



Dryden Flight Research Center Western Aeronautical Test Range (WATR)

Prepared by
Michael Yettaw

Presented by
Russ James

April 19, 2012



Dryden Overview



- **Status**
 - **In-work and Recent Activity**
 - **Systems Overview**
 - **Dryden Current Vehicle Support Programs**
 - **WATR Systems Hand out**





In-work and Recent Activity



Dryden Radio Communications Equipment Replacement



Dryden Radio Communications equipment scheduled to be replaced

- Rockwell Collins GRC 171 & 211 Transceiver support vendors can no longer obtain all the parts necessary to repair modules
 - Dryden AM Transceivers will be replaced with Rockwell Collins model 721S VHF/UHF radios
 - The 721S adds FM capability and expands the frequency range of a single radio to 100 - 500 MHz
 - The 721S is a plug for plug replacement for the GRC 171 and the GRC 211
 - The 721S is on GSA price schedule
 - Transceiver inventory will be replaced in phases - funding dependent



GRC-211: 116 – 152 MHz

The Rockwell Collins model 721S will replace both the UHF GRC 171 & VHF GRC 211 .

GRC-171: 225 – 400 MHz

721S: 100 – 500 MHz



In-work and Recent Activity



The Rockwell Collins model 721S front panel

Tailorable Softkey Touch Controls



Loudspeaker

Front Panel Audio, I/O & PTT Keying Control

Rear Interfaces for Ethernet, Data, Audio, and Keying



In-work and Recent Activity



The 721S has external PC control software options

RT Control Screen

Blade Radio interface showing RT Control options. The screen displays 'Established communication with Blade Radio' and includes buttons for VOL DN, VOL UP, KEY RADIO, RCU OPTIONS, and RT OPTIONS. A large frequency display shows 123.0000. Other controls include AM, WB, ANT A, SIM, TX, GD SCAN, and SQ CFG.

Cavity Filter Control Screen

FormCvtyFiltMainDisplay interface showing CAVITY FILTER OPTIONS. The screen has tabs for MAIN and NETWORK. It displays a large frequency display showing 0000 and includes a Filter Frequency control.

Radio Summary Screen

| Radio | Frequency (MHz) | Preset | Indicators | Levels | Squelch |
|---------|-----------------|-------------|------------------------|--------|---------|
| Radio 1 | 137.0000 | Preset Name | Guard Ra FLT TX 58 dBm | | SQ 0000 |
| Radio 2 | 137.0000 | Preset Name | Main Ra EPM RX 87 dBm | | SQ 0000 |
| Radio 3 | 137.0000 | Preset Name | Guard Ra FLT TX 58 dBm | | SQ 0000 |
| | | | Main Ra EPM RX 87 dBm | | SQ 0000 |

Device Selection Screen

Device Selection Screen interface showing a table of devices and their configurations. The table includes columns for Device IP Address, Device Description, Device Type, Control Only, Assoc. #, and Reachable. Buttons for Add, Delete, Un-Associate, Associate, Poll, Connect, Save, and Reload are present.

| Device IP Address | Device Description | Device Type | Control Only | Assoc. # | Reachable |
|-------------------|-------------------------|-----------------|--------------|----------|-----------|
| 10.1.1.9 | Blade Radio | Radio(Remote) | No | | No |
| 10.2.1.11 | Blade 2 | Radio(Remote) | No | | No |
| 10.0.1.254 | Chan D | CV-1004 | No | | No |
| 10.0.1.253 | Chan C | CV-1004 | No | | No |
| 10.0.1.252 | Chan B | CV-1004 | No | | No |
| 10.0.1.251 | Chan A | CV-1004 | No | | No |
| 10.1.1.20 | Cavity Filter 10.1.1.20 | Cavity Filter | No | | No |

MultiRadioPresetDisplay interface showing Preset Summary for Radio 1. The screen displays a large frequency display showing 137.0000 MHz and a grid of Tower presets at 128.0000 MHz. Configuration options include CONFIG, SQUELCH, and SQ ON/OFF.

Preset Summary Screen



In-work and Recent Activity

A composite background image showing a control room with multiple computer monitors and a person working, overlaid with a large satellite dish antenna structure.

