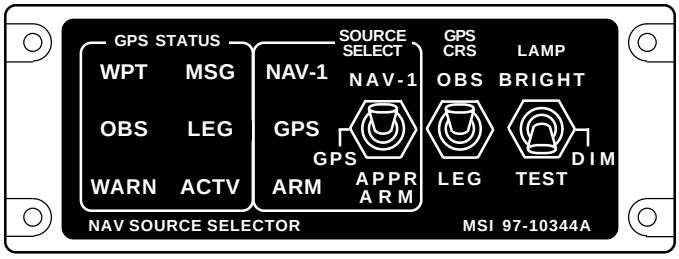
MSI 97-10344A(V/T/R)
INTEGRATED NAV SOURCE SELECTOR
AND DISPLAY UNIT

INSSDU III

INSTALLATION AND OPERATION MANUAL



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DOCUMENT REVISION RECORD

ORIGINAL ISSUE DATE: 15 SEP 1994 APPROVED: WAF
REV-

REV-1 DATE: 09 DEC 1994 APPROVED: WAF

The INSSDU III unit was modified, beginning with S/N 3109, Date code 1294, to provide a contact closure to ground on CT-2 (PIN-1) in the NAV-1 mode (instead of the GPS mode).

Section 1.2.4.2 was modified.
Section 1.3.1.1 was modified.
Section 1.3.1.2 was added.

REV-2 DATE: 05 APR 1999 APPROVED: WAF

APPENDIX A, Warranty Documents, was modified.
APPENDIX D, Continued Airworthiness, was added.

LIST OF ILLUSTRATIONS

1 GENERAL DESCRIPTION

1.1 INTRODUCTION

The MSI 97-10344A is an Integrated Navigation Source Selector and Display Unit (INSSDU). It combines all the necessary functions and features required for switching HSI/AUTOPILOT data inputs between a conventional NAV receiver and an approach-certified GPS receiver. The 97-10344A (INSSDU III) is specifically designed to interface with the King KLN-90B receiver.

As the unit also contains an internal WARN annunciator, it is ideal for installation with the KLN-90A when upgrade to the KLN-90B is planned.

The INSSDU unit mounts in the aircraft instrument panel, and contains all the required relays, control switches, logic circuits and annunciators in a single easy-to-install package. Use of the INSSDU unit in a typical installation will save substantial time over a conventional piece-parts installation.

The INSSDU unit requires less panel space than discrete switches and annunciators would require to accomplish the same functionality.

Within the unit, all connector and relay contacts are gold plated for maximum reliability. The relays used in the unit are rated for high vibration and shock, and are sealed and nitrogen filled. All the components used in the unit are of the highest commercial quality.

The internal circuit boards are constructed of flame retardant glass-epoxy material. The finished board and all electronics components are post-coated to protect against dust, moisture and fungus. Even the rugged aluminum housing is chem-coated for corrosion protection.

All the front panel annunciators are color coded, back lighted, deadfront text legends. All annunciator positions have two, parallel connected, lamp bulbs for high reliability and redundancy.

1.2 TECHNICAL SPECIFICATIONS

1.2.1 MECHANICAL

Front Panel
- Width: 3.50 inches
- Height: 1.30 inches
- Thickness: 0.15 inches
- Mounting: (4) 4-40 Pan Head Screws, (Black Zinc Coated)

Through panel enclosure
- Width: 2.90 inches
- Height: 1.175 inches
- Depth: 5.50 inches

Weight: 12 oz (335 grams)

1.2.2 ENVIRONMENTAL

Temperature: -40 to +70 Degrees C (Ambient)
Altitude: 50,000 feet (Maximum)
Humidity: 95% Non-condensing
Shock and Vibration: 5G (Any axis)

1.2.3 ELECTRICAL

1.2.3.1 POWER REQUIREMENTS

Power requirements: 14 VDC (Model 97-10344A-14)
28 VDC (Model 97-10344A-28)
1.25 Amp (Maximum)

1.2.3.2 FRONT PANEL CONTROLS

SOURCE SELECT Switch: 3- Position Toggle Switch
- NAV-1 (Up Position)
- GPS (Center position)
- APPR ARM (Momentary Down Position)

GPS CRS Switch: 2-Position Toggle Switch
- OBS (Up Position)
- LEG (Down Position)

LAMP Switch: 3-Position Toggle Switch
- BRIGHT (Up Position)
- DIM (Center Position)
- LAMP TEST (Momentary Down Position)

1.2.3.3 FRONT PANEL ANNUNCIATORS

All built-in annunciators are color-coded, deadfronted text legends.

Nav Source Annunciators:

NAV-1 (Green) NAV-1 Radio selected
GPS (Blue) GPS Receiver selected

GPS Status Annunciators:

WPT (Amber) Waypoint Arrival Alert
MSG (Amber) Message Alert
OBS (Amber) No Sequencing
LEG (Green) Automatic Waypoint Sequencing
ACTV (Green) Approach Coupled
ARM (White) Approach Available/Armed
WARN (Red) System Warning

1.2.4 INTERFACE

1.2.4.1 LOGIC LEVELS

CDI/FLAG Data: Deviation, Right/Left
Flag +/-
To/From +/-
(Standard instrument voltage levels)

OBS Data: C through H lines (6 lines)
(Standard instrument voltage levels)

ILS Override: A logic low (or ground) on this INSSDU input line will cause the INSSDU unit to switch to the NAV-1 mode regardless of the position of the SOURCE SELECT switch.

