MSI 97-10241-001
RS-24 N
24-POLE REMOTE SWITCH UNIT

INSTALLATION AND OPERATION MANUAL

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

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TABLE OF CONTENTS

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REV-

LIST OF ILLUSTRATIONS

1 GENERAL DESCRIPTION

1.1 INTRODUCTION

The MSI Model RS-24N (P/N 97-10241-001) is a bulkhead mounted, general purpose remote switching unit. The unit contains 24 SPDT (form C) relay poles that are all user-definable. The relays are grouped into six (6) groups of four (4) poles per group. Each group is individually controllable, or all may be controlled by a common signal.

The RS-24N unit consists of two RS-12 (97-10229-001) pc board assemblies in one package The MSI RS-24N unit is an exact pin-for-pin replacement for the popular RS24-020 and RS24-035 units made by NAT and others.

In a typical installation, these relay poles might be used to switch the TO/FROM, FLAG, DEVIATION and/or RESOLVER data between a CDI or HSI and multiple navigation receivers, such as a standard NAV radio and a GPS, LORAN or other alternate navigation receiver. The additional poles may be used for switching any required annunciators or descrete logic signals.

In addition, the RS-24 unit provides good inter-pole isolation, making it ideal for low-level signal switching for audio and other entertainment systems applications.

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 boards 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.

1.2 TECHNICAL SPECIFICATIONS

1.2.1 MECHANICAL

Width:	4.50 inches
Height:	2.35 inches
Length:	2.40 inches
Mounting:	Bulkhead Attachment, (4) 10-32 Pan Head Screws
Weight:	16 oz (450 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 200mA (Typ) (Case is internally grounded)

1.2.4 INTERFACE

1.2.4.1 LOGIC LEVELS

Relay/Control Logic	A logic low on any **RELAY KEY** input will cause the corresponding relay group to switch to the alternate mode. A logic low on the **RELAYS 1, 2, 3 COMMON** input will cause relays 1, 2 and 3 to switch to the alternate mode. A logic low on the **RELAYS 4, 5, 6 COMMON** input will cause relays 4, 5 and 6 to switch to the alternate mode.
Contacts:	1A at 28VDC (Maximum)
Other:	Internal 0.5mA and 1.0mA FLAG BIAS (2 ea) Six (6) internal 1K OHM user load resistors.

1.2.4.2 CONNECTORS

Connectors: J1 and J2 are 50 pin D-type, metal shell, male
(Mating connector is female)

J1 Pin designations:

RS-24N J1 PIN NUMBER	SIGNAL NAME/DESCRIPTION
1	RELAY 1-D, N.O.
2	RELAY 1-C, N.O.
3	RELAY 1-B, N.O.
4	RELAY 1-A, N.O.
5	RELAY 2-D, N.O.
6	RELAY 2-C, N.O.
7	RELAY 2-A, N.O.
8	RELAY 2-B, N.O.
9	RELAY 3-D, N.O.
10	RELAY 3-C, N.O.
11	RELAY 3-B, N.O.
12	RELAY 3-A, N.O.
13	1K OHM LOAD RESISTOR, 1-A
14	1K OHM LOAD RESISTOR, 2-A
15	1K OHM LOAD RESISTOR, 3-A
16	0.5 mA BIAS OUTPUT
17	+10-33 VDC POWER INPUT
18	RELAY 1-D, N.C.
19	RELAY 1-C, N.C.
20	RELAY 1-B, N.C.
21	RELAY 1-A, N.C.
22	RELAY 2-D, N.C.
23	RELAY 2-C, N.C.
24	RELAY 2-A, N.C.
25	RELAY 2-B, N.C.
26	RELAY 3-D, N.C.
27	RELAY 3-C, N.C.
28	RELAY 3-B, N.C.
29	RELAY 3-A, N.C.

