VidiVest Palladium™

body worn video vest system

with Palladium™ Digital Technology

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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- ArmorNet™
- SplitPIX™
- MiniPIX™
- DynaView™

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

The Vidivest Palladium has been tested to meet Occupational/Controlled exposure limits for Bodyworn Devices per FCC rules under Chapter 47, Part 2, Section 1093, paragraphs (b), (c), (d)(1), (d)(3) - Laboratory Technique, and (d)(4), by a certified testing laboratory. Information is available upon request.

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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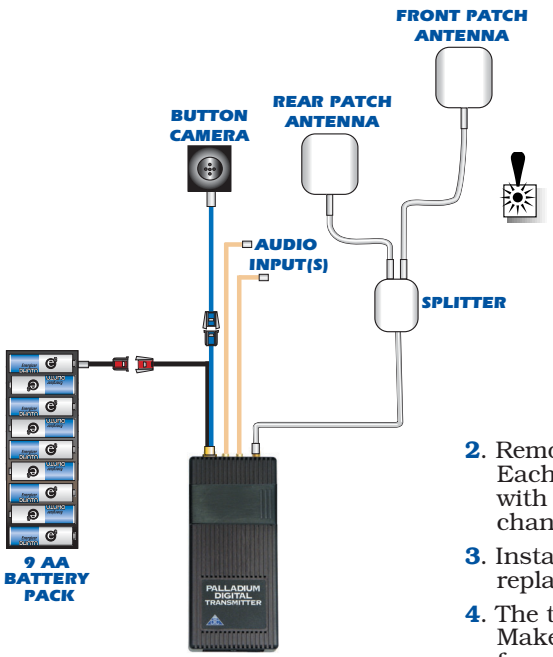
VidiVest Palladium



VidiVest Palladium Wiring Diagram

The vest is shipped with all components installed and ready for use. Be careful with the button camera when working on the rear pockets where most of the components are located. Setup the vest on a clean, soft cloth on a tabletop for best results.

1. Inspect the bottom rear pocket section of the vest. Make sure all connectors are secure as shown in the illustration (left). Connectors are keyed and color-coded.

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

Connections

- Camera to Transmitter: 3-Pin to 3-Pin
- Audio (if used): Two Lemo connectors (Push/Pull locking)
- Power (Battery pack to TX): 2-Pin to 2-Pin
- Antenna: SMA Male to TX SMA Connector

2. Remove the battery holder by carefully releasing the locking connector. Each section of the battery holder has a cover, which must be removed with a Phillips screwdriver to allow the batteries to be inserted or changed.

3. Install 9 NEW Lithium AA size batteries, observing proper polarity and replace the screws for each section.

4. The transmitter has been factory programmed to eight preset channels. Make sure the channel frequency selected matches the receiver's frequency. Slide the control panel door open (to the right). If you need to change the operating channel, press the CONFIG button to cycle through the 8 available channels indicated by the channel number LEDs. Refer to the Programming section on page 10 for more information on channel settings. When you change the channel configuration, the RF transmission is automatically switched OFF to prevent accidental interference.

When you have selected the channel you need, push the RF button to start transmitting again. The RF LED will turn ON. The transmitter RF should always be set to ON. The vest is deactivated by disconnecting power.

NOTE: The RF switch should remain ON during normal use. The RF automatically shuts off during programming to prevent accidental transmissions on unintended frequencies. 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.

5. When power is applied, the transmitter will power-up to its last RF ON/OFF state. Ensure that the green RF LED turns ON indicating the unit is transmitting. If needed, push the RF button to begin transmitting.

   The channel number LED also turns ON, representing the most recent channel setting from the last time the transmitter was used.

6. Put the vest on (refer to photos page 6). Tighten the Velcro side straps so that the system components are held closely to the body. The rear flap of the vest should be hanging loose.
7. Orient the camera on the Velcro for a proper (right side up) picture.
8. Put the shirt on over the vest. Button the camera through the appropriate buttonhole in the shirt. (See photos right.)
9. Test the system. Verify the camera is properly positioned by looking at the receiver's monitor. Walk quickly for a few steps, returning to the monitor. Make sure the camera's field of view has not changed.

   Reposition if necessary. Double-check the camera picture and angle before the mission.

   Your Transmitter is now operational. Confirm its signal with your Palladium Receiver.

NOTE: The red ALARM LED typically indicates no video input. It could also indicate a hardware failure or low battery power.

The camera position can be adjusted to desired button hole.

OVERVIEW

The VidiVest Fits Snugly On The Body
Using Velcro Fasteners.
One size fits all.

The Palladium VidiVest Vest is a covert, body worn, 100 mW COFDM microwave video transmission garment system. Palladium digital technology and our advanced antenna system combine to provide high signal quality and very effective mobility. The vest conceals all components and provides sheilding from transmitter heat. Power is supplied by a concealed 9 AA battery pack.

