

Changing the Face of Combat Support





Lonny McClung Capt USN (Ret.), TOP ACES Contract Test Pilot
Phil Oppenheimer Lt COL USAF (Ret.), TOP ACES Chief Pilot, Director of OPS



Pedigree

- Carrier Based Fighter Pilot 30 Years.
- 12,500 Hours/1070 Carrier Landings/250 Combat Missions Vietnam.
- B. S. Mechanical Engineering, U. of Illinois.
- M.S. Naval Postgraduate School, Financial/Systems Acquisition Management.
- Commands: F-4, F-14 Training Squadron, TOPGUN, Training Air Wing.
- COS: USS Enterprise; Commander Atlantic Fleet.
- USAF Test Pilot School Edwards AFB.
- U-2 Carrier Suitability.
- Extensive Air Refuel Testing on Boeing 767 For Italy.
- Contract Test Pilot/Instructor, TOP ACES USA.
- FAA Designated Pilot Proficiency Examiner, Eclipse Jet.
- HU-16 Grumman Albatross IP

OUTLINE

- **Overview**
- **Contract**
- **Background**
 - TOP ACES**
 - ATSI History**
 - Avionics Panel Design**
- **Flight Test**
 - Profiles**
 - Lessons Learned**
- **Summary**
- **Questions**



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LM2

Important to understand the business environment that we tested in

Lonny McClung, 5/5/2015

- **GERMAN AIR FORCE CONTRACT**
- **Seven Aircraft**
- **1200 Hours/Year. Five Years**
- **Specialized Support**
- **Canadian Registry**
- **Upgraded Avionics Package (EASA/German AF)**
- **Four Aircraft Required January 2015**

LM1



Discovery Air Defence Services

EXPERIENCE MATTERS

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Slide 7

LM1

Lonny McClung, 5/5/2015

- **DADS is a wholly-owned subsidiary of Discovery Air**
- **Top Aces USA is a DADS wholly-owned subsidiary**
 - DDTC registered, owns Alpha Jets and A-4Ns in the USA
 - Will be the registered owner of the 25 F-16s
- **DADS has acquired a current US provider (Dec, 2013)**
 - Formerly ATSI Inc, Mesa, AZ
- **Our Solution is a 100% US Operation**
 - Special Security Agreement with DSS for Facility Security Clearance
 - 100% US Pilots (SECRET Clearances or higher, as required)
 - 100% US Technicians (ITAR Controls)
 - Cyber security measures managed by a US Chief Tech. Officer



Discovery Air – Top Aces USA Corporate Relationship



Mission Profiles

- **Air Force:**
 - Adversary training (Red Air) with EW
 - Basic Fighter Pilot Training Support
 - Large Force Employment (Flag Exercise)
 - Supplement International Partner Training
- **Army & Special Forces:**
 - Close Air Support (CAS) for JTAC training / Day/Night capable (NVIS)
 - Digital CAS & Live Drop capability
- **Navy**
 - Ship Anti-Air Warfare training (AAW)
 - Threat replication & ESM training
 - Target Tow (sea skimming) system

Roles and Experience

- **5000+ Hrs annually**
- **50%+ flown while deployed**
- **98%+ Mission availability Rate**
- **Only North American Service Provider Authorised to:**
 - Carry Military EWO back-seaters
 - Train CF-18 aircrew (act as Flt Lead)
 - Fly embedded with the USAF 64th Aggressor Sqn
- **Top Aces USA delivers a full service solution**
 - Aircraft
 - Logistics
 - Sparing
 - Pilots / Maint personnel
 - QA and Flight Safety Personnel













A4N RETURN TO SERVICE

- **Limited Operations = Caretaker Status --- Minimal Crew**
- **Avionics Panel Mod Only? --- Not So Fast!**
- **Warbird Maintenance Standards Part 91**
- **Standard Depot Level Maintenance (11 Years)**
- **Wing Spars**
- **Ejection Seats**
- **Parts to OEM Standards**
- **Part 91 to Part 135 Equivalent**
- **Growth/New Hires/Training**
- **Multi-Task. Production + Train Maintenance & Aircrews**



EXPORT COMPLIANCE

- **International Traffic in Arms Regulations (ITAR)**
- **Export Administration Regulations (EAR)**
- **Transportation Security Administration (TSA)**
- **Handicapped Testing/Training**
- **Manuals/Pilot's Inflight Guide For Flight Test**
- **Fines/Prison**

LESSON LEARNED:

Know the rules. Play the game. Expert.

