AEROSPACE MAINTENANCE COMPETITION
AVIONICS ADS-B EVENT

sponsored by

JetBlue University

Embry Riddle

COBHAM CE Avionics

Orange County Convention Center

Orlando, Florida

April 25-27

jetBlue UNIVERSITY

CE Avionics

COBHAM

EMBRY-RIDDLE Aeronautical University

Objective
AMC Competition ADS-B Event

Goal:

To create a Technician event for the 2017 AMC competition.

Idea:

The FAA's Next Gen system will affect all aspects of the aviation industry from General Aviation, Business, Commercial and Aerospace Maintenance Training Schools. These AMC events need to cover a broad spectrum of aviation professionals and students attending the competition. The Avionics ADS-B testing event would be a very useful competition to not only raise awareness but, to help prepare the Technicians with what they will be challenged with in the field.

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Concept
AMC Competition ADS-B Event

Concept:

Electronic Flight Instrument panel set-up with GPS and Encoder simulators to represent a working modern flightdeck.

Technicians will be task with using modern test equipment, Aeroflex IFR 6000 to validate proper operation and reporting to comply with the upcoming 2020 regulations for all aircraft operating in regulated airspace.

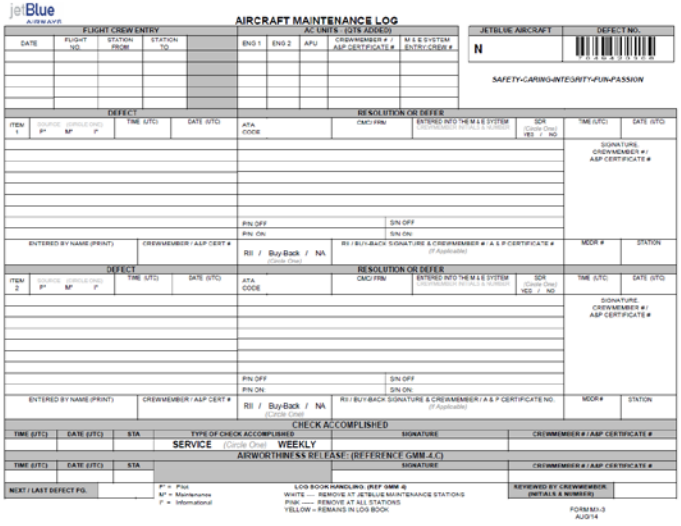
The technicians will have to set-up the mock aircraft to be tested and demonstrate proper testing procedures and document results for completion.

Example: A/C Identity, Altitude and Position

Task Card

Competitors will be given a task card for a functional test of the ADS-B system on the flightdeck simulators.

- Following the task card the technicians will power-up and run functional test of the ADS-B system.
- Simulated aircraft will have to be configured properly for the test.
- Document the test results on the task card paperwork.
- Make logbook entry for compliance of the functional test.


jetBlue

AIRCRAFT MAINTENANCE LOG

FLIGHT CREW ENTRY | AC UNITS - (QTS ADDED) | JETBLUE AIRCRAFT | DEFECT NO.

N

SAFETY-CARING-INTEGRITY-FUN-PASSION

DEFECT | RESOLUTION OR DEFER

ENTERED BY NAME (PRINT) | CREWMEMBER / A&P CERT # | RII / Buy-Back / NA | MDR # | STATION

CHECK ACCOMPLISHED

SERVICE (Circle One) WEEKLY

AIRWORTHINESS RELEASE: (REFERENCE GMM 4.C)

NEXT / LAST DEFECT PG.

LOG BOOK HANDLING: (REF GMM 4)

WHITE ---- REMOVE AT JETBLUE MAINTENANCE STATIONS

PINK ---- REMOVE AT ALL STATIONS

YELLOW – REMAINS IN LOG BOOK

FORM MX-3 AUG14

Tally No: **A/C:** *FOR REFERENCE ONLY* jetBlue

Task Card No.	Description	EC No.
A3412116-01	ADS-B OUT MODIFICATION ON JETBLUE AIRWAYS A320 AIRCRAFT - EHS EQUIPPED AIRCRAFT	A3412116-01
Station	**Work Order No.** **Fleet**	
Date	**Regulatory Ref.** **Area**	**Revision** 01/18/2016

HAVE YOU INVENTORIED YOUR PARTS & TOOLS?

