be a requirement to disable cell modems for operational or regulatory reasons.

The DZMx Plus may be configured so that:

- Cell modems are always enabled.
- Cell modems can be disabled via softkey – the modem can be disabled manually on the DZMx Plus, using a long press on the A or B softkey allocated to that modem.
- Cell modems are automatically disabled when the aircraft is in flight.

When a cell modem is disabled, all transmit and receive functions are completely disabled.

These settings can be changed using DZMx Connect. Go to **Settings > Modem > Cell modems.** Select one of the options from the drop down (Off, Disable Via Soft Key, Disable When in Flight. Select **OK.** Select DONE when completed**.**

Note: When set to automatically disable in flight, the manual disable/enable key can override the automatic option until the next take-off or landing.

Backlighting

The DZMx Plus Control Head has a backlit keypad and LCD display.

Backlighting can only be adjusted using the DZMx Plus menus or DZMx Connect.

Backlighting Options

The DZMx Plus Control Head can support variable lighting controlled from the aircraft dimmer control. Aircraft without dimmer controls can manually set the brightness to Day and Night levels. External lighting provides the user with the ability to dim or brighten the display by adjusting the cockpit dimmer control. The Control Head uses the lighting control input (pin 10) for its external lighting input.

- Day backlight is set at maximum brightness for the DZMx Control Head keypad and display.
- Night backlight can be adjusted separately for the keypad and LCD display.
- A separate dimmer control can be used for each DZMx Plus Control Head.
- External lighting is only available if the DZMx Plus has been installed with external lighting wiring.

Switching Backlight Modes

To switch modes between Day, Night and External Backlighting on the Control Head:

1. Press and hold the ***** key for 2 seconds.
2. Scroll to the **Backlight Mode.**
3. Use the **LEFT** or **RIGHT** keys to change the setting.
4. Press the **END** key to exit to the main screen.

Altering Backlight Brightness Levels

Day and Night Modes

Backlight settings can be adjusted separately for the keypad and LCD display. To configure backlight settings on the DZMx Plus Control Head for Day and Night modes.

1. Press and hold the ✱ key for 2 seconds and then release.
2. Select the **Day or Night** setting.
3. Select **Display Brightness** or **Keypad Brightness**. The brightness level is displayed within the brackets e.g. <80>.
4. Use the **LEFT** key to decrease the brightness and the **RIGHT** key to increase the brightness.
5. Press the **END** key to exit the lighting mode and save the setting and to exit the menu.

External Lighting Mode

The minimum and maximum brightness levels can be set for the DZMx Plus Control Head. The external lighting has two modes, which is determined by the way you set the **Ext Lighting Calib Low** point. The external lighting options are:

Option 1: External lighting input controls night lighting and toggles Day/Night mode. This requires setting the 'Low calib' point to a level higher than the lowest input voltage (typically at the 'detent' on the dimmer control). Turning the input below the 'detent' position switches the brightness to Day mode.

Option 2: External lighting input controls night lighting only (no Day/Night mode switch). This requires setting the 'Low calib' point at the minimum input voltage.

To change the brightness options for the external lighting on the DZMx Plus Control Head:

1. Press and hold the ✱ key for 2 seconds.
2. Scroll to **Advanced** > press **ENTER** > **Ext Lighting Config Low** > press **ENTER**.
3. Adjust both the keypad and display brightness. Use the **LEFT** key to lower the brightness and the **RIGHT** key to increase the brightness to match the cockpit lighting levels.
4. Scroll to **Input Calib.** > press **ENTER**.
5. Press the **END** key 3 times to save the settings and exit to the main screen.

To change the maximum brightness options for the external lighting on the DZMx Plus Control Head:

1. Press and hold the ✱ key for 2 seconds.
2. Scroll to **Advanced > Ext Lighting Config High >** press **ENTER**.

3. Adjust both the keypad and display brightness. Use the **LEFT** key to lower the brightness and the **RIGHT** key to increase the brightness to match the cockpit lighting levels. Scroll to **Input Calib**. >press **ENTER**
4. Press the **END** key 3 times to save the setting and exit to the main screen.

Checking Input Range

The **Input Calib.** options in the maximum and minimum brightness shows the raw input values, which update each time the **ENTER** key is pressed. These values need to be checked during installation to ensure that the hardware is functioning correctly.

The following requirements are necessary for proper set-up of the external lighting:

- The minimum position needs to have a smaller value than the maximum position.
- A DZMx Plus Control Head will typically have a difference of around 900.

Note: It is recommended that the lighting control input should vary between 0V and 28V between minimum and maximum lighting respectively.

DZMx Plus WiFi

The DZMx Plus can be supplied with optional integrated WiFi components (designated by a W at the end of the product's part and dash number e.g.: DZP_07-xxx-xxW

DZMx Plus Wi-Fi is a licensed application; purchase of a Wi-Fi licence is required to activate the Wi-Fi service on the DZMx Plus.

DZMx Plus Wi-Fi allows the DZMx Plus to act as an access point to connected devices, enabling the DZMx Plus to be used to route DZMx Plus data connections to connected devices, including:

- PCs
- Tablets
- Smartphones
- Medical devices
- Other specialised devices
- Provide WPA2 encryption security to wireless devices.

Starting WiFi

If the DZMx is WiFi capable and the Wi-Fi licence has been activated, the WiFi service is active by default.

It is possible to toggle WiFi on and off from the front panel using a long press on the **MODE** key.

When WiFi is enabled, a wireless icon will appear at the top right of the screen on the front panel.

If it is necessary to disable WiFi so that it cannot be overridden by the flight crew, the **MODE** key function can be disabled using DZMx Connect.

1. Go to **Settings > Preferences > Main Screen Options > Mode Button Function**.
2. Select required option (Disabled, Toggle WiFi, Toggle Bluetooth, Toggle BT and WiFi).
3. Select **Ok** then DONE.

WiFi Settings

WiFi settings can be configured using DZMx Connect. Go to **Connectivity >WiFi**.

The following settings can be modified:

- Service Set Identifier (SSID).

- Passkey.
- Wireless Local Area Network (WLAN) channel.
- WiFi Dynamic Host Configuration Protocol (DHCP) Server settings.

DZMx Plus Bluetooth™

DZMx Plus Bluetooth is a built-in option that works with any DZMx Plus that has a DZP_07-xxx-xxW part and dash number.

DZMx Plus Bluetooth is a licensed application; purchase of a Wi-Fi or Bluetooth licence is required to activate Bluetooth on the DZMx Plus.

DZMx Plus Bluetooth provides the ability to pair a mobile device, such as mobile phone or tablet, to the aircrafts Inter Communication System (ICS)/headset which is like the hands-free operation in a motor vehicle.

Functionality includes:

- Making and receiving calls on a mobile device and talk via the ICS and headset.
- Listening to streaming media on a headset from a mobile device.

If Bluetooth menu options are not available, this functionality will need to be purchased and then activated with a software key supplied by Flightcell International Ltd.

Enabling Bluetooth

Once Bluetooth is enabled, it is possible to toggle it on and off from the front panel or the Control Head using a long press on the **MODE** key.

When Bluetooth is enabled, the Bluetooth icon will appear at the top right of the DZMx Plus Control Head screen.

