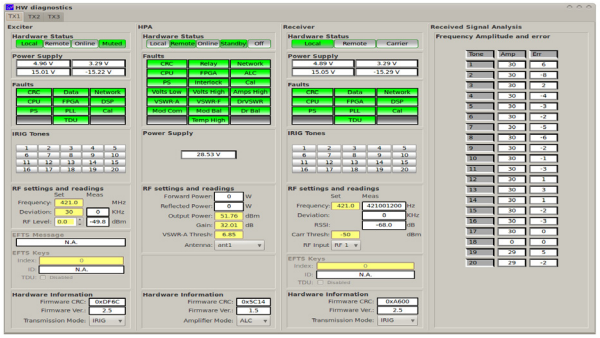


FTS Programming System – FPS

User friendly GUI based configuration, status and control system

Based on Linux operating system

Data is not stored in FPS; it is stored in FCP. FPS is only "thin client" user interface.

Set up system configuration

Set up transmitter configuration:

- Fail over order
- On line / off line
- Read equipment status
- Directly control equipment

Transmitters belong to groups. Failover can occur to any transmitter in a group. Multiple groups are used for switching to downrange or for multiple simultaneous missions.

Set up mission configuration:

- IRIG
- High Alphabet
- EFTS
- Define button to command mapping
- Define tones used by each command in IRIG
- Define button behavior (momentary, latching)
- Define failover criteria
- Supports auxiliary/user command configuration
- Allows multiple FTPs to have identical, overlapping or different functionality on a mission, such as one or two for FTS commands and separate ones for user commands
- Specify mission parameters: frequency, power, mode, deviation, antenna, etc

Manages multiple missions

Global setting of all receivers, exciters, and high power amplifiers

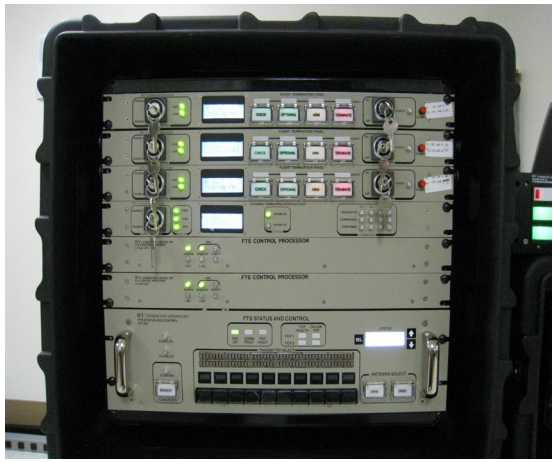
Displays all vital system parameters – RSSI, Deviation, commands or tones, etc

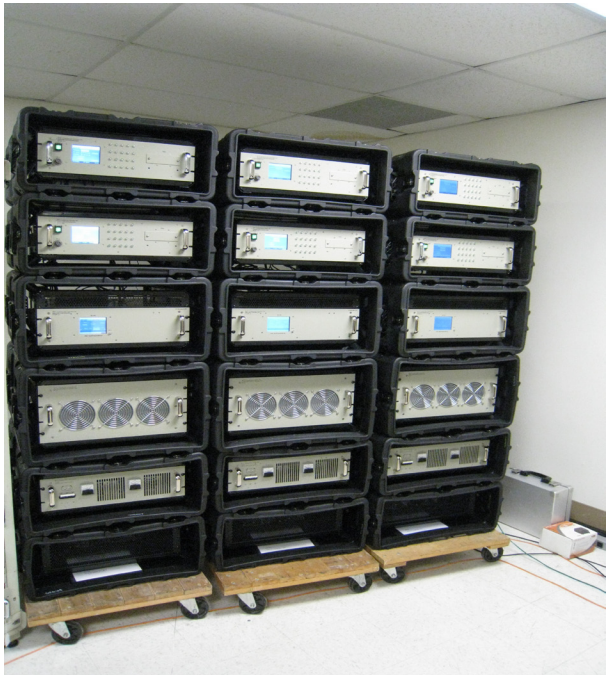
Collects logging data from FCP and stores it to disk

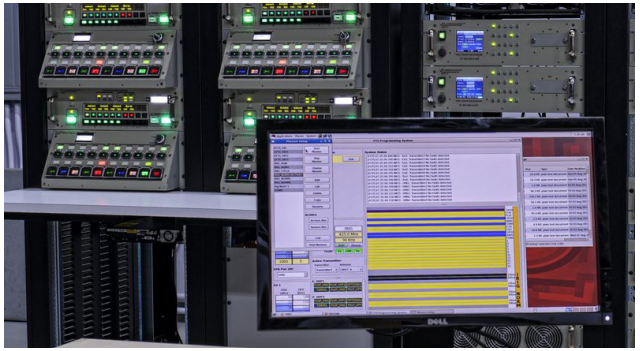
Playback of log data in graphic timeline (Strip Chart) and textual form (Log).