J1 Pin designations (continued):

RS-24N J1 PIN NUMBER	SIGNAL NAME/DESCRIPTION
30	1K OHM LOAD RESISTOR, 1-B
31	1K OHM LOAD RESISTOR, 2-B
32	1K OHM LOAD RESISTOR, 3-B
33	1.0 mA BIAS OUTPUT
34	POWER GROUND
35	RELAY 1-D, COMMON
36	RELAY 1-C, COMMON
37	RELAY 1-B, COMMON
38	RELAY 1-A, COMMON
39	RELAY 2-D, COMMON
40	RELAY 2-C, COMMON
41	RELAY 2-A, COMMON
42	RELAY 2-B, COMMON
43	RELAY 3-D, COMMON
44	RELAY 3-C, COMMON
45	RELAY 3-B, COMMON
46	RELAY 3-A, COMMON
47	RELAY-1 KEY INPUT
48	RELAY-2 KEY INPUT
49	RELAY-3 KEY INPUT
50	RELAYS 1, 2, 3 COMMON INPUT

J2 Pin designations:

RS-24N J2 PIN NUMBER	SIGNAL NAME/DESCRIPTION
1	RELAY 4-D, N.O.
2	RELAY 4-C, N.O.
3	RELAY 4-B, N.O.
4	RELAY 4-A, N.O.
5	RELAY 5-D, N.O.
6	RELAY 5-C, N.O.
7	RELAY 5-A, N.O.
8	RELAY 5-B, N.O.
9	RELAY 6-D, N.O.
10	RELAY 6-C, N.O.
11	RELAY 6-B, N.O.
12	RELAY 6-A, N.O.
13	1K OHM LOAD RESISTOR, 4-A
14	1K OHM LOAD RESISTOR, 5-A
15	1K OHM LOAD RESISTOR, 6-A
16	0.5 mA BIAS OUTPUT
17	+10-33 VDC POWER INPUT
18	RELAY 4-D, N.C.
19	RELAY 4-C, N.C.
20	RELAY 4-B, N.C.
21	RELAY 4-A, N.C.
22	RELAY 5-D, N.C.
23	RELAY 5-C, N.C.
24	RELAY 5-A, N.C.
25	RELAY 5-B, N.C.
26	RELAY 6-D, N.C.
27	RELAY 6-C, N.C.
28	RELAY 6-B, N.C.
29	RELAY 6-A, N.C.

J2 Pin designations (continued):

RS-24N J2 PIN NUMBER	SIGNAL NAME/DESCRIPTION
30	1K OHM LOAD RESISTOR, 4-B
31	1K OHM LOAD RESISTOR, 5-B
32	1K OHM LOAD RESISTOR, 6-B
33	1.0 mA BIAS OUTPUT
34	POWER GROUND
35	RELAY 4-D, COMMON
36	RELAY 4-C, COMMON
37	RELAY 4-B, COMMON
38	RELAY 4-A, COMMON
39	RELAY 5-D, COMMON
40	RELAY 5-C, COMMON
41	RELAY 5-A, COMMON
42	RELAY 5-B, COMMON
43	RELAY 6-D, COMMON
44	RELAY 6-C, COMMON
45	RELAY 6-B, COMMON
46	RELAY 6-A, COMMON
47	RELAY-4 KEY INPUT
48	RELAY-5 KEY INPUT
49	RELAY-6 KEY INPUT
50	RELAYS 4, 5, 6 COMMON INPUT

1.3 OPERATIONAL SPECIFICATIONS

1.3.1 RELAY SWITCHING

The RS-24N unit provides, via the J1 connector, twelve (12) poles of SPDT (FORM C) dry relay contacts for general purpose data and low power dc switching.

The unit also provides, via the J2 connector, an additional and identical twelve (12) poles of SPDT (FORM C) dry relay contacts for general purpose data and low power dc switching.

J1 and J2 are pin-for-pin identical to each other. See Section 1.2.4.2 for pin designations for relay poles and control functions.

1.3.1.1 LOSS OF POWER

Loss of power to the RS-24N unit will cause the unit to automatically return to the primary (Normally Closed) mode on all relays, regardless on the state of the RELAY KEY or RELAY COMMON inputs.

If power to the RS-24N unit is lost, all other switching and control functions of the RS-24N unit will be inoperative.

1.3.2 BUILT-IN FLAG BIAS

Each of the two sections of the RS-24N unit contains built in 0.5mA and 1.0mA bias resistors. These bias sources can be used to power a flag in the CDI/HSI display. See section 1.2.4.2 for pin designations.

1.3.3 BUILT-IN LOAD RESISTOR

Each of the two sections of the RS-24N unit contains three (3) built in user load resistors. Both terminals of these resistors are available to the user as needed. See section 1.2.4.2 for pin designations.

