MSI 97-10224-001
RS-08
REMOTE SWITCH UNIT

INSTALLATION AND OPERATION MANUAL

MSI AVIONICS
Div. Microterm Systems, Inc.
Phoenix, Arizona USA

PROPRIETARY NOTICE

THIS DOCUMENT AND THE INFORMATION DISCLOSED HEREIN ARE PROPRIETARY DATA OF MICROTERM SYSTEMS INC. NEITHER THIS DOCUMENT NOR THE INFORMATION CONTAINED HEREIN SHALL BE REPRODUCED, USED, OR DISCLOSED TO OTHERS WITHOUT THE WRITTEN AUTHORIZATION OF MICROTERM SYSTEMS INC.

NOTICE

FREEDOM OF INFORMATION ACT (5 USC 552) AND
DISCLOSURE OF CONFIDENTIAL INFORMATION GENERALLY
(18 USC 1905)

THIS DOCUMENT IS BEING FURNISHED IN CONFIDENCE BY MICROTERM SYSTEMS INC. THE INFORMATION DISCLOSED HEREIN FALLS WITHIN EXEMPTION (b) (4) OF 5 USC 552 AND THE PROHIBITIONS OF 18 USC 1905.

Copyright 1991 - 1999 Microterm Systems Inc.
All Rights Reserved

PRINTED IN U.S.A. INITIAL RELEASE DATE: August 1991 PUB. NO. MSI-97-10224-001 REV -3

TABLE OF CONTENTS

Use or disclosure of this information is subject to the restrictions on the cover page of this document

TABLE OF CONTENTS (contd)

Use or disclosure of this information is subject to the restrictions on the cover page of this document

DOCUMENT REVISION RECORD

ORIGINAL ISSUE DATE: 24 AUG 1991 APPROVED: WAF
REV-

REV-1 DATE: 19 SEP 1991 APPROVED: WAF

Corrections of various typographical errors.

REV-2 DATE: 02 FEB 1999 APPROVED: WAF

General update of document to current MSI document specifications, including preparation for pdf format.

Cover page was modified (photo)
Text in Section 1.3 was added
Figure 1, Interconnect diagram (page 1 of 2), was added
Figure 2, Interconnect diagram (page 2 of 2), was added
Figure 3, Package outline, was added
Appendix A, Warranty Documents, was modified (light bulbs)

REV-3 DATE: 12 APR 1999 APPROVED: WAF

APPENDIX A, Warranty Documents, was modified (area code)
APPENDIX D, Continued Airworthiness, was added

Use or disclosure of this information is subject to the restrictions on the cover page of this document

LIST OF ILLUSTRATIONS

Use or disclosure of this information is subject to the restrictions on the cover page of this document

1 GENERAL DESCRIPTION

1.1 INTRODUCTION

The MSI Model RS-08 (P/N 97-10224-001) is a bulkhead mounted, general purpose remote switching unit. The unit is intended for applications such as switching CDI/HSI data between a conventional NAV receiver and an alternate navigation receiver such as a GPS or LORAN. The unit is also well suited for a variety of other switching applications, including audio and low-power DC.

The RS-08 contains 6 SPDT (form C) relay poles that are fully user-configurable, but intended to switch the TO/FROM, FLAG and DEVIATION signals. Additionally, the unit provides 2 poles internally configured for driving external annunciators to indicate the status of the display.

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.

Use or disclosure of this information is subject to the restrictions on the cover page of this document

1.2 TECHNICAL SPECIFICATIONS

1.2.1 MECHANICAL

Width:	4.50 inches
Height:	1.25 inches
Length:	2.40 inches
Mounting:	Bulkhead Attachment, (4) 10-32 Pan Head Screws
Weight:	6 oz (168 grams)

1.2.2 ENVIRONMENTAL

Temperature:	-40 to +70 Degrees C (Ambient)
Altitude:	50,000 feet (Maximum)
Humidity:	95% Non-condensing
Shock and Vibration:	12G (Any axis)

1.2.3 ELECTRICAL

1.2.3.1 POWER REQUIREMENTS

Power requirements:	+10-33 VDC at 100mA (Typ) (Case is internally grounded)

