

PALLADIUM™ SERIES

Digital Transmitter

COFDM Transmitter

Model Pd-TX-1000 1 W Output

Model Pd-TX-2000 2 W Output



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.

Customer Service is available Monday through Friday between the hours of 9:00 AM and 5:00 PM EST at:

Tel: 603-880-4411

Fax: 603-880-6965

Website: www.dtccom.com

Email: info@dtccom.com

486 Amherst Street
Nashua, New Hampshire 03063

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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.

FCC information

The following information is provided as a service to our law enforcement customers who require a Part 90 station license for video surveillance operations.

You will need to provide two documents:

- Form 600 (the application form)
- Form 159 (the filing fee form)

Forms can be obtained from the FCC on their website at:

www.fcc.gov

You can also contact the FCC using their FAX back service at: (888) 418-3676

Additional instructions are available by telephone at: (888) 225-5322

The filing fee form is returned to:

Federal Communications Commission

1270 Fairfield Road

Gettysburg, PA 17325-7245

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.

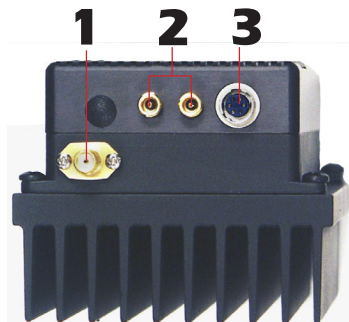


NOTE: This device is for occupational use only. Occupational users are those persons who are exposed as a consequence of their employment, provided these persons are fully aware of and exercise control over their exposure.

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QUICK START



Palladium Transmitter, Top View

Thermal Issues

Higher power Palladium 1 and 2 Watt Transmitters feature mounting tabs for convenient installation and heat dissipation. Proper heat sink mounting is required. Operating without proper heat sinking would cause overheating and damage to electronic components.

Complete these steps:

- 1** Connect the transmitter antenna to the SMA connector on the top of the Palladium unit.
- 2** If you plan to use audio, connect one or two microphones to the Audio 1 and/or Audio 2 LEMO connectors.
- 3** Connect power and video input via the Multi I/O cable to the 6-pin Hirose connector:
 - a** Attach your camera video input (75 ohm composite video source in PAL or NTSC) to the Multi I/O cable BNC connector.
 - b** Apply the necessary power to your camera and turn ON.
 - c** Attach a 12 VDC power source to the Multi I/O cable via the Molex connector. The power source must be capable of supplying a minimum of 30 Watts for the PdTx-1000 and 36 Watts for the PdTx-2000.



NOTE: Eight Channel LEDs are located under the sliding control panel door. If all 8 green LEDs are flashing, this indicates that your power source is low.

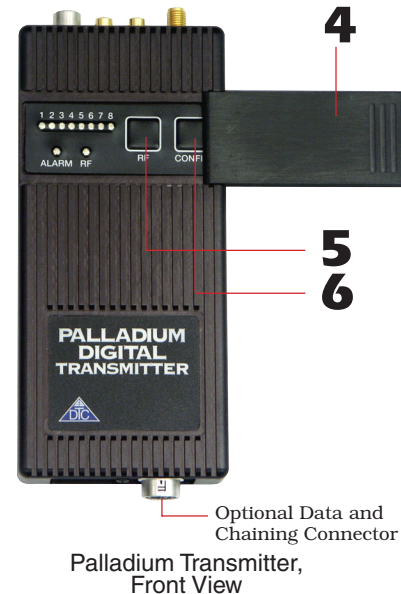
QUICK START

- 4 Slide the control panel door to the right.
- 5 When power is applied, the green RF LED turns ON. The channel number LED also turns ON, representing the most recent channel setting from the last time the transmitter was used. Push the RF button to transmit.
- 6 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 for one second to start transmitting again. The RF LED will turn ON.

 **NOTE:** A red ALARM LED indicates that no video is connected.

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

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



INTRODUCTION



Palladium Pd-TX-1000
1 Watt Digital Transmitter

Palladium Transmitters

The Palladium Pd-TX-1000 and Pd-TX-2000 digital video transmitters are high power COFDM transmitters designed for longer range transmission. The Pd-TX-1000 provides 1 Watt of RF output power and the Pd-TX-2000 has 2 Watts of RF output power.

Both models use internal high-linearity power amplifiers to boost the output power. Users must consider heat generation under anticipated operating environments and ensure sufficient heatsinking and/or cooling. A number of heat sinks are available for use with these units.

These Palladium Transmitters are designed for stand-alone operation, off the body in surveillance applications, unattended long range transmitters with sufficient battery or AC power sources, and in larger robotic and UAV platforms.

All Palladium Series transmitters are designed for 2.5 MHz channel spacing and use approximately 400 carriers to transmit video and two channels of voice or data. Transmitters may be located on adjacent channels without a guard interval. The transmitter housings are built out of rugged milled aluminum, with heat sink mounting tabs incorporated into the chassis.

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 status. 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.

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.