2 INSTALLATION CONSIDERATIONS

2.1 LOCATION

Select a suitable location for the RS-24N unit.

If the RS-24N is being used to switch CDI/HSI data, any 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-24N logic or signal lines with any RF, antenna or transmitter coax lines.

DO NOT bundle any of the RS-24N logic or signal lines with any 400Hz synchro wiring or AC power lines.

In all installations, use shielded cable, where required and properly ground any shields. 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-24N unit in accordance with good aviation practices.

3 INSTALLATION PROCEDURES

3.1 UNPACKING AND INSPECTION

Remove the RS-24N unit from the packing container, and verify that the RS-24N 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-24N UNIT

Locate a suitable place to mount the RS-24N 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.

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-24N 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-24N unit and any relevant systems before testing.

NOTE: DO NOT CONNECT THE RS-24N 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 RS-24N and all related equipment and instruments are connected correctly, and are fully operational.

4.2 PRE-FLIGHT TESTS

4.2.1 POWER/GROUND TEST

With the RS-24N unit disconnected, from both of its mating harness connectors, check PIN-17 on both of the RS-24N mating connectors 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-34 on both of the RS-24N mating connectors 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-24N unit until all tests and checks are verified. Damage to the RS-24N unit or other equipment could occur.

Once the above steps are complete, connect the mating harness connectors to the panel connectors on the RS-24N unit, and secure with appropriate screws (not provided).

4.2.2 POWER ON TEST

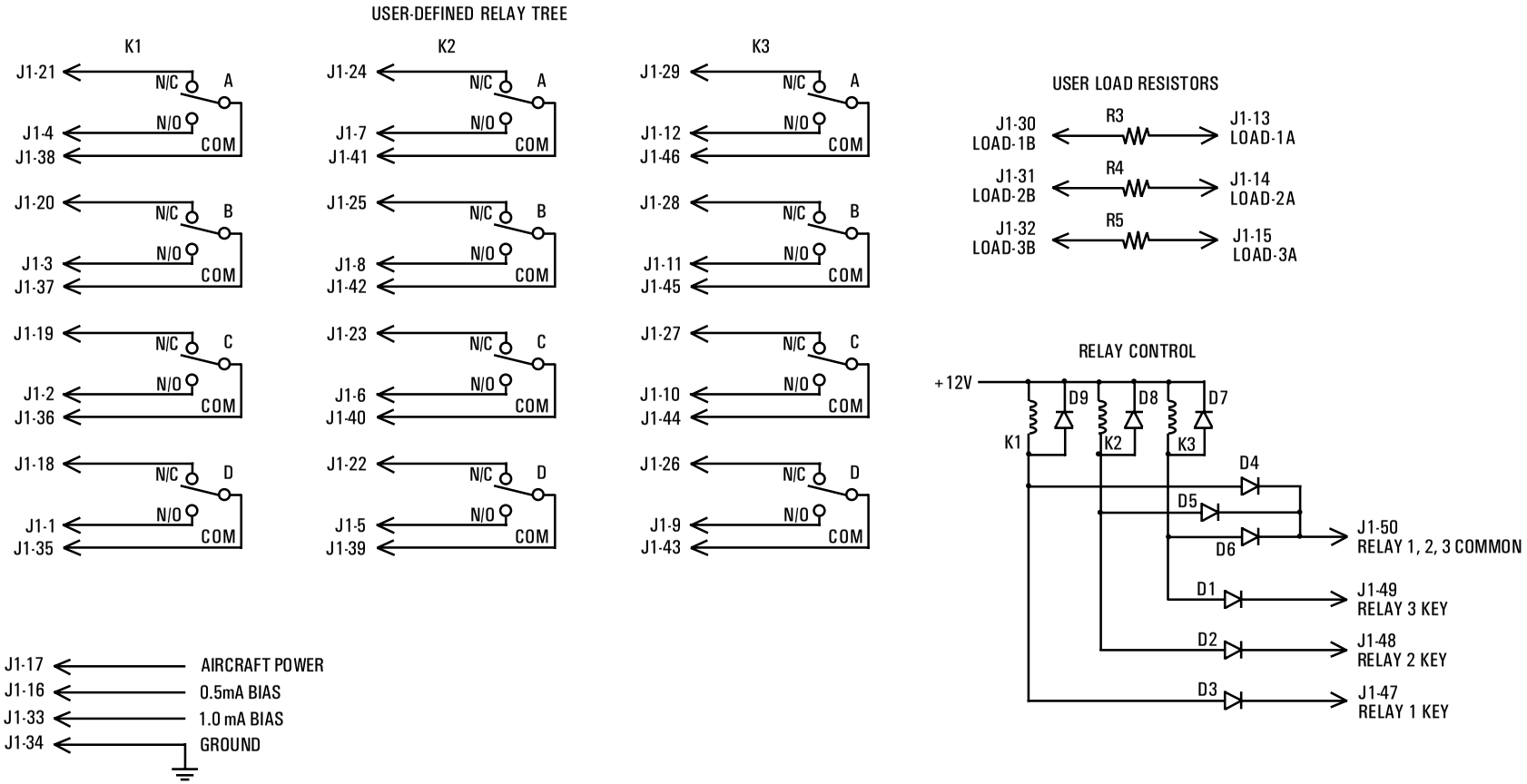
Power up all relevant systems and equipment and test the installed functions as appropriate.