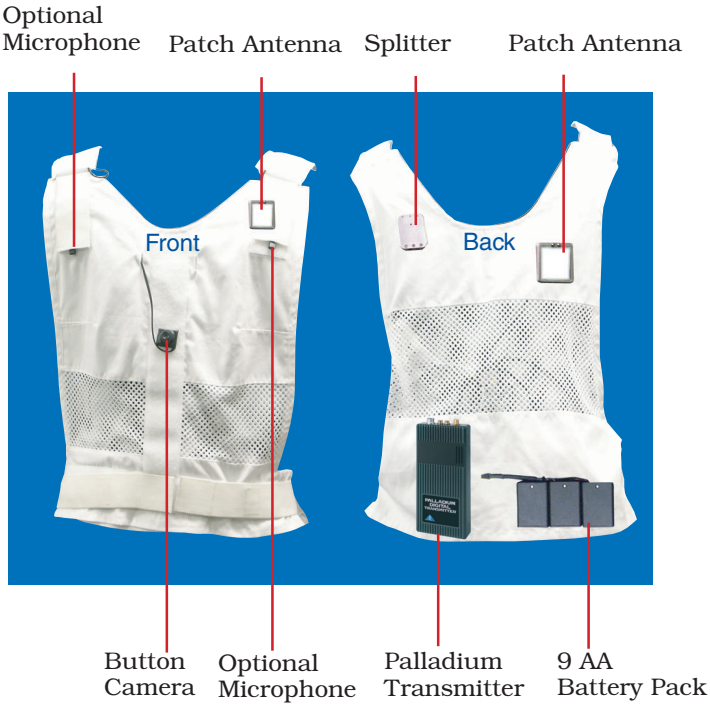
The lightweight vest is designed to fit many body sizes and is ventilated for comfort. It is designed to hold all system components as an undergarment for use with a casual shirt. The design holds all components close to the body, allowing a loosely fitting shirt to be buttoned over it without protrusions or wires showing. A hard-wired ON/OFF switch is available as an option. An optional wireless keyfob ON/OFF switch is also available.

The high-resolution color CCD camera is disguised as a shirt button. The Palladium transmitter offers integral AES encryption. Two audio inputs are provided.

Deployment is quick and easy. All connectors are color-coded and locking. A special two-patch antenna harness, built into the vest, provides an omni-directional transmission pattern. The entire vest system is powered from a single battery pack, which holds 9 AA size Lithium batteries. A set of NON-rechargeable Lithium cells have been provided in the kit. Battery life with one set of fresh Lithium cells is more than 3 hours.

Note: Only Lithium Ion AA batteries are recommended.

Component Placement



VidiVest Palladium Components

System Components

- Vest – White with vents. Machine wash on gentle cycle with detergent. Hang dry.
- Transmitter – 100 mW, with eight programmable channels
- Button Camera – Color, 5VDC
- Antenna – Two-Patch system with Splitter
- Two Audio Inputs
- Battery Pack for 9AA batteries
- Batteries – (Lithium are supplied. The battery pack is shipped with batteries installed)
- Six buttons that match the button camera appearance
- Operator Manual
- Programming Software CD

Using your Palladium Transmitter

Follow the instructions given in the Quick Start section on pages 4-5. When power is first applied to the Palladium, 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. If the video source (Camera) is not connected, the ALARM LED will be ON.

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. See the *Quick Start* (pages 4-5).

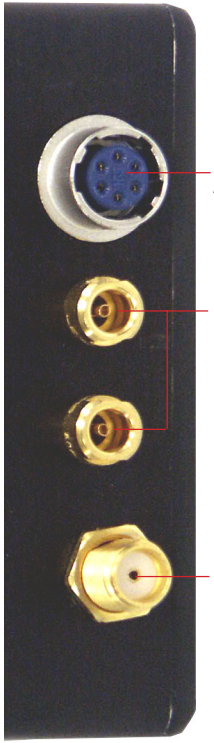
Changing your Transmitter Configuration

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.

Typical Palladium Operating Temperatures

A wide range of variables can affect the temperature of electronic devices including ambient temperature, air flow, heat sink and mounting considerations. In a typical test performed at room temperature, the Palladium 100 has been observed to have a baseplate operating temperature of 37°C (99°F). In other words, it can get warm. The VidiVest Palladium has a special heat shield between the transmitter chassis and the user to provide comfort in entended missions or in warm environments. Be sure this is properly installed before each mission.