Dryden Ground Voice Communications VoIP End-Station Implementation

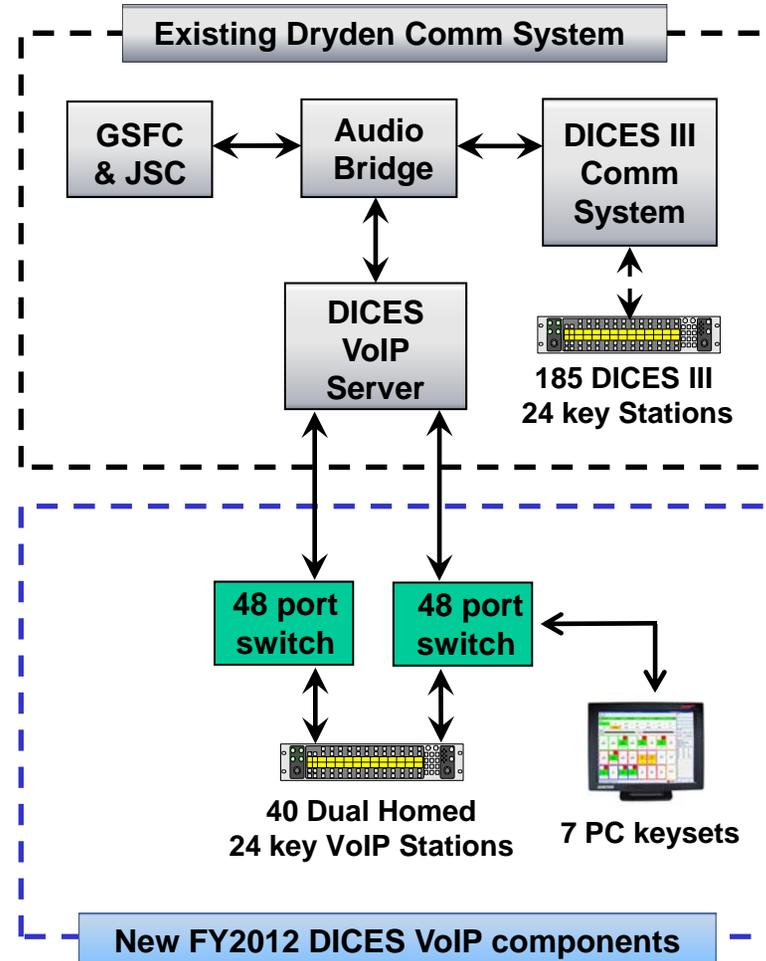


In-work and Recent Activity



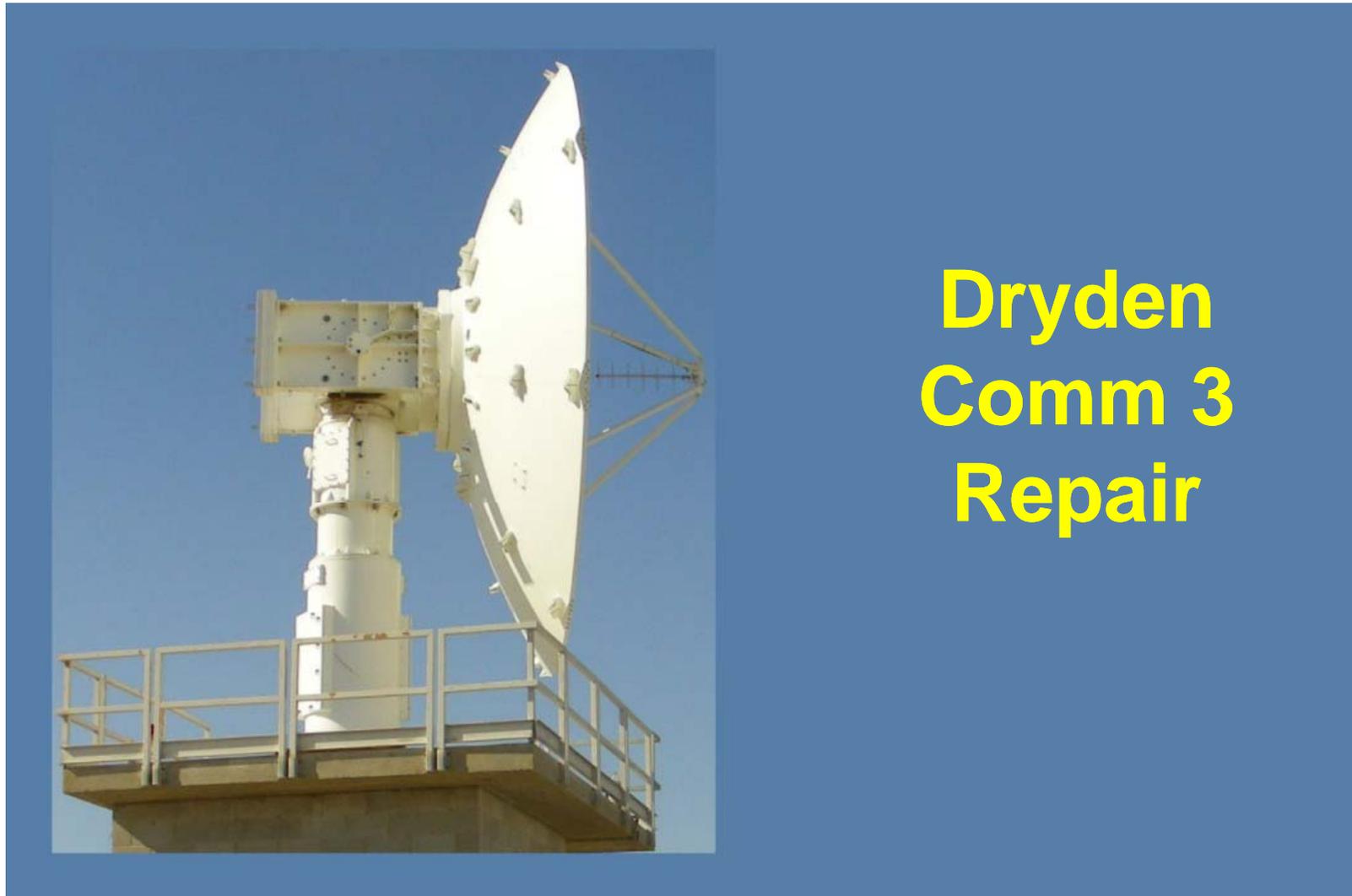
Dryden Ground Communications VoIP End Station Deployment

- DICES III voice communications system vendor can no longer obtain all the components required for repair of some DICES III equipment
- Dryden will be adding additional VoIP end stations to work with existing VoIP node
- New VoIP end stations will allow existing DICES III equipment to be re-utilized as spares to prolong system life
- DICES VoIP end stations will be identical to existing 24 key DICES III end stations





In-work and Recent Activity





In-work and Recent Activity



Dryden Comm 3 repair