4.3 FLIGHT TESTS

If all system ground checks pass satisfactorily, perform any necessary test in flight, as required, to determine that there are no vibration-related problems or system cross-talk problems.

This manual and any related notes should be appended to the Aircraft Flight Manual for reference.

REV	DESCRIPTION	DATE
NONE	INITIAL RELEASE	07-13-1999

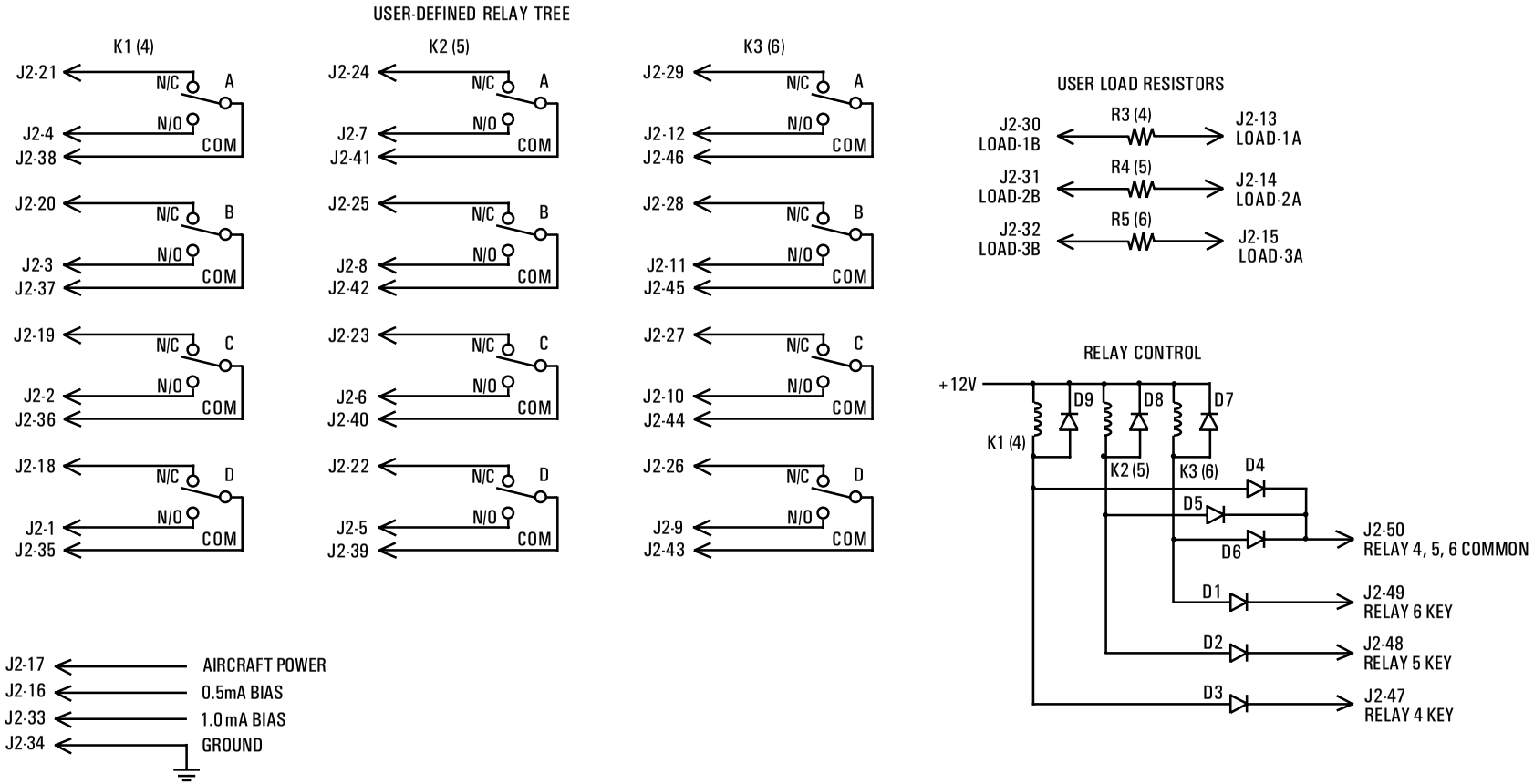


RS-24 N REMOTE SWITCH UNIT
LOWER (J1) SECTION

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

TITLE: SCHEMATIC DIAGRAM, RS-24N	
DWG NO.: RS24NSC1	
DRW BY: MHK	**DATE:** 07-13-1999