N-Reg	CSN	C-Reg	MSN
N260WL	158730	C-FGZS	14337
N261WL	159533	C-FGZI	14531
N264WL	159823	C-FGZE	14495
N265WL	159544	C-FGZT	14542
N266WL	159534	C-FGZO	14532
N267WL	159051	C-FGZD	14367
N269WL	159536	C-FGZH	14534

- **Conformity Inspections**
- **A4 Not in TCCA Data Base**
- **Air Speed Restriction**
- **Canadian Pilot's License**
- **Training Documentation**

Cockpit Pre-Mod (Before)

EXPERIENCE MATTERS



A-4N Left Console Pre-Mod

EXPERIENCE MATTERS



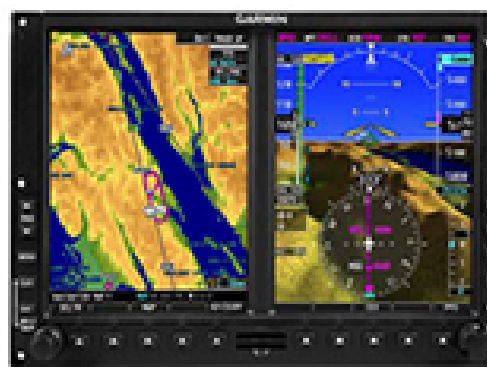
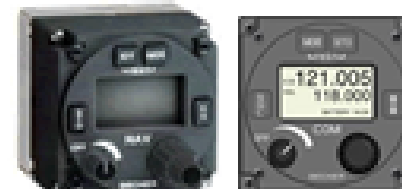


A-4N New Avionics Components



Mid Continent Turn & Slip

Becker CU5301-1 NAV
2 & 6201 VHF 2



GDU 620



GNS 750



AN/APC-11 THERM / AN/ARN-118V TACAN / AXP 71 DEF



NAT 301A-00 COMM PNL



Kelly RCA 2600-2
Standby Attitude



SN3500

GTN 750 Comm Window and Tuning

- **COMM 1** Freqs can be selected by using the large and small knobs on the lower right of the display or by touch-screen keypad.
- Touching the Enter key accepts the displayed value and places it into the Standby Comm Window.
- Touching the XFER key will place the selected freq directly into the Active Window.
- Touch the MONITOR key to listen to the standby frequency ("MON" annunciation).
- **EMERG FREQ** – To quickly tune and activate 121.50, press and hold the volume knob for 2 seconds.



Backup NAV Source

- NAV 3 Source
 - AN/ARN-118v TACAN
 - Electrical Bus = DC Monitored
 - Normal Ops = A/A rmg, T/R brg+rmg and paired VOR/DME rmg displayed on SN3500 only
 - **Gen Fail = Tacan NOT AVAILABLE**



NAV3 source selected



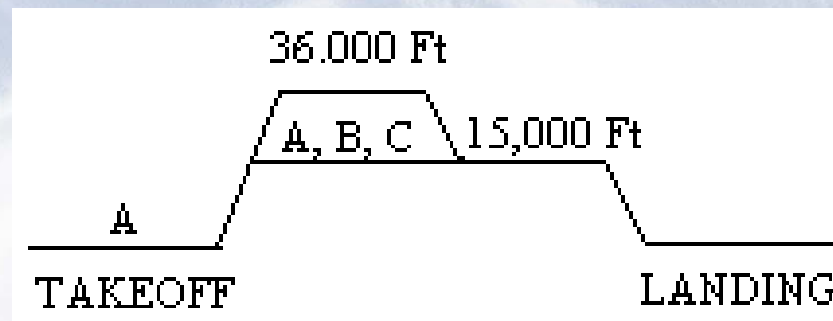




FLIGHT TEST LESSONS LEARNED

First Flight --- July 2014
Aircraft # 7 Still in Work

- **AIRCRAFT MANUALS/PILOT CHECKLISTS/EMERGENCY PROCEDURES**
- **Lesson Learned: Considerable time was required to revise all technical publications and the inflight guide.**
- **PMCF CHECK LIST/PROFILE**



- **Lesson learned: Test Card Always Evolves. Be flexible.**



HIGH SPEED TAXI TEST

Lesson Learned: Conduct a Robust Risk Analysis. Mitigate Risk As Much As Possible.



