

Model CDI-500, P/N 50-000X-XX
COURSE DEVIATION INDICATOR
Design Specification # 50-000X-XX
September 27, 1997

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(i) Operating Instructions

1. General

The CDI-500 operation is automatic and dependent on the digital output of the on board Long Range Navigational System.

The CDI-500 indicator has no "OFF/ON" switch. The unit becomes operational upon application of aircraft power.

2. Controls

TEST Press to verify all the LED displays function. The test button is recessed into the panel to prevent inadvertent use.

3. Warning Flags

The *red* legend FLG lights to warn of two different error conditions:

Flashing *red* legend FLG. with otherwise blank display:

An invalid SM label has been received.

Constant *red* legend FLG. with otherwise blank display:

No data is being received - the data bus, the CDI-500, and/or the LRN system has failed.

4. Navigation Mode

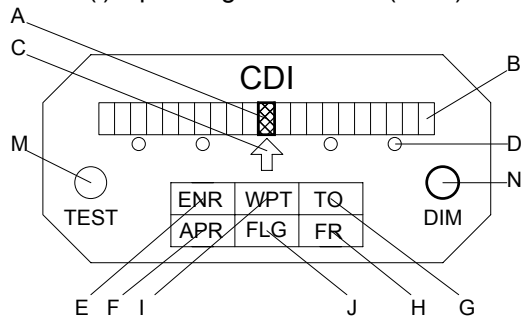
On application of power, prior to input of LRN system flight plan, the CDI-500 will display the green centerline and the *red* flag LED's.

Upon input of LRN system flight plan, the CDI-500 will display the following data as received from the LRN system label outputs:

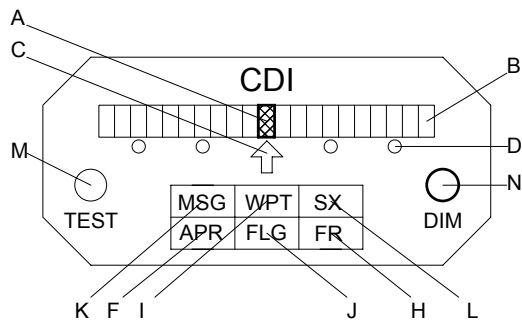
Course Deviation Display 21 segment LED bargraph display of aircraft's position with respect to the selected course as detailed in the Operation Illustration.

Status Displays Six color legend LED's display LRN system status depicted in the Operation Illustration.

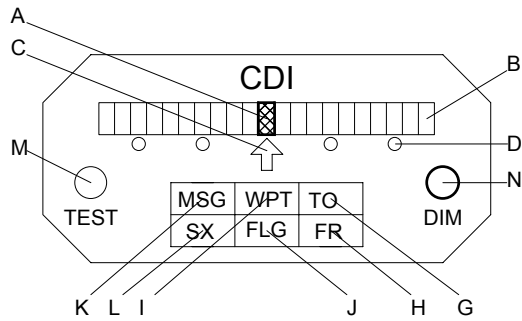
(i) Operating Instructions (cont.)



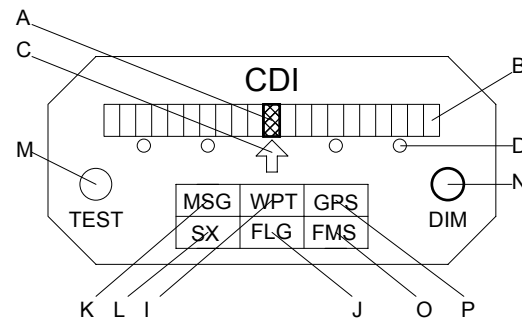
P/N 50-0001-(XX) Illustration (i-1)



P/N 50-0002-(XX) Illustration (i-2)



P/N 50-0003-(XX) Illustration (i-3)



P/N 50-0004-(XX) Illustration (i-4)

(i) Operating Instructions (cont.)

Course Deviation Bar Graph Display

- A On Course / Center Line (Green LED segment at full/half brightness.)
- B Right / Left Course Deviation (Yellow LED bar graph segments.)
- C On Course / Center Line (White arrow symbol.)
- D Right / Left Course Deviation (White dot symbols.)