CHK BY: WAF	**SHEET:** 1 **OF:** 2

REV	DESCRIPTION	DATE
NONE	INITIAL RELEASE	07-13-1999

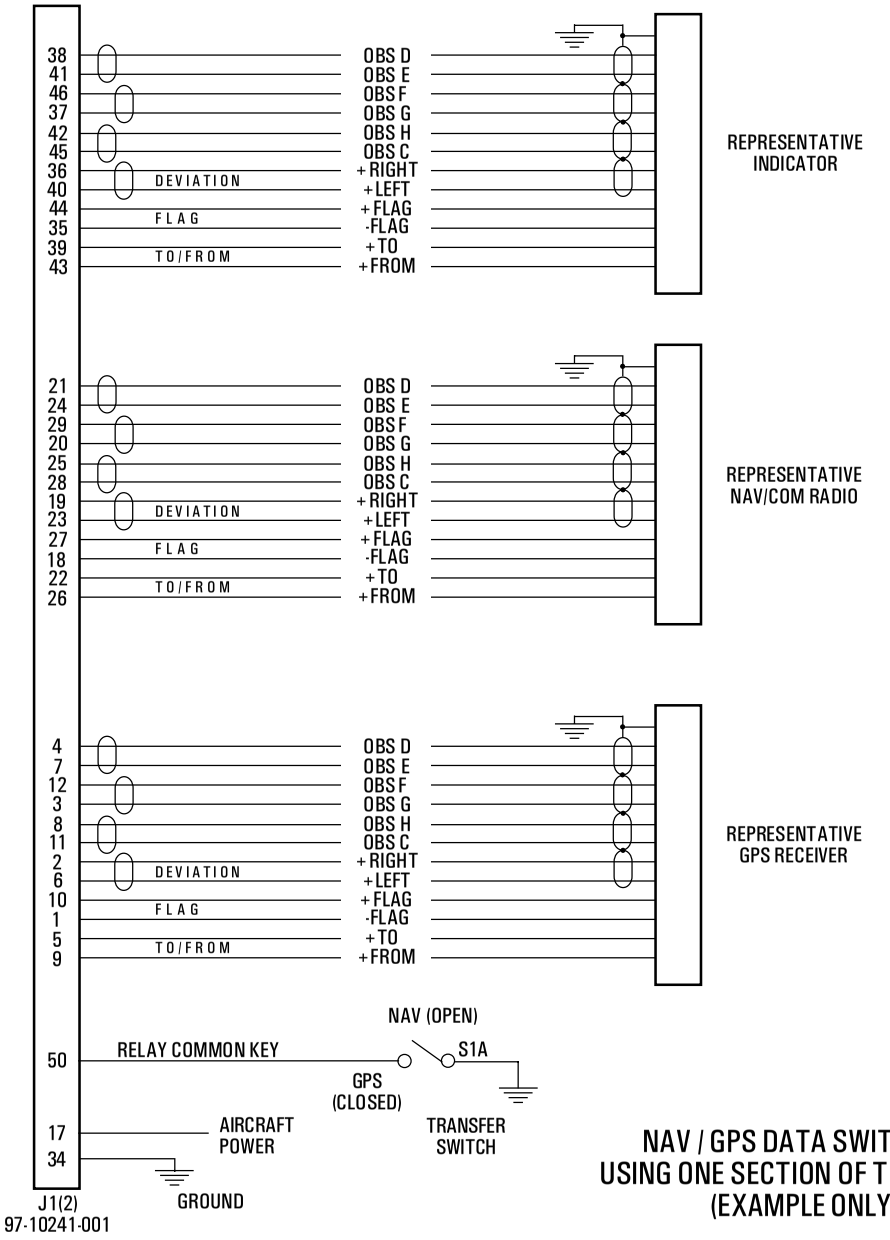


RS-24 N REMOTE SWITCH UNIT
UPPER (J2) SECTION

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

TITLE:	SCHEMATIC DIAGRAM, RS-24N	
DWG NO.:	RS24NSC2	
DRW BY:	MHK	**DATE:** 07-13-1999
CHK BY:	WAF	**SHEET:** 2 **OF:** 2

REV	DESCRIPTION	DATE
NONE	INITIAL RELEASE	07-13-1999



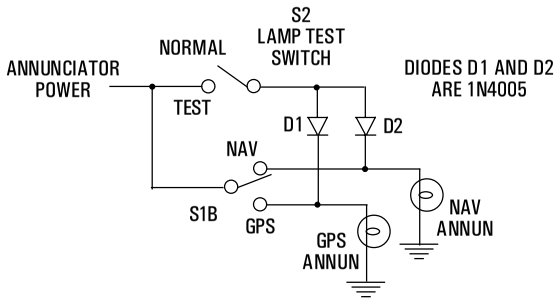
NAV / GPS DATA SWITCHING
USING ONE SECTION OF THE RS-24N
(EXAMPLE ONLY)

NOTES