1.2.4 INTERFACE

1.2.4.1 LOGIC LEVELS

Relay/Control Logic	A logic low on the **TRASNFER** input will cause the relays to switch to the GPS (or alternate receiver) mode. A logic low input on the **ILS ENERGIZE** input will cause the relays to switch to the NAV (primary receiver) mode, regardless of the status of the TRANSFER input.
Contacts:	HSI levels (500uA), or up to 1A at 28VDC
Annunciators:	100 mA each annunciator (Maximum) Type 327/387 for 28 volt systems (40mA) Type 330-382 for 14 volt systems (80mA)
Other:	Internal 0.5mA FLAG BIAS 1 internal 1K OHM load resistor

Use or disclosure of this information is subject to the restrictions on the cover page of this document

1.2.4.2 CONNECTOR

Connector: 37 pin D-type, metal shell, male
(Mating connector is female)

J1 Pin designations:

RS-08 J1 PIN NUMBER	SIGNAL NAME/DESCRIPTION
1	AIRCRAFT POWER INPUT
2	ANNUNCIATOR POWER INPUT
3	**Jumper to pin 4**
4	**Jumper to pin 3**
5	GPS/LORAN ANNUNCIATOR HIGH
6	NAV ANNUNCIATOR HIGH
7	TRANSFER INPUT
8	GPS/LORAN +FLAG IN
9	NAV +FLAG IN
10	GPS/LORAN +FROM IN
11	NAV +FROM IN
12	GPS/LORAN +RIGHT IN
13	NAV +RIGHT IN
14	GPS/LORAN -FLAG IN
15	NAV -FLAG IN
16	GPS/LORAN +TO IN
17	NAV +TO IN
18	GPS/LORAN +LEFT IN
19	NAV +LEFT IN
20	AIRCRAFT GROUND
21	DIMMER BRIGHT
22	DIMMER, 14V DIM (not used on 28 volt systems)
23	DIMMER, 28V DIM (not used on 14 volt systems)
24	GPS/LORAN ANNUNCIATOR LOW
25	NAV ANNUNCIATOR LOW
26	ILS ENERGIZE IN (active low)
27	+FLAG OUT (to indicator)
28	FLAG BIAS OUT (0.5mA)
29	+FROM OUT (to indicator)
30	1K OHM LOAD RESISTOR, 1-A
31	+RIGHT OUT (to indicator)
32	**not used**
33	-FLAG OUT (to indicator)
34	AIRCRAFT GROUND
35	+TO OUT (to indicator)
36	1K OHM LOAD RESISTOR, 1-B
37	+LEFT OUT (to indicator)

Use or disclosure of this information is subject to the restrictions on the cover page of this document

1.3 OPERATIONAL SPECIFICATIONS

For the purposes of this manual, it will be assumed that the RS-08 switch unit is being installed to switch between a NAV and a GPS receiver. It will be further assumed that the TRANSFER, LAMP BRIGHTNESS and LAMP TEST functions are also being installed.

1.3.1 RELAY SWITCHING FOR CDI/HSI DATA LINES

The RS-08 unit provides, via the J1 connector, six (6) poles of SPDT (FORM C) dry relay contacts for CDI/HSI data line switching.

In a typical installation, these relay poles are used to switch the TO/FROM, FLAG and DEVIATION data between the CDI/HSI and multiple navigation receivers, such as a standard NAV radio and a GPS, LORAN or other alternate navigation receiver.

In addition, the RS-08 unit provides two (2) additional poles internaly configured to switch annunciators for system status. these poles may also be used for other switching applicaions.

1.3.1.1 LOSS OF POWER

Loss of power to the RS-08 unit will cause the unit to automatically return to the NAV (or primary receiver) mode. In this condition, the internal relays will cause the primary receiver's data to be channeled to the CDI/HSI.

If power to the RS-08 unit is lost, the connected annunciators will not illuminate, and all other switching and control functions of the RS-08 unit will be inoperative.

1.3.2 ILS OVERRIDE FUNCTION

In accordance with FARs, the RS-08 unit incorporates an **ILS ENERGIZE** override feature. This feature, if used, will cause the RS-08 unit to automatically switch to the NAV mode, regardless of the status of the TRANSFER switch position, if the NAV receiver is tuned to an ILS frequency.