Bluetooth can be disabled in the DZMx Plus Control Head menu: Select **MENU > Hardware Config** > **Wireless and Networks > >Bluetooth Enable>** select **No** or **Yes >** press **ENTER** to save and press **END** to return to the main screen.

Pairing

1. Check that the Bluetooth icon is showing on the DZMx Plus display
2. Make the DZMx Bluetooth discoverable using the:
   - DZMx Connect app menu. Go to **Connectivity > Bluetooth**. Ensure Bluetooth is toggled On**.**
   - DZMx Plus Control Head. Select **MENU> Hardware Config > Wireless and Networks** > **Blue Tooth Discoverable** > Press **ENTER** and select **No** or **Yes** > press **ENTER** to save and press **END** to return to the main screen.
3. Enable Bluetooth on the mobile device settings and select the ‘DZMx Plus Bluetooth’ device.
4. A pairing notification message with a confirmation code will appear on the DZMx Plus Control Head and the mobile device. Ensure they are the same number.
5. Press the **ENTER** key on the DZMx Plus Control Head, then select **Pair** on the mobile device.

Connecting paired Bluetooth devices

The DZMx Plus may be configured to require devices to be connected manually each time, or to automatically connect the last connected device.

» Use DZMx Connect. Go to **Connectivity > Bluetooth.** Toggle **Discoverable ON** and or auto connect **ON.**

» Use the DZMx Plus Control Head. Select **MENU** > **Hardware Config** > **Wireless and Networks** > **Bluetooth Autoconnect** > select **No** or **Yes** > press **ENTER** to save and press **END** to return to the main screen.

Note: The auto-connect functionality may vary according to mobile devices and the level of support provided by their operating systems.

A high degree of variability is present across Android devices, and they may need to be connected manually.

Hands Free Calling

The DZMx Plus supports a Bluetooth audio Hands Free Profile (HFP). If a Bluetooth device is connected in this mode and pairing has been successful, the DZMx Plus Control Head will display a mobile phone icon in the top left corner of its display. If a user receives or initiates a call on the paired mobile device, the audio will be routed to/from the ICS/Headset.

Media Streaming

The DZMx Plus supports an Advanced Audio Distribution Profile (A2DP). If a Bluetooth device is connected and pairing has been successful, the DZMx Plus Control Head will display a musical icon in the top left corner of its display. When the user starts audio playing on the connected mobile device it will be audible through the ICS/Headset.

IMPORTANT NOTE RELATING TO DZMx Plus BLUETOOTH MODEM: *To comply with FCC requirements, the BT800 must not be co-located or operating in conjunction with any other antenna or transmitter.*

Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

1. Reorient or relocate the receiving antenna.

2. Increase the separation between the equipment and receiver.

3. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

4. Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: *Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.*

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

DZMx Tracking

The DZMx Plus has an embedded GPS, which provides precise information on position, heading, altitude and speed. This information can be sent to a tracking provider to enable the aircraft to be monitored and its movements tracked. To use the DZMx Plus tracking capability, it is necessary to enter a contract with a tracking service to receive, process and display tracking information. The DZMx Plus must then be configured to work with that tracking service.

The DZMx Plus cannot provide continuous tracking due to the constraints of the networks used but can transmit position reports at regular pre-programmed intervals.

As well as periodic position reports, the DZMx Plus can be configured to automatically send event reports – these are position reports with an event code attached.

Tracking settings can be configured using either the DZMx Plus Control Head tracking menu or by using DZMx Connect.

Note: Most of the menu settings will not be visible unless the user has unlocked the Installer Menu.

Changing Tracking Modes

Tracking can be disabled (until re-enabled) or suspended (for the current flight only).

To suspend or disable tracking:

1. Using the DZMx Control Head select **MENU** > **Tracking > Tracking Mode** > press **ENTER** and select one of the following options:
   - **On**: Turns tracking on until it is disabled or suspended.
   - **Suspend**: Suspends tracking until the DZMx Plus is next powered on
   - **Off**: Turns tracking off until it is manually enabled
2. When selected press the **ENTER** key followed by the **END** key to return to the main screen.

Locking the Tracking Menu

By default, some tracking settings are unlocked and can be altered by the crew to change the main tracking timers.

1. To lock the tracking menu using the DZMx Plus Control Head.

   Select **MENU > Tracking Lock > Tracking Menu >** select **No or Yes >** press **ENTER >** press **END** to return to the main screen.
2. To lock the tracking menu using DZMx Connect.

   Go to **Settings > Tracking > General.** Toggle the **Lock Tracking Menu**. Select DONE.

The Tracking Menu will be hidden from view when the DZMx Plus is next restarted.

Note: The tracking menu can also be locked or unlocked using DZMx Connect.

Configuring the DZMx tracking system

Configuring DZMx GPS

The DZMx Plus default setting for the GPS receiver provides for a maximum operating altitude of 12,000 meters and a maximum ground speed of 310m/s (603 knots, or 1116 km/hr).

When operating at high speed or high-altitude you can change the GPS settings using DZMx Connect. Go to **Settings > Preferences > GPS** and select **General Purpose, High Altitude** or **High Speed** from the dropdown box. Select **OK** followed by **DONE**.

Setting	Max Altitude (*m*)	Max Horizontal Speed (m/s; knots; km/hr)	Max Vertical Speed (m/s; knots; km/hr)
General Purpose	12,000	310; 603; 1116	50; 97; 180
High Altitude	50,000	250; 486; 900	100; 184; 360
High Speed	50,000	500; 972; 1800	100; 184; 360

GPS Display Options

GPS information is displayed on the top line of the DZMx Plus Control Head screen and can be varied to meet your needs. The current available options for the display line are:

- **Off:** no information shown
- **Speed and Heading:** the aircraft's speed and heading are shown in knots and degrees relative to true north (rather than magnetic north)
- **Clock:** the current time and date is shown in UTC (not local) time
- **TTAF:** Total Time Airframe
- **DFT:** Daily Flight Time
- **Trip:** Current trip time.

To set the GPS display using the:

- DZMx Plus Control Head. Go to **MENU > Display Setup Menu > Top Line Options** or
- DZMx Connect. Go to **Settings > Preferences > Top Line Options**

Tracking Providers

Flightcell does not provide a tracking service but works with a number of tracking service providers who support DZMx Plus data. Contact Flightcell for information on available tracking service providers or refer to the list of providers on the Flightcell website (http://www.flightcell.com/tracking/tracking-providers).

If you have a preferred tracking provider who is not currently supported by Flightcell, please contact us at info@flightcell.com. We are always prepared to support additional providers.

Setting up the Tracking Service Provider

Before your tracking service provider can configure your tracking account, you may need to provide them with the following information:

1. DZMx Plus Serial Number: Used to identify your aircraft when data is sent to a tracking provider. You can find your serial number in one of three places:
   - » On the DZMx Plus packaging.
   - » On the serial number label on the back plate of the DZMx Plus.
   - » By using the DZMx Plus Control Head. Select **MENU > Diagnostics Menu > About DZMx.** The serial number will be displayed. Press **END** to return to the main screen.
2. International Mobile Equipment Identity (IMEI)): This is a unique 16-digit number which is located on the backplate label of the DZMx Plus or under the battery of the (optional) Iridium External Device.