Palladium Pd-TX-2000
2 Watt Digital Transmitter

COMPONENTS



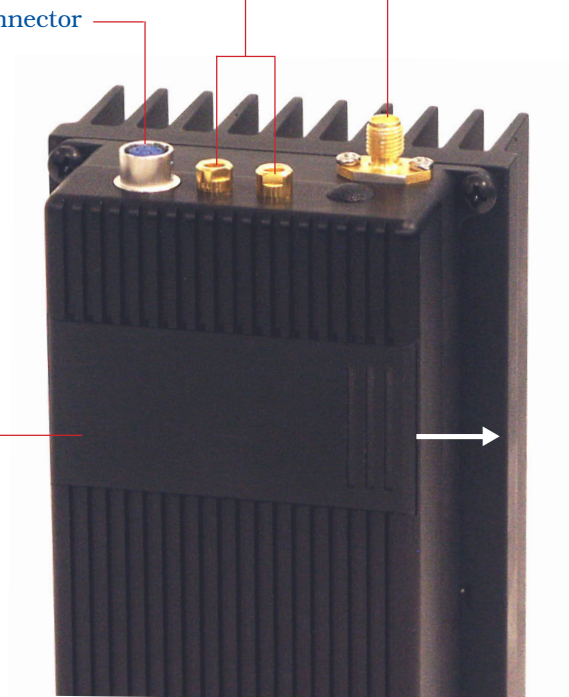
Optional Data and Chaining Connector (10-Pin Hirose)

This connector is located on the bottom of the transmitter for future use.

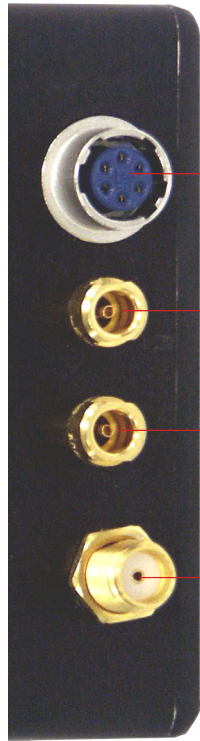
Audio 1 and 2 Connectors

Multi I/O Connector

Transmitter Antenna Connector



Sliding Control Panel Door
(Control Panel shown on right.)

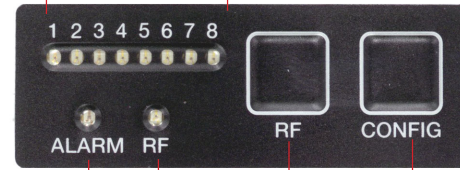


Multi I/O Connector (6-pin Hirose)
This connector provides connections for the DC power input, programming, and 75 Ohm composite video signal.

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.



CONFIG Button This membrane switch cycles through the eight channels.

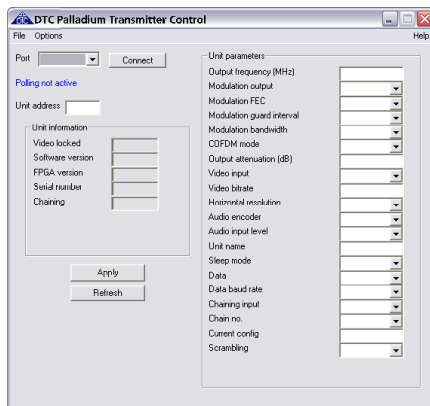
RF Button This membrane switch toggles ON/OFF the RF output.

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

ALARM LED This red LED indicates a valid video signal is not present.

Control Panel (located under sliding door)

PROGRAMMING



Programming Cable is connected to the Multi-I/O Connector on the top of the Palladium.

System PC Controller Application Software

Advanced control of the system is available by using the PC controller application provided. Typically users may want to customize default configurations to control settings such as frequency, encryption keys, modulation parameters, etc.

The transmitter is controlled by the application **DTC_tx_ctrl.exe** provided on the CD delivered with the Palladium.

A PC is required with an available RS232 Serial COM port to control the transmitter programming.

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

Getting Started

- Use the supplied programming cable to connect the chosen COM port(s) of the PC to the Palladium to be configured.
- Launch the application by double clicking or using the run command.
- Connection with a transmitter should be automatic, but the user can force selection of the correct COM port using the drop down, followed by the Connect button.
- Errors may appear during the connection process if the PC is unable to automatically ascertain which unit is connected to which COM port.

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 complex and resolved to the closest achievable within the constants of the supported step sizes of 1MHz, 1.6667 MHz and 2.5 MHz.

Output frequency (MHz) (your frequency)

Modulation Output

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

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 therefore reducing picture quality.

Modulation FEC 2/3

FEC Link Bitrate Sensitivity 2/3 2.4Mb/s: -99dBm,
1/3 1.2Mb/s: -102dBm

Modulation guard interval 1/16

Modulation Guard Interval

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

Modulation Bandwidth

For the Palladium transmitter products, the modulation bandwidth is fixed at 2.5MHz.

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, giving significantly better video quality.

COFDM mode QPSK

Default values are shown in red.