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

1.3.3 ANNUNCIATOR BRIGHTNESS CONTROL

The RS-08 unit features selectable annunciator lamp brightness. For

Use or disclosure of this information is subject to the restrictions on the cover page of this document

daytime flying, the LAMP BRIGHTNESS toggle switch is placed in the BRIGHT position. In this position, the illuminated annunciators illuminate to full brightness for easy daytime viewing.

For night flying, the LAMP BRIGHTNESS toggle switch can be placed in the DIM position. In this position the annunciators are dimmed by a built-in circuit.

1.3.4 ANNUNCIATOR LAMP TEST FUNCTION

As an additional safety feature, the RS-08 inerconnect diagram shows a means for a lamp test function. If the LAMP TEST toggle switch is momentarily moved to the TEST position, all annunciators will illuminate at full brightness.

The lamp test mode should be a momentary function. The LAMP TEST switch should be a spring-loaded switch that will automatically return to the NORMAL (non-test) 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 RS-08 unit will provide the appropriate annunciation to the pilot, as required in FAR 23.1329.

If the TRANSFER switch is placed in the NAV position, the NAV receiver data will be channeled into the CDI/HSI. The NAV annunciator will be illuminated.

If the TRANSFER switch is placed in GPS position, and if the NAV receiver is not tuned to an ILS frequency, the GPS receiver data will be channeled into the CDI/HSI. The GPS annunciator will be illuminated.

1.3.6 BUILT-IN FLAG BIAS

The RS-08 unit contains a built in 0.5mA bias resistor. This source can be used to power a flag in the CDI/HSI display. See section 1.2.4.2 for pin designation.

1.3.7 BUILT-IN LOAD RESISTOR

The RS-08 unit contains a built in 1K ohm load resistor. Both terminals of this resitor are available to the user as needed. See section 1.2.4.2 for pin designations.

Use or disclosure of this information is subject to the restrictions on the cover page of this document

2 INSTALLATION CONSIDERATIONS

2.1 LOCATION

Select a suitable location for the RS-08 unit. The connected annunciators should be mounted as close to the pilot's field of view as possible. The preferable location is as close to the CDI/HSI display as possible.

2.2 NOTES AND CAUTIONS

DO NOT bundle the RS-08 logic or signal lines with any RF, antenna or transmitter coax lines.

DO NOT bundle any of the RS-08 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 RS-08 unit in accordance with good aviation practices.

3 INSTALLATION PROCEDURES

3.1 UNPACKING AND INSPECTION

Remove the RS-08 unit from the packing container, and verify that the RS-08 unit, the installation and operation manual and install components (if ordered) were received.

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

3.2 MOUNTING THE RS-08 UNIT

Locate a suitable place to mount the RS-08 unit and any connected annunciators and/or control switches, in accordance with the considerations in section 2 of this manual.

If drilling, 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 drilling to clean all chips and filings.

Use or disclosure of this information is subject to the restrictions on the cover page of this document

3.3 WIRING HARNESS

3.3.1 PREPARATION OF THE WIRING HARNESS

Prepare the wiring harness in accordance with the interconnect 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 RS-08 unit may be withdrawn at least six (6) inches from the bulkhead without causing strain on either the harness or the connector. This will facilitate easier initial checkout and any future 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 RS-08 unit, the NAV radio and the GPS (or other alternate) receiver.

NOTE: DO NOT CONNECT THE RS-08 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 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 RS-08 unit disconnected, from its mating harness connector, check PIN-1 and PIN-2 of the RS-08 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-20 and PIN-34 of the RS-08 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 RS-08 unit until all tests and checks are verified. Damage to the RS-08 unit or other equipment could occur.

Use or disclosure of this information is subject to the restrictions on the cover page of this document

Once the above steps are complete, connect the mating harness connector to the rear panel connector on the RS-08 unit, and secure with appropriate screws (not provided).

