



AVIONICS ENGINEERING SERVICES

L35 LRN SIU

STEERING INTERFACE UNIT

DESCRIPTION AND THEORY OF OPERATION

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L35 LRN STEERING INTERFACE UNIT

P/N 92-7009-1



AVIONICS ENGINEERING SERVICES INC.

6416 EAST TANQUE VERDE

TUCSON, ARIZONA 85715

PHONE: (602) 886-8520

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REVISIONS

| | | |
|-------|--------------------------------|--------------------|
| IR | Complete Manual | July 29, 1992 |
| REV A | Added DO - 160C Qualifications | September 19, 1994 |
| REV B | Updated Interconnect - Page A3 | February 7, 1995 |

1.0 General Data

The L35 LRN Steering Interface Unit (SIU) is designed to provide integrated flight control guidance between the JET FC200 autopilot and the on board FMS or Long Range Navigation System (LRN). The SIU takes roll guidance signals from the LRN and converts them to a format acceptable to the FC200. Mode logic interlocks are also provided for proper autopilot interface. A detailed description of the unit is provided under item 5.0, Theory of Operation.

2.0 FAA Approval

2.1 Applicable Documents

RTCA Document No. DO-160C December 1989, Environmental Conditions and Test Procedures for Airborne Equipment.

2.1.1 DO-160C Environmental Categories

ENVIRONMENTAL QUALIFICATION FORM

NOMENCLATURE: L35 LRN Steering Interface Unit
TYPE/MODEL/PART NO: 92-7009-1 TSO NUMBER: N/A

MANUFACTURER: Avionics Engineering Services

ADDRESS: 6416 E. Tanque Verde Tucson, Arizona 85715

The SIU and its associated boards and components are qualified to the following test categories:

| CONDITIONS | SECTION | DESCRIPTION |
|------------------------|---------|---|
| Temperature & Altitude | 4.0 | Category D2 |
| Low Temperature | 4.5.1 | (-55 C) |
| High Temperature | 4.5.3 | (+70 C) |
| Altitude | 4.6.1 | (50,000 feet) |
| Decompression | 4.6.2 | (45,000 feet) |
| Overpressure | 4.6.3 | (-15,000 feet) |
| Temperature Variation | 5.0 | Category A |
| Humidity | 6.0 | Category A |
| Shock | 7.0 | Operational testing only |
| Operational | 7.2 | 6g |
| Crash Safety | 7.3 | Not Applicable |
| Vibration | 8.0 | Category B, Equipment tested without shock mounts, Table 8-1. |
| Explosion | 9.0 | Category X, No test required |
| Waterproofness | 10.0 | Category X, No test required |
| Fluids Susceptibility | 11.0 | Category X, No test required |

2.1.1 DO-160C Environmental Categories (cont..)

| CONDITIONS | SECTION | DESCRIPTION |
|---|---------|------------------------------|
| Sand and Dust | 12.0 | Category X, No test required |
| Fungus | 13.0 | Category X, No test required |
| Salt Spray | 14.0 | Category X, No test required |
| Magnetic Effect | 15.0 | Category X, No test required |
| Power Input | 16.0 | Category E |
| Voltage Spike Conducted | 17.0 | Category A |
| Audio Frequency Conducted Susceptibility | 18.0 | Category E |
| Induced Signal Susceptibility | 19.0 | Category A |
| Radio Frequency Susceptibility | 20.0 | Category U |
| Radio Frequency Emission | 21.0 | Category A |
| Lightning Induced Transient Susceptibility | 22.0 | Category X, No test required |
| Other Tests | | |
| <p>REMARKS:</p> <p>Testing was conducted at Viking Labs / Honeywell in Tucson, Az for Sections 4, 5, 6, 7, 8. Reference report 92-0005-04 for complete details.</p> <p>Testing was conducted at M'sco Labs, Glendale, California for Sections 16, 17, 18, 19, 20, 21. Reference report 92-0005-05 for complete details.</p> | | |

3.0 Mechanical Description and Aircraft Installation

The SIU is housed in a 4.25 X 6.25 X 1.50 inch box with a D Subminiature connector for electrical interface. Aircraft connector is a DCMA-37S. Unit mounting is accomplished with four stand off tabs using four #6 screws and washers. Weight of unit is 1.00 LBS.