- **Comm 3, six meter directional antenna to be taken down for maintenance in April 2012**
 - **Gearbox assembly noise issues to be addressed**
 - **Repair could take several months, return to service TBD based on inspection results**
 - **Comm 1 & Comm 2 (both 3 meter directional) available for support**





Dryden Systems Overview





Dryden Systems Overview



Dryden WATR Operational Systems



Mobile Systems



Telemetry & Radar



Long Range Optics



Communications systems

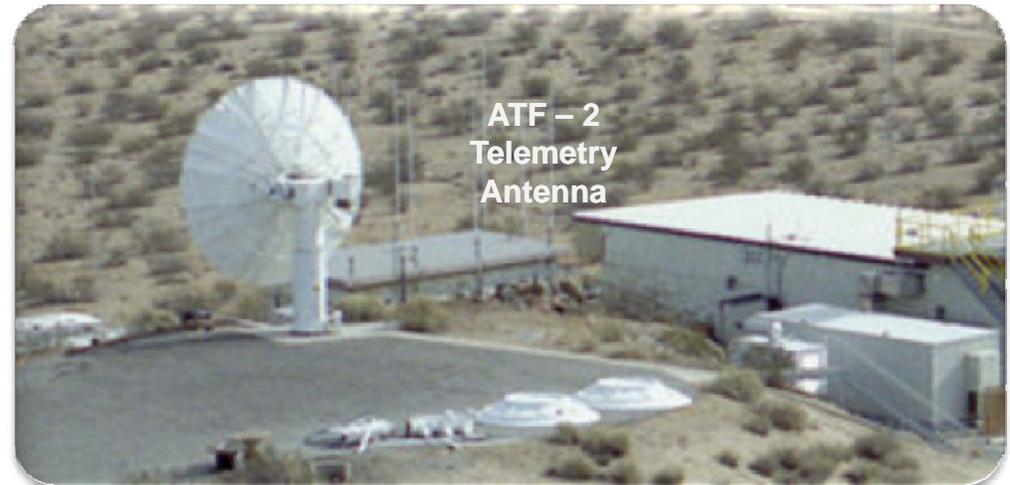


Dryden Systems Overview



Fixed Telemetry Systems

- Two 7 meter (ATF 1 & 2) and one 3.7 meter (ATF 3) L-, S-, and C-Band telemetry and TV downlink and L- & S-Band uplink with a redundant 100 Watt transmitter
 - ATF 1 & 2 G/T= 17 dB @ 2250 MHz
 - ATF 3 G/T= 9.8 dB @ 2250 MHz



