



Flightcell[®] DZM3

The world's most advanced all-in-one communications and tracking system

- Embedded Iridium satellite transceiver
- Optional cell modem
- GPS flight following
- Optional AES256 data and voice encryption



Technical Installation Manual

(All DZM3 military and civil models)

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Version history

DZM3 Technical Installation Manual

Version	Date	Author	Description	PCB Revision
1.0	15 July 2010	J Mace/ F Twissel	Initial version created (FCN0092)	A and B
1.1	17 March 2011	F Twissell	Updated wiring connection (FCN0166)	A and B
1.2	12 April 2011	J Glasgow	Updated RS422 pinout information and note on PC RTS/CTS use. (FCN0180)	A and B
2.0	21 June 2011	J Glasgow	Updated drawing section (FCN0228)	A and B
2.1	26 August 2011	J Glasgow	Updated Associated drawing section, added SIM card installation instructions. (FCN0266)	A and B

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Registering your Flightcell® DZM3

Please register your Flightcell® DZM3 product by completing and returning the registration card enclosed in the box.

We are continually enhancing DZM3 firmware. Registration will enable us to contact you with service updates and upgrade notifications.

About this manual

Flightcell® DZM3 models

The instructions and information contained within this manual are for the following products:

Flightcell® DZM3 English Civil

Flightcell® DZM3 English Military

Flightcell® DZM3 Spanish Military

Who should use this manual?

This manual is intended for use by engineers installing and maintaining the DZM3. It describes the physical, mechanical and electrical characteristics and installation requirements for the DZM3 system.

Information on configuring and operating the DZM3 is provided in this manual. More detailed information is available in the Operation Manuals for each DZM3 unit.

Flightcell® manuals are regularly updated. The latest version of each manual and the latest wiring diagrams are available on the Flightcell® website at <http://www.flightcell.com/downloads.aspx>, or by contacting Flightcell® International Ltd.

NOTE! Throughout this manual, the term “audio panel” is also used to refer to an intercom or interphone system (ICS).

Flightcell® DZM3 features

The Flightcell® DZM3 provides aircraft operators with global voice and data communications and asset tracking.

The DZM3 is installed fully integrated with the aircraft's audio panel or intercom/interphone system (ICS). This enables crew members to use the Iridium network or cellphone network (if the optional cell modem is installed) from their individual ICS locations and headsets.

Passengers can also use the Iridium or cellphone networks from the aircraft cabin using the optional cabin phone.

In military units, an embedded encryption system allows secure transmission of all voice and data communications.

A GPS module and sophisticated active tracking software provide for transmission of position and mission critical data via satellite phone.

Incoming and outgoing messaging capability can be accessed using the DZM3 display and keypad. More extensive messaging and data transmission capabilities can be accessed by connecting the DZM3 to a portable computer or PDA.

Three data communication modes are available:

- Iridium Short Burst Data (SBD)

- Short Messaging System (SMS)

- Iridium Circuit Switched Data

Flightcell® DZM3 system configuration overview

The Flightcell® DZM3 can be used to interface a range of communications and audio devices into an aircraft or vehicle audio panel or intercom system (ICS). Your DZM3 system can be configured to meet your specific requirements.

This manual provides information on installation with an Iridium satellite phone only. Other phones or radios may also be interfaced. Please contact Flightcell® International Ltd for more information or a proposal.