Each	Interior Segment	1 DOT Symbol	2 DOTS Symbol	SCALE \ MILE Scale
Enroute	0.75	3.0	6.0	7.5
Approach(APR lit)	0.125	0.5	1.0	1.25
Enroute	0.625	2.5	5.0	6.35 * NOTE 1

Aircraft Status / Position Information Displays

- E ENR - Enroute (Green LED.)
- F APR - Approach Mode (Yellow LED, indicates scale change.)
- G TO - To Waypoint (Green LED.)
- H FR - From Waypoint (Yellow LED, no "next Waypoint".)
- I WPT - Way Point Alert (Flashing yellow LED.)
- J FLG - Warning Flags: Flashing red LED - Invalid Data
Steady red LED - No Data / System failure
- K MSG - Message Alert (Flashing Yellow LED,)
- L SX - Selected Cross track Warning (Yellow LED.)
- O GPS - Integrity of GPS (Yellow LED, Lit Invalid.)
- P FMS - FMS Heading Selected (Green LED.)

Controls

- M TEST - Verifies that all light segments function
- N DIM - Varies LED display intensity

NOTES: 1. P/N 50-0003-(XX) and P/N 50-0004-(XX) stand alone monitors no approach mode.

(ii) Equipment Limitations

The CDI-500, Digital Course Deviation Indicator, is only a display of ARINC 419/429 digital data received from other on-board flight or navigation system outputs. The update speed, accuracy, and data available for display is directly limited to the output of the system to which it is interfaced. In effect, it is a display component of that navigation system and therefore subject to all inherent limitations of that system.

(iii) INSTALLATION PROCEDURES

1. INTRODUCTION

This section contains information relative to the installation of the, CDI-500 indicator to assure satisfactory performance of the unit. (See Sections "iv" and "v" for detailed mechanical and wiring diagrams.)

2. UNPACKING AND INSPECTING EQUIPMENT

After unpacking the unit, make a visual inspection of the unit for evidence of damage incurred during shipment. If a claim for damage is to be made, save the shipping container to substantiate the claim.

3. PREINSTALLATION CHECK

Perform a continuity and power check on the wiring harness before connecting equipment.

4. POWER REQUIREMENTS

The CDI-500 has been designed to accept from 14 to 32 VDC power with no special modification or wiring considerations. The CDI-500 operates from a standard +28 VDC aircraft power source. Circuit protection should be provided with an in-line 1 Amp breaker. Panel lighting for the unit can be either +5 or +28 VDC, depending on aircraft requirements.

5. POST INSTALLATION CHECK

Power: Upon application of the aircraft 28 VDC power, verify the CDI-500 displays the green center line segment of the deviation bar graph and a constant red FLG(flag) LED.

Press and hold the TEST button. Verify that all of the display lights function.

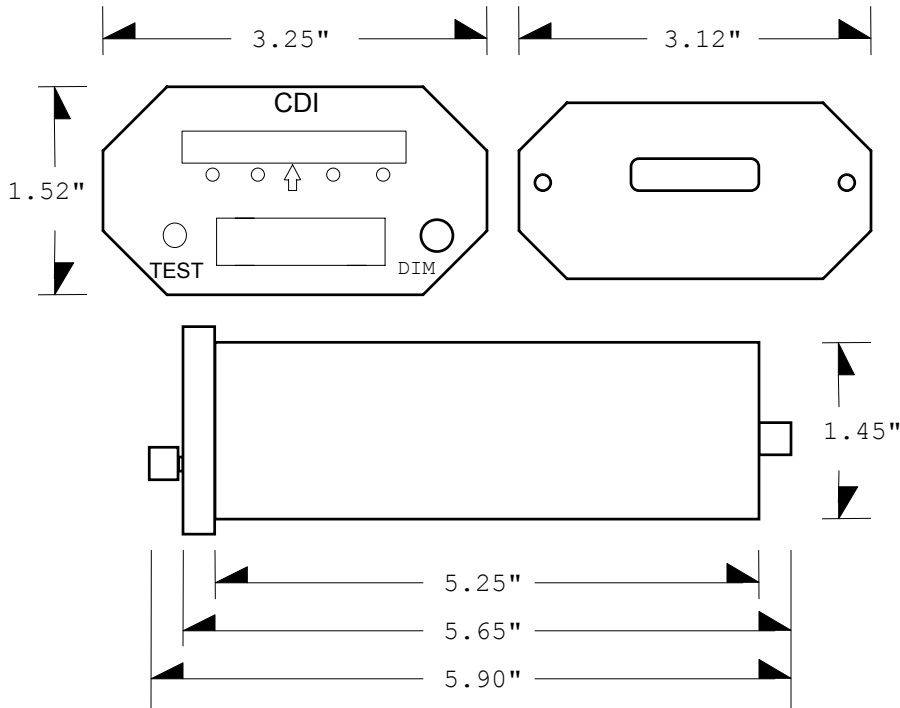
Systems Check: After the system to which the CDI-500 has been interfaced has been verified and is operating, verify that each data format function is operational. Input a flight plan to the LRN, including a waypoint. The CDI-500 should display a course deviation and waypoint position information which reflect the LRN CDU deviation and message data displays.