Radar

- Two 4.9 meter C-Band RIR 716 Radars
 - Capable of tracking LEO vehicles from horizon to horizon. S/N ratio is dependent on vehicle cross section and other variables



Dryden Systems Overview



Mobile Telemetry Systems

- MOF1 is a 30 foot trailer
 - Equipped with a 6-ft telemetry antenna with L-, S-, & C-Band telemetry and TV downlink, L- & S-Band uplink with a redundant 100 Watt transmitter
 - $G/T=1.9$ dB at 2250 MHz
 - Three point electro-mechanical lift for deploying antenna system
 - 2 UHF/VHF radios
 - 12 channel voice intercomm system



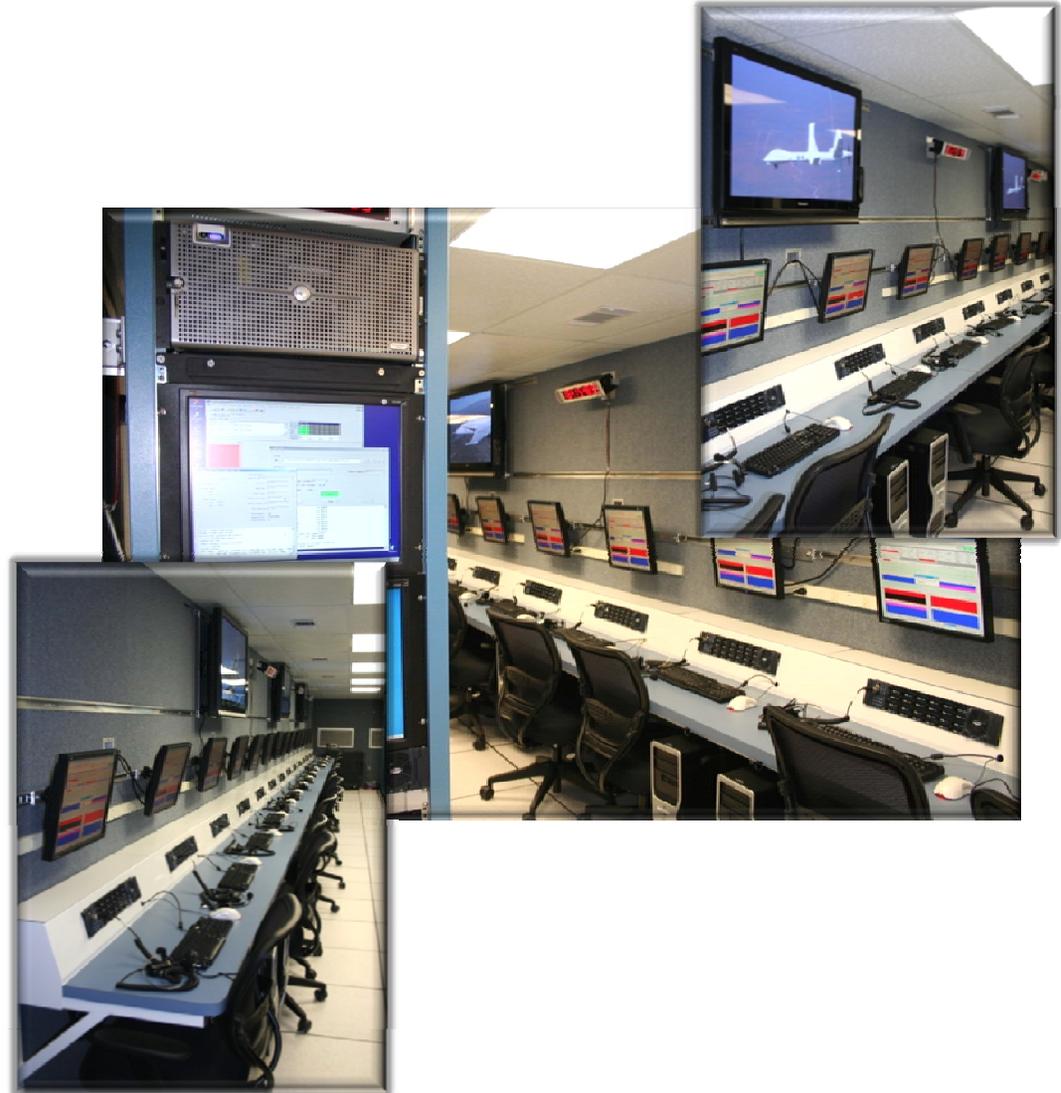


