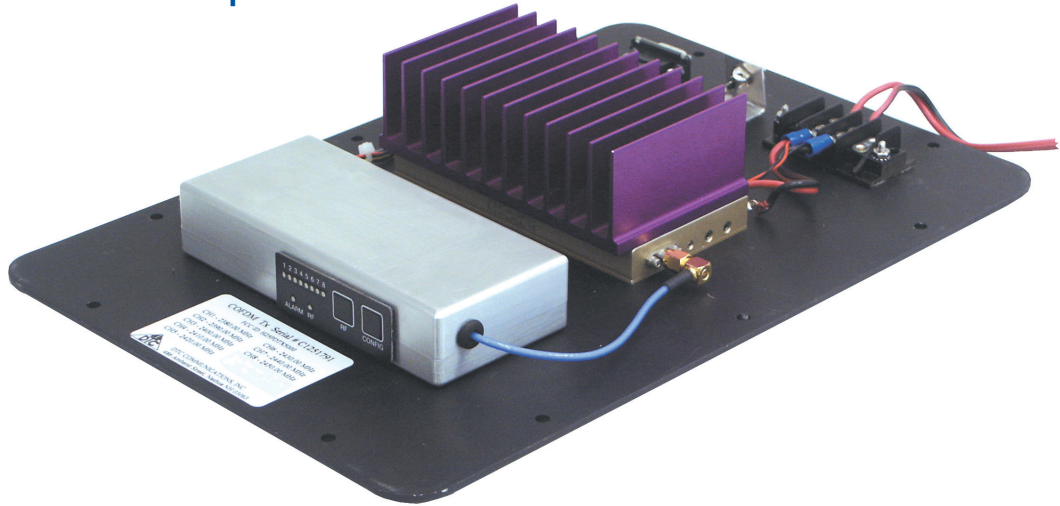


PALLADIUM™ SERIES

# Digital Transmitter

COFDM Transmitter Module

Model Pd-TX-5000A 5 Watt 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](http://www.dtccom.com)

Email: [info@dtccom.com](mailto:info@dtccom.com)

486 Amherst Street  
Nashua, New Hampshire 03063

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- DynaPIX®

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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 using the 2450 to 2483.5 MHz band.

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](http://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

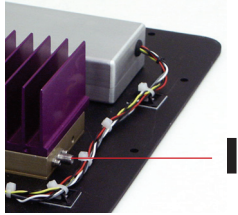
A separation distance of at least 20 cm must be maintained between the antenna and the body of the user or nearby persons.



**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

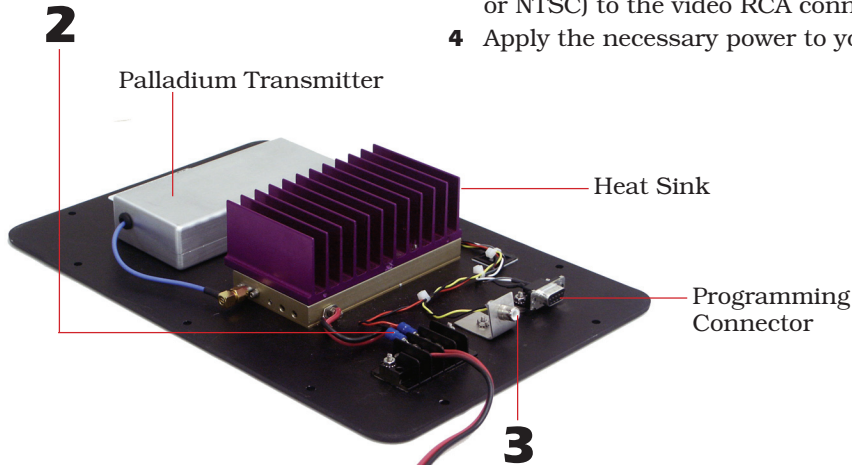


### Complete these steps:

- 1 Connect the transmitter antenna to the SMA connector on the Palladium unit (see photo left).
- 2 Attach a 12 VDC power source (such as a battery pack or AC power adapter) to the power block as shown below. The input voltage range is from 10 to 18 VDC.

**NOTE:** Device is polarity sensitive. Connect DC power only as shown below; black to black (-), red to red (+).

- 3 Attach your camera video input (75 ohm composite video source in PAL or NTSC) to the video RCA connector (see photo below).
- 4 Apply the necessary power to your camera and turn ON.