Standard DZM3 installation

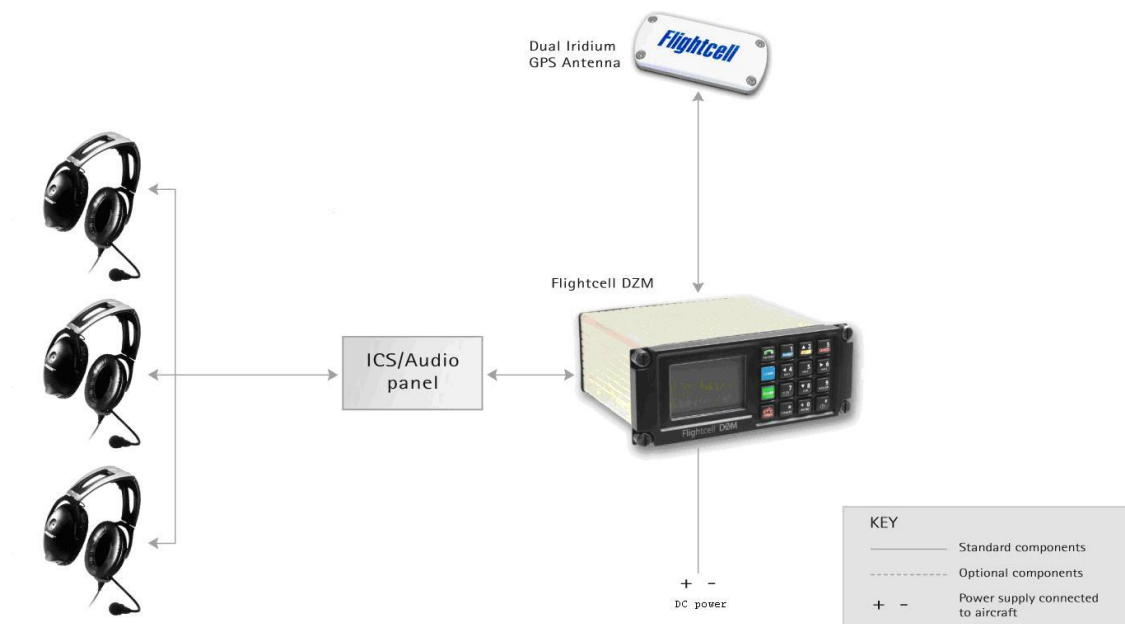


FIGURE 1: STANDARD INSTALLATION

The standard DZM3 installation includes:

A Flightcell® DZM3 unit

A Dual Iridium/GPS Antenna

DZM3 installation with cellular modem

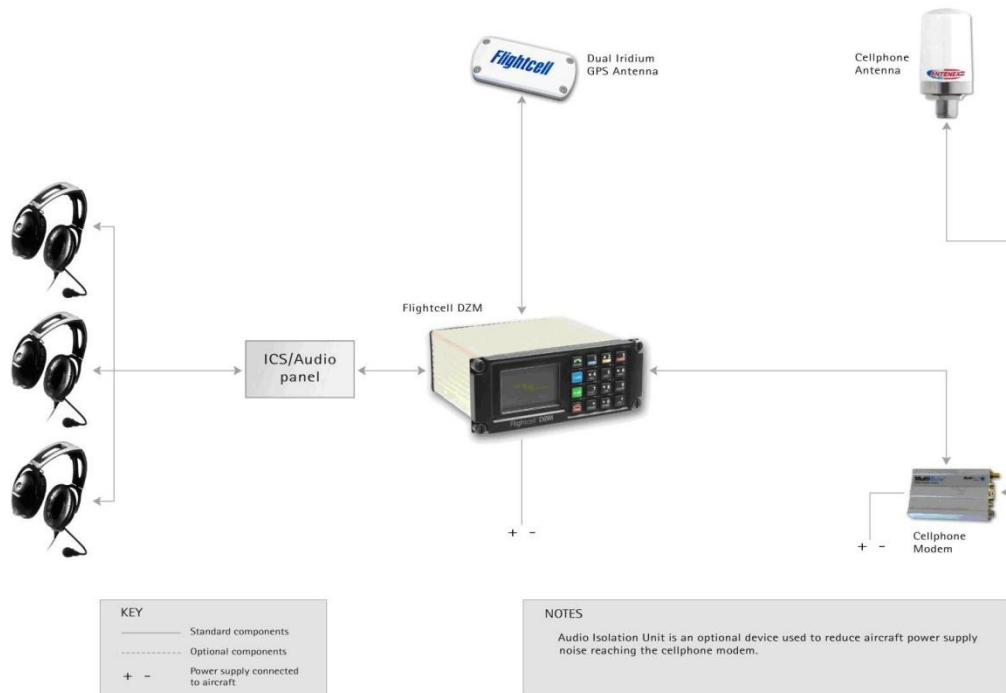


FIGURE 2: EXTENDED INSTALLATION WITH CELLULAR MODEM

The DZM3 can be installed with a cellular modem:

A **Cellular Modem** is installed to enable use of the cellular network from the aircraft. The DZM3 is not designed to support cellphone handsets, due to the large number of models and rapid obsolescence. Two models of cellular modem are available; GSM and 3G.