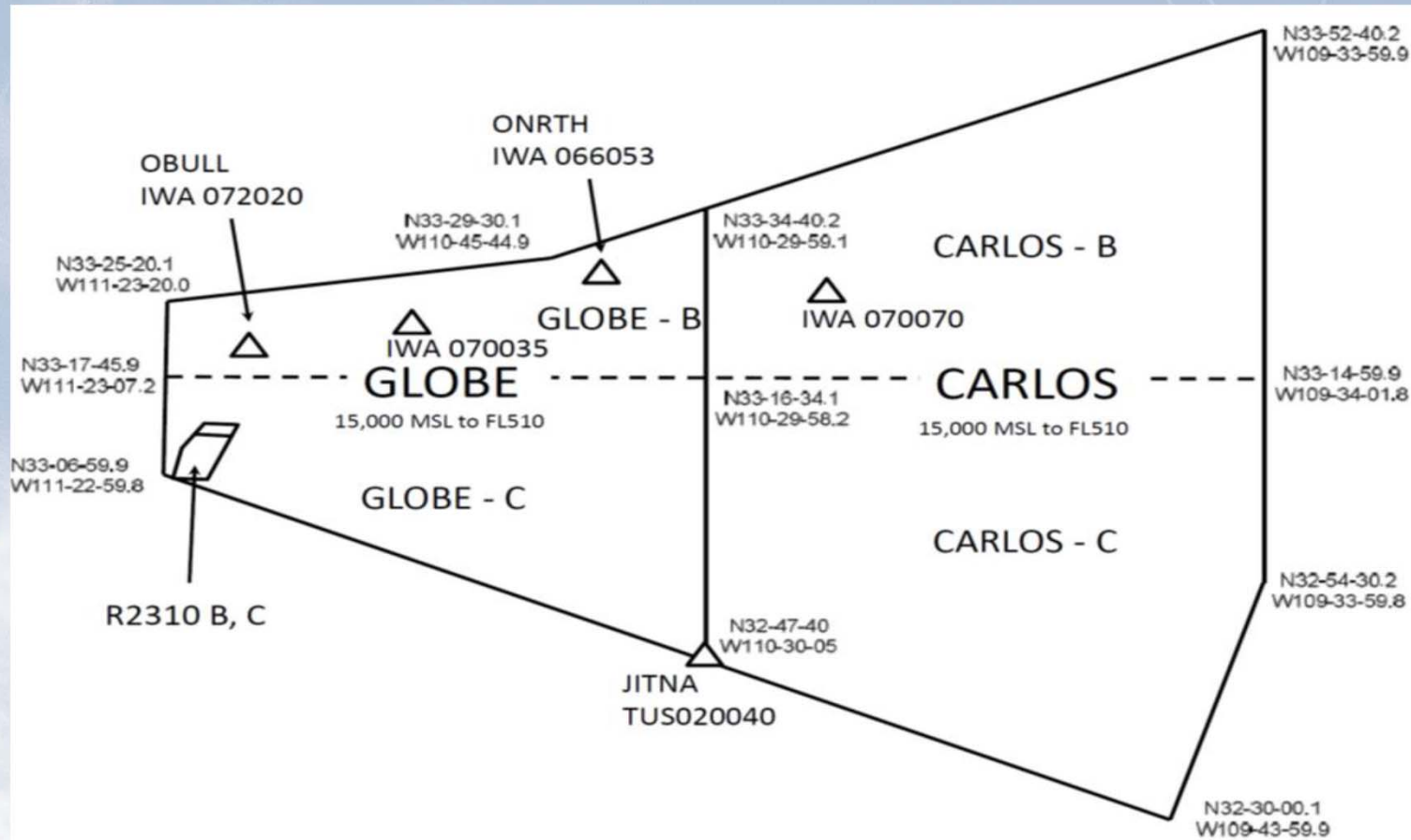
STANDBY SAFETY CHASE

Lesson Learned: Conduct a Robust Risk Analysis. Mitigate Risk As Much As Possible.