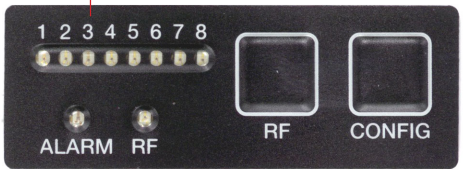


Muiti I/O Connector (6-pin Hirose) This connector provides connections for the DC power input, programming, and 75 Ohm composite video signal.

Audio 1 and 2 Connectors (LEMO) These connectors provide the microphone connections to the transmitter. Either one or two microphones can be used with the Palladium Transmitter.

Transmitter Antenna Connector (SMA) This connector attaches to the transmitter antenna and carries the RF output signal. Always ensure the transmitter antenna is attached before operating the Palladium Transmitter.

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

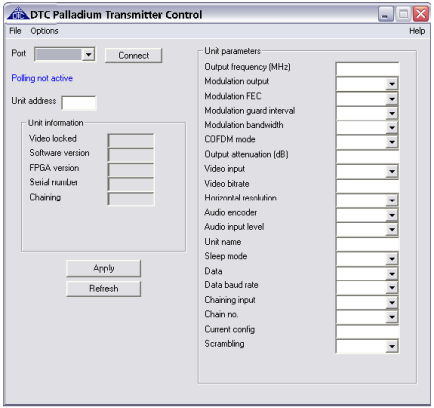


ALARM LED This red LED typically indicates a valid video signal is not present. It can also indicate a hardware failure or low battery power.

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.



Getting Started

- Use the supplied programming cable to connect the chosen COM port of the PC to transmitter to be configured. Connect DC power.
- Launch the application by double clicking or using the `Start > Run...` command.
- Connection with a transmitter should be automatic, but the user can force selection of the correct COM port using the drop down port menu, followed by the Connect button.

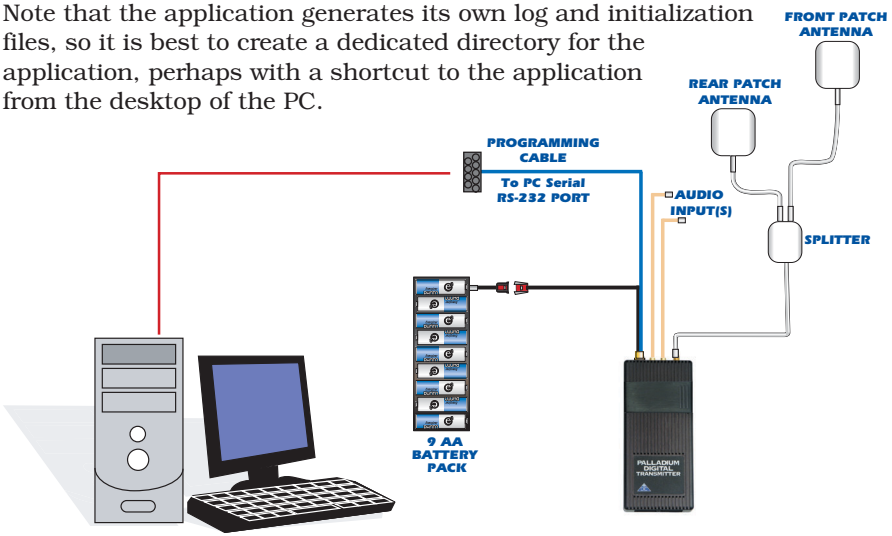
System PC Controller Application Software

Advanced control of the system is available by using PC control applications. Typically users may want to customize the default configurations to control settings such as frequency, scrambling keys, modulation parameters, and video resolution.

The transmitter is controlled by the application `DTC_tx_ctrl.exe` available on the CD delivered with the product.

A PC is required with an open RS232 Serial COM port to configure a transmitter.

Installation of the control program is as simple as copying it from the CD to a suitable location on the PC. No install shield routine is launched. Note that the application generates its own log and initialization files, so it is best to create a dedicated directory for the application, perhaps with a shortcut to the application from the desktop of the PC.



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 resolution of the transmit frequency is resolved to the closest achievable within the supported step sizes of 1MHz, 1.6667 MHz and 2.5 MHz.

Output frequency (MHz) (your frequency)

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.

Modulation output OFF

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

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.

Modulation FEC 2/3

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

Modulation guard interval 1/16

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

Modulation bandwidth 2.5 MHz

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 improves the link data throughput.

COFDM mode QPSK

Default values are shown in red.

Output attenuation (dB)	0

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

Default values are shown in red.

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.)

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 pedestal.

Video Bitrate (status only)
The video bit rate is automatically maximized in each configuration when Chaining Input is turned off. This control can be used to set the video bitrate within the constraints of capacity available in the channel, but only when Chaining Input is set to ON. Chaining CANNOT be enabled on normal transmitters, and as such video bit rate control is automatic.

