

Handheld Video Transmitter

Portable Day/Night Camera and
Digital COFDM Transmitter



DTC COMMUNICATIONS, INCORPORATED

how to contact DTC

For operator and troubleshooting information, customers are encouraged to refer to the details in this manual. For additional clarification or instruction, or to order parts, contact DTC.

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- DTC
- MiniPIX™
- SplitPIX™
- DynaView™
- Palladium™
- ArmorNet™

Other product names used in this manual are the properties of their respective owners.

warranty

DTC warrants its manufactured components against defects in material and workmanship for a period of two (2) years, commencing on the date of original purchase.

Products manufactured by others that are approved for use with DTC equipment are warranted for the manufacturer's warranty period, commencing from the date of shipment from DTC.

manual conventions



NOTE: Describes special issues you should be aware of while using a particular function.



WARNING: Calls out situations in which equipment could be damaged or a process could be incorrectly implemented, but in which operator safety is not a factor.



TIP: Describes application hints.

RF EXPOSURE STATEMENT

A separation distance of at least 20 cm must be maintained between the antenna and the body of the user or nearby persons.



NOTE: This device is for occupational use only. Occupational users are those persons who are exposed as a consequence of their employment, provided these persons are fully aware of and exercise control over their exposure.

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LASER RADIATION AVOID
DIRECT EXPOSURE TO BEAM

(LASER DIODE, WAVELENGTH 630-680 nm,
MAXOUT: 5 mW CLASS III A LASER PRODUCT)

AVOID  EXPOSURE

DANGER

Laser radiation from top front lens,
when switched ON.

QUICK START

Accessories

- Shipping Case w/Quick Guide
- Extra Battery Pack
- Battery Chargers (2):
 - Connect to Battery (External)
 - Connect to Flashlight (Internal)
- External DC Power Conditioner w/Cigarette Adapter
- Programming Cable
- Programming CD
- User Manual
- Lens Cleaning Wipes
- Lens Cleaning Cloth
- Silicon O-Ring Lubrication



HVT Shipping Case

Complete these steps:

1. Make sure the antenna is connected to the transmitter.
2. Be sure to start each mission with a fully-charged battery pack. See Charging the HVT battery pack (page 5). The RED LED blinks when the battery is low. If using alternative power source, connect through Ext. DC Power Source module supplied.
3. Select the Channel on the transmitter that matches the frequency and settings of your receiver or repeater receive Channel. For programming instructions, see *Programming* on pages 10 to 15.
4. Unlock the Main Power Switch. Set the Main Power switch to LEFT for illumination, or RIGHT for camera TX only.
5. To operate the spotting laser, press the Laser ON/OFF Button. An LED in the button indicates ON/OFF State. The laser spots for approximately 30 feet, placing a dot in the center of the image. The laser produces a beam strength of less than 5 mW and is blink safe.



WARNING: Do not apply power to the transmitter unless an antenna or non-radiating load is connected to the Antenna SMA connector.



WARNING: Do NOT connect external DC power sources directly to the HVT. Connect all external DC sources through the supplied Ext. DC Power Source module. (Examples: car battery, customer-supplied battery, etc.)



NOTE: Ensure the Zoom Retainer is plugged-in to the Monitor Zoom connector to ensure a 1:1 zoom setting. (See Page 7.) Otherwise, the zoom setting is not controlled.



Charging the HVT battery pack

(external method):

- A. Make sure the Main Power Switch is in the center position.
- B. Loosen and remove the front bezel.
- C. Grasp black plastic ring and carefully pull out assembly.
- D. Unplug 13-pin Hirose connector and fully remove assembly.
- E. Unplug DC power connector, loosen Velcro straps and replace battery pack with a fully charged spare (at least 3 hours charging time).

Charging the HVT battery pack

(internal method):

- F. Turn the HVT Main Power Switch to OFF (center).
- G. Attach the Battery Charging cable to the Ext. Power Input Connector.
- H. Connect AC Charger unit to proper power source.

(The battery will charge at a slower rate when the HVT is powered from the Ext. DC Power Conditioner.)