Zone	Classification
131, 132	ALTERATION / MAJOR

Access Panels

131CW, 131DW

Component	Description	Serial No.	Position

Note to Technician / QC:

Part/Tools Required to Accomplish Task:

Part Number	Description	Quantity
7514081-911	ANTENNA, TCAS DIRECTIONAL	2
7517800-10310	ATC-TRANSPONDER, XS-950 ATDL (ADS-B EQUIPPED ONLY)	2
8007277-401	KIT - ADS-B OUT 80VU - SUBKIT A	1
8007277-402	KIT - ADS-B OUT 80VU - SUBKIT B	1
9003500-10905	TCAS - COMPUTER 3000 VER 7.1 (ADSB-OUT A/C ONLY)	1
NAS1133E12	SCREW,MACHINE-PAN HD, CLOS TOL	8
09-008D	SEALANT - POLYSULFIDE	2
09-016	POLYSULFIDE SEALANT - GENERAL PURPOSE FILLET	2
DMC519	KIT ELECTRICAL SERVICE TOOL	1
IFR6000	TEST UNIT - ATC/TCAS/ADS-B	1

Item	Work Instructions	Technician	Checked By
1	NOTES: 1. Accomplish the work instructions in accordance with the attached ACSS Engineering order 8007277-101 Rev E. Sign off accomplishment of the Engineering order workscope per the following worksteps below. 2. Eight (8) ea, Top TCAS Antenna mounting screws P/N NAS1133E12 are intended only for N661JB and onwards (FSN 0661 and up).		
2	Accomplish work steps in accordance with attached ACSS Engineering order 8007277-101 Task 3.3.1 Preparation Steps 1 through 5.		
3	Accomplish work steps in accordance with attached ACSS Engineering order 8007277-101 Task 3.3.2 Remove ADIRU's 1 and 2 Step 6.		

Technician / QC Notes:

HAVE YOU INVENTORIED YOUR PARTS & TOOLS?

Task Card: A3412116-01

ALL DISCREPANCIES FOUND WHILE PERFORMING THIS TASK CARD MUST BE DOCUMENTED ON A NON-ROUTINE PER GMM 4C AND 4D

Page: 1 of 8

Print Date: 01/12/2017

Event Display

Flightdeck Simulator

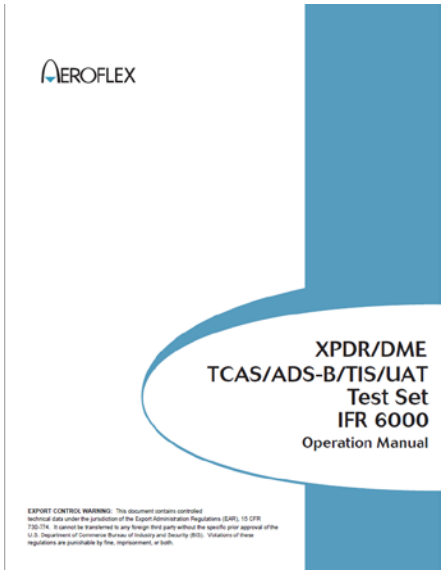
Aeroflex IFR 6000 test set

Test Equipment

Aeroflex IFR 6000

IFR Operation Manual

http://ats.aeroflex.com/avionics-test-products/identification-products/ifr-6000-flightline-test-set



Interactive Training

http://ats.aeroflex.com/media/videos/ifr6000/6000%20ICW.swf

Simulation Equipment

Aeroflex GPSG-1000 Portable GPS Position Simulator

http://ats.aeroflex.com/avionics-test-products/nav-comm-products/gpsg-1000-portable-satellite-simulator

Simulation Equipment

Open or shorted wire in your encoder harness? A bad input gate on the transponder?

The EET-200 provides the avionics technician a clean, quick and reasonably priced method of emulating an altitude encoder output by providing a known good altitude code source to aide in isolating each data bit D2 through C4. Simply unplug the altitude encoder and substitute the EET-200; rotating the knob will move the transponder through a variety of preprogrammed altitudes testing each data bit in sequence.

Suspect a problem with the altitude encoder?

Unplug the encoder and plug both the transponder and the encoder into the EET-200. Use the built in vacuum syringe to simulate any altitude from below sea level to over 30,000 feet (using supplied 12” x 1/8” tubing, not pictured). Compare the encoder output to the supplied altitude code chart to determine if an error is present.

Strobe function not working?

Simply toggle the strobe switch on the EET-200 to simulate an open strobe on the digitizer or the transponder.

Power supply connected correctly?