4.0 Power Requirements

The SIU requires 26VAC at .200 amps.

5.0 Theory of Operation

5.1 General

The L35 LRN SIU is the interface between the FC200 autopilot and the Long Range Navigation System (LRN). The unit is designed to adjust roll commands from the LRN and route these to the autopilot Heading channel. HDG mode operation will not be affected by the installation of a Steering Interface Unit.

Failure monitors within the SIU ensure proper data output to the autopilot. In the event of an SIU failure, standard autopilot operation continues via the normal autopilot controller roll mode selection. (LRN selection would be the only mode inoperative). An external "SIU FAIL" amber annunciator, located on the pilots instrument panel, indicates an internal failure.

5.2 LRN Mode Selection

Selection of LRN on HSI with and auxiliary switch enables the SIU. It will also cancel the existing Roll mode and automatically place the autopilot in Level mode.

If the LRN is valid, LRN roll steering commands are now available to be coupled to the FC200 via the NAV select button on the existing autopilot controller. Short range navigation (such as VOR) is now locked out until the LRN mode is deselected.

In the event of an LRN invalid the autopilot will automatically revert to Level mode and the NAV CAPT light will begin to flash. The autopilot will remain in this condition until the pilot takes appropriate action, (such as selecting HDG mode). This will clear the flashing NAV light.

If the NAV button is pushed with an invalid LRN, the NAV CAPT light will begin to flash, and the autopilot will revert to the LVL mode.

When LRN on HSI is deselected, the autopilot will automatically be placed in Level mode.

5.3 HDG Mode Selection

With an SIU installed, the HDG Mode will continue to function the same as always, even if the LRN switch has been activated. The crew will continue to have the option of alternately selecting between either HDG or NAV mode.

6.0 SIU Signal Description

Signal Input Characteristics (AC Roll Steering input from LRN):

| | |
|---------------|----------------------|
| Load - | 5 K to infinity |
| Resolution - | .03 degrees |
| Null - | 50 mvac |
| Range - | 12.0 VAC RMS maximum |
| Scale - | 393 mvac / degree |
| Phase angle - | 0, + 5 degrees |
| Accuracy - | .3 degrees |

In phase with 26VAC 400Hz reference for right wing down command.