4.2.2 POWER ON TEST

With the aircraft power switched off, insure that the connected NAV radio is not tuned to an ILS frequency, and set the RS-08 switches in the following positions:

TRANSFER SWITCH:	NAV
LAMP BRIGHTNESS SWITCH:	BRIGHT
LAMP TEST SWITCH:	NORMAL (non-test)

Apply aircraft power to the RS-08 unit. Also power the NAV radio, GPS receiver and other relevant nav instruments. Upon applying power, the NAV annunciator should be illuminated.

4.2.3 TRANSFER SWITCH TEST

Using appropriate test signal generators, provide a VOR-type signal to the NAV receiver. With the TRANSFER switch in the NAV position, verify that the NAV annunciator illuminates, and that the CDI/HSI display operates correctly with the supplied NAV radio information.

Move the TRANSFER switch to the GPS position. Verify that the NAV annunciator goes off, and the GPS annunciator illuminates.

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

4.2.4 ILS OVERRIDE TEST

With the TRANSFER switch in the GPS position, tune the NAV radio to an ILS frequency. Verify that the GPS annunciator goes off, and the NAV annunciator illuminates, regardless of the position of the TRANSFER switch.

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

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

Use or disclosure of this information is subject to the restrictions on the cover page of this document

4.2.5 LAMP DIMMER TEST

Move the LAMP BRIGHTNESS switch to the DIM position. Verify that the illuminated annunciators dim slightly.

4.2.6 LAMP TEST VERIFICATION

Momentarily move and hold the LAMP TEST switch to the TEST position. Verify that all annunciators illuminate to full brightness.

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

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 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 data to the CDI/HSI display.

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 radio to a different frequency. Observe that there is no interference on any of the navigation displays.

