

# GBAS Flight Tests and Data Collection

Presented to: GBAS Program Office

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Federal Aviation  
Administration



# Nature of Flight Testing

- **Accuracy/Resolution of MMR receivers**
- **Terminal Area Approaches**
- **Procedure turn Radii/Speeds**
- **Flight Control Parameters**
- **Replicate any RWY approach at ACY**
- **Support other GBAS programs**



# Equipment on the Plane

- **Dual GNLU-930 MMRs**  
**Gables Control Head**  
**Analog CDI**
- **TSPI reference receiver**
- **Sandel Multifunction Display**
- **Ballard DCS/Time Code Generator**
- **Media for data collection**
- **Cabling**



# GNLU 930 MMR Shelf

- **GNLU 930 MMR**
- **GABLES Control Head**
- **Control Display Indicator (CDI)**
- **ARINC 429 outputs**
- **RS-422 outputs**



# Ballard 429 Collector

- **12 Channel Receive 429 ports**
- **4 Channel Transmit 429 Ports**  
**Drives Convair flight control system**
- **16 Channel RS-422 Ports**
- **Two Ethernet Ports**
- **Compact Flash Drive**
- **Linux OS/ C software**



# Ballard Data Collector



# TSPI Receiver

- **Z Extreme GPS receiver**
- **Reference Receiver ground based**
- **Provides positional data and time**
- **1,2,5 or 10 Hz data rate**



# ES-291 IRIG Time Code Generator

- **GPS Based**
- **IRIG – B TTL output**
- **1 PPS output**
- **AC/DC Power**





# ES – 291 Time Code Generator



# SANDEL SN3500 DISPLAY

- **Electronic HSI**
- **Features of EFIS but fraction of cost**
- **Waypoint/Moving Map Display**
- **Perfect for TAP profiles**
- **Weather/Traffic display**
- **Distance to Waypoint**