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
The Audio can be turned ON and OFF with this control. Audio is OFF by default, but there are several audio modes that vary from very high quality to speech grade that can be selected with this control. One or two channel audio is supported. For optimum link performance, select the lowest audio quality necessary to support the mission.

Audio Input Level
This control is used to define the audio gain to be applied to the audio input signal. 0dB is used for line level audio and various options up to 48dB of gain can be applied for microphone inputs. 3.5 VDC is applied at the microphone connector for “phantom power” used to power electret condenser microphones. Input impedance is 5K Ohms. The transmitter works best with a high-impedance audio source.

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. Do not change.

Data Baud Rate
Future use. Do not change.

Chaining Input
Future use. Do not change.

Chain Number
Future use. Do not change.

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.

Current config (Ch. No.)

Current Config
This field reports the last loaded configuration number. Note that for the Palladium transmitter, changes applied after the configuration has been loaded are saved immediately into the current configuration.

Scrambling OFF

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.) See page 15.

Video locked

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

Software Version (Status Only)
This status information describes the version of the software running the transmitter product.

FPGA version

FPGA Version (Status Only)
Engineering use only.

Serial number

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

Chaining (Status Only)
Future use.

Default values are shown in red.

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 use.
Change RS232 address – prompts the user to change the units RS-232 address, which can be useful when connecting multiple units together via a multi drop RS-485 bus for control purposes.
Write AES Key – opens a dialogue box for entering a 128 bit AES scrambling key, as 32 ASCII hexadecimal characters (0…F) (256 bit encryption is optional.)
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.

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

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.

SPECIFICATIONS

Physical	
Unit Dimensions	
Pd-TX-100	7.5 x 2.5 x 0.75 in (127 mm x 70 mm x 30 mm)
Environmental	
Operational Temp	-10 degrees C to 70 degrees C
Power	
Input Voltage	10 to 18 VDC
Power Consumption	
Pd-TX-100	Fully Operational ~ 6.5 W
Control	
PC Control Interface	RS-232.
Memory	Ten 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 43 milliseconds

Audio Encoding	
Input	Stereo or Dual Mono pair
Bitrates	28 kbps to 72 kbps depending on configuration
Sampling Frequency	32 kHz, 16 kHz or 8kHz
THD	< 0.1% max
Response	20Hz to 13KHz, +/- 0.25dB depends on Audio Encoder setting
Crosstalk	> 55 dB min
S/N	60 dB RMS
Composite Video Input	
Standards	NTSC (with and without pedestal) or PAL
Specification	Rec. ITU-R BT.470-4
Connector	Hirose
Composite PAL and NTSC decoding	Eight-bit comb filtering composite decoder
Analog Audio	
Analog Audio Input	+10 dBu
Nominal Level	+4 dBu
Scrambling	
Scrambling type	Fixed key scrambling system Algorithms offered include AES.
COFDM RF output	
Output Frequency	Band Dependent
Occupied Bandwidth	2.44 MHz
Power	100 mW
Connector	SMA
COFDM Standard	Proprietary, 2.5 MHz channel spacing, OFDM bandwidth of 2.44 MHz with 400 carriers.

TWO YEAR WARRANTY

DTC Communications, Inc. (DTC) warrants its RF transmitting and receiving products to be free from defects in workmanship or material for a period of two (2) years from the date of shipment unless otherwise stated.

The liability of DTC, Inc. under this warranty is limited to replacing, repairing, or issuing credit, at option, for any products, which are returned by the purchaser during such warranty period, provided:

DTC is notified and a Repair Authorization Number is issued by DTC Customer Service within 30 days after discovery of such defects by Customer.

The defective units are returned to DTC with transportation charged Prepaid by the Customer.

Product damaged in shipment must be reported to and claim forms filed with the Carrier by the Customer. In shipments to the factory, notice and claim procedures will be initiated by DTC.

DTC's examination of such products shall disclose to its satisfaction that such defects exist and have not been caused by misuse, misapplication, neglect, improper installation, improper storage, alteration, physical damage or accidents.

The warranty shall not apply to material or accessories ordinarily susceptible to field damage or of a disposable nature. Examples include batteries, antennas, microphones, headsets, cases, accessory bags, etc. The warranty shall not apply to Engineering Prototypes or Customer requested modifications to electronic circuits.

This warranty does not apply to and DTC does not independently warrant items or systems sold by DTC which are produced by other manufacturers. With respect to such items, the Customer shall look to the warranty of the original manufacturer and DTC disclaims all warranty, expressed or implied.

Nothing in this warranty, or any statement, brochure, bulletin, or advertisement is to be interpreted as establishing the suitability of any product for particular application or use. Applications of the product and the determination of suitability for any application, is the sole responsibility of the Customer.

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