This Technical Briefing is prepared for the Libyan Ministry of Defense
What We Are Offering
**Intent:** Provide an airborne Intelligence Surveillance and Reconnaissance + close air support capability to the Ministry of Defense. This will support intelligence operations for border control and military operations. Capable of acquiring targets and engaging targets independently.

12 ea ACA-9 Defender, Single Engine Aircraft

**12 x ACA-9 Defender Aircraft**
- Imagery
- Direction Finding
- 4 under wing Pylons
- Fixed Gun Sight
- Rocket pod (2 per A/C)
- Dillon Aero M134 mini gun
**Intent:** Provide an airborne Intelligence Surveillance and Reconnaissance and close air support capability to the Ministry of Defense. This will support intelligence operations for border control and military operations. Additionally, support VIP movement, air ambulance and Radar calibration. 15 Total aircraft

8 x ACA-16 ISR Aircraft
- Imagery
- Direction Finding
- 4 under wing Pylons
- Fixed Gun Sight
- Rocket pod (2 per A/C)
- Dillon Aero M134 mini gun
- 2 x Air Ambulance
- 2 x VIP Transport
- 2 x Cargo
- 1 x Radar Calibration
**Intent:** Provide a transport aircraft for VIP movement inside Libya. Provided free upon the purchase of the ACA-9 and ACA-16 Aircraft

**4 x CA-12 Transport Aircraft**

**Standard Pax Configuration:** 8+1 (pilot)

**Cruise:** 310 knots at 30,000 thousand ft.

**Range:** 2,535 nautical miles

**Useful Load:** 5,000 lbs
Who We Are
LOCATION

Location #2: 7017 Challenger Ave., Titusville, Florida 32780 – Building #9 and 7030 Center Lane, Titusville, Florida 32780 – Building #51 Airport Ident: TIX. Our Titusville airport facilities are where aircraft layup, construction and tooling design and fabrication are located. The two locations are where the construction of the ACA-9 And ACA-16 ISR aircraft takes place.

We are located on the Space Coast Regional Airport, which is the closest airport to Kennedy Space Center. NASA recently closed the Shuttle program, so we have at our disposal very talented Scientist, Engineers, Technicians and Program Directors to work on Comp Air’s projects.
Comp Air Aviation is a world leader in the design, development and manufacturing of advanced, carbon composite aircraft. Over its 23 years of successful operations, Comp Air has delivered over 600 aircraft. These range in size from 4 to 10 seats and are powered by engines from 180 HP to 1,650 HP. Comp Air’s airplanes are built of carbon composite materials, with aluminum structural reinforcements. This materials used in building Comp Air Aircraft is the same used on United States military aircraft.

Known for their roomy cabins, high useful loads, strength, durability and impressive performance capabilities, Comp Air’s products are popular among pilots who appreciate performance aircraft that offer a lot of utility.

Over the years, Comp Air has become a well-known fixture in producing high-performance, utility, aircraft. Comp Air Aviation was on the cover of several aviation magazines, and having several articles published in various aviation magazines, such as Private Pilot Magazine, Custom Planes Magazine, Kit Planes, AOPA Pilot, US Aviator and General Aviation News, along with several on-line publications.
Comp Air Jet (Single Engine with Stand-up Cabin)
Comp Air 11 Pressurized Single Engine

The Comp Air 11 recently completed all ground tests and is ready for first flight.
Future Designs:

BUILDING EXCITING NEW AIRCRAFT FOR THE FUTURE OF AVIATION

- CA-Tri-Jet
- CA-Twin-Jet
Some of Comp Air’s Innovative Designs:

The New CA-6.2 Six Seat Aircraft
Military or Commercial Use; High Capacity, Twin Engine

ACA-16 ISR
ACA-9 DEFENDOR Military and CA-9 Commercial version
ACA-9 Defender Carbon Composite Construction
ACA-9 Defender Construction