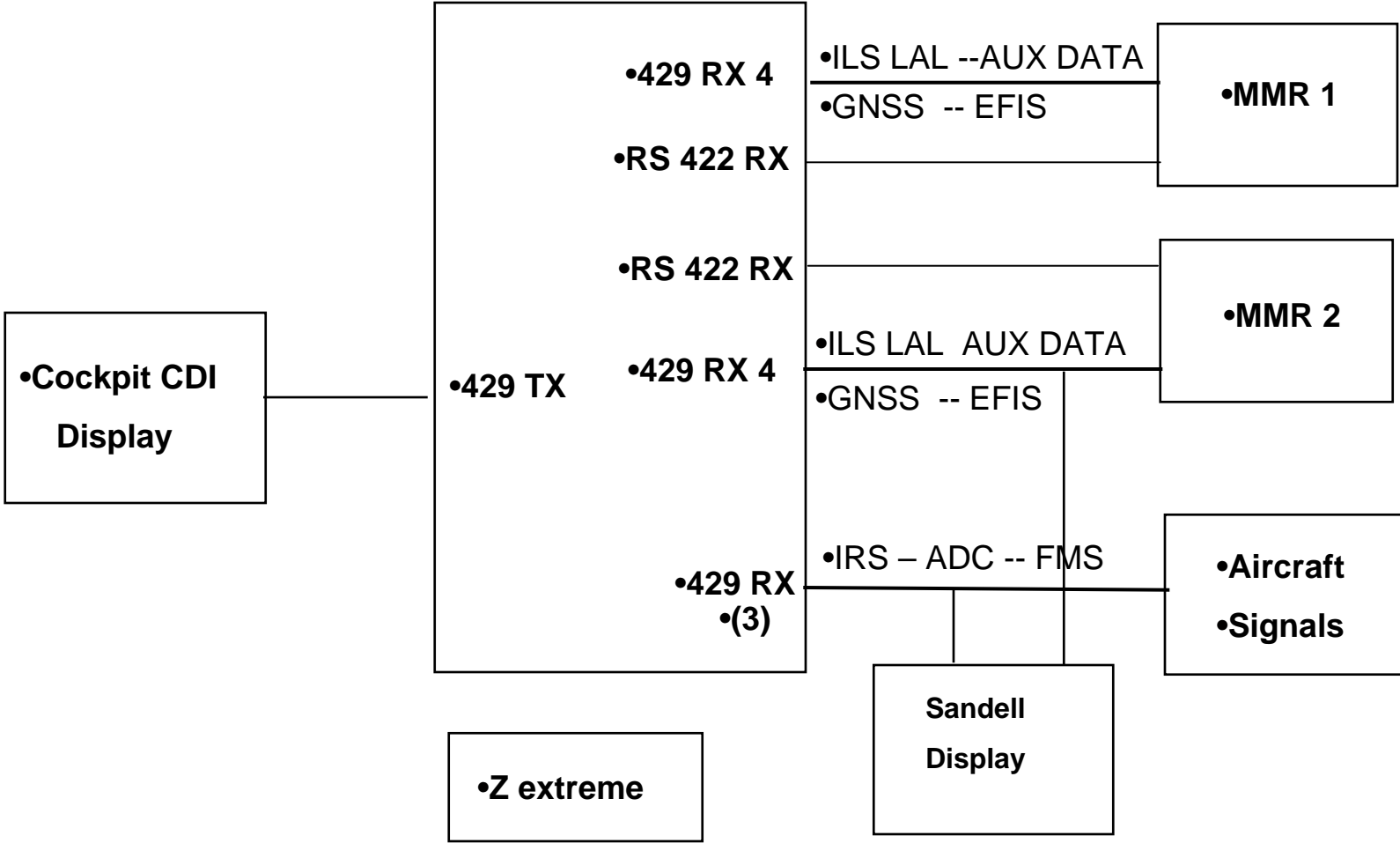


# SANDEL 3500 DISPLAY



# Typical FAA Aircraft Installation

## Ballard DCS



# MMR – DCS Rack



# Aircraft Racks

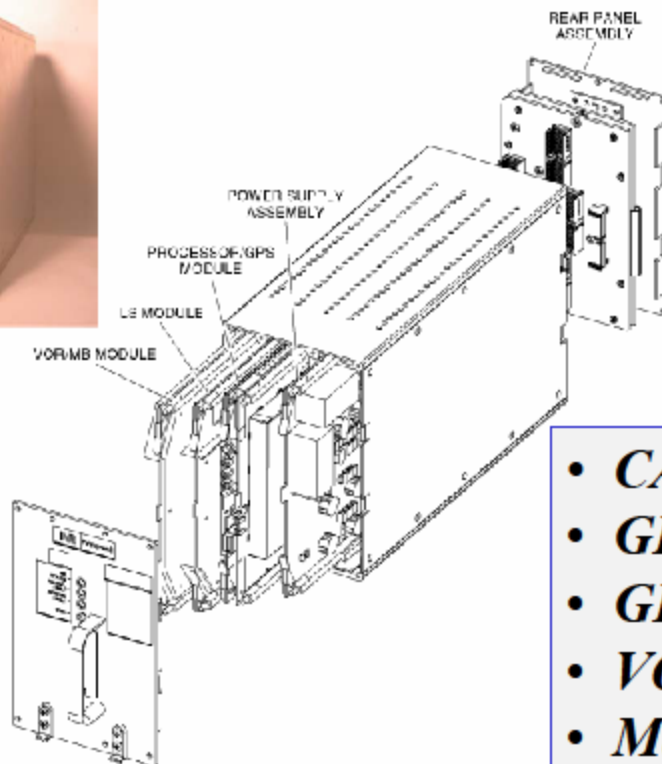


# FUTURE GBAS TESTING

- **Different Airport Procedures**
- **Honeywell INR CAT III receiver**
- **GNLU 925 MMR**



## Integrated Navigation Radio (INR)



- *CAT IIIb ILS/GS*
- *GLS*
- *GPS*
- *VOR*
- *Marker Beacon*

3



# Flight Test Procedures For INR

- **Twenty Mile Orbits**
- **Twenty Mile Radials**
- **25 and 10 Mile Approaches**
- **All runways**