Your Flightcell® DZM3 at a glance

Front panel (English civil)



FIGURE 3: FRONT PANEL - ENGLISH CIVIL UNIT

Front panel (English military)



FIGURE 4: FRONT PANEL - ENGLISH MILITARY UNIT

Front panel (Spanish military)



FIGURE 5: FRONT PANEL – SPANISH MILITARY UNIT

Before you start

Check components required for installing your Flightcell® DZM3

Before you start, check you have all the components and connectors required for the installation. The table below shows the components and connectors required for installation of the DZM3 English Civil, English Military and Spanish Military versions.

Item	Component	Flightcell® Part Number	Connectors Required	Notes	DZM3 Unit		
					EC	EM	SM
1	Flightcell® DZM3 unit	FCDZM300DIC (Civilian)	D25 female		●	●	●
		FCDZM300DIM (Military)	D9 male (for data connection) D15 high density female (if optional cell modem fitted) TNC plug (for Iridium) BNC plug (for GPS)				
2	Dual Iridium / GPS antenna	ANP_00003	BNC plug (GPS) and TNC plug (Iridium)	Alternative antenna may be used subject to compatibility. Contact Flightcell® International Ltd for further details.	●	●	●

Additional components for installation with cellphone modem

7	Cellphone modem						
	-	GSM	FSU001-9GNB00	D15 high density female		●	
	-	3G	FXT003	SMA plug to antenna			

8	Cellphone antenna	ANP_00001	N-type plug	Other antenna options are available, including TSO'ed versions. Contact Flightcell® International Ltd for further details.	●
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Check tools required for installing your Flightcell® DZM3

Installation of the DZM3 system can be completed using the following tools:

Crimping tools

Insert/extract tool, for installation of connector pins

Wire strippers

Multimeter

General hand tools

Installing your Flightcell® DZM3

Mounting the Flightcell® DZM3 unit

The DZM3 is designed to be installed in a DZUS mounting rack in the aircraft communications panel.

If the aircraft does not have a DZUS rack, the unit may be panel mounted using an alternative faceplate available from Flightcell® International. Please contact your Flightcell® supplier for details.

The DZM3 also has a mounting point at the rear of the unit which can be used to secure the unit to the aircraft chassis to provide additional mechanical support. This mounting point has an M4 thread and can also be used as an earth stud.

The DZM3 should be mounted where the flight crew or radio operator have clear view of the display and can access the keypad. Avoid mounting the unit where the display will be viewed at an oblique angle, as it may not be clearly readable. Avoid mounting the DZM3 where sunlight can shine direct on the display.

NOTE! Refer to drawing "DRW_DZP_02_MechanicalAssembly_1.0.pdf" listed in APPENDIX A: Associated installation documents on page 23 for mechanical dimensions and mounting details of the DZM3. CAD solid model files are also available from Flightcell® International.

Wiring the Flightcell® DZM3 installation

Installers may fabricate their own wiring harnesses, or a prefabricated main wiring harness kit may be purchased from your Flightcell® DZM3 supplier. If you require a fabricated harness kit, please specify:

- length of the cable between the DZM3 and the ICS inputs (allowing for enough slack to enable the DZM3 to be partially removed from the aircraft panel for service or to exchange the Iridium SIM card)
- length of the cable to the optional cellphone modem, if required
- length of the cable to the mounting point for the data connection.

If you are making up your own wiring harness, most connectors are readily available from electronics or avionics component suppliers.

NOTE! Refer to Interconnect documents listed in APPENDIX A: Associated installation documents on page 23 for further information about system wiring.

Guidelines for 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 un-terminated.

The following minimum wiring specification is recommended:

Power supply - 22 AWG (0.325mm²)

Other cabling - 24 AWG (0.205mm²)

It is recommended that enough slack be left in the main cable to enable the DZM3 to be partially removed from the aircraft panel for service or to exchange the Iridium SIM card.

It is recommended that the data port (D9 connector) is mounted where it is readily accessible. If the data port is not panel mounted, it should be secured to the loom near the D25 connector, so that the D9 data connector can be accessed when required for firmware upgrades.

NOTE! Refer to “Installing a PC data port” on page 16 for further information about installing a PC Data Port.

Using prefabricated wiring harnesses

Flightcell® International manufactures a prefabricated main wiring harness kit that contains the wiring and main connectors required for your installation. Use of this harness can significantly reduce installation time and minimize the risk of faulty connections.