Honeywell TPE 331-12 JR Turbine Engine Installation

Instrument Panel Design
ACA-9 Defender Construction

Wing Mating to Fuselage

Rugged Construction Techniques
Aircraft Capabilities CA-9

Performance Specifications

<table>
<thead>
<tr>
<th>Crew/Pax: 2 Crew +6 Pax</th>
<th>Max ramp weight: 8,800 lbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max cruise speed: 250 kts</td>
<td>Max takeoff weight: 8,800 lbs</td>
</tr>
<tr>
<td>Max range: 1,500 nm</td>
<td>Max landing weight: 8,800 lbs</td>
</tr>
<tr>
<td>Max operating altitude: 25 thousand ft.</td>
<td>Usable fuel: 320 gal/2,144 lbs.s</td>
</tr>
<tr>
<td>Takeoff distance over 50 ft obstacle: 1,150 ft. gross@sealevel</td>
<td>Payload with full fuel: 1,350</td>
</tr>
<tr>
<td>Rate of climb (MTOW): 2,150 fpm</td>
<td></td>
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<tr>
<td>Stall (MTOW): 68 kts</td>
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<tr>
<td>Ldg distance over 60 ft obstacle: 750 ft (with Beta)</td>
<td></td>
</tr>
</tbody>
</table>

Maintenance and Support

TBO: Engine 5,400 hrs
Oil: Mil-L-23699C, Type II
Special tools: Basic
Mechanic training required: suggested (composites, OEM, avionics)
Facility/support requirements
GSE required: non specific General Aviation

Operational and Performance

Max range with 2 pilots and 6 passengers: 1,500 nm
Max outside air temp for flying: 126 degrees F
Air conditioning: Two Zone
Honeywell TPE331-12JR Turboprop Engine

Increased Performance with Lower Cost of Ownership

Advanced Power and Performance for Turboprop Aircraft

Comp Air Aviation

Honeywell TPE331-12JR Technical Data Installed on the ACA-9 Defender
**Engines – Honeywell TPE331-12JR**

**Performance Specifications**

| (Sea level-standard day) | RPM: gas gen 41,730 shaft output 1,591  
|                         | Rotation: ccw from rear  
|                         | Weight: 415 lb  
|                         | PWR/WT ratio: 2.41  
|                         | Pressure ratio: 10.2  
|                         | Airflow: 8.11 lb/sc  
| Power output: shp 1,000 |  
| eshp 1,050              |  
| emergency APR           |  
| available to            |  
| 44°C @ 850 shp         |  
| SFC: 0.553             |  
| ESFC: 0.523            |  |

**Maintenance and Support**

- Oil: Mil-L-23699, Type II, Mil-L-7808, Type I
- Electrical: 24 vdc, 16.2 amp
- Start capability: SL–20,000 ft up to +130°F
- Operational limits: SL–35,000 ft
- TBO: 5,000 hrs.

**Operational and ISR Performance**

- Remote site maintenance
- Dust kit: Not Required
- Emergency fuels and oils
- FOD protection: Not Required
- Additional field repair considerations: TBD
- Additional planned redundancy of accessories: TBD
- Additional accessories planned (i.e. generators, invertors, etc): TBD
TPE331 advantages

Prepared for Comp Air
April 10th, 2014
TPE331 vs. the Competition (PT6A-42A)

✓ Faster throttle response - single shaft design
✓ Better fuel efficiency
✓ Lower cost of ownership - Conklin & de Decker
✓ Longer maintenance intervals – no extension program needed
✓ Quieter flyover - meets new German Airfield Noise Protection Order
✓ Higher gearbox rating - up to 950 shp
✓ Single exhaust – on side opposite cargo door
✓ Simpler to operate - automatic one-button starting, single red line, torque and temperature limiting
✓ No inlet particle separator - less hardware and much less performance penalty in icing conditions
✓ Clean installation – access to all LRUs for maintainability
✓ More tolerant of coastal environments - cast aluminum vs. magnesium

Two firms independently selected TPE331 over a larger PT6 and invested their own money to develop STCs to re-engine Cessna Caravans with TPE331

All of these benefits are measurable.
AIN Survey Results

Honeywell 1st or 2nd in every rating category in 2013 Survey!

Honeywell Turbofans and Honeywell (turboprops/turboshfts) were also the only engine manufacturers to score more this year than they did last year; all the others either tied their last-year numbers or fell short!"  

* AIN magazine, October 2013 issue, page 46
“Anecdotally, a commercial operator of the 208B with the 331-12JR conversion reports that on a typical trip that used to take 2 hours 20 minutes in their stock 208B now can be done in less than two hours. This was done on the same amount of fuel! This operator makes about a dozen of these trips each week: … This one operator had a reduction in hours flown of 18% for no change in the amount of fuel consumed.”