GPS Annunciation: A logic low (or ground) on any of the INSSDU unit's annunciator lines will cause the appropriate annunciator to illuminate.

NOTE: The GPS receiver unit must be able to sink 120mA on each of these lines.

1.2.4.2 CONNECTOR

Connector: 50 pin D-type, metal shell, male
(Mating connector is female)

J1 Pin designations:

INSSDU J1 PIN NUMBER	SIGNAL NAME/DESCRIPTION
1	Contact closure to Gnd in NAV-1 mode
2	NAV-1 DEVIATION +RIGHT in
3	NAV-1 DEVIATION +LEFT in
4	NAV-1 +FLAG in
5	NAV-1 -FLAG in
6	NAV-1 +TO in
7	NAV-1 +FROM in
8	NAV-1 OBS D in
9	NAV-1 OBS E in
10	NAV-1 OBS F in
11	NAV-1 OBS G in
12	NAV-1 OBS H in
13	NAV-1 OBS C in
14	SPARE RELAY, N.C. CONTACT
15	ARM SELECT (to GPS) (SWITCH)
16	MSG (Message) ANNUNCIATOR IN (from GPS)
17	ILS Override input (from NAV-1 radio)
18	GPS DEVIATION +RIGHT in
19	GPS DEVIATION +LEFT in
20	GPS +FLAG in
21	GPS -FLAG in
22	GPS +TO in
23	GPS +FROM in
24	GPS OBS D in
25	GPS OBS E in
26	GPS OBS F in
27	GPS OBS G in
28	GPS OBS H in
29	GPS OBS C in
30	SPARE RELAY, N.O. CONTACT

J1 Pin designations (continued):

INSSDU J1 PIN NUMBER	SIGNAL NAME/DESCRIPTION
31	OBS/LEG CONTROL (to GPS)
32	WARN (Warning) ANNUNCIATOR IN (Optional)
33	INSSDU POWER IN (14 or 28 Volts)
34	DEVIATION +RIGHT OUT (To HSI/AUTOPILOT)
35	DEVIATION +LEFT OUT (To HSI/AUTOPILOT)
36	+FLAG OUT (To HSI/AUTOPILOT)
37	-FLAG OUT (To HSI/AUTOPILOT)
38	+TO OUT (To HSI)
39	+FROM OUT (To HSI)
40	OBS D OUT (To HSI)
41	OBS E OUT (To HSI)
42	OBS F OUT (To HSI)
43	OBS G OUT (To HSI)
44	OBS H OUT (To HSI)
45	OBS C OUT (To HSI)
46	SPARE RELAY, COMMON CONTACT
47	APPR (from GPS) (ACTV ANNUNCIATOR)
48	APPROACH ARM (ARM ANNUNCIATOR)
49	WPT (Waypoint) ANNUNCIATOR IN (From GPS)
50	INSSDU GROUND

1.3 OPERATIONAL SPECIFICATIONS

1.3.1 RELAY SWITCHING FOR CDI/OBS DATA LINES

The INSSDU unit provides, via the rear panel connector, twelve (12) poles of SPDT (FORM C) dry relay contacts for CDI/OBS data line switching.

In a full-up, approach-certified installation, these relay poles are used to switch the FLAG, DEVIATION and TO/FROM CDI lines, as well as the six OBS rotor and stator lines, C through H.

The INSSDU unit also provides an additional spare SPDT (FORM C) relay pole, available to switch the SUPERFLAG, or to switch other user-defined functions.

NOTE: In certain specialized installations that require substantial additional switching, this spare pole can be used to control an external switching module such as the MSI 97-10229 REMOTE SWITCH UNIT.

This module provides an additional twelve (12) poles of user-definable external relay switching that is controllable by the INSSDU unit. Consult factory for details.

In addition to the spare pole, the INSSDU III unit provides a separate relay contact closure to ground in the GPS mode. This contact may be used to control additional, external annunciators, or other user-defined switching functions.

1.3.1.1 SWITCHING FOR GPS DISPLAY

The KLN-90B GPS DISPLAY line (PIN-1) needs to be grounded in the NAV-1 mode. The CT-2 line (PIN-1) on the INSSDU unit is specifically intended to provide this ground.

1.3.1.2 LOSS OF POWER

Loss of power to the INSSDU unit will cause the unit to automatically return to the NAV-1 mode. In this condition, the internal relays will cause the NAV-1 receiver data to be channeled to the HSI/AUTOPILOT.

If power to the INSSDU unit is lost, the front panel annunciators will not illuminate, and all other switching and control functions of the INSSDU unit will be inoperative.

1.3.2 ILS OVERRIDE FUNCTION

In accordance with FARs, the INSSDU unit incorporates a Glideslope/ILS override feature. This feature will cause the INSSDU unit to automatically switch to the NAV-1 mode, regardless of the position of the SOURCE SELECT switch, if the connected NAV-1 receiver is tuned to an ILS frequency.