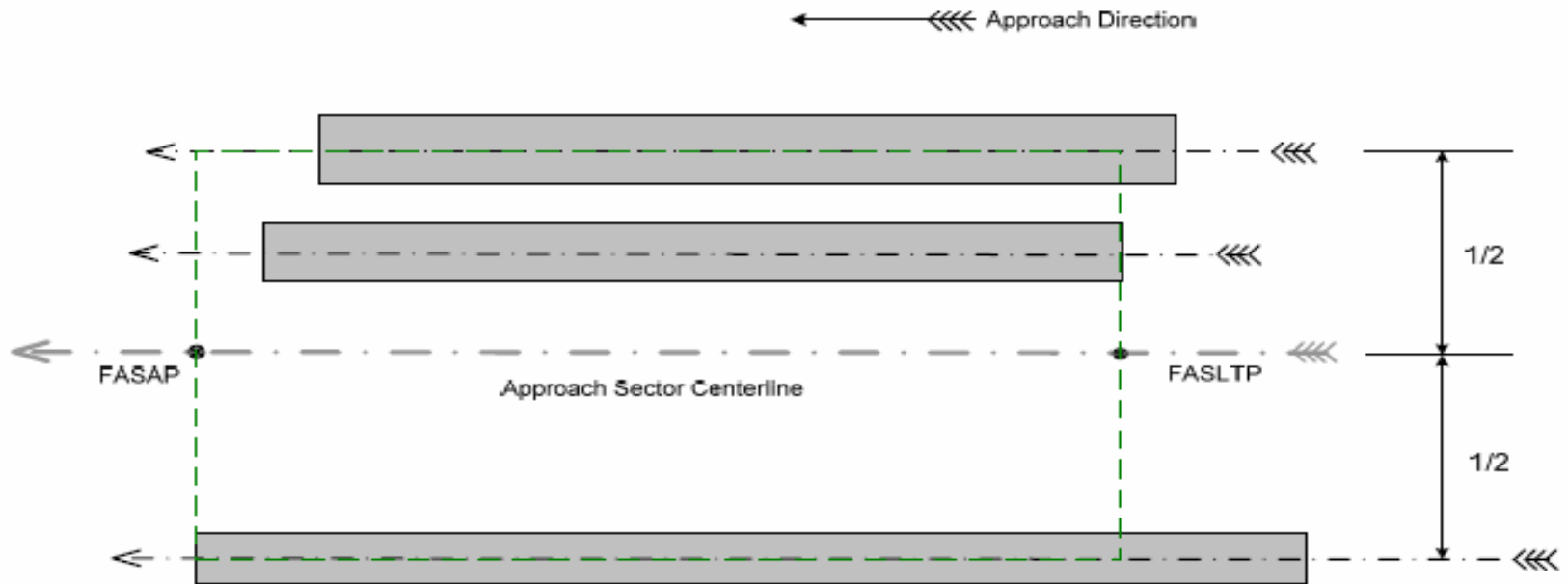
# LAAS Flight Inspection

- FAA National Policy Notice N8200.116
- Flight Inspection/Validation GBAS Procedures
- Precision Approach/Analysis/Tolerances
- FAA Website:

[http://www.avn.faa.gov/content/fioo/pdf/N\\_8200-116.pdf](http://www.avn.faa.gov/content/fioo/pdf/N_8200-116.pdf)

