Primus Elite™
Flight Deck Retrofit

Honeywell
Primus Elite™ Overview

• A new product designed to meet existing requirements with planned growth functionality to support future situational awareness enhancements and CNS/ATM progression
• Revolutionary technology allows CRT to LCD display upgrade for G-IV, G-IVSP and G-V legacy aircraft
• SPZ 8000/8400/8500 core systems maintained
  – No change to symbol generator software
  – No change to current PFD, ND, EICAS formats
• Supports ease of installation requirement (less than 10 days)
• Data storage for application databases integrated in DU
  – Supports a Paperless Terminal Charts and Maps solution
• Cursor Control Device
  – Supports additional display control capability required for additional functionality for advanced situational awareness features
Primus Elite™ Installation Requirements

• LRU Changes
  – Remove DU-880 CRT displays
  – Modify DU-880 mounting trays
    • Remove cooling connections
    • Add J2 growth connector
  – Install DU-885 LCD displays
  – Install RJ 45 Jack for data loading
  – Install Cursor Control Devices
    • CC-500 Interface Units
    • Trackball CCDs
  – Install XM WX Receiver and Antenna

• Wiring Changes
  – Each Primary ASCB (2) to each DU-885 ND (2)
  – 28V power to Ethernet switch (if selected)
  – Ethernet wire from RJ45 Jack to each ND DU (2) for database upload
  – Wiring between XM receiver and antenna
  – RS-422
    – between the DU-885 NDs and the CC-500
    – between DU-885 NDs (2) and XM receiver
  – Discretes
    – between the CCD (pilot interface) and the CC-500
    – TBD number of additional discrete wires
Primus Elite™ 885
### Primus Elite™ Baseline Functionality

<table>
<thead>
<tr>
<th>Function / Feature</th>
<th>Notes</th>
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</table>
| **Electronic Charts** | - Jeppesen airport maps and approach charts with SIDs, STARs, NOTAMs, Noise procedures, and Airspace  
- Geo-Referenced – own ship position  
- Bi-weekly updates of 300MB chart database  
- Paperless solution for Terminal Charts and Maps  
- Relies on free flowing cursor select/action button  
  - Cursor moves to areas of display that have function  
  - Chart task menu defines actions  
  - Database resides in each DU  
  - Uses MFD display  
    - Replaces MFD formats  
    - Cannot overlay on a PFD; PFD has priority at all times  
  - Links with FMS flight plan to provide “chart” linking and “airport” linking  
    - Chart linking requires an FMS update to output procedures |

*Diagram of Airport Map*
## Primus Elite™ Baseline Functionality

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- Available Charts List
- Chart Split View
# Primus Elite™ Baseline Functionality

## Function / Feature | Notes
--- | ---
Electronic Moving Map | Map Includes:
- Geopolitical Boundaries
- Aircraft Heading (North or HDG Up)
- FMS Flight Plan
- Airports
- Navaids
- Airways
- Airspace
- Aircraft Position
- Uplink Weather

![Map Hdg Up](image1)

![Map Data Menu](image2)
# Primus Elite™ Baseline Functionality

## Function / Feature

### Electronic Moving Map w/ Uplink Graphical Weather

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<tr>
<td>Initial release supports XM Satellite Weather</td>
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<tr>
<td>XM receiver provides streaming data for the following Wx displays:</td>
</tr>
<tr>
<td>- NEXRAD – NEXt-Generation RADar</td>
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<tr>
<td>- Storm Tops</td>
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<tr>
<td>- Satellite Imagery</td>
</tr>
<tr>
<td>- Winds</td>
</tr>
<tr>
<td>- TFRs – Temporary Flight Restrictions</td>
</tr>
<tr>
<td>- AIRMETs - AIRman’s METeorological Information</td>
</tr>
<tr>
<td>- SIGMETs – SILONtic METeorological Information</td>
</tr>
<tr>
<td>- Turbulence</td>
</tr>
<tr>
<td>- Lightning</td>
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<tr>
<td>- Vertical Winds</td>
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<tr>
<td>- Vertical Clear Air Turbulence</td>
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</tbody>
</table>

- Selected views are turned on and off using the check boxes next to the menu items
- CONUS (Continental United States) coverage map
- Multiple concurrent display formats
- Allows replay of NEXRAD with Winds, CAT and Satellite Imagery
- Drop down menus allow selection of weather views
- Geopolitical and water boundaries - no terrain.
## Primus Elite™ Baseline Functionality

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</table>
| Internal DU Maintenance     | Maintenance Includes:  
Power On Self Test Results  
Initiate Test and Initiated Built In Test Results  
Fault management page and fault memory download through external Ethernet connector  
Available only while on ground. |
| Cursor Control Device       | Cursor Control Device  
GAC designing pilot Interface unit  
Honeywell providing CC-500 electronics unit  
Pilot and Co-pilot duzs rail mounted  
Adjustable for fatigue free long-term use  
Charts, Map and Video Shortcut keys |
## Primus Elite™ Baseline Functionality

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</table>
| Data Loading       | Data Loading  Includes:  
                      Ethernet loading of Databases  
                      Downloading of fault data  

Data Loading will be done via RJ45 Jacks which will be added to the flight deck.
## Primus Elite™ Phase II (post EIS) Features