If the ILS override function becomes active while the GPS is the selected navigation source, the blue GPS annunciator will go off and the green NAV-1 annunciator will illuminate, and the internal relays will cause the NAV-1 receiver data to be channeled to the HSI/AUTOPILOT.

In the ILS override mode, the position of the SOURCE SELECT switch will have no effect on navigation source selection.

1.3.3 ANNUNCIATOR BRIGHTNESS CONTROL

The INSSDU unit features selectable and fully adjustable annunciator lamp brightness. For daytime flying, the LAMP toggle switch is placed in the up, or BRIGHT position. In this position, the illuminated annunciators illuminate to full brightness for easy daytime viewing.

For night flying, the LAMP toggle switch can be placed in the center, or DIM position. In this position the annunciators are controlled by a built-in lamp dimmer circuit. The DIM mode brightness is fully adjustable, and may be set to any desired brightness by a control located on the side of the unit.

The lamp brightness is not adjustable in flight, other than to select either the BRIGHT or DIM mode. Typically, the desired DIM mode brightness is set at the time of installation, but may easily be adjusted from time to time, as required. The range of adjustment is very wide, ranging from about 90% to about 20% of full brightness.

1.3.4 ANNUNCIATOR LAMP TEST FUNCTION

As an additional safety feature, the INSSDU unit contains a built-in lamp test function. If the LAMP toggle switch is momentarily pressed to the down, or TEST position, all annunciators will illuminate at full brightness.

The lamp test mode is a momentary function. The LAMP switch will automatically return to the center, or DIM position when released. It is recommended that the lamp test function be limited to just a few seconds, as required.

1.3.5 ANNUNCIATION FOR NAV SOURCE SELECT

Depending upon which navigation source is selected, the INSSDU unit will provide the appropriate annunciation to the pilot, as required in FAR 23.1329.

If the SOURCE SELECT toggle switch is placed in the up, or NAV-1 position, the connected NAV-1 receiver data will be channeled into the HSI/AUTOPILOT. The green NAV-1 annunciator on the INSSDU unit will be illuminated.

If the SOURCE SELECT toggle switch is placed in the center, or GPS position, and if the connected NAV-1 receiver is not tuned to an ILS frequency, the GPS receiver data will be channeled into the HSI/AUTOPILOT. The blue GPS annunciator on the INSSDU unit will be illuminated.

1.3.6 APPROACH ARM ANNUNCIATION

By asserting the APPR ARM line on the INSSDU unit, the GPS receiver can alert the pilot that an approach is available, or that the approach mode is selected.

If this line is forced to a logic low (or ground) by the GPS receiver, the white ARM annunciator on the INSSDU unit will illuminate.

1.3.6.1 SETTING THE ARM MODE

If the SOURCE SELECT toggle switch is momentarily pressed to the down, or APPR ARM position, the INSSDU unit will provide a momentary logic low output to the GPS receiver via the ARM SELECT line. This will arm the approach mode within the GPS receiver.

The APPR ARM position of the SOURCE SELECT switch is a momentary function. The SOURCE SELECT switch will automatically return to the center, or GPS position when released. The CDI/OBS data lines are not affected by this operation. The GPS data will be channeled into the HSI/AUTOPILOT before, during and after the arming function.

Having the approach arming function controlled by a momentary position of the SOURCE SELECT switch is a dual safety feature. First, it prevents the INSSDU from powering up in the armed mode. Secondly, this configuration also prevents the arming of the GPS approach mode unless the GPS receiver is selected as the navigation source.

1.3.7 APPROACH COUPLED ANNUNCIATION

At or near the initial approach fix (IAF) the GPS receiver will assert the APPR input on the INSSDU unit. If the GPS receiver forces a logic low (or ground) on this input, it will cause the green ACTV annunciator to illuminate.

This indicates to the pilot that the approach mode is coupled and the GPS will begin sequencing through the approach.

1.3.8 ANNUNCIATION FOR GPS OUTPUTS

The INSSDU III unit incorporates annunciators for the GPS receiver outputs. Under control of the GPS receiver, annunciators for **WARN** (Warning), **WPT** (Waypoint Arrival Alert) and **MSG** (Message) can be illuminated. Some of these annunciators are required by the FARs for instrument and approach certification.

All the GPS annunciators are color-coded deadfronted text legends. The WPT and MSG annunciators, when illuminated, are amber. The WARN annunciator, when illuminated, is red.

NOTE: USE OF THE WARN ANNUNCIATOR IS NOT REQUIRED IN THE STANDARD KING KLN-90B INSTALLATIONS.

These GPS annunciators are also illuminated to full brightness whenever the LAMP toggle switch is pressed to the down, or TEST position.

1.3.9 OBS/LEG (GPS CRS) SELECTOR

The INSSDU III unit features a front-panel toggle switch to select the OBS mode. The OBS function will cause the GPS receiver to stop the automatic waypoint sequencing, allowing the pilot to execute a procedure turn, hold or other ATC instructed procedure.

If the GPS CRS switch is placed in the up, or OBS position, the INSSDU III unit will provide a logic low on the OBS/LEG CONTROL line to the GPS receiver. It will also illuminate the amber OBS annunciator on the INSSDU unit. In this mode, the GPS receiver will not sequence waypoints.

