Un-tethered Test Capability:
Improving Airborne Test Efficiency

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Distribution Statement A: Approved for public release; distribution unlimited.
Joint Range Instrumentation Pod (JRIP)

• Background
  – Designed, Developed, Fabricated by 846th Test Support Squadron, Eglin AFB, FL

• Purpose
  – Receive and Record Weapon Telemetry
  – Collect and Record TSPI Data

• Unique Features
  – Un-tethered Test
  – Non-intrusive and Compatible

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Non-intrusive, Compatible Instrumentation

- Same shape, weight, balance as AIM-120A/B
Non-intrusive, Compatible Instrumentation

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Non-intrusive, Compatible Instrumentation

• Same shape, weight, balance as AIM-120A/B
• Self-contained pod
  – Power via 1776 or AIM-9X connections

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Un-tethered Test

• Tray 1: Receivers
  – Modulations: PCM/FM and SOQPSK
  – Max Data Rate: 20 Mbps
  – Operating Frequencies: Lower L, Upper L, S Bands
Un-tethered Test

• Tray 5: Recorder
  – Total Memory: 32 GB
  – Media: Compact Flash Cards (2)
  – Max Record Time @ Max Data Rate: ~1.7 hrs
  – Format: IRIG-106 Ch. 10
PCM/FM vs. SOQPSK

- Flight test losing parts of frequency spectrum
- Need to fit more data into less space
Supplementing Ground Range

- Tray 5: **Transmitter**
  - Modulations: PCM/FM and SOQPSK
  - Max Data Rate: **20 Mbps**
  - Operating Frequencies: Lower L, Upper L, S Bands
Supplementing Ground Range

- Test Item to JRIP: **SOQPSK**
- JRIP to Ground Receiver: **PCM/FM**
Unique User Equipment

- Tray 4: User Equipment
  - Allows user to install unique test equipment with no aircraft modification
User Tray

- Orthogonal Frequency Division Multiplexing (OFDM)
  - Allows multiple data streams on one frequency
  - Network-based instrumentation
Operation

F-15 C-E Stations
2A/B, 3*, 4*, 6*, 7*, 8A/B
*MIL-STD-1776 Connection only

F-16 Stations
1, 2, 8, 9

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Operation

- JRIP programmed and set to record before taxi
- Receives, records and re-transmits data during mission

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Summary

• Receives and records weapon telemetry, TSPI data, aircraft performance data and targeting parameters
• Can re-transmit data to the ground
• Dedicated space for user equipment

Un-tethered, Non-intrusive, Compatible Instrumentation Pod
Questions

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The ASEI Advanced GPS / Inertial System (AAGIS) is the navigation subsystem in the JRIP Pod that provides real-time and post-mission TSPI data.

The major components that make up the AAGIS subsystem are as follows:

- Honeywell HG-1700 Inertial Measurement Unit (IMU)
- Novatel OEM4 G2L Dual-Frequency WAAS Enabled GPS Receiver
- Navigation and INS/GPS Integration Filter software developed by ASEI Inc.

AAGIS utilizes a Dual Frequency (L1/L2) Wide Area Augmentation System (WAAS) capable receiver from Novatel with the following performance specifications:

| Position:  | Horizontal: 1.0 m CEP (with SBAS corrections to the GPS receiver) |
| Vertical:  | 3.0 m CEP (with SBAS corrections to the GPS receiver) |
| Velocity:  | 0.1 m/s RMS (with GPS) |
| Max Velocity: | 514 m/sec |
| Attitude:  | Pitch/Roll: 0.1 deg RMS |
| Max Altitude: | 18288 m |
| G’s: | 4g sustained track |
| Heading: | 0.2 deg RMS |

Measurements from the GPS receiver are used to correct an inertial navigation solution at a 1 Hz rate utilizing a 15-state Kalman Filter.

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