Mobile Telemetry Van
Remote Control Upgrade

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Mobile Telemetry Van
Remote Control Upgrade

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Outline

• Overview
• Background
• Capabilities of Existing Telemetry Vans
• Advantages of Remote Control System Upgrade
• Summary
Overview

- Remote control of Telemetry Mobile Ground Support (TMGS) Van proposed to allow tracking of aircraft beyond limits of the fixed sites at Edwards Air Force Base (AFB) without daily “in field” support by O&M personnel
- Research conducted to discover how other ranges have implemented remote control of their TM Systems
- Information supplied by China Lake Naval Weapons Center (NWC) personnel provided valuable data for full-function remote control of telemetry tracking vans
Background

- TMGS Vans support Flight Test at Edwards AFB at remote locations as well as providing extra capabilities for heavy Telemetry (TM) mission support load near fixed sites.
- Remote control capability from main TM site at Building 5790 currently allows support via TMGS Van at nearby C-15 Site, Plant 42 in Palmdale, and as far (tested to date) as FAA Radar Site Panamint Valley, California - 70 miles north of Edwards AFB.
- Ability to control from central point allows O&M personnel to support multiple Air Force TM tracking tasks cost effectively, with fewer personnel.
- Existing, L, S and C-Band capable versions of TMGS Vans are ideal for current and near future Air Force mission support requirements.
TMGS 1 Van Located
At Panamint Valley
Satellite View of TMGS 1 Van Located At Panamint Valley FAA Radar Site

Satellite picture shows TMGS Van in position in fenced compound at FAA Radar site in the Panamint Valley
The Panamint FAA Radar site allows the testing to be conducted in a fenced site with on a federal installation which is partially manned. External power was made available. The distance is about 70 miles by "crow-flight" from Edwards AFB in the northern part of the R2508 Complex.
1 - Remote Control Equipment Items Added: Remote Control Spectrum Analyzer, 4 Channel Oscilloscope, Ethernet Switch, Analog Video Switch

2 – TMGS Van Equipment Items Modified for Remote Ethernet Control: VHF/UHF Radio, Signal Generator, RF Modulator, Antenna Control Unit, All RCB 2000 L-3 Receivers, Local Computer
Ethernet/RS 422 Converter Added to Digital Microwave System
For Remote Control of Radio

TMGS 1 Van
Comm Rack Modification

USAF PHOTO: APPROVED BY 412TW/TENG SECURITY OFFICE
New Remote Control Console at Building 5790

- Dual Video Monitors
- Dual PC Monitors
- Remote ACU
- Ethernet Switch & Video Decoders
- Rack Mount PC
Ethernet controlled pan and tilt video monitor camera sends video of equipment front panel information to Building 5790 Remote Control Console.

Similar camera in weatherproof housing mounts outside the TM van to monitor antenna operation and functions as safety and security monitor system in the field.
Hardware and Software Description

– **Equipment Power**
  • Server Technology CW-16V1-C20MX Ethernet Power Strips
  • Controlled via Web Browser application

– **Telemetry Receivers**
  • L3 Telemetry-East Model RCB-2000 (4 each)
  • Controlled via vendor supplied Windows application

– **Telemetry Antenna System**
  • TCS Model 1800 with ACU-M1 Antenna Control Unit
  • Controlled via Remote ACU-M1 in Master-Slave configuration

– **Spectrum Analyzer**
  • LP Technologies Model LPT-3000R Remote Spectrum Analyzer
  • Controlled via vendor supplied Windows application
Hardware and Software Description Cont.

- **Oscilloscope**
  - Agilent Model DSO-X 3024A
  - Controlled via Web Browser application

- **Vector Signal Generator**
  - Agilent Model N5182A Vector Signal Generator
  - Controlled via vendor supplied Windows application

- **Multimode Waveform Generator**
  - RF Networks Model SK10155-2
  - Controlled via DOS (Telnet) Command Line Interface

- **Video Switch**
  - Universal Switch Model VSU1-3224 Analog Video Router System
  - Controlled via Web Browser application
– Internal and External Surveillance Cameras
  • VIVOTEK Model PZ8111W Pan/Tilt/Zoom Network Camera
  • Controlled via Web Browser application

– HVAC System
  • Proliphix Model IMT550C Internet Managed Thermostat
  • Controlled via Web Browser application

– VHF/UHF Radio
  • Motorola Model URC-200
  • Controlled via vendor supplied Windows application
Edwards Main TM Site
Remote Control Block Diagram

Legend: Black - Existing TM Equipment, Green - Modified Equipment, Blue – New Equipment for Remote
Edwards AFB TMGS Van Remote Control
TM System Block Diagram

Legend:  Black – Existing TM Equipment,  Green – Modified Equipment,  Blue – New Equipment for Remote
Telemetry Bands In Use at Present and For Immediate Future

- L, S-Band frequencies currently in use at Fixed, Mobile, and Remote Mobile TM sites for Edwards Flight Test Aircraft:
  - L-Band: 1435 – 1525 MHz
  - 1755 – 1850 MHz
  - S-Band: 2200 – 2395 MHz
  - C-Band frequencies planned for near term:
    - 4400 – 4940 MHz and 5091 – 5150 MHz
Summary

• Testing of Remote Control TM Van antenna has been very successful at Edwards C-15 site and Panamint Radar Site across L, S and C-Band frequencies of interest – ATP and ACP flights completed in March 2012

• Utilization of 4 Ft. Roof Mounted TM Antenna with control from main Building 5790 Telemetry Site allowed tracking of aircraft out beyond 70 miles from Van Antenna – actual range only limited by available comm link

• Bit-Error Rates and receiver Signal-To-Noise Ratios are within required limits

• Modifications of TMGS Vans 1 complete and TM Systems Commissioned

• Modification of remaining TMGS Vans 2, 3 and 4 in progress