1. RS-24N 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. TRANSFER SWITCH S1 IS DPDT TOGGLE OR PUSHBUTTON SWITCH. LAMP TEST SWITCH S2 IS SPST MOMENTARY TOGGLE OR PUSHBUTTON SWITCH. RATING SHOULD BE SUFFICIENT TO HANDLE ANY CONNECTED ANNUNCIATORS.
4. THE INDICATOR AND NAV/COM RADIO AND GPS RECEIVER SHOWN ARE REPRESENTATIVE ONLY. REFER TO THE MANUAL FOR THE SPECIFIC UNITS INSTALLED IN THE AIRCRAFT. REFER TO SIGNAL NAMES.

THIS SAMPLE DIAGRAM IS INTENDED AS A BASIS FOR DESIGN ONLY. IT MAY NOT BE APPROPRIATE FOR ANY PARTICULAR INSTALLATION.

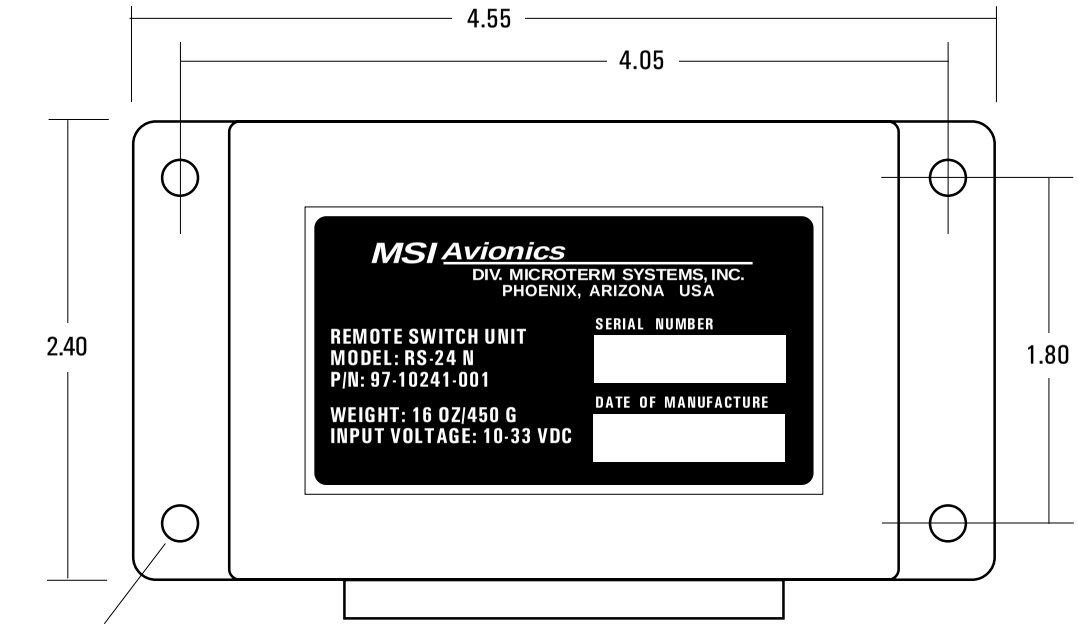
REFER TO APPLICABLE INSTALLATION DOCUMENTS FOR THE EQUIPMENT BEING INSTALLED.