NOTE: If the display LED's light in random, alternate, or vague patterns, the interconnect input wiring is incorrect. Check A and B inputs and the discreet select wiring.

(iv) Install Specification: Physical

1. Mechanical

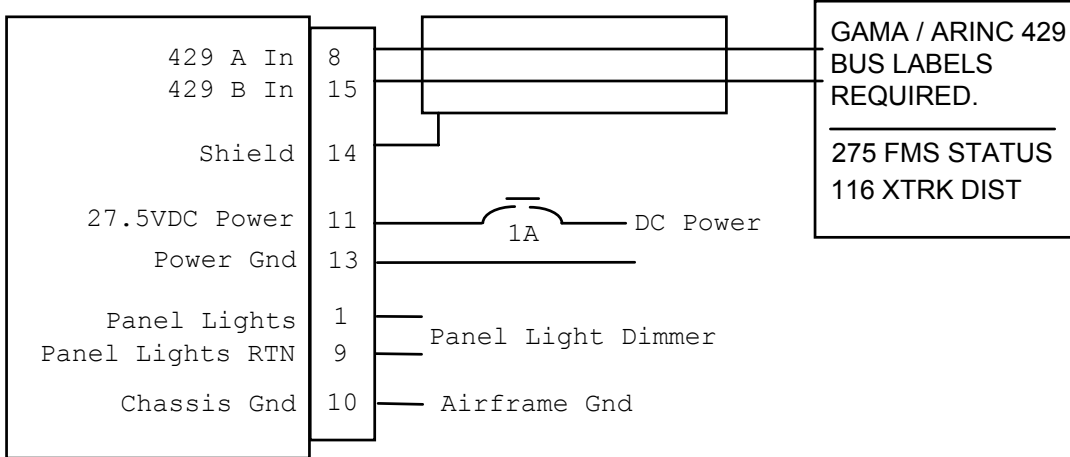
The CDI-500 is designed for rigid mounting in the aircraft instrument panel; a standard 1/2 3 ATI cutout and mounting clamp.



Mechanical Installation Drawing
Illustration (iv-1)

(v) Install Specification: Electrical

1. Pinout



Note:

Connector: DA15P (AMP P/N 745093-1)

Mate: DA15S (Standard 15 pin with male screw retainer)

P/N 50-000X-XX Pinout
 Illustration (v-1)

2. Data Format

Labels of the input being used must conform to the ARINC GAMMA 419/429 formatted standards. Data format labels required for the proper operation CDI-500, P/N 50-000X-XX are as follows:

Bus	429	419	
Labels	116	003	Cross Track Distance
	275	100	Status
	261		Status GPS Integrity 50-0004-XX only

(v) Install Specification: Electrical (cont.)

2a. Data Format: 419 bus

Cross Track Distance, label 003.

Bit
33	32	2222	2222	2111	1111	1110	00000000
21	09	8765	4321	0987	6543	2109	87654321
MM		ten NM	unitNM	tenthNM		0000	11000000
 ^hundred NM ^hundredth NM
 Where: MM is 01 = functional test, 00 = a/c right of course
 10 = invalid, 11 = a/c left of course.

Status, label 110.

Bit
3	33222222222211111111110	00000000
2	10987654321098765432109	87654321
P	Status	00010010
 Where: P is odd parity.(Ignored)
 Status has the following bit definitions when bit is set:
 Bit 31 = From, Bit 30 = To, Bit 29 = HSI Valid (NAV WARN, 1 = valid)
 Bit 14 = Approach (0 = Enroute), Bit 09 = Waypoint Alert

2b. Data Format: 429 bus

Cross Track Distance, Label 116

Bit
3	332	2222222222111111	11110	00000000
2	109	876543210987654	32109	87654321
P	SSM	2sComp+/-128NMI	00000	01110010
 Where: SSM is 110 = right of course, 111 = left of course, 010 = invalid
 P is odd parity. (Ignored)

Status, Label 275

:
 Bit 29 = HSI Valid (NAV WARN)
 Bit 27= MSG , (0 = Enroute)
 Bit 25= Offset Sel
 Bit 24 = From
 Bit 23 = To
 Bit 17 = FMS HDG
 Bit 16 = Approach Mode
 Bit 11 = Waypoint Alert

Status, Label 261

Bit 24 (0= GPS Valid, 1= GPS Warn)