### Thermal Issues

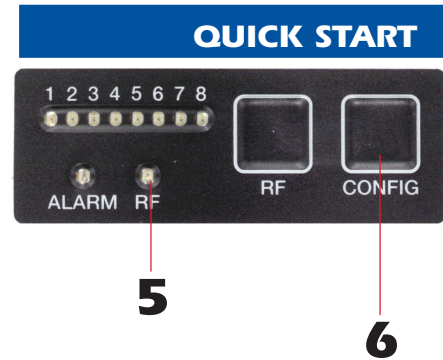
Palladium TX-5000A Modules feature a heat sink for proper heat dissipation. For optimal performance, do not block air flow over the fins of this heat sink.

- 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.
- 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.

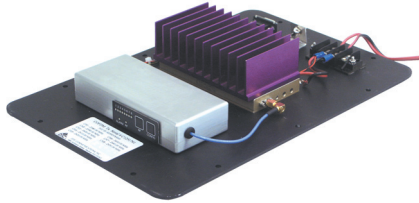
Your Transmitter is now operational. Confirm its signal with your Palladium Receiver.

**NOTE:** Eight Channel LEDs are located on the control panel. If all 8 green LEDs are flashing, this indicates that your battery source is low.



Palladium TX-5000A Transmitter Controls

## INTRODUCTION



Palladium TX-5000A  
5 Watt Digital Transmitter

The Palladium Series of digital video transmitters provide exceptional video quality in high multipath environments. They are ideal for use inside buildings, in urban areas, and in other applications where multipath would normally cause video tearing or breakup.

All Palladium Series transmitters are designed for spectrum-efficient 2.5 MHz channel spacing. Approximately 400 carriers are used to transmit video and two channels of voice and data. Palladium transmitters may be located on adjacent channels without a guard band. AES 128-bit encryption ensures users of secure communications.

The Palladium 5000A is a small, modular transmitter with a 5W RF power output. It's ideal for OEM concealments and short to mid-range robotic and UAV applications. The package is only 13" x 9" x 2.5". All connections are conveniently located. This device can be powered with disposable batteries. The Palladium 5000A incorporates a power amplifier bringing total power output to 5W.



**NOTE:** Use only Lithium batteries with this device.

## 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 is turned ON. 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.

To place your Palladium Transmitter in (low current consumption) standby mode, hold the RF button for one second. The RF LED turns OFF indicating the TX is now in standby mode. Push RF again to resume transmitting.



Palladium TX-5000A  
Transmitter Control Panel

## COMPONENTS

### Transmitter Control Panel

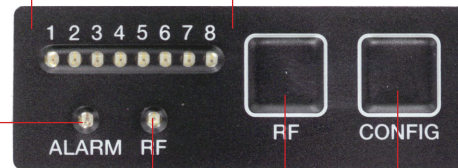
**Channel LEDs** These green LEDs, numbered 1 through 8, indicate the channel number currently selected. Each channel represents a set of preconfigured settings.

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

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

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

**CONFIG Button** This membrane switch cycles through the eight channels.





# COMPONENTS

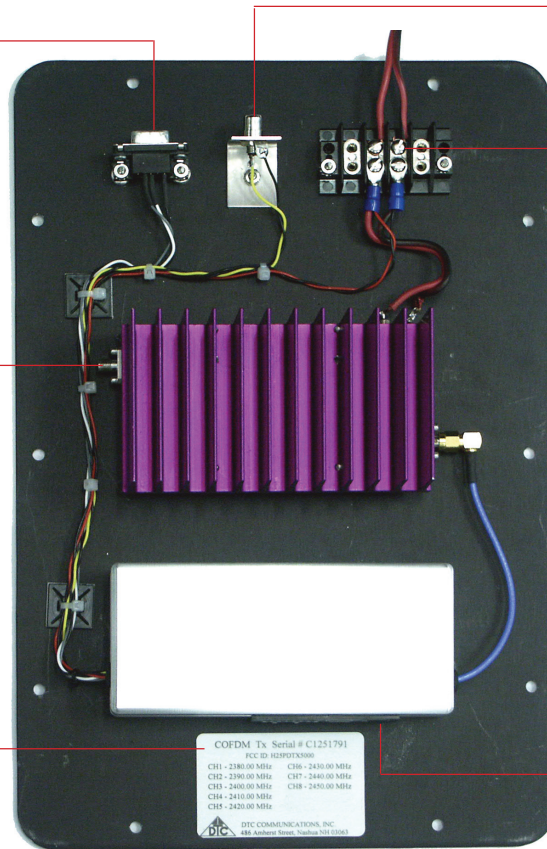
**Programming Connector**  
(DB-9) See Page 10.