- J. Charge the HVT battery pack for at least three hours.

Reassembly Tips

- Align external and internal switches to center position to prevent damage to switch.
- Keep threads, O-ring groove, and inside lip of bezel lubricated with Silicone Grease.
- Screw together firmly. Periodically check O-ring for damage.

BATTERY CHARGER:

ORANGE = CHARGING,
FLASHING GREEN or ORANGE = CHARGING TOP OFF,
GREEN = CHARGED



WARNING: Make sure the Main Power Switch is in the center position during disassembly and reassembly or damage to the switch may occur.



Handheld Video Transmitter, Rear View (Antenna position shown for reference only. Adjust antenna position for best performance.)



O-Ring Lubricant



HVT, Front View

The Handheld Video Transmitter

The Handheld Video Transmitter is the latest innovation in tactical video reconnaissance and digital video transmission from DTC. First responders will find the HVT valuable for search and rescue, assessing threats, physical security, and disaster sites. The HVT is an essential tool for government, military, and law enforcement teams.

Weighing only 5.5 pounds and completely portable, the HVT uses a Palladium digital transmitter and fits in a durable 9.8 by 9.0 by 4.8 inch package. Rechargeable Lithium batteries provide a nominal runtime of three hours with all features ON. Even longer runtimes are achieved with the illuminator LED's and laser turned OFF. The LED's are ultra-bright and efficient, providing sufficient illumination for excellent video in near total darkness.

A red spotting laser provides a safe method of effectively pointing the camera without the need for a monitor. The HVT was designed to go virtually anywhere and to work well in virtually any environment from sunlight to darkness. The HVT is the essential tool for tactical video collection and transmission. A miniature color video camera is fitted in the center of the HVT, with dual banks of illuminator LED's in concentric circles around the camera.

Two types of LED's are used with illumination beam-widths of 20 degrees and 45 degrees. This combination provides both a spot light and an effective flood light, with a combined output designed to recognize a person in a dark room at a 12-foot distance.

The HVT can be ordered to provide either NTSC or PAL video.

Using your HVT Transmitter

Follow the instructions given in the Quick Start section on pages 4-5. When power is first applied to the HVT, the unit reverts to the last used channel and RF (ON/OFF) state. One of the green channel LEDs will turn ON indicating the active channel. The Alarm LED may be ON, which indicates that there is no active video input.

- ☑ **NOTE:** Since the Palladium transmitter always returns to the last configuration on power-up, the unit should always be deployed with the RF switch ON. Therefore, once deployed, control of the unit must be restricted to applying and removing power via the HVT Main Power Switch.

Changing your Transmitter Configuration

The Palladium Transmitter can store up to 8 different configurations, which can be selected on the front panel. Each of these configurations can be programmed into the Transmitter with the supplied DTC Programming Software and a Windows PC. Refer to the Programming section on page 10 for more information.

To cycle through your preconfigured channels press the CONFIG button once to advance to the next setting. By default, the Palladium will turn OFF the transmitted signal while you are changing channels. This is to prevent accidental interference. Push the RF button after channel selection to resume RF transmission of your video image.

- ☑ **NOTE:** DO NOT HOLD THE RF BUTTON DOWN FOR MORE THAN ONE SECOND, or the unit will go into sleep mode. In sleep mode, the unit is non-functional. If necessary, recover from sleep mode by pressing and holding the RF button for more than two seconds.

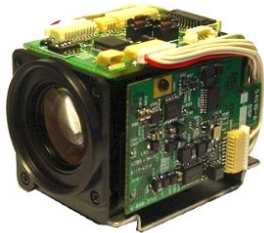


HVT Transmitter Control Panel,
Located on Bottom



Plug-in the Zoom Retainer to ensure a 1:1 Zoom setting. If not plugged-in, the zoom may change state randomly.

COMPONENTS



Camera Module



WARNING: You can damage internal components if you do not take precautions. Electrostatic Discharge (ESD), caused by static electricity, can damage sensitive electronic parts. You can reduce the chances of ESD damage by using proper grounding and handling techniques, especially when accessing battery packs. Handle with care and do not expose internal components to dirt, water, or other foreign substances.