Monitor and control the mission in real time:

- Fault/Failover
- Power, Antenna, Transmitter, Deviation
- Button state, Command state, Command history, sent and verified received
- VFTP for command control override







Flight Termination Control System

WV Communications offers a fully integrated FTS system that combines the reliability of dedicated, firmware based processors with the user friendliness of a Linux based GUI. The command control path is kept within the firmware based system so it does not depend on the reliability of the operating system running the GUI. The GUI is only essential to pre-mission setup. The system provides a consistent, command centric user interface that can be used for EFTS missions while supporting the legacy missions that will inevitably continue to be required for some time.

WV Communications Inc.
1125 Business Center Circle
Newbury Park, CA 91320-1186
Tel: 805-376-1820
www.wv-comm.com

System Architecture:

A typical system consists of one to ten Flight Termination Panels (FTP) each connected to two to four FTS Control Processors (FCP) which handle conversion and routing. The FCP controls two to 16 Transmitter Chains consisting of an encoder / exciter, an HPA and a monitoring receiver. User Interface is through the FTS Programming System (FPS) which consists of a Graphical User Interface running on a Linux workstation, or through an FTS Status and Control Panel (FSC) which offers an essential subset of the FPS capability using the same high reliability architecture used by the FCP.

System Features:

All parts of the command communication path are controlled and processed by dedicated high reliability processors running without an operating system using very simple, robust programming techniques.

All communication links use error detecting protocols and acknowledgement and are constantly supervised to insure availability when needed. Serialized data minimizes the number of conductors required for communication, simplifying installation and enhancing reliability.

Uses a command centric approach that is consistent across all modes

Can support centralized Triple Data Encryption Standard (DES) Unit (TDU) for secure EFTS

Component Fault monitoring with automatic or manual transmitter failover and automatic FCP failover

Command verification takes off-the-air data from the monitor receiver and provides command level verification of transmission to the Range Safety Officer (RSO)

FLIGHT TERMINATION PANEL – FTP – (CT1009)

The RSO command entry interface

Keyed power switch

Keyed RF Carrier switch

Up to four outputs to four redundant FCPs

Separate processor assembly for each output for redundancy

LED Illuminated DPDT momentary Pushbutton switches. Each processor uses one NO and one NC contact to verify correct switch operation. Illumination is controlled by the FCP

FCP creates logical button behavior, including momentary, push lock, push release, interlock, priority override, lockout or suspend

FCP controls illumination, creating consistent behavior for multiple FTPs. A push lock, push release button could be turned on from one FTP and all others assigned would show it. Any of them could turn it off.

Separate LED verification lights above switches indicate verified reception of command actually transmitted

Communications options (FTP to FCP):
- RS-232 / 422 / 485, 2400 Baud synchronous FSK voice band modem
- Ethernet

Fault monitoring:
- All power supply voltages
- Button integrity
- Communication integrity

Indicators for Power, Communication and Fault
- Front panel three color LED summary indicators
- Back panel detailed diagnostic indicators

Status LCD displays mission name and verifies FTP location

ROM based processors with no operating system for reliable, deterministic operation

Each processor board has its own power connector to allow redundant powering

Powered from 48 VDC to allow operation from telecommunication battery bank

FLIGHT CONTROL PANEL – FCP – (CT1007)

The heart of the system

Up to ten inputs (expandable) for FTPs

Two separate LAN connections for redundant communication

Simple, reliable UDP communication

Straightforward high reliability program starts from reset vector with no operating system

Non-volatile FRAM for setup, configuration, equipment profile and mission configuration settings

Indication of active FTP communication and any communication faults

Indication of LAN communication faults.

Automatic data synchronization across all FCP

Automatic correct operation check and failover to redundant FCP

Automatic transmitter and communication status checks

Automatic or manual fail over to backup transmitter

Flexible equipment allocation, levels of redundancy, and failover order

Indication of primary status of FCP

Indication of CPU fault

Thorough event logging:
- Button press state change
- Command state change
- Commands sent to Exciter with verification
- Commands received by Monitor receiver
- Any change in fault status
- All measurement parameters from forward power output to transistor current
- All entries are time stamped

Provision to support TDU for centralized encoding of secure EFTS missions

Powered from 48Vdc allowing operation from telecommunication battery bank