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<tr>
<th>Phase II Function / Feature</th>
<th>Notes</th>
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| Data Loader                 | **DL-1000 Data Loader**  
A new database loader that will be a form/fit replacement for the current DL-900/950. The DL-1000 will replace the EIS RJ45 Jacks and will provide:  
  - Media interface Secure Digital or USB  
  - Less than 30 minute load time for all databases  
  - Growth to support up to 8 displays and 8Gb of data |
## Primus Elite™ Phase IIA (post EIS) Features

<table>
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<tr>
<th>Phase II Function / Feature</th>
<th>Notes</th>
</tr>
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<tbody>
<tr>
<td><strong>Uplink Graphical Worldwide Weather</strong></td>
<td><strong>Worldwide Weather</strong>&lt;br&gt;Feature will be supported via Ethernet connection from the HD-710 Satcom (or equivalent High Speed Data system) to the DL-1000 Data Loader which acts as an Ethernet Switch sending the information on to the DUs, also via Ethernet.</td>
</tr>
<tr>
<td><strong>Basic Operation</strong></td>
<td><strong>World Wide Weather using High Speed Data</strong></td>
</tr>
</tbody>
</table>

- User requests a data product for a region through a Graphical User Interface for the DU (same as EPIC)
- DU sends the request to the HD-710 SATCOM through the Ethernet switch in the DL-1000 (or equivalent)
- HD-710 transmits the request to a ground station
- Ground station forwards the request to the Honeywell Global Data Center via Internet
- Honeywell Global Data Center retrieves the requested data
- GDC sends the data to the ground station via internet
- Ground station transmits data to the aircraft via SATCOM
- HD-710 receives the data from the SATCOM
- HD-710 sends the data to the DU through the DL-1000 via Ethernet
- DU process the data and displays it

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World Wide Weather using High Speed Data
## Primus Elite™ Future Capabilities

<table>
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<tr>
<th>Future Capability</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Printer</td>
<td>Print Capability</td>
</tr>
<tr>
<td></td>
<td>Adds capability to print selected Chart or Map displayed on the MFD to an ARINC 744A printer.</td>
</tr>
<tr>
<td>Document Viewer</td>
<td></td>
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<td></td>
<td>Adds capability to store and view .pdf data on the DU 885 NDs.</td>
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<tr>
<td>Enroute Charts</td>
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<td></td>
<td>Adds Enroute Charts to file sever database.</td>
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# Primus Elite™ Future Capabilities

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<td>Advanced Map Display</td>
<td>The Advanced Map Display feature will add obstacles, terrain, a vertical profile view and other select elements from Honeywell’s Interactive Navigation (INAV) Display. This upgrade will further enhance the situational awareness display capabilities of the DU-885 LCD.</td>
</tr>
<tr>
<td></td>
<td>Lateral Map: Display of NDB data, Geopolitical, and Terrain data as layers. Vertical Map: Display of Terrain along the flight plan or aircraft track. Display of EGPWS or Weather features. Sensor Data Overlay: Display of EGPWS, TCAS (incl. ADS-B), and Weather (airborne and uplink) as layers on top of lateral map. Interactivity: Controlled via CCD, allows selection / viewing of map information.</td>
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<td><strong>SmartView™ Synthetic Vision System</strong></td>
<td>IPFD</td>
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<tr>
<td></td>
<td>“IPFD reduces the pilots’ mental workload of trying to create this same picture by interpreting the information in current flight deck displays.”</td>
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<tr>
<td></td>
<td>“The display blends symbology like runway centerlines and range rings with surrounding terrain in a display that is easy for flight crew to use without appearing cluttered.”</td>
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<tr>
<td></td>
<td>Accumulated more than 500 hours of flight simulator testing and 300 hours of flight test on Honeywell aircraft.</td>
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<td></td>
<td>EGPWS terrain database with &gt;800 million flight hours</td>
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<td></td>
<td>FAA Certified World-wide coverage</td>
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<tr>
<td></td>
<td><a href="http://www.honeywell.com/ipfd">www.honeywell.com/ipfd</a></td>
</tr>
</tbody>
</table>
Primus Elite™ Program Status

• ETSO / TSO received

• G-IV / V STC – December, 2009

• ASC release – Q1 2010
  – Upgrade available from Gulfstream Service Center Facilities

DU-885
Primus Elite™ Value Proposition

Low Risk Display Upgrade Offers:

- **Improved Safety**
  - Enhanced Situational Awareness through intuitive display of information
    - Electronic display of Charts and Maps, XM ground based weather
    - Identical display formats – minimal pilot training

- **Reduced Cost of Ownership**
  - Higher reliability
    - ~2X for CRT to LCD
  - System weight reduction
    - Paperless Terminal Charts and Maps (~60lbs)
    - Installed Weight savings (~7lbs per DU)
    - CRT cooling system not required
  - New product warranty on DUs
  - Reduction in annual HAP pricing
  - Reduced Maintenance
    - Periodic task of changing cooling filters eliminated
    - 100 hour task of rotating CRT displays eliminated

- **Increased Aircraft Value**
- **Confirmed Growth Path**
  - Advanced Map
  - SmartView™ (SVS)