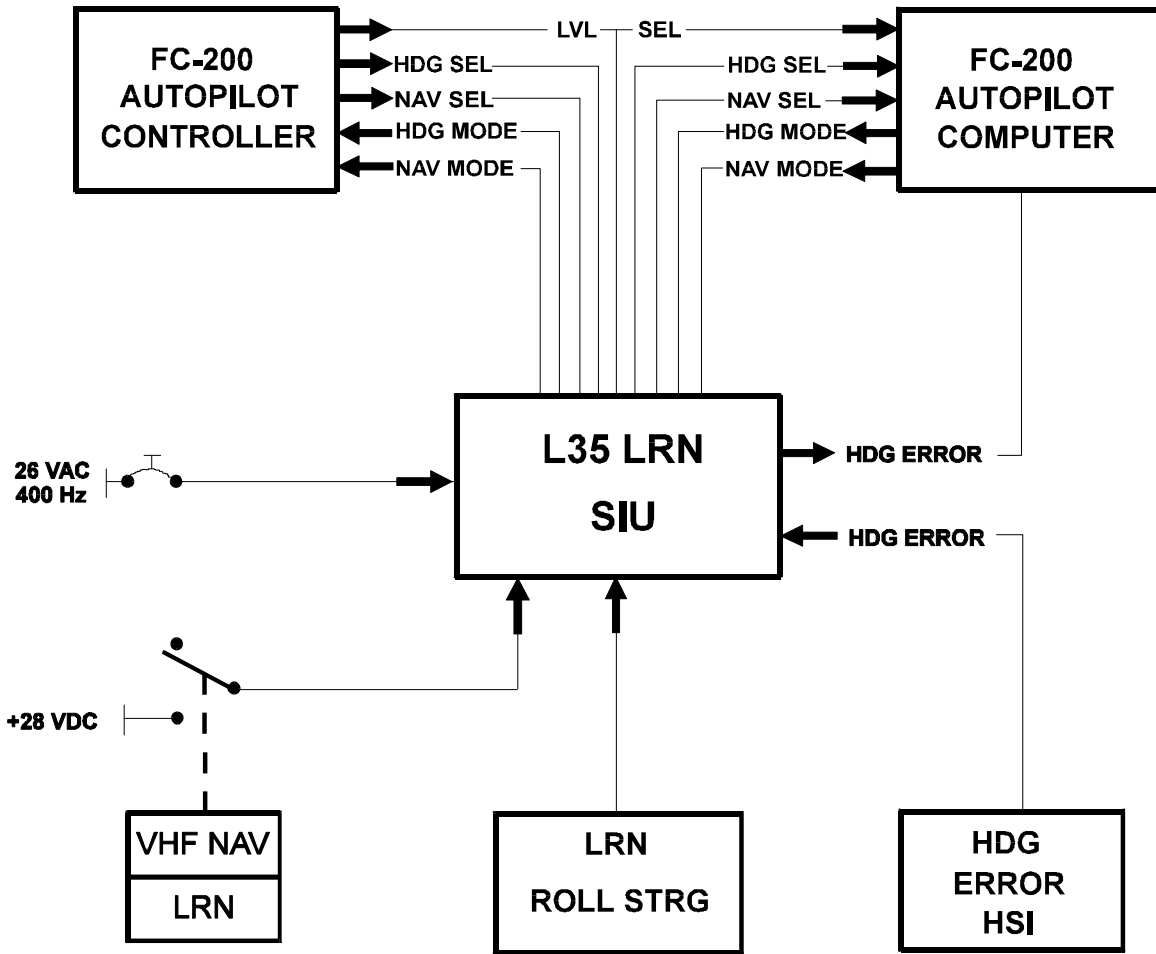
Signal Output Characteristics:

| | |
|---------------|--|
| Load - | 5 K to infinity |
| Resolution - | .03 degrees |
| Range - | 12.0 VAC RMS maximum (adjustable) |
| Scale - | 180 to 400 mvac / degree, (300 mvac / degree typical) |
| Phase angle - | 0, + 5 degrees |
| Accuracy - | .3 degrees |
| Source - | Isolation transformer with adjustable OP Amp for scaling |

Output is in phase with 26VAC 400Hz reference for right wing down command.

