DTC

SOLO7 Nano Transmitter and OBTX User Guide

Video, Transmitters, SOLO7 Nano Transmitter

0. Preface

0.1   About this Document

This document contains relevant details required for the Operation and Administration of the equipment or system.

Since the available functions are licensed and depend on the specific implementation, not all the functions and or applications contained in this document may be relevant or applicable to the system you will be working with.

The actual presentation may differ from those in this document due to hardware or software changes.

0.2   Who Should Read this Publication

This document is meant for anyone interested in how the system can best be used, but it is of most benefit to:

- **Operators** who are in charge of the daily operation of the equipment.
- **Installers** who are responsible for the pre-installation, on-site installation and configuration of the system in the end-user environment.
- **Maintainers** who are responsible for maintaining the equipment or system.

0.3   Assumed Knowledge

Throughout this book it is assumed that the reader has a thorough knowledge of:

- Basic Personal Computer Operations.
- Basic Radio Frequency (RF) Principles.

0.4   Notice about Specifications

While DTC makes every attempt to maintain the accuracy of the information contained in its product manuals, the information is subject to change without notice. Performance specifications included in this manual are design-centre specifications and are included for customer guidance and to facilitate system installation. Actual operating performance may vary.

0.5   Notice about this Guide

The product described in this manual is subject to continuous development and improvement. All particulars of the product and its use (including the information and particulars in this guide) are given by DTC in good faith. However, it is acknowledged that there may be errors or omissions in this guide.

0.6   Typographic Conventions

This document uses these typographic conventions to identify text that has a special meaning:

Typographic Convention	Example
TEXT in small capitals represents a specific key press on the console **keyboard** or hardware **panel**.	ESC, F1, SHIFT
The + sign means "hold down the first key while pressing the second key".	Press CTRL+C to abort
<Text> Serves as a placeholder for variable text that you will replace as appropriate to its context.	Use the filename <systemname>.sys for…
Text in **bold** emphasises a new word or term of significance.	We call this a **protocol** and its function is…
[-a] Text in these brackets indicates an optional component that can be left out.	Ls [-a]
NN This indicates a value entered on a **numeric keypad**.	45 on the numeric keypad
Successive menu selections are shown using **arrows** to indicate a sub-menu. In this example this would mean: Select the **Insert** menu, then select **picture**, then select **from file**.	**Insert** > **picture** > **from file**

0.7   Symbols

This document uses these symbols to highlight important information:

WARNING: A written notice given to a reader when a situation might result in personal injury or loss of life.

CAUTION: A written notice given when a situation might result in damage to or destruction of equipment or systems.

Note: A written notice given to draw the reader's attention to something or to supply additional information.

0.8   Trademarks

All trademarks or registered trademarks that appear in this document are the property of their respective owners.

0.9   Related Documents

You may also need to read:

Document	Source
SOLO Concept Guide	DTC
IP Concept Guide	DTC

0.10   Document History

This document was written and produced by the DTC Technical Publications Team.

This is a change controlled document. Each main page of this document displays a revision number and date at the bottom left corner of the page. The revision is also indicated in the table below.

Changes to any page will raise the revision status of the whole document.

Revision	Date	Author	Summary of Changes
1.0	11/11/2013	RC	First release
8.0	31/10/2014	RC	FCC statement
9.0	14/12/2015	IR	Recommended video settings
10.0	22/02/2016	IR	Temperature control tips
11.0	22/06/2016	IR	OBTX and DTC rebrand.
12.0	11/08/2016	IR	CA2253 assembly cautions

Contents

1. Systems Description

The subject equipment of this User Guide is:

Equipment Title	Part Number
SOLO7 Nano Transmitter	SOL7NTX-
SOLO7 HD Nano Transmitter	SOL7HDNTX-
SOLO7 OB Transmitter	SOL7OBTX-

1.1 What is the SOLO7 Nano Transmitter?

The SOLO7 Nano Transmitter is an ultra-miniature COFDM digital video transmitter from DTC, designed specifically for covert video installations and body-worn applications.

With proven DTC COFDM technology at its core, the exceptionally small size and low power consumption (typically 3.7W @ 100mW RF power) of the SOLO7 Nano transmitter make it the product of choice for covert video hides, or applications requiring long term battery power deployments, small unmanned aerial vehicles, and body-worn or body-wire use.

The SOLO7 Nano Transmitter employs ultra-low latency High Profile H.264 (MPEG-4 AVC) encoding for excellent image quality retention over the wireless link. MPEG-4 ASP video encoding is also available for backward compatibility with older DTC video transmission products. Equipped with integral COFDM modulation, the SOLO7 Nano Transmitter is ideal for establishing rugged wireless video links in numerous environments, including mobile and urban. Offering several user-selectable modes that trade off image quality against range, the SOLO7 Nano Transmitter is very well suited to all mission types.

The SOLO7 Nano Transmitter supports both industry standard DVB-T modulation and DTC Narrowband (2.5 MHz), Ultra Narrowband (1.25 MHz) and Ultra-X (625 kHz) bandwidths. The narrowband modes allow users to share scarce spectrum allocation extremely efficiently.

The SOLO7 Nano Transmitter is supplied in a simple aluminium lightweight case and features an industry standard reliable SMA transmit connector. Video, control and power interfaces use two Micronetics connectors.

The SOLO7 Nano Transmitter can be controlled via either USB or via RS232. The versatile and intuitive DTC Field Controller can also be used to configure and control the SOLO7 Nano transmitter.

Security is ensured with optional AES128/256 Encryption.

The SOLO7 Nano Transmitter will transmit images in a non-line of sight environment up to 750m, depending on mode and frequency.

1.2 What are the Features and Benefits of the Nano Transmitter?

It can be very useful to understand how the features of the unit yield tangible benefits to you. This table summarises these features and, more importantly, the benefits.

Features and Benefits Table – Nano Transmitter

Key Features	Key Benefits
Digital COFDM Modulation	Excellent performance - Resistant to multipath interference, delivers high quality video and audio, even when mobile or in built up areas like urban

	environments.
Low Delay, high quality video encoding in MPEG-4	High reliability - Use a radio system just like it was a line. You can choose between MPEG-4 ASP and H.264 encoding standard to suit your application.
Compliant DVB-T Modulator and proprietary narrowband.	True multi-mode operation - Perfect integration with your current equipment.
100mW RF Up-Converter	Excellent range in non-line of sight environments like cities, stadiums and airports.
Compact and Power Efficient Transmitters	Put the transmitter just where you need it. Get those difficult links that ensure the success of your operation. Never lose a link for lack of power.
Composite Video Interfaces	Low cost of ownership - Easy connection to your current cameras.
Integral Encryption at AES128 or AES256 (Optional).	Secure - Preserve your security of transmission with powerful, simple to operate encryption.
Choice of UHF, L, S or C band solutions	Improved operational efficiency - Efficient use of limited radio spectrum. Choose the frequency that suits your operations. Select licence free bands for some operations. Avoid cluttered parts of the radio spectrum.
Low Latency	Enables real time operations like remote vehicle control or UAV operations.
Sixteen Presets Available	Better use of assets and resources - You can preset frequencies into any of sixteen presets. Configure the whole operation in the calm of the base then the operations staff just have to quickly select the preset with one button.
High reliability and availability	Reduced maintenance requirement, reduced spares holding, resulting in significant cost benefits over the life of the system.
Low Mass (51g)	Suitable for discrete operation in the field.

Table 1-1 – Features and Benefits

1.3   What is the SOLO7 HD Nano Transmitter?

The SOLO7 **HD** Nano Transmitter is an ultra-miniature COFDM digital video transmitter from DTC, designed specifically for Point-of-View (PoV) and body-worn applications.

With proven DTC COFDM and H.264 encoder technology at its core, the exceptionally small size and ultra-low power consumption (typically 7.5W) HD Nano Transmitter enables production teams to offer viewers stunning high definition images from the heart of the action, in situations never previously possible due to equipment size and battery run-time constraints.

The small size and ultra-low power consumption make the HD Nano TX ideal for UAV 'Octocopter' installations, enabling true long range HD broadcasting from these increasingly popular devices for the first

time. Optional lightweight, low power consumption amplifiers are also available for even greater range capability.

The HD Nano Transmitter employs ultra-low latency High Profile H.264 (MPEG-4 AVC) encoding for excellent image quality retention over the wireless link and supports composite, SDI, HD-SDI and HDMI video input formats.

The HD Nano Transmitter offers numerous modulation options to suit various deployment scenarios:

■   Industry standard DVB-T modulation for full HD quality and compatibility with existing systems

■   DTC UMVL modulation for enhanced high speed operation (motorsports) and improved performance at high frequencies (6 & 7GHz)

■   DTC Narrowband (2.5 MHz), Ultra Narrowband (1.25 MHz) and Ultra-X (625 kHz) bandwidths. The narrowband modes allow users to share scarce spectrum allocation extremely efficiently.

The HD Nano Transmitter is supplied in a simple aluminium lightweight case and features an industry standard SMA RF connector. Composite video, audio, control and power interfaces use two latching Omnetics connectors. A latching DIN 1.0/2.3 co-axial connector is used for the SDI / HD-SDI input and a micro HDMI (with optional cable clamp) for the HDMI input.

The HD Nano Transmitter can be controlled via either USB or via RS232. The versatile and intuitive DTC Field Controller can also be used.

1.4   What is the SOLO7 OB Transmitter?

The SOLO7 OB Transmitter from Domo Tactical Communications (DTC) is a compact and feature rich COFDM digital video transmitter specifically designed for high quality Outside Broadcast applications. This includes the latest in DTC encoder developments for 1080p50/60 support and 4:2:2 sampling.

With proven DTC COFDM and H.264 encoder technology at its core, the small size and ultra-low power consumption enables high definition images and is ideal for establishing rugged wireless video links in all environments including mobile, urban and non-line of sight:

■   Industry standard DVB-T modulation for high quality and compatibility with existing systems

■   DTC UMVL modulation for enhanced high speed operation (motorsports) and improved performance at high frequencies (6 & 7GHz)

■   DTC Narrowband allow users to share scarce spectrum allocation efficiently

Designed to offer maximum flexibility in the pressurised and rapidly-changing OB environment, the unit has a variety of video input options including composite, 3G-SDI and HDMI – particularly useful when accessing material in the field from prosumer and semi-professional equipment. Balance audio inputs feature variable gain and 12/48V microphone power. SDI or HDMI embedded audio inputs are also supported as standard. ASI interfaces enable the unit to be used as a stand-alone encoder or modulator.

The SOLO7 OB Transmitter has an integrated control panel with sunlight-readable OLED display covering all major functions and has 16 user-defined presets. A wide range of RF frequency bands are available from 200MHz to 8.9GHz. Users can upgrade the RF section to an alternative frequency band as a low-cost option.

Integrated UHF band Camera Control is available as an extra. This is directly compatible with the DTC Broadcast Camera Control System and would replace the stand-alone Camera Unit.

2. Getting Started

2.1 Identifying your Device

There are three types of SOLO7 Transmitter described in this User Guide.

SOLO7 Nano Transmitter

Designation: SOL7NTX

Size: 58mm (L) x 38mm (W) x 17mm (H).

Weight: 51g.

Operating Temperature: -10°C to +50°C.

Power Consumption: Typically 3.7W @ 100mW RF.

DC Input: 5.9 to 17.8VDC reverse polarity protected.

SOLO7 HD Nano Transmitter

Designation: SOL7HDNTX

Size: 67mm (L) x 68mm (W) x 22mm (H).

Weight: 135g.

Operating Temperature: -10°C to +50°C.

Power Consumption: Typically 7.5W @ 100mW RF.

DC Input: 5.9 to 17.8VDC Reverse polarity protected.

SOLO7 OB Transmitter

Designation: SOL7OBTX

Size: 170mm (L) x 97mm (W) x 35mm (H).

Weight: 520g to 870g depending on options.

Operating Temperature: -10°C to +50°C.

Power Consumption: Typically 10W @ 100mW RF with additional 2.0W for >6.0GHz and additional 0.5W for Camera Control.

DC Input: 9.2 to 17.8VDC reverse polarity protected.

2.2   Unpacking your SOLO7 Nano Transmitter

Carefully open the packaging and remove the device. Verify that all the components have been included in the package as shown in the packing list. Inspect the unit for shipping damage.

Retain the packing list and all the packing materials for storage.

The codes on the picture mean:

■   CA – Cable Assembly

■   SA – Sub Assembly

■   AP – Assembly Part.

The codes are useful to you if you need to order a new cable sometime.
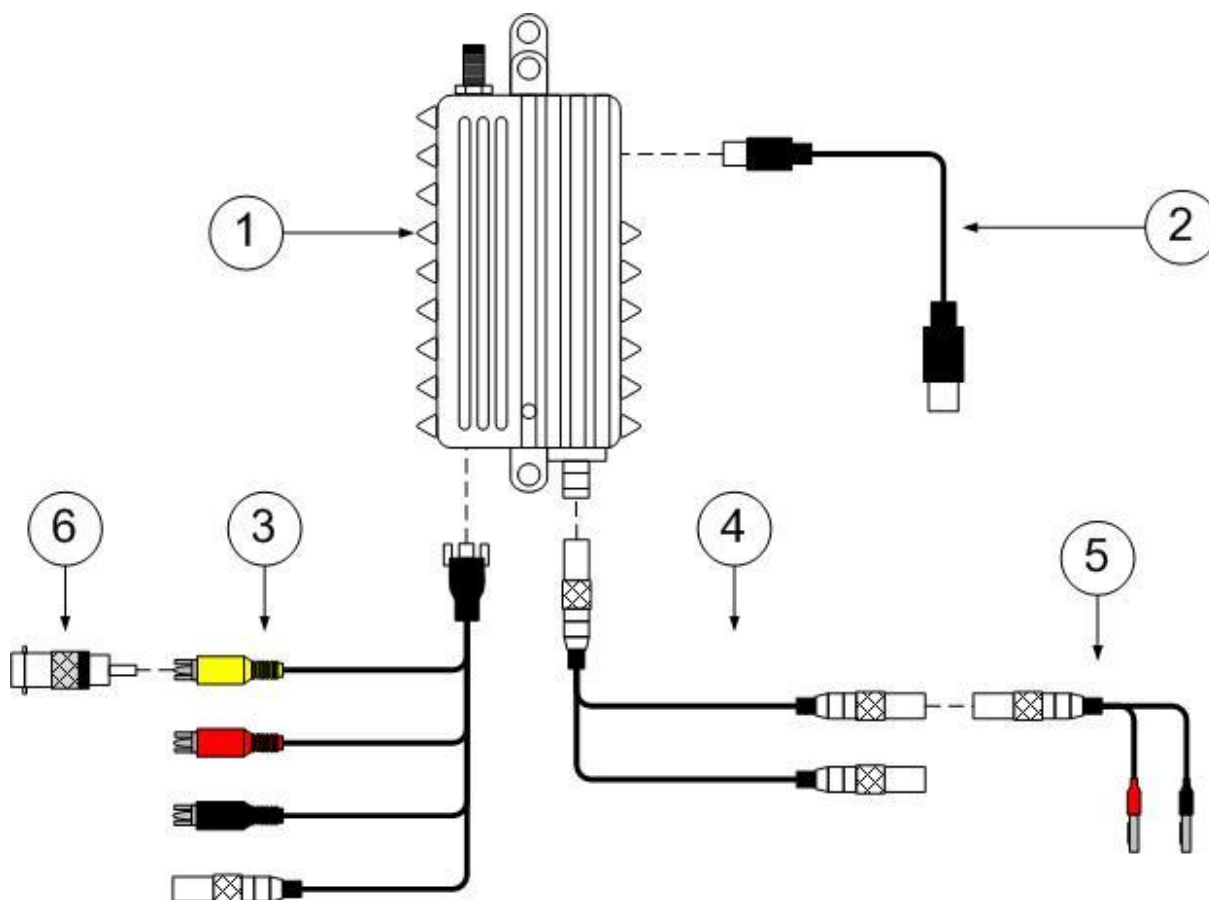
Figure 2-1 – SOLO7 Nano Transmitter Packing Diagram

No	Item	Notes
1	SOLO7 Nano Transmitter	SOL7NTX-100150 with a frequency range of 1.00 GHz to 1.50 GHz in this example. Other frequencies are available.
2	USB2.0 CABLE 1 Metre, A TO MICRO-B, AP007377	USB Micro-B 4-way plug (pin) to USB type-A 4-way plug (pin).

No	Item	Notes
3	Audio / Video / Data Cable Assembly, CA2254	Audio / Video / Data Cable Assembly (16.5 centimetres) Omnetics Tri-Lobe Latching 9-way plug (socket) to RCA Phono 2-way plug (socket), yellow, video and RCA Phono 2-way plug (socket), red, audio right and RCA Phono 2-way plug (socket), black, audio left and Lemo OB 3-way plug (socket), data.
4	Power / Control Cable Assembly, CA2253	Power / Control Cable Assembly (16.5 centimetres). Omnetics Nano Circular 6-way plug (pin) to Lemo OB 3-way plug (socket), Control and Lemo OB 4-way plug (socket), Power
5	Power Cable Assembly, CA0002	Power Cable Assembly (3 metres) Lemo OB 4-way plug (pin) to Banana 1-way plug (pin) red and Banana 1-way plug (pin) black
6	Phono (pins) to BNC (socket) adapter, AP007619	Enables you to connect equipment with a BNC plug to the video (yellow) RCA Phono 2-way plug, (socket) on CA2254.

Table 2-1 – Parts in the SOLO7 Nano Transmitter Package

CAUTION: Newer revision CA2253 cables will have alignment marks to aid mating with the Omnetics Nano Circular 6-way receptacle on the NTX, however, the user must take great care when aligning the connectors and be aware that they are push-fit and must not be twisted.

Note: There is a kit version of the Nano transmitter which comes complete with a camera and battery and other cables. Please refer to the Quick Start Guide included with the kit for details.

Troubleshooting

☹ I don't have all the parts you described!

☺ Call your DTC contact right away and we'll get this solved for you.

DTC – Solent Fusion 2 1100 Parkway, Solent Business Park Whiteley, Hampshire PO15 7AB, England	+44 (0)1489 566 750

2.3   Unpacking your SOLO7 HD Nano Transmitter

Carefully open the packaging and remove the device. Verify that all the components have been included in the package as shown in the packing list. Inspect the unit for shipping damage.

Retain the packing list and all the packing materials for storage.

Figure 2-2 – SOLO7 HD Nano Transmitter Packing Diagram

No	Item	Notes
1	SOLO7 HD Nano Transmitter	SOL7HDNTX-100150 with a frequency range of 1.00 GHz to 1.50 GHz in this example. Other frequencies are available.
2	USB2.0 CABLE 1 Metre, A TO MICRO-B, AP007377	USB Micro-B 4-way plug (pin) to USB type-A 4-way plug (pin).
3	Audio / Video / Data Cable Assembly, CA2254	Audio / Video / Data Cable Assembly (16.5 centimetres) Omnetics Tri-Lobe Latching 9-way plug (socket) to RCA Phono 2-way plug (socket), yellow, video and RCA Phono 2-way plug (socket), red, audio right and RCA Phono 2-way plug (socket), black, audio left and Lemo OB 3-way plug (socket), data.
4	Power / Control Cable Assembly, CA2253	Power / Control Cable Assembly (16.5 centimetres). Omnetics Nano Circular 6-way plug (pin) to Lemo OB 3-way plug (socket), Control and Lemo OB 4-way plug (socket), Power

No	Item	Notes
5	Power Cable Assembly, CA0002	Power Cable Assembly (3 metres) Lemo OB 4-way plug (pin) to Banana 1-way plug (pin) red and Banana 1-way plug (pin) black
6	Phono (pins) to BNC (socket) adapter, AP007619	Enables you to connect equipment with a BNC plug to the video (yellow) RCA Phono 2-way plug, (socket) on CA2254.
7	BNC to DIN 1.0/2.3 cable adaptor, CA2396	This will allow you to connect SDI video signals from a BNC connector source to the SOL7HDNTX
8	HDMI type A to micro HDMI type D cable, AP008399	This will allow you to connect HDMI signals from an HDMI type A connector source to the SOL7HDNTX.

Table 2-2 – Parts in the SOLO7 HD Nano Transmitter Package

CAUTION: Newer revision CA2253 cables will have alignment marks to aid mating with the Omnetics Nano Circular 6-way receptacle on the NTX, however, the user must take great care when aligning the connectors and be aware that they are push-fit and must not be twisted.

Troubleshooting

☹ I don't have all the parts you described!

☺ Call your DTC contact right away and we'll get this solved for you.

DTC – Solent Fusion 2 1100 Parkway, Solent Business Park Whiteley, Hampshire PO15 7AB, England	+44 (0)1489 566 750

2.4   Unpacking your SOLO7 OB Transmitter
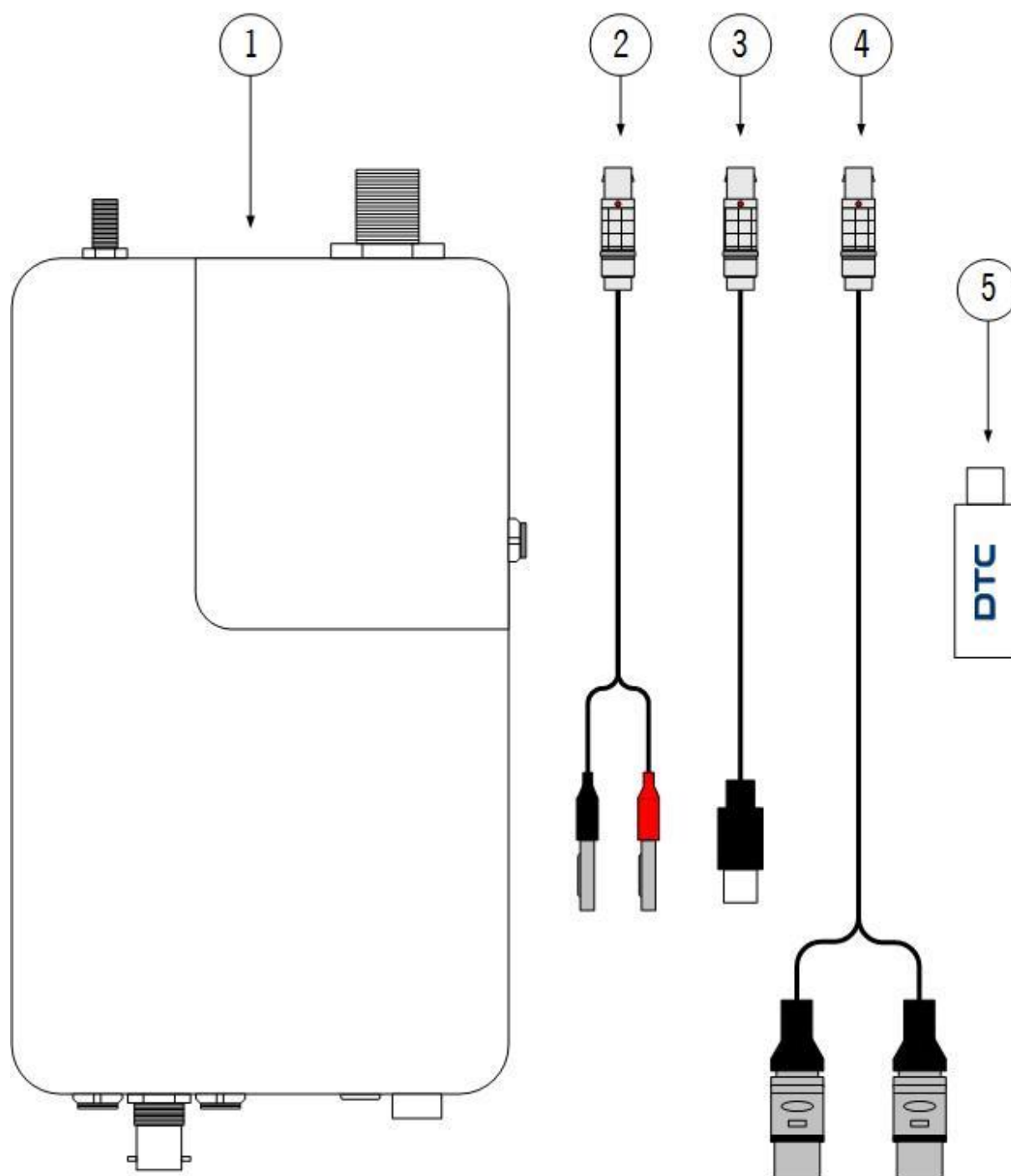
Figure 2-3 SOLO7 OB Transmitter Packing Diagram

No	Item	Notes
1	Primary Unit	The SOLO7 OB Transmitter
2	CA0002	DC power cable for connection to a PSU.
3	CA0343	USB control cable
4	CA0579	XLR audio cable

No	Item	Notes
5	SA3688	OBTX support USB stick
6	AP008822 (not illustrated)	433MHz telemetry antenna (CCCAM expansion option only)

Table 2-3 Parts in the SOLO7 OB Transmitter Package

Troubleshooting

☹ I don't have all the parts you described!

☺ Call your DTC contact right away and we'll get this solved for you.

DTC – Solent Fusion 2 1100 Parkway, Solent Business Park Whiteley, Hampshire PO15 7AB, England	+44 (0)1489 566 750

2.5   About the Labels on your SOLO7 Nano Transmitter

Which model do I have? What is its Serial Number?