If the GPS CRS switch is placed in the down, or LEG position, the OBS/LEG CONTROL line will be open, and the green LEG annunciator on the INSSDU unit will be illuminated. In this mode, the GPS receiver will automatically sequence through waypoints.

2 INSTALLATION CONSIDERATIONS

2.1 LOCATION

The INSSDU unit must be mounted as close to the pilot's field of view as possible. The preferable location is as close to the HSI display as possible.

When selecting the location, it is preferable to mount the INSSDU unit under the glare shield in order to protect its front panel from direct sunlight, as much as possible. Even though the INSSDU unit's annunciators are very bright, shielding them from direct sunlight will enhance readability.

Also, when locating the INSSDU unit, select a location that provides ample ambient light at night. The pilot must be able to read the legend on the INSSDU front panel.

If necessary, a post light assembly can be installed near the INSSDU panel to provide additional light.

With an appropriate adaptor panel, the INSSDU unit may easily be mounted in a spare 3.5 inch instrument hole.

2.2 ADDITIONAL ANNUNCIATORS

Depending upon the individual installation, the approval authority may require the installer to provide additional external annunciators for nav source select, next to or close to the HSI display.

The INSSDU unit's spare contact closure (see section 1.3.1) may be used to control these external annunciators.

Be sure that any external annunciators are labeled and color-coded correctly in accordance with the applicable FAR's and installation manuals.

2.3 NOTES AND CAUTIONS

DO NOT bundle the INSSDU logic or signal lines with any RF, antenna or transmitter coax lines.

DO NOT bundle any of the INSSDU logic or signal lines with any 400Hz synchro wiring or AC power lines.

In all installations, use shielded cable, where required, exactly as indicated, and ground as shown. Failure to observe this procedure may result in problems or incorrect operation of the system.

In all cases, install and dress the wiring harness for the INSSDU unit in accordance with good aviation practices.

3 INSTALLATION PROCEDURES

3.1 UNPACKING AND INSPECTION

Remove the INSSDU unit from the packing container, and verify that the INSSDU unit, the installation and operation manual and the four (4) 4-40 black zinc coated mounting screws were received.

Verify that all components are in good order and free of visible defects.

3.2 MOUNTING THE INSSDU UNIT

Using the template provided in this manual, locate a suitable place to mount the INSSDU unit, in accordance with the considerations in section 2 of this manual.

Locate, drill and tap the 4 mounting holes. The threads are 4-40 UNC-2B. If drilling and tapping are not appropriate to the installation, individual hex nuts and locking washers (not provided) may be used.

Mark and carefully cut the rectangular clearance hole in the panel. Be sure to file and/or sand all edges to remove all burrs and break any sharp edges.

Take caution that metal chips and filings do not land in or on any other equipment. Vacuum thoroughly after cutting to clean all chips and filings.

3.3 WIRING HARNESS

3.3.1 PREPARATION OF THE WIRING HARNESS

Prepare the wiring harness in accordance with the wiring diagram in this manual. Observe all cautions and wire size specifications.

When measuring the cable length, be sure to leave sufficient extra cable so that the INSSDU unit may be withdrawn at least six (6) inches from the panel without causing strain on either the harness or the connector. This will facilitate easier initial checkout and any future lamp dimmer adjustments.

3.3.2 INSTALLATION OF THE WIRING HARNESS

Install the wiring harness in accordance with good aviation practice. When installing the harness, connect the aircraft power and ground connections such that power will be supplied to the INSSDU unit, the NAV-1 radio and the GPS receiver.

NOTE: DO NOT CONNECT THE INSSDU UNIT TO ITS MATING CONNECTOR UNTIL ALL CHECKS AND TESTS IN SECTION 4.2.1 HAVE BEEN COMPLETED.

4 POST INSTALLATION CHECKOUT

4.1 OTHER EQUIPMENT CONSIDERATIONS

At this point, verify and test, in accordance with the applicable installation/operation manuals, that the GPS receiver, the NAV-1 receiver and all related instruments are connected correctly, and are fully operational.

4.2 PRE-FLIGHT TESTS

4.2.1 POWER/GROUND TEST

With the INSSDU unit disconnected, from its mating harness connector, check PIN-33 of the INSSDU mating connector for 14 or 28 volts with respect to aircraft ground. The voltage measured will depend on the aircraft system voltage.

Using an ohm meter, check PIN-50 of the INSSDU mating connector for continuity with aircraft ground. The continuity (resistance) measurement should be less than 0.5 ohm.

Using appropriate means, carefully check and verify all other pin connections in the wiring harness. Do not connect the INSSDU unit until all tests and checks are verified. Damage to the INSSDU unit or other equipment could occur.

Once the above steps are complete, connect the mating harness connector to the rear panel connector on the INSSDU unit, and secure with appropriate screws (not provided).

CONNECT THE NAV RADIO INTO THE WIRING HARNESS, AND INSURE THAT THE GPS RECEIVER IS DISCONNECTED AT THIS TIME.

4.2.2 POWER ON TEST

With the aircraft power switched off, insure that the connected NAV-1 radio is not tuned to an ILS frequency, and set the INSSDU unit's front panel switches in the following positions:

SOURCE SELECT SWITCH:	UP (NAV-1)
GPS CRS SWITCH:	DOWN (LEG)
LAMP SWITCH:	UP (BRIGHT)

Apply aircraft power to the INSSDU unit. Also power the NAV-1 radio and other relevant nav instruments.