Auto Iris

The Auto Iris camera feature allows the device to automatically adjust for varying lighting conditions. This feature emulates the human iris, which opens in dark conditions to let in more light and closes down in bright light to prevent overexposure.

The HVT camera will accommodate a wide range of ambient light from bright sunlight to near total darkness. You may notice a slight delay for the camera to adjust when moving between these conditions.

Auto Nightshot

When ambient light is too dim for color reproduction, the HVT camera automatically switches to black and white mode. Black and white mode requires less light than color. This feature emulates the human eye, which sees in black and white in darkened conditions. You may notice a slight delay for the camera to adjust when moving between these conditions.

Auto Focus

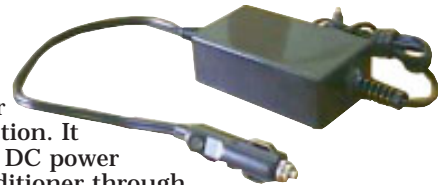
The HVT camera can focus on objects from a few inches away to infinity. The Auto Focus feature constantly monitors distance and adjusts the focus to optimize the image. You may notice a slight delay for the camera to adjust when moving between these conditions.

Camera Mount

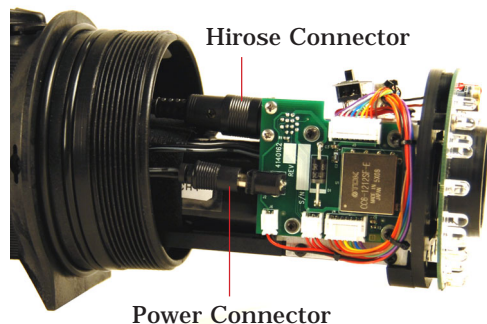
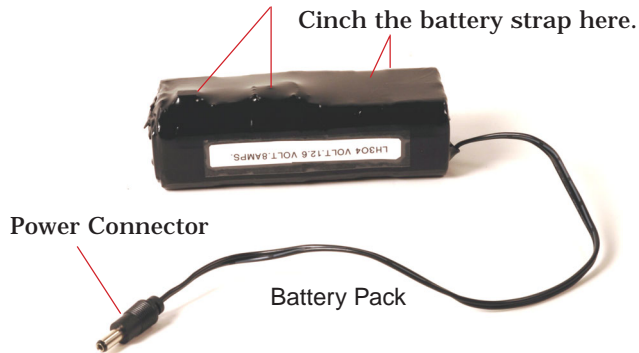
The HVT is equipped with a standard 1/4 - 20 camera mount for convenient attachment to a tripod, monopod, or other support.

Ext. DC Power Source

Use only the Ext. DC Power Conditioner provided. This is a regulated, filtered DC to DC converter suitable for automotive power connection. It has a cigarette-lighter adapter. Other DC power sources can be connected to the Conditioner through the Ext. DC Power Input Jack: Input voltage range: 10.0 to 15.0 VDC., Output voltage: 12 VDC @ 75 Watts.



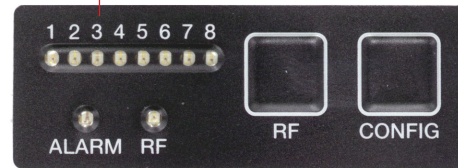
Do not cinch the Velcro® battery strap here or you could damage the PC board inside.



HVT, Partially Disassembled View

You must disconnect the Hirose Connector and the Power Connector in order to access the Battery Pack.

Channel LEDs These green LEDs, numbered 1 through 8, indicate the channel number currently selected. Each channel represents a set of preconfigured settings.



HVT Transmitter Control Panel,
Located on Bottom

ALARM LED This red LED indicates a valid video signal is not present. In addition, if no other LED is ON, the ALARM LED indicates battery is less than 10 Volts.

RF LED This green LED indicates that the RF output is ON.

RF Button This membrane switch toggles ON/OFF the RF output. Normally this should be left ON.