There is almost a 17% cost reduction in the per nautical mile variable costs of the 208B Grand Caravan when switching from the PT6A-114A to the TPE331-12JR. During an operating year where the aircraft is flown 100,000 NM, this results in cash savings of over $53,000 per year. In revenue operations, this also means the ability to generate additional revenue-miles for the same flight hours.
Technical Description
Why Single Shaft Design?

- Design advantages
  1. Efficiency - Better SFC
     - Turbine engines achieve their highest efficiency at, or near, their design point. The TPE331 is designed to operate at a specific RPM (constant speed) – “at the design point”
     - TPE331 has a dual centrifugal compressor – optimum for this power class of turbine engine
  2. Weight - lighter
  3. Length - shorter

- Pilot advantages
  - Rapid throttle response
  - Rapid reverse thrust - the engine responds well during landing roll or aborted takeoff
Why Dual Centrifugal Compressor?

“For the Cessna Caravan operators, the 2-c compressor is a no-brainer. These bush pilots, tour operators, and cargo haulers will love the robustness, reliability, stability, and low maintenance costs inherent in the 2-c architecture.”

1. **Outstanding surge margin** – no variable geometry or surge bleed required
2. **Higher pressure ratio for a given envelope** - only two stages are required
3. **Improved tolerance to FOD and sand erosion** - increased airfoil thickness, long-chord blading, and lower tips speeds (compared to an axial compressor)
   - Note: no inlet particle separator required = no significant performance loss in icing
4. **High tolerance to inlet distortion** - low aspect ratio impeller blade design
5. **Low compressor moment of inertia** - enabling rapid engine acceleration
6. **Minimal engine complexity** – lower parts count, weight and manufacturing costs
7. **No compressor wash required** – a procedure is available…just not required!
Typical Dual Centrif Hardware

TPE = Tough + Proven + Efficient
Compressor Efficiency

- For small engines, 2-c design offers best efficiency

For this power class, 2c architecture makes most sense
Hartzell Propeller Technical Data Installed on the TPE331-12JR powered ACA-9 Defendor
Hartzell 4-blade Aluminum Propeller

Performance Specifications
Manufacturer: Hartzell
Blades: 4
Type: Constant Speed, reversible
Diameter: 98"
Electric De-Ice

Maintenance and Support
World Wide Hartzell Support
Flying a wide range of missions demanding – sometimes punishing conditions, today's pilots now have the tools.
Cockpit – Flight Management System

Performance Specifications

- Touchscreen control to light turbine aircraft
- Wide-format WXGA displays
- Most intuitive pilot interface available in this class of avionics
- Synthetic Vision Technology (SVT™)
- NextGen/SESAR growth provisions
- What avionics and autopilot planned and specs?
- What other avionics planned?
- Full list of capabilities and functions here (like G1000 slide)

Operational and ISR Performance

- NVG compatibility
- Planned Autopilot
- Planned comms radios (qty, type, freq ranges)
- Digital engine monitoring?
- Systems monitoring?
- Emergency indications?
- Synthetic terrain?
- Field Mx and spares
- Power requirement and GSE
Garmin G1000 Technical Data For The ACA-9 Defendor

Flying a wide range of missions demanding – sometimes punishing conditions, today's pilots now have the tools.
Star SAFIRE 380-HLD For the ACA-16 ISR and ACA-9 Defendor

ACA-16 ISR

ACA-9 Defendor
Performance Specifications
Resolution: 720p/1080p HD
Zoom Ratio: 120x
Operating Temps: -40°C to +55°C
FOVs (depending on options): 28° to 0.25°
Color HD, Color Low light, SWIR Options
Laser Options:
- Rangefinder
- Illuminator
- Pointer
Fully Integrated IMU and GPS for target geo-location

Maintenance and Support
Special tools and procedures
Cooling considerations
Spare availability
Recommended number of spares
OEM Training locations and availability
Interchangeable with the 380-HLD?

Operational and ISR Performance
See PDF
**Star SAFIRE 380-HLD** For the ACA-16 ISR and ACA-9 Defender

**ACA-16 ISR**

**ACA-9 Defender**
WOLFHOUND

ACA-16 ISR

ACA-9 Defender
Communications Intercept – WOLFHOUND

Performance Specifications
Frequency range:
Real-time situational awareness and direction finding
Reduced size, weight and power
Handheld display
Bluetooth, 802.11
Forward support area and support beyond the forward operating base
Lightweight, man-portable
Ruggedized
Easy-to-use graphical user interface
Easy-to-learn “buttonology” (20 minutes)
Easy to learn use and concept of operation (16 hours)