Dryden Systems Overview



Mobile Telemetry Systems

- MOF5 is a 53 foot trailer
 - Equipped with 14 research stations
 - Full PCM decom capability
 - Up to 6 PCM streams
 - Multi-channel video distribution system
 - Multi-channel voice intercomm system



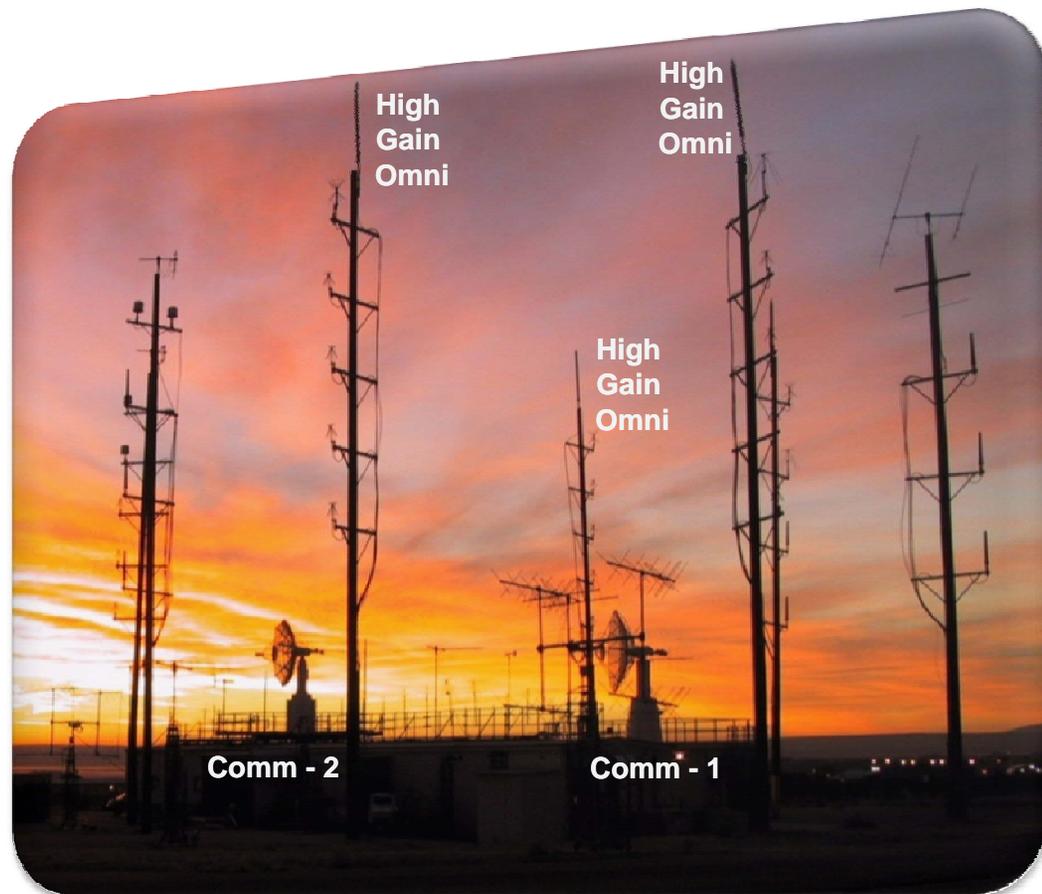


Dryden Systems Overview



Voice Communications Facility

- Three UHF Directional Antennas (Comm 1, 2 & 3)
10 to 22 dB gain frequency dependent.
- Three 7 dB gain UHF High Gain Omni antennas
- Two 10 dB gain VHF Directional Antennas
- Redundant Voice Communications system