NOTE! Refer to Interconnect documents listed in APPENDIX A: Associated installation documents on page 23 for further information about system wiring.

The prefabricated harness includes the following connectors to the DZM3, cellphone modem and data port. The remaining un-terminated connections are individually labeled.

Connector	Backshell Colour	Details
D25 male	Black	Connections from DZM3 to ICS, power supply and digital and analogue inputs
D15 high density female	Black	Connector to optional cell modem and general purpose outputs
D9 female	Blue	Data port

Connecting to the aircraft communications system: low impedance systems

The DZM3 can be installed in aircraft communication systems with either high impedance or low impedance microphones. Most (but not all) civil aircraft operate high impedance (electret) microphone systems. Most (but not all) military aircraft operate low impedance microphone systems.

NOTE! Refer to Interconnect documents listed in APPENDIX A: Associated installation documents on page 23 for further information about system wiring.

Connecting to the aircraft communications system: low impedance systems

It is recommended that the DZM3 is connected to a spare radio position on the audio panel, as shown on the drawings supplied with this manual.

Connecting to the aircraft communications system: high impedance systems

There are several options for connecting the DZM3 into an audio panel/ICS with high impedance microphones. The way in which the DZM3 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 DZM3 on a hot mic connection, rather than PTT. The DZM3 will typically be installed in one of the following ways:

To a cell phone port on the audio panel (if available) **OR**

Direct to headset microphone line(s) **OR**

To a spare transceiver position on the ICS

The DZM3's audio inputs and outputs have a wide audio adjustment range, so can be adjusted to suit most configurations through the DZM3 setup menu or using the configuration utility.

The appropriate connection for each option is detailed below.

Connecting to a cell phone port on the audio panel:

Some audio panels have a dedicated cell phone port, which provides a convenient connection option. The DZM3 MIC HI line is connected to the audio panel's cell phone input, and the DZM3 Audio HI line is connected to the cell phone output. Please consult your audio panel installation manual for more details.

NOTE! Refer to document "WRL_DZP_03_InterconnectDrawings_1.0.pdf" listed in APPENDIX A: Associated installation documents on page 23 for further information about system wiring.

Connecting to a spare transceiver position on the audio panel:

On aircraft with separate audio control panels at each crew position (as is the case on many military aircraft) this option enables crew to use the DZM3 and connected phones on demand.

NOTE! Refer to document "WRL_DZP_03_InterconnectDrawingsTransceiverICSInterconnectionsToGMA-340_1.0.pdf" listed in APPENDIX A: Associated installation documents on page 23 for further information about system wiring.

On low impedance (most military and some non-military aircraft) microphones, DZM3 MIC HI can be connected direct to the audio panel input, and its levels adjusted using the DZM3 audio setup menu.

On aircraft using high impedance (electret, dynamic or carbon) microphones, a bias voltage is commonly required on MIC HI lines to the audio panel, in order to energize the user's microphone when using the DZM3. The DZM3 main connector provides two MIC HI lines; biased and unbiased. The appropriate pins in the DZM3 main connector are:

Biased connection	HI Pin 10	LO Pin 23
Unbiased connection	HI Pin 9	LO Pin 22

Connecting direct to a headset microphone line:

The DZM3 Audio HI line is connected to a spare audio input on the audio panel.

NOTE! Refer to document “WRL_DZP_03_InterconnectDrawingsDirectMicICSInterconnectionsToGMA-340_1.0.pdf” listed in APPENDIX A: Associated installation documents on page 23 for further information about system wiring.

The DZM3 MIC HI line is connected directly to one or more headset microphone inputs on the audio panel. As these microphone inputs have mic bias provided by the audio panel, the DZM3’s unbiased microphone connection should be used.

The way this is configured will depend on how many headsets are to have access to the DZM3:

If only the pilot is to use the DZM3, its MIC HI is connected only to the pilot’s microphone line.

If both pilot and co-pilot are to use the DZM3, its MIC HI line is connected to both microphone lines via a two-way selector switch mounted on the control panel, which is used to select either pilot or co-pilot use of the DZM3.

If the DZM3 is connected to a radio port on the ICS then it can be selected by any crew member using the audio panel controls.

NOTE! Refer to document “WRL_DZP_03_InterconnectDrawings_1.0.pdf” listed in APPENDIX A: Associated installation documents on page 23 for further information about system wiring.