Maintenance and Support
Plug and play – COTS solution
Carry-on/Carry-off configuration and capability
Heavily supported with spares and spare parts
Extremely rugged

Operational and ISR Performance
No heat or sand limitations
Proven to work in rough terrain and conditions
Multi-node control capability (air and ground)
AN/ALE-47 CMDS Counter Measures Dispensing System
For the ACA-16 ISR and ACA-9 Defendor

ACA-16 ISR

ACA-9 Defendor
Dillon Mini Gun A34D ACA-9 Defendor

ACA-9 Defendor
HellFire Missles ACA-9 Defendor

ACA-9 Defendor
Counter Measures –
AN/ALE-47 Counter Measures

Performance Specifications
Used in connection with detector systems (e.g. AN/AAR-47 Missile Warning System),
Multiple dispense options (flare, chaff)
Information integration into cockpit MFD
Ongoing modifications supporting new weapons systems
Smart dispense
Bypass Mode: System operates if Programmer fails allowing aircrew to dispense using CDU

Maintenance and Support
Pyrotechnic handling and storage requirements
Emergency discharge
GSE/Power requirements
Programming, test and calibration support
Common LRUs
USG Coalition compliant software loads
Information integration into cockpit MFD
Higher MTBF
Lower cost to support
Logistically supportable today (no new support equipment)

Operational and ISR Performance
Remote site maintenance, handling and transport
Area specific capabilities (tied to area weapons systems and data)
AN/AAR-47 Missile Warning System
For the ACA-16 ISR ACA-9 Defender

ACA-16 ISR

ACA-9 Defender
Missile Warning System

Performance Specs
The AN/AAR-47 is an electronic warfare system designed to protect aircraft against IR guided missile threats, laser-guided / laser-aided threats and unguided munitions. Upon detection of the threat, the system will provide an audio and visual sector warning to the pilot. For IR missile threats, the system automatically initiates countermeasures by sending a command signal to the Countermeasures Dispensing Set.

Multi-Threat Detection: Missile, Laser, and Hostile Fire in one fully integrated system
In service on a wide variety of fixed and rotary wing aircraft
Low False Alarm Rate
High Probability of Timely Warning
Sensor pre-processing for improved performance in high clutter environments

Maintenance and Support
15-Year Service Life
Computer Processor (CP) is approx. 8x8x10 inches and weighs approx. 16.25 lbs.
Control Indicator (CI) is approx. 2x5x6 inches and weighs approx. 2 lbs.
Optical Sensor Converters (OSC) are approx. 5x8 inches and weighs approx. 3.5 lbs each

Operational and ISR Performance
In service on a wide variety of fixed and rotary wing aircraft
Proven performance & reliability in prolonged and demanding combat environments
ACA-16

10 x ACA-16 ISR
2 x CA-16 Cargo
ACA-16 ISR Construction
## ACA-16 ISR Aircraft Capabilities

### Performance Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crew/Pax:</td>
<td>2 Crew on configuration) 4-20 Pax (depending on configuration)</td>
</tr>
<tr>
<td>Max cruise speed:</td>
<td>275 kts</td>
</tr>
<tr>
<td>Max range:</td>
<td>1520 km</td>
</tr>
<tr>
<td>Max operating altitude:</td>
<td>25,000 ft</td>
</tr>
<tr>
<td>Takeoff distance over 50 ft</td>
<td>1200 ft</td>
</tr>
<tr>
<td>Stall (MTOW):</td>
<td>75 kts</td>
</tr>
<tr>
<td>Ldg distance over 60 ft 1500 ft</td>
<td>with reverse</td>
</tr>
<tr>
<td>Max ramp weight:</td>
<td>21,390 lbs</td>
</tr>
<tr>
<td>Max takeoff weight:</td>
<td>21,100 lbs</td>
</tr>
<tr>
<td>Max landing weight:</td>
<td>18,750 lbs</td>
</tr>
<tr>
<td>Max zero fuel weight:</td>
<td>15,250 lbs</td>
</tr>
<tr>
<td>Basic operating weight:</td>
<td>21,000 lbs</td>
</tr>
<tr>
<td>Usable fuel:</td>
<td>850 gals</td>
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<tr>
<td>Payload with full fuel:</td>
<td>4,950 lbs</td>
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<tr>
<td>V1:</td>
<td>65 kts</td>
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<tr>
<td>Vr:</td>
<td>80 kts</td>
</tr>
<tr>
<td>VMC:</td>
<td>90 kts</td>
</tr>
<tr>
<td>Vne:</td>
<td>275</td>
</tr>
<tr>
<td>Rate of climb (MTOW):</td>
<td>3,800 fpm</td>
</tr>
<tr>
<td>SE rate of climb (MTOW):</td>
<td>950 fpm</td>
</tr>
<tr>
<td>V:</td>
<td>91 kts</td>
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</table>