This topic contains information covering placards, labels, markings, etc., showing the part number, legend and location of each placard, label, or marking required for safety or maintenance significant information.
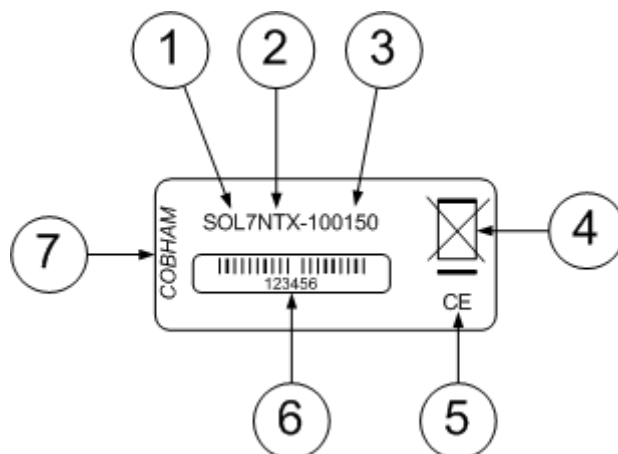
Figure 2-4 – SOLO7 Nano Transmitter Label

No	Item
1	SOLO7 Group.
2	Nano Transmitter family of products.
3	Frequency range, 1.00GHz to 1.50GHz in this example.
4	Disposal mark.

No	Item
5	The CE marking (also known as CE mark) is a mandatory conformity mark on many products placed on the single market in the European Economic Area (EEA). The CE marking certifies that a product has met EU consumer safety, health or environmental requirements.
6	Barcode with six digit serial number. We'll nearly always ask you for this number during a support call.
7	Manufacturer.

Table 2-4 – SOLO7 Nano Transmitter Label Key

2.6   About the Labels on your SOLO7 OB Transmitter

The Product Label

The product label is situated on the rear panel of the OBTX. It identifies the OBTX assembly and has a different serial number to the RF Module.
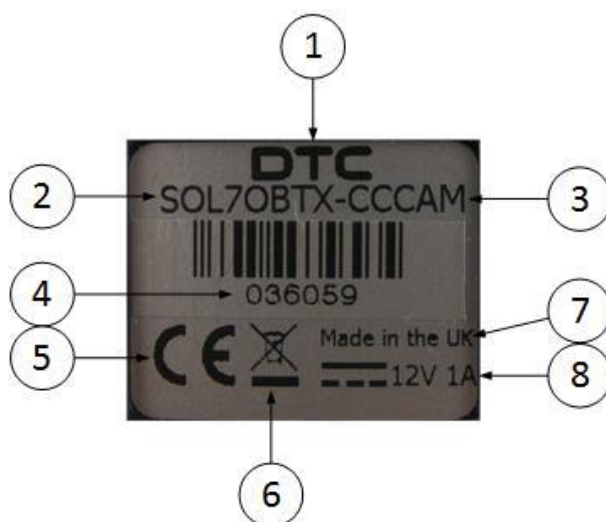
Figure 2-5 SOLO7 OB Transmitter Label

No	Item
1	Manufacturer
2	SOLO7 OBTX family of products.
3	CCCAM expansion option in this example (if not fitted, this will be blank).
4	Barcode with six digit serial number. We'll nearly always ask you for this number during a support call.

No	Item
5	The CE marking (also known as CE mark) is a mandatory conformity mark on many products placed on the single market in the European Economic Area (EEA). The CE marking certifies that a product has met EU consumer safety, health or environmental requirements.
6	Disposal marking.
7	Country of manufacture.
8	Power requirement, 12VDC, 1A

Table 2-5 SOLO7 OB Transmitter Label Key

The RF Module Label

The RF Module Label is situated in the left panel of the OBTX. It identifies the RF Module and has a different serial number to the OBTX.
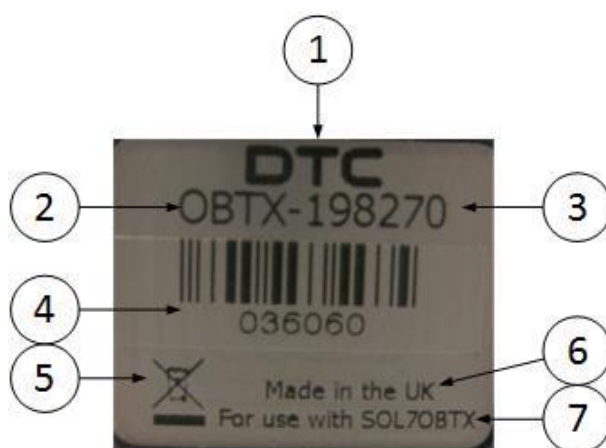
Figure 2-6 RF Module Label

No	Item
1	Manufacturer
2	OBTX family of products.
3	Frequency range, 1980MHz to 2700MHz in this example.
4	Barcode with six digit serial number. We'll nearly always ask you for this number during a support call.
5	Disposal marking.
6	Country of manufacture.
7	Compatibility.

Table 2-6 RF Module Label Key

2.7 Identifying the Variants of SOLO7 Nano Transmitter

Equipment Title	Part Number
SOLO7 Nano Transmitter 200-300MHz	SOL7NTX-020030
SOLO7 Nano Transmitter 300-470MHz	SOL7NTX-030047
SOLO7 Nano Transmitter 1.00-1.50GHz	SOL7NTX-100150
SOLO7 Nano Transmitter 1.65-2.40GHz	SOL7NTX-165240
SOLO7 Nano Transmitter 1.98-2.70GHz	SOL7NTX-198270
SOLO7 Nano Transmitter 3.00-3.70GHz	SOL7NTX-300370
SOLO7 Nano Transmitter 4.40-5.00GHz	SOL7NTX-440500
SOLO7 Nano Transmitter 5.50-6.00GHz	SOL7NTX-550600

Table 2-7 – SOLO7 Nano Transmitter Variants

2.8 Identifying the Options of SOLO7 Nano Transmitter

The Nano Transmitter has **two** types of options:

- Accessory Options
- Licensing Options

Step 1: Identify the Accessory Options

Equipment Title	Part Number
Lemo to Dsub9 RS232 Control Cable	CA0001
NTX DC Power Cable	CA2250
NTX DC Power / FCON Cable	CA2370
NTX 9-way Breakout Cable	CA2298
NTX 6-way Breakout Cable	CA2485
NTX 7.4V Battery Pack (2250mAh)	NTXBAT
NTX Battery Charger (multi-region)	NTXBATCH
500mW booster PA, 4W power consumption	SOLAMP500mW
1W Nano PA, 3-5W power consumption	SOL7NAMP1W
Various frequencies available	Antennas

Table 2-8 – SOLO7 Nano Transmitter Accessory Options

Step 2: Identify the Licensing Options

Equipment Title	Part Number
DVB-T, MPEG-4 and H.264	Silver
Silver plus MPEG-4 ASP, 2.5MHz and 1.25MHz Modulation	Gold
Gold plus 625kHz Modulation and Ultra Mobile Video Link (UMVL)	Platinum
AES128 Encryption	AES128
AES256 Encryption	AES256

Table 2-9 – SOLO7 Nano Transmitter Licensing Options

2.9 Identifying the Variants of SOLO7 HD Nano Transmitter

Equipment Title	Part Number
SOLO7 HD Nano Transmitter 200-300MHz	SOL7HDNTX-020030
SOLO7 HD Nano Transmitter 300-470MHz	SOL7HDNTX-030047
SOLO7 HD Nano Transmitter 1.00-1.50GHz	SOL7HDNTX-100150
SOLO7 HD Nano Transmitter 1.65-2.40GHz	SOL7HDNTX-165240
SOLO7 HD Nano Transmitter 1.98-2.70GHz	SOL7HDNTX-198270
SOLO7 HD Nano Transmitter 3.00-3.70GHz	SOL7HDNTX-300370
SOLO7 HD Nano Transmitter 4.40-5.00GHz	SOL7HDNTX-440500
SOLO7 HD Nano Transmitter 5.50-6.00GHz	SOL7HDNTX-550600
SOLO7 HD Nano Transmitter 6.40-7.00GHz	SOL7HDNTX-640700
SOLO7 HD Nano Transmitter 7.00-7.50GHz	SOL7HDNTX-700750
SOLO7 HD Nano Transmitter 8.10-8.90GHz	SOL7HDNTX-810890

Table 2-10 – SOLO7 HD Nano Transmitter Variants

2.10 Identifying the Options of SOLO7 HD Nano Transmitter

The HD Nano Transmitter has **two** types of options:

■ Accessory Options
■ Licensing Options

Step 1: Identify the Accessory Options

Equipment Title	Part Number
Lemo to Dsub9 RS232 Control Cable	CA0001
NTX DC Power Cable	CA2250
NTX DC Power / FCON Cable	CA2370
NTX 9-way Breakout Cable	CA2298
NTX 6-way Breakout Cable	CA2485
NTX 7.4V Battery Pack (2250mAh)	NTXBAT
NTX Battery Charger (multi-region)	NTXBATCH
500mW booster PA, 4W power consumption	SOLAMP500mW
1W Nano PA, 3-5W power consumption	SOL7NAMP1W
Various frequencies available	Antennas

Table 2-11 – SOLO7 HD Nano Transmitter Accessory Options

Step 2: Identify the Licensing Options

Equipment Title	Part Number
DVB-T, MPEG-4 SD and HD H.264	Silver
Silver plus MPEG-4 ASP, 2.5MHz and 1.25MHz Modulation	Gold
Gold plus 625kHz Modulation, Ultra Mobile Video Link (UMVL) and 4:2:2 H.264 profile	Platinum
AES128 Encryption	AES128
AES256 Encryption	AES256

Table 2-12 – SOLO7 HD Nano Transmitter Licensing Options

2.11 Identifying the Variants of SOLO7 OB Transmitter

Equipment Title	Part Number
SOLO7 OB Transmitter 1.00-1.50GHz	SOL7OBTX-100150
SOLO7 OB Transmitter 1.98-2.70GHz	SOL7OBTX-198270
SOLO7 OB Transmitter 3.00-3.70GHz	SOL7OBTX-300370
SOLO7 OB Transmitter 4.40-5.00GHz	SOL7OBTX-440500

Equipment Title	Part Number
SOLO7 OB Transmitter 5.50-6.00GHz	SOL7OBTX-550600
SOLO7 OB Transmitter 6.40-7.00GHz	SOL7OBTX-640700
SOLO7 OB Transmitter 7.00-7.50GHz	SOL7OBTX-700750
SOLO7 OB Transmitter 8.10-8.90GHz	SOL7OBTX-810890

Table 2-13 – SOLO7 OB Transmitter Variants

2.12   Identifying the Options of SOLO7 OB Transmitter

The OB Transmitter has **two** types of options:

■   Accessory Options

■   Licensing Options

Step 1: Identify the Accessory Options

Equipment Title	Part Number
Additional V-Mount battery plates	OBTX-V-OEM
Additional Anton Bauer battery plates	OBTX-AB-OEM
Additional PAG battery plates	OBTX-PAG-OEM
Additional RF module (where xxxxxx is the frequency band)	OBTX-xxxxxx-OEM
Factory fit Camera Control RX upgrade. Also requires: Enable Camera control upgrade At least one control protocol and cable (see below options)	OBTX-CCCAM-RMA OBTX-CCCAM-ENABLE OBTX-CCCAM-xUP
Sony Control protocol and cable	OBTX-CCCAM-SUP
Panasonic Control protocol and cable	OBTX-CCCAM-PUP
Grass Valley Control protocol and cable	OBTX-CCCAM-TUP
Ikegami Control protocol and cable	OBTX-CCCAM-IUP
Hitachi Control protocol and cable	OBTX-CCCAM-HUP
Composite Video Input Cable	CA3122
Various frequencies available	Antennas

Table 2-14 – SOLO7 OB Transmitter Accessory Options

Note: If replacement battery plates or RF modules are purchased, they will be supplied with Assembly Guides.

Step 2: Identify the Licensing Options

Equipment Title	Part Number
DVB-T, Ultra Mobile Video Link (UMVL) and MPEG-4 SD-H.264	Silver
Silver plus MPEG-4 HD-H.264	Gold
Gold plus 4:2:2-H.264	Platinum
2.5MHz Modulation and MPEG4 HD-H.264	Film Assist
AES128 Encryption	AES128
AES256 Encryption	AES256

Table 2-15 – SOLO7 OB Transmitter Licensing Options

3. Controls, Connections and Indicators

3.1   About Controls, Connections and Indicators

You'll need to be able to find all the **controls** and **connections** on the unit. You'll also need to be able to identify and interpret any **alarms** or **indicators**. The following topics will help you identify all these features.

Each Transmitter has top, bottom and side panels which contain all the interface connections for the units and the controls and indicators.

3.2   SOLO7 Nano Transmitter Connections

Overview of the SOLO7 Nano Transmitter
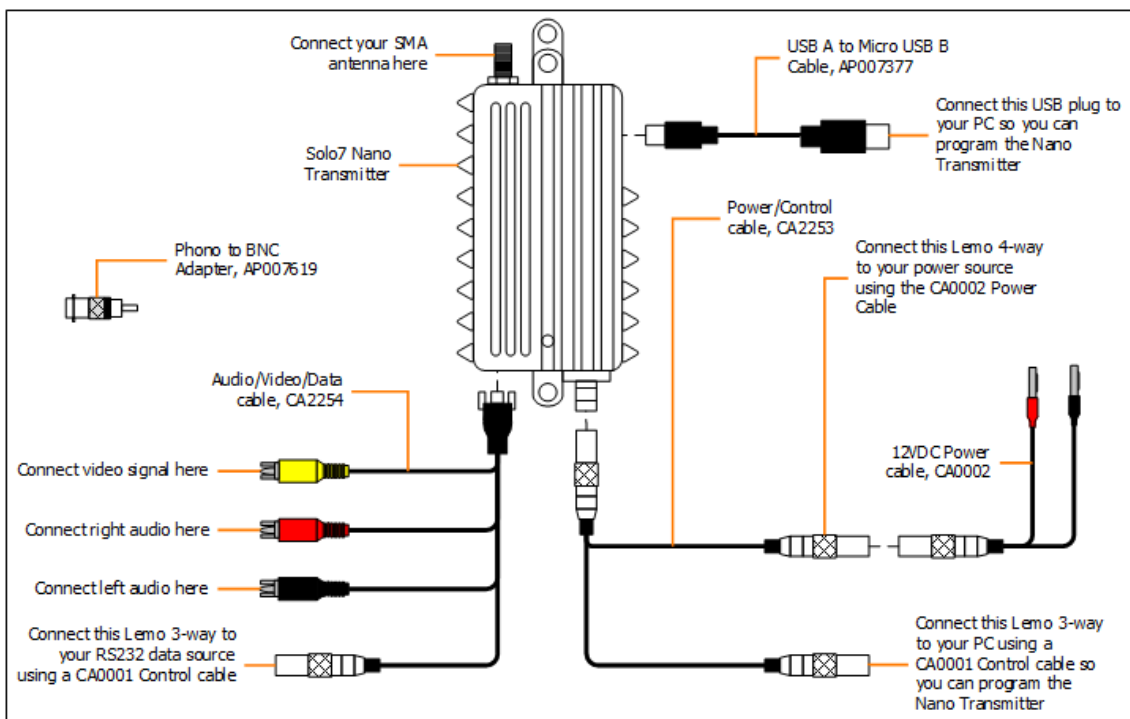
Figure 3-1 SOLO7 Nano Transmitter Overview Diagram
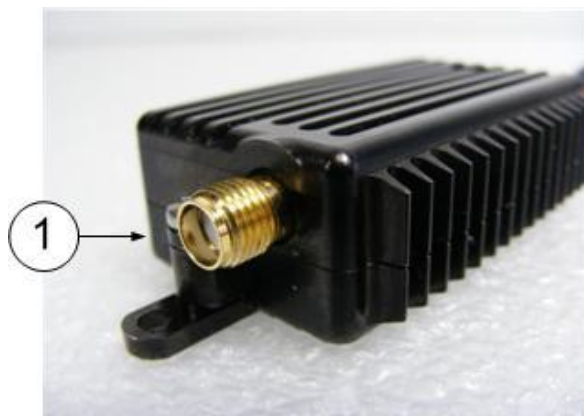
Exploring the Top Panel

Figure 3-2 SOLO7 Nano Transmitter Top Panel

No	Item	Used for...
1	SMA receptacle 2-way (socket).	Connect the antenna to the SMA receptacle on the top panel of the transmitter unit.
		CAUTION: Do not over tighten the antenna – hand tight only!

Table 3-1 – SOLO7 Nano Transmitter Top Panel Key

Exploring the Bottom Panel
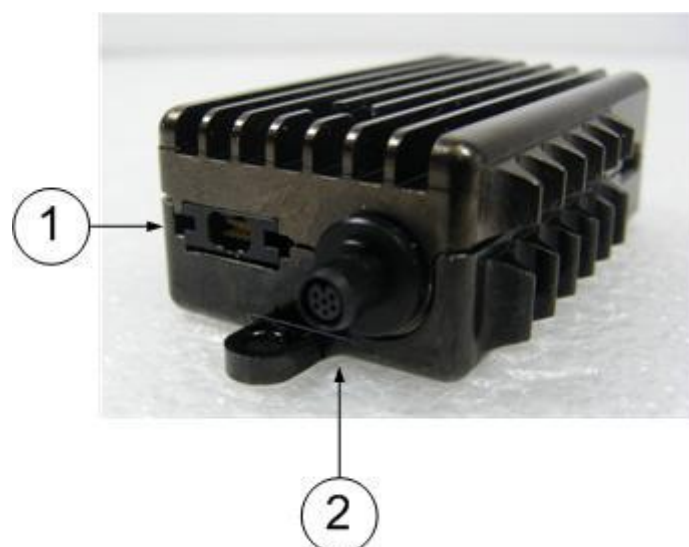
Figure 3-3 SOLO7 Nano Transmitter Bottom Panel

No	Item	Used for...
1	Omnetics Tri-Lobe Latching 9-way receptacle (socket). **Note**: They *look* like pins but they really are sockets.	Video, audio left/right and data inputs.
2	Omnetics Nano Circular 6-way receptacle (pin). **Note**: They *look* like sockets but they really are pins.	Power input and serial control port.

Table 3-2 – SOLO7 Nano Transmitter Bottom Panel Key

CAUTION: Newer revision CA2253 cables will have alignment marks to aid mating with the Omnetics Nano Circular 6-way receptacle on the NTX, however, the user must take great care when aligning the connectors and be aware that they are push-fit and must not be twisted.

Exploring the Side Panel
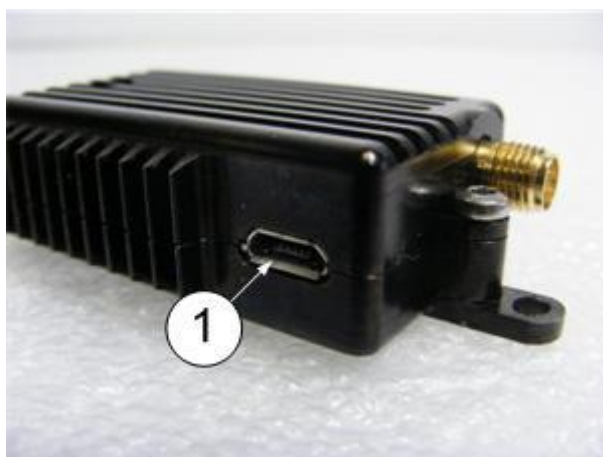
Figure 3-4 SOLO7 Nano Transmitter Side Panel

No	Item	Used for...
1	USB Micro-B 4-way receptacle (socket).	USB Control Port for configuring unit.

Table 3-3 – SOLO7 Nano Transmitter Side Panel Key

3.3   SOLO7 HD Nano Transmitter Connections

Overview of the SOLO7 HD Nano Transmitter
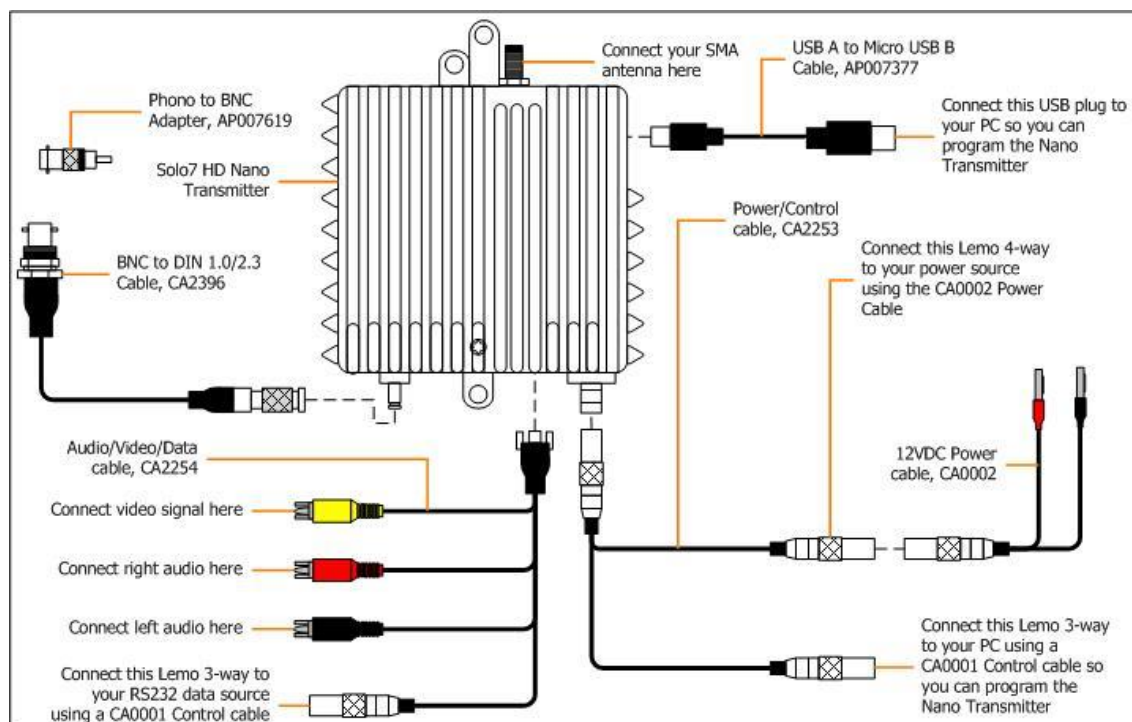
Figure 3-5 SOLO7 HD Nano Transmitter Overview Diagram

Exploring the Top Panel

Figure 3-6 SOLO7 HD Nano Transmitter Top Panel

No	Item	Used for...
1	SMA receptacle 2-way (socket).	Connect the antenna to the SMA receptacle on the top panel of the transmitter unit.
		CAUTION: Do not over tighten the antenna — hand tight only!

Table 3-4 – SOLO7 HD Nano Transmitter Top Panel Key

Exploring the Bottom Panel

Figure 3-7 SOLO7 HD Nano Transmitter Bottom Panel

No	Item	Used for...
1	DIN 1.0/2.3	SD/SD-SDI and ASI
		Note: Video input is configured in Domo Device Controller. This can be configured as either SDI or ASI but not both.
2	Micro HDMI Type-D	HDMI Input.
3	Omnetics Tri-Lobe Latching 9-way receptacle (socket). **Note**: They *look* like pins but they really are sockets.	Video, audio left / right and data inputs.

No	Item	Used for...
4	Omnetics Nano Circular 6-way receptacle (pin).	Power Input and Serial Control Port.
	Note: They *look* like sockets but they really are pins.	

Table 3-5 – SOLO7 HD Nano Transmitter Bottom Panel Key

CAUTION: Newer revision CA2253 cables will have alignment marks to aid mating with the Omnetics Nano Circular 6-way receptacle on the NTX, however, the user must take great care when aligning the connectors and be aware that they are push-fit and must not be twisted.

Exploring the Side Panel

Figure 3-8 SOLO7 HD Nano Transmitter Side Panel

No	Item	Used for...
1	USB Micro-B 4-way receptacle (socket).	USB Control Port for configuring unit.