Upon applying power, the green NAV-1 annunciator, and the green LEG annunciator on the INSSDU unit should be illuminated.

4.2.3 ANNUNCIATOR TEST

While the GPS receiver is disconnected from the harness, momentarily apply a ground to PIN-16 of the INSSDU unit. This may be done at the GPS mating connector. Verify that the amber MSG annunciator on the INSSDU unit illuminates. Remove the ground from the pin.

While the GPS receiver is disconnected from the harness, momentarily apply a ground to PIN-49 of the INSSDU unit. This may be done at the GPS mating connector. Verify that the amber WPT annunciator on the INSSDU unit illuminates. Remove the ground from the pin.

While the GPS receiver is disconnected from the harness, momentarily apply a ground to PIN-32 of the INSSDU unit. This may be done at the GPS mating connector. Verify that the red WARN annunciator on the INSSDU unit illuminates. Remove the ground from the pin.

While the GPS receiver is disconnected from the harness, momentarily apply a ground to PIN-48 of the INSSDU unit. This may be done at the GPS mating connector. Verify that the white ARM annunciator on the INSSDU unit illuminates. Remove the ground from the pin.

While the GPS receiver is disconnected from the harness, momentarily apply a ground to PIN-47 of the INSSDU unit. This may be done at the GPS mating connector. Verify that the green ACTV annunciator on the INSSDU unit illuminates. Remove the ground from the pin.

NOTE: THE WARN ANNUNCIATOR MAY NOT BE USED IN EVERY INSTALLATION. IT IS A GOOD PRACTICE TO TEST IT ANYWAY, TO INSURE THAT NO SHORTS EXIST.

4.2.4 OBS/LEG SELECTOR TEST

With the GPS CRS switch on the INSSDU unit in the down, or LEG position, verify that the green LEG annunciator on the INSSDU unit is illuminated. Using an ohm meter, or other appropriate means, verify that PIN-31 of the INSSDU unit's connector open.

Move the GPS CRS switch on the INSSDU unit to the up, or OBS position. Verify that the green LEG annunciator goes off and the amber OBS annunciator illuminates. Using an ohm meter, or other appropriate means, verify that PIN-31 of the INSSDU unit's connector goes to ground.

4.2.5 SOURCE SELECTOR TEST

Connect the GPS receiver into the harness, and power the unit.

Using appropriate test signal generators, provide a VOR-type signal to the NAV-1 receiver. With the INSSDU unit's SOURCE SELECT switch in the up, or NAV-1 position, verify that the green NAV-1 annunciator on the INSSDU unit illuminates, and that the HSI display operates correctly with the supplied NAV-1 radio information.

Move the INSSDU unit's SOURCE SELECT switch to the center or GPS position. Verify that the green NAV-1 annunciator goes off, and the blue GPS annunciator illuminates.

Using appropriate signal generators, internal GPS receiver test mode, or actual GPS satellite signals, verify that the HSI display operates correctly with the supplied GPS information.

4.2.6 ILS OVERRIDE TEST

With the INSSDU unit's SOURCE SELECT switch in the center or GPS position, tune the connected NAV-1 radio to an ILS frequency.

Verify that the blue GPS annunciator on the INSSDU unit goes off, and the green NAV-1 annunciator illuminates, regardless of the position of the SOURCE SELECT switch.

Using appropriate test signal generators, verify that the ILS and/or glideslope data is correctly displayed on the HSI.

Tune the connected NAV-1 radio back to a standard VOR frequency. Verify that the GPS annunciator again illuminates and that the GPS data is now being correctly displayed on the HSI.

4.2.7 LAMP DIMMER TEST AND ADJUSTMENT

Move the LAMP switch on the INSSDU unit to the center, or DIM position. Verify that the illuminated annunciators dim slightly.

Using a small, flat-blade alignment tool or screwdriver, adjust the dimming control located on the right side (as viewed from the front) of the INSSDU unit to set the desired brightness. Rotate the control counter-clockwise to dim the annunciators. Rotate the control clockwise to make the annunciators brighter.

NOTE: DO NOT USE EXCESSIVE INWARD FORCE ON THE ALIGNMENT TOOL, AND DO NOT USE EXCESSIVE ROTATIONAL FORCE. DAMAGE MAY RESULT.

4.2.8 ANNUNCIATOR (LAMP) TEST

Momentarily press and hold the LAMP switch on the INSSDU unit to the down, or TEST position. Verify that all annunciators on the INSSDU unit front panel illuminate to full brightness.

There are a total of nine (9) annunciators, including:
WPT (amber), MSG (amber), OBS (amber), LEG (green), WARN (red), ACTV (green), NAV-1 (green), GPS (blue) and ARM (white).

Release the LAMP switch and verify that it returns to the center, or DIM position, and that only the appropriate annunciators are illuminated.

4.2.9 SECURING THE INSSDU UNIT

When all tests and checks have been successfully completed and verified, carefully slide the INSSDU unit into the panel. Secure it in place with the four (4) black zinc coated screws provided. Tighten securely, but do not over-tighten.

Dress the cable harness as appropriate and secure it as needed with appropriate cable ties or clamps. Be sure to leave a service loop behind the INSSDU unit such that it may be withdrawn from the panel for future annunciator brightness adjustments.