   This can also be found by using the DZMx Plus Control Head. Select **MENU > Diagnostics Menu > Sat Device Details**. The IMEI number will be displayed. Press **END** to return to the main screen.
3. SIM Card: The DZMx Plus will usually be delivered with an unlocked Iridium SIM Card installed. Your tracking provider should be able to activate an account for this SIM Card.

   Iridium Phone Number: You may already have an Iridium phone number. phone number for the Iridium SIM card can be found in the back of the starter guide included with your DZMx Plus. If there is no SIM card installed – then your tracking service provider will be able to send you an activated card.
4. Cellular Phone Number: If you have a cell modem installed.

Tracking Transmission

The DZMx Plus can send position reports over:

- » The cellular network: Using an Internet Protocol (IP) data connection.
- » The Iridium network: Using the Short Burst Data service (SBD) or Short Message Service (SMS).

If you wish to enable a particular modem for tracking and for sending data. Ensure the "Use For Tracking" modem setting is enabled and the "SBD Enable" modem setting is enabled for any Iridium modem.

Preferred Transmission Mode

The DZMx Plus can prioritise the available networks used for sending tracking messages. This is particularly useful and allows you to prioritise the cheapest transmission method, or least cost tracking. The DZMx Plus will use the alternate network only if there is no coverage on the preferred network.

DZMx Plus also allows tracking messages to be sent from the alternate modem while the other modem is in use for calls/data.

To set the preferred transmission mode:

1. Using DZMx Connect app. Select **Settings > Tracking > Transmission**. Select one from the list below, select **OK** and **DONE**.
2. Using DZMx Plus Control Head. Select **MENU > Tracking > Transmission Opts > Preferred Device**. Select one from the list below:

   Select one of the following:

   - **Try Sat First:** If messages cannot be transmitted over the Iridium satellite network the DZMx Plus will send them over the cellular network.
   - **Try Cell First**: If messages cannot be transmitted over the cellular network (for example if the aircraft is out of cell coverage) the DZMx Plus will send them over the Iridium satellite network.
   - **Sat Only:** If the iridium network is the preferred and there is no signal, tracking messages will be queued.
   - **Cell Only:** if the cellular network is preferred and there is no signal, tracking messages will be queued.

Note: During a satellite call, SBD will be unavailable.
To ensure tracking is not interrupted, the satellite modem will default to Iridium SMS for tracking, until the call has ended.

Configuring DZMx Plus Tracking Destinations

Once the Tracking Service Provider has your account set up, the DZMx Plus can be configured to send tracking messages to your selected providers. The destination gateways for Iridium and cellular networks need to be configured for each tracking service. The tracing service provider will provide you with their destination address. The following tracking gateways can be used with the DZMx Plus:

- **Iridium SBD:** Destination addresses are configured by your tracking service provider on the Iridium service SPNet.
- **Iridium SMS:** Configure using DZMx Connect. Go to **Settings > Tracking > Transmission,** then enter the destination address.
- **Cellular Tracking over IP:** Enter the IP address and port number using DZMx Connect. Go to **Settings > Tracking > Transmission**.

Note: If a method of transmission is not supported by your tracking provider, leave the destination address setting for that transmission method blank.

Configuring Tracking over Internet Protocol (IP) using Cellular Data

If supported by your tracking provider, the DZMx Plus can be configured to send tracking messages via the cellular data connection to an IP address when a data connection is available.

1. Configure the following settings in DZMx Connect: Select **Settings > Modem.**

- **Access Point Name (APN)** for your cellular network: this can be obtained from your cellular service provider or from their website. The normal default APN is "**Internet**".
- **Enable Data:** This setting must be set to **On**. There must be a data connection active to send tracking messages to an IP port.

2. Configure in DZMx Connect. Select **Settings > Tracking > Transmission**.

- **IP address:** Your tracking provider will advise you what IP address setting to use. An example is: 123.123.5.6.
- **IP port:** Your tracking provider will advise you what IP port number to use. An example is: 12021.
- **IP Timeout Profile:** There are three possible settings; **Short, Medium** (default) and **Long**. The IP timeout configures the delay used to wait on the connection to the IP gateway from the tracking provider when attempting to send the messages. The shorter the delay, the faster the tracking system will fall back onto another network service to send tracking messages if transmission over IP fails. Setting this to Long will make the system more resilient and will maximise the use of tracking over IP when the connection is poor, but this setting could also result in messages taking longer to send.

Configuring Periodic Events

The DZMx Plus can be configured to send position reports at designated intervals, depending on aircraft activity. The following events or timers can be configured individually:

- **Periodic Timer:** The time, in minutes, between sending automated position reports while in flight (15 seconds for HD tracking)
- **On Ground Timer:** The time, in minutes, between sending automated position reports while on the ground (not in flight)
- **Taxiing Timer:** The time, in minutes, between sending automated position reports while taxiing.
- **Hover Timer:** The time, in minutes, between sending automated position reports while hovering. Hover events will replace the periodic events when they are due to be sent. Hovering can only be reported for a helicopter which has a collective or weight on wheels switch to detect take-off and landing. The hover timer cannot be enabled if using speed only.
- **Heading Timer:** The minimum time, in minutes, between position reports when the aircraft is changing heading.

To Change the Interval for the Selected Timer:

1. Using DZMx Connect. Go to Settings > Tracking > Periodic. Select the required periodic timer settings. Select DONE
2. Using the DZMx Plus Control Head. Press MENU > Tracking> Periodic Events > Periodic Timer (mins) > press ENTER. Use the LEFT key to reduce the interval and the RIGHT key to increase the interval. The intervals are displayed in minutes. Press the ENTER key to save the setting. Press END return to the main screen.

Note: Any timer can be disabled by setting its interval to zero.

Enabling HD Tracking

While tracking interval over Iridium is set in minutes, with tracking over cellular IP, the interval can be reduced to 15 seconds (High Definition Tracking).

To enable or disable HD Tracking using DZMx Connect:

Go to **Settings > Tracking > General > Tracking Mode** and select one of the following options:

- **On**: Enables HD tracking, thus allowing up to 1 tracking message to be sent every 15 seconds by the DZMx while a data connection is available.
- **Off**: Turns HD tracking off, reverts to the periodic tracking interval as set-up in "Periodic Events".
- When the tracking mode has been selected, select DONE.

Configuring the Heading Timer

If the **Heading Timer** is configured, a position report will be sent as soon as a specified change in heading occurs.

To set the heading variation that triggers a heading change report using DZMx Connect. Select **Settings > Tracking > Periodic Settings > Heading Timer (mins)**. You can type in the number of minutes or move the scroll bar until the required number of minutes is displayed. When finished select DONE.

Note: The heading timer only specifies a minimum delay between heading events.

Triggered Events

Manual Reports

The **MARK** key on the DZMx Control Head keypad can be configured to send a variety of manual position reports:

1. Long press of MARK key:

- **A position report only**, to the tracking service, or
- **Position with text message:** When **MARK** is held for 2 seconds, it opens a list of pre-programmed text messages that can be sent with the manual position report.

2. Short press of the MARK key:

- **A position report only**, to the tracking service, or
- **A mission mark** – this prompts the user to press one of the coloured keys on the DZMx Plus Control Head, then the mission number; this is sent to the tracking service, or

» **Mark and text contacts** – send a position and message (from the DZMx Plus message library) to one or more SMS recipients and optionally the tracking service. The recipients for each message are designated individually by editing entries in the DZMx Plus phonebook.