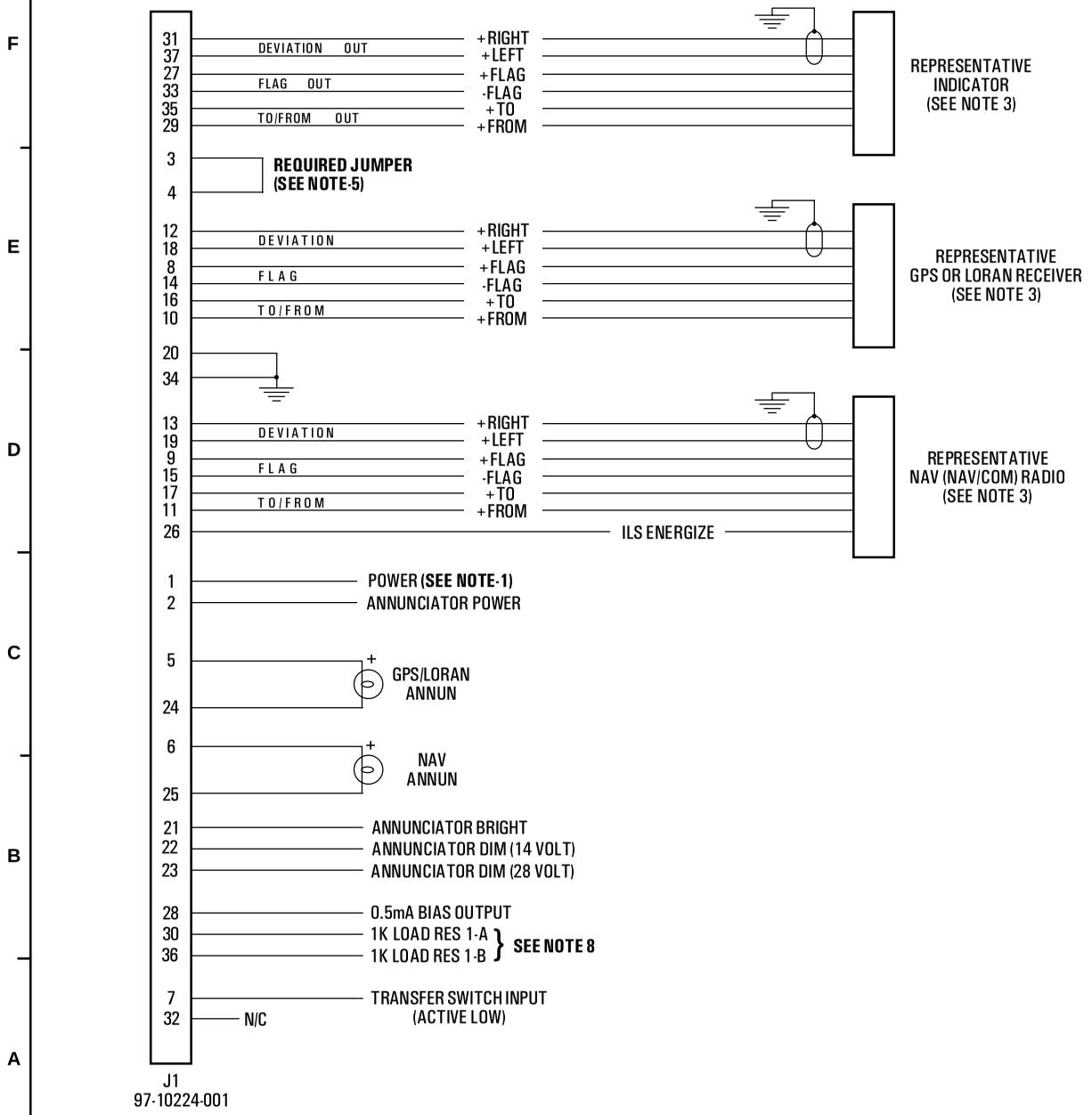
4.3.2 VIBRATION TEST

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.

Use or disclosure of this information is subject to the restrictions on the cover page of this document



REV	DESCRIPTION	DATE
NONE	INITIAL RELEASE	08-24-91

NOTES

1. THE RS-08 UNIT SHOULD BE ON A SEPARATE 2A BREAKER FROM THE AVIONICS MASTER BUS.

2. UNLESS OTHERWISE NOTED, WIRE SHOULD BE AT LEAST 22 AWG. EXACT WIRE GAUGE AND TYPE TO BE DETERMINED UPON INSTALLATION

3. THE INDICATOR, NAV/COM RADIO AND GPS RECEIVER CONNECTORS SHOWN ARE REPRESENTATIVE ONLY. REFER TO THE MANUAL FOR THE SPECIFIC UNITS INSTALLED IN THE AIRCRAFT. REFER TO SIGNAL NAMES.

4. ILS ENERGIZE (RS-08 PIN 26) IS OPTIONAL. IF AUTOMATIC RETURN TO NAV MODE IS NOT DESIRED, LEAVE DISCONNECTED.

5. PINS 3 AND 4 MUST BE JUMPERED TOGETHER AT THE RS-08 MATING CONNECTOR IN ORDER FOR THE UNIT'S INTERNAL RELAYS AND LOGIC TO OPERATE.

6. SIX (6) OF THE RS-08 UNIT'S RELAY POLES ARE USER-DEFINABLE. THE REMAINING TWO (2) ARE INTERNALLY CONFIGURED FOR DRIVING THE STATUS ANNUNCIATORS. DO NOT USE ANNUNCIATOR ASSEMBLIES THAT HAVE ONE SIDE OF THE BULB ASSEMBLY GROUNDED.

7. ANNUNCIATOR POWER MAY BE TIED TO RS-08, PIN-1, OR MAY BE CONNECTED TO AIRCRAFT ANNUNCIATOR POWER BUS.

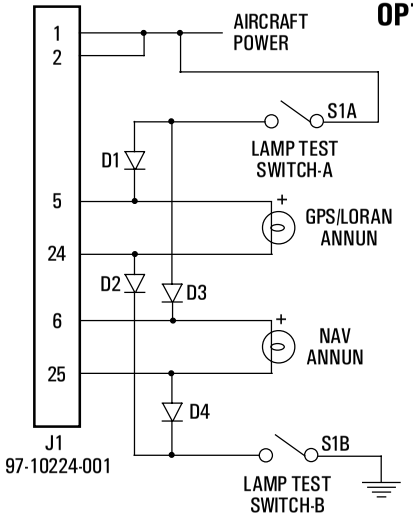
8. THE RS-08 UNIT CONTAINS AN INTERNAL USER LOAD RESISTOR WHICH MAY BE USED AS REQUIRED. THIS RESISTOR HAS NO INTERNAL CONNECTIONS OTHER THAN TO THE J1 PINS SHOWN