Simply unplug the altitude encoder and substitute the EET-200. If the power LED glows green then your good to go, if it glows red then your power is connected improperly.

http://www.aircraftspruce.com/catalog/avpages/eet200.php

EET-200 ENCODER EMULATOR TESTER

(Click image for a larger view)

In Stock

★★★★★ (0) review this

Part # 11-09606

Quantity: 1 $319.00/ea

ADD TO CART

Add to Wishlist

Instrument Testing Panels

Embry Riddle assembled instrument panel Garmin Apollo MX20 with Garmin GLD 90

Position Source:

•Primary - External GPS or LORAN via RS-232 serial

Expansion / Internal Architecture:

•Open software architecture
•Field upgradeable software
•PC-104/PC-104L expansion bus
•3 high-speed RS232 serial I/O ports
•1 high-speed RS422 serial I/O port
•4 general purpose input flags
•External alpha keypad support

Databases:

•Worldwide Jeppesen nav data
•Terrain (elevation) data

Specifications:

•Height 5.00 inches (12.7 cm)
•Width 6.25 inches (15.88 cm)
•Depth 8.00 inches (20.3 cm)
•Weight 3.1 lb (1.4 kg)

Instrument Testing Panels

Garmin model GDL 90

Needed

- 3ea GPS Antennas
- 3ea UAT Antennas
- 3ea Power Supplies
- 3ea Configuration Modules
- 3ea Altitude Encoders

Physical

Height:	7.42 inches (18.84 cm)
Width:	3.54 inches (8.97 cm)
Depth:	12.64 inches (32.11 cm)
Weight:	
(with mounting tray):	6.4 lb (2.9 kg)
(mounting tray only):	1.2 lb (0.54 kg)

Electrical

Power:	20 Watts
Voltage:	10-40 VDC
Input Current (typical):	1.5 A @ 14 VDC 750 mA @ 28 VDC

UAT performance

TSO Compliance:	TSO-C154
Frequency:	978.00 MHz
TX Power:	50 W
Frequency Tolerance:	+/- 20 PPM
Modulation:	Continuous Phase FSK, h = 0.6, Raised Cosine shaping, a = 0.5
Data Rate:	1.04 Mbps
99% Power Bandwidth:	1.3 MHz
60 dB Bandwidth:	3.3 MHz (estimated)
Receiver Sensitivity:	-96 dBm for 90\% MSR

GPS/WAAS receiver performance

TSO Compliance:	TSO-C145a (RTCA/DO-229C)
Number of Channels:	15 (12 GPS and 3 GPS/WAAS/SBAS)
Frequency:	1575.42 MHz L1, C/A code
Sensitivity (acquisition):	-116 dBm to -134.5 dBm GPS -116 dBm to -135.5 dBm WAAS
Sensitivity (drop lock):	-144 dBm
Dynamic Range:	> 20 dB
Lat/Long Position Accuracy:	<1 meter RMS typical with WAAS (horizontal/vertical)
Velocity:	1000 knots maximum (above 60,000 ft)
TTFF (time to first fix):	1:45 min. typical with current almanac, position, and time
Reacquisition:	10 seconds typical
Position Update Interval:	0.2 sec (5 Hz)
1 pps (pulse per second):	±275 nsec of UTC second
Datum:	WGS-84
SATCOM Compatibility:	Compatible on aircraft equipped with SATCOM Antenna Power Supply 35 mA typical, 40 mA max at 4.7 VDC