APPENDIX A

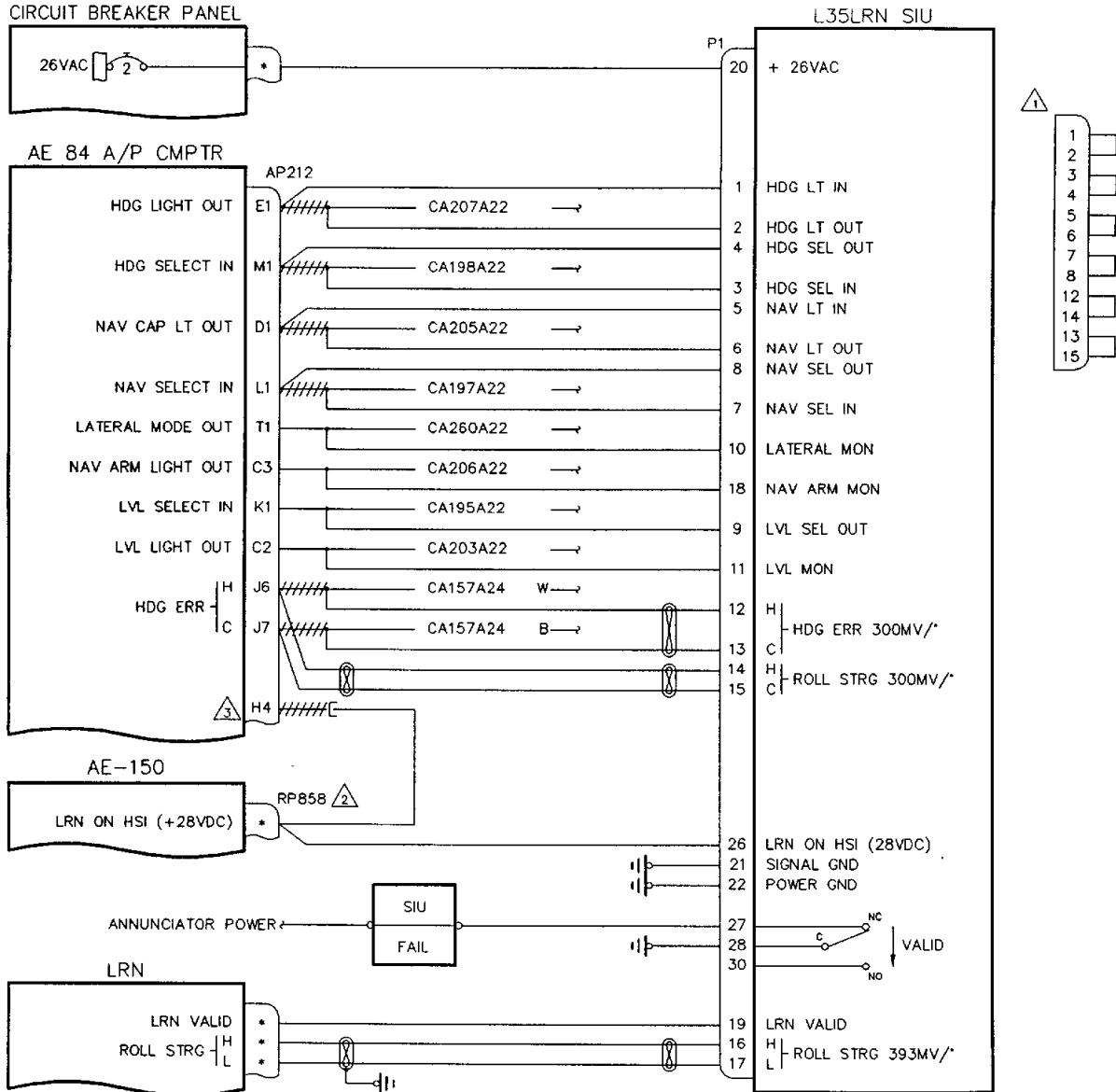
SIU INTERFAC BLOCK DIAGRAM



L35 LRN SIU INTERCONNECT

NOTES:

- 1 JUMPER PLUG FOR SIU HARNESS WHEN SIU NOT INSTALLED.
- 2 PIN NUMBER TO BE DETERMINED BY DASH NUMBER OF AE-150.
- 3 THERE ARE MANY VARIATIONS OF AE150 ACCESSORY UNITS. DEPENDING UPON DASH NUMBER OF UNIT, PLUG 858 PIN 9 OR PLUG 753 PIN 6 MAY BE USED FOR LRN ON HSI. IF SOMETHING OTHER THAN AE150 UNIT WAS USED, THE L35 LRN SIU NEEDS TO HAVE +28VDC ON PIN 26 FOR SELECTION OF LRN ON HSI.



L35 LRN SIU MECHANICAL LAYOUT