4.3 FLIGHT TESTS

If all system ground checks pass satisfactorily, perform the following flight checks on the system.

4.3.1 SYSTEM CROSS-TALK TEST

While in flight, select the NAV-1 radio as the navigation source, and tune in an available VOR station. Verify that all instruments operate properly.

Select the GPS receiver as the navigation source. Enter an appropriate flight path, and verify that the GPS receiver unit provides correct operation, both to the HSI display, and to the annunciators on the INSSDU unit.

If a GPS approach is available, verify that the APPR ARM, ACTV and GPS CRS functions operate correctly in flight.

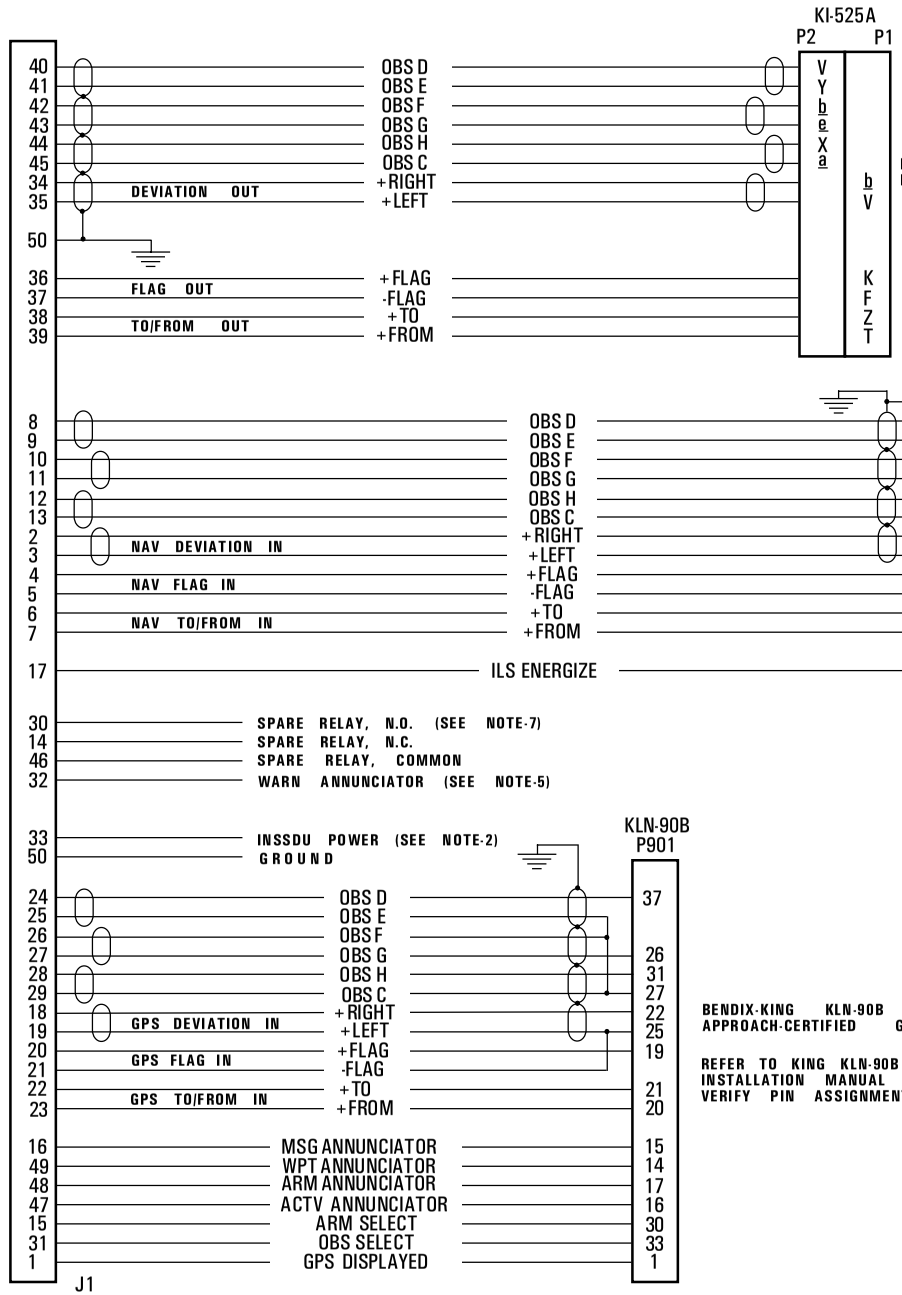
With both navigation sources operational, verify that no cross-talk exists between the units. With the GPS receiver selected as the navigation source, tune the NAV-1 radio to a different frequency. Observe that there is no interference on any of the navigation displays.

4.3.2 VIBRATION TEST

While in flight, verify that there are no vibration-related problems. Verify that all displays operate smoothly. There should be no erratic behavior of any annunciators, gauges or other displays.

If all ground and flight checks and tests pass satisfactorily, the aircraft can be released as serviceable. Be sure to make all appropriate entries into the aircraft log books.

Section 1 of this manual should be appended to the Aircraft Flight Manual for reference.