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

TITLE:	INTERCONNECT DIAGRAM, RS-08	
DWG NO.:	97-10244-002	
DRW BY:	MHK	**DATE:** 08-24-91
CHK BY:	WAF	**SHEET:** 1 **OF:** 2

REV	DESCRIPTION	DATE
NONE	INITIAL RELEASE	08-24-91

OPTIONAL LAMP TEST CIRCUIT



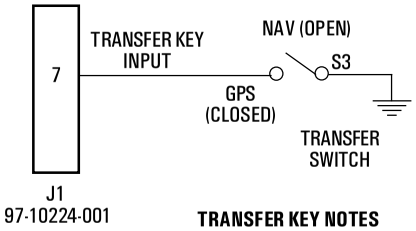
LAMP TEST NOTES

1. SWITCH S1 IS A DPST MOMENTARY CONTACT TOGGLE OR PUSHBUTTON SWITCH. BE SURE RATING IS SUFFICIENT FOR INSTALLED ANNUNCIATORS.

2. DIODES D1-D4 ARE 1N4005

3. RS-08 PINS 1 AND 2 MUST BE JUMPERED TOGETHER. **AIRCRAFT ANNUNCIATOR BUS MUST NOT BE USED TO POWER ANNUNCIATORS.**

TRANSFER KEY CONNECTIONS

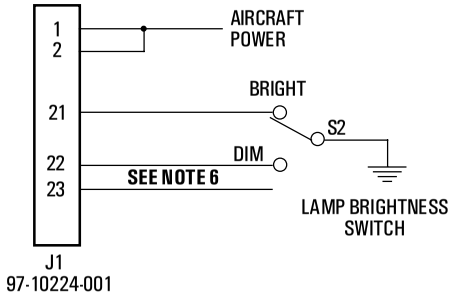


TRANSFER KEY NOTES

1. S3 IS A SPST TOGGLE OR PUSHBUTTON SWITCH. WHEN SWITCH IS CLOSED, RS-08 UNIT WILL SWITCH TO THE GPS/LORAN MODE.

2. IF THE ILS ENERGIZE SIGNAL (RS-08, PIN-26) IS CONNECTED, AND IS PULLED TO A LOGIC LOW (GROUND), THE RS-08 UNIT WILL SWITCH TO THE NAV MODE REGARDLESS OF THE POSITION OF THE TRANSFER KEY SWITCH.