These options are configured using DZMx Connect. Go to **Settings > General > Mark Long Button Press/Mark Short Button press.** Select options from the drop down and when completed select DONE.

Note: These options are not supported by all tracking service providers. Check with your service provider before activating these options.

Power Up

To send a position report when the aircraft power is supplied to the DZMx Plus.

Note: It is recommended that the DZMx Plus be connected to the primary power bus on the aircraft so that the power up message is created when the aircraft is first powered on.

Take-off and Landing Events

The DZMx Plus can be configured to send take-off and landing event reports at the start and end of each flight leg. The simplest approach is to use aircraft speed to trigger take-off and landing reports. This is ideal for fixed wing aircraft. However, while this approach can be used for helicopters, it is not ideal as it can result in false take-off and landing reports when hovering.

For helicopters, it is recommended that a collective switch or squat switch (also known as a "wheels on ground" or "weight on wheels" switch) be used to activate these reports.

To configure the DZMx Plus for take-off and landing events using aircraft speed use DZMx Connect. Go to **Settings > Tracking > Triggered** and set a speed just below take-off speed for the aircraft, and a landing speed just below the aircraft's landing speed. When completed select DONE.

Engine Start and Stop Events

The DZMx Plus can be configured to send an event report when the engine starts and stops. Typically, this is triggered by the transmission oil pressure warning light circuit.

Message Queue

The DZMx Plus sends position reports and other messages to the selected networks as soon as they are created. Occasionally, the DZMx Plus may lose network connection, which will cause messages to be stored in a message queue until a network connection is restored.

The behaviour of this queue can be configured using DZMx Connect. Go to **Settings > Tracking > Queue**

- Queue size can be set up to store up to 20 messages. Que size can be entered using text or the sliding bar.
- Using the dropdown menu select the Queue type. Either "**send the newest messages first** or the "**oldest messages first**".
- Restore Unsent messages (Msgs); unsent messages in the queue are retained in DZMx Plus memory when it is powered down and sent when the DZMx is started up again. This function can be toggled on or off.

Note: Once this message queue limit is reached, the oldest messages will begin to be deleted from the queue.

Note: Some tracking providers are unable to cope with tracking messages that are out-of-order, so it may be required to use the **Send Oldest First** setting.

Note: Messages older than 24 hours will not be restored.

Automated Rescue Monitoring

Automated Rescue Monitoring (A.R.M) also known as Automated Flight Following (AFF) is an optional automated flight monitoring system. When A.R.M. is activated, your tracking service monitors position reports from the aircraft and raises an alert when reports are overdue by a specified period, or (optionally) if the aircraft is stationary for a specified period.

Enabling A.R.M. allows for the feature to be activated when the A.R.M. key is pressed. To enable the A.R.M. function using the DZMx Plus Control Head keypad select **MENU** > **Tracking > ARM Enable >** press **ENTER.** Select **No** or **Yes**.

Not all Flightcell tracking providers support A.R.M so before activating it contact your tracking service provider to determine if they support this function.

Note: A.R.M. can only be configured with tracking providers who support this application.

Alert Mode

Alert Mode allows users to send special alert messages in specific circumstances (e.g. Under Fire).

The Alert mode setting can only be enabled using DZMx Connect. Go to **Settings > Tracking > Automated Remote Monitoring.** Toggle **"Arm enabled"** on or off. **"Alert Mode Enabled"** can also be toggled on or off.

When enabled, it is activated using a long press on the DZMx Plus Control Head **A.R.M. key.**

Note: A.R.M. and Alert mode cannot be enabled at the same time.

Geofence Suspend Mode

The Geofence Suspend application allows operators to suspend tracking while the aircraft remains within a set geographical radius. This enables position reports to be supressed while the aircraft is operating in a localised area, e.g. during crop dusting or Airwork operations.

Moving outside the geofence perimeter will cause geofence mode to be cancelled and normal tracking to resume. Whilst within the perimeter, periodic tracking is suspended and depending on how geofence suspend mode is configured, triggered events, such as take-offs and landings, can also suspended.

Setting the Geofence Mode

1. Set the Geofence radius using the:

» DZMx Connect app. Go to **Settings > Tracking > Geofence > Geofence Settings > Geofence Radius**. Enter the Geofence radius then select DONE.

» DZMx Plus Control Head keypad. Select **MENU > Tracking > Geofence > Geofence Radius** >press **ENTER**. Use the **left** arrow key to reduce the Geofence radius and the **right** arrow key to increase the Geofence radius. Press **ENTER** to save then press **END** to return to the main screen.

2. Geofence Mode is configured using the:

» DZMx Connect app. Go to **Settings > Tracking > Geofence > Geofence mode.** Select the Geofence mode from the list below. When selected, select **OK** then select **DONE.**

» DZMx Plus Control Head keypad. Press **MENU > Tracking > Geofence > Geofence Mode.** Select the Geofence mode from the list below. When selected press **ENTER** then press **END** to save and return to the main screen.

Select: **Disabled** to disable the Geofence application. This will remove the geofence function from the **MENU** key.

Select: **Without Events** mode to suspend all tracking messages, except emergency, forms, ETM1000 and manual mark messages.

Select: **With Events** mode to suspend periodic and course change tracking messages as above, but all triggered events will still be transmitted.

Select: **Events on Cell Only** mode to operate as per With Events mode but with the additional cost- saving feature to only send event messages via cell modem.

3. Triggered event messages will be queued if the cell modem has no signal until the cell modem obtains a connection to the cell network, or the aircraft flies out of the geofence perimeter.

Refer to the DZMx Operators' Manual for details of how to activate a geofence.

DZMx Plus Inputs and Outputs

The DZMx Plus has General Purpose Inputs/Outputs (GPIO) which can be configured to trigger alerts or tracking messages during operation, or to signify some event. The DZMx Plus has five inputs and two outputs. Another seven inputs can be installed with the optional Input Expansion Card (IEC).

DZMx Plus Inputs

The DZMx Plus general-purpose inputs (GPIs) can be used to indicate some event or state on the aircraft. A standard DZMx Plus has five inputs, with another seven inputs available on the optional DZMx Input Expansion Card (IEC). An input may be used for a range of functions:

Uses include:

1. Indicating an event, including, but not limited to:

» Engine start.

» Take-off.

» Release of water from a fire-fighting tank.

» Indicating a level, such as the amount of water in a fire fighting tank.

» Triggering an action on the DZMx Plus, such as triggering an Iridium Push-to-Talk (PTT) transmission. To trigger an action; e.g. connect to a

» **PTT button** to start/stop a PTT transmission.

» **Custom button** to cancel DZMx Plus audio alerts.

» **Custom button** to turn on or off Wi-Fi and Bluetooth.

2. To trigger an event report; e.g. connect to a Collective switch or Weight on Wheels (Weight on Ground) switch to generate take-off tracking messages.

» **Collective switch** or **Weight on Wheels** (Weight on Ground) **switch** to generate take-off tracking messages.

» **Oil pressure switch:** To generate engine start and stop messages.

» **Cockpit lighting control** to control DZMx brightness externally from the dimmer control (only available on input 5)

» **Rotor brake light** to trigger a Rotor Brake On/Off report

» **Winch control** to trigger winch out/in report.