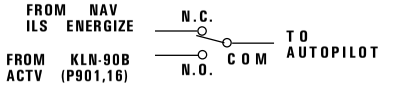


REV	DESCRIPTION	DATE
NONE	INITIAL RELEASE	05-24-96
REV-2	KI-525A CONNECTOR UPDATE	06-14-96

NOTES

1. INSSDU PIN-1 (GPS DISPLAYED) PROVIDES A CONTACT TO GROUND WHEN THE INSSDU SOURCE SELECTOR IS IN THE NAV POSITION. CONTACT RATING: 2A.
2. INSSDU SHOULD BE ON A SEPARATE 2A BREAKER FROM THE AVIONICS MASTER BUS.
3. UNLESS OTHERWISE NOTED, WIRE SHOULD BE AT LEAST 22 AWG. EXACT WIRE GAUGE AND TYPE TO BE DETERMINED UPON INSTALLATION
4. THE INDICATOR AND NAV/COM RADIO SHOWN ARE REPRESENTATIVE ONLY. REFER TO THE MANUAL FOR THE SPECIFIC UNITS INSTALLED IN THE AIRCRAFT. REFER TO SIGNAL NAMES.
5. WARN ANNUNCIATOR (INSSDU PIN-32) NOT REQUIRED FOR IFR INSTALLATION OF THE KLN-90B. LEAVE DISCONNECTED.
6. ILS ENERGIZE (INSSDU PIN-17) IS OPTIONAL. IF AUTOMATIC RETURN TO NAV MODE IS NOT DESIRED, LEAVE DISCONNECTED.
7. INSSDU SPARE RELAY CAN BE USED TO CONTROL EXTERNAL EXPANDER RELAYS SUCH AS MSI P/N 97-10229-001, WHEN ADDITIONAL POLES ARE NEEDED. IT MAY ALSO BE USED TO SWITCH HIGH-LEVEL SIGNALS SUCH AS SUPERFLAG.

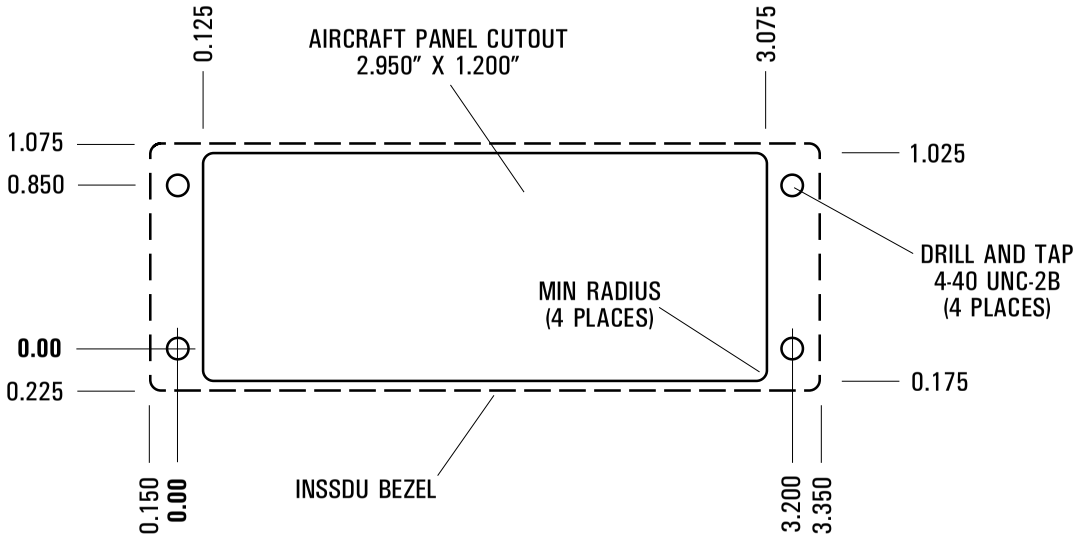
IF NEITHER OPTION IS NEEDED, A SUGGESTED USE IS TO SWITCH THE AUTOPILOT SENSITIVITY CONTROL BETWEEN THE DESIGNATED NAV RADIO AND THE GPS.



MSI Avionics
DIV. MICROTERM SYSTEMS, INC.
PHOENIX, ARIZONA, USA

TITLE:	INTERCONNECT DIAGRAM, INSSDU III / KLN-90B		
DWG NO.:	97-10344A-002 REV-2		
DRW BY:	MHK	**DATE:**	05-24-96
CHK BY:	WAF	**SHEET:**	1 **OF:** 1