Connecting to the aircraft power supply

The DZM3 unit and other components require aircraft DC power for their operation. Operating range is 12-32VDC.

All components are usually connected either to the aircraft radio power supply bus or to the critical systems bus. Circuit breakers or fuses should be used between DZM3 system components and the power supply:

A 1 amp circuit breaker/fuse is recommended to protect the DZM3 system.

A 1 amp circuit breaker/fuse is recommended to protect the cell modem, if installed.

NOTE! If combining both on a single circuit breaker, a 1.5A or 2A circuit breaker/fuse is recommended.

Installing a PC data port

A data port is an essential part of the DZM3 system. The data port is used to:

Send and receive data via the DZM3 and Iridium satellite phone link using a connected laptop or tablet PC or a PDA

Configure the DZM3

Load new firmware.

It is recommended that the data port is installed in a position where it is readily accessible. If it will be used by passengers for messaging or data transfer, it should be installed in the passenger cabin.

If the data port is only to be used intermittently (for example, for firmware upgrades), it may be secured to the main harness behind the DZM3, so it can be accessed by removing the DZM3 from the control panel.

NOTE! If the PC data port connection is not installed, the DZM3 will need to be removed from the aircraft and connected to a bench test set-up each time a firmware upgrade or diagnostic testing is required.

Connecting to the aircraft dimmer control

The DZM3 display and keypad are backlit with NVG-compliant green LEDs. Backlighting can be controlled either manually (using the DZM3 menus), or from the aircraft dimmer control.

The automatic dimmer control function supports either 0-5V AC or 0-28V DC external control signals. To utilize these options, the DZM3 lighting control line should be connected to the aircraft panel lighting circuit.

Installing a collective switch on a helicopter

The DZM3 can be programmed to send special position reports on takeoff and landing. For fixed-wing aircraft, the DZM3 uses preset speed thresholds to trigger takeoff and landing reports.

On helicopters, it is recommended that a collective switch be used (if already fitted) or installed to provide information on takeoff and landing:

When the collective is up and speed exceeds 5 or greater knots, a takeoff report is transmitted

When the collective is down and speed falls below 5 knots, a landing report is transmitted

This switch can be connected to either Digital Input 1 or Analogue Input 2 on the DZM3.

The DZM3 can be programmed to specify whether the position of the collective is denoted by either an open or closed switch (for the digital input) or by a high and low threshold (for the analogue input).

The External Inputs Diagnostics menu (**Main Menu>Diagnostics Menu>External Inputs**) displays the current state of the all the External Inputs. This can be used to determine the correct configuration setup for the collective input. If the collective is raised while this menu item is open, the display will update once a second to show if the input is wired correctly.

Alternatively, a squat switch on the helicopter undercarriage can be used to initiate takeoff and landing reports. The Squat switch must be connected to Digital Input 1.

NOTE! Refer to document "WRL_DZP_03_InterconnectDrawings_1.0.pdf" listed in APPENDIX A: Associated installation documents on page 23 for further information about system wiring.

Installing an Iridium/GPS antenna

Location:

The Flightcell® dual Iridium/GPS antenna should be installed on the top of the aircraft where it 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 antennae. Preferred separation is 0.75m from L-band (GPS), TCAS or transponder antennae, but a lesser separation can be applied if there is limited space on the aircraft

On a helicopter, avoid placing the antenna 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 the transmit and receive signals.

Mounting:

NOTE! Refer to the Antenna documents listed in APPENDIX A: Associated installation documents on page 23 for further information about mounting the Iridium/GPS antenna.

Cables:

An appropriate cable should be selected to keep signal loss within accepted levels. Total signal loss on the connection between the Iridium phone cradle and the antenna should not exceed 3dB at 1645MHz.