3. To trigger an action; connect to a

» PTT button to start/stop a PTT transmission.

» Custom button to turn on or off Wi-Fi and Bluetooth.

4. Additional applications can be activated on the DZMx Plus which provides a large range of additional functions for the inputs. These include:

» Airline Application.

» Firefighting Application (see details in the DZMx Firefighting Application Manual).

Wiring the inputs

The inputs can tolerate a voltage range of 0-28VDC, with an over/under voltage protection to ±32VDC. The inputs have two states, **Open** (high voltage) or **Closed**

(low voltage). Refer to the Flightcell website at www.flightcell.com/resources for the wiring diagrams.

Two ground return pins are provided for the five primary General-Purpose Inputs (GPIs) (pin 10 and pin 11 of the primary connector); these are internally connected to power ground and aircraft chassis ground, so the aircraft chassis can be used as a ground return for these GPIs if required.

Configuring the inputs

These inputs can be set up using the DZMx Plus Control Head menus or using DZMx Connect. In practice, it is easier to set them up using the DZMx Plus Control Head menus as the DZMx Plus reports the status of the input in real time.

Inputs 1 to 5 can be used either as two-state or as variable inputs.

Events can only be triggered on inputs 6-12 (on the input expansion card) by pulling them to ground, as they are two-state inputs.

To set up the inputs using the:

1. DZMx Connect app. Go to **Settings > Inputs or MENU > Hardware Config > Input Configuration.**
   - » Select the function that you want to assign to an input (e.g. **Take-off Switch**).
   - » Select **Input Designation**, then select the input which has been wired for that function or select **Not Installed.**
2. Using the DZMx Plus Control Head keypad. Select **MENU > Hardware Config > Input Configuration.**
   - » Select the function that you want to assign to an input (e.g. Take-off Switch)
   - » Select Input Designation, then select the input which has been wired for that function or select **Not Installed.**

If using the DZMx Plus Control Head a pop-up will show the current state the DZMx Plus reads from this input (e.g. **Up/Down**, **On/Off**).

If the state is wrong (e.g. DZMx Plus reports “Collective is Up” when it is down, go to **Input Configuration** and change the selected condition.

Note: Some specialised input functions will only appear in the Input Configuration menu if the application (e.g. airline, firefighting, or PTT) is enabled.

DZMx Plus Outputs

The DZMx Plus has two outputs, these are switches that can be used to turn an electrical signal on or off. A typical use of an output is to energise a ring alert light on the aircraft panel.

Each output has two terminals, A and B. The output consists of an isolated switch, internal to the DZMx Plus. When the output is active, the switch is closed (terminals A and B are connected). When output is inactive, the switch is open (terminals A and B are disconnected). The outputs can be configured to flash or simply turn on/off.

The events that can be configured to trigger the outputs on the DZMx Plus are:

- **Off Hook:** Turned on when the operator is dialling, or in a call.
- **Incoming Call:** Alerts the operator when there is an incoming call.
- **PTT Transmitting:** A device in the talk group is transmitting.
- **Received Msg:** Alerts the operator when a text message has been received or a call has been missed.
- **Power Indicator:** Alerts the operator when the DZMx Plus is powered on.

To select the allocation of the outputs and the blink pattern using the DZMx Plus Control Head select **MENU > Hardware Config > Outputs Config >** press **ENTER** and select the appropriate setting.

- Off Hook Output > [Disabled | Output 1 | Output 2]
- Off Hook Mode > [Off | Solid | Blink]
- Incoming Call Output > [Disabled | Output 1 | Output 2]
- Incoming Call Mode > [Off | Solid | Blink]
- PTT Transmitting Output > [Disabled | Output 1 | Output 2]
- PTT Transmitting Mode > [Off | Solid | Blink]
- Received Msg Output > [Disabled | Output 1 | Output 2]
- Received Msg Mode > [Off | Solid | Blink]
- Power Indicator Output > [Disabled | Output 1 | Output 2]
- Power Indicator Mode > [Off | Solid | Blink].

Configuring DZMx Plus Data

DZMx Plus data can provide access to the internet for a connected PC, laptop, or Windows tablet over a cellular data connection. These devices can connect to the DZMx Plus via its Ethernet port or Wi-Fi connection.

Ethernet Configuration

It is recommended that the Flightcell USB/Ethernet module is installed to provide the necessary Ethernet connection.

The DZMx Plus can be set as a DHCP server, a DHCP client, or allocated a fixed IP address.

These can be selected using DZMx Connect. Go to **Settings > Preferences > Local Network > Local Network Settings.**

To access the DZMx Plus data connection, the Ethernet configuration should be set to DHCP Server or Static IP address mode. When configured with a static IP address, or when configured in DHCP Server mode, the DZMx cellular data internet connection can be shared and is available via its Ethernet port.

Configure connected network devices to use the DZMx Plus IP address 192.168.4.1 as their default IP gateway.

DHCP Server Mode Configuration

The DZMx Plus can be set as a DHCP server, a DHCP client, or allocated a fixed IP address.

These can be selected using DZMx Connect. Go to **Settings > Preferences > Local Network > Local Network Settings.**

The DZMx Plus operates as an internet router while in DHCP server mode. When a PC or laptop is plugged in using the DZMx Plus Ethernet port, the DZMx Plus DHCP server will allocate the connected device an IP address in the range 192.168.4.xxx.

Note: When using this mode ensure that there are no other devices on the network configured as a DHCP server.

Static IP Address Mode Configuration

The DZMx Plus can be assigned static IP settings, this includes a static IP address, a subnet mask, a default gateway (optional) and Domain Name System (DNS) settings (optional).

Static IP settings (IP address, Subnet Mask) are set using DZMx Connect.

1. Go to **Settings > Preferences > Local Network > Local Network Settings**.
2. Select **"Static IP Address"** in the dropdown menu.
3. Select **OK** then **DONE**.

A static IP address may also be set using the DZMx Plus Control Head:

1. Using the keypad select **MENU > Hardware Config> Wireless and Network > Static IP Configuration >**press **ENTER**.
2. Scroll to Host IP Address, press **ENTER** and then specify the DZMx Ethernet interface IP address e.g. 192.168.4.100, then press **ENTER**.
3. Scroll to Subnet Mask and then specify the subnet mask that matched the IP address (previous step) usually 255.255.255.0, then press **ENTER**. If the gateway IP address does not need to be configured Press **END** to return to the main screen.

Optional Gateway and DNS Configuration

Independently from the IP address mode, DNS server settings can be specified to use a specific DNS server. This will work with all 3 possible modes (DHCP client, server, or Static IP address). This is optional as it overrides default settings provided by DHCP mode and is only required if internet connectivity is needed in static address mode.

Default Gateway: Specify which network gateway provides internet connectivity to the DZMx Plus. This can be an internet default gateway.

The following steps are Optional.

1. Using the DZMx Plus Control Head keypad select **MENU > Hardware Config > Wireless and Networks > Static IP Configuration > Gateway IP address >** press **ENTER.**

To specify the default internet gateway, the DZMx Plus will where the internet connectivity is coming from a specific IP gateway (contact your cell network provider for more information) i.e. 192.168.4.100, then press **ENTER**. Press **END** to return to the main screen.