CONFIG Button This membrane switch cycles through the eight channels.

Transmitter Control Application

Output Frequency (MHz)

The transmit frequency can be changed by entering the new desired frequency in this field. Values outside the range supported by a particular transmitter type will be rounded to the highest or lowest supported frequency as appropriate. The transmit frequency may be entered in 1MHz steps.

Modulation Output (same as RF button functionality)

This control is used to turn on and off the RF output. After a configuration change, the output always reverts to OFF. It must be ON for operation. Either press RF button on front panel or select **ON** and **Apply** from application.

Modulation FEC*

The default FEC is 2/3, however improved range operation can be achieved by selecting FEC 1/3. FEC 1/3 will improve signal range by 3dB. However FEC 1/3 reduces link capacity to 1.2Mb/s. *FEC 2/3 is recommended.*

Modulation Guard Interval

The Guard Interval is fixed at 1/16 in current firmware releases.

Modulation Bandwidth

For the Palladium transmitter products, the modulation bandwidth is fixed at 2.5MHz in current firmware release.

COFDM Mode

The COFDM mode can be changed between QPSK and 16QAM. QPSK is the default mode and will give the strongest most rugged RF link performance. Selecting 16QAM reduces the link performance by 5dB but doubles the link data throughput.

Output frequency (MHz)

Modulation output

*Advanced options are shown in blue. These options are for trained and experienced technicians only.

Modulation FEC

Modulation guard interval

Modulation bandwidth

COFDM mode

Default values are shown in red.

PROGRAMMING

Output attenuation (dB) (As Desired)

Advanced options are shown in blue. These options are for trained and experienced technicians only.

Video input NTSC

Video bitrate 1.1

Horizontal resolution 528

Audio encoder OFF

Output Attenuation

This control can be used to make minor adjustments to the output power level, but in normal operation should not be changed from factory settings. (0 attenuation = full output power, greater than 0 attenuation = reduced power in 1 dB steps.)

Video Input

This control is used to select the composite video input standard. Options are PAL, and NTSC both with and without 7.5 IRE black level pedestal. PAL/NTSC should be selected according to the camera format. NO pedestal is correct for most applications.

Video Bitrate (status only)

Displays data capacity for video channel.

Horizontal resolution

The video coding resolution can be selected from 704, 528, 480 and 352 pixels. For optimum performance, choose a resolution one step better than your camera's resolution.

Audio Encoder

Not available in this device.

Default values are shown in red.

PROGRAMMING

Audio Input Level

Not applicable to this device.

Unit Name

Enter up to 16 characters to identify unit as desired.

Sleep Mode

This control allows the unit to be forced into a Sleep Mode where main functions are disabled, and the power consumption is significantly reduced.

Data

Future use.

Data Baud Rate

Future use.

Chaining Input

Future use.

Chain Number

Future use.

Audio input level

24 dB

Unit name

(As Desired)

Advanced options are shown in blue. These options are for trained and experienced technicians only.

Sleep mode

NO

Data

OFF

Data baud rate

1200

Chaining input

OFF

Chain no.

0

Default values are shown in red.

PROGRAMMING

Current config

Scrambling

Video locked

Software version

FPGA version

Serial number

Chaining

Default values are shown in red.

Current Config (same as display panel)

This field reports the last loaded configuration number (1-8). Note that for the Palladium transmitter, changes applied after the configuration has been loaded are saved immediately into the current configuration. To select another configuration, enter number (1-8) then click [Apply](#).

Scrambling

Scrambling is enabled at the transmitter by selecting AES in the scrambling field. At this point the user will need to ensure that the correct key is in use and this is done by using Options/Write AES key. The key is 128 bits and is entered as 32 ASCII hexadecimal characters (0-9 and A-F). (256 bit is optional.)

Video Locked (Status Only)

This status information indicates whether the transmitter is successfully locked to the incoming composite video signal. Unlocked status may indicate cabling faults, or poor quality incoming video feeds to the unit.

Software Version (Status Only)

This status information describes the version of the software running the transmitter product.

FPGA Version (Status Only)

Engineering use only.