CG ISSUE

Lesson Learned: Strict analysis of CG is required with any aircraft modification and configuration change. On site engineering support critical to facilitate unforeseen modification requirements and interact with regulatory contacts to assist in getting the necessary approvals/clearances.



AIRSPACE USE

Lesson Learned: Government Contract or "Public Use" status is required for unrestricted use of MOA's. Coordination with regulatory agencies required for authorization to use or create special use airspace for RDT&E.

PILOT TRAINING

- **Reliability Testing/Time Build**
- **Company Pilots**
- **Canadian Pilots (DPE) (TA4)**
- **German Pilots (TSA)**
- **Undiscovered Discrepancies**
- **ILS Validated With Formation Approach**
- **Second PMCF Just Prior to Deployment**

RELIABILITY TESTING/TIME BUILD

First flight dates and time build flight hours for the modified aircraft were:

- N267WL /C-FGZD First flight 8/19/2014, flew 30.5 hours before departure to Canada
- N264WL /C-FGZE First flight 10/28/2014 flew 5.6 hours before departure to Canada
- N269WL /C-FGZH First flight 12/18/2014, flew 9.2 hours before departure to Canada
- N261WL /C-FGZI First flight 1/31/2015, flew 13.7 hours before departure to Canada
- N266WL /C-FGZO First flight 3/9/2015, flew 9.3 hours before departure to Canada
- N260WL/C-FGZS First flight 4/30/2015, flew 10.0 hours before departure to Canada

Lesson Learned: Dedicated flight test should be complete when possible before conducting training on the new systems.

AHRS/GPS ON EMERGENCY POWER

- A4N Electrical System
- No FMS
- No Battery
- Ground Alignment
- Generator Fail --- RAT Power
- Magnetic Flux Valve Disconnect/LCR92
- LCR100 – Gyro Compass Mode
- Flux Valve Connect
- Battery Pack -- Discarded

**Lesson Learned: Prototyping during flight test is part of the process.
Accurate engineering analysis produced a robust design.**

PILOT VISIBILITY OF STANDBY INSTRUMENTS



Lesson Learned: Optimum location of all gauges and controls on an aircraft like the A-4 is limited. There simply is not enough “real estate” to optimize all controls. Just because it looked good in the hangar, doesn’t mean it works in bright sunlight. Improved lighting was required to accurately tune the standby Becker Units.

RADIO ISSUES

- Early Flights
- Receive normal
- Transmit weak/garbled
- Dirty Power ?
- Variable Speed Constant Frequency
- 115/200 V, 3 Phase, 400 HZ, 20 KVA Generator
- Converter to 28 V DC
- Regulator Change
- Antenna Wire in Large Bundle
- Unshielded Generator Cable

Lesson Learned: There is no substitute for skilled engineering support on site to isolate and solve unforeseen design issues.

Maintenance Workload/Contract Deadline

- SDLM Delays
- Prototype Systems Problems
- “Can Do” Attitude
- 7 Day Weeks Without Breaks
- Production/Flight Test/Crew Training
- Repeat Discrepancies
- Pin in Power Pack --- In Flight Abort
- Time Out --- Slow Down
- Adjusted Contract Requirement Aircraft Delivery Dates

Lesson Learned: Don't let business requirements drive test schedule to an unsafe level.

GO PRO CAMERA



Lesson Learned: This simple, inexpensive system was “good enough” for this test program.

GROUND PROXIMITY WARNING SYSTEM TESTING

- Developed Our Own Procedures
- Terrain in Globe/Carlos Offered Ideal Testing Ground
- No Problems Noted

VIDEO

TCAS TESTING

- Second Aircraft Required
- Flew Profiles Above, Below, Co-altitude
- System Was Spot On
- No Modifications Required

Lesson Learned: **Improvise & Innovate**

SUMMARY

- **Routine Avionics Modification? ---- Far from it !!!!**
- **Safety Mitigation**
- **Transport Canada**
- **ITAR/EAR/TSA**
- **Part 135 Equivalent Maintenance**
- **Be Innovative**
- **RVSM & Airspace**
- **Contract Pressure on Maintenance – Realistic Planning**
- **On Sight Engineering Support**
- **Go Pro Camera**
- **AHRS/GPS on Emergency Power**
- **Flight Test & Pilot Training Don't Mix Very Well**

QUESTIONS ?

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