Established three tenets in order for UAS to fly in the NAS

- **Airworthiness**
  - MIL-HDBK-516 (DOD)

- **Pilot/Operator Qualifications**
  - CJCSI 3255.01 (Joint Staff)

- **Regulatory Compliance**
  - Standardized Procedures
  - COA Refinement
We are here
**Live-Fly Test Sites**
- Fort Hood, Texas
- Marine Corps Air Station Cherry Point, North Carolina
- Cannon AFB, New Mexico
- Grand Forks, North Dakota
- Fort Drum, New York

**Modeling & Simulation Sites**
- MITRE, McLean, Virginia
- William J. Hughes FAA Technical Center, Egg Harbor Township, New Jersey
The MITRE Corporation, McLean, VA

M & S

August 2012

Charter

Army

Air Force

Marines

Federal Interagency

Air National Guard

Customs and Border Protection

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Test Timeline

229 Total Sorties
Flight procedures differ significantly between locations and agencies (COAs)

No standardized FLIP for terminal Area UAS operations
- Pilots not provided approved charts
- UAS details don’t exist in publications

UAS specific guidance not yet fully developed
- IFR vs. VFR?
- Common terminology

Knowledge of UAS capabilities and limitations lacking for key personnel
- ATC
- Other users of DOD airspace (civilian and military)
Questions?
UNFO SP and Chart Overview

CW4 Mark Burrows  
*JT Standardization and Safety Officer*

Mrs. Dana Whitman  
*JT ATC SMA*
What is the UNFO SP?

Part One

Provides a single source descriptive guide to ensure operationally

Effective planning
Safe and Efficient Integration
Utilization of UAS in the NAS
Part Two

Standardizes and aligns UAS routine and contingency procedures as much as possible to match manned aviation.
Flight Plan Route

CANNON AFB
APPROACH CONTROL
(SFC-17,000ft)

Acronyms
- CHP: Contingency Hold Point
- FTP: Flight Termination Point
- IAF: Initial Approach Fix
- TADP: Terminal Area Departure Point
- TAAP: Terminal Area Arrival Point

Phases of Flight
- Black: Terminal Departure
- Green: En Route
- Orange: Operating Area
- Blue: Terminal Arrival
- Red: Contingency

DoD Joint Test & Evaluation
UNCLASSIFIED
Terminal Departure Lost Link Contingency Non-Self-Land Capable

CANNON AFB APPROACH CONTROL (SFC-17,000ft)

Acronyms

- **CHP**: Contingency Hold Point
- **FTP**: Flight Termination Point
- **IAF**: Initial Approach Fix
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**Phases of Flight**

- **Terminal Departure**
- **En Route**
- **Operating Area**
- **Terminal Arrival**
- **Contingency**
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CANNON AFB
APPROACH CONTROL
(SFC-17,000ft)

Acronyms

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<th>Definition</th>
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Phases of Flight

- **Terminal Departure**
- **En Route**
- **Operating Area**
- **Terminal Arrival**
- **Contingency**
CANNON AFB
APPROACH CONTROL
(SFC-17,000ft)

Acronyms

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Phases of Flight

- Terminal Departure
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Acronyms

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**Phases of Flight**

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- **En Route**
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- **Terminal Arrival**
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**CANNON AFB APPROACH CONTROL**

(SFC-17,000ft)
Acronyms:

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- Terminal Departure
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**CANNON AFB**

**APPROACH CONTROL**

(SFC-17,000ft)

**DoD Joint Test & Evaluation**

**UNCLASSIFIED**

Terminal Arrival

Lost Link Self-Land Capable & All Lost Communications
DOD approved UAS charts would provide:

- Increased safety
- Increased predictability
- Increased efficiency
- Illustrate routings, contingency fixes, and altitudes
- Graphically standardize UAS contingency procedures

Our solution was to develop UAS charts that mirror existing standards to the greatest extent possible:

- UAS Departure Procedures (UDP)
- Standard UAS Terminal Arrival (SUTA)
- UAS Approach Procedures (UAP)

The following charts are a collaborative effort between UAS-AI JT and the NGA
Standard Instrument Departure (SID)-like
Added “UAS” to title of the UDP chart in the top margin

Added “Departure Control” airspace and applicable notes

Added applicable ATC facility phone numbers to ATC frequency information block for lost communications

Added “UNMANNED” to the margins; “UNMANNED” margin markings should be annotated on ALL UAS charts

Added waypoint information (waypoint type, name, and lat/long coordinates) for UAS mission planning
Charts should be depicted using color to highlight special use airspace and contingency routing.