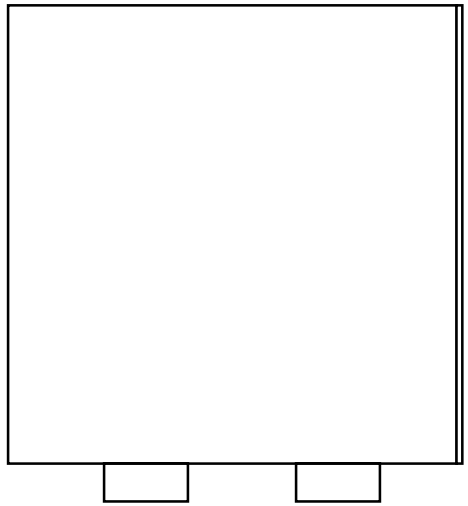


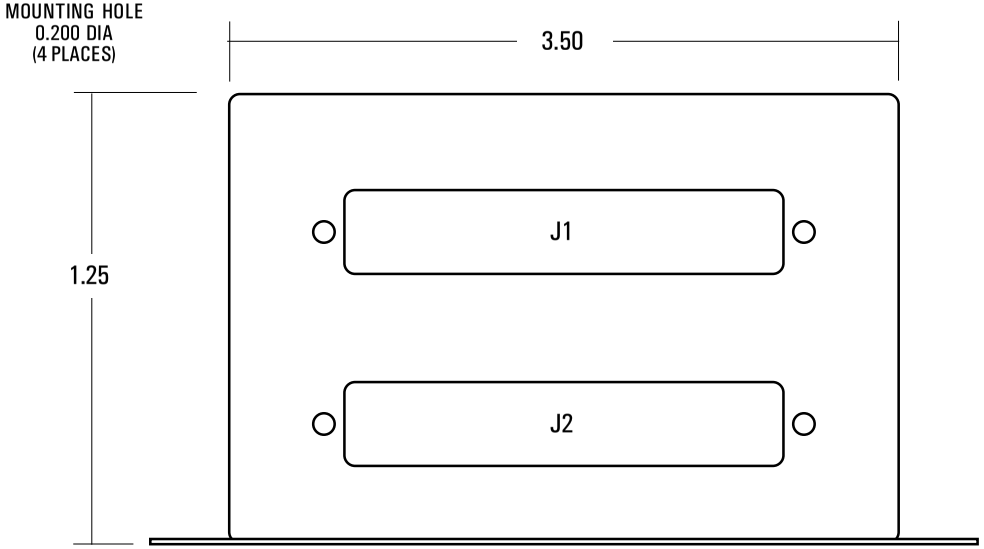
MSI Avionics
DIV. MICROTERM SYSTEMS, INC.
PHOENIX, ARIZONA, USA

TITLE:	SAMPLE INTERCONNECT DIAGRAM, RS-24N		
DWG NO.:	RS24NINT		
DRW BY:	MHK	**DATE:**	07-13-1999
CHK BY:	WAF	**SHEET:**	1 **OF:** 1

REV	DESCRIPTION	DATE
	INITIAL RELEASE	07-13-1999







MSI Avionics DIV. MICROTERM SYSTEMS, INC. PHOENIX, ARIZONA, USA		
TITLE: OUTLINE DRAWING, RS-24N REMOTE SWITCH UNIT		
DWG NO.: RS24NPKG		
DRW BY: WAF	DATE: 07-13-1999	
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

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 97-10241-001 Remote Switch Unit is on condition only. Periodic maintenance of the unit is not required.