Serial Number (Status Only)

This status information is the electronic serial number of the transmitter PCB. This number can be used for upgrades or support.

Chaining (Status Only)

Future use.

Options

Timeouts – password protected access to change timeouts used during the serial communications between the unit and the controller.

Engineering – password protected access to further diagnostic and calibration features.

Write License Code – open a further password protected box for entering license codes for future upgrade.

Change RS232 address – (future use).

Write AES Key – opens a dialog box for entering a customer-selected scrambling key. A key is a combination of 32 hexadecimal characters (64 for optional 256-bit encryption). Hexadecimal characters are 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, and F. The receiver and transmitter must have identical AES keys.

Restore Defaults – restores factory default settings in the transmitter.

Polling Enabled – selecting this option makes the control application automatically refresh the data presented to the user every few seconds.

File

Load Config – used for loading configuration data to text file.

Save Config - used for saving configuration data to text file.

Change Logfile – opens a standard Windows file save dialog box which allows the user to change the path and name of the log file generated by the application.

Exit – exits the control application.



Advanced options are shown in blue. These options are for trained and experienced technicians only.

SPECIFICATIONS

Physical

Unit Dimensions (approx.)	9.8" (24.892cm) L x 9.0 (22.86cm) "H x 4.8" (24.892cm) D
Weight	5.5 lbs. (2.5 kg)
5:1 Water: Chlorine bleach solution	Protected from immersion at 1 meter deep for 30 minutes (IP67)
Tripod Mount	1/4 - 20 threaded hole at bottom of housing

Environmental

Operational Temp	0° F (24.892°C) to 120° F (48.99°C)
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Power

Input Voltage	10 to 15 VDC through Ext. DC Power Conditioner 12 VDC @ 60 Watts max.
Battery Voltage	12 V @ 20 W typical
Low Battery	Red LED is ON when battery approaches end- of-life (approx. 10.5 VDC).
Battery Life	3 hours nominal on full charge w/illuminator at 50% duty cycle.
Chargers	(1) Internal, (1) External 100 to 240 VAC, 50/60 Hz Input

Control

PC Control Interface	RS-232.
Memory	8 user-programmable configurations

Video Encoding

Compression Standard	MPEG-2 with non-DVB modes
Chrominance Profile	4:2:0
Line Standard	PAL 625 or NTSC 525
Horizontal Resolution	704, 528, 480, 352 pixels (528 as standard)
Vertical Resolution	576 (625 lines) or 480 (525 lines)
Video Bitrates	1Mbps to 10 Mbps
System Latency	End to end delay of approx. 54 milliseconds

Scrambling

Scrambling type	Fixed key scrambling system Algorithms offered include AES. (AES 256 Optional)
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COFDM RF output

Output Frequency	Band Dependent
Occupied Bandwidth	2.44 MHz
Power	250 mW
Connector	SMA
COFDM Standard	Proprietary, 2.5 MHz channel bandwidth.

Video Output

External Video Output	Optional Remote Video Out and Zoom Control
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Camera

Image Sensor	1/4-inch CCD
Resolution	500 TV Lines
Auto Iris	AES
Lens	F1.8 to 2.9, f= 4.2 to 42 mm
Focus	Automatic

Antenna

Omnidirectional, articulating base	Rubber duck style dipole SMA 50 Ohms
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Laser Pointer

Spotting laser	5 mW (blink safe) red, button switch actuated
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Illuminator

Ultrabright LED array	141 total candlepower
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ACCESSORIES

Accessories	DTC Part Number
• Shipping Case w/Quick Guide	QG1920330
• Extra Battery Pack	8030091
• Battery Chargers (2):	
• Connect to Battery (External)	4640129
• Connect to Flashlight (Internal)	8340090
• External DC Power Conditioner w/ Cigarette Adapter	8340093
• Programming Cable	4640168
• Programming CD	8002027
• User Manual	OP1920330
• Lens Cleaning Wipes	8530102
• Lens Cleaning Cloth	8530101
• Silicon O-Ring Lubrication	8500173

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