**Video Input Connector**  
75 Ohm Composite Video Signal

**DC Power Input**  
10-18 VDC

**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.

**FCC ID Label** This label identifies the frequencies programmed into the Palladium Transmitter.



**Control Panel**  
See Page 8.

## PROGRAMMING

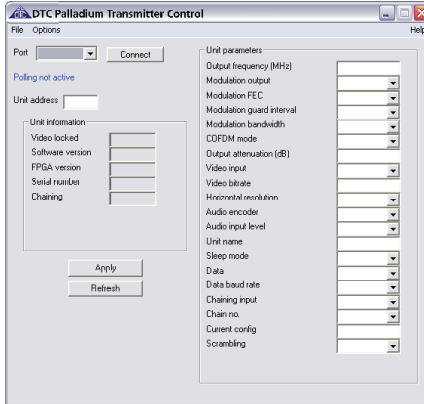


### System PC Controller Application Software

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 two RS232 Serial COM ports to control both a transmitter and receiver simultaneously. Where changes are to be made to either a transmitter, or a receiver, at different times, a PC with a single RS232 Serial COM port can be used.



Installation of the two control programs is as simple as copying them from the CD to a suitable location on the PC. No install shield routine is launched. Note that the controllers generate their own log and initialization files, so it is best to create a dedicated directory for these applications, perhaps with links to the applications from the desktop of the PC.

### Getting Started

- Use the supplied cables to connect the chosen COM port(s) of the PC to unit(s) to be configured.
- Launch each application in turn 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)

### 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

### 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

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

Modulation guard interval

### 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

### 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

## PROGRAMMING

Output attenuation (dB)

### 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

### 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

### 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

### 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

### 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

Can be user defined. Type in name.

### 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

Unit name

Sleep mode

Data

Data baud rate

Chaining input

Chain no.

## PROGRAMMING

Current config

Scrambling

Video locked

Software version

FPGA version

Serial number

Chaining

### **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**

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.



## SPECIFICATIONS

### Physical

Unit Dimensions	
Pd-TX-5000A	10 x 10 x 3.75 in (254 mm x 254 mm x 95 mm)

### Environmental

Operational Temp with Heatsink	-10 degrees C to 70 degrees C
Ambient Temp with Heatsink	-10 degrees C to 40 degrees C

### Power

Input Voltage	10 to 18 VDC
Power Consumption	
Pd-TX-5000A	Fully Operational ~ 70 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 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.
-----------------	--

## COFDM RF output

Output Frequency	Band Dependent
Occupied Bandwidth	2.5 MHz
Power	5 Watts
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.

## Contact Information

### Nashua Main Office Numbers

486 Amherst Street  
Nashua, New Hampshire 03063 USA  
(T) 603 880-4411  
(F) 603 880-6965  
Toll Free in the USA  
1-800 233-8639

### Inside Sales

Law Enforcement  
603 546-2217  
  
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## CONTACT US

A complete listing of Contact Individuals  
can be located on our website at:

[www.dtccom.com](http://www.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

### Ed Bryant

toll free (800) 396-0295  
voice (903) 725-7229  
fax (903) 725-6952  
cell (903) 399-5496  
CO, KS, OK, AR, NM, TX, LA  
ebryant@dtccom.com

### Joe Parkinson

toll free (800) 515-0599  
voice (928) 443-9399  
fax (928) 443-9302  
CA, AZ, NV, HI, UT, AK  
jparkinson@dtccom.com

### Greg Langley

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

### Christine Guzman

toll free (800) 233-8639  
voice (603) 546-2217  
fax (603) 880-6965  
NH, VT, ME  
cguzman@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



**486 Amherst Street ■ Nashua, New Hampshire 03063 ■ 603-880-4411**  
**[www.dtccom.com](http://www.dtccom.com)**