Table 3-6 – SOLO7 HD Nano Transmitter Side Panel Key

3.4 SOLO7 OB Transmitter Connections

Overview of the OB Transmitter
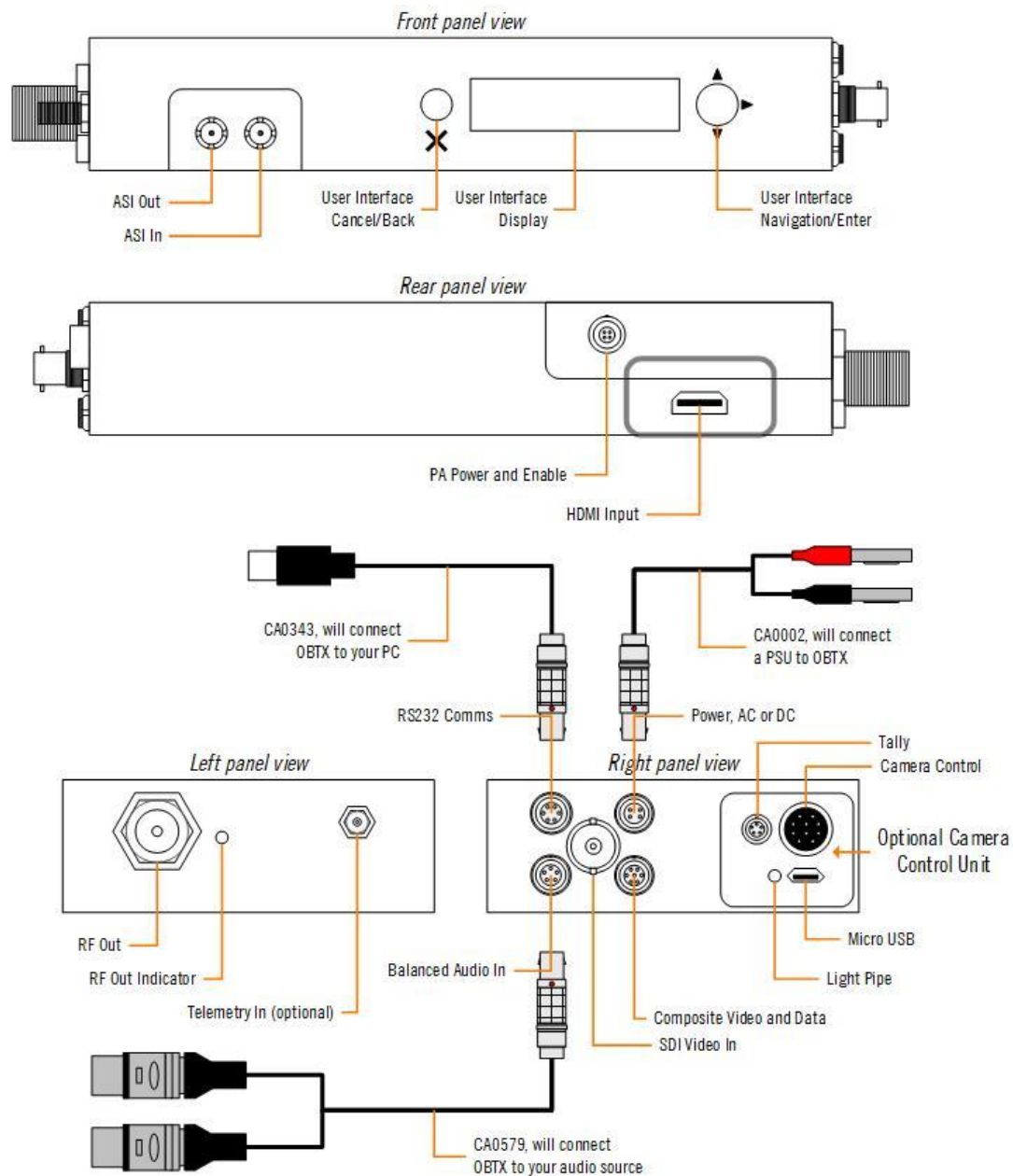
Figure 3-9 SOLO7 OB Transmitter Overview Diagram

Exploring the Front Panel
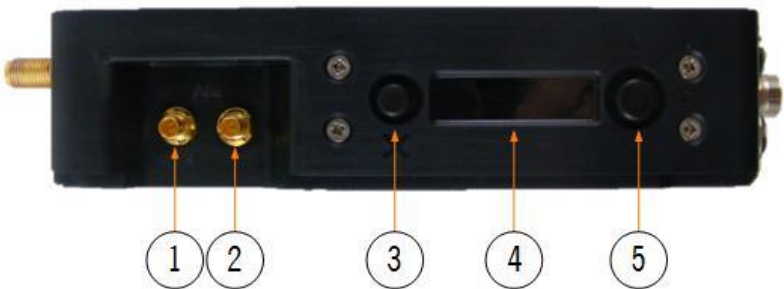
Figure 3-10 SOLO7 OB Transmitter Front Panel

No	Item	Used for...
1	DIN 1.0/2.3 2-way jack (pin)	ASI Out
2	DIN 1.0/2.3 2-way jack (pin)	ASI In
3	Cancel/Back Button	User control interface
4	Display Screen	User control interface
5	Navigate/Confirm Button	User control interface

Table 3-7 SOLO7 OB Transmitter Front Panel Key

Exploring the Rear Panel

Figure 3-11 SOLO7 OB Transmitter Rear Panel

No	Item	Used for...
1	Lemo 4-way jack (sockets)	Power amplifier – power and enable
2	HDMI type A receptacle	HDMI Video In

Table 3-8 SOLO7 OB Transmitter Rear Panel Key

Exploring the Left Panel
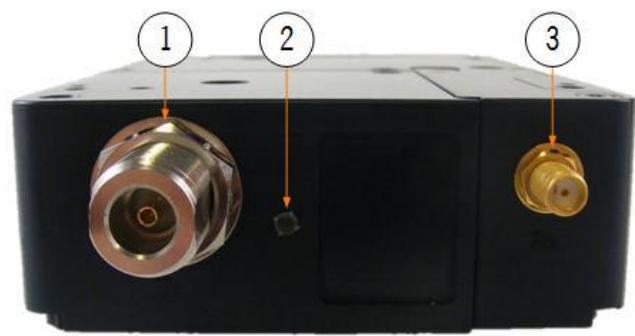
Figure 3-12 SOLO7 OB Transmitter Left Panel

No	Item	Used for...
1	N-Type 2-way RF jack (socket)	RF power out
2	Light pipe indicator	RF Out/Video Status: Green = RF on, video locked No light = RF off, video locked Green/red flash = RF on, video error Red flash = RF off, video error
3	SMA 2-way jack (socket) – CCCAM only	CCCAM telemetry receive (403-474MHz)

Table 3-9 SOLO7 OB Transmitter Left Panel Key

Exploring the Right Panel
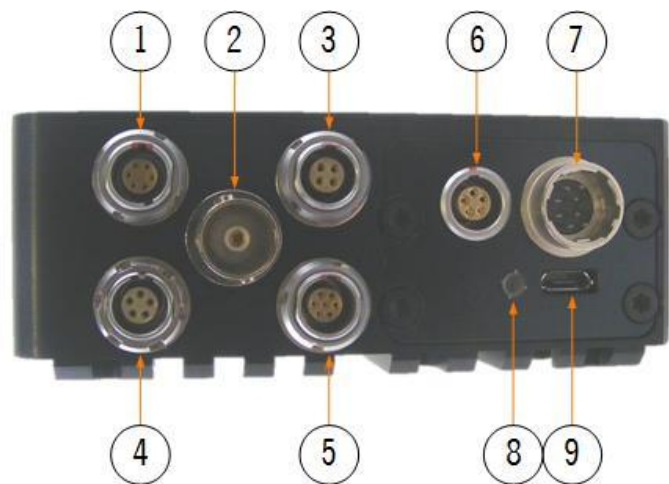
Figure 3-13 SOLO7 OB Transmitter Right Panel

No	Item	Used for...
1	Lemo 6-way jack (sockets) labelled **CTRL**	RS232 communications to your PC

No	Item	Used for...
2	BNC 2-way jack (socket) labelled **SDI**	SDI In
3	Lemo 4-way jack (sockets) labelled **PWR**	Power connector
4	Lemo 5-way jack (sockets) labelled **AUDIO**	Balanced audio connector
5	Lemo 7-way jack (socket) labelled **DATA CVBS**	Composite video and RS232 data
6	Lemo 5-way jack (sockets) – CCCAM only	Tally light control
7	Hirose 10-way jack (pins) – CCCAM only	Data and power to the camera.
8	Light pipe indicator - CCCAM only	Data receive indicator.
9	USB Micro-B 4-way jack (socket) – CCCAM only	This is for software updates.

Table 3-10 SOLO7 OB Transmitter Right Panel Key

4. Connecting up your Transmitter

4.1 Planning the Hardware Installation

During the design and layout of the system, you should give careful consideration of the location of this and all other associated modules. Some of the items to consider include:

■ Space - Leave at least 100mm clearance left and right to allow for cable bending

■ Proximity to other devices (for example, source equipment)

■ Length of cable runs

■ Environmental conditions (temperature, humidity, etc.)

■ Access for service repair

■ Compliance with local regulations

4.2 Wearing the Nano Transmitter on your Body
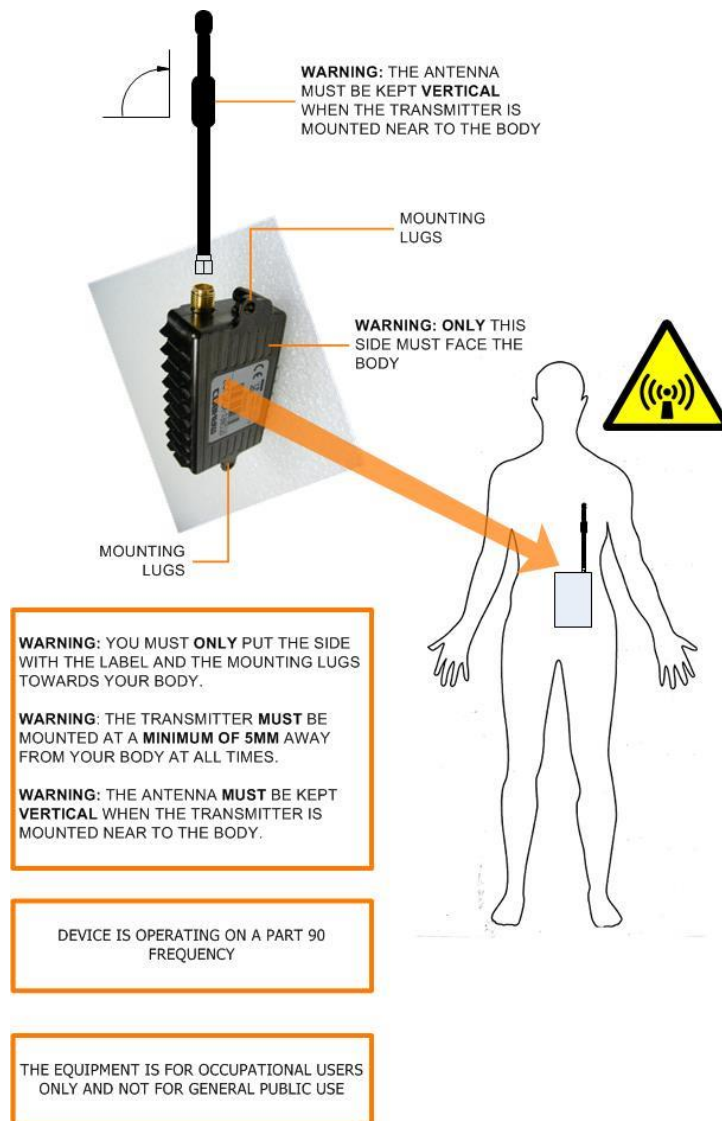
Figure 4-1 Wearing the Nano Transmitter on your Body

4.3   Connect the RF Antenna

This topic describes connecting systems designed mainly for transporting the RF signals. Of all the variables affecting single-channel radio communications, the one factor that an operator has the most control over is the antenna. With the right antenna, an operator can change a marginal net into a reliable net.

There is an antenna interface located on the top panel of the Nano Transmitter. An antenna **must** be fitted before you place the unit in RF mode.

CAUTION: Antennas should be connected **directly** to the unit. If you have to use cables between the antennas and the Transmitter (in a mobile application for example), keep them short and use very high quality cable.

Before you Begin

You'll need:

■ An antenna that matches the frequency range of your Transmitter with the correct connector type.

Note: The antenna connector type on a Nano Transmitter is SMA and the antenna connector type on an OBTX is N-Type.

Step 1: Attach the Antenna

1. Connect the antenna to the RF Out connector on the Transmitter.
2. Do not over tighten the antenna – hand tight only!

Step 2: Set Antenna Polarization

1. COFDM links are very robust and are tolerant to changes in antenna position, however, it is important to try and keep the antennas in the **same plane** if possible.
2. The antennas used with the COFDM links are normally **linearly** polarized.

4.4   Connect DC Power – SOL7NTX/SOL7HDNTX

The Nano Transmitter requires 12VDC. This can be supplied from a vehicle, an AC Adaptor or a battery pack.

Before you Begin

You'll need:

■ A 12VDC Power Source
■ NTX or HDNTX
■ CA0002 Power Cable Assembly.
■ CA2253 Omnetics Nano Circular Power Cable.

Connect the DC Power

1. Connect the Lemo OB 4-way plug (pin) to the Lemo OB 4-way 12V plug (socket) on the Omnetics Nano Circular Power Cable.
2. Connect the Omnetics Nano Circular Power Cable to the Omnetics Nano Circular 6-way receptacle on the Nano Transmitter.

> **CAUTION**: Newer revision CA2253 cables will have alignment marks to aid mating with the Omnetics Nano Circular 6-way receptacle on the NTX, however, the user must take great care when aligning the connectors and be aware that they are push-fit and must not be twisted.

3. Connect the Red Banana plug to the positive terminal of the DC source.

4. Connect the Black Banana plug to the negative terminal of the DC source.

4.5 Connecting DC Power – SOL7OBTX

SOLO7 OB Transmitter has a 4-pin Lemo power connector and is supplied with cable CA0002 for connection to a DC power source. However, commonly the OBTX will be fitted to a Broadcast Camera and powered by a battery.

Before you Begin

You'll need:

- ■ OBTX with battery plates fitted (AB-Mount, PAG-Mount or V-Mount)
- ■ A suitable camera battery

Connect DC Power from a Battery

1. Connect the camera battery to the back panel of the SOL7OBTX.

2. SOL7OBTX will power on and the display screen will illuminate.

3. Connect SOL7OBTX to the Camera backplane.

4. The Camera will also have power available.

4.6 Connect AC Power – SOL7NTX/SOL7HDNTX

Before you Begin

You'll need:

- ■ A 12V AC Adapter (Optional)
- ■ NTX or HDNTX
- ■ CA2253 Omnetics Nano Circular Power Cable.

Connect the AC Power

1. Connect the **Lemo OB 4-way plug** (pin) from the AC adaptor to the **Lemo OB 4-way plug** (socket) on the Omnetics Nano Circular Power Cable.

2. Connect the Omnetics Nano Circular Power Cable to the Omnetics Nano Circular 6-way receptacle on the Nano Transmitter.

> **CAUTION**: Newer revision CA2253 cables will have alignment marks to aid mating with the Omnetics Nano Circular 6-way receptacle on the NTX, however, the user must take great care when aligning the connectors and be aware that they are push-fit and must not be twisted.

3. Now connect the **IEC mains 3-way plug** (socket) to the **IEC mains 3-way receptacle** on the AC adaptor.

4. Connect IEC mains plug to your **local AC supply** and switch on.

4.7   Connect Video Signals – Composite

Before you Begin

You'll need:

- NTX, HDNTX or OBTX.
- CA2254 Omnetics Tri-Lobe Latching 9-way plug (socket) AV Cable Assembly for NTX and HDNTX.
- CA3122 Composite Video Input Cable (option) for OBTX or refer to *Pinouts – OBTX*.
- A composite video source.

Connect Composite Video Signal – SOL7NTX/SOL7HDNTX

1. Connect CA2254 9-way plug (socket) to the AV receptacle of the Nano Transmitter.
2. Connect the RCA Phono 2-way plug (socket), yellow, to the video source.
3. Switch on the video source.

> **Note**: CA2298 (option) Omnetics 9-way Breakout accessory cable for Nano Transmitter can be used to access two video inputs. Here's how you can use them:
>
> For **Composite Video**, you can use one or the other (but not both at the same time).
>
> Video 1: Composite 1 Input.
>
> Video 2: Composite 2 Input.
>
> For **S-Video**, you'll use **both** like this:
>
> Video 1: S-Video Luma Input.
>
> Video 2: S-Video Chroma Input.

Connect Composite Video Signal – SOL7OBTX

1. Connect CA3122 7-way Lemo plug to 7-way Lemo jack on OBTX.
2. Connect CA3122 BNC plug to the video source.
3. Switch on the video source.

4.8   Connect Video Signals – HDMI

Before you Begin

You'll need:

- HDNTX or OBTX
- AP008399 HDMI type A to micro HDMI type D adaptor cable for HDNTX
- HDMI type A cable (not supplied)
- An HDMI video source

Connect HDMI Video Signal – SOL7HDNTX

1. Connect AP008399 micro HDMI type D connector to HDNTX HDMI Input.
2. Connect AP008399 HDMI type A connector to the video source via an HDMI type A cable.
3. Switch on the video source.

Connect HDMI Video Signal – SOL7OBTX

1. Connect an HDMI type A cable to OBTX HDMI Input.

2. Connect the other end of the HDMI type A cable to the video source.

3. Switch on the video source.

4.9   Connect Video Signals – SDI

Before you Begin

You'll need:

- ■ HDNTX or OBTX

- ■ CA2396 BNC to DIN 1.0/2.3 adaptor cable for HDNTX

- ■ Male BNC to male BNC coaxial cable

- ■ An SDI video source

Connect SDI Video Signal – SOL7HDNTX

1. Connect CA2396 DIN 1.0/2.3 connector to HDNTX SDI In.

2. Connect CA2396 BNC connector to one end of the BNC coaxial cable.

3. Connect the other end of the BNC coaxial cable to the video source.

4. Switch on the video source.

Connect SDI Video Signal – SOL7OBTX

1. Connect one end of the BNC coaxial cable to OBTX SDI In.

2. Connect the other end of the BNC coaxial cable to the video source..

3. Switch on the video source.

4.10   Connect Audio Signals – SOL7NTX/SOL7HDNTX

Before you Begin

You'll need:

- ■ NTX or HDNTX

- ■ CA2254 Omnetics Tri-Lobe Latching 9-way plug (socket) AV Cable Assembly

- ■ An analogue audio source.

Connect Audio Signal

1. Connect the 9-way plug (socket) to the AV receptacle of the Nano Transmitter.

2. Connect the 2 x RCA Phono 2-way plugs (socket), red and white, to the audio source.

3. Switch on the audio source.

4. Ensure the radio is configured to send audio (Audio is off by default).

4.11   Connect Audio Signals – SOL7OBTX

Before you Begin

You'll need:

- OB Transmitter
- CA0579, XLR Audio Cable Assembly
- A balanced audio source.

Connect Audio Signal

1. Connect the 5-way Lemo plug of CA0579 to the 5-way Lemo jack on OBTX.
2. Connect the 2 x XLR 3-way plugs of CA0579, to the balanced audio source.

Note: XLR pin 1 is **GND**, pin 2 is **Audio +** and pin 3 is **Audio -**.

3. Switch on the audio source.
4. Ensure the radio is configured to send audio (Audio is off by default).

4.12   Connect Data Signals

Before you Begin

You'll need:

- NTX or HDNTX
- CA2254 Omnetics Tri-Lobe Latching 9-way plug (socket) AV Cable Assembly for NTX and HDNTX
- A data source.

Note: Data signals can be connected to **OBTX** through the **DATA/CVBS** 7-way Lemo connector. Refer to *Pinouts – OBTX* for OBTX data connections.

Connect Data Signal – SOL7NTX/SOL7HDNTX

1. Connect the 9-way plug (socket) to the AV receptacle of the Nano Transmitter.
2. Connect the Lemo OB 3-way plug (socket) to the data source.
3. Switch on the data source.
4. Ensure the radio is configured to send data (data is off by default).

4.13   Connect Control Signals

Before you Begin

You'll need:

- NTX, HDNTX or OBTX
- AP007377 USB type-A to USB Micro-B Cable Assembly for NTX and HDNTX
- CA0343 USB control cable for OBTX

Connect Control Signal – SOL7NTX/SOL7HDNTX

1. Connect the USB Micro-B 4-way plug (pin) to the USB receptacle of the Nano Transmitter.

2. Connect the USB type-A 4-way plug (pin) to the USB receptacle on your PC.

Connect Control Signal – SOL7OBTX

1. Connect CA0343 6-way Lemo plug to the OBTX 6-way Lemo jack.

2. Connect CA0343 USB type-A plug to the USB receptacle on your PC.

4.14   Connect the CCCAM Expansion Option - SOL7OBTX

Before you Begin

You'll need:

- OBTX with CCCAM option fitted.
- AP008822 1/4 Wave Antenna.
- OBTX-CCCAM-xUP control protocol and cable (where *x* identifies the manufacturer), see *Identifying the Options of SOLO7 OB Transmitter*.
- USB Micro B to USB type-A cable (not supplied)

Step 1: Attach the Telemetry Antenna

1. Connect the antenna to the telemetry SMA antenna receptacle.

2. Do not over tighten the antenna – hand tight only!

Step 2: Attach the Camera Control Cable

1. Attach the OBTX-CCCAM-xUP cable Hirose 10-way plug to the OBTX 10-way jack.

2. The other end of the OBTX-CCCAM-xUP cable will connect to the camera's remote port.

Step 3: Attach the Tally Cable

Refer to OBTX CCCAM Connectors for pinout details if Tally light operation is required.

Step 4: Attach the USB Interface

This is for software upgrades to the CCCAM expansion unit only and will prevent normal operation if connected.

1. Attach the USB Micro B cable to the CCCAM expansion USB Micro B receptacle.

2. Attach the USB type-A end of the cable to the USB receptacle on your PC.

5. Basic Operation

5.1   Starting and Stopping the Transmitter

SOLO7 Transmitters units don't have power switches – you simply apply power to them and they will start up.

Before you Begin

You'll need:

■ An NTX, HDNTX or OBTX

■ A source of power

Step 1: Powering Up

1. Power-on the Transmitter using one of the procedures in *Connecting up your Transmitter*.

Step 2: Shutting Down

It is important to shut down the system carefully. This ensures that all processes are terminated correctly and no data or settings are lost.

1. Ensure the unit is **not** in sleep mode.

2. Disconnect power from the SOLO7 Transmitter either by removing the cable or switching off the power source.

3. The system is shut down safely.

5.2   About the Software with your Transmitter

The SOLO7 Transmitter family of products has **two** software elements:

■ **Firmware** that runs inside the device

■ **Domo Device Controller** that you operate on your Windows PC

About the Firmware

Although much of the unit is built up of hardware components, many of the sophisticated features are implemented in firmware running on a Field Programmable Gate Array (FPGA) inside the device.

When you need to perform an internal software upgrade we provide an installer pack which contains all the code you'll need to do this easily.

About Domo Device Controller

Domo Device Controller gives users a convenient access to the most usual features and functions of the device. The Domo Device Controller allows you to set up to sixteen presets and have control of all parameters of the unit.

> **Note**: The Domo Device Controller application will allow you to configure the modulation and video quality settings; for optimum performance use the sliders explained in *Exploring the Domo Device Controller Main Window*, for manual adjustment refer to *Recommended Manual Video Encoder Settings*.

Here's what the Domo Device Controller Application looks like when it is started:

Figure 5-1 – Domo Device Controller Application

5.1 Installing the Domo Device Controller on your PC

Before you Begin

You'll need:

- A PC running **Windows XP** or better
- The PC needs to have a spare USB port
- A copy of the **Domo Device Controller** software

Note: You can download the latest version of the Controller from the DTC's Watchdox facility.

Install the Controller on your PC

1. The Installer package is called: **DomoDeviceController.exe**. Double-click this file.
2. The **Domo Device Controller** software will be installed on your PC.
3. A desktop icon will appear on your desktop.

5.2   Connecting your PC to the SOLO7 Nano Transmitter

Before you Begin

You'll need:

- A powered NTX, HDNTX
- A Personal Computer with the Domo Device Controller Application installed
- Refer to *Connecting up your Transmitter* for USB and Power connections

Start Domo Device Controller

1. Double-click **Domo Device Controller** icon on the computer desktop.
2. **Domo Device Controller** opens.
3. From the **Language** box, select the Language you want to use.
4. You'll see the **Click to Connect** message.
5. Click the **Connect** button.
6. The **Device Connection** Window opens.
7. Select **USB**.
8. Click the **Refresh** button.
9. You'll see the **Identification Number** of the Transmitter's USB interface.
10. Click the **Connect** button.
11. The Device Controller reads the SOLO7 Transmitter configurations.
12. The Domo Device Controller **Main Window** opens.
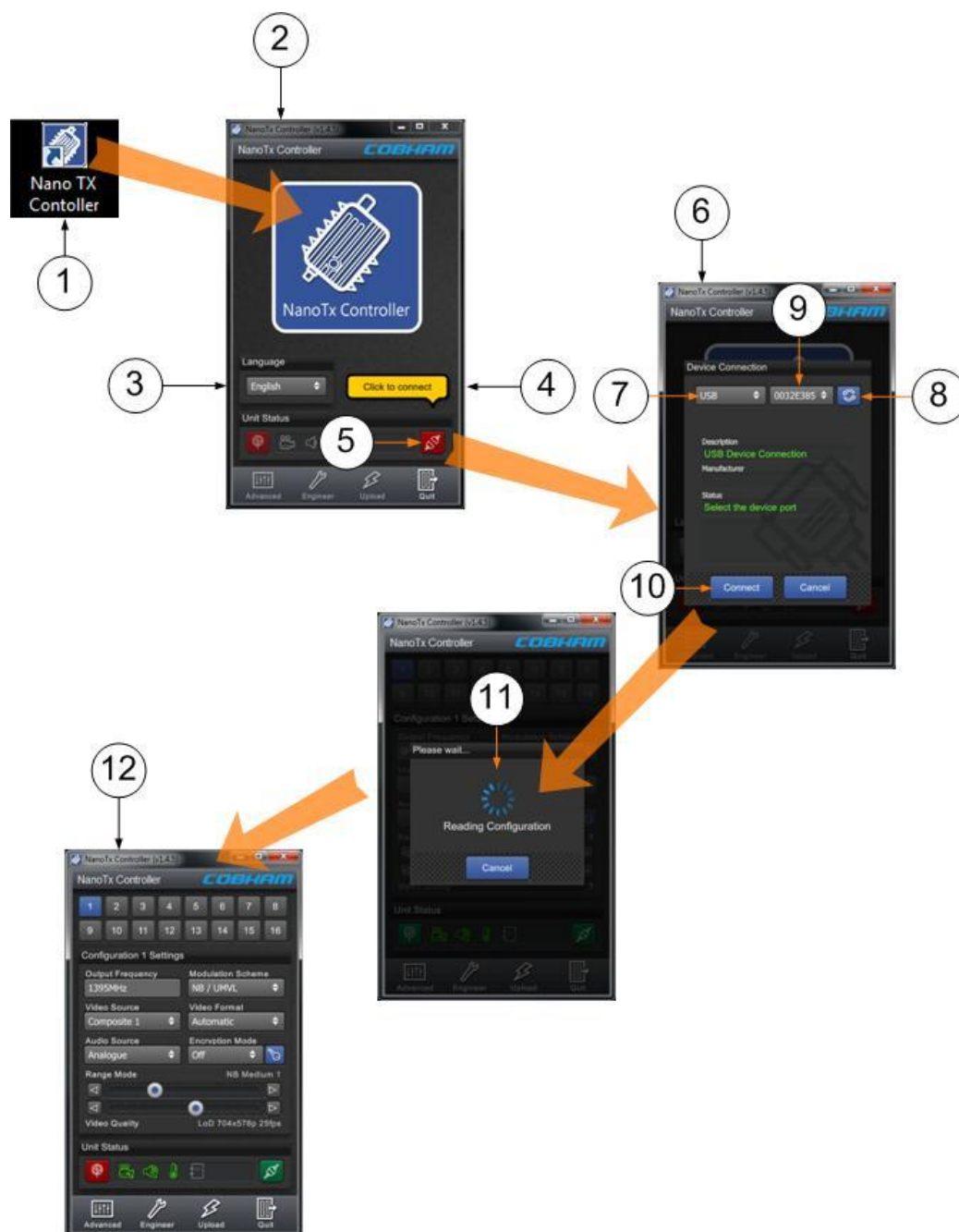
Figure 5-2 Start the Domo Device Controller (NTX and HDNTX)

5.3   Connecting your PC to the SOLO7 OB Transmitter

Before you Begin

You'll need:

- A powered OBTX
- A Personal Computer with the Domo Device Controller Application installed
- Refer to *Connecting up your Transmitter* for USB and Power connections

Note: If using OBTX for the first time, you may need to install drivers to enable the Com Port. See *Install Device Drivers – OBTX*.