### Maintenance and Support

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBO:</td>
<td>9,000 hrs</td>
</tr>
<tr>
<td>Special tools:</td>
<td></td>
</tr>
<tr>
<td>Mx training required (composites,</td>
<td>(composites, OEM, avionics)</td>
</tr>
<tr>
<td>OEM, avionics)</td>
<td></td>
</tr>
<tr>
<td>Types of fuel/Emergency fuels/</td>
<td></td>
</tr>
<tr>
<td>Oils</td>
<td></td>
</tr>
<tr>
<td>Facility/support requirements:</td>
<td>TBD</td>
</tr>
<tr>
<td>GSE required:</td>
<td>TBD</td>
</tr>
</tbody>
</table>
Honeywell TPE331-14 GR HR Technical Data Installed on the ACA-16 ISR
Engine Characteristics – Honeywell TPE331-14 GR HR

Performance Specifications

| shp | 1,650 |
| shp (thermo) | 1,759 |
| eshp | 1,833 |
| emergency APR | 2,022 |
| Start capability: SL | 20,000 ft |
| -65°F + 130°F |
| Operational limits: SL | 31,000 ft |
| -85°F + 130°F |
| RPM: gas gen | 35,602 |
| 35,645GR/ |
| 35,585HR |
| shaft output | 1,552 |
| Rotation: GR cw from rear |
| HR ccw from rear |
| Weight: TPE331-14GR |
| 620 CB (dry) |
| TPE331-14HR |
| 633 CB (dry) |

Maintenance and Support

Oil: Mil-L-23699C, Type II
Mil-L-7808D, F & G, Type I
Electrical: 24 vdc, 16.2 amp
TBO: 9,000
Hot Section Inspection: 4,500 hrs

Operational and ISR Performance

Remote site maintenance
Dust kit: Not Required
Emergency fuels and oils
FOD protection: Not Required
Additional field repair considerations: TBD
Additional planned redundancy of accessories: TBD
Additional accessories planned (i.e. generators, invertors, etc): TBD
Hartzell Propeller Technical Data Installed on the TPE331-14 GR HR powered ACA-16 ISR
Garmin G3000 Technical Data For The ACA-16 ISR

Flying a wide range of missions demanding – sometimes punishing conditions, today's pilots now have the tools.
Cockpit – Flight Management System

Performance Specifications
Touchscreen control to light turbine aircraft
Wide-format WXGA displays
Most intuitive pilot interface available in this class of avionics
Synthetic Vision Technology (SVT™)
NextGen/SESAR growth provisions
Full list of capabilities and functions here (like G1000 slide)

Operational and ISR Performance
NVG compatibility
Planned Autopilot
Planned comms radios (qty, type, freq ranges)
Digital engine monitoring: Yes
Systems monitoring: Yes
Emergency indications: Yes
Synthetic terrain: Yes
Field Mx and spares: TBD
Power requirement and GSE: TBD
RDR 1700B G Radar
For the ACA-16 ISR

The RDR-1700B Radar Series
Search, Surveillance, Tracking, Imaging, and Weather Avoidance Radar Systems

 ACA-16 ISR
Radar –
RDR 1700B G Radar

Performance Specifications
Resolution?
Maritime surveillance
SAR/ISAR imaging (1 meter)
Weather detection
SART beacon detection
Unsurpassed ease of integration
AIS Overlay Capability
GMTI mode for overland moving target detection and tracking
Optional advanced maritime classification aids

Maintenance and Support
Special Tools and Processes
Updates in firmware and software
OEM training and availability
GSE requirements
Calibration requirements
Lifecycle management program
Personnel Safety considerations

Operational and ISR Performance
Field mx considerations
Effects of heat and dust
Re-calibration requirements
Distances and Altitudes
CA-12
Executive Aircraft
4 x CA-12
Comp Air 12 Executive Aircraft
Comp Air 12 Executive Aircraft
Comp Air 12 Executive Aircraft
Comp Air 9 Commercial
Sold by our dealer in Brazil