Instrument Testing Panels

Garmin model GDL 90 Hook-ups

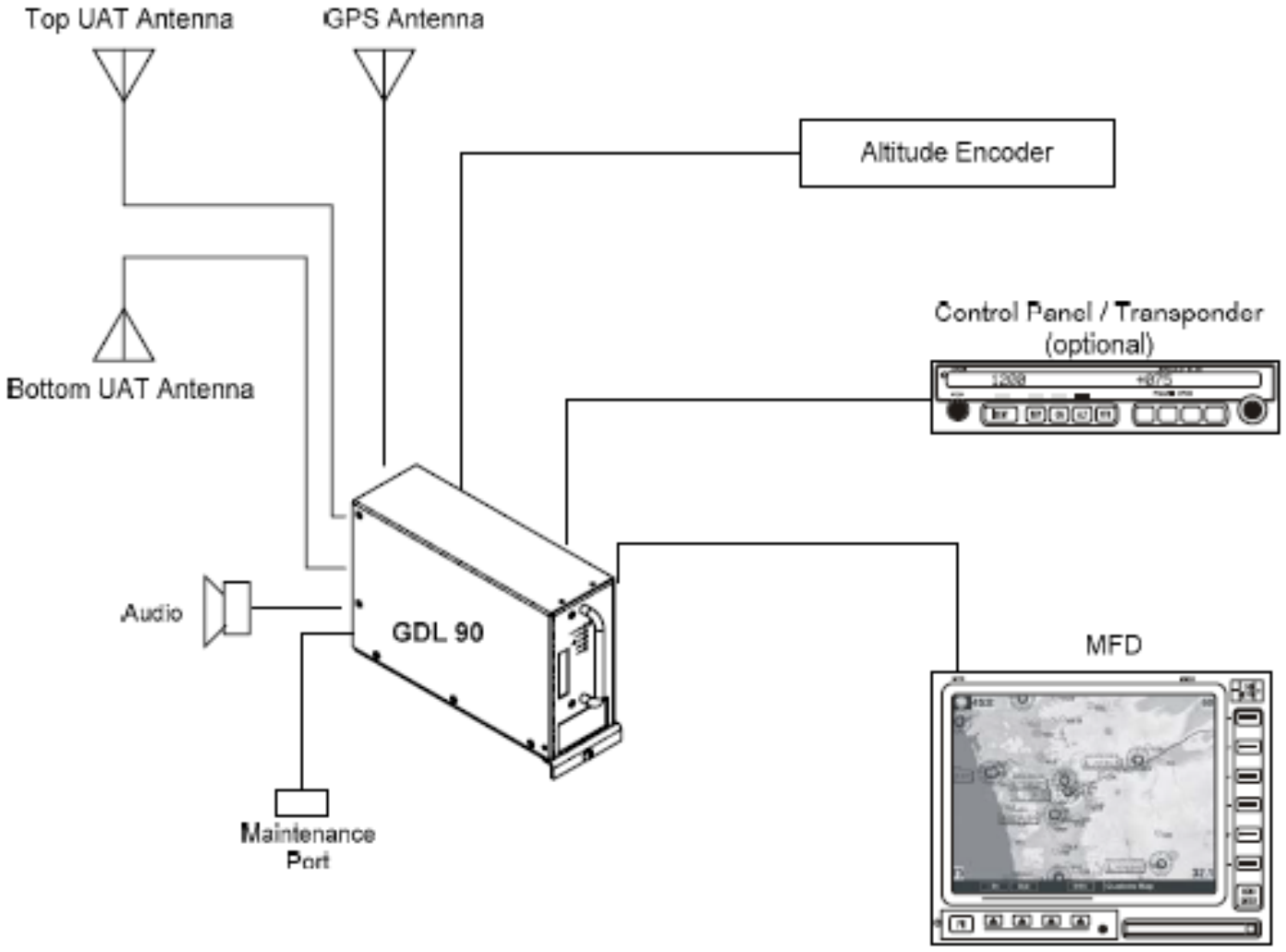


Figure 1-1. Sample GDL 90 System Diagram

Instrument Testing Panels

Garmin model GDL 90

GPS/UAT Antenna Chart

Table 3 - System Equipment List

	Description	Model No.	Mfg. P/N	Mfg.	Comment
	Data Link Sensor	GDL 90	430-6081-100-000	Garmin AT	SW Ver. 2.0, 2.1, or 2.2
	UAT Control Panel	GSL 71	430-6090-600	Garmin AT	SW Ver. 1.0
	Micro APM		430-6200-000	Garmin AT	SW Ver. 1.0
OR	UAT Antenna	A-41	590-0051 AT-130-2	Garmin AT AeroAntenna	Optional antenna
	UAT Antenna	A-40	590-0052 CI 105-11	Garmin AT Comant	Standard antenna
OR	GPS Antenna	A-33	590-1104 AT-575-9	Garmin AT AeroAntenna	Optional antenna
	GPS Antenna	A-34	590-1112 AT-575-93	Garmin AT AeroAntenna	Optional "teardrop" footprint
	GPS Antenna	GA 35	013-00235-00	Garmin	Standard "teardrop" antenna
	GPS Antenna	GA 36	013-00244-00	Garmin	Optional "arinc" footprint
	GPS Antenna	GA 37	013-00245-00	Garmin	Optional GPS + XM
	GPS Antenna	GA 56W	011-01111-00	Garmin	Optional "teardrop" antenna
	GPS Antenna	GA 56A	011-01154-00	Garmin	Optional "arinc" footprint
	GPS Antenna	GA 57	011-01032-00	Garmin	Optional GPS + XM

Event Supporters

To build the testing devices it will take the coordination of several key parties

Aeroflex IFR 6000/GPSG-1000
Cobham AvComm
Russ Smith
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Avionics Business Development Manager
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Instrument Panels/Garmin Apollo MX 20 Displays/Garmin GDL-90
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GPS/UAT/Consultation
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