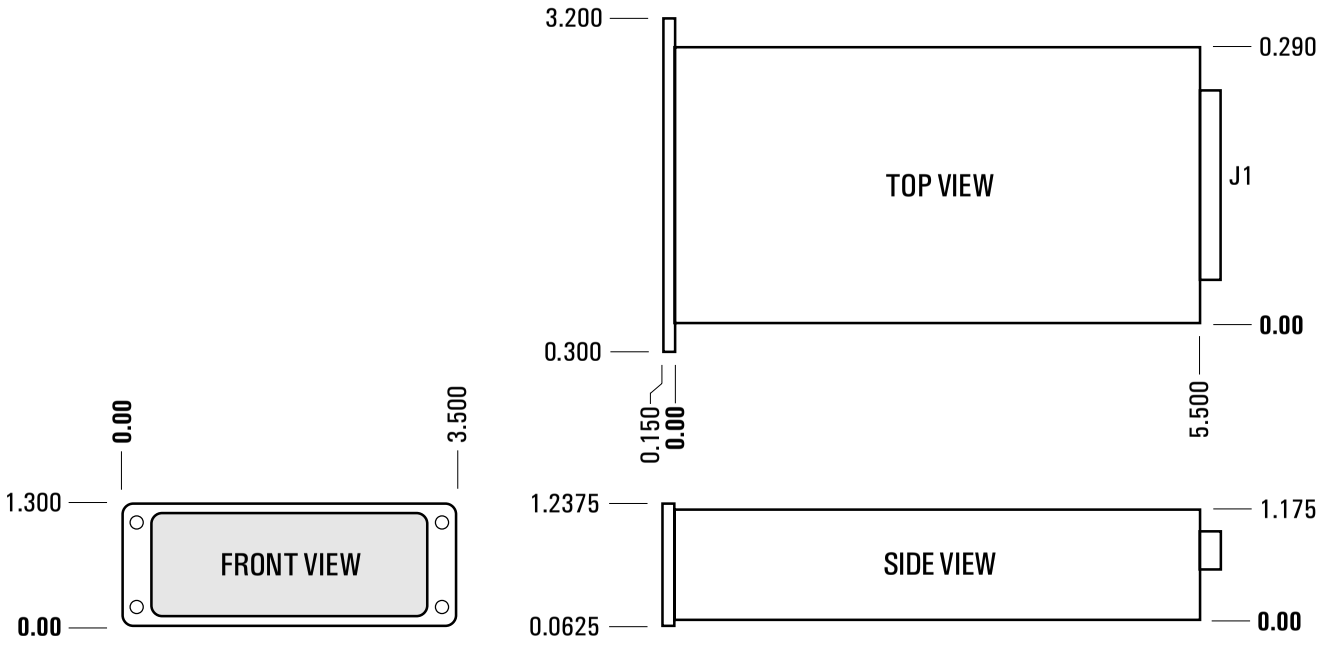
REV	DESCRIPTION	DATE
NONE	INITIAL RELEASE	05-01-94



MSI Avionics
DIV. MICROTERM SYSTEMS, INC.
PHOENIX, ARIZONA, USA

TITLE: PANEL CUTOUT TEMPATE, INSSDU, STANDARD	
DWG NO.:	
DRW BY: WAF	**DATE:** 05-01-94
CHK BY:	**SHEET:** 1 **OF:** 1

REV	DESCRIPTION	DATE
NONE	INITIAL RELEASE	05-01-94



MSI Avionics
DIV. MICROTERM SYSTEMS, INC.
PHOENIX, ARIZONA, USA

TITLE: PACKAGE OUTLINE, INSSDU, STANDARD	
DWG NO.:	
DRW BY: WAF	**DATE:** 05-01-94
CHK BY:	**SHEET:** 1 **OF:** 1

APPENDIX A WARRANTY DOCUMENTS

WARRANTY

Microterm Systems, Inc. (MSI) warrants this unit to be free from component and manufacturing defects for a period of one (1) year from the date of purchase.

In the event of a failure of this unit within the warranty period, MSI will, at its sole option, repair or replace the unit without charge. To obtain service under this warranty, the unit must be returned to MSI, freight prepaid, along with Customer's name, full mailing address, phone number, and proof of purchase of the unit.

MSI will repair the returned unit, or exchange it with a new or reconditioned unit of the same type. MSI will pay the return freight charges.

This warranty shall be considered void if there is any evidence of mis-use or abuse or faulty handling of this unit. Any opening of or disassembly of the unit, or any attempted repair by other than MSI will also void this warranty. If in MSI's opinion, this warranty has been voided, MSI will advise the customer as to the anticipated repair charges. If the warranty has been voided, the customer will be liable for return freight charges as well as any repair charges.

MSI assumes no liability other than that stated herein. MSI will not be liable for any consequential damage caused by the installation, use or mis-use of this unit. MSI makes no warranty or claim as to the suitability of this unit for any particular application or installation.

NOTE: Incandescent lamp bulbs (if used in this product) are specifically excluded from this warranty. Although MSI uses only the highest quality bulbs in our products, incandescent bulbs are subject to premature failure due to aircraft power surges, vibration, temperature cycling and other physical stresses. MSI offers bulb replacement at nominal charge. Contact MSI for details.

For return instructions and information, contact MSI at:

MSI Avionics div Microterm Systems Inc.
PO Box 86418
Phoenix, Arizona 85080-6418 USA
(623) 582-2202 Fax (623) 582-2856
e-mail: msi@msiavionics.com

APPENDIX B FLIGHT MANUAL SUPPLEMENTS

Section 1 of this manual may be appended to the Aircraft Flight Manual for in-flight reference.

APPENDIX C INSTALLATION NOTES

The installing agency shall describe any installation-specific details on this page (and/or additional pages), and append to the Aircraft Flight Manual and Logs for reference.

APPENDIX D CONTINUED AIRWORTHINESS

Maintenance of the MSI P/N 97-10344A Integrated Nav Source Selector and Display unit (INSSDU) is on condition only. Periodic maintenance of the unit is not required.