Start Domo Device Controller

1. Double-click **Domo Device Controller** icon on the computer desktop.

2. **Domo Device Controller** opens.

3. You'll see the **Click to Connect** message.

4. Click the **Connect** button.

5. The **Device Connection** Window opens.

6. Select **Serial Port**.

7. You can **scan** for COM ports by clicking the **search** button.

8. Alternatively, you can select the com port for your OBTX.

Note: You will need to establish the Com Port that has been created for the Field Controller from your PC's Device Manager.

9. Click the **Connect** button.

10. The Device Controller reads the SOLO7 Transmitter configurations.

11. The Domo Device Controller **Main Window** opens.
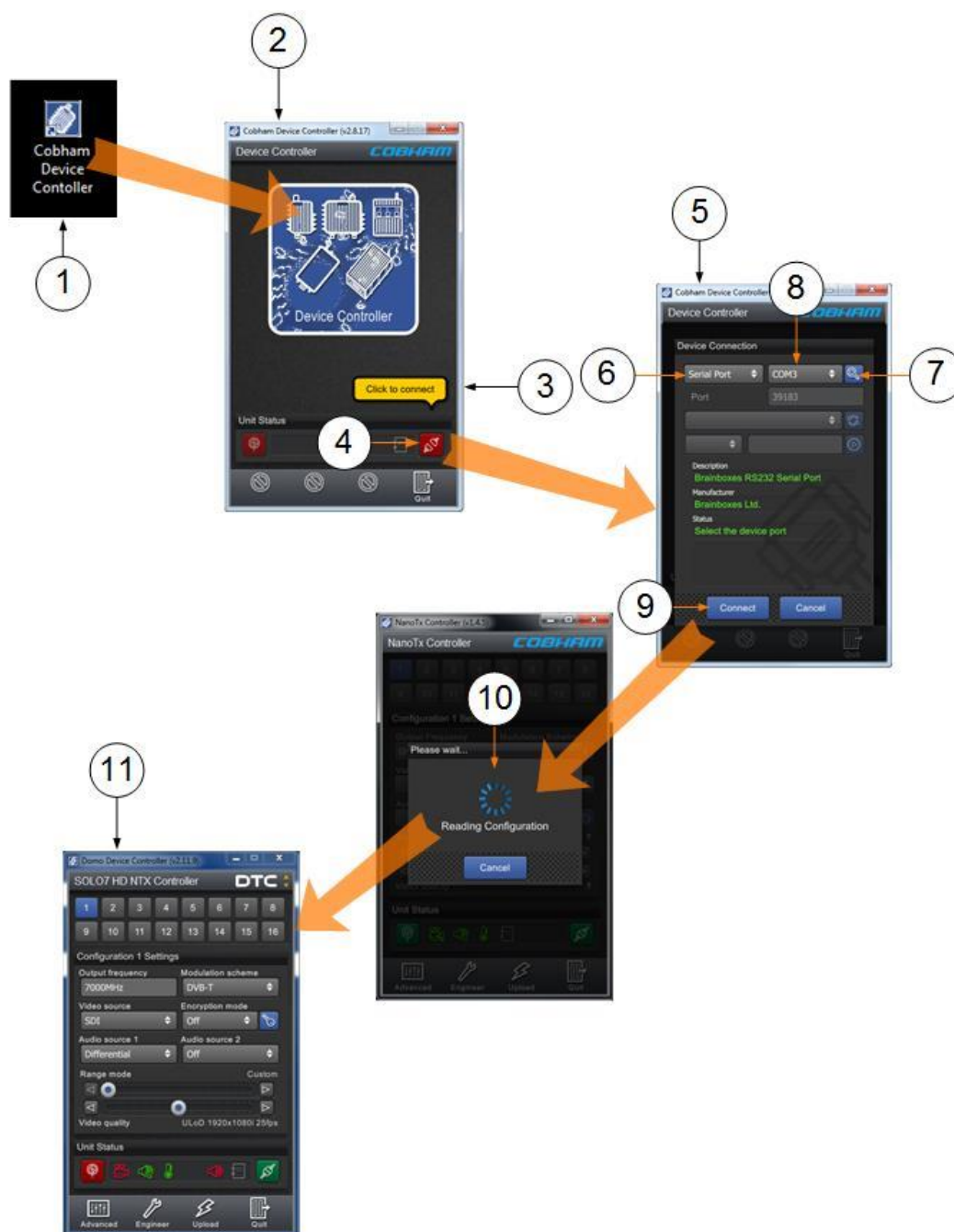
Figure 5-3 Start the Domo Device Controller (OBTX)

5.4   Exploring the Domo Device Controller Main Window

Before you Begin

You'll need:

■   A powered NTX, HDNTX or OBTX

■   Refer to *Connecting up your Transmitter* for connectivity

■   To have established a connection using Domo Device Controller
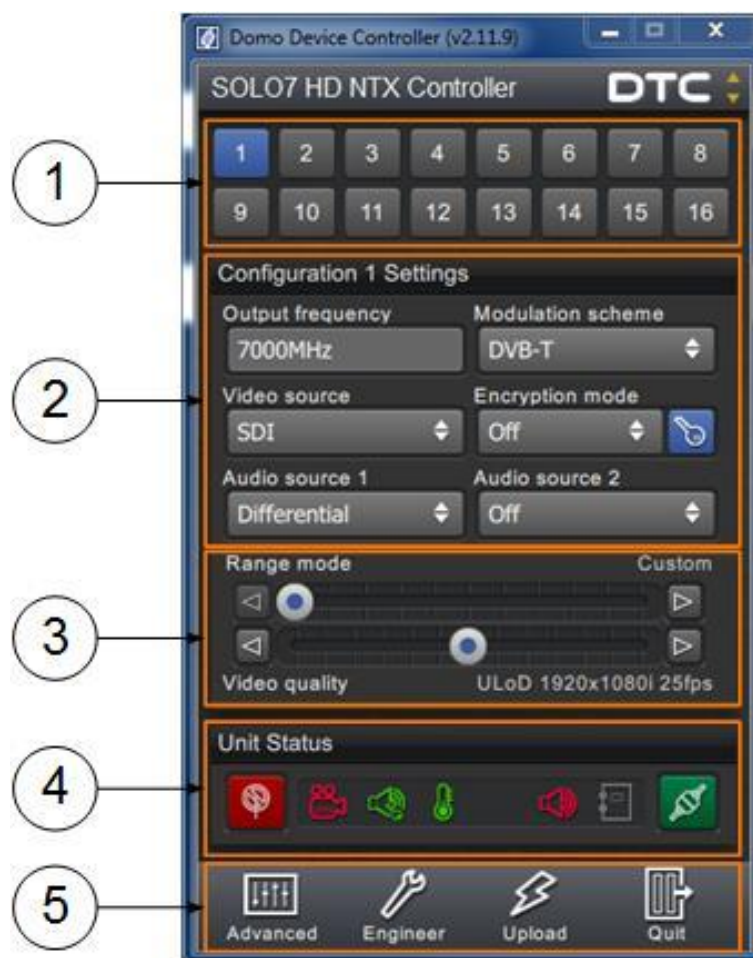
Figure 5-4 Explore the Domo Device Controller Main Window

No	Name	Notes
1	Configuration Buttons.	Sixteen (or eight) configurations can be stored. The Blue button is the currently active configuration. You can set up just one of them if you want but it can be very useful to have all 16 populated. Try having different frequencies and range settings available.
2	Basic Settings for the Active Configuration	When you have selected a configuration button above, this section shows the core settings for that configuration. These are repeated in the Advanced window along with many more settings. You can edit these settings right here to make quick changes.
3	Range Mode/Video Quality	The modulation and video settings will be automatically selected for optimum performance by using these sliders. This is more fully explained in *Step 3: Perform a Basic Configuration Setting*.
4	Unit Status Panel	A group of indicators to report things like: RF Status, Video Lock, Audio Lock, Temperature and Connection Status.
5	Switch Panel	Buttons to take you to: The Advanced window, the Engineer window, the Upload window and to quit the Domo Device Controller.

Table 5-1 – Domo Device Controller Main Window Key

5.5   Performing a Quick Setup

There are several **basic setup** fields that enable you to do a quick setup of the unit without getting into fine details (we'll meet those later).

Before you Begin

You'll need:

■   A powered NTX, HDNTX or OBTX

■   Refer to *Connecting up your Transmitter* for connectivity

■   To have established a USB connection using Domo Device Controller

Step 1: Choose a Configuration

1.   Click one of the sixteen configuration buttons.

2.   You'll see the **Reading Configuration** message.

3.   The button is illuminated in **blue** and the **Configuration Settings** are ready to edit.

Step 2: Work with the Configuration Settings

1.   Click one of the **Configuration Settings** boxes.

2.   The box turns **white** and **check mark** and **cross** buttons appear.

3.   When you start to edit, the check mark button becomes **active** (shaded in **blue**).

4.   When you have completed your edit, click the **check mark** button to **accept** the change or click the **cross** button to **discard** the change.

5.   This technique applies to **any** drop-down box you'll edit on Nano TX Controller.

Figure 5-5 Work with the Configuration Settings

Step 3: Perform a Basic Configuration Setting

Basic Setting	Options	Notes
Output frequency (MHz)	Any frequency in the range of the unit. A SOL7NTX-100150 for example can use frequencies from 1.00GHz to 1.50GHz.	Type in the **frequency** that you want this device to use in megahertz (MHz). If you type in a frequency which is **out of range**, the unit will automatically round to the highest or lowest frequency which actually is available. The transmitter frequency can be set in step sizes of 125kHz.
Video Source	Off Composite 1 Composite 2 S-Video **HD Nano TX** and **OBTX**: SDI HDMI	With the supplied CA2254 breakout cable, there is one yellow RCA Phono plug for Video input. This is Composite 1. With the optional CA2298 breakout cable you can connect two video inputs or S-Video, see *Connect Video Signals – Composite*. You can switch video off, leaving all the bandwidth available for audio and data.
Audio Source	Off Analogue Differential **HD Nano TX** and **OBTX**: Embedded 1 Embedded 2	You can switch audio off, leaving all the bandwidth available for video and data. Analogue – When selected the audio input cable can be used for mono left, mono right or stereo pair. Differential – When selected, the audio input cable can be used as a differential pair for long cable runs on high quality microphones (NTX and HDNTX will be mono only).
Modulation Scheme	NB / UMVL DVB-T	This box enables you to select DTC's **Narrowband / UMVL** modes (NB / UMVL) or **DVB-T.**

Basic Setting	Options	Notes
Video Format	Automatic PAL NTSC NTSC NP **HD Nano TX and OBTX**: 720p50, 720p59, 720p60, 1080i50, 1080i59, 1080i60, 1080p23, 1080p24, 1080p25, 1080p29, 1080p30, 1080psf23, 1080psf24, 1080psf25, 1080psf29, 1080psf30, 1080p50, 1080p59, 1080p60, 1080dl50, 1080dl59, 1080dl60	Select the Video format that matches the camera you are using. Alternatively the **Automatic** setting enables the Nano TX to determine if the signal is PAL or NTSC automatically. Power up standard in Automatic mode defaults to PAL. This can be changed by setting the input to NTSC NP for example and then back to Automatic. **Note**: 1080p50/59/60 equates to 3G-SDI Level A, and 1080dl50/59/60 is 3G-SDI Level B-DL
Encryption Mode	Off ABS AES128 AES256	In this drop-down you'll see a list of Encryption Modes available on this unit. All Nano Transmitters have ABS but the AES modes are all license dependant. If you are not licenced for AES128, you won't see it in this list. Select the Encryption Mode you want to use or choose off to transmit in clear.
Encryption Key	Opens the Encryption Key Entry dialog.	Check the Encryption mode is correct (you can change it here if required) and then enter your **Key**. ABS=8 characters AES=32 characters AES=64 characters Must be: ASCII hexadecimal characters (0..9, A..F).

Basic Setting	Options	Notes
Range Mode	Custom NB Short 1 NB Short 2 NB Medium 1 NB Medium 2 NB Long 1 NB Long 2 NB ULong 1 NB ULong 2 NB XLong 1 NB XLong 2 UMVL Short 1 UMVL Short 2 UMVL Medium 1 UMVL Medium 2 UMVL Long 1 UMVL Long 2 DVB-T XShort 1 DVB-T XShort 2 DVB-T Short 1 DVB-T Short 2 DVB-T Medium 1 DVB-T Medium 2 DVB-T Medium 3 DVB-T Long 1 DVB-T Long 2 DVB-T Long 3	Move the slider towards the left to get shorter ranges but higher picture and audio quality. Move the slider to the right to increase the range but reduce the picture and audio quality. Custom enables you to make up your own setting which we'll look at later. NB types apply when you have selected the Narrowband Modulation scheme. UMVL types apply when you have selected the UMVL Modulation scheme. DVB-T types apply when you have selected the DVB-T Modulation scheme.

Basic Setting	Options	Notes
Video Quality	LoD 176x144p 25fps LoD 176x288p 25fps LoD 352x288p 25fps LoD 352x576i 25fps LoD 470x576i 25fps LoD 528x576i 25fps LoD 704x576p 25fps StD 704x576p 25fps StD 704x576p 12fps StD 704x576p 6fps StD 704x576p 3fps StD 704x576p 1fps These settings taken with Range Mode set to NB Medium 1 and Video Format at PAL. They will be different for other Range Modes and Video Formats.	The centre point corresponds to our recommended compromise for the current available bandwidth or range mode. Move the slider to the left to get lower resolution at a higher frame rate. Move the slider to the right to get higher resolution at a lower frame rate. LoD=Low Delay ULoD=Ultra Low Delay StD=Standard Delay Fps=Frames per second 25 for PAL, 30 for NTSC. P=Progressive I=Interlace

Table 5-2 – Perform a Basic Configuration Setting

Note-1: Some **Modulation Schemes** are **licensed** features. If you are not licensed for these modes you will not be able to select them.

Check **Advanced Settings** > **Unit** to see your licence status.

Unlicensed features in option lists are marked with a padlock icon.

Note-2: **Some** encryption modes are **licensed** features. If you are not licensed for these modes you will not be able to see them in the Encryption Mode list.

Check **Advanced Settings** > **Unit** to see your licence status.

6. Advanced Operation

6.1 Temperature Control Tips

The SOLO7 Nano Transmitter can get very hot, therefore, it is worth noting some configurations and environmental conditions that can help mitigate any temperature concerns.

> **Note**: The FPGA temperature can be monitored as a colour coded scheme on the Domo Device Controller **Main Window** or from the **Advanced>Unit** tab to monitor the actual temperature in °C of the on-board FPGA device (see *Working with the Unit Tab*).

1. Use a heatsinking plate, thermal conductivity will help draw heat from the SOLO7 Nano Transmitter case.

2. Lower the **Output power** if operational conditions allow (see *Working with the Modulation Tab*).

3. Switch **High linearity** to **Off** if operational conditions allow (see *Working with the Modulation Tab*).

4. Change the **Video encoder** format to **MPEG4 ASP** if operational conditions allow (see *Working with the Video Tab*).

6.2 About Encryption

The target is focused on intercepting your radio signal. To do this, all that they need is a radio receiver that operates in the same mode and on the same frequency you are using to transmit. The mere fact that you are operating gives them valuable information. It tells them that you are in the area and by the number of stations operating on the same frequency they can estimate the size of the operation against them. If your radio net is operating in the clear, the target specialists can see or hear exactly what is being transmitted for even more information. When analysing the traffic patterns, the target can work out which station is the net control station and identify the headquarters.

6.3 Setting up Encryption

If the AES scrambling option has been purchased for the SOLO system in use, then it is possible to encrypt the link. Both AES128 and AES256 are licence-controlled features. You'll need to encrypt the traffic leaving the transmitter and set up the receiver for decrypt.

Before you Begin

You'll need:

- A powered NTX, HDNTX or OBTX

- Refer to *Connecting up your Transmitter* for connectivity

- To have established a USB connection using Domo Device Controller, see *Installing the Domo Device Controller on your PC*.

Step 1: Select the Encryption Mode

1. Double-click the **Domo Device Controller** icon on the computer desktop.

2. The **Domo Device Controller** opens.

3. In the **Encryption Mode** drop-down box select an encryption type. (AES128 for example).

Step 2: Change the Encryption Key

The **encryption key** is a 128bit value for AES128 and a 256bit value for AES256, and is entered as 32 or 64 ASCII hexadecimal characters (0..9, A..F).

1. Click the **Encryption Key Entry** button (the blue key).

2. The **Encryption Key Entry** dialog box opens.

3. Ensure the **Encryption mode** box is displaying the Encryption Mode you set in Step 1. If not, set it now.

4. In the **<Mode> key** text box, type the encryption key you want to use.

5. When you have entered the key, click the **Check Mark**.

6. Click the **Apply** button.

7. You'll see the **Setting Encryption Keys** message, then your encryption is set.

Screenshot: Setting up Encryption

Figure 6-1 Setting up Encryption

Remarks

In our example above we used ABS encryption. ABS was the only item in the list because this Transmitter is not licenced for AES128 or AES256.

ABS needed a key of eight characters. If we had chosen AES256 for example, it would need a 64 character key which we spread over two fields.

Key Type	Number of Characters Needed
ABS	8
AES128	32
AES256	64 (32 in each field)

6.4   About High Linearity and Low Power Modes

CAUTION: The combination of 100mW output power and High Linearity Mode must only be used with additional cooling, either extra heat sinking or a fan.

The SOLO7 Transmitter has two modes of operation:

■ Low Power Mode

■ High Linearity Mode

Low Power Mode

Low Power Mode optimises DC power consumption but to do this it must compromise the quality of the COFDM waveform 'shoulders'. This compromising of the shoulders often makes little difference operationally when you just need to get a short range link in a reasonable RF environment.

What Low Power Mode *does* do however is save a considerable amount of power so you can deploy a unit on batteries for extended times.

Take a look at these power consumption figures for SOL7NTX when in Low Power Mode:

RF Output Power	VHF / UHF	L-Band	S-Band
10mW	3.1W	3.3W	3.4W
50mW	3.4W	3.6W	3.7W
100mW	3.7W	3.9W	4W

Table 6-1 – Typical Power Consumption in Low Power Mode

High Linearity Mode

High Linearity Mode optimises the quality of the COFDM waveform 'shoulders' but to do this it must increase DC power consumption.

This mode can be very useful when you are using an external amplifier which always expects very high quality shoulders to work at its best.

Also, in busy RF environments you'll need excellent shoulders to reject adjacent channel interference.

Take a look at these charts to make a comparison between the modes:

DC Power	RF Power Out (dBm)	Current (mA)	Mode	Wattage
10	20	395	Low	3.95
10	17	330	Low	3.30
10	10	300	Low	3.00
10	20	455	High	4.55
10	17	380	High	3.80
10	10	320	High	3.20

Table 6-2 – Typical Power Consumption 1650 to 2400MHz (High L and S-Band)

DC Power	RF Power Out	Current I(mA)	Mode	Wattage
10	20	390	Low	3.90
10	17	355	Low	3.55
10	10	325	Low	3.25
10	20	465	High	4.65
10	17	375	High	3.75
10	10	340	High	3.40

Table 6-3 – Typical Power Consumption 200 to 300MHz (VHF)

About DC Power Use

SOLO7 Transmitter is very power efficient. In earlier models of transmitter, if you switched from high to low RF power, the same DC power level would be used although the RF signal was attenuated.

In these newer transmitters, when you select lower RF powers the DC power level is dropped too, using just the power needed to achieve the RF power required.

This stepping down of the DC power level applies to both Low Power Mode and High Linearity Mode.

7. Advanced Setup

7.1   About Advanced Setup

To get the most from your radio system you must customise the programming for your operations and area.

CAUTION: Before you start programming your radio make sure the batteries are fresh and fully charged. If the radio loses power while you program it, its memory might be corrupted which will require you to reset defaults. All information programmed in the radio might be lost. Alternatively, you could use an AC adapter to power your radio.

The SOLO7 Transmitter uses the **Domo Device Controller** software running on your PC which enables you to perform many configuration tasks quickly and easily. These next topics tell you how to connect your PC to the Nano Transmitter and then use your Domo Device Controller to configure the unit.

If the **Device Controller** menu shows a 'lock' symbol lock next to a feature, this means that it is not available for your device variant or that it is missing a license.

Note: An alternative method to setup a SOL7OBTX is to use the user control interface on the front panel. This is explained in detail in *The User Control Interface – SOL7OBTX only*.

7.2   Working with the Unit Status Panel

Before you Begin

You'll need:

■   A powered NTX, HDNTX or OBTX

■   Refer to *Connecting up your Transmitter* for connectivity

■   To have established a USB connection using Domo Device Controller
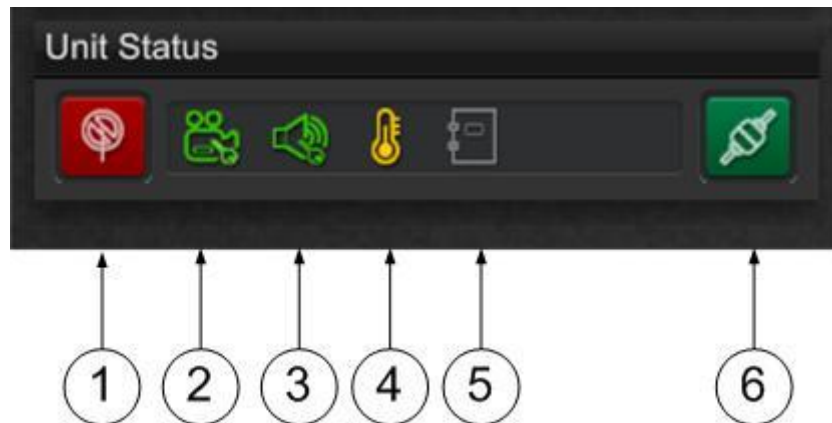
Figure 7-1 The Unit Status Panel

Interpret the Toolbar

No	Name	Options	Notes
1	RF Button	Red=RF Off Green=RF On	Click to toggle RF on or Off.

No	Name	Options	Notes
2	Video Lock	Red=Unlocked Green=Locked	Tells you if the unit has successfully locked to the video source. Unlocked will also be shown if video is disabled.
3	Audio Lock	Red=Unlocked Green=Locked	Tells you if the unit has successfully locked to the audio source. Unlocked will also be shown if audio is disabled.
4	Temperature	Green Symbol Yellow Symbol Red Symbol	An indication of the temperature of the FPGA. Attempt to keep it green. 0 to 59 degrees Celsius shown in green. 60 to 84 degrees Celsius shown in yellow. 85 degrees Celsius or above shown in red.
			CAUTION: If it changes to red, switch the unit off and allow it to cool. >95°C some video encoder functionality is disabled to try and reduce temperature, video quality will be affected. >99°C the unit will shut down and restart to avoid permanent FPGA damage.
5	Logging	Dimmed-Unavailable White-Logging running	Logging is normally off by default. Logging is enabled by using a command line switch which is fully described in *Appendix A – Reference Material*.
6	Connect Button	Red=Disconnected Green-Connected	Click to toggle Serial Connection. Indicates the status of the serial connection between the Nano TX Controller software on your PC and the Nano Transmitter. You must be connected to control the unit.

Table 7-1 – Unit Status Panel Key

7.3   Working with the Switch Panel

Before you Begin

You'll need:

- A powered NTX, HDNTX or OBTX
- Refer to *Connecting up your Transmitter* for connectivity
- To have established a USB connection using Domo Device Controller
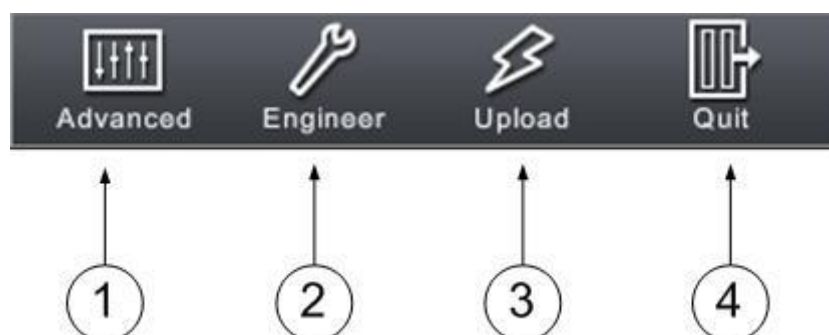
Figure 7-2 The Switch Panel

Interpret the Switch Panel

No	Name	Options	Notes
1	Advanced	Click to open the Advanced Window. The Back Button will always return you to the Main Window.	The **Advanced Window** gives access to five windows: Unit – Software versions, licenses etc. Modulation – Frequency, power, FEC etc. Audio – Audio source, sample rate etc. Video – Video source, format etc. Misc – Data settings etc. The Advanced Windows are fully described later.
2	Engineer	Click to open the Engineering Options window. The Back Button will always return you to the Main Window.	This gives access to the **diagnostic** pane where you can send serial commands direct to the unit and get results back. This pane is designed advanced users. The Engineering Options are fully described in *Appendix A – Reference Material*.
3	Upload	Click to open the Upload File window. The Back Button will always return you to the Main Window.	This gives access to the **Upload File** window where you can upgrade your license files to get more features or upgrade your firmware to the latest version. This procedure is fully described in Appendix A – Reference Material.
4	Quit	Click to quit the Nano TX Controller application.	You'll see a **Confirmation** message box. Click **OK** button to really quit or Cancel to return to the application.