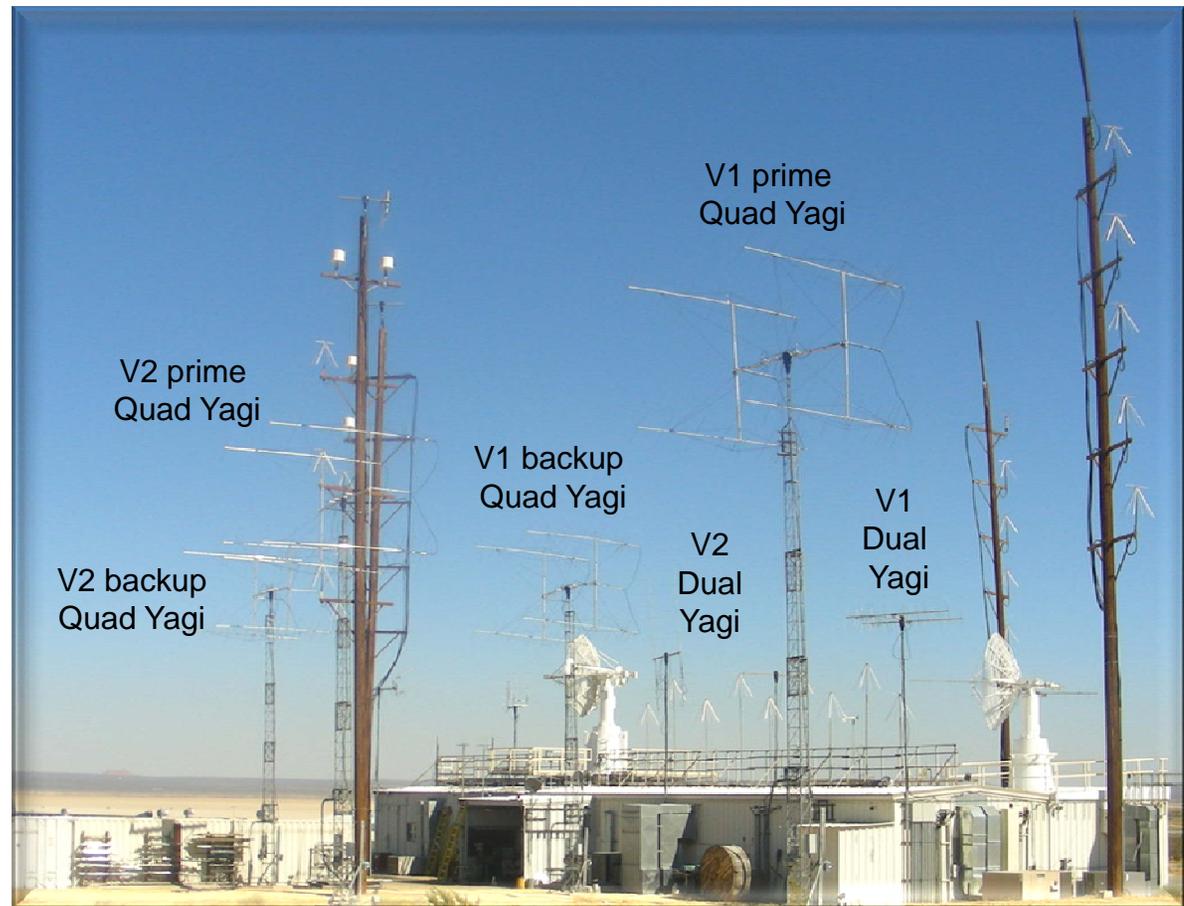


Dryden Systems Overview



ISS Support Systems

- **V1:**
 - Two Quad Yagi Antennas
 - One Dual Yagi Antenna
- **V2:**
 - Two Quad Yagi antennas
 - One Dual Yagi antenna
- **No open DRs or CCRs on the VHF ISS support system**
- **Six certified operations personnel**





Dryden Systems Overview



Video Support

- Long Range Optics
 - HD 720p camera with 13.5 – 2300mm lens tracking to 100 nautical miles
 - 480i Infrared camera with 15x lens tracking to 40 nautical miles





Dryden Systems Overview



Video Support - continued

- TV 1 Mobile Video
 - HD 720p Camera with 27 – 1760 mm lens



- TV 2 Mobile Video
 - HD 720p Camera with 15.2 – 260 mm lens
 - HD transmit capability