2. To override the default DNS server configuration using the DZMx Plus Control Head keypad select **Menu** > **Hardware Config > Wireless and Networks > DNS Configuration > DNS Server IP Address #1**> press **ENTER.**

   Specify the IP address for the Primary DNS server, then press **ENTER**. Repeat this step for the DNS Server Address #2 to specify the Secondary DNS server IP Address. Press **END** to return to the main screen.

Applying the Specified Static IP Configuration

To apply the specified static IP settings and optional settings, Default gateway and DNS use the DZMx Plus Control Head keypad.

Select **MENU > Hardware Config > Wireless and Networks> Select IP Address Mode > Static IP Address >** press **ENTER.**

This process can take a few seconds. A window advising "**Ethernet configuration update please wait**" will appear. Press **END** to return to the main screen.

Note: To check which IP address is in use for the Ethernet connection, using the DZMX Plus Control Head keypad.
Select **Menu** > **Diagnostics Menu > About DZMx.** The Ethernet IP address will be displayed.

Configure Cellular Data

To enable or disable cellular data using DZMx Connect.

1. Go to **Settings > Modems > Modem 2.**
2. Toggle "**Enable Data**" to on to allow cellular data to be used.
3. Set **Data Roaming** to allow cellular data to be used outside the area coverage of your cellular data account.

Note: Data roaming can incur significant charges!

Set the Access Point Name (APN).

The APN setting must be configured to enable a data connection to be established. The APN is the name of the setting your cellular modem uses to set up a connection to the gateway between your carrier's cellular network and the public Internet. The APN you need to specify will depend on the cellular network service provider. The APN is often published on the service provider's web site.

This setting is easier to enter using DZMx Connect as you can type in or paste in the APN. It can also be entered using the DZMx Plus Control Head.

Enabling and Disabling Satellite Data

Modify the satellite modem settings using DZMx Connect. Select **Settings > Modem > Internal Sat Modems** to enable and disable satellite data. This cannot be enabled using the DZMx Plus Control Head keypad.

DZMx Plus Data Logging

The DZMx Plus provides several data logging functions.

DZMx Plus Flight Data Recorder

The DZMx Plus has an inbuilt flight data recording function that includes an inertial measurement unit and barometric pressure sensor. The output from these sensors is logged at one second intervals.

The following raw sensor data is logged:

- Angular rotation in all 3 axes (radians per second, relative to the DZMx Plus)
- Acceleration in all 3 axes (G force, relative to the DZMx Plus)

The inertial data is fused and logged to provide:

- Airframe pitch (degrees)
- Airframe roll (degrees)
- Pressure (millibars)
- Pressure altitude (reference to 1013.25 millibars)

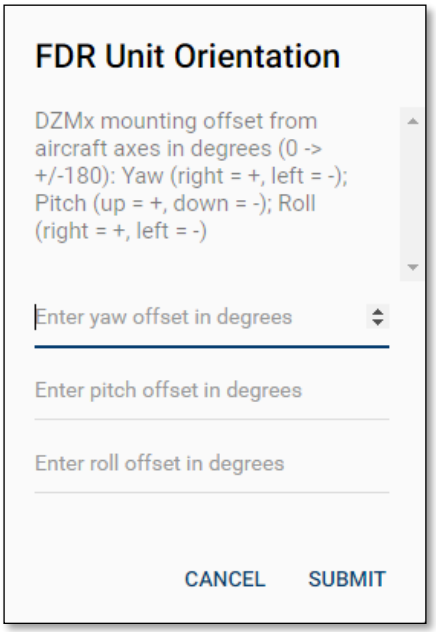
Disclaimer

The Flight Data Recording system in the DZMx Plus uses a six degree of freedom sensor fusion technique and thus all pitch and roll values output are a best estimate based on measured angular rate (prone to drift) and estimated gravity vector (which can be distorted by accelerations). This must not be used for navigational or control purposes.

Setting up the Flight Data Recorder

To correctly estimate the pitch and roll of the aircraft using the DZMx Plus, the unit's rotational offset relative to the aircraft's primary axes is required. DZMx Connect provides an interface to set those parameters:

» Using DZMx Connect select **Flight** > **Flight Icon** > **Gear Icon**



Note: If the DZMx Plus is installed not aligned with respect to any of the aircraft axes, data readings will be incorrect unless this step is performed at installation

Accessing DZMx Plus Flight Data

This data can be accessed by the user in several ways:

» Using DZMx Connect to view the data live.

» Using DZMx Connect to download the data for a given flight. Select **Flight > Flight Icon > Folder Icon.**

» Using Flightcell International's DZMx Plus Application Programming Interface (API) the data can be accessed and incorporated into a third-party application. Emailed automatically using the DZMx Plus email outbox.

Cellular Network Data Logging

The DZMx Plus logs several network parameters for the cellular network, along with aircraft position, altitude, speed and heading.

GPS Data Logging

The DZMx Plus logs GPS data at one second intervals, including aircraft position, speed, heading and altitude, and GPS quality metrics.

Transmitting Log Data

The DZMx Plus can automatically transmit log data using the DZMx Plus email Outbox feature.

Using DZMx Connect. Go to **Settings > Preferences > Logging Email Reporting** to specify which logs are transmitted and to activate automatic emailing of the logs.

DZMx Plus Email Outbox

The DZMx Plus can transmit data via email. To do this, the email outbox must be configured.

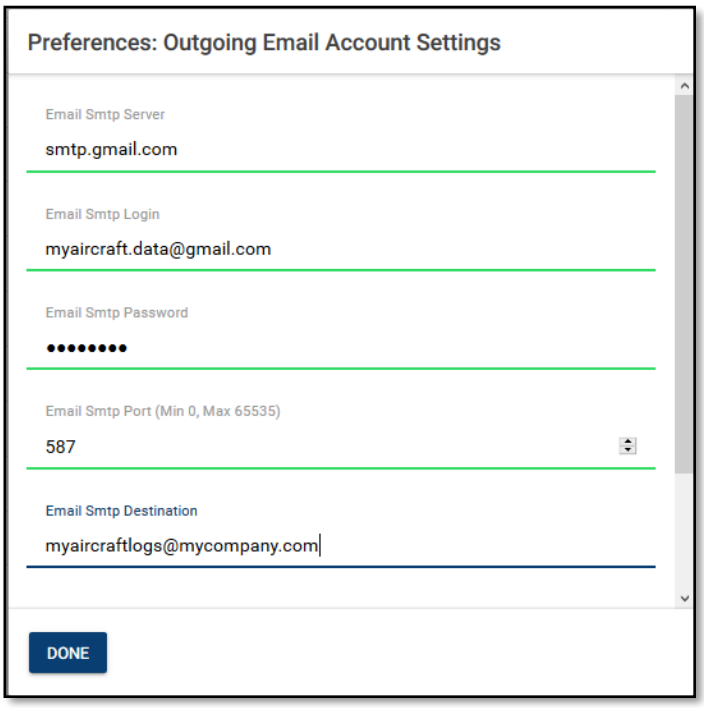
4. Using DZMx Connect. Go to **Settings > Preferences > Outgoing Email Account**

   Enter the following settings, (these can be for an existing email account, or you can set up an email account):

   - Email Smtp server.
   - Email Smtp email login.
   - Email Smtp password.
   - Email Smtp port (Min 0, Max 65535).
   - Email SMTP destination (the destination address for the log data).