Table 7-2 – Switch Panel Key

7.4   Working with the Unit Tab

Before you Begin

You'll need:

- NTX, HDNTX or OBTX

- Refer to *Connecting up your Transmitter* for connectivity

- To have established a USB connection using Domo Device Controller

Step 1: Open the Advanced Window > Unit Tab

1. On the Main Window in the Switch Panel, click the **Advanced** button.

2. Click the **Unit** Tab.

Step 2: Configure the Unit Settings
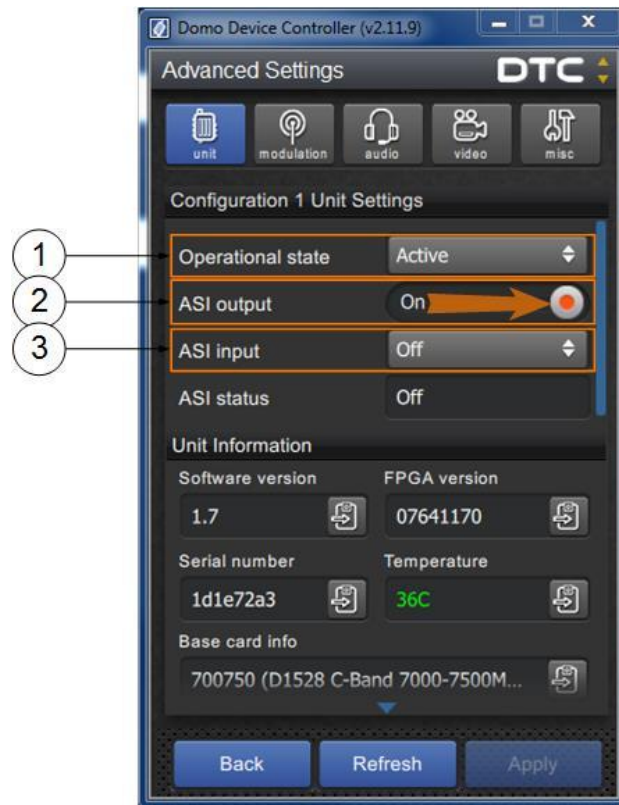
Figure 7-3 Unit Settings

No	Name	Options	Notes
1	Operational State	Active Standby Sleep	Active – The unit is fully powered and in an operational state. Standby – The unit is using less power but can be brought back to operation rapidly. Sleep – The unit is consuming the least amount of power but needs to be woken before being able to operate fully.

No	Name	Options	Notes
2	ASI output (OBTX only)	Blue=Off Orange=On	Swipe to the right to enable and ASI video output **On**.
3	ASI input (HDNTX and OBTX)	Off On Relay	When ASI input is **On**, this will add the service to the RF link.
			Note: You will have to divide the video bit rates so that they don't exceed the transmit mux bit rate.
			In **Relay** mode, the remote service will be transmitted, turning the local service off.
			HDNTX Note: The video input can be configured as either SDI or ASI but **not both**. If **ASI** input is selected **SDI** will be switched **Off**.

Table 7-3 – Unit Settings Key

Step 3: Working with the Unit Information Settings
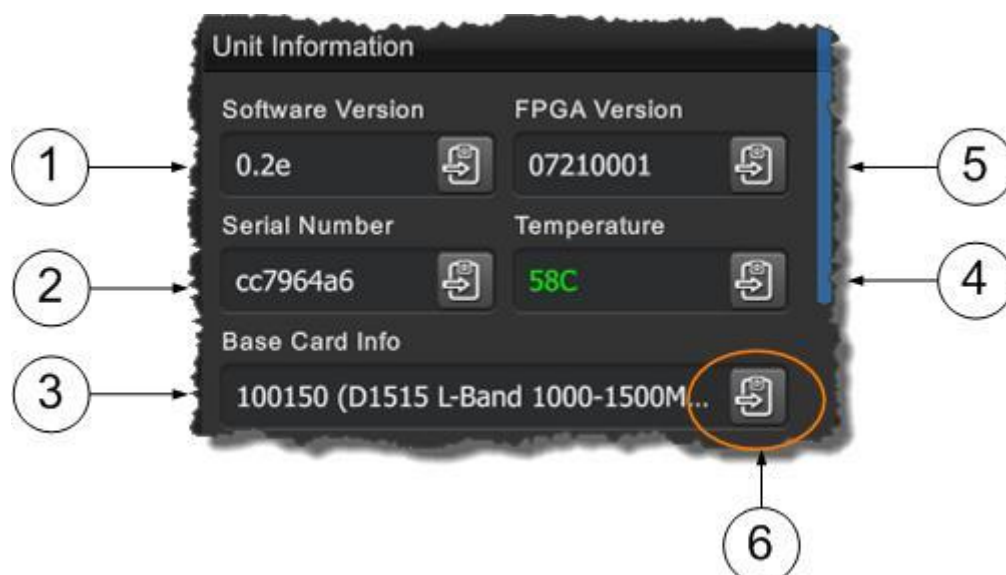
Figure 7-4 Unit Information Settings

No	Name	Options	Notes
1	Software Version	0.2e or any valid software release number.	This is the version of the firmware running on the board. We may ask you for this during a support call.
2	Serial Number	cc7964a6	The Electronic Serial Number of the unit. We may ask you for this during a support call. The licence file is specially configured to **only** work with a device that has a matching **Electronic Serial Number**. This means the licence can only be used with the actual hardware device for which it is intended.

No	Name	Options	Notes
3	Base Card Info	100150 (D1515 L-Band 1000-1500MHz).	The frequency band details for the RF card in the unit. See *Getting Started, Identifying the Variants* for more versions.
4	Temperature	Any temperature in degrees Celsius.	0 to 59 shown in green. 60 to 84 shown in yellow. 85 or above shown in red. An indication of the temperature of the FPGA. Attempt to keep it green. **CAUTION**: If it changes to red, switch the unit off and allow it to cool. >95°C some video encoder functionality is disabled to try and reduce temperature, video quality will be affected. >99°C the unit will shut down and restart to avoid permanent FPGA damage.
5	FPGA Version	07210001 or any valid version number.	The version of FPGA firmware currently running on the D1500 board. We may ask for this number during a support call.
6	Copy to Clipboard Button	Click to copy contents of the field to your Windows clipboard.	If you need to gather some data about the unit these buttons make it simple to get a copy of the field onto your clipboard. Then, you can paste it into a Word document for example. You'll find these buttons on most fields in the Nano TX Controller.

Table 7-4 – Unit Information Settings Key

Step 4: Working with the Unit Actions Settings

Figure 7-5 Unit Action Settings

No	Name	Options	Notes
1	Restore to Factory Button	Click to Restore factory settings.	If you have been working on a complex setup and need to get back to a simple setup, click Restore to Factory. The unit will put all parameters back to a default know state from where you can start again.

No	Name	Options	Notes
2	Switch to 8 / 16 Configs Button	Click to toggle between 8 and 16 configurations.	It is possible to toggle the unit into eight configurations mode instead of sixteen. You'll see the Confirmation warning message. Click the OK button if you are sure, Cancel returns you to the previous menu. Some options are stored on a global or configuration basis depending on the number of configurations used.
3	Reset Device	Click to reset.	This performs a power cycle on the device. You'll see the Confirmation warning message. Click the OK button if you are sure, Cancel returns you to the previous menu.

Table 7-5 – Unit Action Settings Key

Step 5: Interpret the Licensed Features
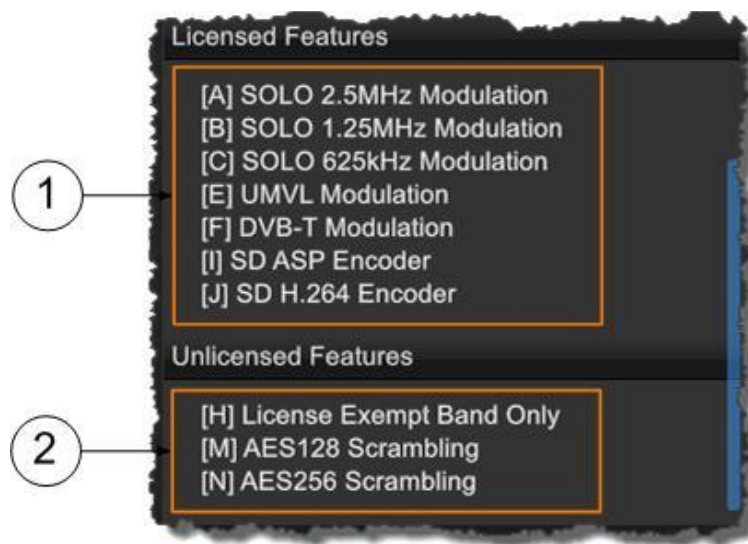
Figure 7-6 Licensed Features

No	Name	Options	Notes
1	Licensed Features	Any license which is available for the Nano Transmitter.	Licenses are given letter codes in square brackets [A] and a note of what that license does, SOLO2.5MHz Modulation for example. Codes shown in the **Licensed Features** group box are loaded on your device and all these features are available to use.
2	Unlicensed Features	Any license which is available for the Nano Transmitter.	Codes shown in the **Unlicensed Features** group box are available for the Nano Transmitter, but have not been purchased for your device yet. To load new licenses see *Appendix A – Reference Material*.

Table 7-6 – Licensed Features Key

7.5   Working with the Modulation Tab

Before you Begin

You'll need:

- NTX, HDNTX or OBTX

- Refer to *Connecting up your Transmitter* for connectivity

- To have established a USB connection using Domo Device Controller

Step 1: Open the Advanced Window > Modulation Tab

1. On the Main Window in the Switch Panel, click the **Advanced** button.

2. Click the **Modulation** Tab.

3. Click and drag the **scrollbar** on the right of the screen to see the whole display.

Figure 7-7 Modulation Tab

Step 2: Configure the Modulation Settings
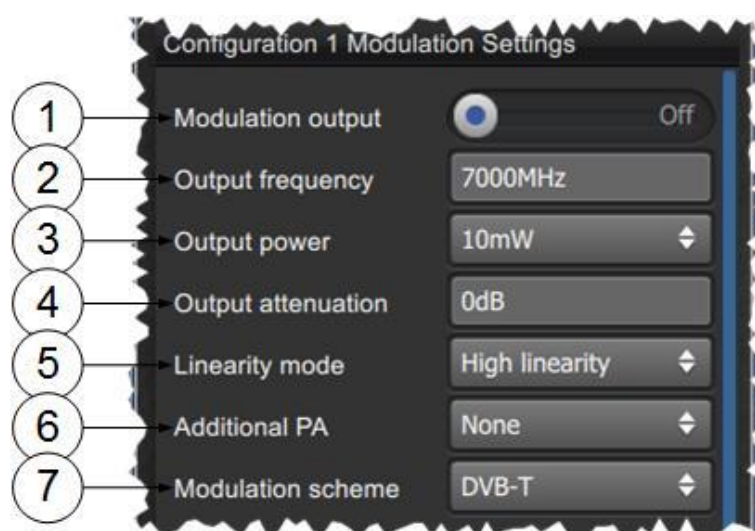
Figure 7-8 Modulation Settings

No	Name	Options	Notes
1	Modulation Output	Off or On	Toggles the RF on or Off. Exactly repeats the action of the RF Button on the Unit Status panel on the Main Window.
2	Output Frequency	UHF, L, S and C Bands Range dependant on unit type and licensing.	The frequency in megahertz (MHz) that you want to use for this preset. If you try to input a frequency that is out of range, the radio will tune the nearest available frequency automatically.
3	Output Power	10mW 50mW 100mW	Choose the power output you want to use for your transmission. For short range applications for example you may choose low power to protect the receiver and to reduce the possibility of detection. A lower power output will significantly lower power consumption of the unit, increasing battery life. The unit will also run cooler which may be important for enclosed / body worn applications. **CAUTION**: The combination of 100mW output power and high linearity must only be used with additional cooling, either extra heat sinking or a fan.
4	Output Attenuation	0 to 31.75dB	0 to 31.75dB of attenuation can be applied to the output of the transmitter.

No	Name	Options	Notes
5	Linearity mode	Low power High linearity	When in high linearity mode, improves shoulder performance by several dB at the expense of power consumption. Often used when working with power amplifiers which expect excellent shoulder performance to operate, or for improved adjacent channel performance. See *About High Linearity and Low Power* Modes for more detail.
			CAUTION: The combination of 100mW output power and high linearity must only be used with additional cooling, either extra heat sinking or a fan.
6	Additional PA	None 500mW 1W 2W	When an additional external power amplifier is attached to the SOLO7 Transmitter, you can match the amplifier rating here.
			Note: If the PA is setup at the customer site, you may need to refer to the D15xx or D16xx OEM Integration document.
7	Modulation Scheme	NB/UMVL DVB-T	This box enables you to select DTC's **Narrowband/UMVL** modes (NB/UMVL) or **DVB-T.**

Table 7-7 – Modulation Settings Key

Step 3a: Configure the NB /UMVL Settings

If you selected NB /UMVL for the Modulation scheme earlier, then these next settings need to be configured.

If you selected DVB-T then see *Step 3b: Configure the DVB-T Settings*.

Figure 7-9 NB / UMVL Settings

No	Name	Options	Notes
1	Bandwidth	Narrowband: 2.5MHz 1.25MHz 625kHz UMVL: 6MHz 7MHz 8MHz	DTC Narrowband, Ultra-Narrowband and Ultra-X modes provide excellent range and efficient use of available channel bandwidth. DTC Ultra Mobile Video Link modes provide higher data throughput than Narrowband by using the same bandwidths as DVB-T. UMVL will provide an advantage over DVB-T at C/X-band in short range mobile environments.
2	Constellation	QPSK, 16QAM, BPSK and 8PSK	The COFDM constellation in use. On a sliding scale: 16QAM-more user data, less robust, less range. QPSK 8PSK BPSK-less user data, more robust, more range.
3	FEC Rate	1/3 or 2/3	This field indicates the forward error correction (FEC) rate which is being applied. Think 'data bits/all bits' 1/3 means 1 bit out of 3 bits is data and therefore 2 bits are used for error correction. Little user data means less picture quality, but more error correction means a more robust signal and therefore more range. 2/3 means 2 bits out of 3 bits are data and therefore 1 bit is used for error correction. More user data means better picture quality, but less error correction means less robust signal and therefore less range.
4	Guard Interval	1/16 or 1/8	The guard interval which is being applied. The guard interval is a deliberate extension of the RF symbol period to give immunity to reflections. 1/16, short extension, deals with fast reflections, more data, less range. 1/8, long extension, deals with slower reflections, less data, more range.

Table 7-8 – NB / UMVL Settings Key

Step 3b: Configure the DVB-T Settings

If you selected DVB-T for the Modulation scheme earlier, then these next settings need to be configured.

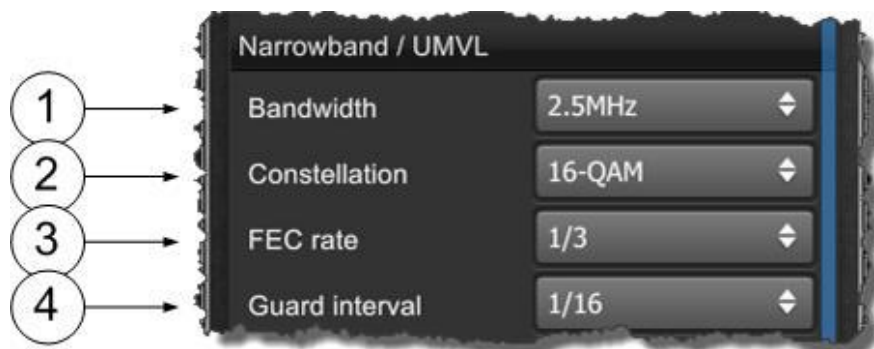If you selected NB / UMVL then see *Configure the NB / UMVL Settings* previously.

Figure 7-10 DVB-T Settings

No	Name	Options	Notes
1	Bandwidth	DVB-T: 6MHz 7MHz 8MHz	DVB-T modes provide excellent data throughput but shorter range than DTC Narrowband modes. Typically bandwidth requirements for DVB-T depend on location and channel licensing. User data rates and range also vary slight between bandwidths.
2	Constellation	QPSK, 16QAM and 64QAM	The COFDM constellation in use. QPSK-less user data, more robust, more range. 16QAM-more user data, less robust, less range. (link performance reduced by 5db) 64QAM-max user data, least robust, least range.
3	FEC Rate	1/2, 2/3, 3/4, 5/6 and 7/8	The forward error correction (FEC) rate which is being applied to the DVBT mode in use. Think 'data bits/all bits' 1/2 means 1 bit out of 2 bits is data and therefore 1 bit is used for error correction. Little user data means less picture quality, but more error correction means a more robust signal and therefore more range. 7/8 means 7 bits out of 8 bits are data and therefore 1 bit is used for error correction. More user data means better picture quality, but less error correction means less robust signal and therefore less range.

No	Name	Options	Notes
4	Guard Interval	1/32, 1/16, 1/8 and 1/4	The guard interval which is being applied to the DVBT mode in use.
			The guard interval is a deliberate extension of the RF symbol period to give immunity to reflections.
			1/32, short extension, deals with fast reflections, more data, less range.
			1/4, long extension, deals with slower reflections, less data, more range.

Table 7-9 – DVB-T Settings Key

7.6   Working with the Audio Tab

Before you Begin

You'll need:

■   NTX, HDNTX or OBTX

■   Refer to *Connecting up your Transmitter* for connectivity

■   To have established a USB connection using Domo Device Controller

Step 1: Open the Advanced Window > Audio Tab

1.   On the Main Window in the Switch Panel, click the **Advanced** button.

2.   Click the **Audio** Tab.

3.   Click and drag the **scrollbar** on the right of the screen to see the whole display.

Figure 7-11 Audio Tab

Step 2: Configure the Audio Settings
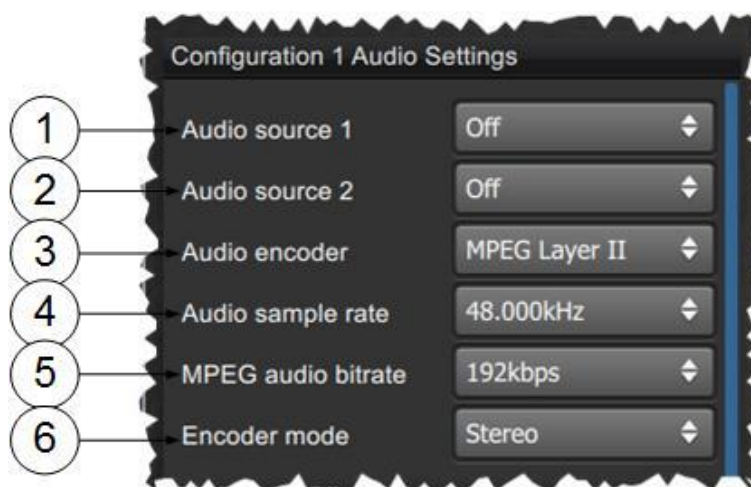
Figure 7-12 Audio Settings

No	Name	Options	Notes
1	Audio Source 1	Off Analogue Differential Embedded 1 Embedded 2	You can switch audio off, leaving all the bandwidth available for video and data. Analogue – When selected the audio input cable can be used for mono left, mono right or stereo pair. Differential – When selected the audio input cable can be used as a differential pair for long cable runs on high quality microphones. **Note**: NTX and HDNTX will be mono only. Embedded – digital audio from either SDI or HDMI video source.
2	Audio Source 2	Off Analogue Differential Embedded 1 Embedded 2	You can switch audio off, leaving all the bandwidth available for video and data. Analogue – When selected the audio input cable can be used for mono left, mono right or stereo pair. Differential – When selected the audio input cable can be used as a differential pair for long cable runs on high quality microphones. **Note**: NTX and HDNTX will be mono only. Embedded – digital audio from either SDI or HDMI video source.
3	Audio Encoder	MPEG Layer I MPEG Layer II	You can select one of two modes to suit operational and bandwidth requirements. As you select each of these audio modes and apply them, take a look at the Video bitrates parameter and watch it change. The higher the audio quality used the less the video bandwidth available.
4	Audio Sample Rate	8.000kHz to 48.000kHz	This is the MPEG audio encoding sample-rate. Generally the higher the number the better the audio quality.
5	MPEG Audio Bit rate	Available rates depend on current audio encoder. Layer I: 32 – 448kbps Layer II: 32 – 384kbps	This is the MPEG audio encoding bit-rate. Generally the higher the number the better the quality.

No	Name	Options	Notes
6	Encoder Mode	Stereo Left mono Right mono Dual mono	Select the audio mode you want to use. Dual mono allows for different Gain values on the left and right channel. Stereo uses just one.

Table 7-10 – Audio Settings Key

Step 3: Configure Analogue and SDI Audio
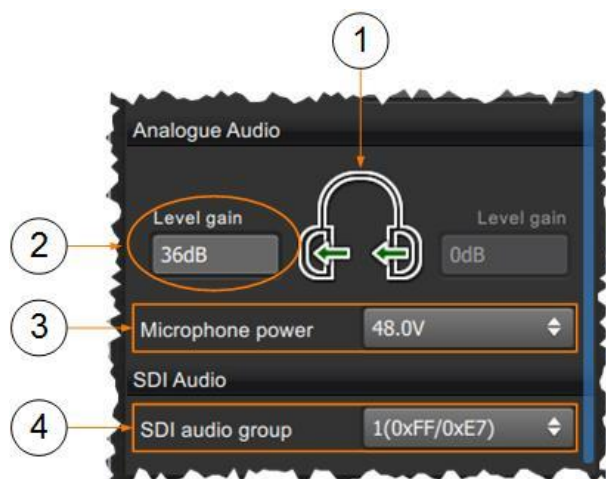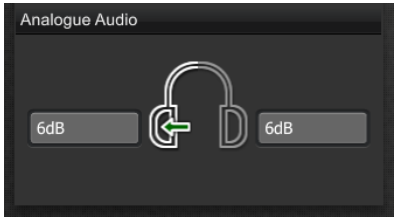
Figure 7-13 Analogue and SDI Audio Settings

No	Name	Options	Notes
1	Analogue Audio	Graphic	Note how the Analogue Audio graphic changes to reflect the Audio Encoder mode you have chosen. The arrows point to the applicable gain value(s) in the selected mode. Stereo and Left mono uses left gain. Right mono uses right gain. Dual mono uses both gains.
2	Level gain	0 to 66dB	You can apply different levels of gain to each channel as required. Encoder mode determines which gain value is used. Click on the box to edit the value.

No	Name	Options	Notes
3	Microphone power	0ff 2.0V 12.0V 48.0V	This provides phantom power to the microphone. **Note**: 12.0V and 48.0V are only available for the OBTX.
4	SDI audio group	1(0xFF/0xE7) 2(0xFD/0xE6) 3(0xFB/0xE5) 4(0xF9/0xE4)	SDI provides 16 channels of embedded audio in eight pairs. This should be left at default unless an advanced user.