LAMP DIMMING CONNECTIONS



LAMP DIMMING NOTES

4. TO USE INTERNAL DIMMING CIRCUITRY, RS-08 PINS 1 AND 2 MUST BE CONNECTED TOGETHER

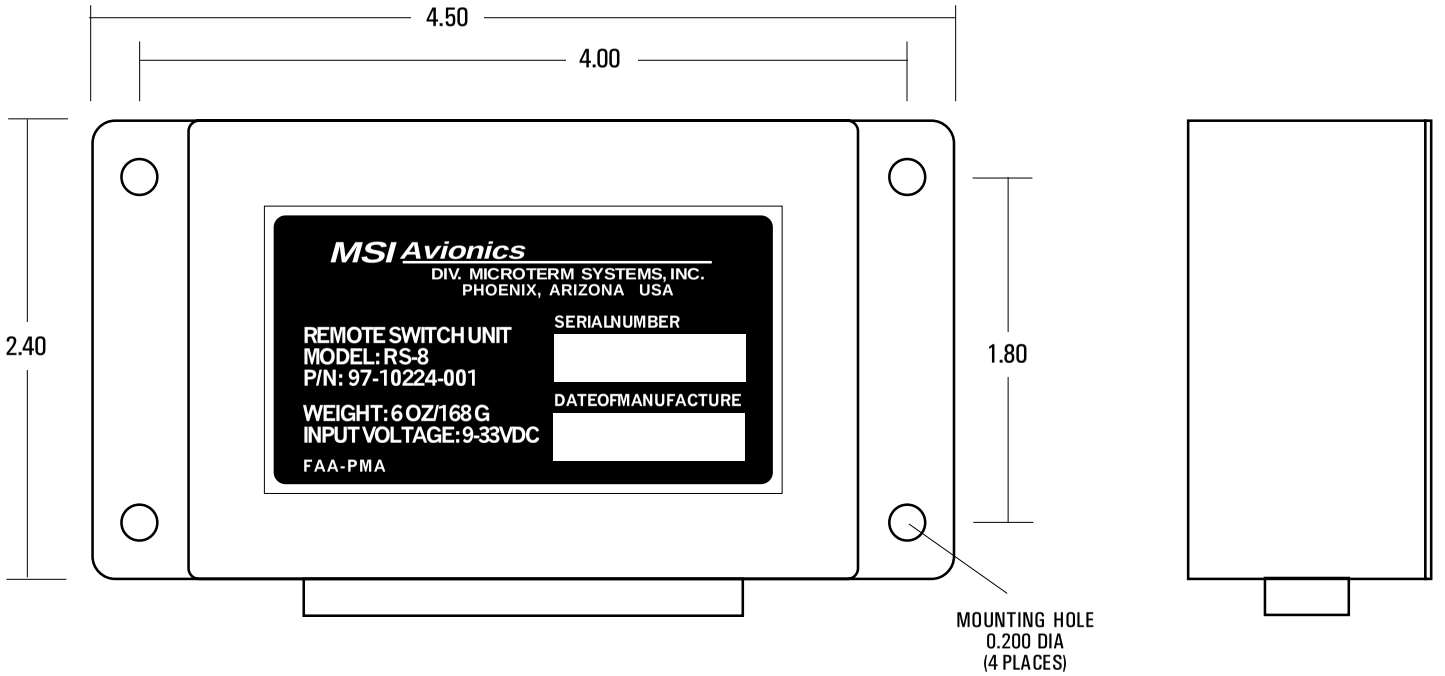
5. SWITCH S2 IS A SPDT TOGGLE SWITCH. BE SURE SWITCH RATING IS SUFFICIENT FOR INSTALLED ANNUNCIATORS.

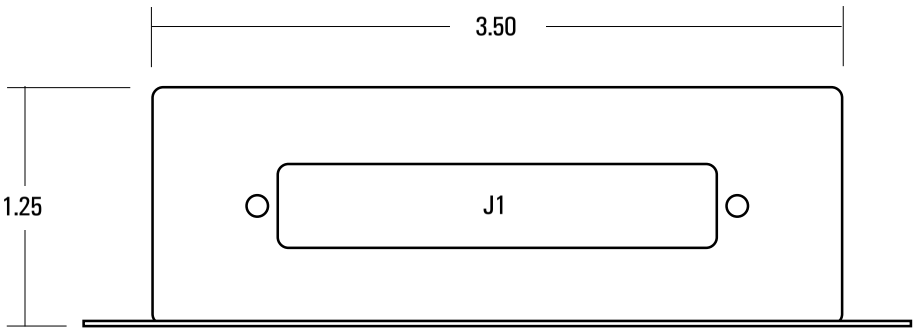
6. EXAMPLE SHOWN IS FOR 14 VOLT SYSTEM. FOR 28 VOLT SYSTEM USE PIN 23 IN PLACE OF PIN 22 ON RS-08 UNIT. **PINS 22 AND 23 CAN NOT BOTH BE CONNECTED AT THE SAME TIME. DAMAGE WILL RESULT.**

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

TITLE: INTERCONNECT DIAGRAM, RS-08	
DWG NO.: 97-10244-002	
DRW BY: MHK	**DATE:** 08-24-91
CHK BY: WAF	**SHEET:** 2 **OF:** 2

REV	DESCRIPTION	DATE
	INITIAL RELEASE	04-19-97





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

TITLE: RS-8 REMOTE SWITCH, OUTLINE DRAWING	
DWG NO.: 97-10224-001	
DRW BY: WAF	**DATE:** 08-24-91
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 97-10224-001 Remote Switch Unit (RSU) is on condition only. Periodic maintenance of the unit is not required.

Use or disclosure of this information is subject to the restrictions on the cover page of this document