Note: The Mobile Vans are no longer part of the WATR. The assets have been moved to Dryden Information Technology branch Code MI

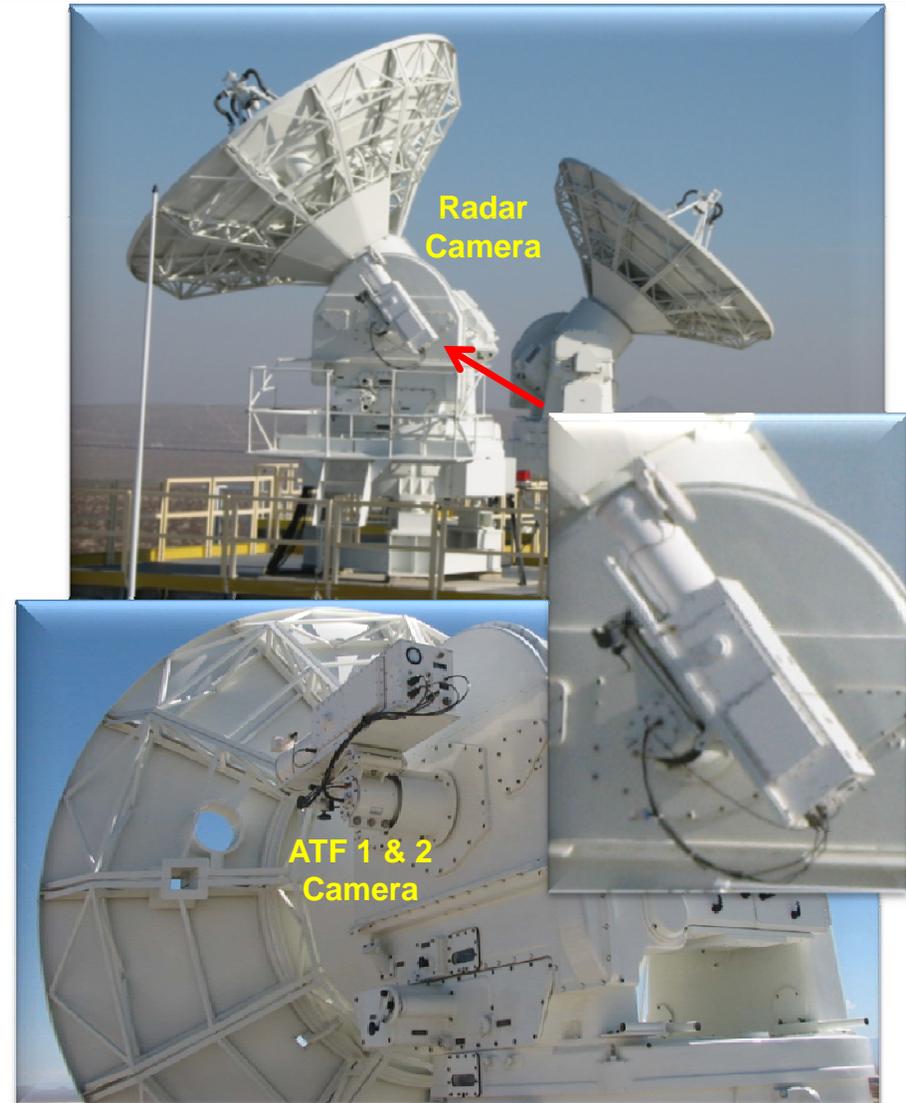


Dryden Systems Overview



Video Support - continued

- ATF 1 & 2 camera
 - 520 NTSC with 2200 mm lens
- ATF 3 camera
 - 520 NTSC with 503 mm lens
- FRCC (Radar 34) camera
 - 520 NTSC with 3050 mm lens
- FDRC (Radar 38) camera
 - 520 NTSC with 3050 mm lens





Dryden Systems Overview



Dryden Mission Control Centers & Data Processing

- The WATR has two Mission Control Centers to support research and test missions
 - MCC1 - 27 Data display stations
 - MCC2 - 17 Data display stations
- The Mission Control Center provides real-time mission operations for test conductors, research engineers, range safety and project personnel
 - Monitoring data for flight safety
 - Data analysis for in-flight test point clearance