Table 7-11 Analogue and SDI Audio Settings Key

7.7   Working with the Video Tab

Before you Begin

You'll need:

- NTX, HDNTX or OBTX
- Refer to *Connecting up your Transmitter* for connectivity
- To have established a USB connection using Domo Device Controller

Step 1: Open the Advanced Window > Video Tab

1. On the Main Window in the Switch Panel, click the **Advanced** button.
2. Click the **Video** Tab.
3. If you scroll down, you will also find **SDI Video** settings.
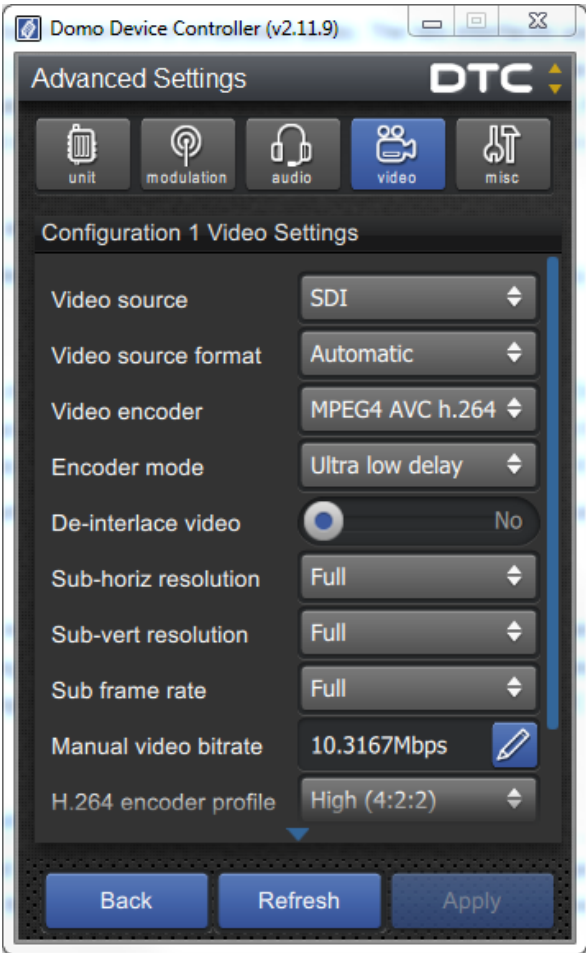
Figure 7-14 Video Tab

Step 2: Configure the Video Settings
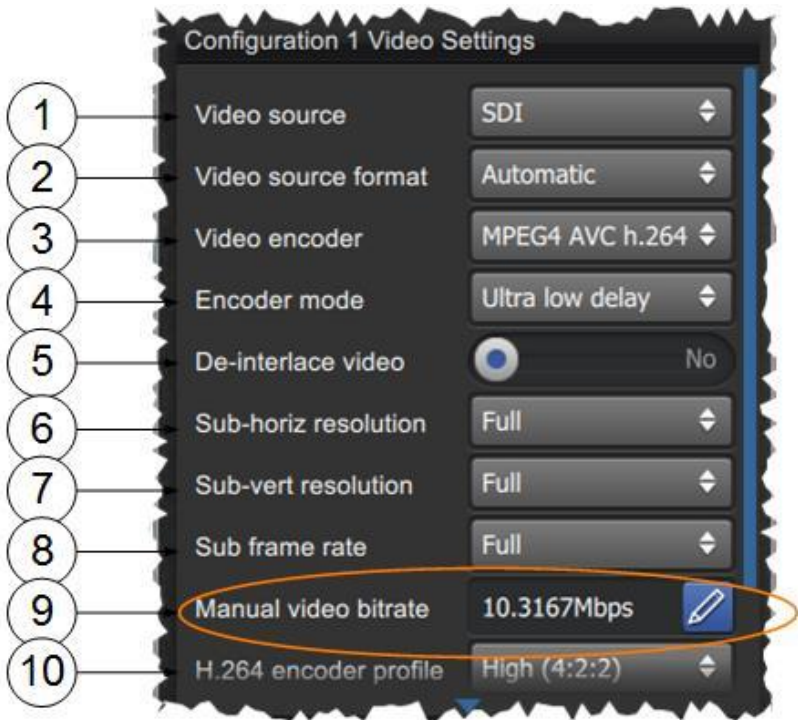
Figure 7-15 Video Settings

No	Name	Options	Notes
1	Video Source	Off Composite 1 Composite 2 S-Video **HD Nano TX and OBTX**: SDI HDMI	With the supplied CA2254 breakout cable, there is one yellow RCA Phono plug for Video input. This is Composite 1. With the optional CA2298 breakout cable you can connect two video inputs or S-Video, see *Connect Video Signals – Composite*. You can switch video off, leaving all the bandwidth available for audio and data.
2	Video Source Format	Automatic PAL NTSC NTSC NP **HD Nano TX and OBTX**: 720p50, 720p59, 720p60, 1080i50, 1080i59, 1080i60, 1080p23, 1080p24, 1080p25, 1080p29, 1080p30, 1080psf23, 1080psf24, 1080psf25, 1080psf29, 1080psf30, 1080p50, 1080p59, 1080p60, 1080dl50, 1080dl59, 1080dl60	Select the Video format that matches the camera you are using. Alternatively the **Automatic** setting enables the Nano TX to determine if the signal is PAL or NTSC automatically. Power up standard in Automatic mode defaults to PAL. This can be changed by setting the input to NTSC NP for example and then back to Automatic. **Note**: 1080p50/59/60 equates to 3G-SDI Level A, and 1080dl50/59/60 is 3G-SDI Level B-DL
3	Video Encoder	MPEG4 ASP MPEG4 H.264	Select the Video Encoder mode to suit your operation. MPEG4 ASP may be required backward compatibility with older receivers. MPEG4 H.264 generally provides improved picture quality over ASP.
4	Encoder Mode	Standard Delay Low Delay Ultra Low Delay	Select the level of delay you can accept. Standard Delay mode provides higher picture quality at the expense of delay. Should be used with long range modulation parameters. Ultra Low Delay mode provides exceptionally low delay at the expense of picture quality. Short range modulation parameters will generally be required.

No	Name	Options	Notes
5	De-interlace Option Button	Blue=OFF Orange=ON	When on, the de-interlace option converts interlaced fields to a progressive frame. This improves picture quality on PC monitor type devices. Having a progressive type of image is also easier to encode so you save bit rate too. Use it when you want to display video on a computer monitor and save bit rate. Don't use it when you want to preserve Vertical resolution or interlaced field rate.
6	Sub-horiz resolution	Full, 3/4, 2/3, 1/2, 1/4	This is the fraction of the horizontal resolution for whatever format you have selected. Let's say you chose an HD 1080 format. This is actually 1920 x 1080 where 1920 is the horizontal resolution. If you choose Full then you'll see all 1920 pixels, if you choose 1/2 you'll see a down-sampled picture which requires much less bit-rate to encoder.
7	Sub vert resolution	Full, 1/2, 1/4	This is the fraction of the vertical resolution for whatever format you have selected. Let's say you chose an HD 1080 format. This is actually 1920 x 1080 where 1080 is the vertical resolution. If you choose Full then you'll see all 1080 lines, if you choose 1/2 you'll see a down-sampled picture which requires much less bit-rate to encoder. **Note**: Depending on the type of video content, when using a sub-vertical resolution you may want to enable the de-interlace option as well.
8	Sub frame rate	Full, 1/2, 1/4, 1/8, 1/24	If full frame rate is giving poor quality, you can step this down until you get an acceptable picture. **Note**: Using a sub-frame rate will force the Encoding mode to Standard delay progressive.

No	Name	Options	Notes
9	Manual video bitrate	Pencil Return Symbol	Normally left in automatic. Press the Pencil Button and then the Video bit rate box will become active. Now you can manually set the video bit rate you want to use. Click the return symbol to return to automatically calculated bitrate.
10	H.264 encoder profile	Baseline Main High (4:2:0) High (4:0:0) High (4:2:2)	This will default to High (4:2:0). This should be left at default unless an advanced user.

Table 7-12 – Video Settings Key

Step 3: Configure SDI Video
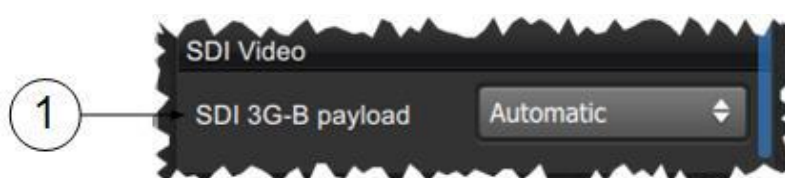
Figure 7-16 SDI Video

No	Name	Options	Notes
1	SDI 3G-B payload	Automatic Force payload 1 Force payload 2	This will default to Automatic. This should be left at default unless an advanced user.

Table 7-13 SDI Video Key

Troubleshooting

☹ I am having video problems. My picture is freezing during fast camera movement.

☺ Check the video encoder settings for optimum performance using the sliders on the Control Application main window, see *Exploring the Domo Device Controller Main Window* or refer to *Recommended Manual Video Encoder Settings* for guideline settings.

7.8   Recommended Manual Video Encoder Settings

Note: The preferred method to set range and video quality settings would be to use the sliders explained in *Exploring the Domo Device Controller Main Window*. This section may be used as a guideline for manual settings only.

The SOLO7 Transmitter can offer transmission bitrates from 150kbps^{-1} to almost 30Mbps^{-1}. The DTC product uniquely offers this wide data rate range in the marketplace. When a user chooses a lower bitrate link they

will achieve much greater range than standard achieved by a DVB-T link. Range increases of 2 to 5 times over DVB-T are possible.

DTC encoding products provide the user with a wide range of settings so that a user can trade-off increased image resolution .v. frame rate .v. latency for any chosen COFDM link mode.

DTC Video Encoders offer both **Standard Delay** and **Low Delay** settings. **Standard Delay** provides between 0.5 to 1 second delay for bitrates above 1Mbps and slightly longer delays as the bitrate is reduced. **Low Delay** typically reduces the end-to-end delay by a factor of 4 to 8. When operating with COFDM links below 600kbps of bitrate it is recommended to only use Standard Delay mode.

Recommended Single SD Video Settings

The table *Typical Single SD Video* Settings details some settings for a **single** standard definition (**SD**) video input in NTSC or PAL format.

System and Bandwidth	Modulation Type	Bitrate	SD Video NTSC/PAL Low Delay	SD Video NTSC/PAL Standard Delay
DVB-T 8MHz	QPSK 1/2 Guard 1/32	6 Mbps	Full resolution	Full resolution
Narrowband 2.5MHz	16QAM 2/3	4.8Mbps	Full resolution	Full resolution
Narrowband 2.5MHz	QPSK 2/3	2.4Mbps	3/4 horizontal Full frame rate	Full resolution
Narrowband 1.25MHz	QPSK 2/3	1.2Mbps	Low delay progressive 3/4 horizontal Full frame rate	3/4 horizontal Full frame rate
Narrowband 625MHz	QPSK 2/3	600kbps	N/A	Progressive 3/4 horizontal 1/2 frame rate
Narrowband 625MHz	BPSK 2/3	300kbps	N/A	Progressive 1/2 horizontal 1/2 frame rate

Table 7-14 Typical Single SD Video Settings

Recommended Single HD Video Settings

The table *Typical Single HD Video* Settings details some settings for a **single** high definition (**HD**) video input.

> **Note**: 'Res H' refers to the horizontal resolution setting on the video encoder.
>
> 'Res V' refers to the vertical resolution setting on the video encoder.
>
> 'Frame' refers to the selected frame rate – so '1/2 frame' would be 15 video frames per second on a 1080P30 mode or 30 frames per second on a 720p60 encoded image. The DTC encoder allows 1/4, 1/8 and even 1/24 frame rates to be selected.

System and Bandwidth	Modulation Type	Bitrate	Standard Delay		Low Delay	
			HD Video 720p	HD Video 1080p30	HD Video 720p	HD Video 1080p30
DVB-T 8MHz	QPSK 2/3 Guard 1/32	8 Mbps	Full Res H Full Res V Full Frame	Full Res H Full Res V Full Frame	3/4 Res H Full Res V Full Frame	3/4 Res H Full Res V Full Frame
DVB-T 8MHz	QPSK 1/2 Guard 1/32	6 Mbps	3/4 Res H Full Res V Full Frame	3/4 Res H Full Res V Full Frame	2/3 Res H Full Res V Full Frame	2/3 Res H Full Res V Full Frame
Narrowband 2.5MHz	16QAM 2/3	4.8Mbps	3/4 Res H Full Res V Full Frame	3/4 Res H Full Res V Full Frame	2/3 Res H Full Res V Full Frame	2/3 Res H Full Res V Full Frame
Narrowband 2.5MHz	QPSK 2/3	2.4Mbps	1/2 Res H Full Res V Full Frame	1/2 Res H Full Res V Full Frame	1/2 Res H 1/2 Res V Full Frame	1/2 Res H 1/2 Res V Full Frame
Narrowband 2.5MHz	QPSK 1/3	1.2Mbps	1/2 Res H 1/2 Res V 1/2 Frame	1/2 Res H 1/2 Res V 1/2 Frame	N/A	N/A
Narrowband 1.25MHz	QPSK 2/3	1.2Mbps	1/2 Res H 1/2 Res V 1/2 Frame	1/2 Res H 1/2 Res V 1/2 Frame	N/A	N/A
Narrowband 1.25MHz	QPSK 1/3	600kbps	1/2 Res H 1/2 Res V 1/4 Frame	1/2 Res H 1/2 Res V 1/4 Frame	N/A	N/A
Narrowband 625MHz	QPSK 2/3	600kbps	1/2 Res H 1/2 Res V 1/4 Frame	1/2 Res H 1/2 Res V 1/4 Frame	N/A	N/A

Table 7-15 Typical Single HD Video Settings

Image Resolution vs Frame Rate

It is also possible to enhance image resolution by reducing the frame rate. The table *Alternative Resolution and Frame Rate Settings* should be compared with table *Typical Single HD Video* Settings to illustrate how this can be achieved.

System and Bandwidth	Modulation Type	Bitrate	Standard Delay	
			HD Video 720p	HD Video 1080p30
DVB-T 8MHz	QPSK 1/2 Guard 1/32	6 Mbps	Full Res H Full Res V 1/2 Frame	Full Res H Full Res V 1/2 Frame
Narrowband 2.5MHz	16QAM 2/3	4.8Mbps	Full Res H Full Res V 1/2 Frame	Full Res H Full Res V 1/2 Frame
Narrowband 2.5MHz	QPSK 2/3	2.4Mbps	2/3 Res H Full Res V 1/2 Frame	2/3 Res H Full Res V 1/2 Frame
Narrowband 2.5MHz	QPSK 1/3	1.2Mbps	1/2 Res H Full Res V 1/4 Frame	1/2 Res H Full Res V 1/4 Frame
Narrowband 1.25MHz	QPSK 2/3	1.2Mbps	1/2 Res H Full Res V 1/4 Frame	1/2 Res H Full Res V 1/4 Frame
Narrowband 625MHz	QPSK 2/3	600kbps	1/2 Res H Full Res V 1/8 Frame	1/2 Res H Full Res V 1/8 Frame

Table 7-16 Alternative Resolution and Frame Rate Settings

7.9 Working with the Misc Tab

Before you Begin

You'll need:

■ NTX, HDNTX or OBTX

■ Refer to *Connecting up your Transmitter* for connectivity

■ To have established a USB connection using Domo Device Controller

Step 1: Open the Advanced Window > Misc Tab

1. On the Main Window in the Switch Panel, click the **Advanced** button.

2. Click the **Misc** Tab.

Figure 7-17 Misc Tab

Step 2: Configure the Miscellaneous Options
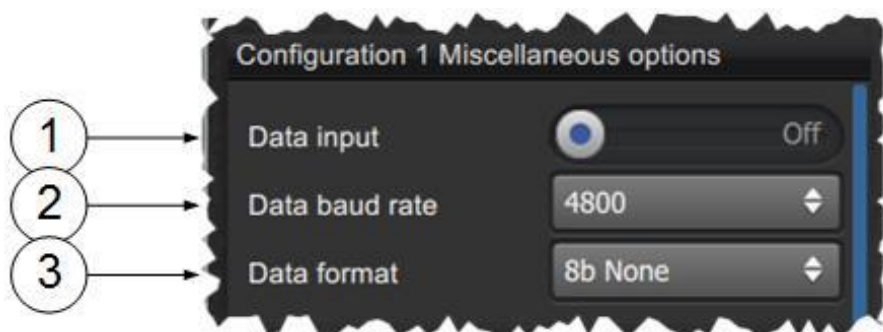
Figure 7-18 Miscellaneous Options

No	Name	Options	Notes
1	Data Input	Off On	Selects if RS232 data is passed over the link.
2	Data Baud Rate	1200 to 115200	This is the speed of serial data running through the unit. This must match the data source you are planning to use.

No	Name	Options	Notes
3	Data Format	8b None 8b Even 8b Odd 7b None 7b Even 7b Odd	When you have switch data on, you can select from one of the available modes. 8b (8-bit data) or 7b (7-bit data) must match the data source, as must the parity.

Table 7-17 – Miscellaneous Options Key

Step 3: Configure the Pattern Generator

Figure 7-19 Pattern Generator Options

No	Name	Options	Notes
1	Generator control	Disabled Force on Auto video/audio Auto video Auto audio AV sync	Off. Permanently on (overrides all other video). Will display pattern or emit tone if video or audio signal is missing. Will display pattern if video signal is missing. Will emit tone if audio signal is missing. Will display an AV sync pulse only.
2	Generator mode	Pattern generator options	A list of choices of pattern generator display.

Table 7-18 Pattern Generator Options Key

Step 4: Configure the Service Options
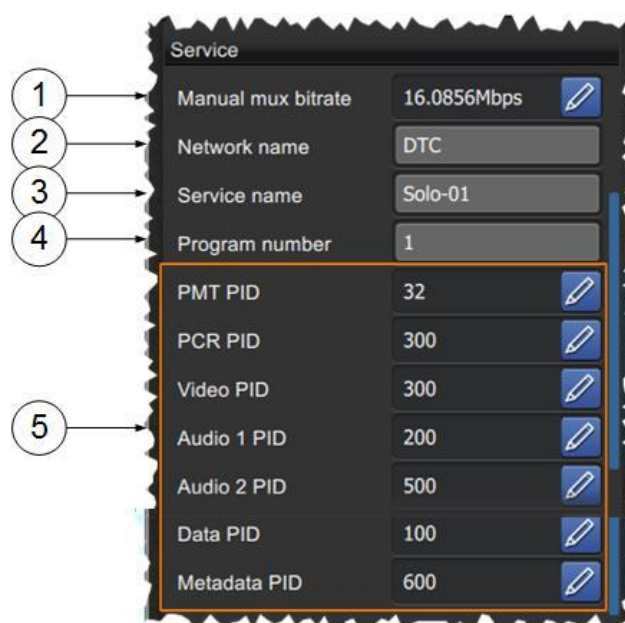
Figure 7-20 Service Options

No	Name	Options	Notes
1	Manual Mux Bitrate	Any valid Bitrate.	When set to 0 the mux bit rate is defined automatically based on modulation settings.
			When set manually with RF output turned off. This overrides the automatic calculation. In this case it can be used to adjust the stream rate on the ASI outputs.
2	Network Name	DTC is the default or you can use any valid name.	The Network Name applies to the whole transport stream (TS). Inside that TS there may be many Services each with a Service Name.
3	Service Name	SOLO-01	The default is SOLO-01. This is an identifier for the service within the transport stream (TS).
			This must match the name at the receiver for the service to be decoded.
			Inside that TS there may be many Services each with a Service Name.
4	Program number	1 to 16	The Program Number uniquely identifies the channel in a transport stream. All channels in a chained system must have a different Program Number which can be decoded at the receiver.
			Click on the box to edit the value.
5	PID numbers		The PID numbers are automatically allocated, depending on the Program number.
			These can be edited but should be left to auto allocate unless an advanced user.

Table 7-19 – Service Options Key

7.10   The User Control Interface – SOL7OBTX only

The OBTX has a user control interface on the front panel to enable you to make changes to the settings without the need for a PC and application software.

Note: You may need to read this in conjunction with *Advanced Setup* for an explanation of functions.

Before you Begin

You'll need:

- A powered OBTX which is not connected to the PC

- Refer to *Connecting up your Transmitter* for connectivity

Step 1: Working with the Control Interface

1. When you power up, the display will illuminate.

2. The left button is used to **Cancel** an operation or move **Back** one level in the menu structure.

3. The right button is used to **Navigate** through the menu by pushing the button up, down, left or right and to **Confirm** a selection by pushing the button in the centre. It can also be used to change the value of a property e.g. AES key or RF Freq.

Figure 7-21 User Control Interface

Step 2: Explore the Unit Status Menu Structure

Top Menu	Second Level	Function
Unit Status	Range desc	Shows current range setting
	Vid desc	Shows current video quality setting
	Vid lock	Shows video lock status
	ASI status	Shows current ASI lock status
	Mux rate	Shows the current Mux rate.
	S/W Ver	Shows current software issue number of the receiver device (D360 PCB)
	Serial	Shows electronic serial number

Top Menu	Second Level	Function
	FPGA ver	Shows current FPGA version number/functionality
	Temp	Shows the internal temperature of the FPGA

Table 7-20 Unit Status Menu Structure

Step 3: Explore the Unit Control Menu Structure

Top Menu	Second Level	Third Level	Function
Unit Control	RF	Output	Set modulation output On or Off
		Freq	Set unit frequency
		Mod mode	Set the modulation scheme
		Power	Set the RF output power
		Lin mode	Set the linearity mode
	NB/UMVL	Bandwidth	Set narrowband bandwidth
		Const	Set the constellation
		FEC	Set the FEC rate
		Guard	Set the guard interval
	DVB-T	Bandwidth	Set DVB-T bandwidth
		Const	Set the constellation
		FEC	Set the FEC rate
		Guard	Set the guard interval
	Video	Source	Set the video source
		Format	Set the video source format
		Mode	Set the encoder mode
		Deinterlace	Set de-interlace video No or Yes
		Horz res	Set sub-horiz resolution
		Vert res	Set sub-vert resolution
		Sub f/rate	Set sub frame rate
		Profile	Set H.264 encoder profile
		Encoder	Set video encoder

Top Menu	Second Level	Third Level	Function
	Audio	Source 1	Set audio source 1
		Source 2	Set audio source 2
		Encoder	Set the audio encoder
		Samp rate	Set the audio sample rate
		Bitrate	Set the MPEG audio bitrate
		Mode	Set the encoder mode
		Gain S/LM	Set the stereo or left mono gain
		Gain RM	Set the right mono gain
		Mic power	Set microphone power
	Data	Input	Set data input On or Off
		Baud	Set the data baud rate
		Format	Set the data format
		Mode	Set the data mode for Low latency or Low bitrate
			Note: This setting may not appear in the current Device Controller application
	Misc	Generator	Set the pattern generator control
		Pattern	Set the pattern generator mode
		Network	Set the network name
		Service	Set the service name
		Prog Num	Set the program number
	Scram	Scram	Set the encryption mode
		ABS key	Set the ABS encryption key
		AES key 1	Set AES key 1
		AES key 2	Set AES key 2
	Unit	ASI out	Set ASI output On or Off
		ASI in	Set ASI input Off, On or Relay
		Config	Set one of the sixteen available configs

Top Menu	Second Level	Third Level	Function
		State	Set the operational state Active, Standby or Sleep
		Defaults	Set defaults to Yes to restore unit to default configurations

Table 7-21 Unit Control Menu Structure

Step 4: Explore the Local Settings Menu Structure

Top Menu	Second Level	Function
Local Settings	**Serial**	Shows unit serial number
	S/W Ver	Shows loaded software version of FCON controller
	Name	Set unit name
	Menu Level	Set FCON menu availability (Full, Basic or User)
	SOLO4 FP	Change the FCON display to SOLO4 mode (On or Off)
	RS232 Ctrl	Set RS232 control function (On or Off)
	Status Display	Show frequency on FCON display (On or Off)
	LEDs	Sets the internal FCON LEDs On or Off.
	Voltage Disp	Shows voltage input on FCON screen (On or Off)
	Low Batt Disp	Shows Low battery warning (On or Off)
	Low Batt	Set voltage at which Low battery waning appears (0-16V)
	Brightness	Sets FCON display brightness (a number between 0 and 255)
	Disp Mode	Set FCON display power-save mode (On, Auto Dim, Auto Off)
	Boot Logo	Show DTC boot logo on start-up (On or Off)
	Poll Write	Not intended to operate with SOLO7 Transmitters. Default is No.
	Terminal Mode	Set terminal mode (Yes or No)
	Time	Shows Time Stamp
	Date	Shows Date Stamp

Table 7-22 Local Settings Menu Structure

8. Appendix A – Reference Material

8.1 Licensing your Unit

Before you Begin

You'll need:

- To have connected your PC to the Nano Transmitter using Serial.

- To have established a serial connection. (Green Connect button showing).

Step 1: Open the Upload Tab

1. On the Main Window in the Switch Panel, click the **Upload** button.

2. The **Upload** tab opens.

Step 2: License your Unit

1. On the **Upload License File** pane, click the blue **Folders** button.

2. **Navigate** to where you have placed your license file.

3. You can use these buttons to explore any **mapped drives** you have on your PC.

4. In my example, the license files are located in my **Downloads** folder. They always end in .lic. Click the **license** file you want to use and it will appear in the File name box.

> **Note**: If you are unsure which licence is for your device, look at the filename. It will contain an Electronic Serial Number (ESN). If it matches your unit's ESN then this is your licence. In this example, the middle part of the filename is -c9657cdb- which is the ESN for my Nano Transmitter.

5. Click the **Upload** button.

6. You'll see the **Upload Status** change to **Upgrade Succeeded**.
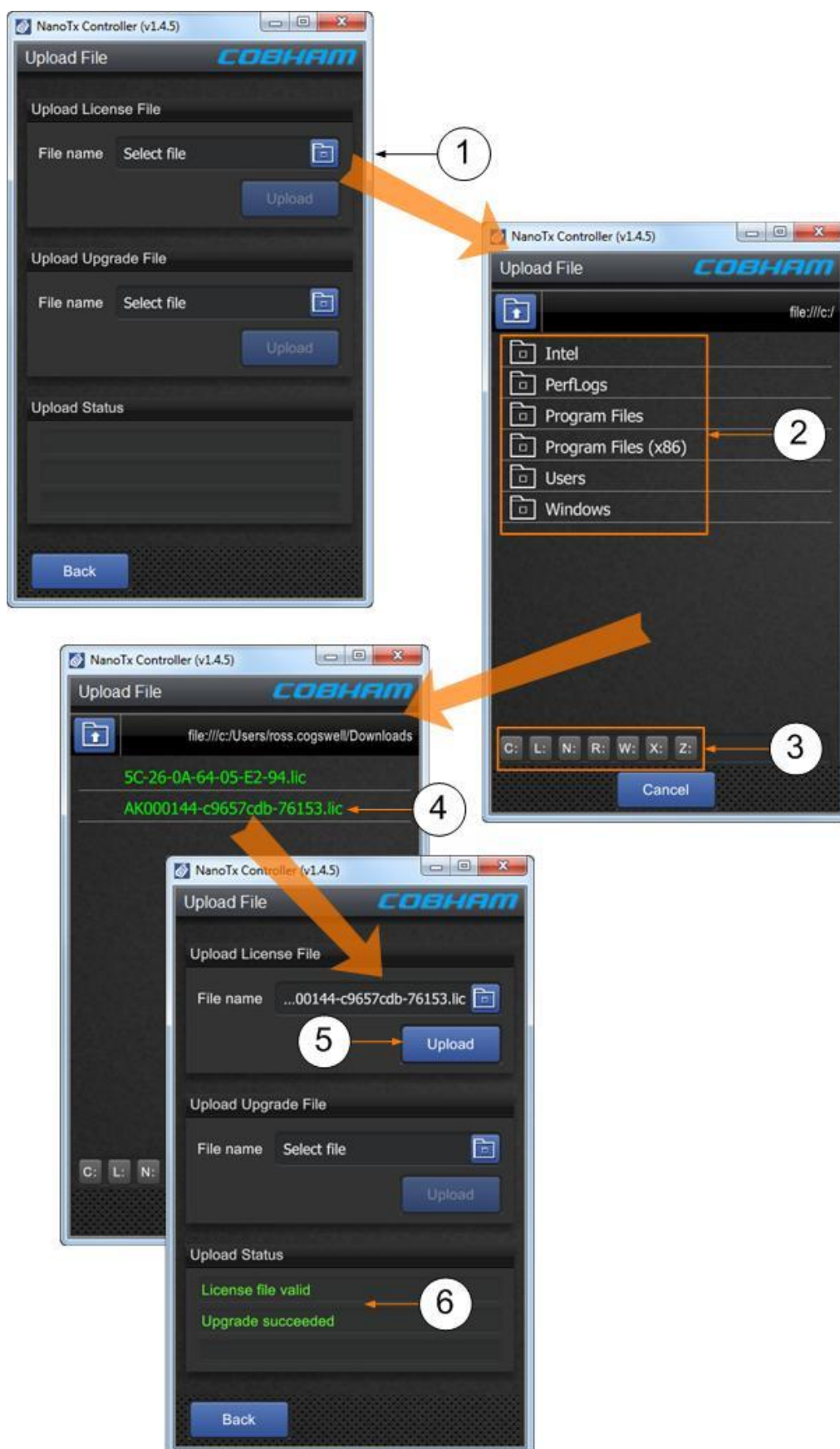
Figure 8-1 License your Unit

8.2   Upgrading your Firmware

Before you Begin

You'll need:

- To have connected your PC to the Nano Transmitter using Serial.
- To have established a serial connection. (Green Connect button showing).