Used as many manned chart symbols and chart annotations as possible.

Added ATC and UAS system requirements needed to use this UDP chart.

Added Emergency Safe Altitude.

Verbal depiction of departure routing, starts at runway and ends at the TADP; contingency routing would be on page 2.

Added “UAS” to title in the bottom margin.
Standard Terminal Arrival (STAR)-like

LANDING Rwy 04: From DAMRN (TAAP) via heading 082° to FLUTY, 152° to JELIL, then 171° to DEEKA (IAF). Expect UAP Rwy 04 for final approach and landing.

LANDING Rwy 13: From DAMRN (TAAP) via heading 082° to FLUTY, 152° to JELIL (IAF). Expect UAP Rwy 13 for final approach and landing.

LANDING Rwy 22: From DAMRN (TAAP) via heading 082° to FLUTY, 092° to PIBIE (IAF)

Expect UAP Rwy 22 for final approach and landing.

LANDING Rwy 31: From DAMRN (TAAP) via heading 082° to FLUTY, 092° to PIBIE, then 120° to STAFO, the 171° to RUSLE (IAF). Expect UAP Rwy 31 for final approach and landing.

Approach Control airspace: Surface to 17,000

CAUTION: Holding pattern is depicted with a 2.5 NM radius. Advise ATC if UA holding pattern dimensions differ.

CAUTION: Advise ATC on initial contact if unable to accept descent rates

Radar required
Gps required
For UAS groups 4 and 5 only
Standard UAS Terminal Arrival (SUTA) Chart

(2 of 3)

Verbal depiction of arrival routing, starts at the TAAP and ends at the IAF; contingency routing would be on page 2

Added applicable ATC facility phone numbers to ATC frequency information block for lost communications

SUTA charts may begin at TAAP or feeder fix

Added “Approach Control” airspace ceiling and applicable chart notes

Added “UAS” to title on top and bottom of SUTA chart
Added “Approach Control” airspace and applicable chart notes

Charts should be depicted using color to highlight special use airspace and contingency routing

Added Emergency Safe Altitude

Holding Pattern depicted at all IAFs

Added ATC and UAS system requirements needed to use this SUTA chart

Used as many manned chart symbols and chart annotations as possible
GPS approach-like
Added “UAP” to title of the chart in the top margin

Added *Lost Link* and *Lost Communications* contingency procedures to Missed Approach instructions

Added phone numbers to Approach Control, Tower, and Ground Control frequency blocks for lost communications

Added ATC and UAS system requirements needed to use this UAP chart

Used as many manned chart symbols and chart annotations as possible
Used the color red for all lines and text of the contingency routing

Added contingency missed approach routing to profile view; standardized: regular missed approach in top left corner and contingency missed approach in top right corner

Added contingency missed approach arrow to profile view

Added “UAP” to title of the chart in the bottom margin
Tiered Approach Concept

**Full NAS Integration**

**Tiers**
- Maximum coordination
- Moderate coordination
- Increased coordination

**Current systems**
- Standardized **routing** and **contingency procedures**
- Standardized **charting & graphics**, **flight plan** requirements, **DOD FLIP** additions, **standardized lexicon**

**Enablers**
- Additional testing, operational need statements
- JCIDS results, ICDs
- DOTMLPF+P analysis, interagency agreements, UAS Joint/Service pubs and manuals
- DoD FLIP, JO 7610.4, MOAs, other regulatory documents

**Examples**

**Tiered Approach Concept**
Questions?