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

Cable Length	Cable Specification	Notes
Up to 3m	RG58C/U	-
Up to 6.5m	LMR200 RG142A/U-9006 cellfoil	-
Up to 8m	RG213	It is recommended that the antenna cable be reduced to RG58 for the last 300mm next to the DZM3 to assist with installation in the panel.
Up to 17m	LMR400	
Up to 26m	LMR600	

Connectors:

The following connectors are used on the Iridium and GPS antennae:

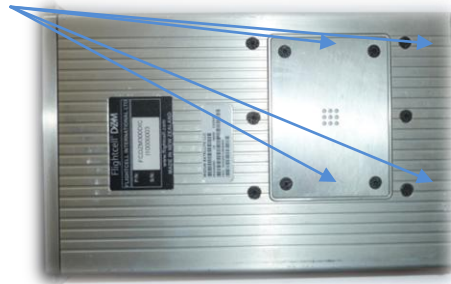
Type	Antenna End	Other End
Iridium cable	TNC	TNC
GPS cable	BNC (SMA available on request)	BNC

Installing the Iridium SIM Card

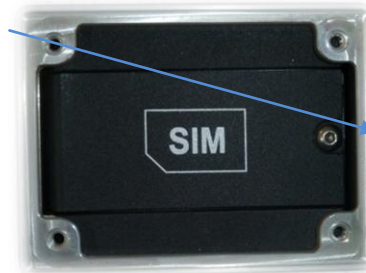
A SIM card must be installed prior to operation of the DZM3. The SIM card is installed under the access hatch in the top side of the DZM3.

To install the SIM card:

1. Unscrew the four screws and remove the hatch



2. Unscrew the single screw retaining the SIM card cover, and lift the SIM card cover out



3. Slide the top part of the SIM card holder towards the cover screw



4. Tilt up the SIM card holder and insert the SIM card as shown here



5. Tilt the SIM card holder down into place, then slide away from the cover screw hole until locked into place



6. Replace and screw down the SIM card cover and hatch

Configuring your Flightcell® DZM3

When you have completed installing your DZM3 system, you need to:

- Configure the DZM3

- Activate your phone and tracking services

Your DZM3 is factory fitted with default settings which will suit many aircraft installations. The DZM3 can be configured using the keypad menu system. However, it is usually quicker and more efficient to adjust settings and load phone book entries using the supplied configuration utility.

Refer to the Flightcell® DZM3 Operation Manuals for each DZM3 unit for full details on how to adjust these settings. This manual is supplied on a disc with your DZM3 or can be obtained from the Flightcell® International Ltd website at <http://www.flightcell.com/downloads.aspx>.

Warranty and contact details

Limited warranty for your Flightcell® DZM3

Flightcell® International Ltd's quality products are proudly designed and manufactured to the highest standards in New Zealand.

Your DZM3 is warranted for two years from date of sale. This 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 DZM3 has been:

Connected to a power supply delivering more than 30 Volts;

Connected with reverse polarity;

Installed in direct contravention to the guidelines outlined in the technical installation manual;

Physically damaged, or a fault has occurred due to the product being used beyond what is considered normal use, causing unusual deterioration of the product.

If the product is deemed to be faulty or in need of repair, please contact Flightcell® International Ltd to obtain a Returned Materials Authorization or download from <http://www.flightcell.com>.

Flightcell® International contact details

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List of appendices

The following appendices documents are attached to this manual:

- APPENDIX A - Associated Installation Documents
- APPENDIX B - Flightcell® DZM3 connector pinouts
- APPENDIX C - Flightcell® DZM3 Technical Specifications

APPENDIX A: Associated installation documents

Interconnect Documents

WRL_DZP_03_InterconnectDrawings_1.1.pdf

WRL_DZP_03_InterconnectDrawingsMasterSlaveInterconnections_1.0.pdf

WRL_DZP_03_InterconnectDrawingsAuxIridiumTransceiverDB25Cradle_1.0.pdf

WRL_DZP_03_InterconnectDrawingsAuxIridiumTransceiverD38999Cradle_1.0.pdf

WRL_DZP_03_InterconnectDrawingsTransceiverICSInterconnectionsToGMA-340_1.0.pdf

WRL_DZP_03_InterconnectDrawingsDirectMicICSInterconnectionsToGMA-340_1.0.pdf

Mechanical Assembly Drawings:

DRW_DZP_03_001_MechanicalAssembly_2.0.pdf

Flightcell® Dual Iridium/GPS Antenna Drawings:

DRW_ANP_001_FlightcellIridiumGPSAntennas_1.0.pdf

APPENDIX B: DZM3 connector pinouts

Connector	Pin No	Function	Direction	Notes
D25	1	Power Ground	Input	Return for DC supply
	2	DC supply positive	Input	DC power supply
	3	DIG GND	Ground	
	4	DIG in2	Input	
	5	ANA in2	Input	
	6	RS422 TX+	Output	
	7	RS422 RX-	Input	
	8	To ICS-	Output	Return for audio output to ICS
	9	Unbiased from ICS+	Input	
	10	Biased from ICS+	Input	
	11	SLIC tip	I/O	For optional telephone handset
	12	USB GND	Ground	Not currently supported
	13	USB D-	I/O	Not currently supported
	14	Chassis GND	Ground	
	15	Lighting	Input	Lighting dimmer input (optional)
	16	DIG in1	Input	
	17	ANA GND	Ground	
	18	ANA in1	Input	
	19	RS422 TX-	Output	
	20	RS422 RX+	Input	
	21	To ICS+	Output	Audio output to ICS
	22	Unbiased from ICS-	Input	
	23	Biased from ICS-	Input	
	24	SLIC ring	I/O	For optional telephone handset
	25	USB D+	I/O	Not currently supported
Connector	Pin No	Function	Direction	Notes
D9	1	DCD	Output	DZM3 uses the RTS/CTS flow control
	2	RXD	Output	connections on this port during firmware
	3	TXD	Input	upgrades of the internal Iridium transceiver.
	4	DTR	Input	The DTR/DSR connections are looped back
	5	GND		internally to the DZM3 so the installer may
	6	DSR	Output	either use a 9-conductor cable or may choose
	7	RTS	Input	to loop back DTR-DSR at the other end and
	8	CTS	Output	only connect the TXD, RXD, RTS, CTS and
	9	RI	NC	GND lines through to the DZM3.

Connector	Pin No	Function	Direction	Notes
D15	1	GPO2 Terminal A	Output	Do not connect through to modem.
	2	TXD	Output	
	3	GPO2 Terminal B	Output	Do not connect through to modem.
	4	MIC+	Output	Where a cell modem is used, connections are
	5	MIC-	Output	generally 1:1 from this connector to the
	6	RXD	Input	equivalent connector on the modem, with
	7	DSR	Input	the exception of pins 1, 3, 13 and 14 which
	8	DTR	Output	should not be connected to the modem.
	9	GND		
	10	SPK+	Input	
	11	CTS	Input	
	12	RTS	Output	
	13	GPO1 Terminal A	Output	Do not connect through to modem.
	14	GPO1 Terminal B	Output	Do not connect through to modem.
	15	SPK-	Input	

APPENDIX C: Technical specifications

Part number		FCDZM300DIC – Civilian FCDZM300DIM – Military FCDZM3ENDIM – Encrypted Military
Material		Faceplate and backplate – machined from aluminium 6061 Extrusion – aluminium 6061
Input voltage		12-32 V DC
Power supply current		Up to 750mA
ICS transmit audio	Input	6mVrms to 5Vrms, adjustable. 775mVrms nominal
	Input impedance	2700Ω
Microphone bias voltage		9.8v via 560Ω
ICS receive audio	Output	53mVrms to 5Vrms 775mVrms nominal
	Output impedance	150 Ω
Backlighting control		0-5VDC, 0-28V DC or 0-5V AC Note that where an AC lighting input is used that is not referenced to DC ground, a suitable isolating transformer should be used.
Backlight colour		Green 540nm. Designed for NVIS B compliance.
Weight		1500grams 3lb 5oz
Dimensions	Width	146mm 5.75"
	Height	57mm 2.25"
	Depth	230mm 9.06"
GPS	Time to first fix	Typically 44s
GPS Antenna	Connector	BNC
	Bias Voltage	5V
	Antenna Current	6-70mA
	Typical gain	21dB
Main connector		D25
Cell connector		D-SUB15
Data connector		D9
GPS connector		BNC
Iridium connector		TNC
		DO160F Sections: 4 (Temperature & Altitude), 5 (Temperature Variation), 6 (Humidity), 7 (Shocks & Crash Safety), 8 (Vibration), 15 (Mag) 16 (Power Input) 17 (Voltage Spike) 18 (Audio Frequency Conducted Susceptibility) 19 (Induced Signal Susceptibility) 20 RF Susceptibility) 21 (EMI) 25 (ESD)
Certification		

Flightcell DZM3 RTCS/DO-160F Equipment Nameplate Marking:

DO-160F Env.Cat [(A2)(B2)(F1)]XBAB[UG]XXXXXXZZAZ[AC][SS]MXXXXXXXXAX

User notes