Step 1: Open the Upload Tab

1. On the Main Window in the Switch Panel, click the **Upload** button.
2. The **Upload** tab opens.

Step 2: Upgrade your Firmware

1. On the **Upload Upgrade File** pane, click the blue **Folders** button.
2. **Navigate** to where you have placed your upgrade file.
3. You can use these buttons to explore any **mapped drives** you have on your PC.
4. Click the **upgrade** file you want to use and it will appear in the File name box.
5. Click the **Upload** button.
6. You'll see the **Upload Status** change to **Upgrade Succeeded**.

8.3   Pinouts – Nano Transmitter

AV Connector – Omnetics Tri-Lobe Latching 9-way Receptacle
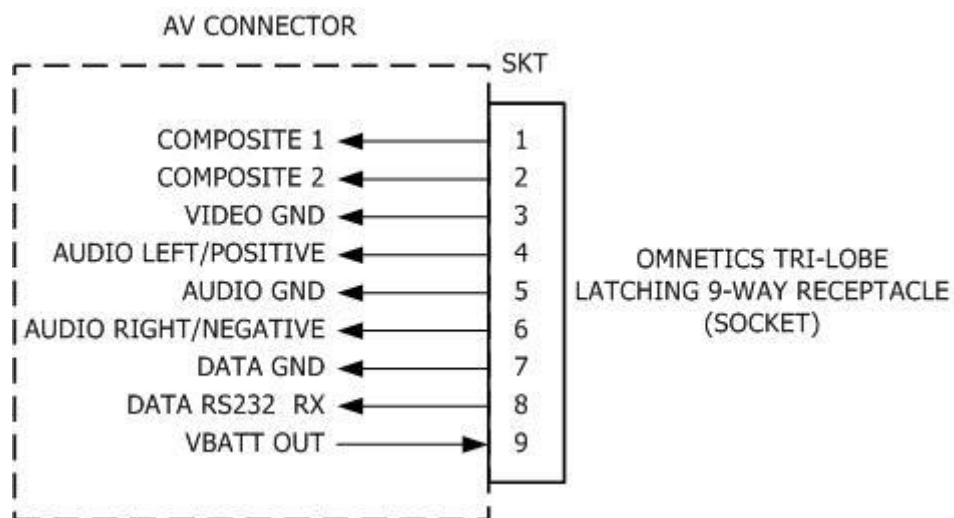
Power / Control Connector – Omnetics Nano Circular 6-way Receptacle

POWER / CONTROL CONNECTOR

	PIN	
RS232 CONTROL RX ◄	1	
RS232 CONTROL TX ◄	2	OMNETICS NANO CIRCULAR
GND ◄	3	6-WAY RECEPTACLE (PIN)
VSUPPLY IN ◄	4	
GND ◄	5	
VSUPPLY IN ◄	6	
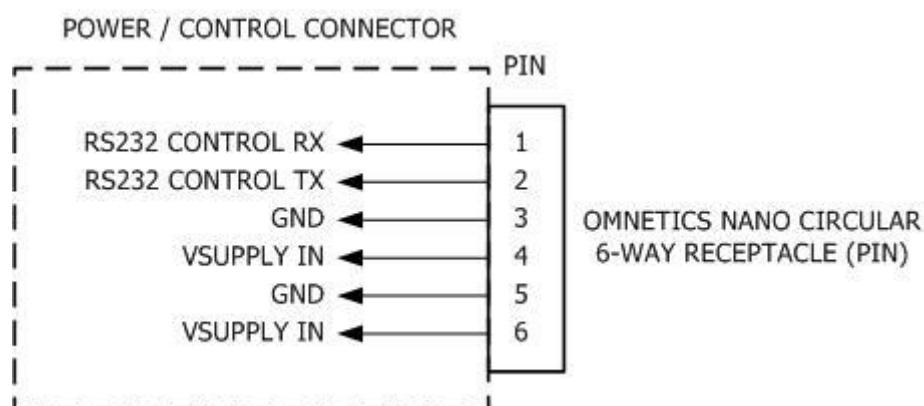
CA2298 SOL7NTX External 9-way Breakout Cable Assembly

This cable assembly has a 9-way plug at one end and a 3-way Molex plug at the other for you to connect to the cameras supplied in the kit version of SOL7NTX Nano Transmitter.

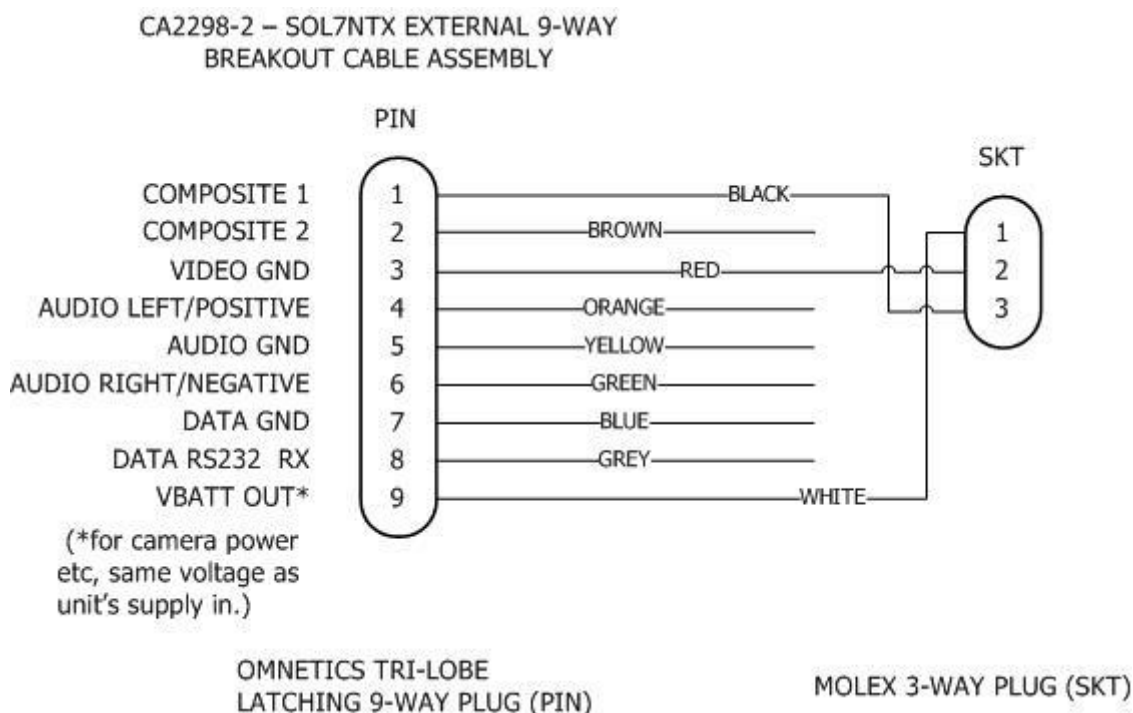There are five bare wires which you can use to make cables to suit your own application. Of course you can remove the Molex plug to get at those cables too.

The diagram shows the signal / power on the Molex and bare wires.

CA2298-2 – SOL7NTX EXTERNAL 9-WAY
BREAKOUT CABLE ASSEMBLY

	PIN			SKT
COMPOSITE 1	1	BLACK		1
COMPOSITE 2	2	BROWN		2
VIDEO GND	3	RED		3
AUDIO LEFT/POSITIVE	4	ORANGE		
AUDIO GND	5	YELLOW		
AUDIO RIGHT/NEGATIVE	6	GREEN		
DATA GND	7	BLUE		
DATA RS232 RX	8	GREY		
VBATT OUT*	9	WHITE		

(*for camera power etc, same voltage as unit's supply in.)

OMNETICS TRI-LOBE
LATCHING 9-WAY PLUG (PIN)

MOLEX 3-WAY PLUG (SKT)

8.4   Pinouts – OBTX

Generic OBTX Connectors

Data/CVBS	
0B Lemo 7-way	
EEG.0B.307.CLL	
Pin	**Function**
1	GND
2	Composite 1
3	GND
4	Composite 2
5	GND
6	RS232 RX
7	VBATT Out

PA Power/Ctrl	
00 Lemo 4-way	
EEG.00.304.CLL	
Pin	**Function**
1	VBATT Out
2	VBATT Out
3	GND
4	PA Enable

Balanced Audio	
0B Lemo 5-way	
EEA.0B.305.CLL	
Pin	**Function**
1	Left (H)
2	Left (C)
3	GND
4	Right (H)
5	Right (C)

Power	
0B Lemo 4-way	
EEG.0B.304.CLL	
Pin	**Function**
1	VBATT In
2	VBATT In
3	GND
4	GND

USB Ctrl	
0B Lemo 6-way	
EEF.0B.306.CLL	
Pin	**Function**
1	RS232 TX
2	RS232 RX
3	GND
4	USB 5V In
5	USB Data (H)
6	USB Data (C)

OBTX CCCAM Connectors

Camera Control	
Circular HIROSE 10-way	
HR10A-10R-10P(73)	
Pin	Function
1	RS422 TX (H)
2	RS422 TX (C)
3	RS422 RX (H)
4	RS422 RX (C)
5	GND
6	RS232 TX
7	RS232 RX
8	N/C
9	N/C
10	GND

| Tally	
0B Lemo 5-way	
EGG.0B.305.CLL	
Pin	Function
1	GND
2	VBATT Out
3	Red
4	Green
5	N/C

8.5   Install Device Drivers – OBTX

The OBTX requires the installation of a driver on the PC before communications can be established. The driver can be found on the Field Controller files on the USB Flash Stick but the installation will differ depending on the Windows Operating System version.
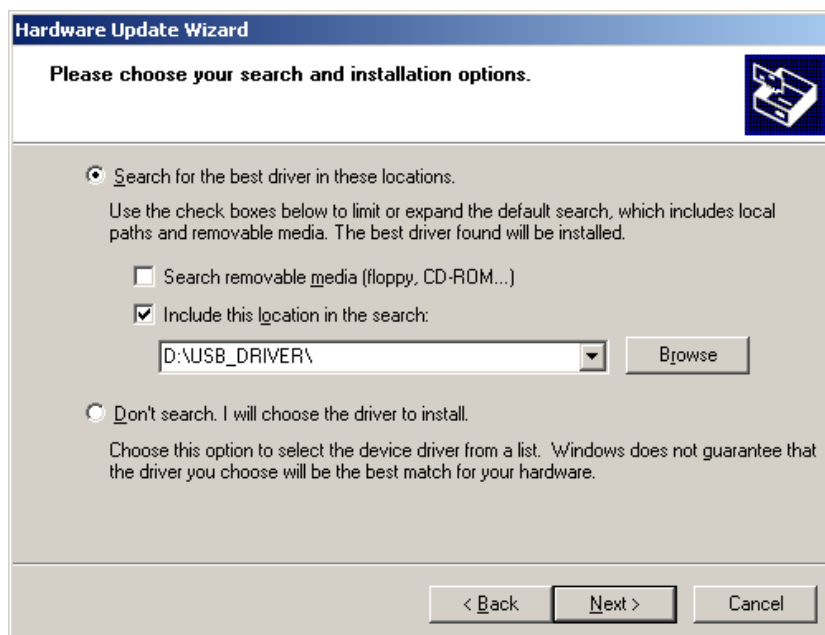
Windows 7, XP and Vista

When you plug the OBTX into a PC USB port for the first time, the windows hardware update wizard will initialise.
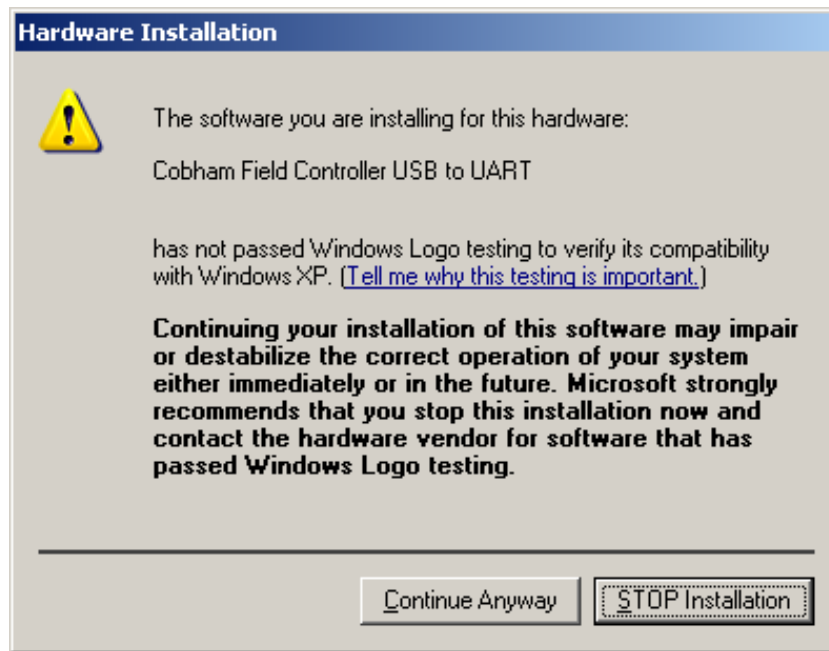

Select **No, not this time** and click **Next**.
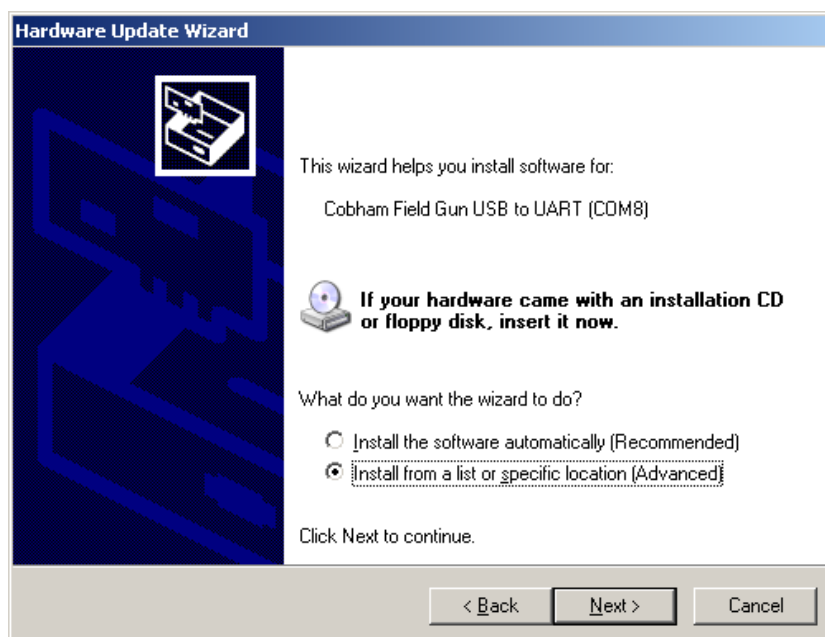
Select **Install from a list or specific location** and click **Next**.

Select **Include this location in the search** and **Browse** to the USB stick where the USB_DRIVER directory is located. Click **Next**.

Windows will pop up a message declaring that the driver has not been verified. Click **Continue Anyway**.

Finally click **Finish** to end the driver installation. The Field Controller and PC are now ready to go.

Windows 8 and 10

Before the drivers can be installed, you may first need to disable driver signature verification on your PC.

To disable driver signature verification, we're going to need to get into the Troubleshooting options from the boot manager.

Simply hold down the **SHIFT** key while you click **Restart** from the power options menu (on Windows 8 that's under Charms or on the login screen, and in Windows 10 it's on the Start Menu).

You can use this trick on any of the power menus in Windows 8 or 10.

Once your computer has rebooted you will be able to choose the **Troubleshoot** option.
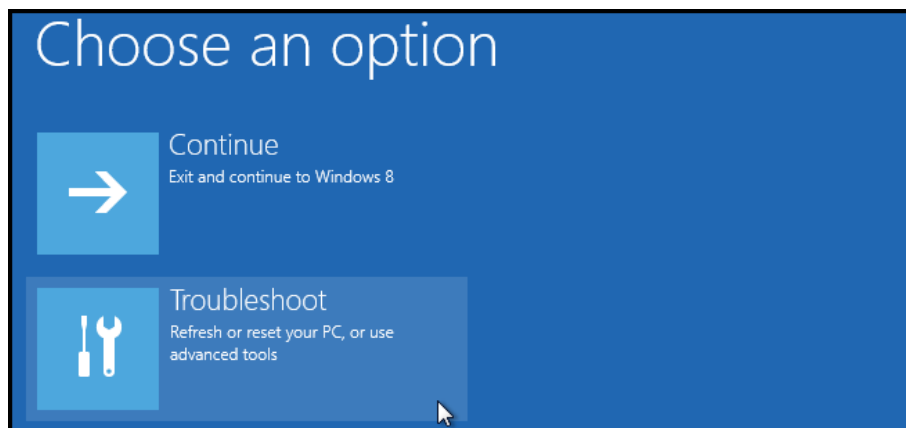
Then head into **Advanced** options.

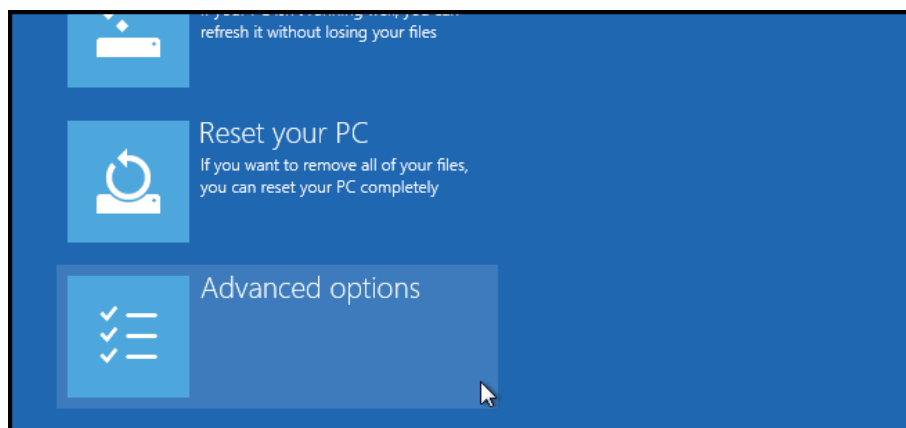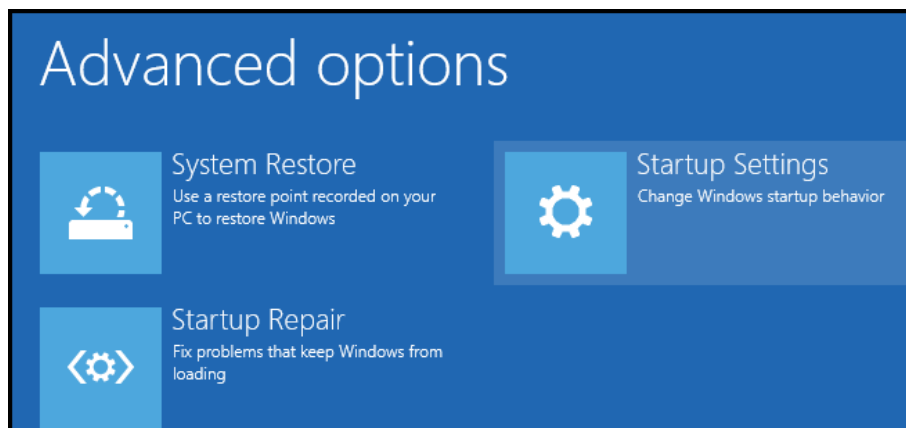Then **Startup Settings**.

Since we are modifying boot time configuration settings, you will need to **Restart** your Computer one last time.
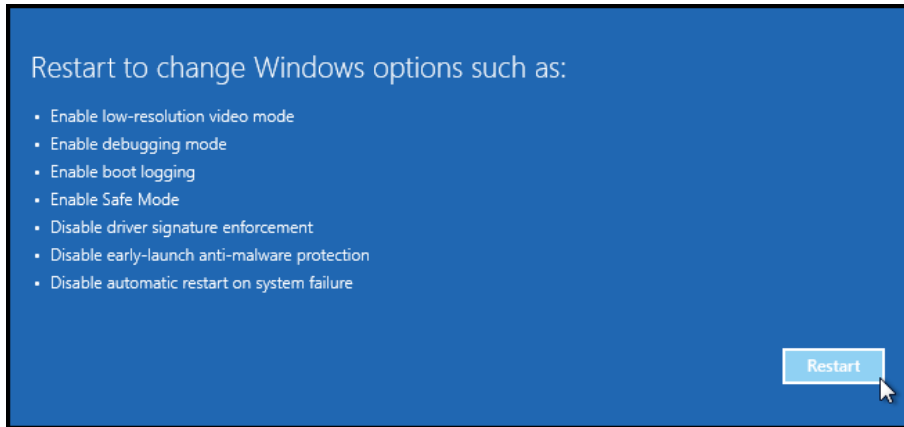
Finally, you will be given a list of **Startup Settings** that you can change. The one we are looking for is **Disable driver signature enforcement**. To choose the setting, you will need to press the F7 key.
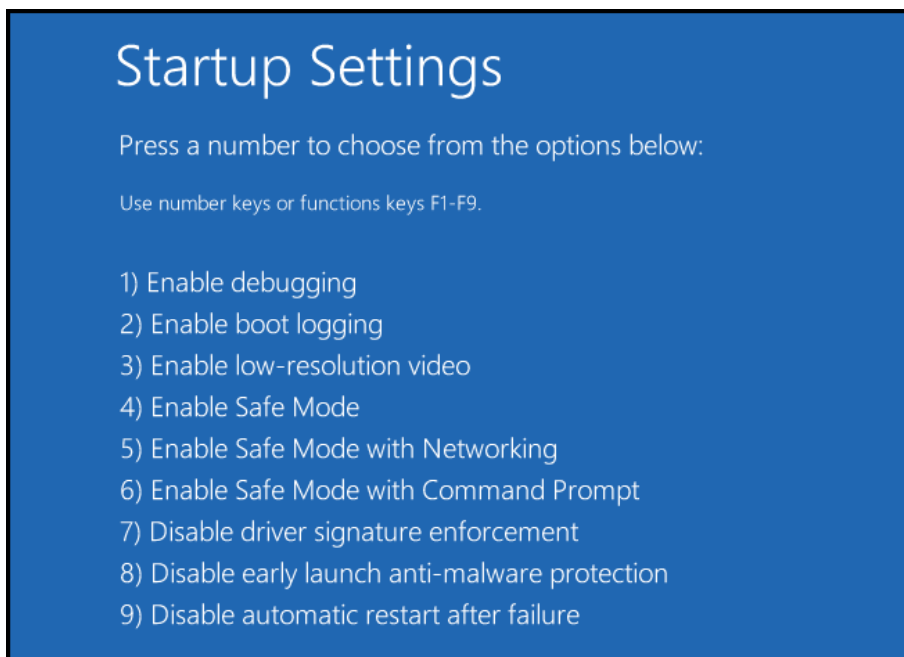
Your PC will then reboot and you will be able to install the **OBTX** drivers without any error message.

8.6   Running the Domo Device Controller in Logging Mode

Before you Begin

You'll need:

- A powered NTX, HDNTX or OBTX
- Refer to *Connecting up your Transmitter* for connectivity
- To have established a USB connection using Domo Device Controller

Set up Logging Mode

1. Create a shortcut to the Domo Device Controller on your desktop and right-click it.

2. The **Shortcut Properties** window opens.

3. In the Target box add **/l "log.txt"** to the end of the line.

Note: In the target box you must leave the quote marks on the original target line, leave a space then forward slash, lowercase L, quote mark, log.txt, close quote.