(vi.) Specifications: General

SPECIFICATION	CHARACTERISTICS
Compliance	TSO C115 DO187 DO160B A1/B/A/KPS/X/X/X/X/X/A/A/A/A/A
Physical Dimensions:	
Height	1.52"
Length	5.90"
Width	3.25"
Weight	13oz.
Temperature Range:	
Operational	-15° C to +55° C
Storage	-55° C to +85° C
Maximum Altitude	
Nonpressurized	15,000'
Pressurized	55,000'
Power Requirements	28 VDC @ .5 Amps Peak, .3 Amps Normal
Digital Inputs	ARINC 419 GAMMA Label 003 (Cross Track Distance) Label 110 (Status) ARINC 429 Hi/Lo GAMMA Label 116 (Cross Track Distance) Label 275 (Status) Label 261 (GPS Status) P/N 50-0004-(XX) Only.
Deviation Scale	
Enroute	0.75 NMI / Segment
Approach	0.125 NMI / Segment
Enroute	0.625 NMI / Segment (P/N 50-0003-(XX) & 50-0004-(XX))
Deviation Range	
Enroute	+/-7.5 NMII
Approach	+/-1.25 NMI
Enroute	+/-6.35 NMI (P/N 50-0003-(XX) & 50-0004-(XX))
Deviation Accuracy	
419 bus	0.1 Nautical Miles
429 bus	0.031 Nautical Miles
Data Update	Less than 1 millisecond
Limitations	Limited to LRN System Data output

(vii.) Major Components

1. Equipment Supplied:

Model CDI-500 Digital Course Deviation Indicator, P/N 50-000X-XX

Dim voltage, Faceplate	Part Number
5V, Black faceplate	50-000X-01
28V, Black faceplate	50-000X-02
5V, Gray faceplate	50-000X-11
28V, Gray faceplate	50-000X-12
5V, Boeing Brown faceplate	50-000X-21
28V, Boeing Brown faceplate	50-000X-22

2. Equipment Required But Not Supplied:

- 1 Standard 1/2 3ATI panel mounting clamp
- 1 Interconnect kit
- 1 Standard DA15S connector with male screw retainers

3. Interconnection



(a) Connect to Any 419/429 instrument, flight, or navigation unit, general purpose bus, which outputs correct GAMMA labels (See Section v., Part 2.). Interconnect varies by manufacturer.

Illustration (vii-1)

(viii.) Environmental Qualification

1. Nomenclature: CDI-500, Course Deviation Indicator
2. Part Number: 50-000X-XX
3. TSO Number: C115
4. Manufacturer's Specifications: None
5. Manufacturer: Skylight Avionics Company
 38629 6th Street East
 Palmdale, CA. 93550, USA

Tests:

Conditions	Section / Paragraph	Test Conducted
Temperature & Altitude	4.0	Equipment tested to Category: A1
Low Temperature	4.5.1	Equipment tested to Category: A1
High Temperature	4.5.2/3	Equipment tested to Category: A1
Altitude Tests	4.6.1	Equipment tested to Category: A1
Decompression Test	4.6.2	Equipment tested to Category: A1
Overcompression Test	4.6.3	Equipment tested to Category: A1
Temperature Variation	5.0	Equipment tested to Category: B
Humidity	6.0	Equipment tested to Category: A
Shock	7.0	Equipment Tested per DO-160B Paragraph 7.1.1
Operational	7.2	
Crash Safety	7.3	
Vibration	8.0	Equipment tested without shockmounts to Categories K, P and S (DO-160B, Table 8-1)
Explosion Proofness	9.0	Equipment Identified as "X" no test required
Waterproofness	10.0	Equipment Identified as "X" no test required
Fluids Susceptibility	11.0	Equipment Identified as "X" no test required
Sand & Dust	12.0	Equipment Identified as "X" no test required
Fungus Resistance	13.0	Equipment Identified as "X" no test required
Salt Spray	14.0	Equipment Identified as "X" no test required
Magnetic Effect	15.0	Equipment tested as Class "A"
	16.0	Equipment tested as Class "A"
Voltage Spike	17.0	Equipment tested as Class "A"
Audio Frequency Conducted Susceptibility	18.0	Equipment tested as Class "A"
Induced Signal Susceptibility	19.0	Equipment tested as Class "A"
Radio Frequency Susceptibility	20.0	Equipment tested as Class "A"
Radio Frequency Emission	21.0	Equipment tested as Class "A"

Skylight Avionics Company
Model CDI-500, P/N 50-000X-XX
TSO-C115, Specification # 50-000X-XX

(viii.) Environmental Qualification (cont.)

Remarks:

Tests 4.0, 5.0, 6.0, 7.0 and 8.0 were conducted at:
A-BEC Environmental Testing Laboratories.

Tests 15.0, 16.0, 17.0, 18.0, 19.0, 20.0 and 21.0 were conducted at:
Mcpete Systems Company, EMC Science Center.

Compliance to FAR part 25 demonstrated by component parts and material analysis.