   When you have made your changes select DONE.

The following is an example of these settings using a Gmail account for sending the data, and an in-house account as the destination:



Recording and Transmitting Maintenance Data

The DZMx Plus supports maintenance timers (also known as a Hobbs Meter). The DZMx Plus can record and log the following:

- Trip time
- Daily Flight Time (DFT)
- Total Airframe Flight Time (TTAF)
- Engine starts.
- Landings.

This data can be displayed on the DZMx Plus Control Head, sent to the tracking provider and sent by email to a nominated email address.

Prerequisites

For the maintenance data to be recorded and sent by email both the outgoing email account settings in **Email Outbox** must be set up and the email address for the maintenance reports.

For maintenance data to be included in landing and take-off messages, tracking must be enabled and either a take-off input or a take-off speed must be configured.

For engine starts to be counted and visible in the Timer page, an oil pressure input must be configured.

For landings to be counted and visible on the Timer page, either a take-off input or a take-off speed must be configured.

Configuring Maintenance Data

To specify whether landings and engine start data are to be sent and to enter the destination email address for the maintenance report use DZMx Connect.

Go to Settings > Preferences > Hobbs and Maintenance to:

- Count Engine Starts
- Count landings
- Send in Tracking Msg.
- Maintenance Email Address. This can be a different email address to what was set up in the DZMx Plus Outbox.

Section 7: DZMx Plus Applications

Flightcell has developed specialised applications on the DZMx Plus to support specific types of operation.

DZMx Plus Applications and Licences

Some DZMx Plus applications require a licence to be activated. If the licence has been purchased with the DZMx Plus, then the application will be activated before delivery. If the licence is required after delivery of the DZMx Plus, the application licences can be installed using DZMx Connect.

To purchase an application licence, contact Flightcell International at info@flightcell.com.

To load the licence file:

1. Open DZMx Connect and enter the installer password.
2. Go to **About**; this will show a list of licences currently installed on the DZMx Plus.
3. Click on **UPLOAD LICENSE** and follow the prompts.
4. Restart the DZMx Plus.

DZMx Plus Applications

These following licensed applications are described in this manual:

- DZMx Plus Wi-Fi – this application activates the Wi-Fi and Bluetooth services on the DZMx Plus.
- DZMx Plus Bluetooth – this application activates only the Bluetooth service on the DZMx Plus.
- Iridium Push-To-Talk (PTT).

For information on the following applications, contact Flightcell International at info@flightcell.com:

- Firefighting application.
- Dropbox file transfer application.
- SBD m application.
- OpenVPN Virtual Private Network connection application.
- Airline application.
- Agriculture application.
- Loadcell application.
- Asset tracking application.
- Direction finder application.

Section 8: Maintenance, Diagnostics and Support

Firmware Upgrades

Flightcell regularly releases firmware upgrades to provide new features, enhancements to existing features and bug fixes.

The duration of the upgrade will vary and is dependent on the previous firmware version installed. It will take between 5 and 40 minutes to complete.

The DZMx Plus must remain connected to a power supply at all times.

A firmware upgrade can be carried out in two ways:

1. Using a DZMx Plus USB port upgrade.
2. Using DZMx Plus Connect upgrade.

Before commencing the upgrade:

1. Check the current DZMx Plus firmware using the DZMx Plus Control Head. Select **MENU > Diagnostics Menu > About DZMx>** press **ENTER**. This screen should show the firmware platform x.x.x (FW Package dzmx). Press **END** to return to the main screen.
2. If using the USB upgrade method, download the firmware directly from: https://www.flightcell.com/support/firmware and save it to a USB memory stick.
3. If using the DZMx Connect upgrade method, download the firmware directly from https://www.flightcell.com/support/firmware and save it to the PC or laptop hard drive.
4. Ensure the aircraft is on ground power or there is enough battery power to run the DZMx Plus for at least 1 hour (The DZMx Plus draws approximately 1A at 28VDC).

To perform the upgrade:

Using the DZMx Plus USB port and DZMx Plus Control Head:

1. Insert the DZMx Plus Control Head display.
2. Insert the USB memory stick into the DZMx USB port.
3. Go to **MENU > Hardware Config** press **ENTER**.
4. If necessary, enable the DZMx extended menus using **Installer Menu Enable**, enter the installer password, then press **ENTER**.
5. Scroll down to **Firmware Upgrade** and press **ENTER**. The upgrade will commence.
6. Follow the prompts on the DZMx display.

Using DZMx Connect:

1. Connect a laptop or PC to the DZMx Plus via Ethernet or Wi-Fi.
2. Open an internet browser and in the address/URL/location bar, enter the IP address: 192.168.4.1.
3. Discover the DZMx Plus and login as an installer using the installer password.
4. Select **Upgrade** and browse to the saved firmware file.
5. Select **Upload** and wait for the firmware file to upload to the DZMx Plus. Once the file has been fully uploaded the upgrade process will start automatically.

6. After being redirected to the Discovery area, wait for the DZMx Plus to fully reboot before re-discovering it. The display and keyboard may alternatively flash on and off during this period.
7. Login as an installer using the installer password.
8. Using the DZMx Plus Control head select **MENU > Diagnostics Menu > About DZMx >** press **ENTER**. Check that the new firmware version is displayed.

Diagnostics

The DZMx Plus provides a range of diagnostic and other information on various aspects of the system.

Note: These files are not user-readable, however they should be forwarded to Flightcell International with a description of any problems.

Real-Time Diagnostics

The DZMx diagnostic pages may enable you to resolve any configuration or other issues. The following options in the **Diagnostics Menu** may be available:

About DZMx Plus	Contains the DZMx serial number, firmware version, IP address, memory usage and whether a USB device is mounted.
System Information	Contains the serial numbers for the fitted cards
GPS Diagnostics	Contains information on the GPS connection
Sat Device Details	Contains information on the IMEI and network status of the satellite device
Cell Modem Details	Contains information on the IMEI of the cellular device, and on the status and band used by the cellular modem
Cell Modem Data	Contains information on the cell data connection
Ext Modem Details	Contains information on an external modem or phone in a cradle. (Only listed when detected).
Tracking over IP	Contains diagnostic information on the tracking over IP function. Performs a check on the settings used to enable Tracking over IP as well as a real time test using the configured tracking provider gateway
Local Network Info	Contains diagnostics on the status of the Bluetooth and WiFi connections
External Inputs	Contains diagnostics on the current status of the DZMx General Purpose Inputs
Export System Log Files	Export system log files for diagnostics and support

Exporting Diagnostic Log Files

The DZMx Plus maintains diagnostic log files, capturing key information on system performance. This information can be exported to a memory stick installed in the DZMx Plus USB socket.

To export log files to a memory stick:

1. Install a USB memory stick in the DZMx USB Plus port

2. Using the DZMx Plus Control Head select MENU > Diagnostic Menu > Export System Log Files. When the download is completed press END to return to the main screen.
3. Remove the memory stick and extract the files onto a PC.

Logfiles can also be downloaded using DZMx Connect.

1. Go to **About,** click on the signal strength bars the top right. 
2. Click on **Device Logs** > **Download all**. A zip file containing the logfiles will be downloaded to your default download folder.