4. Click the **Apply** button.

5. Click the **OK** button.

6. Double-click your Nano **TX Controller shortcut** on your desktop.

7. The Nano TX Controller application opens.

8. The logging symbol is now white indicating logging is running.
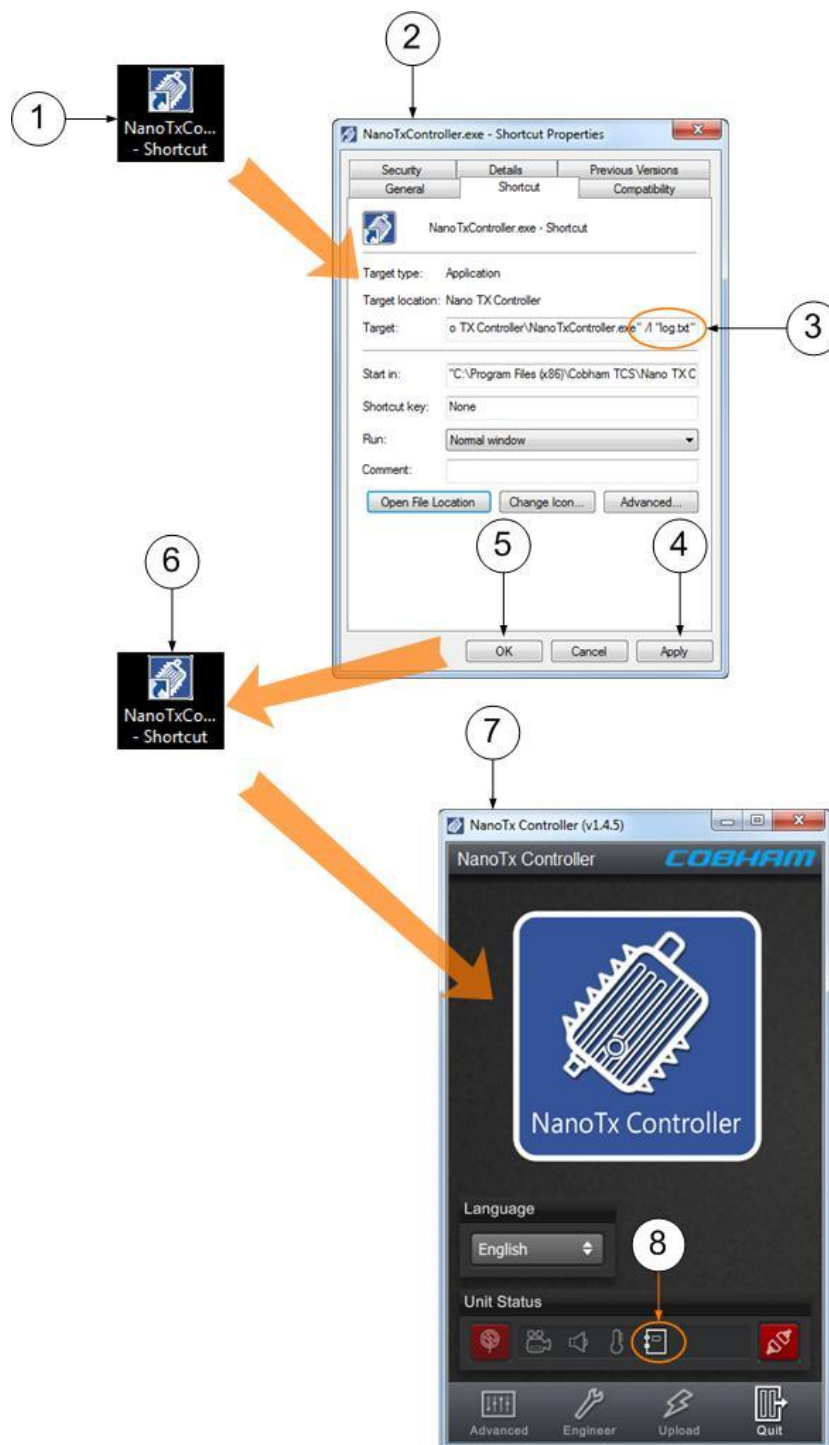
Figure 8-2 Setup Logging Mode

8.7   Recovering the Logging File

Before you Begin

You'll need:

- A powered NTX, HDNTX or OBTX
- Refer to *Connecting up your Transmitter* for connectivity
- To have established a USB connection using Domo Device Controller

Recover the Logging File

1. Right-click the Domo Device Controller shortcut on your desktop.
2. The **Shortcut Properties** window opens.
3. Click **Open File Location** button.
4. Windows Explorer opens where your Domo Device Controller application (and Log file) is located.
5. Double-click the log.txt file.
6. The log.txt file opens and displays your logged events.

Note: You may have to close the Domo Device Controller application to force all log contents to be written to disk.

Figure 8-3 Recover the Logging File

9. Appendix B – Cautions and Approvals

9.1   Cautions and Warnings

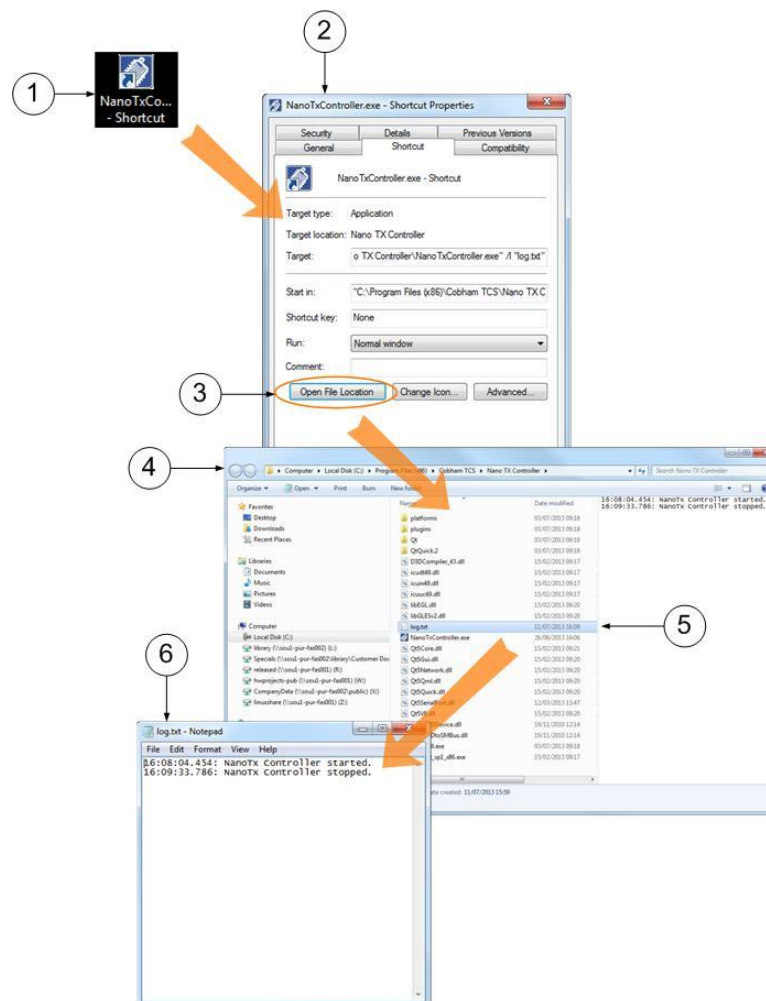| Serial	Area	Note
1	Enclosures	Do not remove any factory installed screws or fastenings. Damage to the units may result and void any warranties.
		Only authorised, trained personnel should open the product. There are no functions that required the user to gain access to the interior of the product. There are no user serviceable parts inside.
2	Maintenance	Other than cleaning, no scheduled maintenance is required to ensure proper function of the unit.
3	Environment	The equipment should not be used in hazardous or corrosive atmospheres. Users are reminded of the necessity of complying with restrictions regarding the use of radio devices in fuel depots, chemical plants and locations where explosives are stored and/or used.
4	Power Supply	Ensure that the power supply arrangements are adequate to meet the stated requirements of each product. Observe all electrical safety precautions.
5	Electro Static Discharge (ESD) Precautions	ESD guidelines must be followed for this electrostatic sensitive device.
6	Lightning Strike	There is a risk of lightning strike to antennas. The equipment should not be assembled in an area at the time of lightning activity. Antennas should be adequately protected from lightning strikes.
7	Working at Height	Observe caution when locating the device at height, for example on a mast. Ensure the unit is well secured to prevent it falling and injuring personnel.
8	Risk of Eye Injury	Care should be taken to avoid eye contact with the antennas.
9	Cables	Connecting cables should not be positioned where they are likely to become damaged or where they may present a trip hazard.
10	Thermal Control System	Any powered device will always produce heat as a by product of its operation. If you operate this device in an enclosed space you must ensure it has adequate airflow to keep it cool.
		Also, if worn close to the body, care must be taken to protect the operator from excessive temperatures.
11	RF Emission System	When using this device please ensure a distance of 20cm is maintained between your device and your body while the device is transmitting.
12	Aircraft Safety	Use of this equipment on board aircraft is strictly forbidden. Use of radio transmitter equipment in an aircraft can endanger navigation and other systems.

Serial	Area	Note
13	RF Emissions	**WARNING**: When wearing the Nano Transmitter on the body, you must **only** put the side with the label and the mounting lugs towards your body.
14	RF Emissions	**WARNING:** The transmitter **must** be mounted at a **minimum of 5mm** away from your body at all times.
15	RF Emissions	**WARNING:** The antenna **must** be kept **vertical** when the transmitter is mounted near to the body.
16	RF Emissions	The device is operating on a Part 90 frequency.
17	RF Emissions	**WARNING**: The equipment is for occupational users only and not for general public use.

9.2   EMC / Safety and Radio Approvals

The equipment has been designed to meet and has been tested against the following harmonized EMC and safety standards:

9.3   CE Marking

The CE mark is affixed to all SOLO7 Transmitter products, the CE Declaration of Conformity as well as the technical file is available on request.

9.4   FCC

Note: Not currently applicable for OBTX.

FCC Subpart 15A Rule Section 15.21

CAUTION: The user of an intentional or unintentional radiator shall be aware that changes or modifications not expressly approved by DTC could void the user's authority to operate the equipment.

FCC Subpart 15B Rule section 15.105

Note: 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 or more of the following measures:

■   Reorient or relocate the receiving antenna.

■   Increase the separation between the equipment and receiver.

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

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

FCC Subpart 15A Rule section 15.19(a)(3)

Note: 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.

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.

RF Exposure Guidance

The unit must be operated at least 5mm away from the body for RF exposure compliance purposes.

10. Appendix C - Care and Maintenance

10.1   Caring for your Equipment

- Do not subject the radio to physical abuse, excessive shock or vibration
- Do not drop, jar or throw the radio
- Do not carry the radio by the antenna
- Avoid exposure to excessive moisture or liquids
- Do not submerse the radio unless it is designed to be submersible
- Do not expose the radio to corrosives, solvents, cleaners or mineral spirits
- Avoid exposure to excessive cold and heat
- Avoid prolonged exposure to direct sunlight
- Do not place or leave radios on surfaces that are unstable
- Always turn the radio off before installing optional accessories
- Only use accessories intended for the specific make and model of your radio, especially batteries, chargers and power adapters

10.2   Charging

- Use approved batteries, chargers and adapters designed specifically for your make and model radio
- Do not attempt to charge a wet radio or battery pack
- Do not charge the radio or battery pack near anything flammable
- Stabilize the battery pack to room temperature (72 degrees F) before charging
- Do not charge radios and/or battery packs on wet or unstable surfaces
- Do not leave radios and/or batteries in chargers for excessive periods

10.3   Working with Lithium Batteries

- Charge only with the approved charging cable
- Batteries are to be used only for the specified purpose. Incorrect use will invalidate the warranty and may make the battery become dangerous.
- Charge in a clean, dry environment, ideally at 10 degrees Celsius. (0 to 45 degrees Celsius is permissible).
- Do not store or operate in direct sunlight for extended periods. Battery can be damaged by over-heating, for example if placed on the rear parcel shelf of a motor vehicle.
- Store in a cool dry environment. Storage at elevated temperatures can cause permanent loss of capacity.
- For short term (less than six months) storage, store in a fully charged state.
- For extended periods of storage (more than one year) charge before storage and recharge every six to nine months.
- Always fully recharge the battery after any storage period greater than one month before use.
- Do not store the battery with the charge depleted as this can cause failure of the battery and invalidate warranty.

- Do not short circuit

- Do not immerse in water

- Do not incinerate. Cells are likely to explode if placed in a fire

- Dispose of batteries in accordance with the regulations in place for the Country of use. Batteries are normally considered 'separate waste' and should not be allowed to enter the normal waste stream. Either return to the seller, or deliver to an approved re-cycling facility.

10.4   Cleaning

- Turn off the radio and remove batteries (if applicable) before maintenance

- Use a clean, soft, damp cloth to clean the radio. A microfiber cloth is recommended

- Do not use alcohol or cleaning solutions to clean the radio

- Do not immerse the radio in water to clean it

- If the radio becomes wet, immediately dry it with a microfiber or other lint-free cloth

10.5   Storage

- Turn off the radio and remove batteries before storage

- Store radios and battery packs in a cool, dry area at room temperature (72 degrees F).

- Do not store radios and/or batteries in active chargers

10.6   Repairs

Do not attempt any repair. The radio contains no user serviceable parts. Contact the DTC Customer Service Centre or take it to a qualified repair technician.

10.7   Getting Technical Support

Contacting Client Services

Technical support enquiries should be sent to the Client Services team.

Post: DTC - Solent, Fusion 2, 1100 Parkway, Solent Business Park, Whiteley, Hampshire, PO15 7AB, England.

Phone: +44 1489 566 750 then press 1 for support. Office hours: 0900-1700 UK time excluding holidays.

Email: solent.support@domotactical.com (no restricted content).

For technical support we undertake to get a first response to you in less than one working day and a progress update at least every two weeks.

Documentation

It is DTC's practice to make the majority of our latest manuals and user guides available to customers online by using our WatchDox facility. To access this site please contact your Account Manager or send a request to solent.support@domotactical.com

You will then be sent a link where you can login and create your own password. You will then receive a confirmation email. Once you have done this you will then be able log into your account.

10.8   Using the DTC RMA Service

You have a problem and all troubleshooting steps have been unsuccessful. You need to contact DTC for Return Material Authorisation (RMA) Service.

Step 1: Email DTC

To return something to Solent please Email solent.rma@domotactical.com. We will then send you an RMA request form to complete and return. We'll then send you an RMA number and shipping instructions.

Step 2: Save your Personal Kit

Remove all personal kit or media from the device.

Step 3: Pack the Unit

Use the original shipping container and packing materials if possible.

If the original packing materials are not available, wrap the equipment with soft material (e.g. PU/PE form) then put the wrapped equipment into a hard cardboard shipping box.

Step 4: Prepare an Information Sheet

Include a sheet with the following information.

Note: Please keep a copy of this sheet for your records.

- Name
- Address
- Unit Serial Number
- Date of Purchase or the original invoice number
- Date of failure
- A detailed description of the problems you have encountered
- A list of the hardware / software configuration if applicable

Step 5: Put the RMA Number on the Box

Clearly mark the outside of the shipping box with the RMA number. If an RMA number is not present on the shipping box, receiving will be unable to identify it and it might be returned.

Step 6: Send the Box to DTC

Send the box using your normal shipping process.

11.Appendix D-Glossary

11.1   Glossary

0-9	Means…
16QAM	16-state Quadrature Amplitude Modulation.
64QAM	64-state Quadrature Amplitude Modulation.

A	Means…
AC	**Alternating Current.** Current that is continually changing in magnitude and periodically in direction from a zero reference level.
A/V	Audio/Video.
AES	In cryptography, the **Advanced Encryption Standard** (**AES**) is an encryption standard adopted by the U.S. government. The standard comprises three block ciphers, AES-128, AES-192 and AES-256, adopted from a larger collection originally published as **Rijndael.** Each AES cipher has a 128-bit block size, with key sizes of 128, 192 and 256 bits, respectively.
ASI	**Asynchronous Serial Interface**. A streaming data interface which often carries an MPEG Transport Stream. An ASI signal can carry one or multiple SD, HD or audio programs that are already compressed, not like an uncompressed SD-SDI (270Mbs) or HD-SDI (1.45Gbs). An ASI signal can carry varying amounts of data but is always padded to run at a fixed line rate of 270 Mb/s.
Amplification	The process of increasing the strength (current, voltage or power) of a signal.
Amplitude	The level of an audio or other signal in voltage or current. The magnitude of variation in a changing quantity from its zero value.
Amplitude Modulation	Modulation in which the amplitude of the carrier wave is varied above and below its normal value in accordance with the intelligence of the signal being transmitted. Also called AM.
Analogue	**Analog transmission** is a transmission method of conveying voice, data, image, signal or video information using a continuous signal which varies in amplitude, phase, or some other property in proportion to that of a variable.
Antenna	An **antenna** (or **aerial**) is a transducer designed to radiate or receive electromagnetic energy (generally RF).
Antenna Bandwidth	The frequency range over which a given antenna will accept signals.
Antenna Gain	The effectiveness of a directional antenna as compared to a standard non-directional antenna. It is usually expressed as the ratio in decibels of standard antenna input power to directional antenna input power that will produce the same field strength in the desired direction. For a receiving antenna, the ratio of signal power values produced at the receiver input terminals is used. The more directional an antenna is, the higher is its gain.

A	Means…
Attenuation	Power loss resulting from conductor resistance and dielectric loss within the insulating material used to separate the conductors.

B	Means…
BNC	**Bayonet Neill-Concelman** – A very common type of RF connector used for terminating coaxial cable.
Bandwidth	The width of a band of frequencies used for a particular purpose.

C	Means…
COFDM	**Coded Orthogonal Frequency Division Multiplexing** is a frequency-division multiplexing (FDM) scheme utilized as a digital multi-carrier modulation method. A large number of closely-spaced orthogonal sub-carriers are used to carry data.

D	Means…
D/C	Downconverter. A device which converts microwave frequencies to UHF frequencies for use in DTC receivers.
Digital	A **digital signal** is a discontinuous signal that changes from one state to another in discrete steps.
Decibel	The standard unit used to express transmission gain or loss and relative power levels. Also written as dB.
Decoder	Processor in a video receiver that converts digital video data to analogue signals for replay on analogue monitors; or in certain cases a software decoder, a program that decodes digital data for replay on the PC (decompression etc).
Demodulate	To recover the information originally impressed on the radio wave.

E	Means…
Electromagnetic field	The field of force that an electrical current produces around the conductor through which it flows.
Electromagnetic Waves	A wave propagating as a periodic disturbance of the electric and magnetic fields and having frequency in the electromagnetic spectrum; the means by which energy is transmitted from one place to another.
Elementary Stream (ES)	Elementary streams: These streams contain only one MPEG-2 video channel and no audio. Elementary streams are required if you intend to use **Milestone** or any player that cannot operate with Transport streams. You must be in RTSP mode to use Elementary streams.

E	Means…
Encoder	A processor in a video transmitter which converts analogue video from a camera to digital data.

F	Means…
FEC	**Forward Error Correction** is a system of error control for data transmission, whereby the sender adds redundant data to its messages, also known as an **error-correction code**. This allows the receiver to detect and correct errors (within some bound) without the need to ask the sender for additional data. The advantage of forward error correction is that a back-channel is not required, or that retransmission of data can often be avoided, at the cost of higher bandwidth requirements on average. FEC is therefore applied in situations where retransmissions are relatively costly or impossible.
Firmware	Software which is installed directly on a device and is intended specifically for that device and is used to control it.
FOV	**Field of View** - The field of view (also field of vision) is the angular extent of the observable world that is seen at any given moment.
Fading	A periodic decrease in received signal strength
Frequency	The rate at which a process repeats itself. In radio communications, frequency is expressed in cycles per second. Signals also have a property called wavelength, which is inversely proportional to the frequency.
Frequency Modulation	The process of varying the frequency of a carrier wave, usually with an audio frequency, in order to convey intelligence. Also called **FM**.
FPGA	**Field-Programmable Gate Array** - an integrated circuit designed to be configured by the customer or designer after manufacturing, hence "field-programmable".

G	Means…
GUI	**Graphical User Interface.**
GHz	**Gigahertz** - One gigahertz is equal to 1,000 megahertz (MHz) or 1,000,000,000 Hz.
Gain	The increase in signal strength that is produced by an amplifier.

H	Means…
Hertz	One cycle per second.

I	Means…

I	Means…
IP Address	**Internet Protocol Address** – A unique numeric ID for a device within a network.
IR	**Infra Red** - Infrared (IR) radiation is electromagnetic radiation whose wavelength is longer than that of visible light.
Impedance	The total opposition offered by a circuit or component to the flow of alternating current.

L	Means…
LOS and NLOS	**Line-of-sight** propagation refers to electro-magnetic radiation including light emissions travelling in a straight line. The rays or waves are diffracted, refracted, reflected, or absorbed by atmosphere and obstructions with material and generally cannot travel over the horizon or behind obstacles. NLOS is Non Line-of-sight.
Load	A device that consumes electrical power.
Lux	The **lux** (symbol: **lx**) is the SI unit of illuminance and luminous emittance. It is used in photometry as a measure of the *apparent* intensity of light hitting or passing through a surface.

M	Means…
MHz	**Megahertz** is equal to 1,000,000 Hz
mW	**Milliwatt** - The milliwatt (symbol: mW) is equal to one thousandth (10^{-3}) of a watt.
MPEG	Moving Pictures Experts Group.
Modulation	To change the output of a transmitter in amplitude, phase or frequency in accordance with the information to be transmitted. Data is superimposed on a carrier current or wave by means of a process called modulation. Signal modulation can be done in either of two main ways: analogue and digital. In recent years, digital modulation has been getting more common, while analogue modulation methods have been used less and less. There are still plenty of analogue signals around, however, and they will probably never become totally extinct.
Multicast	Multicasting is sending data from a sender to multiple receivers where each receiver signals that they *want* to receive the data.

N	Means…
nm	A **nanometre** (American spelling: **nanometer**; symbol **nm**) is a unit of length in the metric system, equal to one billionth of a metre (i.e., 10^{-9} m or one millionth of a millimetre).

N	Means…
NMEA 0183	**NMEA 0183** is a combined electrical and data specification for communication between marine electronic devices such as echo sounder, sonar, anemometer, gyrocompass, autopilot, GPS receivers and many other types of instruments. It has been defined by, and is controlled by, the U.S.-based National Marine Electronics Association.
NTSC	National Television Systems Committee.
Noise	Random pulses of electromagnetic energy generated by lightening or electrical equipment.

O	Means…
Omni directional antenna	An antenna whose radiation pattern shows equal radiation in all horizontal directions.
Oscillation	A periodic, repetitive motion or set of values (voltage, current, velocity).

P	Means…
PAL	Phase Alternate Line.
PIR	**Passive Infra Red** sensor (PIR sensor) is an electronic device that measures infrared (IR) light radiating from objects in its field of view.
PTZ	**Pan, Tilt and Zoom** – PTZ is a common way of referring to controllable cameras.
Propagation	A phenomenon by which any wave moves from one point to another; the travel of electromagnetic waves through space or along a transmission line.

Q	Means…
QPSK	Quadrature Phase Shift Keying.

R	Means…
RF	**Radio Frequency.**
RTSP	**Real Time Streaming Protocol** (RTSP) is a network control protocol designed for use in entertainment and communications systems to control streaming media servers. The protocol is used for establishing and controlling media sessions between end points. Clients of media servers issue VCR-like commands, such as play and pause, to facilitate real-time control of playback of media files from the server.
Rx	**Receiver**, an electronic device that changes a radio signal from a transmitter into useful information.
Radiate	To transmit RF energy.

R	Means…
Radio Frequency	Any frequency of electrical energy capable of propagation into space (usually above 20kHz). Also called RF.

S	Means…
SNR	**Signal to Noise Ratio** is an electrical engineering measurement defined as the ratio of a signal power to the noise power corrupting the signal. Signal-to-noise ratio compares the level of a desired signal (such as music) to the level of background noise. The higher the ratio, the less obtrusive the background noise is.
Shannon Limit	The **Shannon limit** or **Shannon capacity** of a communications channel is the theoretical maximum information transfer rate of the channel, for a particular noise level.
Signal	In electronics, a signal is an electric current or electromagnetic field used to convey data from one place to another. The simplest form of signal is a direct current (DC) that is switched on and off; this is the principle by which the early telegraph worked. More complex signals consist of an alternating-current (AC) or electromagnetic carrier that contains one or more data streams.
Streaming	**Streaming** is the transmission of digital audio or video or the listening and viewing of such data without first storing it.

T	Means…
Tx	A **transmitter** is an electronic device which, usually with the aid of an antenna, propagates an electromagnetic signal such as radio, television, or other telecommunications.
TNC	The **TNC (threaded Neill-Concelman) connector** is a threaded version of the BNC connector. The connector has a 50 Ω impedance and operates best in the 0–11 GHz frequency spectrum.
Transport Stream (TS)	Transport streams: These streams can contain several MPEG-2 content channels and associated audio. All the channels are multiplexed together, allowing the receiver to choose which to play back.

U	Means…
UDP	**User Datagram Protocol** (UDP) Sometimes called fire and forget because there is no dialog between the sender and receiver. If the receiver does not get a packet, the sender will never know. However, UDP is very efficient when there is little chance of errors (like in your LAN), or when TCP would provide "too late" delivery.
USB	Universal Serial Bus

U	Means…
Unicast	Unicast is simply sending packets from one source to one destination. For example, from one web server to one (or each) person viewing a page on a web browser.

V	Means…
VHF	**Very High Frequency** – 30 MHz to 300 MHz
V	Volt.
Viterbi Decoder	A Viterbi decoder uses the Viterbi algorithm for decoding a bit stream that has been encoded using forward error correction based on a Convolutional code.

W	Means…
Watt	The **watt** (symbol: **W**) is a derived unit of power in the International System of Units (SI). It measures rate of energy conversion. One watt is equivalent to 1 joule (J) of energy per second.
Waveform	Signal shape.
Waveguide	A specially form hollow metal tube, usually rectangular in shape in cross section, used to connect a High Power amplifier to the antenna.