PROGRAMMING

Output attenuation (dB) (As Desired)

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.

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

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.

The video bit rate is automatically maximized in each configuration when Chaining Input is turned off.

Horizontal resolution

The video coding resolution can be selected from 704, 528, 480 and 352 pixels. Changing the horizontal resolution to lower values will make the coded picture softer.

Care should be taken to match the horizontal resolution to the resolution of the camera connected to the transmitter; this will give best image results.

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. Enabling audio will degrade the video quality, because some of the available data capacity is diverted away from video to audio. Selecting high fidelity audio modes will degrade the video quality more than lower fidelity audio modes.

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.

Unit Name

Future Use..

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.

PROGRAMMING

Audio input level 24 dB

Unit name (As Desired)

Sleep mode NO

Data OFF

Data baud rate 1200

Chaining input OFF

Chain no. 0

Default values are shown in red.

PROGRAMMING

Current config (Ch. No.)

Scrambling OFF

Video locked

Software version

FPGA version

Serial number

Chaining

Default values are shown in red.

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

If the AES scrambling option has been purchased for the system in use, then it is possible to encrypt the link. Scrambling must be 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).

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 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 128bit AES scrambling key, as 32 ASCII hexadecimal characters (0...F)

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.



DTC Palladium Transmitter Control

File Options

SPECIFICATIONS

Physical

Unit Dimensions

Pd-TX-1000 5.50"L x 3.13"W x 2.52"D

Pd-TX-2000 5.50"L x 3.13"W x 2.52"D

Environmental

Operational Temp -10 degrees C to 70 degrees C

Power

Input Voltage 11 to 18 VDC

Power Consumption

Pd-TX-1000 Fully Operational ~ 24 Watts typical

Pd-TX-2000 Fully Operational ~ 30 Watts typical

Control

PC Control Interface RS-232.

Memory Eight 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 1	Stereo or Dual Mono pair
Bitrates 7	28 kbps to 72 kbps depending on configuration
Sampling Frequency	32 kHz, 16 kHz or 8kHz
THD	< 0.1% max
Response	20Hz to 6KHz, +/- 0.25dB
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

Data

Baud Rate	Up to 115 kbaud
Connector	LEMO

Scrambling

Scrambling type	Fixed key scrambling system Algorithms offered include AES.
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COFDM RF output

Output Frequency	Band Dependent
Occupied Bandwidth	2.5 MHz
Power	1 W or 2 W
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 microphones, batteries, antennas, crystals or material ordinarily susceptible to field damage or any accessories of a disposable nature. 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.

Sales Representatives

Nashua Main Office Numbers

voice (603) 880-4411
toll free (800) 233-8639
fax (603) 880-6965

Director of Federal Sales
John Morgan

(Nashua Main Office Numbers)
direct voice (603) 546-2122
cell (603) 320-3257
jmorgan@dtccom.com

Federal Sales Manager
Walter Patenaude

(Nashua Main Office Numbers)
direct voice (603) 546-2161
cell (413) 454-3651
wpatenaude@dtccom.com

Director
State & Local Agencies & International Sales

Michael Demos

(Nashua Main Office Numbers)
direct voice (603) 546-2120
cell (603) 320-3255
mdemos@dtccom.com

International Sales Manager
Dana Crawford

(Nashua Main Office Numbers)
direct voice (603) 546-2110
cell (508) 320-7225
dcrawford@dtccom.com

Inside Sales

Christine Guzman

(Nashua Main Office Numbers)
direct voice (603) 546-2217
cguzman@dtccom.com
ME, NH, VT

OEM Sales Manager
Ralph Descheneaux

(Nashua Main Office Numbers)
direct voice (603) 546-2119
cell (603) 738-3627
rdeschen@dtccom.com

REGIONAL SALES MANAGERS

Howard Rich

toll free (888) 819-8570
voice (860) 626-8570
fax (860) 626-8571
NY, MA, CT, RI, PA, NJ, MD, DE,
WV, DC
hrich@dtccom.com

Greg Langley

voice (702) 236-0021
fax (702) 293-6448
WA, OR, ID, MT, ND, WY, SD
glang46@aol.com

Joe Parkinson

toll free (800) 952-4914
voice (909) 598-5110
fax (909) 598-3120
CA, AZ, NV, UT, HI, AK
jparkinson@dtccom.com

Ed Bryant

voice (903) 725-7229
fax (903) 725-7863
TX, OK, AR,
LA, NM, KS, CO
ebryant@dtccom.com

Gary Nichols

toll free (866) 794-2823
voice (765) 473-8917
fax (765) 473-8920
MN, WI, MI, IA, MO, IL,
IN, OH, KY, NE
gnichols@dtccom.com

Frank Prioli

toll free (800) 246-2610
voice (727) 392-4761
fax (727) 320-0509
FL, GA, AL, MS, TN, NC,
SC, VA
fprioli@dtccom.com

CONTACT US



486 Amherst Street ■ Nashua, New Hampshire 03063 ■ 603-880-4411
www.dtccom.com