Flightcell Remote Assistance

Flightcell Remote Assistance Virtual Private Network (VPN) allows Flightcell support staff to remotely connect to a DZMx Plus and help with diagnostics, using a secure encrypted connection. This requires either a cellular data connection or a wired Ethernet connection.

Initial Remote Assistance Setup

Remote Assistance must be set up on the DZMx Plus before it can be used. This is a one-off configuration step and will never need to be repeated.

To set up a connection, request a password from Flightcell International Support at tech@flightcell.com. You will need to provide the serial number of the DZMx Plus.

Using the

1. DZMx Plus Control Head go to **MENU > Remote Assistance > Setup Connection >** press **ENTER.**
2. Using DZMx Connect select **Remote Access**. Enter the supplied password and press **ENTER.**

If the setup was successful a "**Configuration received ok**" message will be displayed.

Note: If the DZMx Plus connection has been set up previously, the Setup a Connection option will not be displayed. Instead, you will have three menu options: Connect VPN, Reset Connection and Enable at Start-up. In this instance go direct to step 2 "Establish a VPN Connection".

Establishing a VPN Connection

This provides a secure connection between the DZMx Plus and the Flightcell support team. The support staff will receive a notification and they will be able to remotely access the DZMx Plus.

The DZMx Plus will operate normally throughout this process.

To establish a VPN connection using the:

1. DZMx Plus Control Head select **MENU > Remote Assistance > Setup Connection >** press **ENTER**. Enter Password at Prompt.
2. DZMx Connect app go to **Remote Assistance** and toggle "**Connect"** to on.

If the connection is successful a "VPN connection online" message will be displayed.

If the connection is unsuccessful an "Error: VPN connection has failed" message will be displayed.

Note: An unsuccessful connection can occur when a data connection is unreliable, or the remote assistance server is unreachable.

Disconnect a VPN Connection

Once connected it is possible to disconnect it at any time. Disconnection would normally be done once Flightcell support has finished assisting and has given the 'all-clear'. The VPN connection can be disconnected using the DZMx Plus Control Head or DZMx Connect.

Once the OpenVPN settings are configured and saved, the VPN connection status can be accessed both from DZMx Connect and from the DZMx Plus Control Head.

Other Menu Options

Reset Connection

This menu option resets and updates the Remote Assistance connection and you will typically be directed to do this by Flightcell Support.

Enable at Start-up

This menu option forces the DZMx Plus to automatically establish a VPN Remote Assistance connection on start-up. This feature is useful for long-term monitoring and diagnosis.

Section 9: Documentation and Information

Comprehensive documentation for the DZMx Plus is available on the Flightcell website http://www.flightcell.com.

Documentation, user instructions and technical information can be ordered by contacting Flightcell.

Contact Details

Mailing Address

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Email	info@flightcell.com
Website	http://www.flightcell.com

Warranty

Flightcell International Limited's quality products are proudly designed and manufactured to the highest standards in New Zealand. Your DZMx Plus is warranted for one year from date of sale. Your warranty can be extended to five years if you have purchased the extended warranty and your DZMx Plus is registered on our product registration system, http://www.Flightcell.com/Register.

The DZMx Plus warranty covers Flightcell manufactured items only. Any ancillary items may be covered by individual manufacturer warranties.

The warranty is void if any labels are removed or if it is determined that your DZMx Plus has been:

- Connected to a power supply delivering power outside the designs operational range (12-28V)
- Installed incorrectly as per the guidelines outlined in either the Flightcell DZMx Plus Operator or Installation Manuals.
- Physically damaged, or a fault has occurred due to the DZMx Plus being used beyond what is considered normal use, causing unusual deterioration of the product.

If the DZMx Plus is deemed to be faulty or in need of repair, please complete a Returned Materials Authorization form on www.Flightcell.com/RMA or contact Flightcell International info@flightcell.com

Appendix 1: Connector Kits & Associated Parts

Connector kits provided with the DZMx Plus

Description	Supplied with	Component Description	Qty/ Kit
CNP_00004 - Flightcell Cradle D25 Connector Kit	Flightcell Iridium Phone Cradles with civilian connectors	CNC_00002 - TNC crimp plug, RG58	1
		CNC_00004 - DB25S M24308 Crimp and Poke Socket with Contacts (Female)	1
		CNC_00026 - Metal Back Shell for DB Size connectors Straight (25 way)	1
CNP_00005 - Dual Antenna BNC/TNC Connector Kit	Dual Iridium/GPS antennas	CNC_00100 - BNC crimp plug, RG58	1
		CNC_00101 - TNC crimp plug, RG58	1
CNP_00029 - Single Antenna TNC Connector Kit	Single Iridium/CELL antennas	CNC_00101 - TNC crimp plug, RG58	1
CNP_00042 – Dual Antenna TNC Connector Kit	Dual Iridium/CELL antennas	CNC_00101 - TNC crimp plug, RG58	2
CNP_00039 - Flightcell Iridium Modem Connector Kit	Flightcell Iridium modem	CNC_00045 - DA15P M24308 Crimp and Poke Plug with Contacts (Male)	1
		CNC_00046 - Metal Back shell for DA Size connectors Straight (15 way)	1
		CNC_00002 - TNC crimp plug, RG58	1

Description	Supplied with	Component Description	Qty/ Kit
CNP_00047 - Flightcell DZMx Plus Connector Kit	Flightcell DZMx Plus – Standard Install	CNC_00001 - BNC Straight Crimp Plug, RG58	1
		CNC_00002 - TNC Straight Crimp Plug, RG58	3
		CNC_00003 - SMA Straight Crimp plug, RG58	5
		CNC_00026 - Metal Back Shell for DB Size connectors Straight (25 way)	2
		CNC_00046 - Metal Backshell for DA Size connectors Straight (15 way)	1
		CNC_00048 - DA15S M24308 Crimp and Poke Socket with Contacts (Female)	1
		CNC_00050 - DB25P M24308 Crimp and Poke Plug with Contacts (Male)	2
		CNC_00102 - Metal Back Shell for DD Size connectors Straight (62 way)	2
		CNC_00103 - DD62S M24308 Crimp and Poke Socket with Contacts (Female)	1
		CNC_00104 - DD62P M24308 Crimp and Poke Plug with Contacts (Male)	1
		FAC_00065 - Dsub 4-40 Female Coupling Nut 6.35mm	6
CNP_00049 - Flightcell DZMx Plus Connector Kit	Flightcell DZMx Plus – ARINC 600 Install	CNC_00001 - BNC Straight Crimp Plug, RG58	1
		CNC_00002 - TNC Straight Crimp Plug, RG58	3
		CNC_00003 - SMA Straight Crimp plug, RG58	5
		CNC_00102 - Metal Back Shell for DD Size connectors Straight (62 way)	1
		CNC_00103 - DD62S M24308 Crimp and Poke Socket with Contacts (Female)	1
		CNC_00046 - Metal Backshell for DA Size connectors Straight (15 way)	1
		CNC_00048 - DA15S M24308 Crimp and Poke Socket with Contacts (Female)	1

Associated parts provided with the DZMx Plus

Description	Additional Parts	Component Description	Qty/ Kit
MEP_00001 - Flightcell 2 MCU Mounting Tray	Flightcell DZMx Plus – ARINC 600 Install	2 MCU ARINC 600 Mounting Tray	1