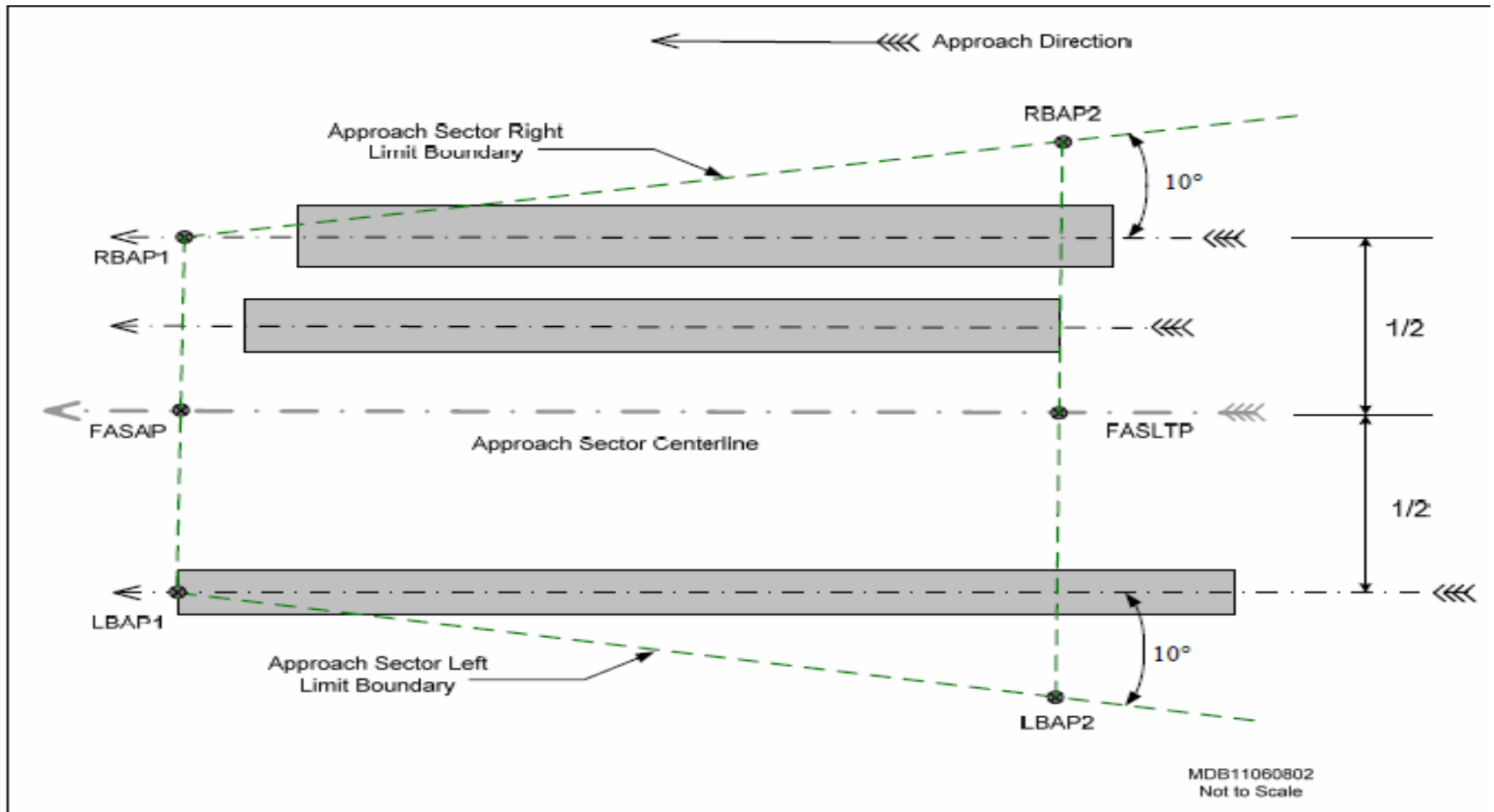


# Approach Sector Centerline, FASAP and FASLTP



MDB11060801  
Not to Scale

# Right /Left Boundary Points and Alignment Points



# Flight Inspection Procedures

Type Inspection	Paragraph Reference
Initial Evaluation/ Commissioning	3a(2)(a)
VHF Data Broadcast (VDB)	4
Terminal Area Path (TAP)	5a
Initial and Intermediate Approach Segment	5b
Final Approach Segment	5c
Missed Approach Segment	5d
Instrument Approach Procedure	5e
Airport Surface	5f
VDB Equipment or Frequency Change	
VHF Data Broadcast (VDB)	4
Final Approach Segment	4b(2)(b)
Periodic Evaluation	6
Facility-based Coverage	6a
Approach Procedures	6b
Terminal Area Path (TAP)	6c
Airport Surface	6d
Special Evaluations	7
Approach Procedures	7a
Terminal Area Path (TAP)	7b
Airport Surface	7c