MCC1



MCC2



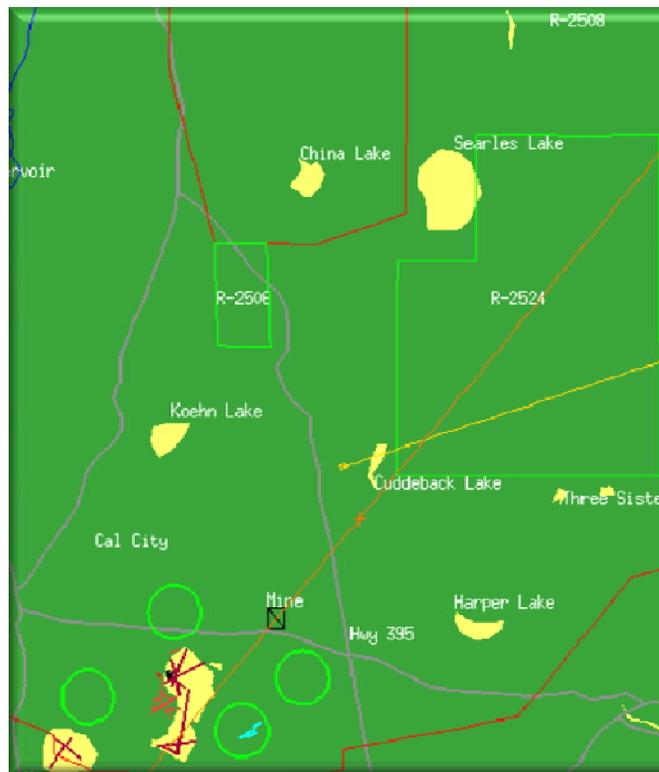
Dryden Systems Overview



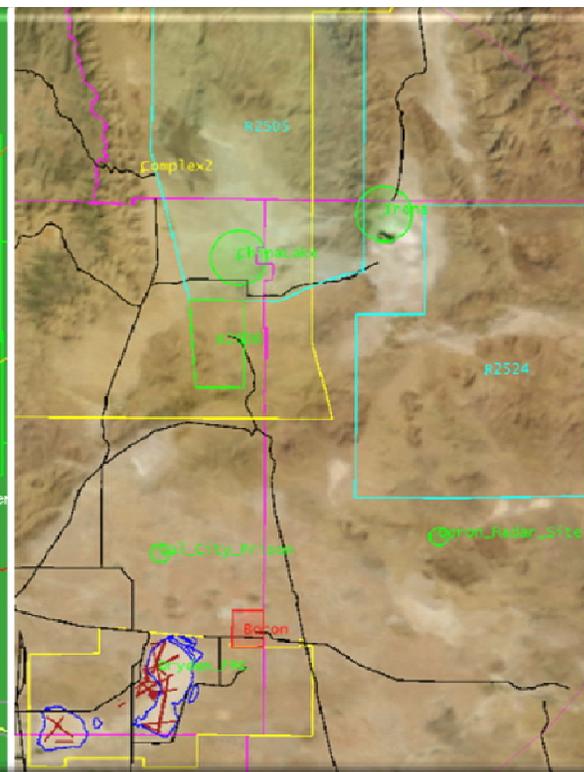
Range Safety

- Flight critical & time-space positioning information (TSPI) data
- Vehicle location and predicted debris impact points displayed on data monitors
- GRIM 2D display system in process of being replaced by PAM3D TSPI data display

**Global
Real-Time
Information
Map (GRIM)
Display**



Current



Future

**Positional
Awareness
Map
(PAM3D)
Display**



Dryden Systems Overview



Range Safety continued

- New TSPI PAM3D display options
 - 3-D terrain view
 - Target to target





Dryden Systems Overview



Range Safety continued

- 20 KW (EIRP) Enhanced Flight Termination System (EFTS) for unpiloted vehicles
- Existing 4 transmitter System is in process of being replaced by a 6 transmitter array
- Currently supporting:
 - X-47 Pegasus
 - X-48 Blended Wing Body
 - Boeing Phantom Eye



Flight Termination System



Dryden Support Programs



LEO SPACECRAFT

ISS

HIGH PERFORMANCE AIRCRAFT

F18 TESTBED

SCIENCE AIRCRAFT

SOFIA

LONG DURATION UAVs

PHANTOM EYE

Space Transportation Vehicles

DREAMCHASER

BWB

UAVs

X-47



Questions?